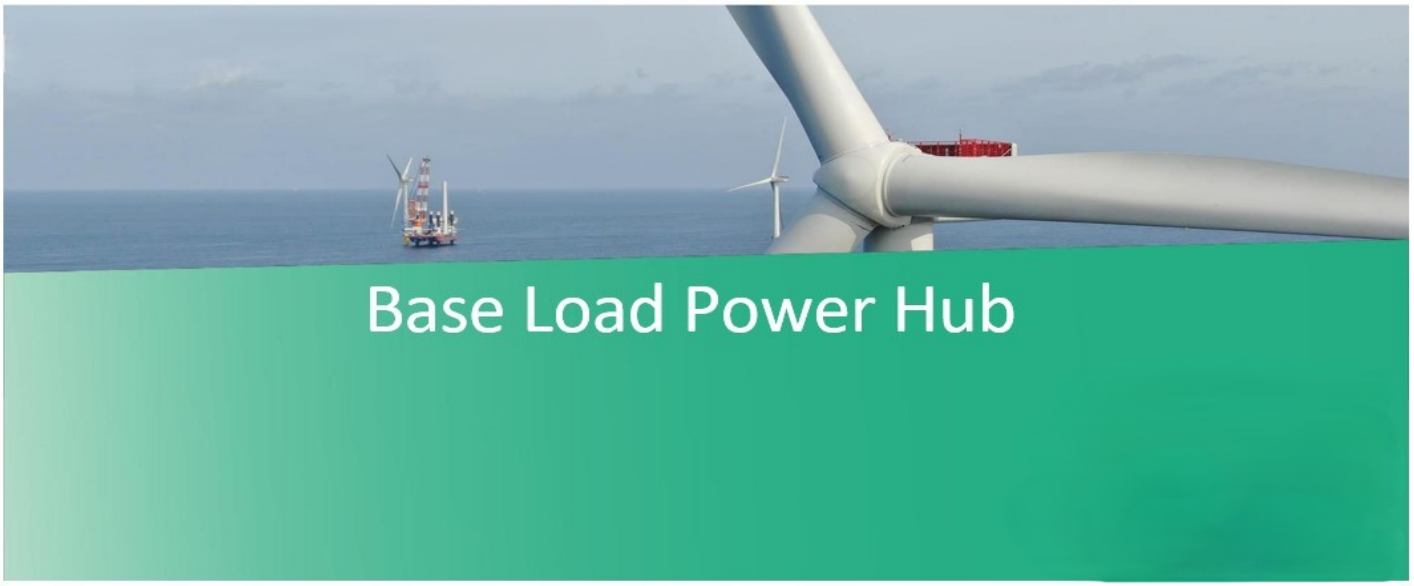
CROSSWIND

ROSETTI MARINO

PROVERUS

PROJECT **123A90 - HOLLANDSE KUST NOORD WIND PARK**
BLPH Project



COMMISSIONING DOSSIER (ONSHORE)

SYSTEM	85 Battery Energy and Storage System
SUBSYSTEM	85-00 BESS Package (A-85000)

CROSSWIND	123A90 - HOLLANDSE KUST NOORD WIND PARK BLPH Project COMMISSIONING DOSSIER INDEX	ROSETTI MARINO

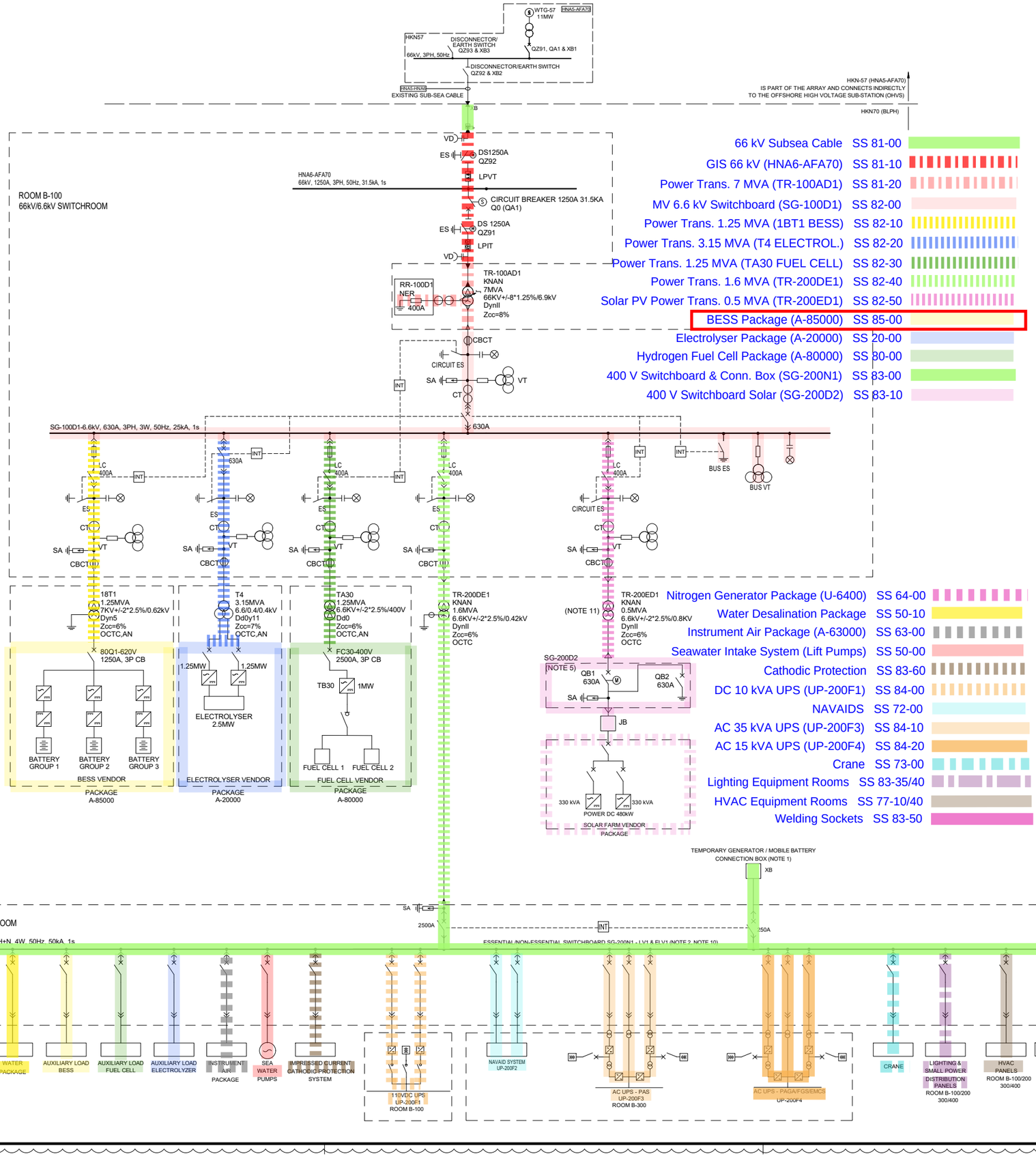
Sub System N°:	85-00	Tick as appropriate	ONSHORE	OK
Description:	BESS Package (A-85000)		OFFSHORE	

1. *SUB-SYSTEM DEFINITION*	OK
1.1 Sub-System Description / Boundary Limit Drawings	
2. *READY FOR OPERATION CERTIFICATE*	OK
2.1 Achievement Of Ready for Operation Certificate (RFO)	
2.2 Exception Punch Lists (per discipline)	
2.3 "As-Commissioned" P&ID's / SLD's / D&ID's / C&E's	
3. *CONSOLIDATED PUNCH LISTS*	OK
3.1 Cleared and Residual Items (sorted by discipline)	
4. *FUNCTIONAL TESTS SHEETS*	OK
4.1 Electrical functional test sheets index	
4.2 Electrical "As-Commissioned" interconnection diagrams	
4.3 Instrumentation Functional Test Sheets Index	
4.4 Instrumentation "As-Commissioned" interconnection diagrams	
4.5 Telecommunication Functional Test Sheets Index	
4.6 Telecommunication "As-Commissioned" I.C.D. / TSLD's	
5. *SITE / OPERATIONAL:*	OK
5.1 Operational Test Procedure	
5.2 Operational Test Certificates	
6. *PIPING AND VESSEL PREPARATION*	NA
6.1 Final Mechanical / Vessel Inspection Checks Index	
6.2 Leak Test / Drying / Inerting Test Sheets Index	
6.3 Chemical Loading & First Fill records Index	
6.4 Chemical Cleaning Reports and Records Index	
6.5 Lubrication Schedule	
7. *VENDORS*	OK
7.1 Vendor Package Summary Index	
7.2 SAT Procedure with associated punch list and reference (Front Page)	
7.3 Vendor Spares & Special Tools lists references	
7.4 Vendor Data / Operations / Maintenance Manuals References	
8. *LIST OF MODIFICATIONS*	NA
8.1 List of changes initiated during the WORKSITE Commissioning phase pertaining to the relevant Sub-System will be incorporated in this section with relevant references (with location and position of blinds/spades, isolation LO & LC valves, list of electrical isolation status, and remaining inhibits and overrides)	
9. *SUPPORTING DOCUMENTS*	NA
9.1 Other supporting documents (as applicable)	

	Contractor Commissioning Site Leader	Company Commissioning Site Leader
Name	Anthony Ivesson	GERRY McCANN
Date	09-July-2025	10/7/2025
Signature	A. Ivesson	

Section 1 SUB-SYSTEM DEFINITION

DRAWING NO. 123A90-DDL-EL-DG-20158 REV. 01



SYMBOL LEGEND:

- VOLTAGE DETECTOR
- EARTHING SWITCH DISCONNECTOR
- MOTORIZED EARTHING SWITCH
- CIRCUIT BREAKER
- FUSE
- CONTACTOR
- THREE-PHASE TRANSFORMER WITH TAP CHANGER
- THREE-PHASE TRANSFORMER
- CURRENT TRANSFORMER
- THREE-PHASE TRANSFORMER, WITH THREE WINDINGS
- NEUTRAL EARTHING RESISTOR
- SURGE ARRESTER
- CORE BALANCE CURRENT TRANSFORMER
- SURGE ARRESTOR FOR T-CONNECTOR (N.1 FOR EACH PHASE)
- VOLTAGE & CURRENT TRANSFORMER (3Ø X 2) (LPIT TYPE)
- VOLTAGE TRANSFORMER (3Ø X 2) (LPVT TYPE)
- VOLTAGE TRANSFORMER
- CABLE BOX
- T-CONNECTOR CABLE TERMINATION
- CABLE AIR TERMINATION

OLTC	= ON LOAD TAP CHANGER
OCTC	= OPEN CIRCUIT TAP CHANGER
KNAN	= NON-MINERAL OIL NATURAL AIR COOLED
AN	= AIR NATURAL
XB	= CABLE BOX
QZ	= DISCONNECT SWITCH & EARTH SWITCH
QA	= CIRCUIT BREAKER
LC	= LATCHED FUSED CONTACTOR (400A)
INT	= INTERLOCK SYSTEM
SA	= SURGE ARRESTER
CBCT	= CORE BALANCE CURRENT TRANSFORMER
ES	=EARTHING SWITCH
VD	=VOLTAGE DETECTOR
LCP	=LOCAL CONTROL PANEL
LPVT	=LOW POWER VOLTAGE TRANSFORMER
LPCT	=LOW POWER CURRENT TRANSFORMER
LPIT	=LOW POWER INSTRUMENT TRANSFORMER
JB	=JUNCTION BOX

NOTES:

1. TEMPORARY POWER SUPPLY CONNECTION BOX LOCATED ON OUTSIDE WALL OF LV SWITCHROOM / CONTAINER.
2. LOAD DEFINITION 'ESSENTIAL' / 'NON-ESSENTIAL' IS SHOWN IN THE LOAD LIST. THE CCS, EMCS AND 'SMART' SWITCHGEAR WILL OPEN / CLOSE CIRCUIT BREAKERS AS REQUIRED.
3. A COMBINED CCS/EMCS SYSTEM COMPRISES A MICROPROCESSOR BASED SYSTEM, ASSOCIATED SOFTWARE AND REQUIRED PERIPHERALS FOR MONITORING AND CONTROLLING OF ELECTRICAL POWER NETWORK. ALL ELECTRICAL EQUIPMENT AND PACKAGE UNITS SHALL BE CONNECTED TO THE CENTRAL CONTROL SYSTEM .
4. IMPRESSED CURRENT CATHODIC PROTECTION SYSTEM SUPPLIED BY COMPANY.
5. THE SOLAR FARM IN-FEED POWER CIRCUIT BREAKERS PANEL IS LOCATED INSIDE THE LV SWITCHGEAR ROOM B-200.
6. DELETED.
7. DELETED.
8. DELETED.
9. CROSSWIND SHALL BE ABLE TO CONTROL THE BLPH 66KV MOTORISED CIRCUIT BREAKER Q0 (QA1) & MOTORISED ELECTRICAL DISCONNECTOR / EARTH SWITCH (QZ92, TYPE B) USING THEIR 'HV-SCADA' SYSTEM. THIS BACK-UP / REDUNDANT CONTROL SHALL BE ADDITIONAL TO THAT PROVIDED BY THE CCS AND BE OF HIGHER PRIORITY OVER A SEPARATE FIBRE OPTIC CABLE (FOC). THE CCS OPERATOR AND 'HV-SCADA' SHALL BOTH BE KEPT FULLY AWARE OF EQUIPMENT STATUS AT ALL TIMES. INTERTRIPPING, INHIBITS & INTERLOCKING FOR BLPH 66KV EQUIPMENT SHALL BE AS PER THE WIND FARM.
10. THE LOADS IN THE LOW VOLTAGE SWITCHGEAR AND THE CURRENT VALUES OF THE CIRCUIT BREAKERS ARE ONLY INDICATIVE.
11. NEUTRAL POINT OF TR-200ED1 SHALL NOT BE GROUNDED AS REQUIRED BY SOLAR FARM SUPPLIER IN 123A90-PML-PM-TQ-00040.

REFERENCES:

1. 123A90-DDL-EL-DG-20014 ELECTRICAL CONTROL, PROTECTION AND METERING DIAGRAMS
2. 123A90-DDL-EL-DG-20015 ELECTRICAL SINGLE LINE DIAGRAM 6.6kV SYSTEMS
3. 123A90-DDL-EL-DG-20159 ELECTRICAL SINGLE LINE DIAGRAMS LV SYSTEM
4. 123A90-DDL-EL-DG-20160 ELECTRICAL SINGLE LINE DIAGRAMS AC UPS SYSTEMS
5. 123A90-DDL-EL-DG-20161 ELECTRICAL SINGLE LINE DIAGRAMS DC UPS SYSTEMS
6. 123A90-DDL-EL-DG-20185 ELECTRICAL SINGLE LINE DIAGRAM HV SYSTEMS
7. 123A90-DDL-EL-DL-20104 ELECTRICAL EQUIPMENT LAYOUT - HV SWITCHROOM
8. 123A90-DDL-EL-DL-20105 ELECTRICAL EQUIPMENT LAYOUT - LV SWITCHROOM
9. 123A90-DDL-EL-LIS-20016 ELECTRICAL LOAD LIST and BALANCE -CCS MODE CHARGING-
10. 123A90-DDL-EL-RE-20152 ELECTRICAL EQUIPMENT SIZING CCALCULATION REPORT
11. 123A90-DDL-EL-RE-20170 ELECTRICAL SYSTEM STUDY REPORT - LOAD FLOW
12. 123A90-DDL-EL-RE-20171 ELECTRICAL SYSTEM STUDY REPORT - SHORT CIRCUIT
13. 123A90-DDL-EL-RE-20172 ELECTRICAL SYSTEM STUDY REPORT - ARC FLASH ENERGY CALCULATION
14. 123A90-DDL-EL-RE-20173 ELECTRICAL SYSTEM STUDY REPORT - HARMONICS

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
01	26/03/2024	GPA	LMA/AMA	LMA/MDO	ISSUE FOR REVIEW (IFR)
00	02/11/2023	DSF	CB/AMA	OYFO/MDO	ISSUE FOR REVIEW (IFR)

CROSSWIND

ROSETTI MARINO

TITLE :

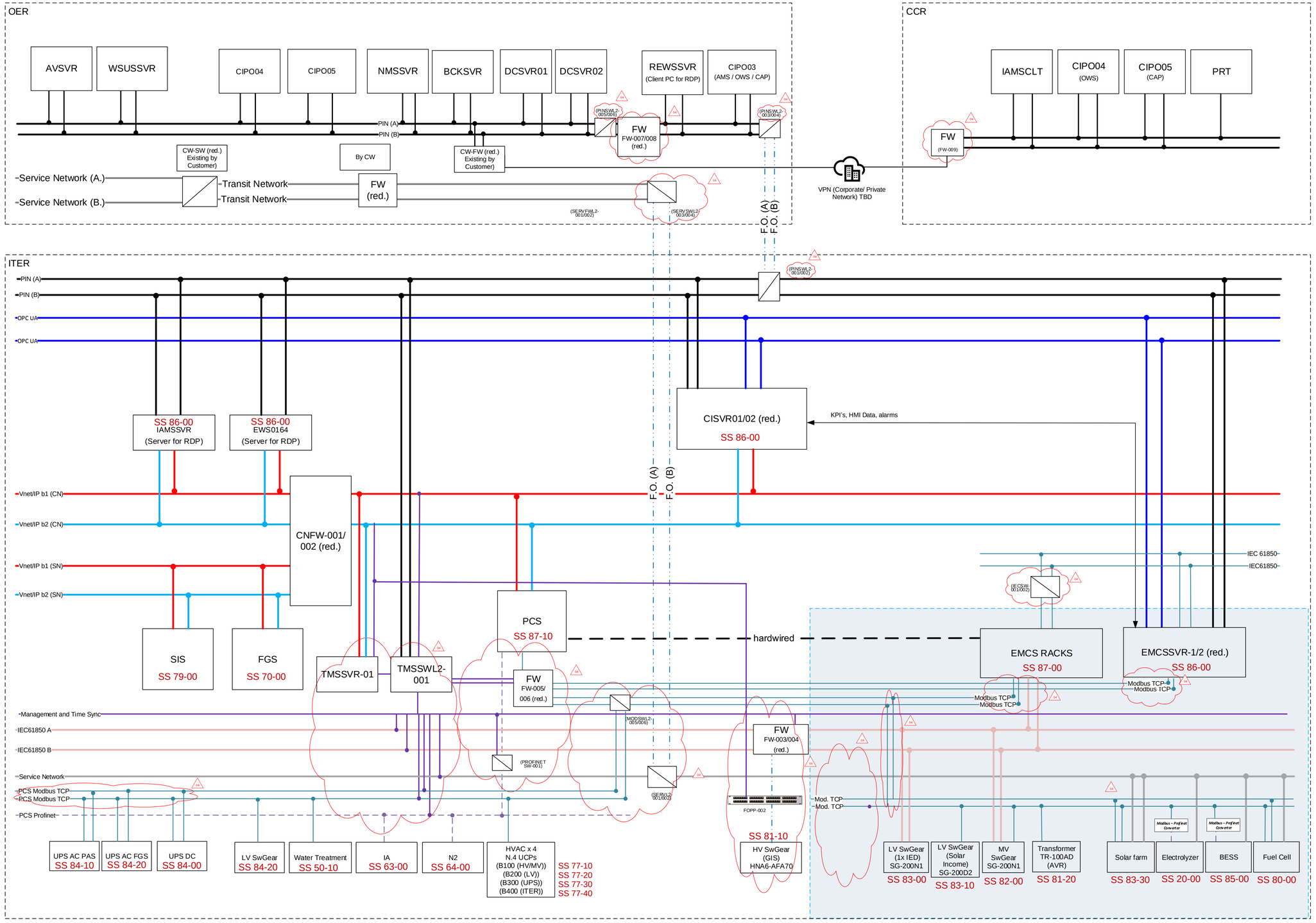
OVERALL/KEY SINGLE LINE DIAGRAM

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK			SCALE N/A
DRAWN GPA	CHECKED LMA/AMA	APPROVED LMA/MDO	DATE 26/03/2023
A1	DRAWING NO. 123A90-DDL-EL-DG-20158	SHEET 001	REV. 01

01

File Name : 123A90-DDL-EL-DG-20158_REV01.dwg

CROSSWIND BLPH PROJECT - SYSTEM BLOCK DIAGRAM



AMS	: Alarm Management System	FCS	: Field Control Station
AV	: Anti-virus	FGS	: Fire & Gas System
BCK	: Backup Server	FO	: Fiber Optic
BESS	: Battery Energy Storage System	FOPP	: Fiber Optic Patch Panel (by others)
BLPH	: Base Load Power Hub	FTA	: Field Termination Assembly
CAP	: Critical Alarm Panel	HIST	: Historian
CCR	: Central Control Room	HKN	: Hollandse Kust Noord
CI	: Collaborative Infomation	IAMS	: Instrument Asset Management System
CN	: Control Network	ITER	: Instrument & Telecom Equipment Room
DC	: Domain Controller	LHVS	: Land High Voltage Station
DMZ	: De-militarized Zone	MCC	: Motor Control Center
ESB	: IO communication bus	MODB	: Modbus
EWS	: Engineering Work Station	MQTT	: Message Queuing Telemetry Transport
FC	: Field Communication (Vnet/IP)	NMS	: Network Management System
OER	: Onshore Equipment Room		
OHVS	: Offshore High Voltage Station		
OWS	: Operator Work Station		
PIN	: Plant Information Network		
PKG	: Package		
RDP	: Remote Desktop Protocol		
SCS	: Safety Control Station		
SIS	: Safety Instrumented System		
SN	: Safety Network		
SW	: Switch		
UCP	: Unit Control Panel (3rd party systems)		
VM	: Virtual Machine		
Vnet/IP	: Yokogawa's Control network		
WSUS	: Windows Security Update Services		

LEGEND:

- PIN (Plant Information Network)
- Vnet/IP BUS 1 PCS
- Vnet/IP BUS 2 PCS
- Vnet/IP BUS 1 SIS/FGS
- Vnet/IP BUS 2 SIS/FGS
- ESB bus connection
- IEC61850 connection
- OPC UA connection
- Service Network connection
- Modbus TCP connection
- Profinet (non redundant)
- Fiber Optic Patch Cords
- Fiber Optic connection (core by Crosswind)
- Fiber Optic backbone (by Crosswind)
- System Cable connection
- Management and Time sync.

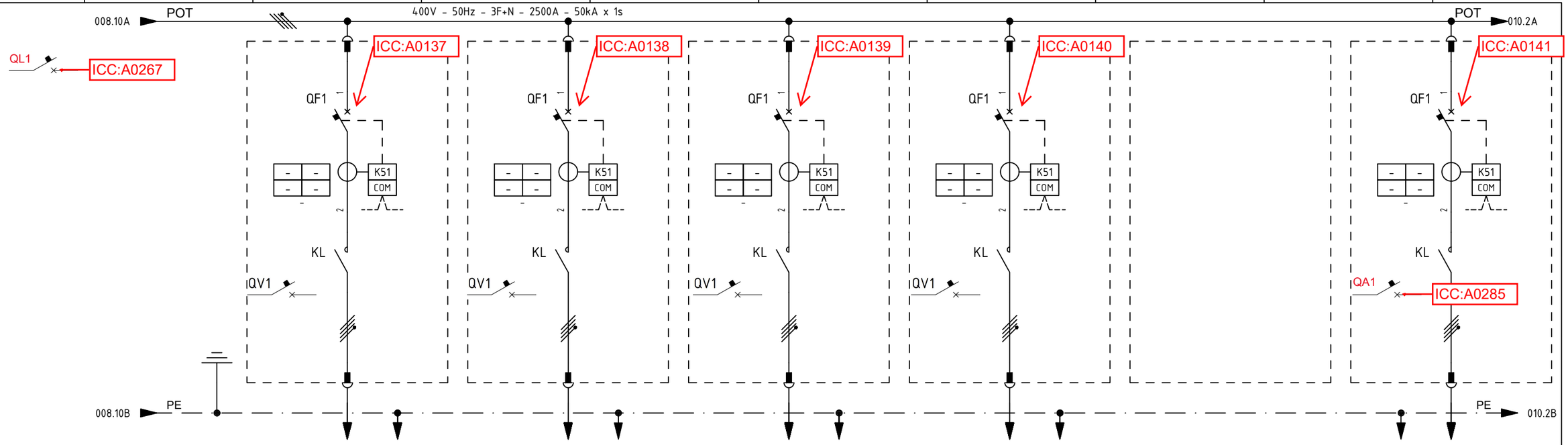
Note 1 : Exact assignment of Servers per cabinet to be defined in cabinet General Arrangement Drawing.
Note 2 : For IP Addresses refer to 1724000594-IN-RE-00043 Cyber Security Settings
Note 3 : All Network Components will be installed in Network Cabinet.
Note 4 : Supply of Console Desk in CCR is in Customer Scope.
Note 5 : All Network Switches and Firewall is configured in VLAN.
Note 6 : Intermediate FO Connection between HNA5 and OER Intentionally not shown.

Zone-1	: PCS Control Zone	Zone-2	: Safety Control Zone
Zone-3	: PCS Zone	Zone-4	: Application Server Facility Zone
Zone-5	: Security Management Zone-1	Zone-6	: Security Management Zone-2
Zone-7	: Demilitirized Zone	Zone-8	: Croswind Zone
Zone-9	: Service Network Zone	Zone-10	: Application Server Facility Zone-OD
Zone-11	: Third Party System Zone		: Out of Scope

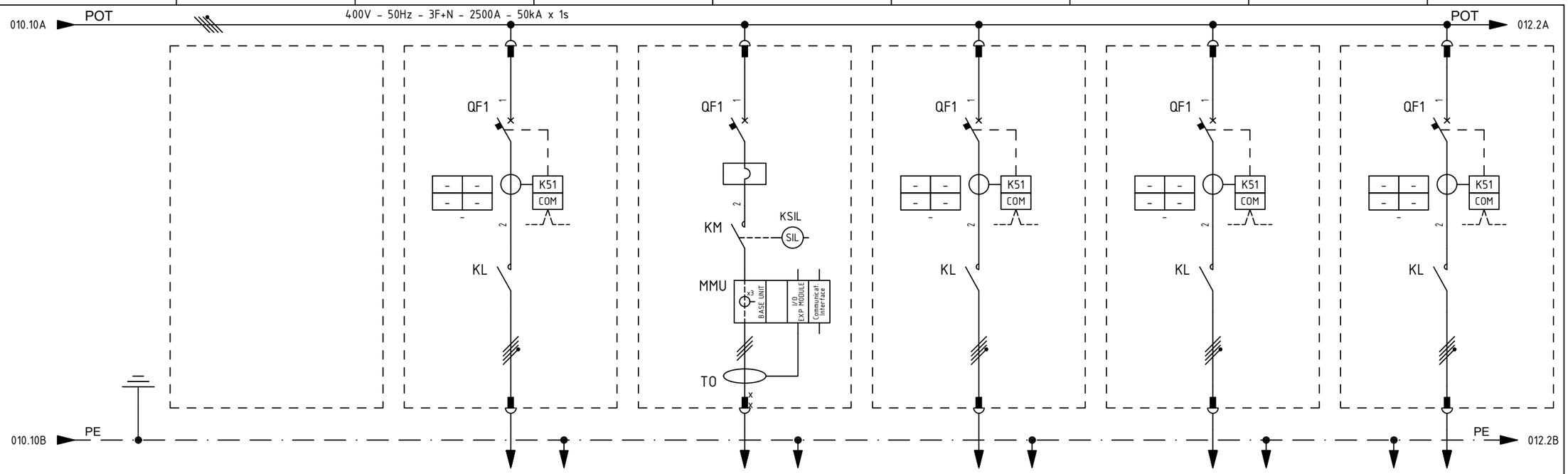
REV	DWG BY	CHK BY	APP BY	DATE
04	SKR	MP/AB	SC	12-Feb-25
03	SKR	MP/AB	SC	26-Aug-24
02	SKR	MP/AB	SC	28-Jun-24
01	SKR	MP/AB	SC	24-May-24
00	SKR	AB	SC	23-Apr-24

Doc No : 1724000594-IN-DD-00015
Doc Name : System Architecture

ROSETTI MARINO
HOLLANDSE KUST NOORD WIND PART Project
CROSSWIND
YOKOGAWA


008.10A
POT
400V - 50Hz - 3F+N - 2500A - 50kA x 1s
POT
010.2A
QL1
ICC:A0267
ICC:A0137
ICC:A0138
ICC:A0139
ICC:A0140
ICC:A0141
QF1
K51
COM
KL
QV1
QA1
ICC:A0285
008.10B
PE
PE
010.2B

| | | |



ITEM				K-63001-B		PM-50001 B		CP-850E1		CP-850E2		-	
UTILITY			2	INSTRUMENTS AIR PACKAGE 01B		SEA WATER PUMP B		BESS LV1 CABINET (+DISTR 1)		BESS LV2 CABINET (+DISTR 2)		SPARE	
COLUMN/CUBICLE			3	A5 / +08		A6 / +01		A6 / +02		A6 / +03		A6 / +04	
RATED POWER | RATED CURRENT			4/5	68.75 kW	111.24 A	6.1 kW	11.0 A	11.28 kW	18.09 A	11.28 kW	18.09 A	- kW	- A
TYPICAL FUNCTIONAL			6	LK2-160		M1-6		LK1-40		LK1-40		LK1-40	
CIRCUIT BREAKER (ABB)	TYPE		7	XT4S - 250		XT2S - 160		XT2S - 160		XT2S - 160		XT2S - 160	
	VERSION		8	4P - FIXED		3P - FIXED		4P - FIXED		4P - FIXED		4P - FIXED	
	TRIP UNITS		9	EKIP HI TOUCH LSIG (In = 160A)		MA (In = 20A)		EKIP HI TOUCH LSIG (In = 40A)		EKIP HI TOUCH LSIG (In = 40A)		EKIP HI TOUCH LSIG (In = 40A)	
	Icu	KA	10	50 kA		-		50 kA		50 kA		50 kA	
OVERLOAD	L	Range A	11	(0.4 - 1) x In		-		(0.4 - 1) x In		(0.4 - 1) x In		(0.4 - 1) x In	
		Range t	12	k/I^2		-		k/I^2		k/I^2		k/I^2	
SEL. SHORT-CIRCUIT	S	Range A	13	(0.6 - 10) x In		-		(0.6 - 10) x In		(0.6 - 10) x In		(0.6 - 10) x In	
		Range t	14	0.05 - 0.4 sec / k/I^2		-		0.05 - 0,4 sec / k/I^2		0.05 - 0,4 sec / k/I^2		0.05 - 0,4 sec / k/I^2	
INST. SHORT-CIRCUIT	I	Range A	15	(1.5 - 15) x In		(6 - 14) x I		(1.5 - 15) x In		(1.5 - 15) x In		(1.5 - 15) x In	
		Range t	16	instantaneous		<= 0.02 sec		instantaneous		instantaneous		instantaneous	
EARTH FAULT PROTECTION	G	Range A	17	(0.1 - 1) x In		-		(0.1 - 1) x In		(0.1 - 1) x In		(0.1 - 1) x In	
		Range t	18	t=k / t=k/I^2		-		t=k / t=k/I^2		t=k / t=k/I^2		t=k / t=k/I^2	
CONTACTOR (ABB)			19	AF190-40-11-13 (275A-AC1); 100-250 VAC/DC		AF38-30-00-13 (18.5 kW - AC3) - 100-250Vac/dc		AF40-40-00-13 (70A-AC1); 100-250VAC/DC		AF40-40-00-13 (70A-AC1); 100-250VAC/DC		AF40-40-00-13 (70A-AC1); 100-250VAC/DC	
THERMAL OVERLOAD RELAY (ABB)			20	-		UMC100.3 UC (0.24 - 63A)		-		-		-	
SURGE ARRESTER (DEHN)			21	-		-		-		-		-	
TOROIDAL CURRENT TRANSFORMER (FRER)			22	-		-		-		-		-	
FUSE HOLDER (ITALWEBER)			23	SUBSISTEM 63.00		SUBSISTEM 50.00		SUBSISTEM 85.00		SUBSISTEM 85.00		SUBSISTEM 83.00	
INDIRECT PROTECTION (ABB)			24										
VOLTMETER			25										
CURRENT TRANSFORMER FOR MEASURE (FRER)	TYPE		26	-		-		-		-		-	
	PERFORMANCE/CLASS		27	-		-		-		-		-	
VOLTAGE TRANSFORMER FOR MEASURE (FRER)	TYPE		28	-		-		-		-		-	
	PERFORMANCE/CLASS		29	-		-		-		-		-	
LOCK-OUT RELAY (-)			30	-		-		-		-		-	
POWER CONDUCTOR		mmq	31	5G70		4G4		4 x (1 x 10)		4 x (1 x 10)		-	

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
3	08/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
2	03/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
1	28/03/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
0	15/02/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

DWG n° : 231298/SD/11
Item n° : PF1002983/26

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"

SINGLE LINE DIAGRAM

Single Line Drawing

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00011

SHEET 011

REV. 03

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00011 Rev. 03

Section 2 READY FOR OPERATION

Section 2.1 Achievement Of Ready for Operation Certificate (RFO)

ROSETTI MARINO

123A90 - HOLLANDSE KUST NOORD WIND PARK
BLPH Project

CROSSWIND

Ready For Operation (RFO) Certificate

COMPLETE	●	PARTIAL	

Revision:	2		Issued on:	2025-06-30	
System:	85	/	Battery Energy and Storage System		
SubSystem:	85-00	/	BESS Package (A-85000)		

We hereby confirm that all Mechanical Completion (MC) and Pre-Commissioning/Commissioning (Pre-Comm./Comm.) activities for the above-mentioned System/Sub-System have been successfully completed in accordance with project specifications, relevant standards and contractual requirements. The System/Sub-System has been tested and verified to ensure readiness for operation. Issuance of this Certificate shall not release CONTRACTOR from any of his obligations, responsibilities or liabilities under the CONTRACT.

Mechanical Completion: All required MC activities have been completed and approved
Pre-Commissioning & Commissioning: All required Pre-Comm. and Comm. activities and OTPs have been completed and approved (Status Index attached)
Punch List: All Punch items categorized as A and B have been cleared (PL report attached)
Documentation: As-built documentation and Commissioning dossier has been completed, reviewed and approved

PUNCH LIST	PENDING POINTS
Note: All Category "A" and "B" Items must be cleared prior to issuance of the Ready For Operation (RFO) Certificate	B: 1

REMARKS:

	CONTRACTOR Commissioning Manager	**COMPANY** Commissioning Lead
Name	Anthony Iveson	Martin Taylor
Date	2025-06-30	2025-07-09
Signature	PROVERLIS Digitaly signed by Anthony Iveson 2025-06-30T14:40:47.037Z	PROVERLIS Digitaly signed by Martin Taylor 2025-07-09T10:10:40.884Z

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

STATUS INDEX DETAIL

Filtered on subsystem: 85-00 & process: COMM

Electrical	85-00 BESS Package (A-85000)						
ITEM		TASK					
Code	Description	Location	Code	Form	Progress	Date	Certificate
A4/+04-QF1	AUX BESS PCS CABINET - A4/+04-QF1	ONSHORE	C10002952	FP00	100	2024-12-07	RFO 2
		ONSHORE	C10002953	FTR-2	100	2024-09-20	RFO 2
		ONSHORE	C10002954	FTR-6	100	2024-10-03	RFO 2
		ONSHORE	C10003025	FTR-5	100	2025-05-22	RFO 2
A6/+02-QF1	AUX BESS LV1 CABINET - A6/+02-QF1	ONSHORE	C10002955	FP00	100	2024-12-07	RFO 2
		ONSHORE	C10002956	FTR-2	100	2024-09-20	RFO 2
		ONSHORE	C10002957	FTR-6	100	2024-10-03	RFO 2
		ONSHORE	C10003026	FTR-5	100	2025-05-22	RFO 2
A6/+03-QF1	AUX BESS LV2 CABINET - A6/+03-QF1	ONSHORE	C10002958	FP00	100	2024-12-07	RFO 2
		ONSHORE	C10002959	FTR-2	100	2024-09-20	RFO 2
		ONSHORE	C10002960	FTR-6	100	2024-10-03	RFO 2
		ONSHORE	C10003027	FTR-5	100	2025-05-22	RFO 2

Project CROSSWIND

STATUS INDEX DETAIL

Filtered on subsystem: 85-00 & process: COMM

Instrumental	85-00 BESS Package (A-85000)						
ITEM		TASK					
Code	Description	Location	Code	Form	Progress	Date	Certificate
85-XA-001	A-85000 BESS PKG confirmed gas alarm	ONSHORE	C10004484	FJ01D	100	2025-03-03	RFO 2
85-XA-002	A-85000 BESS PKG confirmed fire alarm	ONSHORE	C10004485	FJ01D	100	2025-03-03	RFO 2
85-XA-003	A-85000 BESS PKG UCP fault	ONSHORE	C10004486	FJ01D	100	2025-03-03	RFO 2
85-XA-004	A-85000 BESS PKG UCP thermal run away	ONSHORE	C10004487	FJ01D	100	2025-03-03	RFO 2
85-XS-001	SHUT-DOWN A-85000 BESS PKG	ONSHORE	C10004488	FJ01D	100	2025-03-03	RFO 2
A-85000	BESS	ONSHORE	C10004887	FJ05	100	2025-03-26	RFO 2

Project CROSSWIND

STATUS INDEX DETAIL

Filtered on subsystem: 85-00 & process: COMM

Miscellaneous	85-00 BESS Package (A-85000)						
ITEM		TASK					
Code	Description	Location	Code	Form	Progress	Date	Certificate
123A90-PML-COM-PRO-03063	OTP – BESS (CPI)	ONSHORE	C10004630	5300	100	2025-06-28	RFO 2

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM	85	Battery Energy and Storage System
SUBSYSTEM	85-00	BESS Package (A-85000)

Electrical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000814	A	83014-CEL C10000532	The cable termination is not complete . (side BESS LV1 CABINET)	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000821	A	83015-CEL C10000533	The cable termination is not complete	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000828	A	82006-CEC C10002321	Cable termination is not complete with appropriate pin	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000833	A	82006-CEC C10002321	Missing the Thermo-shrink of on the final destination cable. (see document 123A90-DDL-EL-DD-20090 sh.8)	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000838	A	82006-CEC C10002321	Cable termination is not complete with appropriate pin	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000839	A	82006-CEC C10002321	Missing the Thermo-shrink of on the final destination cable. (see document 123A90-DDL-EL-DD-20090 sh.8)	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000844	A	85001-CEC C10002325	Cable termination is not complete with appropriate pin	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000845	A	85001-CEC C10002325	Missing the Thermo-shrink of on the final destination cable. BESS A-85000 (see document 123A90-DDL-EL-DD-20090 sh.8)	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000849	A	85001-CEC C10002325	Missing the Thermo-shrink of on the cores. restore the mechanical protection of the cable (see document 123A90-DDL-EL-DD-20090 sh.8)	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM 85 Battery Energy and Storage System

SUBSYSTEM 85-00 BESS Package (A-85000)

Electrical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000852	A	85001-CEC C10002325	Missing the Thermo-shrink of on the final destination cable. BESS A-85000 (see document 123A90-DDL-EL-DD-20090 sh.8)	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000854	A	85001-CEC C10002325	Cable termination is not complete with appropriate pin. BESS A-85000	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000806	B	83011-CEL C10000522	Core identification tags are wrong . Cabinet side SG-200N1 . (see document 123A90-DDL-IN-DG-40016 sh.3)	.		APolo 2024-11-23	2025-02-15	AAndreani 2025-02-15	2025-02-15
C30000807	B	83011-CEL C10000522	Missing plastic cable tag inside BESS cabinet CP-850E3.	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	2025-04-10
C30000808	B	83011-CEL C10000522	Core identification tags are missing inside BESS cabinet CP-850E3. (see document 123A90-DDL-IN-DG-40016 sh.3)	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30000809	B	83011-CEL C10000522	Documentation: document 123A90-DDL-EL-DG-20149 sh.22 does not report what was installed in the field (CP-850E3).	.		APolo 2024-11-23	2024-12-27	Ecarotenuto 2024-12-27	2024-12-27
C30000810	B	83011-CEL C10000522	The cable termination is not complete. (side BESS PCS CABINET)	.		APolo 2024-11-23	2025-02-04	APolo 2025-02-04	2025-02-04
C30000813	B	83014-CEL C10000532	Core identification tags are wrong cabinet side SG-200N1. (see document 123A90-DDL-IN-DG-40016 sh.3)	.		APolo 2024-11-23	2025-02-15	AAndreani 2025-02-15	2025-02-15
C30000815	B	83014-CEL C10000532	Missing cable tag by BESS LV1 CABINET side	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM	85	Battery Energy and Storage System
SUBSYSTEM	85-00	BESS Package (A-85000)

Electrical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000816	B	83014-CEL C10000532	Missing core identification tags side BESS LV1 . (see document 123A90-DDL-EL-DD-20092 sh.7-8)	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30000817	B	83011-CEL C10000522	The cable is not supported and fixed to the rack (inside and outside BESS panel)	.		APolo 2024-11-23	2025-02-04	APolo 2025-02-04	2025-02-04
C30000819	B	83014-CEL C10000532	Documentation: document 123A90-DDL-EL-DG-20149 sh.22 does not report what was installed in the field (CP-850E1).	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30000820	B	83015-CEL C10000533	Core identification tags are wrong cabinet side SG-200N1. (see document 123A90-DDL-IN-DG-40016 sh.3)	.		APolo 2024-11-23	2025-02-15	AAndreani 2025-02-15	2025-02-15
C30000822	B	83015-CEL C10000533	Missing cable tag by BESS LV2 CABINET side	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30000823	B	83015-CEL C10000533	Missing core identification tag by cabinet BESS LV2 side . (see document 123A90-DDL-EL-DD-20092 sh.7-8)	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30000824	B	83015-CEL C10000533	The cable is not supported and fixed to the rack (inside and outside BESS panel)	.		APolo 2024-11-23	2025-02-04	APolo 2025-02-04	2025-02-04
C30000825	B	82006-CEC C10002321	Core identification tags are wrong cabinet side SG-100D1. (see document 123A90-DDL-IN-DG-40016 sh.3)	.		APolo 2024-11-23	2025-02-19	AAndreani 2025-02-19	2025-02-19
C30000826	B	82006-CEC C10002321	Missing cable tag by cabinet BESS UCP	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM 85 Battery Energy and Storage System
SUBSYSTEM 85-00 BESS Package (A-85000)

Electrical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000827	B	82006-CEC C10002321	Missing core identification tags Cabinet side BESS UCP . (see document 123A90-DDL-EL-DD-20092 sh.7-8)	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30000836	B	82007-CEC C10002322	Missing cable tag by cabinet BESS UCP	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30000837	B	82006-CEC C10002321	Missing core identification tags by Cabinet side BESS UCP . (see document 123A90-DDL-EL-DD-20092 sh.7-8)	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30000841	B	85001-CEC C10002325	Missing cable tags inside cabinet BESS A-85000	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30000842	B	85001-CEC C10002325	Missing the cross-ferruling (Cores) . Cabinet BESS A-85000. (see document 123A90-DDL-EL-DD-20092 sh.7-8)	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30000846	B	85001-CEC C10002325	Spare cores to be properly isolated (bess A-85000)	.		APolo 2024-11-23	2025-02-04	APolo 2025-02-04	2025-02-04
C30000847	B	85001-CEC C10002325	Spare cores to be properly isolated by SG-100D1 side	.		APolo 2024-11-23	2025-02-04	APolo 2025-02-04	2025-02-04
C30000848	B	85001-CEC C10002325	Core identificatio tags are wrong side SG-100D1 . (see document 123A90-DDL-EL-DD-20092 sh.7-8)	.		APolo 2024-11-23	2025-02-19	AAndreani 2025-02-19	2025-02-19
C30000850	B	85002-CEC C10002326	Missing cable tags both cabinet side B400-EMCS-001 / BESS A-85000.	.		APolo 2024-11-23	2025-03-04	JKrizanic 2025-03-04	2025-03-04

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM 85 Battery Energy and Storage System
SUBSYSTEM 85-00 BESS Package (A-85000)

Electrical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000851	B	85002-CEC C10002326	Missing core identification tags both Cabinet side B400-EMCS-001 / BESS A-85000 . (see document 123A90-DDL-EL-DD-20092 sh.7-8)	.		APolo 2024-11-23	2025-06-19	Ecarotenuto 2025-06-19	2025-06-19
C30001005	B	A-85000	Cables in electrical cabinets/panels are missing proper lables and identification for single wires. Many cable connections are missing			CPY 2024-11-28	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30001006	B	A-85000	Cables in electrical cabinets/panels are missing proper lables and identification for single wires. Many cable connections are missing			CPY 2024-11-28	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30001007	B	A-85000	Missing operating manual (PCS Container - Control Cabinet 1)			CPY 2024-11-28	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30001009	B	A-85000	Missing lables, clear marking on cables and ferrules/crimps (BESS 1 - Battery Cabinets)			CPY 2024-11-28	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30001010	B	A-85000	Missing lables, clear marking on cables and ferrules/crimps (BESS 2 - Battery Cabinets)			CPY 2024-11-28	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30001012	B	A-85000	Cables in electrical cabinets/panels are missing proper lables and identification for single wires. Many cable connections are missing			CPY 2024-11-28	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30001013	B	A-85000	As built drawing needed for electrical schematics, GA and mechanical drawings of external and internals of contianers (BESS System)			CPY 2024-11-28	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM 85 Battery Energy and Storage System
SUBSYSTEM 85-00 BESS Package (A-85000)

Instrumental

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000857	A	C-85-XS-001/B400-SIS-001 C10001447	Cable termination to be redone with appropriate pin both side (B400-SIS-001 / A-85000)	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000860	A	P320PLC/B400-SIS-001 C10001453	Cable termination to be redone with appropriate pin both side B400-SIS-001 / BESS A-85000 UCP	.		APolo 2024-11-25	2024-11-26	APolo 2024-11-26	2024-11-26
C30000866	A	P320PLC/B400-FGS-003 C10001464	Cable termination is not complete with appropriate pin. cabinet side B400-FGS-003 / BESS A-85000 UCP	.		APolo 2024-11-25	2024-11-26	APolo 2024-11-26	2024-11-26
C30000855	B	C-85-XS-001/B400-SIS-001 C10001447	Missing cable tags both cabinet B400-SIS-001 / A-85000	.		APolo 2024-11-23	2025-02-27	JKrizanic 2025-02-27	2025-02-27
C30000856	B	C-85-XS-001/B400-SIS-001 C10001447	Missing core identification tags both side B400-SIS-001 / A-85000 . (see document 123A90-DDL-IN-DG-40016 sh.3)	.		APolo 2024-11-23	2025-05-22	Gtangianu 2025-05-22	2025-05-22
C30000858	B	P320PLC/B400-SIS-001 C10001453	Missing cable tags by both panel sides B400-SIS-001 / BESS A-85000 UCP.	.		APolo 2024-11-25	2025-02-20	JKrizanic 2025-02-20	2025-02-20
C30000859	B	P320PLC/B400-SIS-001 C10001453	Missing core identification tags by both side B400-SIS-001 / BESS A-85000 UCP . (see document 123A90-DDL-IN-DG-40016 sh.3)	.		APolo 2024-11-25	2025-05-22	Gtangianu 2025-05-22	2025-05-22
C30000861	B	P320PLC/B400-FGS-003 C10001464	Missing cable tags both panels side B400-FGS-003 / BESS A-85000 UCP.	.		APolo 2024-11-25	2025-02-20	JKrizanic 2025-02-20	2025-02-20
C30000863	B	P320PLC/B400-FGS-003 C10001464	Missing core identification tags both Cabinet side B400-FGS-003 / BESS A-85000 UCP . (see document 123A90-DDL-IN-DG-40016 sh.3)	.		APolo 2024-11-25	2025-03-04	JKrizanic 2025-03-04	2025-03-04

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM 85 Battery Energy and Storage System
SUBSYSTEM 85-00 BESS Package (A-85000)

Mechanical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000871	B	A-85000 C10002359	missing the name plates of containers as per 123A90-DDL-EL-DD-20101 sh.1	.		APolo 2024-11-25			
C30000872	B	A-85000 C10002359	Earthing System is not as indicated by the Electrical Typical Installation Details document . see 123A90-DDL-EL-DD-20090 sh.3	.		APolo 2024-11-25	2025-01-23	APolo 2025-01-23	2025-01-23
C30000873	B	A-85000 C10002359	The earthing and connection conductors (green/yellow) have a section of 95mm2 different from that indicated in document	.		APolo 2024-11-25	2024-12-27	Ecarotenuto 2024-12-27	2024-12-27
C30000874	B	A-85000 C10002359	In the container "BESS 01", the door opening/closing handle is missing	.	Performed by Freqcon personnel	APolo 2024-11-25	JDuinhoven 2025-06-18	JDuinhoven 2025-06-18	JDuinhoven 2025-06-18
C30001008	B	A-85000	Check on coolant liquid level and overpressure collection bottle after transportation and after first re-commisisoning (PCS Container - Converter			CPY 2024-11-28	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30001011	B	A-85000	Missing castell lock to be installed on door (PCS Container - Transformer Area)			CPY 2024-11-28	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30001014	B	A-85000	Install three cranes in Battery rooms (BESS 1)			CPY 2024-11-28	2024-12-19	GMccann 2024-12-19	JMackillop 2024-12-19
C30001015	B	A-85000	Install three cranes in Battery rooms (BESS 2)			CPY 2024-11-28	2024-12-19	GMccann 2024-12-19	JMackillop 2024-12-19
C30001016	B	A-85000	Battery mounting brackets on floor need to be installed (BESS 1 - Battery Cabinets)			CPY 2024-11-28	2024-12-19	GMccann 2024-12-19	JMackillop 2024-12-19

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PUNCH LIST REPORT

SYSTEM	85	Battery Energy and Storage System
SUBSYSTEM	85-00	BESS Package (A-85000)

Mechanical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30001017	B	A-85000	Battery mounting brackets on floor need to be installed (BESS 2 - Battery Cabinets)			CPY 2024-11-28	2024-12-19	GMccann 2024-12-19	JMackillop 2024-12-19
C30004331	B	A-85000	During execution of Cause & Effect OTP doc. n. 123A90-PML-COM-PRO-03054, it had been noted that on equipment packages provided with		Ballard are performed the work	GDelmissier 2025-04-15	JDuinhoven 2025-06-06	JDuinhoven 2025-06-06	JDuinhoven 2025-06-06

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PUNCH LIST REPORT

SYSTEM	85	Battery Energy and Storage System
SUBSYSTEM	85-00	BESS Package (A-85000)

Telecom

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000936	B	P320PLC/B400-NET-001.01 C10004357	The copper conductor of the cable armor must be individually connected to the earthing bar. B400-NET-001. See 123A90-DDL-EL-DD-20090.	.		APolo 2024-11-26	2025-01-22	APolo 2025-01-22	2025-01-22
C30000937	B	P320PLC/B400-NET-001.01 C10004357	Missing cable tag , cabinet input BESS A-850000.	.		APolo 2024-11-26	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30000940	B	P320PLC/B400-NET-001.02 C10004358	The copper conductor of the cable armor must be individually connected to the earthing bar B400-NET-001. See 123A90-DDL-EL-DD-20090.	.		APolo 2024-11-26	2025-02-04	APolo 2025-02-04	2025-02-04
C30000941	B	P320PLC/B400-NET-001.02 C10004358	Missing cable tag , cabinet input BESS A-850000	.		APolo 2024-11-26	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10

Section 2.2 Exception Punch Lists (per discipline)

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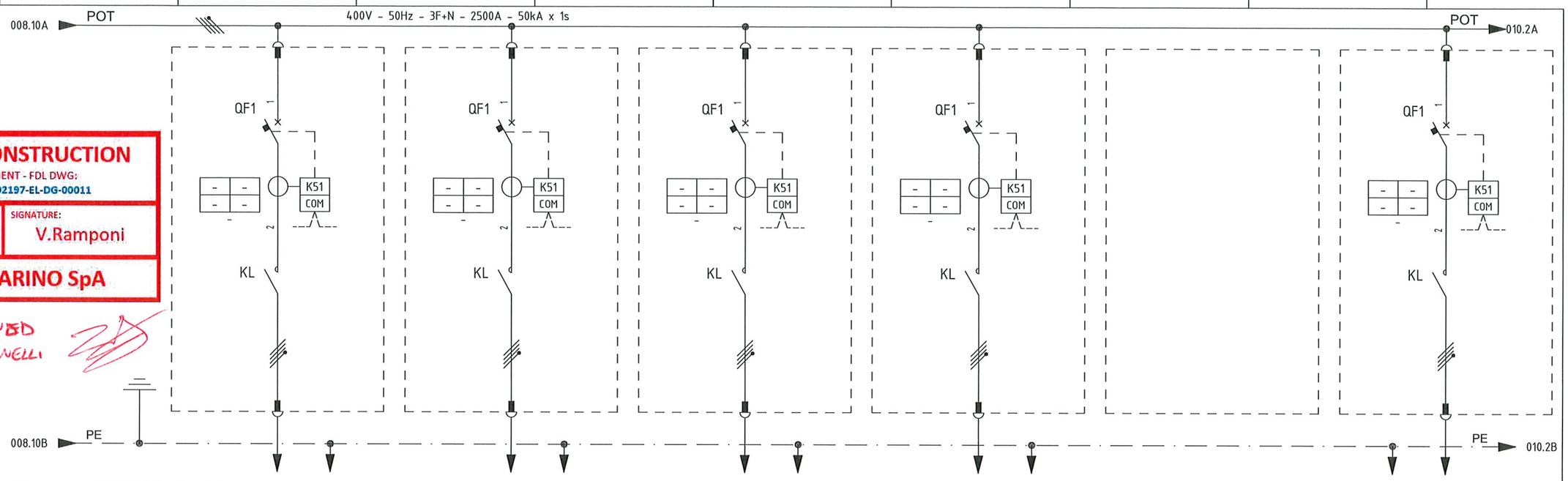
PUNCH LIST REPORT

SYSTEM	85	Battery Energy and Storage System
SUBSYSTEM	85-00	BESS Package (A-85000)

Mechanical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000871	B	A-85000 C10002359	missing the name plates of containers as per 123A90-DDL-EL-DD-20101 sh.1	.		APolo 2024-11-25			

Section 2.3 “As-Commissioned” P&ID's / SLD's / D&ID's / C&E's



VALID FOR CONSTRUCTION

VENDOR DOCUMENT - FDL DWG:
123A90-FDL-1723002197-EL-DG-00011

REV.:	DATE:	SIGNATURE:
4_A	18/12/24	V.Ramponi

ROSETTI MARINO SpA

AS - COMMISSIONED
DAVIDE ZUCCONELLI
20/03/2025
NO MARK UP

ITEM				1	A-80000	CP-850F03	SPARE	SPARE			K-63001-A
UTILITY				2	FUEL CELL AUXILIARY LOAD	BESS PCS CABINET	SPARE	SPARE			INSTRUMENTS AIR PACKAGE 01A
COLUMN/CUBICLE				3	A4 / +03	A4 / +04	A4 / +05	A4 / +06			A4 / +08
RATED POWER | RATED CURRENT				4/5	20 kW | 32.84 A	11,09 kW | 17.42 A	- kW | - A	- kW | - A			68.75 kW | 111.24 A
TYPICAL FUNCTIONAL				6	LK1-63	LK1-40	LK1-40	LK1-40			LK2-160
CIRCUIT BREAKER (ABB)	TYPE			7	XT2S - 160	XT2S - 160	XT2S - 160	XT2S - 160			XT4S - 250
	VERSION			8	4P - FIXED	4P - FIXED	4P - FIXED	4P - FIXED			4P - FIXED
	TRIP UNITS			9	EKIP HI TOUCH LSIG (In = 63A)	EKIP HI TOUCH LSIG (In = 40A)	EKIP HI TOUCH LSIG (In = 40A)	EKIP HI TOUCH LSIG (In = 40A)			EKIP HI TOUCH LSIG (In = 160A)
	Icu	KA		10	50 kA	50 kA	50 kA	50 kA			50 kA
OVERLOAD	L	Range	A	11	(0.4 - 1) x In	(0.4 - 1) x In	(0.4 - 1) x In	(0.4 - 1) x In			(0.4 - 1) x In
		Range	t	12	k/I^2	k/I^2	k/I^2	k/I^2			k/I^2
SEL. SHORT-CIRCUIT	S	Range	A	13	(0.6 - 10) x In	(0.6 - 10) x In	(0.6 - 10) x In	(0.6 - 10) x In			(0.6 - 10) x In
		Range	t	14	0.05 - 0,4 sec / k/I^2	0.05 - 0,4 sec / k/I^2	0.05 - 0,4 sec / k/I^2	0.05 - 0,4 sec / k/I^2			0.05 - 0.4 sec / k/I^2
INST. SHORT-CIRCUIT	I	Range	A	15	(1.5 - 15) x In	(1.5 - 15) x In	(1.5 - 15) x In	(1.5 - 15) x In			(1.5 - 15) x In
		Range	t	16	instantaneous	instantaneous	instantaneous	instantaneous			instantaneous
EARTH FAULT PROTECTION	G	Range	A	17	(0.1 - 1) x In	(0.1 - 1) x In	(0.1 - 1) x In	(0.1 - 1) x In			(0.1 - 1) x In
		Range	t	18	t=k / t=k/I^2	t=k / t=k/I^2	t=k / t=k/I^2	t=k / t=k/I^2			t=k / t=k/I^2
CONTACTOR (ABB)				19	AF52-40-00-13 (100A-AC1); 100-250VAC/DC	AF40-40-00-13 (70A-AC1); 100-250VAC/DC	AF40-40-00-13 (70A-AC1); 100-250VAC/DC	AF40-40-00-13 (70A-AC1); 100-250VAC/DC			AF190-40-11-13 (275A-AC1); 100-250 VAC/DC
THERMAL OVERLOAD RELAY (ABB)				20	-	-	-	-			-
SURGE ARRESTER (DEHN)				21	-	-	-	-			-
TOROIDAL CURRENT TRANSFORMER (FRER)				22	-	-	-	-			-
FUSE HOLDER (ITALWEBER)				23	-	-	-	-			-
INDIRECT PROTECTION (ABB)				24	-	-	-	-			-
VOLTMETER				25	-	-	-	-			-
CURRENT TRANSFORMER FOR MEASURE (FRER)	TYPE			26	-	-	-	-			-
	PERFORMANCE/CLASS			27	-	-	-	-			-
VOLTAGE TRANSFORMER FOR MEASURE (FRER)	TYPE			28	-	-	-	-			-
	PERFORMANCE/CLASS			29	-	-	-	-			-
LOCK-OUT RELAY (-)				30	-	-	-	-			-
POWER CONDUCTOR			mmq	31	5G16	4 x 10	-	-			5G70

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DWG n° : 231298/SD/11
Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
4	28/08/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
3	08/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
2	03/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
1	28/03/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
0	15/02/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

TITLE : "SG-200N1"

SINGLE LINE DIAGRAM

Single Line Drawing

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00011

SHEET 009

REV. 04

F.to UNI A3: 420mmx297mm

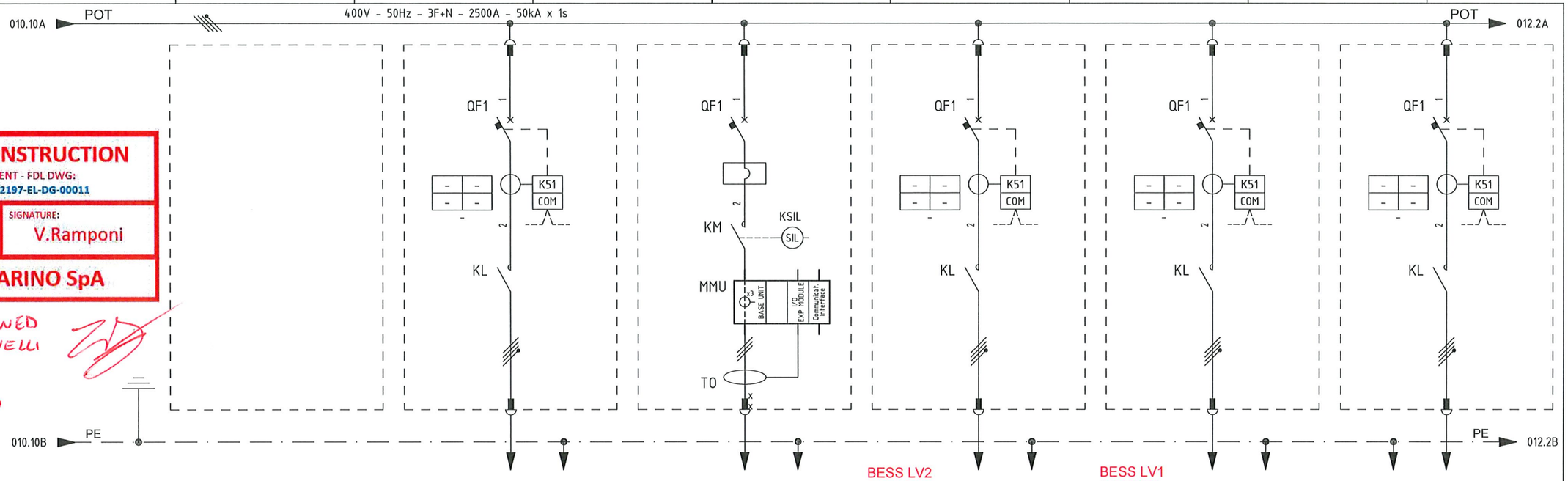
File Name : 1723002197-EL-DG-00011 Rev. 04

VALID FOR CONSTRUCTION
VENDOR DOCUMENT - FDL DWG:
123A90-FDL-1723002197-EL-DG-00011

REV.:	DATE:	SIGNATURE:
4_A	18/12/24	V.Ramponi

ROSETTI MARINO SpA

AS-COMMISSIONED
DAVIDE ZUCCONELLI
20/03/2025
NO MARK UP



ITEM			1		K-63001-B	PM-50001 B	BESS LV2 CABINET (+DISTR 2) ~~CP-850E1~~ CP-850E2 ~~BESS LV1 CABINET (+DISTR 1)~~	BESS LV1 CABINET (+DISTR 1) ~~CP-850E2~~ CP-850E1 ~~BESS LV2 CABINET (+DISTR 2)~~	-
UTILITY			2		INSTRUMENTS AIR PACKAGE 01B	SEA WATER PUMP B			SPARE
COLUMN/CUBICLE			3		A5 / +08	A6 / +01	A6 / +02	A6 / +03	A6 / +04
RATED POWER | RATED CURRENT			4/5		68.75 kW | 111.24 A	6.1 kW | 11.0 A	11.28 kW | 18.09 A	11.28 kW | 18.09 A	- kW | - A
TYPICAL FUNCTIONAL			6		LK2-160	M1-6	LK1-40	LK1-40	LK1-40
CIRCUIT BREAKER (ABB)	TYPE		7		XT4S - 250	XT2S - 160	XT2S - 160	XT2S - 160	XT2S - 160
	VERSION		8		4P - FIXED	3P - FIXED	4P - FIXED	4P - FIXED	4P - FIXED
	TRIP UNITS		9		EKIP HI TOUCH LSIG (In = 160A)	MA (In = 20A)	EKIP HI TOUCH LSIG (In = 40A)	EKIP HI TOUCH LSIG (In = 40A)	EKIP HI TOUCH LSIG (In = 40A)
	Icu	KA	10		50 kA	-	50 kA	50 kA	50 kA
OVERLOAD	L	Range A	11		(0.4 - 1) x In	-	(0.4 - 1) x In	(0.4 - 1) x In	(0.4 - 1) x In
		Range t	12		k/I^2	-	k/I^2	k/I^2	k/I^2
SEL. SHORT-CIRCUIT	S	Range A	13		(0.6 - 10) x In	-	(0.6 - 10) x In	(0.6 - 10) x In	(0.6 - 10) x In
		Range t	14		0.05 - 0.4 sec / k/I^2	-	0.05 - 0,4 sec / k/I^2	0.05 - 0,4 sec / k/I^2	0.05 - 0,4 sec / k/I^2
INST. SHORT-CIRCUIT	I	Range A	15		(1.5 - 15) x In	(6 - 14) x I	(1.5 - 15) x In	(1.5 - 15) x In	(1.5 - 15) x In
		Range t	16		instantaneous	<= 0.02 sec	instantaneous	instantaneous	instantaneous
EARTH FAULT PROTECTION	G	Range A	17		(0.1 - 1) x In	-	(0.1 - 1) x In	(0.1 - 1) x In	(0.1 - 1) x In
		Range t	18		t=k / t=k/I^2	-	t=k / t=k/I^2	t=k / t=k/I^2	t=k / t=k/I^2
CONTACTOR (ABB)			19		AF190-40-11-13 (275A-AC1); 100-250 VAC/DC	AF38-30-00-13 (18.5 kW - AC3) - 100-250Vac/dc	AF40-40-00-13 (70A-AC1); 100-250VAC/DC	AF40-40-00-13 (70A-AC1); 100-250VAC/DC	AF40-40-00-13 (70A-AC1); 100-250VAC/DC
THERMAL OVERLOAD RELAY (ABB)			20		-	UMC100.3 UC (0.24 - 63A)	-	-	-
SURGE ARRESTER (DEHN)			21		-	-	-	-	-
TOROIDAL CURRENT TRANSFORMER (FRER)			22		-	-	-	-	-
FUSE HOLDER (ITALWEBER)			23		-	-	-	-	-
INDIRECT PROTECTION (ABB)			24		-	-	-	-	-
VOLTMETER			25		-	-	-	-	-
CURRENT TRANSFORMER FOR MEASURE (FRER)	TYPE		26		-	-	-	-	-
	PERFORMANCE/CLASS		27		-	-	-	-	-
VOLTAGE TRANSFORMER FOR MEASURE (FRER)	TYPE		28		-	-	-	-	-
	PERFORMANCE/CLASS		29		-	-	-	-	-
LOCK-OUT RELAY (-)			30		-	-	-	-	-
POWER CONDUCTOR		mmq	31		5G70	4G4	4 x (1 x 10)	4 x (1 x 10)	-

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DWG n° : 231298/SD/11
Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
4	28/08/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
3	08/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
2	03/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
1	28/03/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
0	15/02/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

IMESA ELECTRICAL ENGINEERING
CROSSWIND
ROSETTI MARINO

TITLE : "SG-200N1"
SINGLE LINE DIAGRAM
Single Line Drawing

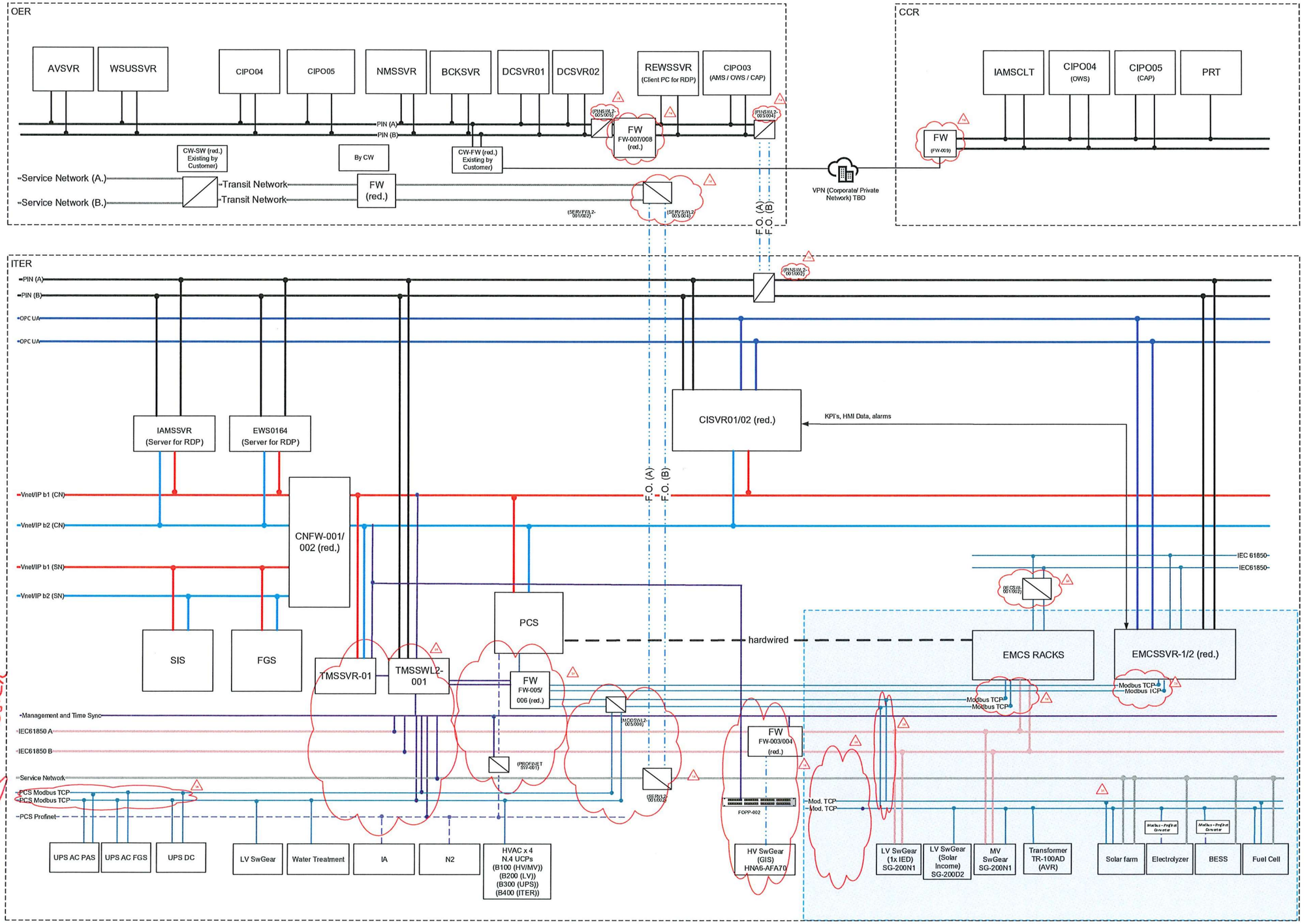
CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK
SCALE : NTS

A3
DRAWING NO. 1723002197-EL-DG-00011
SHEET 011
REV. 04

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00011 Rev. 04

CROSSWIND BLPH PROJECT - SYSTEM BLOCK DIAGRAM



As Commissioning
08-05-2025
Gianluca De Nisco

AMS	: Alarm Management System	FCS	: Field Control Station
AV	: Anti-virus	FGS	: Fire & Gas System
BCK	: Backup Server	FO	: Fiber Optic
BESS	: Battery Energy Storage System	FOPP	: Fiber Optic Patch Panel (by others)
BLPH	: Base Load Power Hub	FTA	: Field Termination Assembly
CAP	: Critical Alarm Panel	HIST	: Historian
CCR	: Central Control Room	HKN	: Hollandse Kust Noord
CI	: Collaborative Information	IAMS	: Instrument Asset Management System
CN	: Control Network	ITER	: Instrument & Telecom Equipment Room
DC	: Domain Controller	LHVS	: Land High Voltage Station
DMZ	: De-militarized Zone	MCC	: Motor Control Center
ESB	: IO communication bus	MODB	: Modbus
EWS	: Engineering Work Station	MQTT	: Message Queuing Telemetry Transport
FC	: Field Communication (Vnet/IP)	NMS	: Network Management System
OER	: Onshore Equipment Room		
OHVS	: Offshore High Voltage Station		
OWS	: Operator Work Station		
PIN	: Plant Information Network		
PKG	: Package		
RDP	: Remote Desktop Protocol		
SCS	: Safety Control Station		
SIS	: Safety Instrumented System		
SN	: Safety Network		
SW	: Switch		
UCP	: Unit Control Panel (3rd party systems)		
VM	: Virtual Machine		
Vnet/IP	: Yokogawa's Control network		
WSUS	: Windows Security Update Services		

LEGEND:

- PIN (Plant Information Network)
- Vnet/IP BUS 1 PCS
- Vnet/IP BUS 2 PCS
- Vnet/IP BUS 1 SIS/FGS
- Vnet/IP BUS 2 SIS/FGS
- ESB bus connection
- IEC61850 connection
- OPC UA connection
- Service Network connection
- Modbus TCP connection
- Profinet (non redundant)
- Fiber Optic Patch Cords
- Fiber Optic connection (core by Crosswind)
- Fiber Optic backbone (by Crosswind)
- System Cable connection
- Management and Time sync.

Note 1 : Exact assignment of Servers per cabinet to be defined in cabinet General Arrangement Drawing.
Note 2 : For IP Addresses refer to 1724000594-IN-RE-00043 Cyber Security Settings
Note 3 : All Network Components will be installed in Network Cabinet.
Note 4 : Supply of Console Desk in CCR is in Customer Scope.
Note 5 : All Network Switches and Firewall is configured in VLAN.
Note 6 : Intermediate FO Connection between HNA5 and OER Intentionally not shown.

Zone-1 : PCS Control Zone
Zone-2 : Safety Control Zone
Zone-3 : PCS Zone
Zone-4 : Application Server Facility Zone
Zone-5 : Security Management Zone-1
Zone-6 : Security Management Zone-2
Zone-7 : Demilitirized Zone
Zone-8 : Croswind Zone
Zone-9 : Service Network Zone
Zone-10: Application Server Facility Zone-OD
Zone-11: Third Party System Zone
: Out of Scope

REV	DWG BY	CHK BY	APP BY	DATE
04	SKR	MP/AB	SC	12-Feb-25
03	SKR	MP/AB	SC	26-Aug-24
02	SKR	MP/AB	SC	28-Jun-24
01	SKR	MP/AB	SC	24-May-24
00	SKR	AB	SC	23-Apr-24

Doc No : 1724000594-IN-DD-00015
Doc Name : System Architecture

ROSETTI MARINO
HOLLANDSE KUST NOORD WIND PART Project
CROSSWIND
YOKOGAWA

Section 3 CONSOLIDATED PUNCH LISTS

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM	85	Battery Energy and Storage System
SUBSYSTEM	85-00	BESS Package (A-85000)

Electrical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000814	A	83014-CEL C10000532	The cable termination is not complete . (side BESS LV1 CABINET)	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000821	A	83015-CEL C10000533	The cable termination is not complete	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000828	A	82006-CEC C10002321	Cable termination is not complete with appropriate pin	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000833	A	82006-CEC C10002321	Missing the Thermo-shrink of on the final destination cable. (see document 123A90-DDL-EL-DD-20090 sh.8)	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000838	A	82006-CEC C10002321	Cable termination is not complete with appropriate pin	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000839	A	82006-CEC C10002321	Missing the Thermo-shrink of on the final destination cable. (see document 123A90-DDL-EL-DD-20090 sh.8)	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000844	A	85001-CEC C10002325	Cable termination is not complete with appropriate pin	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000845	A	85001-CEC C10002325	Missing the Thermo-shrink of on the final destination cable. BESS A-85000 (see document 123A90-DDL-EL-DD-20090 sh.8)	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000849	A	85001-CEC C10002325	Missing the Thermo-shrink of on the cores. restore the mechanical protection of the cable (see document 123A90-DDL-EL-DD-20090 sh.8)	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM 85 Battery Energy and Storage System

SUBSYSTEM 85-00 BESS Package (A-85000)

Electrical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000852	A	85001-CEC C10002325	Missing the Thermo-shrink of on the final destination cable. BESS A-85000 (see document 123A90-DDL-EL-DD-20090 sh.8)	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000854	A	85001-CEC C10002325	Cable termination is not complete with appropriate pin. BESS A-85000	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000806	B	83011-CEL C10000522	Core identification tags are wrong . Cabinet side SG-200N1 . (see document 123A90-DDL-IN-DG-40016 sh.3)	.		APolo 2024-11-23	2025-02-15	AAndreani 2025-02-15	2025-02-15
C30000807	B	83011-CEL C10000522	Missing plastic cable tag inside BESS cabinet CP-850E3.	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	2025-04-10
C30000808	B	83011-CEL C10000522	Core identification tags are missing inside BESS cabinet CP-850E3. (see document 123A90-DDL-IN-DG-40016 sh.3)	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30000809	B	83011-CEL C10000522	Documentation: document 123A90-DDL-EL-DG-20149 sh.22 does not report what was installed in the field (CP-850E3).	.		APolo 2024-11-23	2024-12-27	Ecarotenuto 2024-12-27	2024-12-27
C30000810	B	83011-CEL C10000522	The cable termination is not complete. (side BESS PCS CABINET)	.		APolo 2024-11-23	2025-02-04	APolo 2025-02-04	2025-02-04
C30000813	B	83014-CEL C10000532	Core identification tags are wrong cabinet side SG-200N1. (see document 123A90-DDL-IN-DG-40016 sh.3)	.		APolo 2024-11-23	2025-02-15	AAndreani 2025-02-15	2025-02-15
C30000815	B	83014-CEL C10000532	Missing cable tag by BESS LV1 CABINET side	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10

CROSSWIND

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Project CROSSWIND

PUNCH LIST REPORT

SYSTEM	85	Battery Energy and Storage System
SUBSYSTEM	85-00	BESS Package (A-85000)

Electrical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000816	B	83014-CEL C10000532	Missing core identification tags side BESS LV1 . (see document 123A90-DDL-EL-DD-20092 sh.7-8)	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30000817	B	83011-CEL C10000522	The cable is not supported and fixed to the rack (inside and outside BESS panel)	.		APolo 2024-11-23	2025-02-04	APolo 2025-02-04	2025-02-04
C30000819	B	83014-CEL C10000532	Documentation: document 123A90-DDL-EL-DG-20149 sh.22 does not report what was installed in the field (CP-850E1).	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30000820	B	83015-CEL C10000533	Core identification tags are wrong cabinet side SG-200N1. (see document 123A90-DDL-IN-DG-40016 sh.3)	.		APolo 2024-11-23	2025-02-15	AAndreani 2025-02-15	2025-02-15
C30000822	B	83015-CEL C10000533	Missing cable tag by BESS LV2 CABINET side	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30000823	B	83015-CEL C10000533	Missing core identification tag by cabinet BESS LV2 side . (see document 123A90-DDL-EL-DD-20092 sh.7-8)	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30000824	B	83015-CEL C10000533	The cable is not supported and fixed to the rack (inside and outside BESS panel)	.		APolo 2024-11-23	2025-02-04	APolo 2025-02-04	2025-02-04
C30000825	B	82006-CEC C10002321	Core identification tags are wrong cabinet side SG-100D1. (see document 123A90-DDL-IN-DG-40016 sh.3)	.		APolo 2024-11-23	2025-02-19	AAndreani 2025-02-19	2025-02-19
C30000826	B	82006-CEC C10002321	Missing cable tag by cabinet BESS UCP	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM	85	Battery Energy and Storage System
SUBSYSTEM	85-00	BESS Package (A-85000)

Electrical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000827	B	82006-CEC C10002321	Missing core identification tags Cabinet side BESS UCP . (see document 123A90-DDL-EL-DD-20092 sh.7-8)	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30000836	B	82007-CEC C10002322	Missing cable tag by cabinet BESS UCP	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30000837	B	82006-CEC C10002321	Missing core identification tags by Cabinet side BESS UCP . (see document 123A90-DDL-EL-DD-20092 sh.7-8)	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30000841	B	85001-CEC C10002325	Missing cable tags inside cabinet BESS A-85000	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30000842	B	85001-CEC C10002325	Missing the cross-ferruling (Cores) . Cabinet BESS A-85000. (see document 123A90-DDL-EL-DD-20092 sh.7-8)	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30000846	B	85001-CEC C10002325	Spare cores to be properly isolated (bess A-85000)	.		APolo 2024-11-23	2025-02-04	APolo 2025-02-04	2025-02-04
C30000847	B	85001-CEC C10002325	Spare cores to be properly isolated by SG-100D1 side	.		APolo 2024-11-23	2025-02-04	APolo 2025-02-04	2025-02-04
C30000848	B	85001-CEC C10002325	Core identificatio tags are wrong side SG-100D1 . (see document 123A90-DDL-EL-DD-20092 sh.7-8)	.		APolo 2024-11-23	2025-02-19	AAndreani 2025-02-19	2025-02-19
C30000850	B	85002-CEC C10002326	Missing cable tags both cabinet side B400-EMCS-001 / BESS A-85000.	.		APolo 2024-11-23	2025-03-04	JKrizanic 2025-03-04	2025-03-04

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM	85	Battery Energy and Storage System
SUBSYSTEM	85-00	BESS Package (A-85000)

Electrical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000851	B	85002-CEC C10002326	Missing core identification tags both Cabinet side B400-EMCS-001 / BESS A-85000 . (see document 123A90-DDL-EL-DD-20092 sh.7-8)	.		APolo 2024-11-23	2025-06-19	Ecarotenuto 2025-06-19	2025-06-19
C30001005	B	A-85000	Cables in electrical cabinets/panels are missing proper lables and identification for single wires. Many cable connections are missing			CPY 2024-11-28	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30001006	B	A-85000	Cables in electrical cabinets/panels are missing proper lables and identification for single wires. Many cable connections are missing			CPY 2024-11-28	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30001007	B	A-85000	Missing operating manual (PCS Container - Control Cabinet 1)			CPY 2024-11-28	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30001009	B	A-85000	Missing lables, clear marking on cables and ferrules/crimps (BESS 1 - Battery Cabinets)			CPY 2024-11-28	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30001010	B	A-85000	Missing lables, clear marking on cables and ferrules/crimps (BESS 2 - Battery Cabinets)			CPY 2024-11-28	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30001012	B	A-85000	Cables in electrical cabinets/panels are missing proper lables and identification for single wires. Many cable connections are missing			CPY 2024-11-28	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30001013	B	A-85000	As built drawing needed for electrical schematics, GA and mechanical drawings of external and internals of contianers (BESS System)			CPY 2024-11-28	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM 85 Battery Energy and Storage System

SUBSYSTEM 85-00 BESS Package (A-85000)

Instrumental

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000857	A	C-85-XS-001/B400-SIS-001 C10001447	Cable termination to be redone with appropriate pin both side (B400-SIS-001 / A-85000)	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000860	A	P320PLC/B400-SIS-001 C10001453	Cable termination to be redone with appropriate pin both side B400-SIS-001 / BESS A-85000 UCP	.		APolo 2024-11-25	2024-11-26	APolo 2024-11-26	2024-11-26
C30000866	A	P320PLC/B400-FGS-003 C10001464	Cable termination is not complete with appropriate pin. cabinet side B400-FGS-003 / BESS A-85000 UCP	.		APolo 2024-11-25	2024-11-26	APolo 2024-11-26	2024-11-26
C30000855	B	C-85-XS-001/B400-SIS-001 C10001447	Missing cable tags both cabinet B400-SIS-001 / A-85000	.		APolo 2024-11-23	2025-02-27	JKrizanic 2025-02-27	2025-02-27
C30000856	B	C-85-XS-001/B400-SIS-001 C10001447	Missing core identification tags both side B400-SIS-001 / A-85000 . (see document 123A90-DDL-IN-DG-40016 sh.3)	.		APolo 2024-11-23	2025-05-22	Gtangianu 2025-05-22	2025-05-22
C30000858	B	P320PLC/B400-SIS-001 C10001453	Missing cable tags by both panel sides B400-SIS-001 / BESS A-85000 UCP.	.		APolo 2024-11-25	2025-02-20	JKrizanic 2025-02-20	2025-02-20
C30000859	B	P320PLC/B400-SIS-001 C10001453	Missing core identification tags by both side B400-SIS-001 / BESS A-85000 UCP . (see document 123A90-DDL-IN-DG-40016 sh.3)	.		APolo 2024-11-25	2025-05-22	Gtangianu 2025-05-22	2025-05-22
C30000861	B	P320PLC/B400-FGS-003 C10001464	Missing cable tags both panels side B400-FGS-003 / BESS A-85000 UCP.	.		APolo 2024-11-25	2025-02-20	JKrizanic 2025-02-20	2025-02-20
C30000863	B	P320PLC/B400-FGS-003 C10001464	Missing core identification tags both Cabinet side B400-FGS-003 / BESS A-85000 UCP . (see document 123A90-DDL-IN-DG-40016 sh.3)	.		APolo 2024-11-25	2025-03-04	JKrizanic 2025-03-04	2025-03-04

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM 85 Battery Energy and Storage System

SUBSYSTEM 85-00 BESS Package (A-85000)

Mechanical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000871	B	A-85000 C10002359	missing the name plates of containers as per 123A90-DDL-EL-DD-20101 sh.1	.		APolo 2024-11-25			
C30000872	B	A-85000 C10002359	Earthing System is not as indicated by the Electrical Typical Installation Details document . see 123A90-DDL-EL-DD-20090 sh.3	.		APolo 2024-11-25	2025-01-23	APolo 2025-01-23	2025-01-23
C30000873	B	A-85000 C10002359	The earthing and connection conductors (green/yellow) have a section of 95mm2 different from that indicated in document	.		APolo 2024-11-25	2024-12-27	Ecarotenuto 2024-12-27	2024-12-27
C30000874	B	A-85000 C10002359	In the container "BESS 01", the door opening/closing handle is missing	.	Performed by Freqcon personnel	APolo 2024-11-25	JDuinhoven 2025-06-18	JDuinhoven 2025-06-18	JDuinhoven 2025-06-18
C30001008	B	A-85000	Check on coolant liquid level and overpressure collection bottle after transportation and after first re-commisisoning (PCS Container - Converter			CPY 2024-11-28	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30001011	B	A-85000	Missing castell lock to be installed on door (PCS Container - Transformer Area)			CPY 2024-11-28	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30001014	B	A-85000	Install three cranes in Battery rooms (BESS 1)			CPY 2024-11-28	2024-12-19	GMccann 2024-12-19	JMackillop 2024-12-19
C30001015	B	A-85000	Install three cranes in Battery rooms (BESS 2)			CPY 2024-11-28	2024-12-19	GMccann 2024-12-19	JMackillop 2024-12-19
C30001016	B	A-85000	Battery mounting brackets on floor need to be installed (BESS 1 - Battery Cabinets)			CPY 2024-11-28	2024-12-19	GMccann 2024-12-19	JMackillop 2024-12-19

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM	85	Battery Energy and Storage System
SUBSYSTEM	85-00	BESS Package (A-85000)

Mechanical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30001017	B	A-85000	Battery mounting brackets on floor need to be installed (BESS 2 - Battery Cabinets)			CPY 2024-11-28	2024-12-19	GMccann 2024-12-19	JMackillop 2024-12-19
C30004331	B	A-85000	During execution of Cause & Effect OTP doc. n. 123A90-PML-COM-PRO-03054, it had been noted that on equipment packages provided with		Ballard are performed the work	GDelmissier 2025-04-15	JDuinhoven 2025-06-06	JDuinhoven 2025-06-06	JDuinhoven 2025-06-06

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM	85	Battery Energy and Storage System
SUBSYSTEM	85-00	BESS Package (A-85000)

Telecom

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000936	B	P320PLC/B400-NET-001.01 C10004357	The copper conductor of the cable armor must be individually connected to the earthing bar. B400-NET-001. See 123A90-DDL-EL-DD-20090.	.		APolo 2024-11-26	2025-01-22	APolo 2025-01-22	2025-01-22
C30000937	B	P320PLC/B400-NET-001.01 C10004357	Missing cable tag , cabinet input BESS A-850000.	.		APolo 2024-11-26	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10
C30000940	B	P320PLC/B400-NET-001.02 C10004358	The copper conductor of the cable armor must be individually connected to the earthing bar B400-NET-001. See 123A90-DDL-EL-DD-20090.	.		APolo 2024-11-26	2025-02-04	APolo 2025-02-04	2025-02-04
C30000941	B	P320PLC/B400-NET-001.02 C10004358	Missing cable tag , cabinet input BESS A-850000	.		APolo 2024-11-26	2025-04-10	JDuinhoven 2025-04-10	JDuinhoven 2025-04-10

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000871

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002359	1.4 Discipline	Mechanical
1.2 Item	A-85000	BESS	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

missing the name plates of containers come indicato nel documento 123A90-DDL-EL-DD-20101 sh.1

Name: Alessio Polo

Date: 2024-11-25

Signature: Digitaly signed by Alessio Polo 2024-11-25T08:45:35.888Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-25
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-25T08:46:11.751Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Name

Date

Signature

6- CLEARANCE APPROVAL

Name

Date

Signature


CERTIFIED BY
DNV 2.7-3
RTABLE OFFSHORE
UNIT
SURETANK
PORTABLE OFFSHORE UNIT DATA PLATE
DNV 2.7-3
OWNER : FREQCON GMBH
OWNER ADDRESS : 27336 RETHEM, BÜRGERWIESENWEG 5
GERMANY
POU „TYPE A" OPERATIONAL CLASS R00
DNV CERTIFICATE NO. N142UZBC
UNIT SERIAL NO. FRQ-53406000001
MANUFACTURE DATE 04/2024
SUPPLIER : SURETANK LTD
MANUFACTURER : SEEMANN
DESIGN TEMP : -20°C
DESIGN APPROVAL AUTHORITY : DET NORSKE VERITAS
°SLING ANGLE : 45
TARE MASS (T) : 11650 KG
PAYLOAD (P) : 3850 KG
MAX. GROSS MASS (R) : 15500 KG
INTERMEDIATE DECK : KG
NSP CODE
OPERATIONAL RESTRICTIONS:
OPERATIONAL PROCEDURE:
PORTABLE OFFSHORE UNIT INSPECTION PLATE DNV 2.7-3
TYPE/DATE: 16.04.2024
TYPE/DATE:
TYPE/DATE:
MANUFACTURED UNDER LICENSE FROM SURETANK LIMITED
WWW.SURETANK.COM


CERTIFIED BY
DNV
DNV 2.7-3
PORTABLE OFFSHORE
UNIT
SURETANK
PORTABLE OFFSHORE UNIT DATA PLATE
DNV 2.7-3
OWNER : FREQCON GMBH
OWNER ADDRESS : 27336 RETHEM, BÜRGERWIESENWEG 5
GERMANY
POU „TYPE A" OPERATIONAL CLASS R00
DNV CERTIFICATE NO. : N142WF2Y
UNIT SERIAL NO. : FRO-53412000001
MANUFACTURE DATE : 04/2024
SUPPLIER : SURETANK LTD
MANUFACTURER : SEEMANN
DESIGN TEMP : -20°C
DESIGN APPROVAL AUTHORITY : DET NORSKE VERITAS
*SLING ANGLE : 45
TARE MASS (T) : 11650 KG
PAYLOAD (P) : 3850 KG
MAX. GROSS MASS (R) : 15500 KG
INTERMEDIATE DECK : KG
OPERATIONAL RESTRICTIONS:
OPERATIONAL PROCEDURE:
PORTABLE OFFSHORE UNIT INSPECTION PLATE DNV 2.7-3
TYPE/DATE: 22.05.2024
TYPE/DATE:
TYPE/DATE:
MANUFACTURED UNDER LICENSE FROM SURETANK LIMITED
WWW.SURETANK.COM


CERTIFIED BY
DNV
SURETANK
PORTABLE OFFSHORE UNIT DATA PLATE
DNV 2.7-3
OWNER : FREQCON GMBH
OWNER ADDRESS : 27336 RETHEM, BÜRGERWIESENWEG 5
GERMANY
POU „TYPE A" OPERATIONAL CLASS R00
DNV CERTIFICATE NO. : N142UZBB
UNIT SERIAL NO. : FRQ-53396000001
MANUFACTURE DATE : 03/2024
SUPPLIER : SURETANK LTD
MANUFACTURER : SEEMANN
DESIGN TEMP : -20°C
DESIGN APPROVAL AUTHORITY : DET NORSKE VERITAS
°SLING ANGLE : 45
TARE MASS (T) : 7200 KG
PAYLOAD (P) : 6800 KG
MAX. GROSS MASS (R) : 14000 KG
INTERMEDIATE DECK : KG
IMDP CODE
OPERATIONAL RESTRICTIONS:
OPERATIONAL PROCEDURE:
PORTABLE OFFSHORE UNIT INSPECTION PLATE DNV 2.7-3
TYPE/DATE: 28.03.2024
TYPE/DATE:
TYPE/DATE:
MANUFACTURED UNDER LICENSE FROM SURETANK LIMITED
WWW.SURETANK.COM

2442007
Batteriecontainer
2

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000806

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000522	1.4 Discipline	Electrical
1.2 Item	83011-CEL	LV Switchgear / BESS PCS Cabinet	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Core identification tags are wrong . Cabinet side SG-200N1 . (see document 123A90-DDL-IN-DG-40016 sh.3)

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T09:08:32.551Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Alessio Polo 2024-11-23T09:08:48.481Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Andrea Andreani

Date: 2025-02-15

Signature: Digitaly signed by Andrea Andreani 2025-02-15T17:20:49.825Z

6- CLEARANCE APPROVAL

Name

Date

Signature


L3/A04/+04/83011-CEL/L3
N/A04/+04/83011-CEL/N

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000807

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000522	1.4 Discipline	Electrical
1.2 Item	83011-CEL	LV Switchgear / BESS PCS Cabinet	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Missing plastic cable tag inside BESS cabinet CP-850E3.

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T09:13:37.190Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-23T09:13:49.118Z

4 - PERFORMED ACTION

Name

Date: 2025-04-10

Signature

5 - CLEARANCE CHECK

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T09:47:28.756Z

6- CLEARANCE APPROVAL

Name

Date: 2025-04-10

Signature



ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000808

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000522	1.4 Discipline	Electrical
1.2 Item	83011-CEL	LV Switchgear / BESS PCS Cabinet	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Core identification tags are missing inside BESS cabinet CP-850E3. (see document 123A90-DDL-IN-DG-40016 sh.3)

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T09:15:51.695Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-23T09:16:02.784Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T10:21:55.784Z

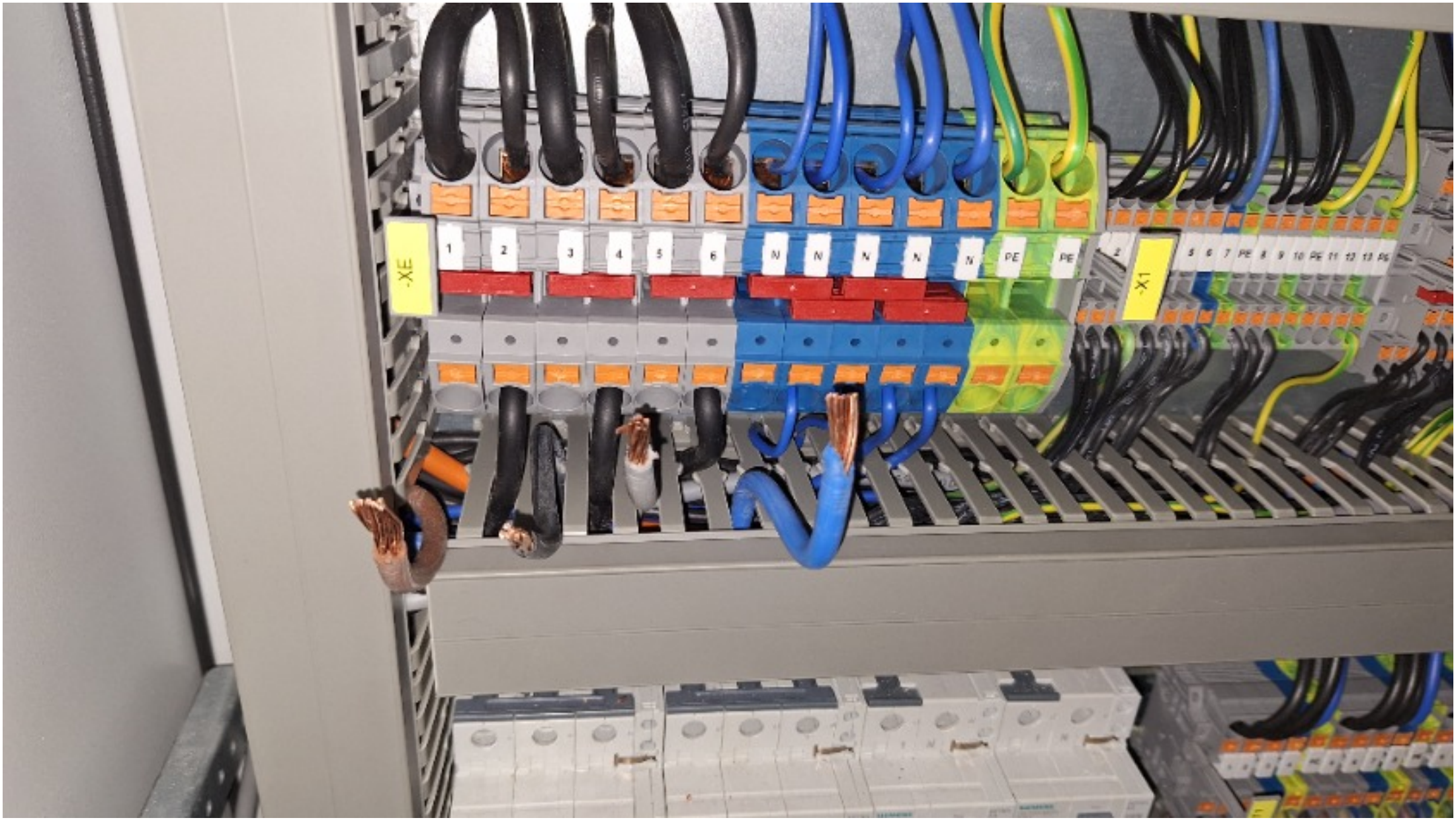
6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T11:12:13.995Z


-XE
1
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6
N
N
N
N
N
PE
PE
-X1

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000809

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000522	1.4 Discipline	Electrical
1.2 Item	83011-CEL	LV Switchgear / BESS PCS Cabinet	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Documentation: wiring 123A90-DDL-EL-DG-20149 sh.22 is wrong. Connection on terminal strip are different from the installation(CP-850E3).

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T09:25:36.752Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	ENG Engineering	Signature	Digitaly signed by Alessio Polo 2024-11-23T09:25:49.365Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

RLMU DONE

Name: Eleonora Carotenuto

Date: 2024-12-27

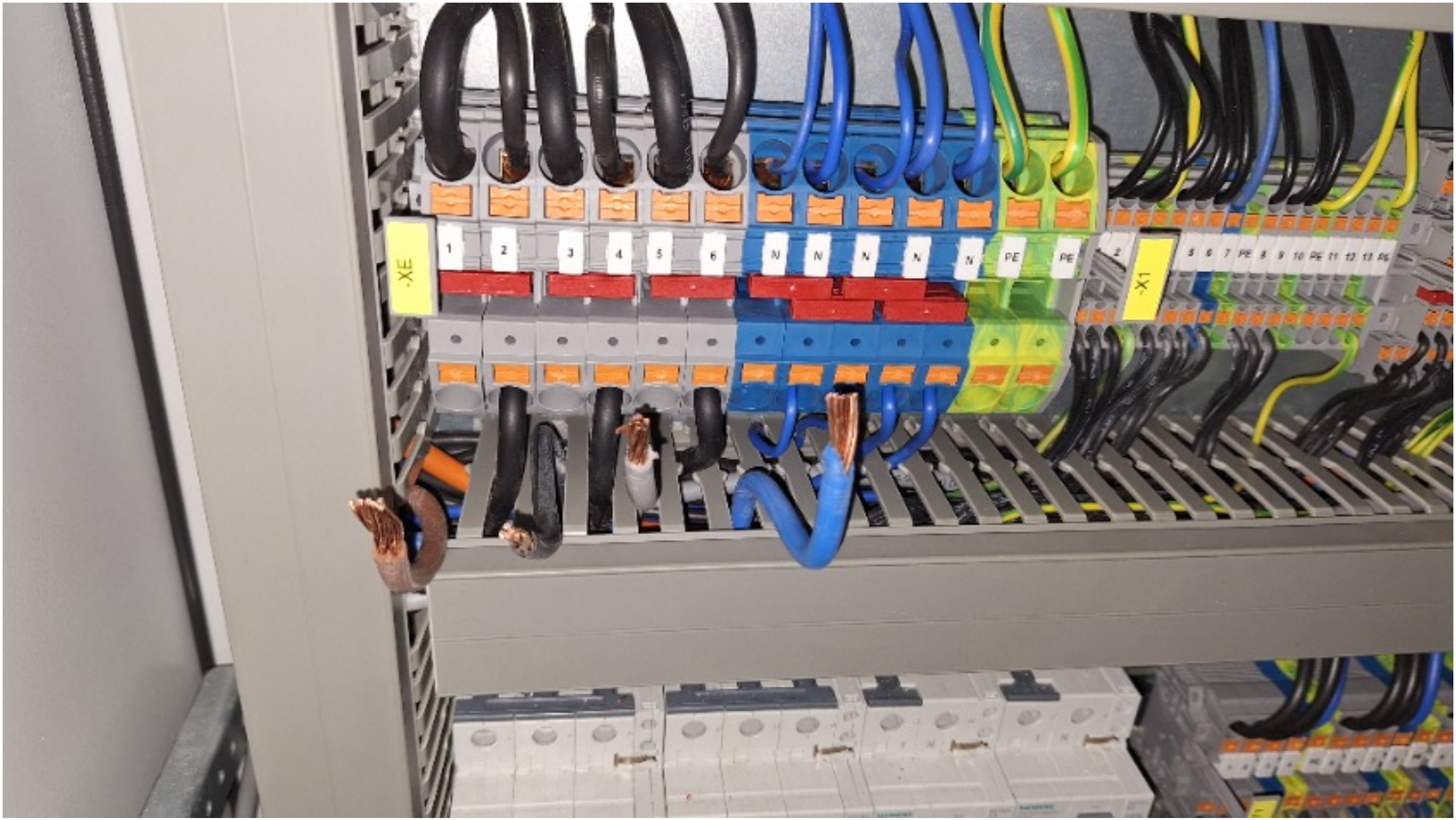
Signature: Digitaly signed by Eleonora Carotenuto 2024-12-27T10:24:03.701Z

6- CLEARANCE APPROVAL

Name

Date

Signature


-XE
1
2
3
4
5
6
N
N
N
N
N
PE
PE
-X1

FROM

DESCRIPTION: LV Switchgear
TAG NUMBER: SG-200N1

COLUMN/CUBIC.: A4/+04

L1 BN
L2 BK
L3 GY
N BU

83011-CEL
4C X 10 mm²

COLUMN/CUBIC.: A6/+02

L1 BN
L2 BK
L3 GY
N BU

83014-CEL
4C X 10 mm²

COLUMN/CUBIC.: A6/+03

L1 BN
L2 BK
L3 GY
N BU

83015-CEL
4C X 10 mm²

TO

DESCRIPTION: BESS PCS CABINET
TAG NUMBER: CP-850E3

-XE

BN 112 1 -AUX_400V_L1
BK 132 3 -AUX_400V_L2
GY 152 5 -AUX_400V_L3
BU 1N2 N -AUX_400V_N

02

DESCRIPTION: BESS LV1 CABINET (+DISTR 1)
TAG NUMBER: CP-850E1

-XES

BN 1
BK 3
GY 5
BU N

DESCRIPTION: BESS LV2 CABINET (+DISTR 2)
TAG NUMBER: CP-850E2

-XES

BN 1
BK 3
GY 5
BU N

VALID FOR CONSTRUCTION
FDL DWG: 123A90-FDL-EL-DG-20149

REV.	DATE:	SIGNATURE:
2_A	21/11/24	G.Randi

ROSETTI MARINO SpA

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	19/11/24	SAI	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	16/10/24	SAI	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	08/07/24	SAI	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL INTERCONNECTING WIRING DIAGRAM
LV SWITCHGEAR SG-200N1

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : 1:X

A3

DRAWING NO. 123A90-DDL-EL-DG-20149

SHEET 022

REV. 02

F.to UNI A3: 420mmx297mm

File Name : 123A90-DDL-EL-DG-20149 Rev. 02

ROSETTI MARINO CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000810

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000522	1.4 Discipline	Electrical
1.2 Item	83011-CEL	LV Switchgear / BESS PCS Cabinet	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

The cable termination is not complete. (side BESS PCS CABINET)

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T09:31:05.568Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	A PL A	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-23T09:31:17.084Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Alessio Polo

Date: 2025-02-04

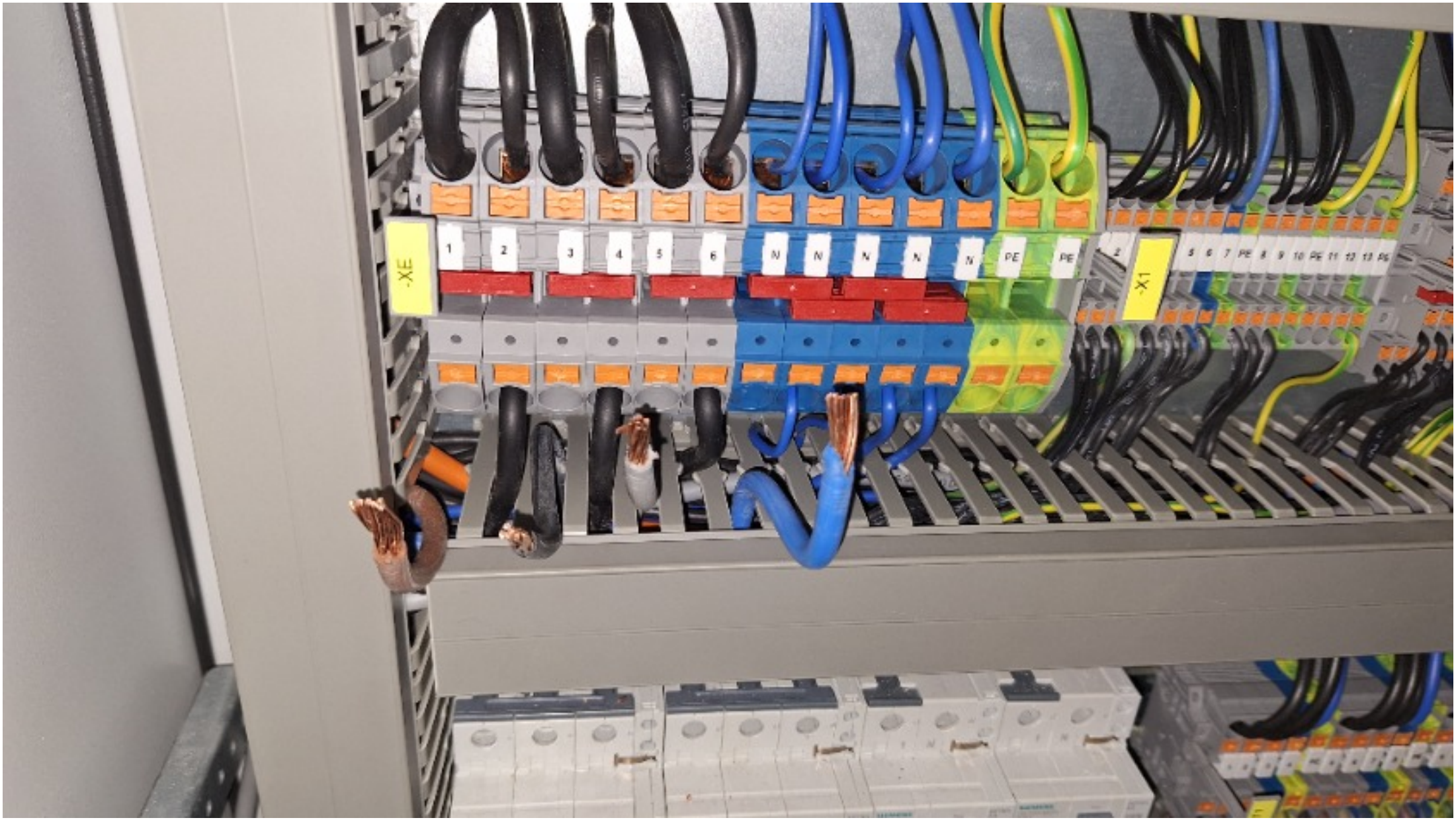
Signature: Digitaly signed by Alessio Polo 2025-02-04T12:34:10.687Z

6- CLEARANCE APPROVAL

Name

Date

Signature


-XE
1
2
3
4
5
6
N
N
N
N
N
PE
PE
-X1

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000813

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000532	1.4 Discipline	Electrical
1.2 Item	83014-CEL	LV Switchgear / BESS LV1 Cabinet (+DISTR 1)	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Core identification tags are wrong cabinet side SG-200N1. (see document 123A90-DDL-IN-DG-40016 sh.3)

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T09:52:36.986Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Alessio Polo 2024-11-23T09:52:49.138Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Andrea Andreani

Date: 2025-02-15

Signature: Digitaly signed by Andrea Andreani 2025-02-15T17:20:43.488Z

6- CLEARANCE APPROVAL

Name

Date

Signature


L2/A6/+02/83014-CEL
L1/A6/+02/83014-CEL

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000814

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000532	1.4 Discipline	Electrical
1.2 Item	83014-CEL		LV Switchgear / BESS LV1 Cabinet (+DISTR 1)
1.3 Subsystem	85-00		BESS Package (A-85000)

2 - OBSERVATION

The cable termination is not complete . (side BESS LV1 CABINET)

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T09:55:47.074Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	A PL A	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Alessio Polo 2024-11-23T09:56:04.179Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Installation done without ferrules according to terminal block datasheet.

Name: Alessio Polo

Date: 2024-11-26

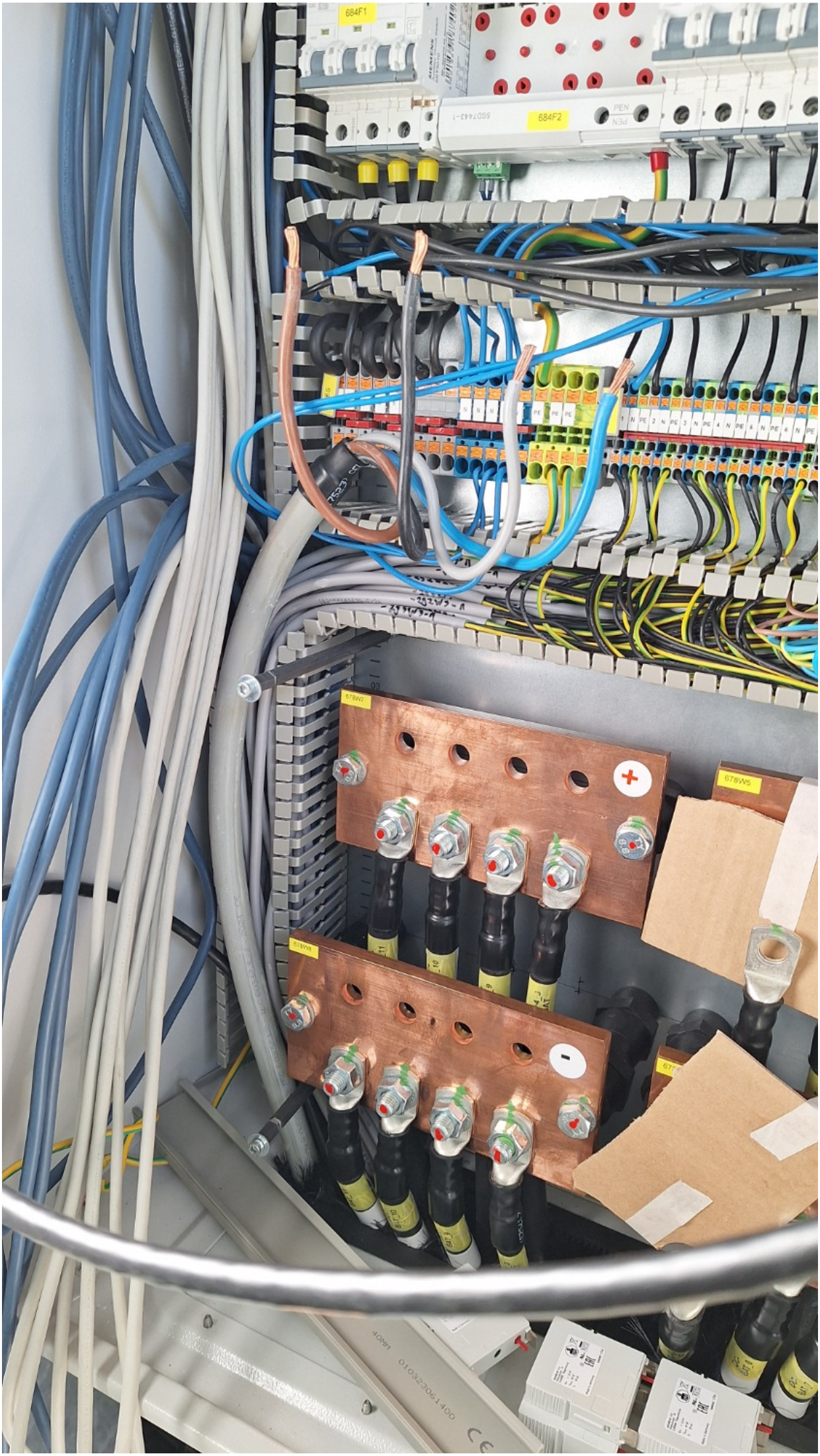
Signature: Digitaly signed by Alessio Polo 2024-11-26T16:21:17.597Z

6- CLEARANCE APPROVAL

Name

Date

Signature


684F1
684F2
678W1
678W5

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000815

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000532	1.4 Discipline	Electrical
1.2 Item	83014-CEL	LV Switchgear / BESS LV1 Cabinet (+DISTR 1)	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Missing cable tag by BESS LV1 CABINET side

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T09:57:39.066Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-23T09:57:49.792Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T10:22:34.810Z

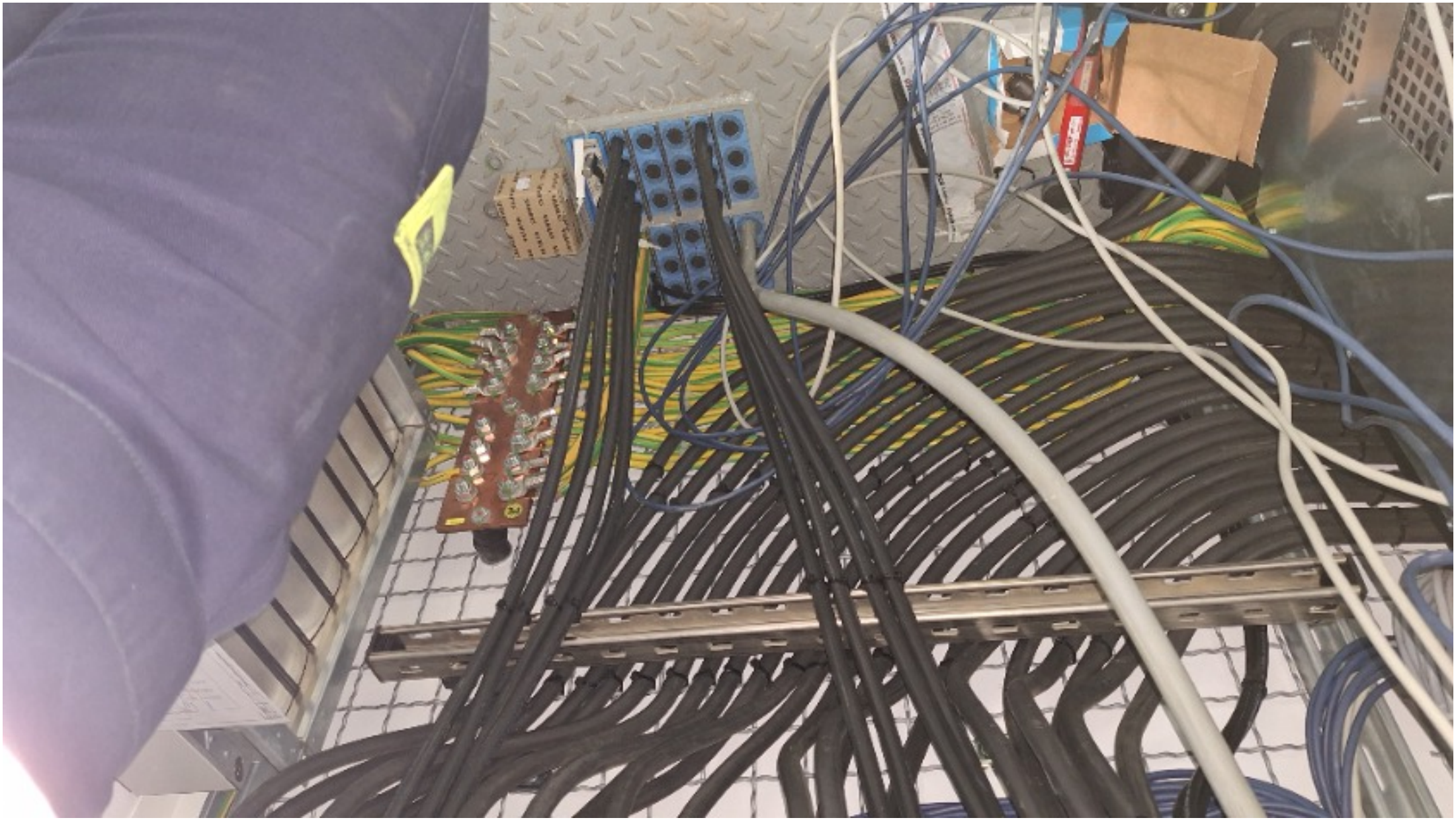
6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T10:23:02.499Z



ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000816

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000532	1.4 Discipline	Electrical
1.2 Item	83014-CEL	LV Switchgear / BESS LV1 Cabinet (+DISTR 1)	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Missing core identification tags side BESS LV1 . (see document 123A90-DDL-EL-DD-20092 sh.7-8)

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T09:59:21.033Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-23T09:59:35.826Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T10:23:48.401Z

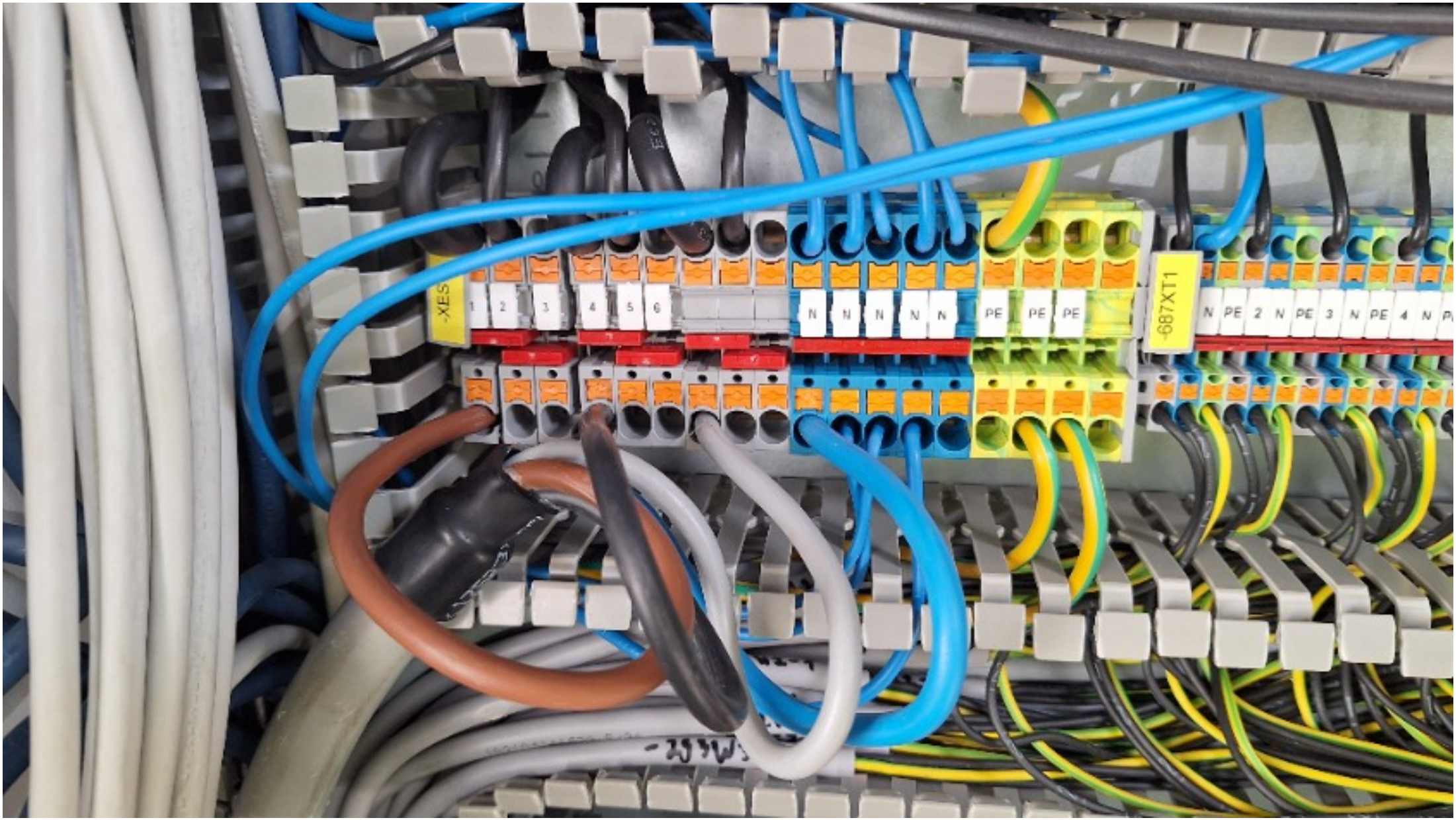
6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T10:24:21.679Z


-XES
1
2
3
4
5
6
N
N
N
N
N
PE
PE
PE
-687XT1
N
PE
2
N
PE
3
N
PE
4
N

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000817

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000522	1.4 Discipline	Electrical
1.2 Item	83011-CEL	LV Switchgear / BESS PCS Cabinet	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

The cable is not supported and fixed to the rack (inside and outside BESS panel)

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T10:10:16.113Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-23T10:10:29.562Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Alessio Polo

Date: 2025-02-04

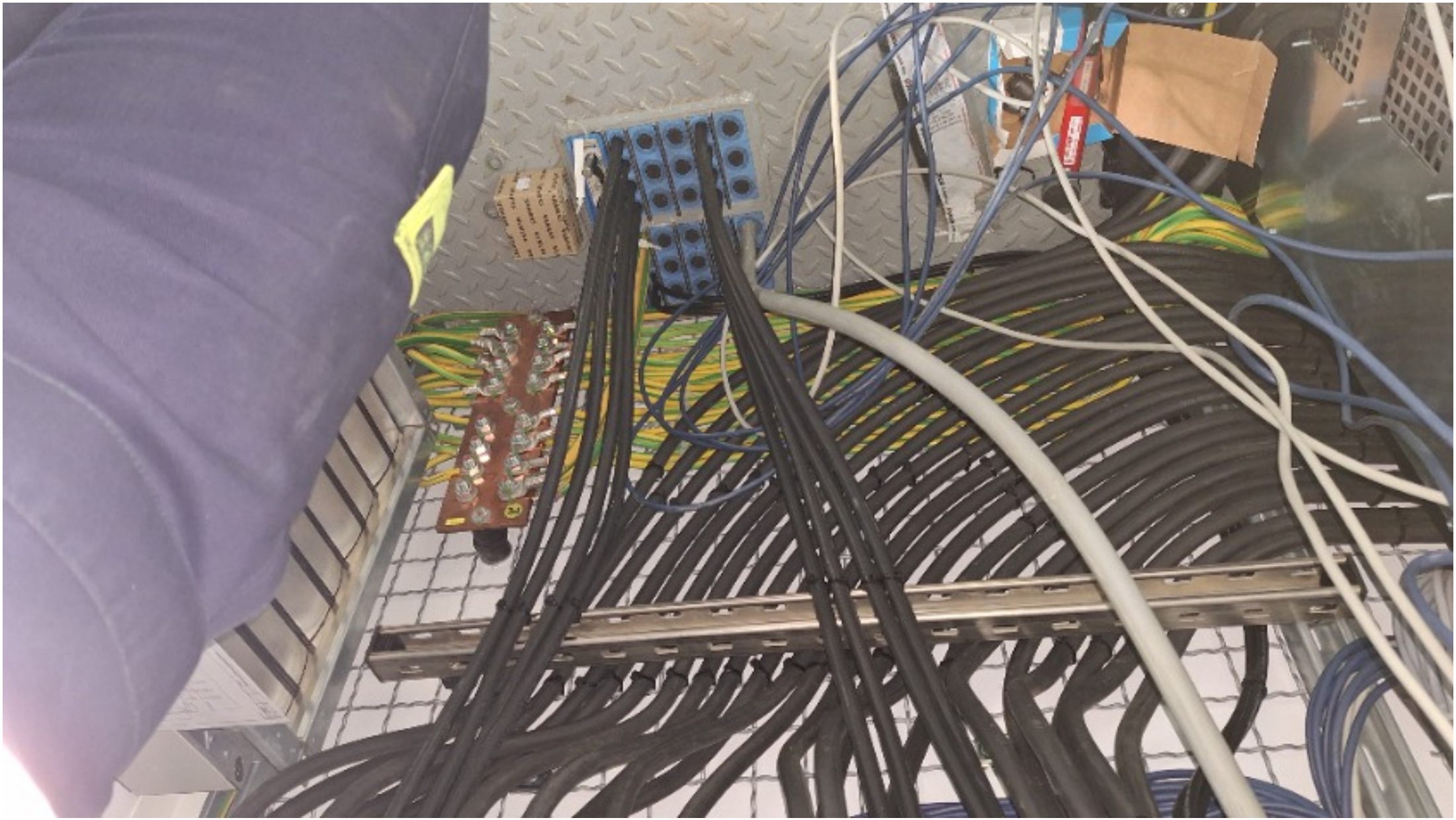
Signature: Digitaly signed by Alessio Polo 2025-02-04T12:34:25.702Z

6- CLEARANCE APPROVAL

Name

Date

Signature




-687XT1
FORCLAZ

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000819

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000532	1.4 Discipline	Electrical
1.2 Item	83014-CEL	LV Switchgear / BESS PCS Cabinet	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Documentation: document 123A90-DDL-EL-DG-20149 sh.22 does not report what was installed in the field (CP-850E1).

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T10:16:23.340Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-23T10:16:35.482Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T10:25:08.815Z

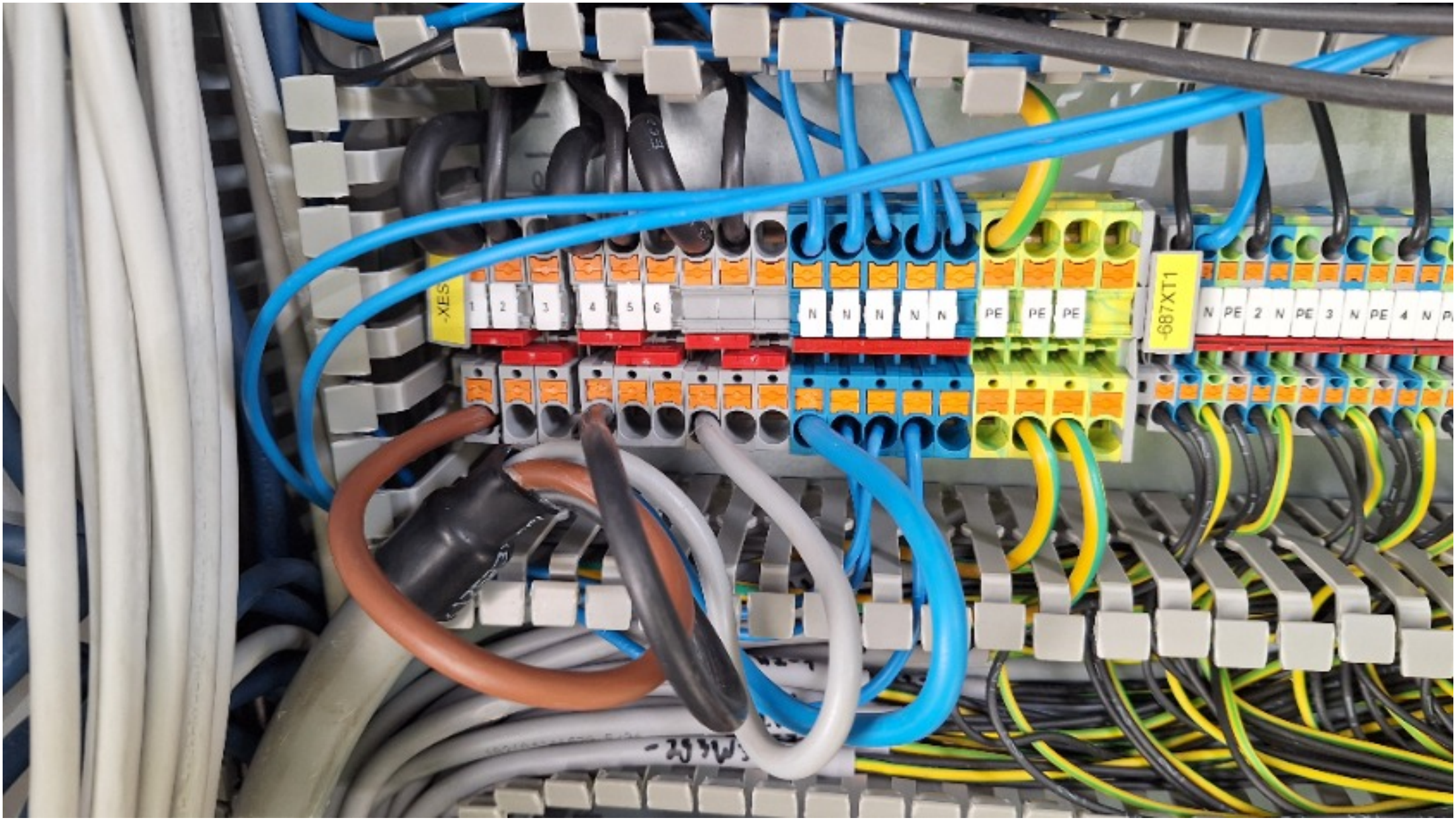
6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T10:25:23.444Z


-XES
1
2
3
4
5
6
N
N
N
N
N
PE
PE
PE
-687XT1
N
PE
2
N
PE
3
N
PE
4
N

FROM

DESCRIPTION: LV Switchgear
TAG NUMBER: SG-200N1

COLUMN/CUBIC.: A4/+04

L1 BN
L2 BK
L3 GY
N BU

83011-CEL
4C X 10 mm²

COLUMN/CUBIC.: A6/+02

L1 BN
L2 BK
L3 GY
N BU

83014-CEL
4C X 10 mm²

COLUMN/CUBIC.: A6/+03

L1 BN
L2 BK
L3 GY
N BU

83015-CEL
4C X 10 mm²

TO

DESCRIPTION: BESS PCS CABINET
TAG NUMBER: CP-850E3

-XE

BN	112	-AUX_400V_L1
BK	132	-AUX_400V_L2
GY	152	-AUX_400V_L3
BU	1N2	-AUX_400V_N

02

DESCRIPTION: BESS LV1 CABINET (+DISTR 1)
TAG NUMBER: CP-850E1

-XES

BN	1	1
BK	3	4
GY	5	7
BU	N	N

DESCRIPTION: BESS LV2 CABINET (+DISTR 2)
TAG NUMBER: CP-850E2

-XES

BN 1
BK 3
GY 5
BU N

VALID FOR CONSTRUCTION
FDL DWG: 123A90-FDL-EL-DG-20149

REV.	DATE:	SIGNATURE:
2_A	21/11/24	G.Randi

ROSETTI MARINO SpA

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	19/11/24	SAI	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	16/10/24	SAI	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	08/07/24	SAI	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL INTERCONNECTING WIRING DIAGRAM
LV SWITCHGEAR SG-200N1

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : 1:X

A3

DRAWING NO. 123A90-DDL-EL-DG-20149

SHEET 022

REV. 02

F.to UNI A3: 420mmx297mm

File Name : 123A90-DDL-EL-DG-20149 Rev. 02

ROSETTI MARINO CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000820

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000533	1.4 Discipline	Electrical
1.2 Item	83015-CEL	LV Switchgear / BESS LV2 Cabinet (+DISTR 2)	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Core identification tags are wrong cabinet side SG-200N1. (see document 123A90-DDL-IN-DG-40016 sh.3)

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T10:20:11.643Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Alessio Polo 2024-11-23T10:20:22.026Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Andrea Andreani

Date: 2025-02-15

Signature: Digitaly signed by Andrea Andreani 2025-02-15T17:20:36.120Z

6- CLEARANCE APPROVAL

Name

Date

Signature


L3/A6/+03/83015-CEL
L2/A6/+03/83015-CEL
N/A6/+03/83015-CEL

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000821

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000533	1.4 Discipline	Electrical
1.2 Item	83015-CEL	LV Switchgear / BESS LV2 Cabinet (+DISTR 2)	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

The cable termination is not complete

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T10:21:51.499Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority: A PL A

3.4 Activity code: MC Mechanical Completion

3.5 Action by: VND Vendor

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T10:22:07.457Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Installation done without ferrules according to terminal block datasheet

Name: Alessio Polo

Date: 2024-11-26

Signature: Digitaly signed by Alessio Polo 2024-11-26T16:22:03.156Z

6- CLEARANCE APPROVAL

Name

Date

Signature



ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000822

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000533	1.4 Discipline	Electrical
1.2 Item	83015-CEL	LV Switchgear / BESS LV2 Cabinet (+DISTR 2)	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Missing cable tag by BESS LV2 CABINET side

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T10:23:58.296Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-23T10:24:08.927Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T10:26:05.743Z

6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T10:26:20.989Z



ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000823

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000533	1.4 Discipline	Electrical
1.2 Item	83015-CEL	LV Switchgear / BESS LV2 Cabinet (+DISTR 2)	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Missing core identification tag by cabinet BESS LV2 side . (see document 123A90-DDL-EL-DD-20092 sh.7-8)

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T10:26:05.610Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-25T10:26:14.578Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T10:27:11.145Z

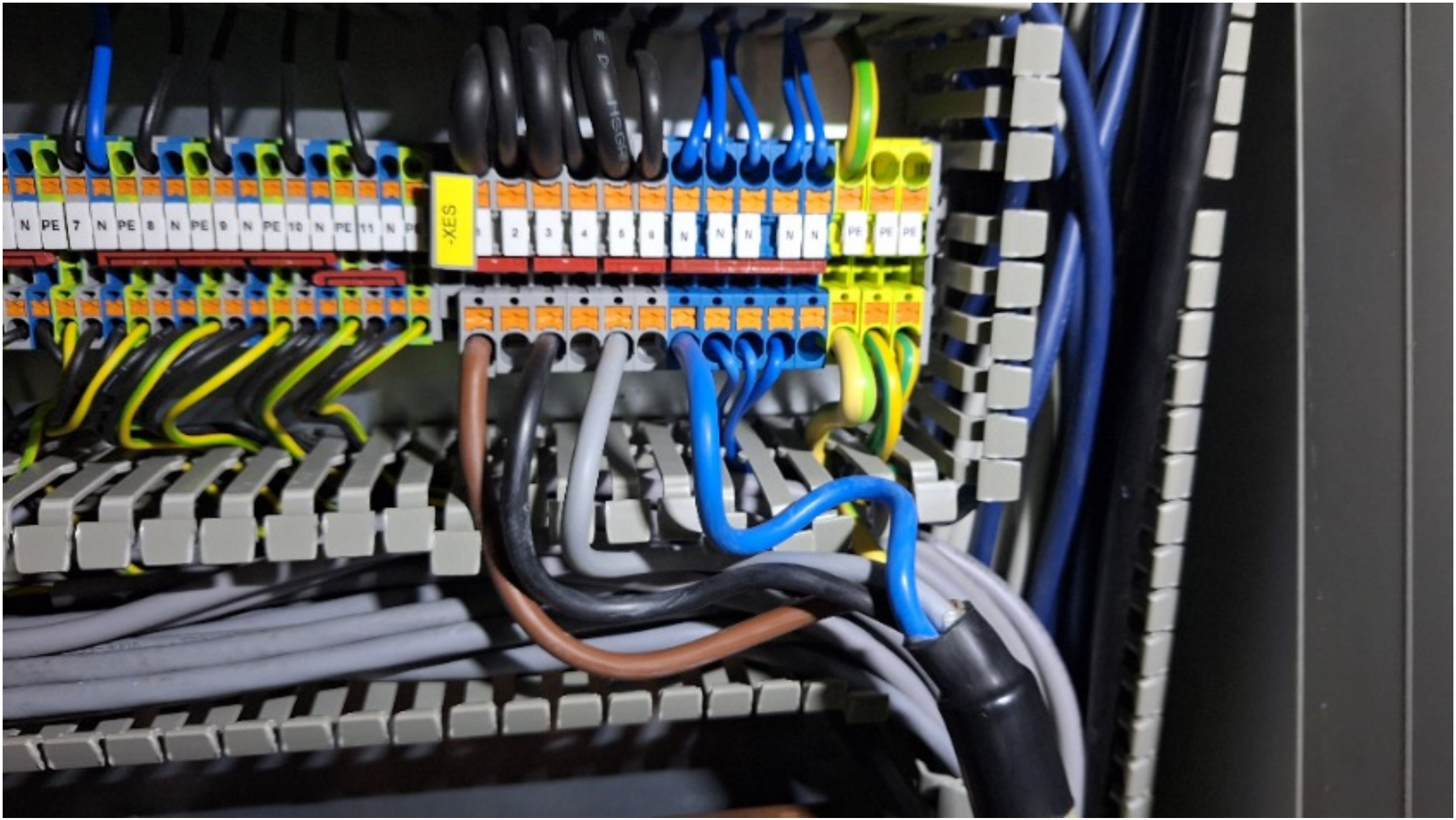
6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T10:27:45.321Z


-XES
N PE 7 N PE 8 N PE 9 N PE 10 N PE 11 N
1 2 3 4 5 6 N N N N N PE PE PE

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000824

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000533	1.4 Discipline	Electrical
1.2 Item	83015-CEL	LV Switchgear / BESS LV2 Cabinet (+DISTR 2)	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

The cable is not supported and fixed to the rack (inside and outside BESS panel)

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T10:27:06.247Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-23T10:27:17.559Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Alessio Polo

Date: 2025-02-04

Signature: Digitaly signed by Alessio Polo 2025-02-04T12:34:36.361Z

6- CLEARANCE APPROVAL

Name

Date

Signature


DC-
BAT_7
DC-
BAT_8
DC-2_3
BAT
DC
BAT_9



ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000825

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002321	1.4 Discipline	Electrical
1.2 Item	82006-CEC		6.6KV HV Switchgear / EMCS BESS UCP
1.3 Subsystem	85-00		BESS Package (A-85000)

2 - OBSERVATION

Core identification tags are wrong cabinet side SG-100D1. (see document 123A90-DDL-IN-DG-40016 sh.3)

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T10:43:46.717Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Alessio Polo 2024-11-23T10:43:57.308Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Andrea Andreani

Date: 2025-02-19

Signature: Digitaly signed by Andrea Andreani 2025-02-19T15:43:57.497Z

6- CLEARANCE APPROVAL

Name

Date

Signature

L2-2S2
L3-2S2
11
C1-2S1
12
13
82006-CEC/XM/1
1
82006-CEC/XM/2
4
82006-CEC/XM/3
82006-CEC/XM/4
7
10
11
+CL
+CL

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000826

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002321	1.4 Discipline	Electrical
1.2 Item	82006-CEC		6.6KV HV Switchgear / EMCS BESS UCP
1.3 Subsystem	85-00		BESS Package (A-85000)

2 - OBSERVATION

Missing cable tag by cabinet BESS UCP

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T11:00:16.547Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-23T11:00:30.042Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T10:28:08.005Z

6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T10:28:25.018Z



ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000827

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002321	1.4 Discipline	Electrical
1.2 Item	82006-CEC		6.6KV HV Switchgear / EMCS BESS UCP
1.3 Subsystem	85-00		BESS Package (A-85000)

2 - OBSERVATION

Missing core identification tags Cabinet side BESS UCP . (see document 123A90-DDL-EL-DD-20092 sh.7-8)

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T11:02:06.690Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-23T11:02:17.581Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T10:29:42.895Z

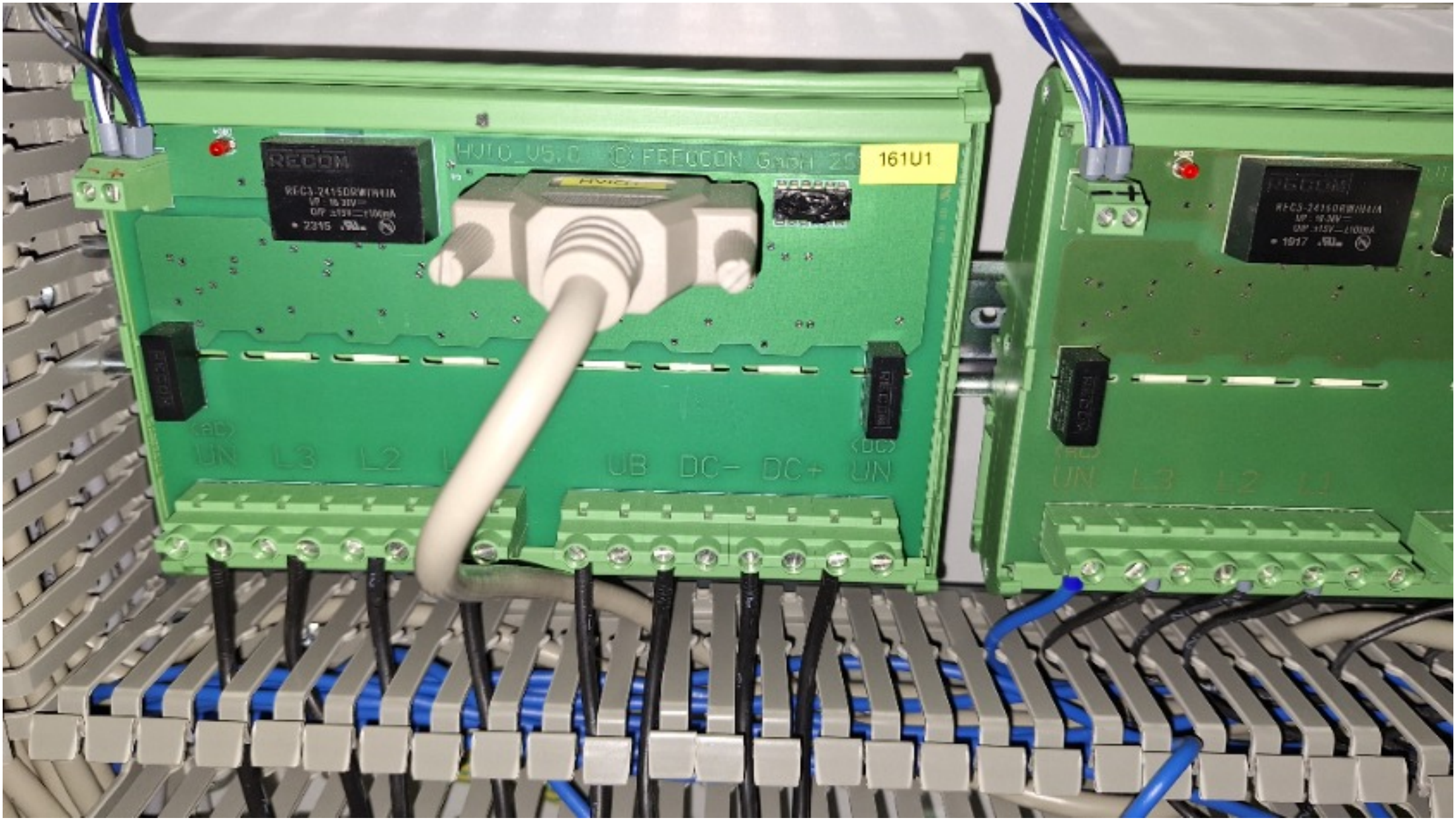
6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T10:29:57.457Z


161U1
RECOM
UN L3 L2
UB DC- DC+ UN

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000828

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002321	1.4 Discipline	Electrical
1.2 Item	82006-CEC		6.6KV HV Switchgear / EMCS BESS UCP
1.3 Subsystem	85-00		BESS Package (A-85000)

2 - OBSERVATION

Cable termination is not complete with appropriate pin

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T11:06:58.173Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	A PL A	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-23T11:07:11.474Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Installation done without ferrules according to terminal block datasheet

Name: Alessio Polo

Date: 2024-11-26

Signature: Digitaly signed by Alessio Polo 2024-11-26T16:22:36.787Z

6- CLEARANCE APPROVAL

Name

Date

Signature


HVIO4

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000833

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002321	1.4 Discipline	Electrical
1.2 Item	82006-CEC		6.6KV HV Switchgear / EMCS BESS UCP
1.3 Subsystem	85-00		BESS Package (A-85000)

2 - OBSERVATION

Missing the Thermo-shrink of on the final destination cable. (see document 123A90-DDL-EL-DD-20090 sh.8)

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T11:21:36.487Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	A PL A	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-23T11:21:52.473Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Alessio Polo

Date: 2024-11-26

Signature: Digitaly signed by Alessio Polo 2024-11-26T16:26:53.725Z

6- CLEARANCE APPROVAL

Name

Date

Signature



ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000836

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002322	1.4 Discipline	Electrical
1.2 Item	82007-CEC		6.6KV HV Switchgear / EMCS BESS UCP
1.3 Subsystem	85-00		BESS Package (A-85000)

2 - OBSERVATION

Missing cable tag by cabinet BESS UCP

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T11:29:38.247Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-23T11:29:48.769Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T11:13:27.087Z

6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T11:14:22.815Z



ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000837

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002321	1.4 Discipline	Electrical
1.2 Item	82006-CEC		6.6KV HV Switchgear / EMCS BESS UCP
1.3 Subsystem	85-00		BESS Package (A-85000)

2 - OBSERVATION

Missing core identification tags by Cabinet side BESS UCP . (see document 123A90-DDL-EL-DD-20092 sh.7-8)

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T11:32:31.024Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-23T11:32:43.178Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T10:31:11.149Z

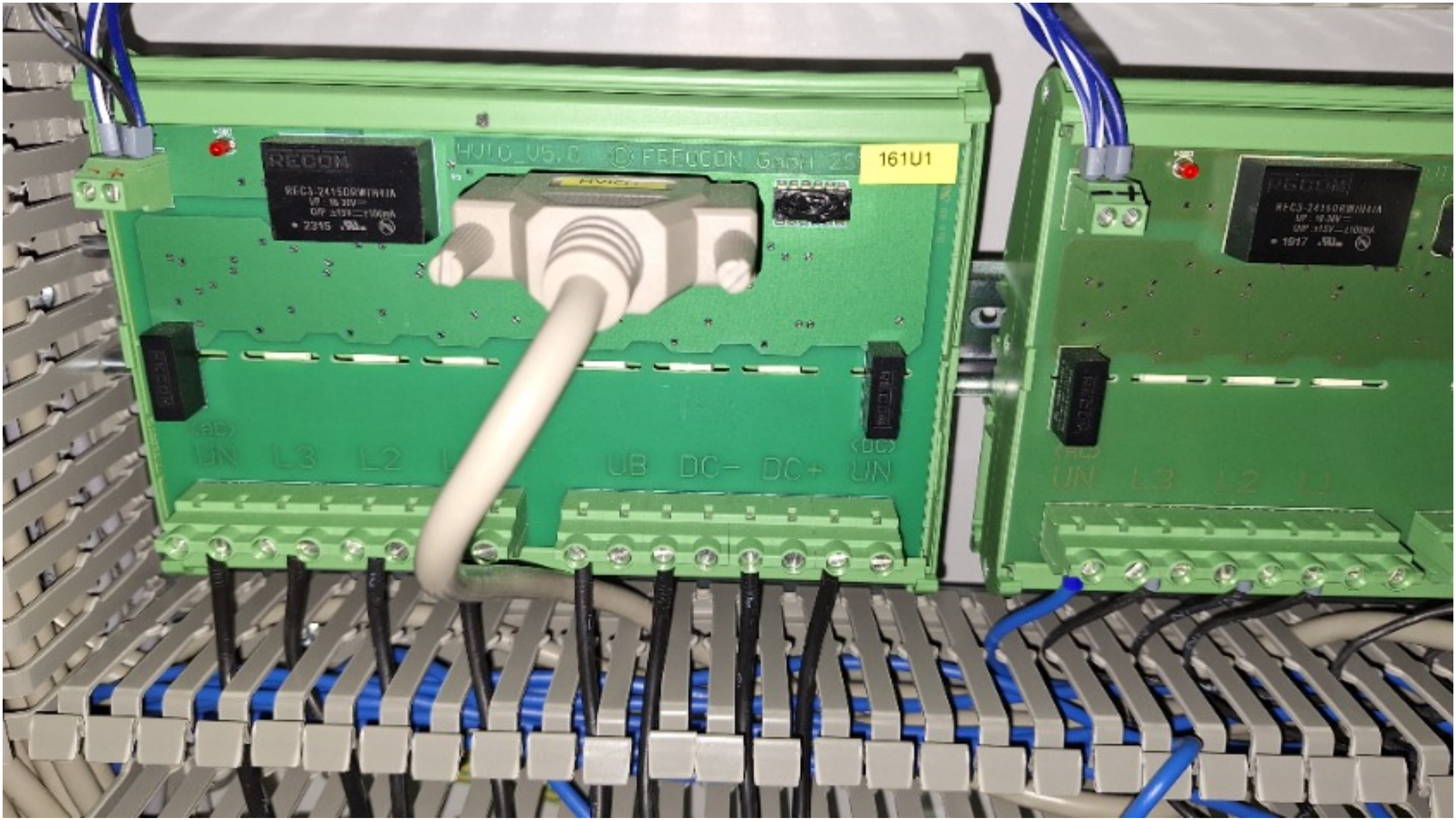
6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T10:31:46.276Z


161U1
RECOM
UN L3 L2
UB DC- DC+ UN

ROSETTI MARINO CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000838

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002321	1.4 Discipline	Electrical
1.2 Item	82006-CEC		6.6KV HV Switchgear / EMCS BESS UCP
1.3 Subsystem	85-00		BESS Package (A-85000)

2 - OBSERVATION

Cable termination is not complete with appropriate pin

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T11:33:23.985Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	A PL A	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-23T11:33:36.067Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Installation done without ferrules according to terminal block datasheet

Name: Alessio Polo

Date: 2024-11-26

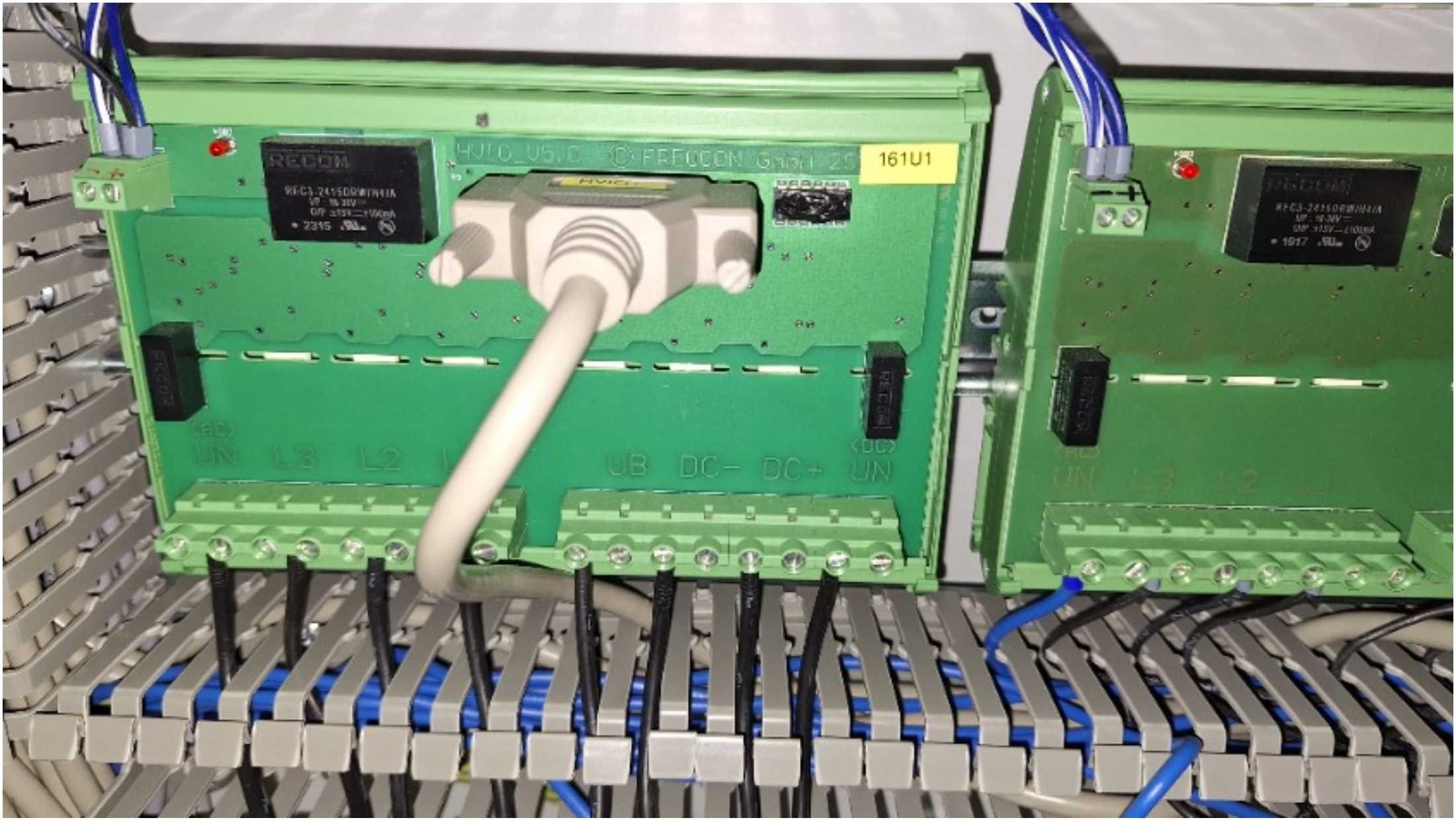
Signature: Digitaly signed by Alessio Polo 2024-11-26T16:22:58.771Z

6- CLEARANCE APPROVAL

Name

Date

Signature


161U1
RECOM
UN L3 L2
UB DC- DC+ UN

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000839

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002321	1.4 Discipline	Electrical
1.2 Item	82006-CEC		6.6KV HV Switchgear / EMCS BESS UCP
1.3 Subsystem	85-00		BESS Package (A-85000)

2 - OBSERVATION

Missing the Thermo-shrink of on the final destination cable. (see document 123A90-DDL-EL-DD-20090 sh.8)

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T11:34:15.258Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	A PL A	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-23T11:34:28.974Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Alessio Polo

Date: 2024-11-26

Signature: Digitaly signed by Alessio Polo 2024-11-26T16:27:16.819Z

6- CLEARANCE APPROVAL

Name

Date

Signature



ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000841

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002325	1.4 Discipline	Electrical
1.2 Item	85001-CEC	BESS / 6.6KV HV Switchgear	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Missing cable tag inside cabinet BESS A-85000

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T11:42:01.647Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-23T11:42:13.207Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T10:32:12.513Z

6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T10:32:31.560Z


85002 CEL
85001 CEL

ROSETTI MARINO CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000842

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002325	1.4 Discipline	Electrical
1.2 Item	85001-CEC	BESS / 6.6KV HV Switchgear	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Missing the cross-ferruling (Cores) . Cabinet BESS A-85000. (see document 123A90-DDL-EL-DD-20092 sh.7-8)

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T11:44:14.398Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Alessio Polo 2024-11-23T11:44:24.774Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T10:33:20.000Z

6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T10:33:35.112Z

-XT1
-XV20

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000844

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002325	1.4 Discipline	Electrical
1.2 Item	85001-CEC	BESS / 6.6KV HV Switchgear	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Cable termination is not complete with appropriate pin

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T11:45:06.193Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	A PL A	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-23T11:48:16.455Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Installation done without ferrules according to terminal block datasheet

Name: Alessio Polo

Date: 2024-11-26

Signature: Digitaly signed by Alessio Polo 2024-11-26T16:23:21.066Z

6- CLEARANCE APPROVAL

Name

Date

Signature

-XT1
-XV20

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000845

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002325	1.4 Discipline	Electrical
1.2 Item	85001-CEC	BESS / 6.6KV HV Switchgear	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Missing the Thermo-shrink of on the final destination cable. BESS A-85000 (see document 123A90-DDL-EL-DD-20090 sh.8)

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T11:47:21.552Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	A PL A	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-23T11:47:32.200Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Alessio Polo

Date: 2024-11-26

Signature: Digitaly signed by Alessio Polo 2024-11-26T16:28:06.746Z

6- CLEARANCE APPROVAL

Name

Date

Signature


85002 CEL
85001 CEL

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000846

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002325	1.4 Discipline	Electrical
1.2 Item	85001-CEC	BESS / 6.6KV HV Switchgear	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Spare cores to be properly isolated (bess A-85000)

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T11:52:28.271Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-23T11:52:41.188Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Alessio Polo

Date: 2025-02-04

Signature: Digitaly signed by Alessio Polo 2025-02-04T12:34:48.396Z

6- CLEARANCE APPROVAL

Name

Date

Signature



ROSETTI MARINO CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000847

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002325	1.4 Discipline	Electrical
1.2 Item	85001-CEC	BESS / 6.6KV HV Switchgear	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Spare cores to be properly isolated by SG-100D1 side

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T11:54:21.916Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Alessio Polo 2024-11-23T11:54:32.108Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Alessio Polo

Date: 2025-02-04

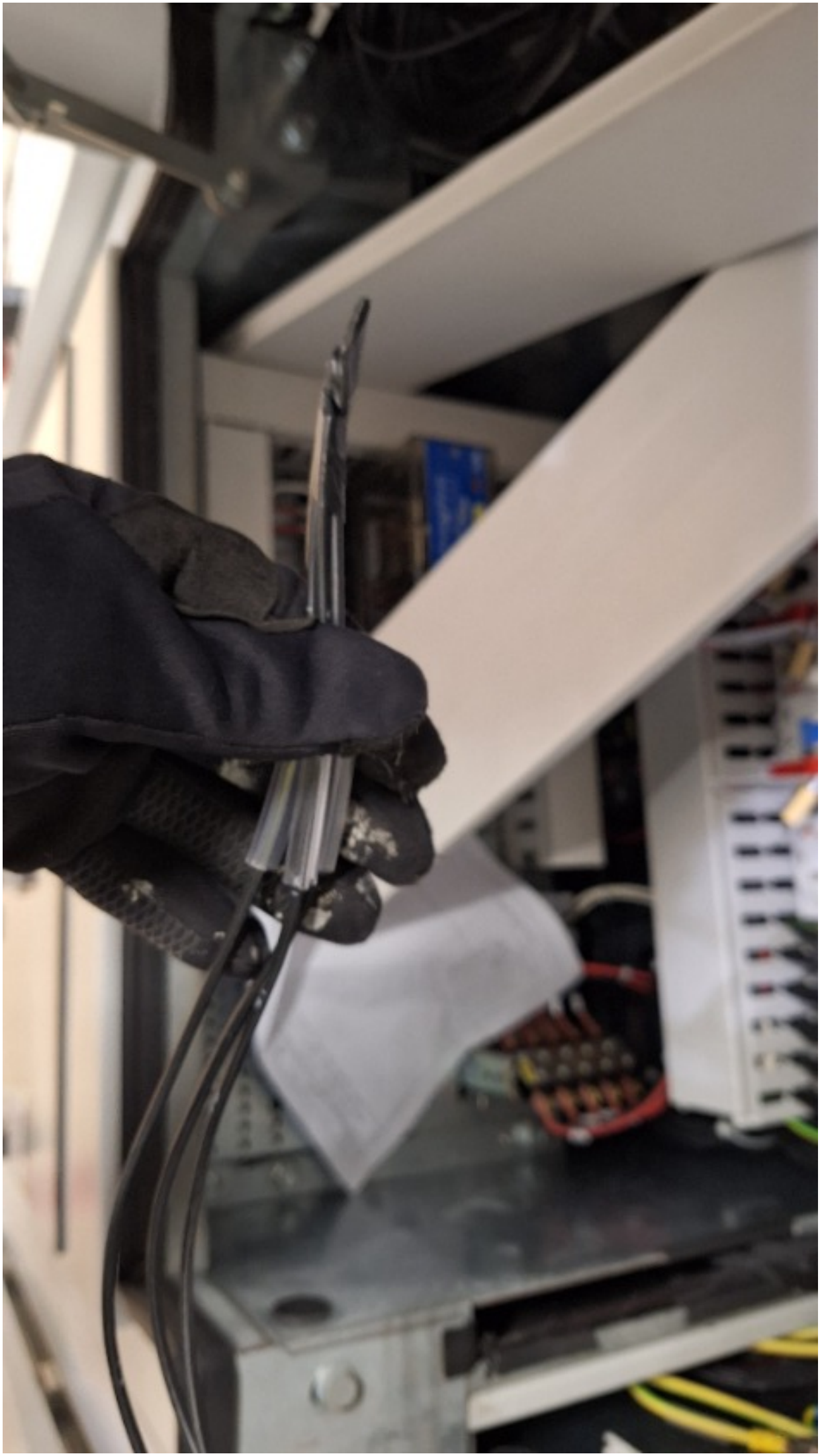
Signature: Digitaly signed by Alessio Polo 2025-02-04T12:34:58.486Z

6- CLEARANCE APPROVAL

Name

Date

Signature



ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000848

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002325	1.4 Discipline	Electrical
1.2 Item	85001-CEC	BESS / 6.6KV HV Switchgear	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Core identificatio tags are wrong side SG-100D1 .(see document 123A90-DDL-EL-DD-20092 sh.7-8)

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T11:57:07.332Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Alessio Polo 2024-11-23T11:57:19.135Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Andrea Andreani

Date: 2025-02-19

Signature: Digitaly signed by Andrea Andreani 2025-02-19T15:47:40.178Z

6- CLEARANCE APPROVAL

Name

Date

Signature

XM
+PR
84
+PR
85
87
90.
98.
100
102
103
104
105
106
107
109
110
116
117
118
119
125
126
59/XM/85001-CEC
60/XM/85001-CEC
82011-CEC/1/-XM/63
82011-CEC/2/-XM/64
82010-CEC/1/-XM/65
82010-CEC/2/-XM/66
82010-CEC/3/-XM/67
82010-CEC/4/-XM/68
71
72
73
77
78

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000849

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002325	1.4 Discipline	Electrical
1.2 Item	85001-CEC	BESS / 6.6KV HV Switchgear	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Missing the Thermo-shrink of on the cores. restore the mechanical protection of the cable (see document 123A90-DDL-EL-DD-20090 sh.8)

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T12:01:53.260Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	A PL A	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Alessio Polo 2024-11-23T12:04:53.702Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Alessio Polo

Date: 2024-11-26

Signature: Digitaly signed by Alessio Polo 2024-11-26T16:29:38.285Z

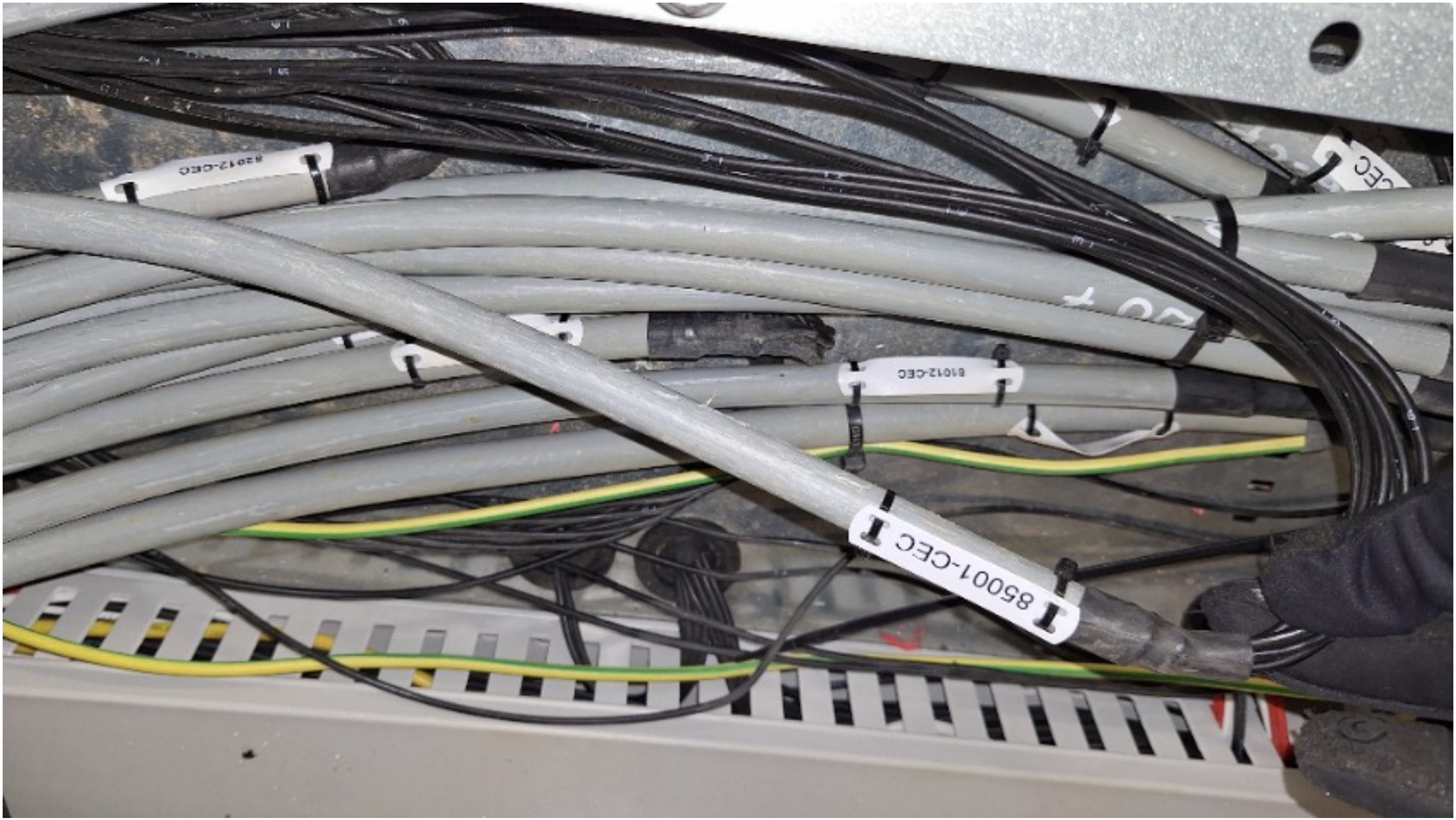
6- CLEARANCE APPROVAL

Name

Date

Signature


85001-CEC
81012-CEC
82012-CEC


85001-CEC



ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000850

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002326	1.4 Discipline	Electrical
1.2 Item	85002-CEC	EMCS / BESS	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Missing cable tags both cabinet side B400-EMCS-001 / BESS A-85000.

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T12:10:19.062Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Alessio Polo 2024-11-23T12:10:28.612Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Josip Krizanic

Date: 2025-03-04

Signature: Digitaly signed by Josip Krizanic 2025-03-04T15:39:36.592Z

6- CLEARANCE APPROVAL

Name

Date

Signature


85002 CEL
85001 CEL



ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000851

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002326	1.4 Discipline	Electrical
1.2 Item	85002-CEC	EMCS / BESS	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Missing core identification tags both Cabinet side B400-EMCS-001 / BESS A-85000 . (see document 123A90-DDL-EL-DD-20092 sh.7-8)

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T12:16:38.245Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Alessio Polo 2024-11-23T12:16:47.123Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Done

Name: Eleonora Carotenuto

Date: 2025-06-19

Signature: Digitaly signed by Eleonora Carotenuto 2025-06-19T08:08:24.904Z

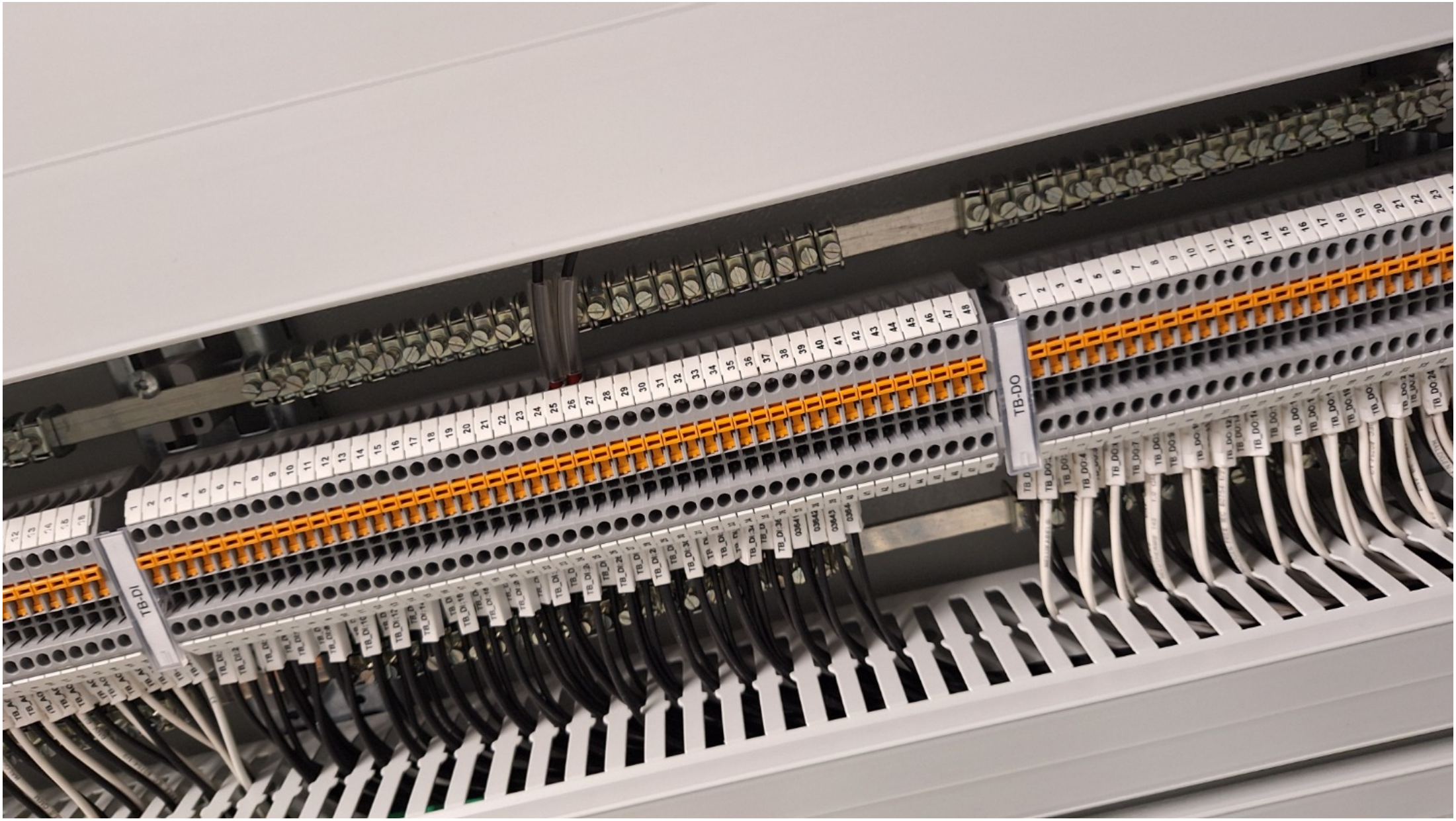
6- CLEARANCE APPROVAL

Name

Date

Signature

-XT1
-XV20


TB-DI
TB-DO



ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000852

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002325	1.4 Discipline	Electrical
1.2 Item	85001-CEC	BESS / 6.6KV HV Switchgear	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Missing the Thermo-shrink of on the final destination cable. BESS A-85000 (see document 123A90-DDL-EL-DD-20090 sh.8)

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T12:18:46.932Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	A PL A	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-23T12:19:00.980Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Alessio Polo

Date: 2024-11-26

Signature: Digitaly signed by Alessio Polo 2024-11-26T16:28:51.844Z

6- CLEARANCE APPROVAL

Name

Date

Signature

85002 CEL
85001 CEL

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000854

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002325	1.4 Discipline	Electrical
1.2 Item	85001-CEC	BESS / 6.6KV HV Switchgear	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Cable termination is not complete with appropriate pin. BESS A-85000

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T12:19:58.539Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	A PL A	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-23T12:20:09.309Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Installation done without ferrules according to terminal block datasheet

Name: Alessio Polo

Date: 2024-11-26

Signature: Digitaly signed by Alessio Polo 2024-11-26T16:23:46.419Z

6- CLEARANCE APPROVAL

Name

Date

Signature

-XT1
-XV20

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000855

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10001447	1.4 Discipline	Instrumental
1.2 Item	C-85-XS-001/B400-SIS-001	TRIP SIGNAL TO UCP / MARSHALLING PCS	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Missing cable tags both cabinet B400-SIS-001 / A-85000

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T12:25:51.413Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	PRE-COMM	Signature	Digitaly signed by Alessio Polo 2024-11-23T12:26:00.361Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Josip Krizanic

Date: 2025-02-27

Signature: Digitaly signed by Josip Krizanic 2025-02-27T12:08:33.835Z

6- CLEARANCE APPROVAL

Name

Date

Signature


SIEMENS
SIEMENS
SIEMENS
SIEMENS



ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000856

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10001447	1.4 Discipline	Instrumental
1.2 Item	C-85-XS-001/B400-SIS-001	TRIP SIGNAL TO UCP / MARSHALLING PCS	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Missing core identification tags both side B400-SIS-001 / A-85000 . (see document 123A90-DDL-IN-DG-40016 sh.3)

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T12:28:28.801Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Alessio Polo 2024-11-23T12:28:40.371Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Installed.

Name: Giovanni Tangianu

Date: 2025-05-22

Signature: Digitaly signed by Giovanni Tangianu 2025-05-22T12:52:01.542Z

6- CLEARANCE APPROVAL

Name

Date

Signature

-XT1
-XV20

TB-P320-PLC
TB-B100-HSB-001
2
4
2
4
6
8
10
PR1/TB-P320PLC/TB-P320PLC/02
PR2/TB-P320PLC/TB-P320PLC/04
PR1/TB-B100-HSB-001/77-ZSL-00012
PR3/TB-B100-HSB-001/77-ZSL-00036

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000857

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10001447	1.4 Discipline	Instrumental
1.2 Item	C-85-XS-001/B400-SIS-001	TRIP SIGNAL TO UCP / MARSHALLING PCS	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Cable termination to be redone with appropriate pin both side (B400-SIS-001 / A-85000)

Name: Alessio Polo

Date: 2024-11-23

Signature: Digitaly signed by Alessio Polo 2024-11-23T12:31:17.635Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	A PL A	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-23
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Alessio Polo 2024-11-23T12:31:27.131Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Alessio Polo

Date: 2024-11-26

Signature: Digitaly signed by Alessio Polo 2024-11-26T16:32:05.604Z

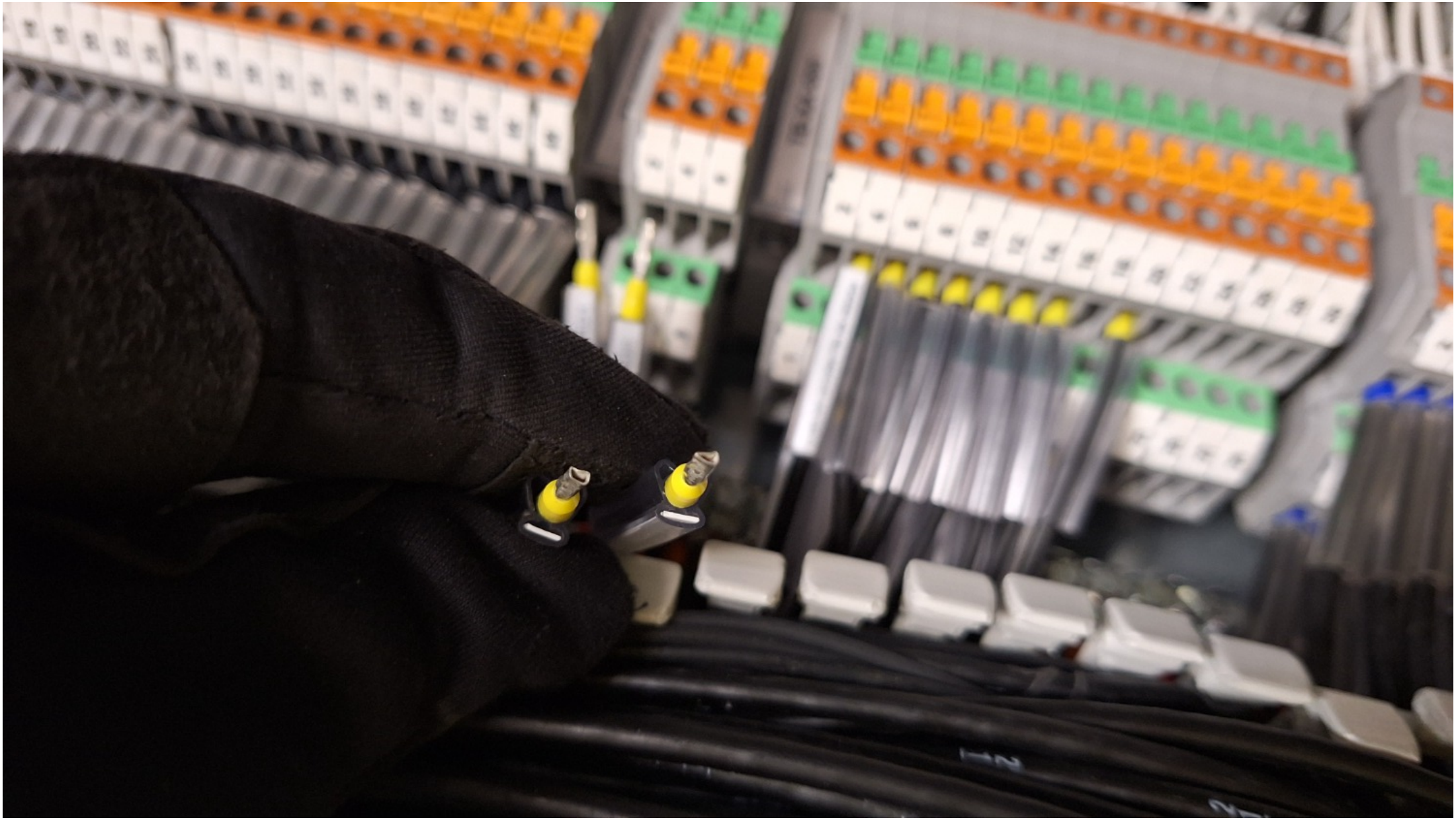
6- CLEARANCE APPROVAL

Name

Date

Signature

TB-P320-PLC
TB-B100-HSB-001
2
4
2
4
6
8
10
PR1/TB-P320PLC/TB-P320PLC/02
PR2/TB-P320PLC/TB-P320PLC/04
PR1/TB-B100-HSB-001/77-ZSL-00012
PR3/TB-B100-HSB-001/77-ZSL-00036



-XT1
-XV20

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000858

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10001453	1.4 Discipline	Instrumental
1.2 Item	P320PLC/B400-SIS-001	UCP FAULT ALARM / MARSHALLING PCS	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Missing cable tags by both panel sides B400-SIS-001 / BESS A-85000 UCP.

Name: Alessio Polo

Date: 2024-11-25

Signature: Digitaly signed by Alessio Polo 2024-11-25T07:26:26.116Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-25
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Alessio Polo 2024-11-25T07:26:48.885Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Josip Krizanic

Date: 2025-02-20

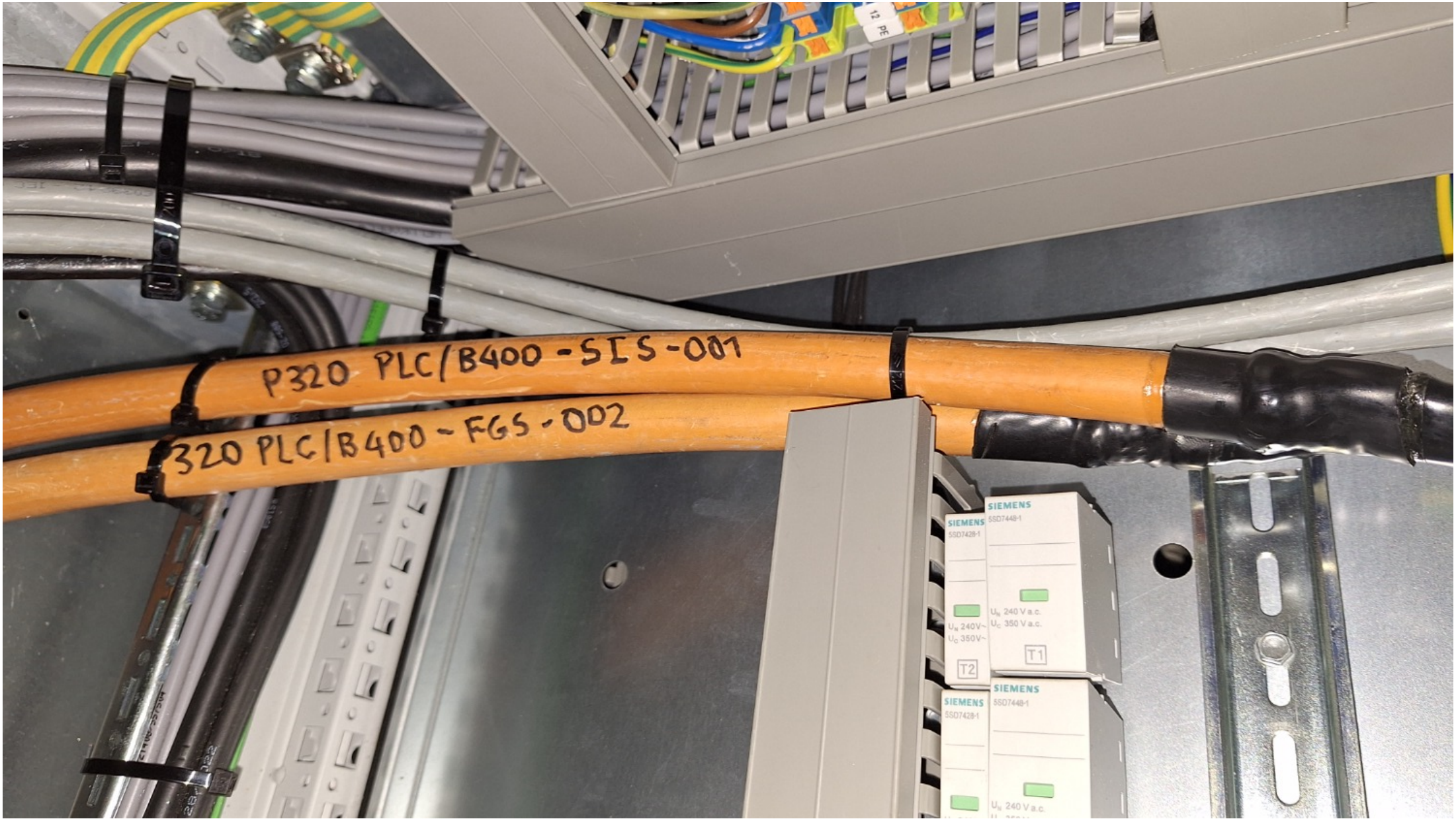
Signature: Digitaly signed by Josip Krizanic 2025-02-20T15:51:40.667Z

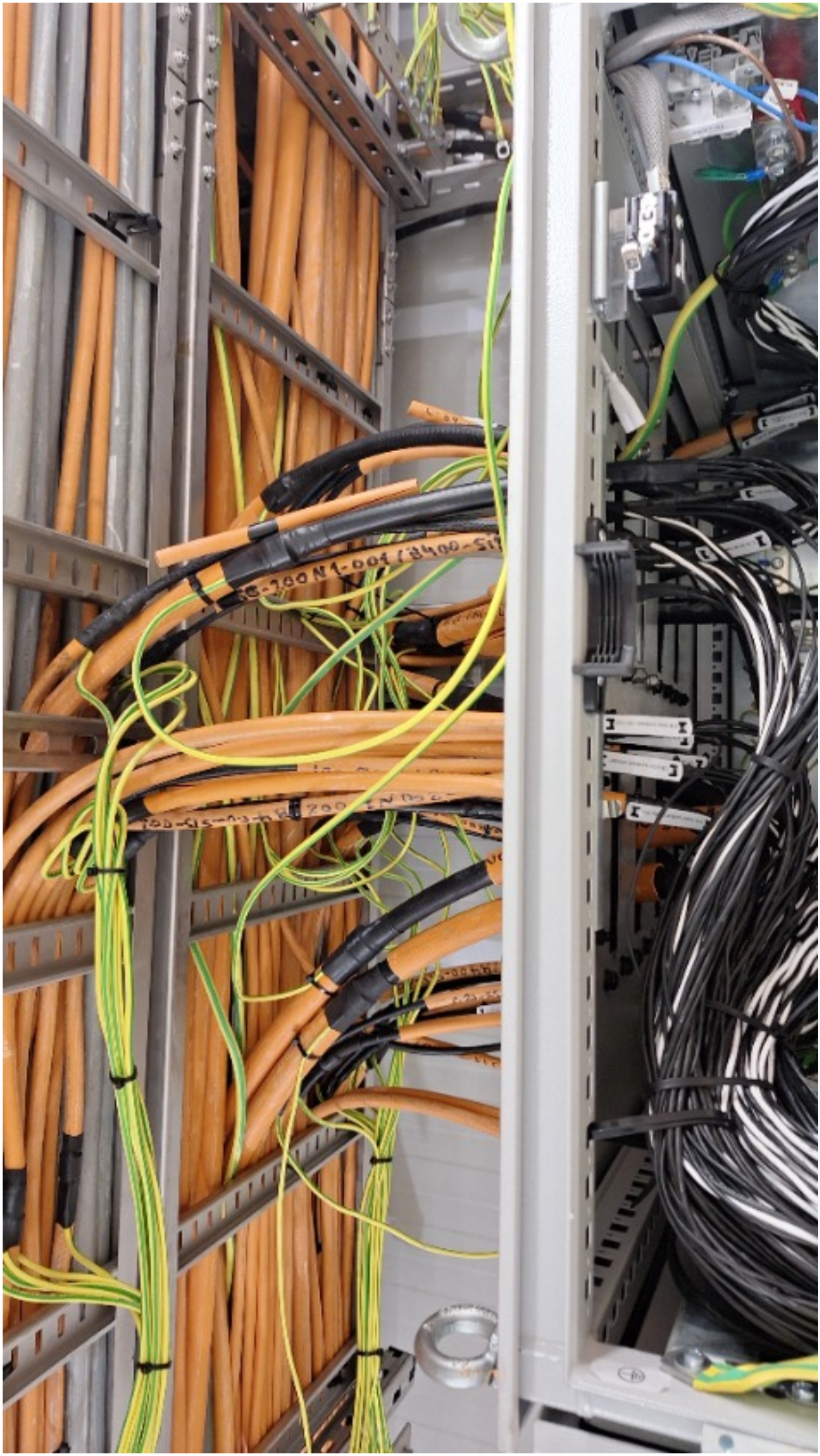
6- CLEARANCE APPROVAL

Name

Date

Signature


P320 PLC/B400 -SIS-001
320 PLC/B400 - FGS - 002
SIEMENS
5SD7428-1
SIEMENS
5SD7448-1
T2
T1



ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000859

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10001453	1.4 Discipline	Instrumental
1.2 Item	P320PLC/B400-SIS-001	UCP FAULT ALARM / MARSHALLING PCS	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Missing core identification tags by both side B400-SIS-001 / BESS A-85000 UCP . (see document 123A90-DDL-IN-DG-40016 sh.3)

Name: Alessio Polo

Date: 2024-11-25

Signature: Digitaly signed by Alessio Polo 2024-11-25T07:34:18.946Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-25
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Alessio Polo 2024-11-25T07:34:30.386Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Installed.

Name: Giovanni Tangianu

Date: 2025-05-22

Signature: Digitaly signed by Giovanni Tangianu 2025-05-22T12:52:20.048Z

6- CLEARANCE APPROVAL

Name

Date

Signature

-XT1
-XV20

PR1/P320PLC/TB-P320PLC/2
PR2/P320PLC/TB-P320PLC/4

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000860

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10001453	1.4 Discipline	Instrumental
1.2 Item	P320PLC/B400-SIS-001	UCP FAULT ALARM / MARSHALLING PCS	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Cable termination to be redone with appropriate pin both side B400-SIS-001 / BESS A-85000 UCP

Name: Alessio Polo

Date: 2024-11-25

Signature: Digitaly signed by Alessio Polo 2024-11-25T07:38:00.906Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	A PL A	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-25
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Alessio Polo 2024-11-25T07:38:14.818Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Alessio Polo

Date: 2024-11-26

Signature: Digitaly signed by Alessio Polo 2024-11-26T16:32:33.098Z

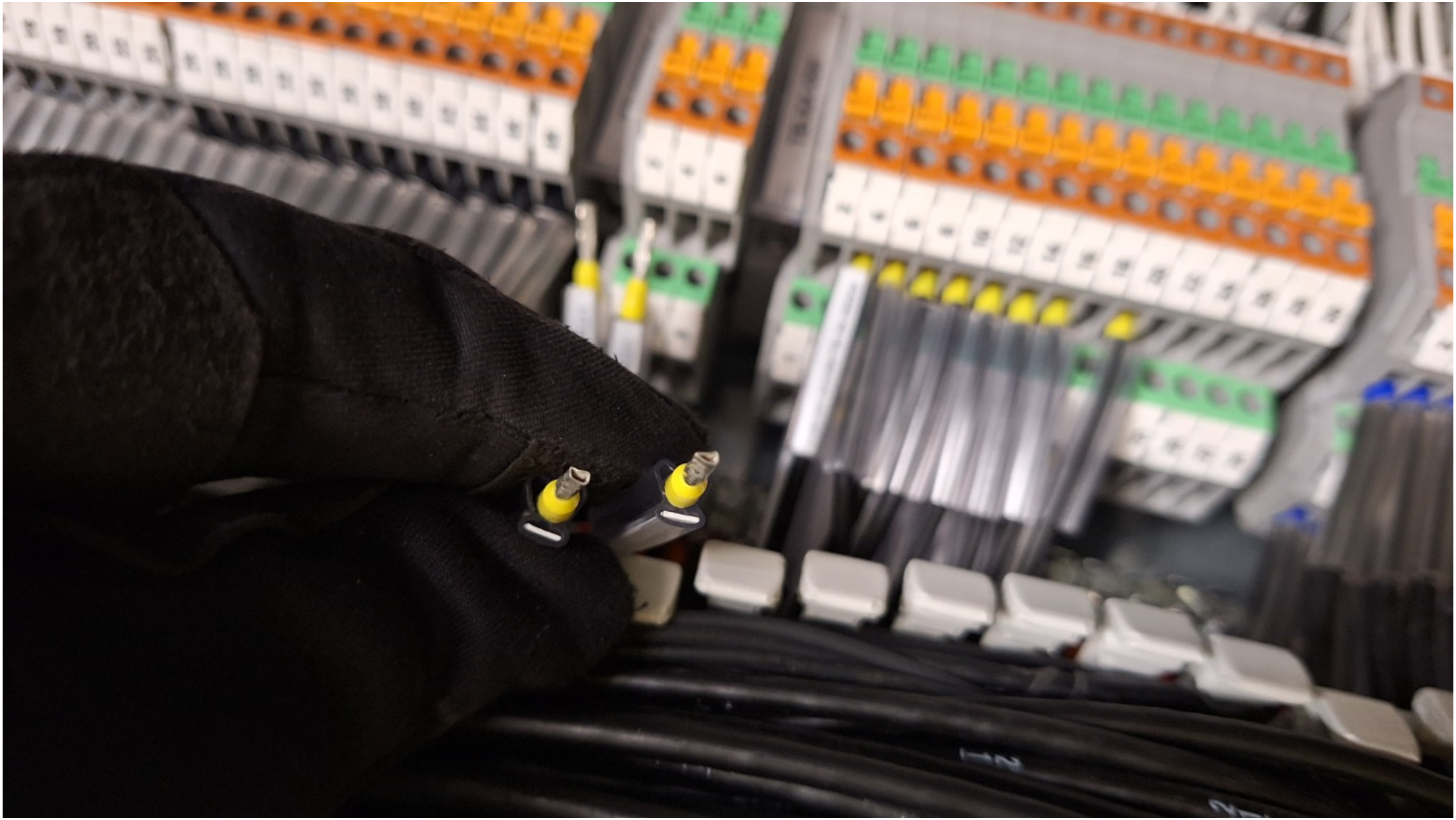
6- CLEARANCE APPROVAL

Name

Date

Signature

-XT1
-XV20



ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000861

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10001464	1.4 Discipline	Instrumental
1.2 Item	P320PLC/B400-FGS-003	CONFIRMED GAS ALARM / MARSHALLING PCS	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Missing cable tags both panels side B400-FGS-003 / BESS A-85000 UCP.

Name: Alessio Polo

Date: 2024-11-25

Signature: Digitaly signed by Alessio Polo 2024-11-25T07:43:14.649Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-25
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Alessio Polo 2024-11-25T07:43:26.016Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Josip Krizanic

Date: 2025-02-20

Signature: Digitaly signed by Josip Krizanic 2025-02-20T15:52:06.157Z

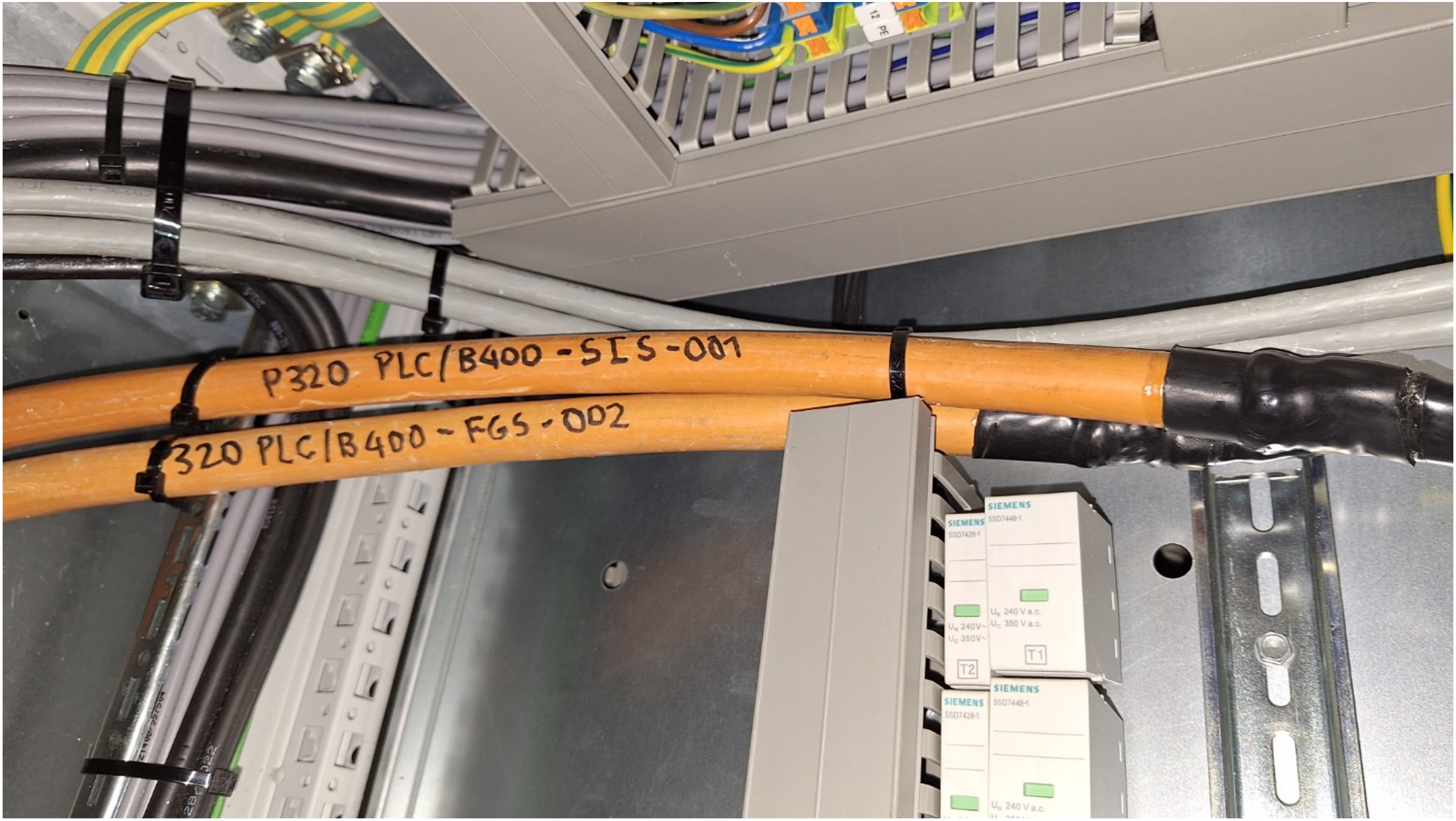
6- CLEARANCE APPROVAL

Name

Date

Signature




P320 PLC/B400 -SIS-001
320 PLC/B400 - FGS - 002
SIEMENS
5SD7428-1
SIEMENS
5SD7448-1
T2
T1

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000863

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10001464	1.4 Discipline	Instrumental
1.2 Item	P320PLC/B400-FGS-003	CONFIRMED GAS ALARM / MARSHALLING PCS	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Missing core identification tags both Cabinet side B400-FGS-003 / BESS A-85000 UCP . (see document 123A90-DDL-IN-DG-40016 sh.3)

Name: Alessio Polo

Date: 2024-11-25

Signature: Digitaly signed by Alessio Polo 2024-11-25T07:45:26.831Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-25
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Alessio Polo 2024-11-25T07:45:36.095Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Josip Krizanic

Date: 2025-03-04

Signature: Digitaly signed by Josip Krizanic 2025-03-04T14:14:37.126Z

6- CLEARANCE APPROVAL

Name

Date

Signature

-XT1
-XV20

PR1/P320PLC/TB-P320PLC/2
PR2/P320PLC/TB-P320PLC/4

ROSETTI MARINO CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000866

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10001464	1.4 Discipline	Instrumental
1.2 Item	P320PLC/B400-FGS-003	CONFIRMED GAS ALARM / MARSHALLING PCS	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Cable termination is not complete with appropriate pin. cabinet side B400-FGS-003 / BESS A-85000 UCP

Name: Alessio Polo

Date: 2024-11-25

Signature: Digitaly signed by Alessio Polo 2024-11-25T07:47:10.072Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	A PL A	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-25
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Alessio Polo 2024-11-25T07:47:22.751Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Alessio Polo

Date: 2024-11-26

Signature: Digitaly signed by Alessio Polo 2024-11-26T16:32:57.844Z

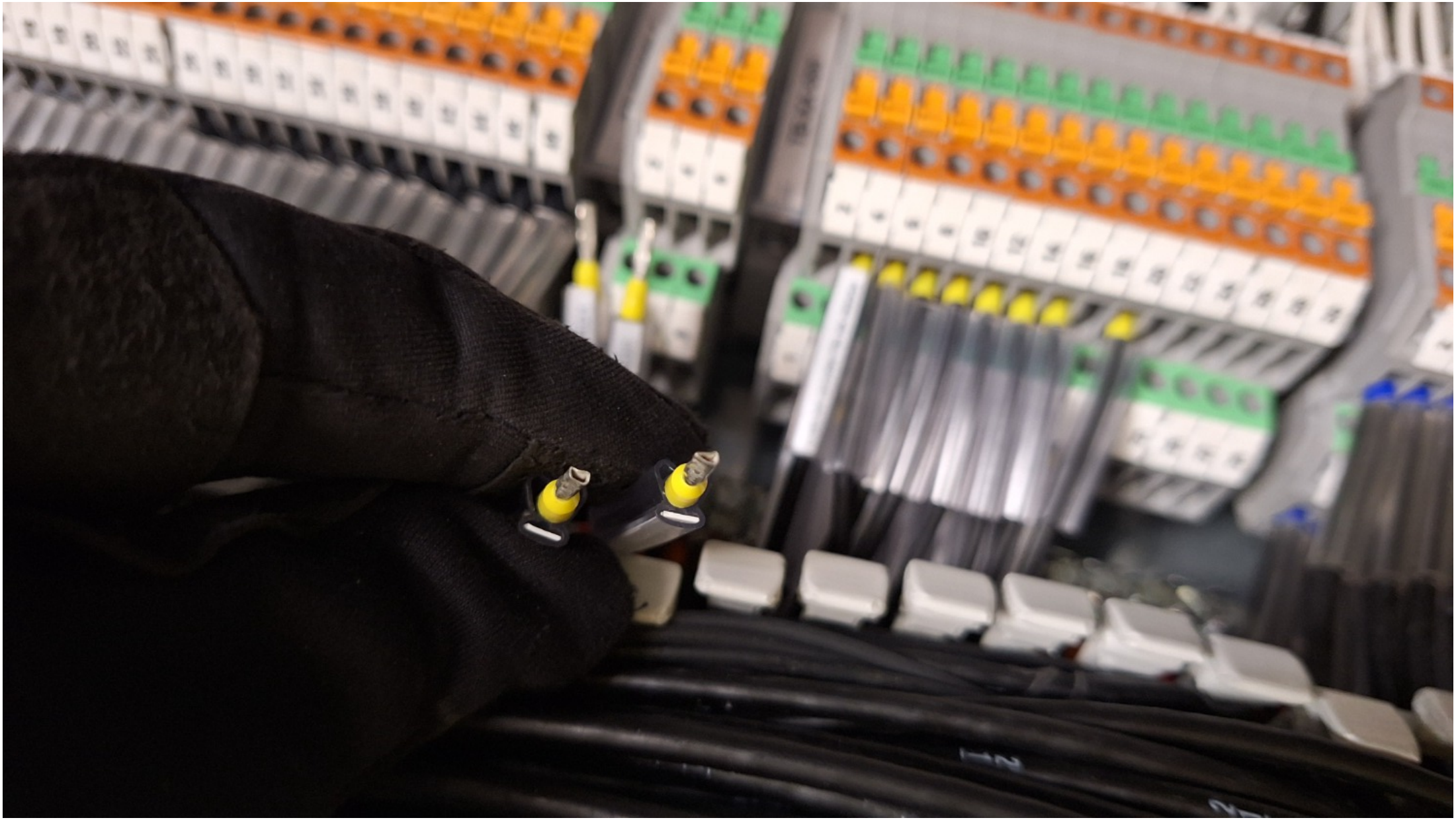
6- CLEARANCE APPROVAL

Name

Date

Signature

-XT1
-XV20



ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000872

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002359	1.4 Discipline	Mechanical
1.2 Item	A-85000	BESS	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Earthing System is not as indicated by the Electrical Typical Installation Details document . see 123A90-DDL-EL-DD-20090 sh.3

Name: Alessio Polo

Date: 2024-11-25

Signature: Digitaly signed by Alessio Polo 2024-11-25T08:55:38.645Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-25
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Alessio Polo 2024-11-25T08:55:58.886Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Alessio Polo

Date: 2025-01-23

Signature: Digitaly signed by Alessio Polo 2025-01-23T16:33:19.140Z

6- CLEARANCE APPROVAL

Name

Date

Signature


NOT TO
DO
N ONLY
R POINT







ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000873

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002359	1.4 Discipline	Mechanical
1.2 Item	A-85000	BESS	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

The earthing and connection conductors (green/yellow) have a section of 95mm2 different from that indicated in document 123A90-DDL-EL-DD-20113 sh.1

Name: Alessio Polo

Date: 2024-11-25

Signature: Digitaly signed by Alessio Polo 2024-11-25T09:11:28.301Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-25
3.5 Action by	ENG Engineering	Signature	Digitaly signed by Alessio Polo 2024-11-25T09:11:46.151Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

RLMU DONE ON 123A90-DDL-EL-DL-20133,sh.01

Name: Eleonora Carotenuto

Date: 2024-12-27

Signature: Digitaly signed by Eleonora Carotenuto 2024-12-27T10:31:31.121Z

6- CLEARANCE APPROVAL

Name

Date

Signature


ONLY
POINT



ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000874

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10002359	1.4 Discipline	Mechanical
1.2 Item	A-85000	BESS	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

In the container "BESS 01", the door opening/closing handle is missing

Name: Alessio Polo

Date: 2024-11-25

Signature: Digitaly signed by Alessio Polo 2024-11-25T09:43:37.644Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-25
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-25T09:44:24.033Z

4 - PERFORMED ACTION

Performed by Freqcon personnel

Name: Alessandro Sutto

Date: 2025-06-18

Signature: Digitaly signed by Alessandro Sutto 2025-06-18T14:07:17.298Z

5 - CLEARANCE CHECK

Confirmed by photo

Name: Alessandro Sutto

Date: 2025-06-18

Signature: Digitaly signed by Alessandro Sutto 2025-06-18T14:07:36.946Z

6- CLEARANCE APPROVAL

Photo attached

Name: Jan Duinhoven

Date: 2025-06-18

Signature: Digitaly signed by Jan Duinhoven 2025-06-18T14:11:56.008Z







ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000936

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10004357	1.4 Discipline	Telecom
1.2 Item	P320PLC/B400-NET-001.01	COMMUNICATION / NETWORK CABINET	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

The copper conductor of the cable armor must be individually connected to the earthing bar. B400-NET-001. See 123A90-DDL-EL-DD-20090.

Name: Alessio Polo

Date: 2024-11-26

Signature: Digitaly signed by Alessio Polo 2024-11-26T16:08:17.230Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-26
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Alessio Polo 2024-11-26T16:08:29.335Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Alessio Polo

Date: 2025-01-22

Signature: Digitaly signed by Alessio Polo 2025-01-22T16:06:47.141Z

6- CLEARANCE APPROVAL

Name

Date

Signature



ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000937

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10004357	1.4 Discipline	Telecom
1.2 Item	P320PLC/B400-NET-001.01	COMMUNICATION / NETWORK CABINET	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Missing cable tag , cabinet input BESS A-850000.

Name: Alessio Polo

Date: 2024-11-26

Signature: Digitaly signed by Alessio Polo 2024-11-26T16:09:36.821Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-26
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-26T16:09:53.959Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T10:33:58.011Z

6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T10:34:14.441Z

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000940

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10004358	1.4 Discipline	Telecom
1.2 Item	P320PLC/B400-NET-001.02	COMMUNICATION / NETWORK CABINET	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

The copper conductor of the cable armor must be individually connected to the earthing bar B400-NET-001. See 123A90-DDL-EL-DD-20090.

Name: Alessio Polo

Date: 2024-11-26

Signature: Digitaly signed by Alessio Polo 2024-11-26T16:11:35.719Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-26
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Alessio Polo 2024-11-26T16:11:47.581Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Alessio Polo

Date: 2025-02-04

Signature: Digitaly signed by Alessio Polo 2025-02-04T12:36:51.860Z

6- CLEARANCE APPROVAL

Name

Date

Signature



ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000941

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10004358	1.4 Discipline	Telecom
1.2 Item	P320PLC/B400-NET-001.02	COMMUNICATION / NETWORK CABINET	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Missing cable tag , cabinet input BESS A-850000

Name: Alessio Polo

Date: 2024-11-26

Signature: Digitaly signed by Alessio Polo 2024-11-26T16:12:47.109Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Alessio Polo
3.4 Activity code	MC Mechanical Completion	Date	2024-11-26
3.5 Action by	VND Vendor	Signature	Digitaly signed by Alessio Polo 2024-11-26T16:13:05.628Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T10:34:38.776Z

6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name: Jan Duinhoven

Date: 2025-04-10

Signature: Digitaly signed by Jan Duinhoven 2025-04-10T10:35:03.680Z

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30001005

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Electrical
1.2 Item	A-85000		BESS
1.3 Subsystem	85-00		BESS Package (A-85000)

2 - OBSERVATION

Cables in electrical cabinets/panels are missing proper lables and identification for single wires. Many cable connections are missing ferrules/crimps (BESS 1 - Electrical Cabinets)

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	-
3.4 Activity code	CPY Company	Date	2024-11-28
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature Digitaly signed by Jan Duinhoven 2025-04-10T10:35:49.432Z

6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature Digitaly signed by Jan Duinhoven 2025-04-10T10:36:07.463Z

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30001006

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Electrical
1.2 Item	A-85000		BESS
1.3 Subsystem	85-00		BESS Package (A-85000)

2 - OBSERVATION

Cables in electrical cabinets/panels are missing proper lables and identification for single wires. Many cable connections are missing ferrules/crimps (BESS 2 - Electrical Cabinets)

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	-
3.4 Activity code	CPY Company	Date	2024-11-28
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature Digitaly signed by Jan Duinhoven 2025-04-10T10:36:27.911Z

6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature Digitaly signed by Jan Duinhoven 2025-04-10T10:37:01.805Z

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30001007

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Electrical
1.2 Item	A-85000	BESS	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Missing operating manual (PCS Container - Control Cabinet 1)

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	-
3.4 Activity code	CPY Company	Date	2024-11-28
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature Digitaly signed by Jan Duinhoven 2025-04-10T10:37:42.537Z

6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature Digitaly signed by Jan Duinhoven 2025-04-10T10:38:03.937Z

ROSETTI MARINO CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30001008

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Mechanical
1.2 Item	A-85000	BESS	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Check on coolant liquid level and overpressure collection bottle after transportation and after first re-commisisoning (PCS Container - Converter Cooling System)

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	-
3.4 Activity code	CPY Company	Date	2024-11-28
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature PROVERLIS Digitaly signed by Jan Duinhoven 2025-04-10T10:38:34.978Z

6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature PROVERLIS Digitaly signed by Jan Duinhoven 2025-04-10T10:39:09.773Z

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30001009

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Electrical
1.2 Item	A-85000		BESS
1.3 Subsystem	85-00		BESS Package (A-85000)

2 - OBSERVATION

Missing lables, clear marking on cables and ferrules/crimps (BESS 1 - Battery Cabinets)

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	-
3.4 Activity code	CPY Company	Date	2024-11-28
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature Digitaly signed by Jan Duinhoven 2025-04-10T10:40:02.598Z

6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature Digitaly signed by Jan Duinhoven 2025-04-10T10:40:52.487Z

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30001010

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Electrical
1.2 Item	A-85000	BESS	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Missing lables, clear marking on cables and ferrules/crimps (BESS 2 - Battery Cabinets)

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	-
3.4 Activity code	CPY Company	Date	2024-11-28
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature Digitaly signed by Jan Duinhoven 2025-04-10T10:41:13.488Z

6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature Digitaly signed by Jan Duinhoven 2025-04-10T10:42:03.310Z

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30001011

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Mechanical
1.2 Item	A-85000	BESS	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Missing castell lock to be installed on door (PCS Container - Transformer Area)

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	-
3.4 Activity code	CPY Company	Date	2024-11-28
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature Digitaly signed by Jan Duinhoven 2025-04-10T10:42:23.459Z

6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature Digitaly signed by Jan Duinhoven 2025-04-10T10:43:03.407Z

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30001012

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Electrical
1.2 Item	A-85000		BESS
1.3 Subsystem	85-00		BESS Package (A-85000)

2 - OBSERVATION

Cables in electrical cabinets/panels are missing proper lables and identification for single wires. Many cable connections are missing ferrules/crimps (BESS System)

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	-
3.4 Activity code	CPY Company	Date	2024-11-28
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature Digitaly signed by Jan Duinhoven 2025-04-10T10:43:28.094Z

6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature Digitaly signed by Jan Duinhoven 2025-04-10T10:47:46.598Z

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30001013

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Electrical
1.2 Item	A-85000	BESS	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

As built drawing needed for electrical schematics, GA and mechanical drawings of external and internals of contianers (BESS System)

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	-
3.4 Activity code	CPY Company	Date	2024-11-28
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature PROVERLIS Digitaly signed by Jan Duinhoven 2025-04-10T10:48:05.263Z

6- CLEARANCE APPROVAL

Work has been completed by CPI Vendor and confirmed by package manager.

Name Jan Duinhoven

Date 2025-04-10

Signature PROVERLIS Digitaly signed by Jan Duinhoven 2025-04-10T10:49:05.277Z

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30001014

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Mechanical
1.2 Item	A-85000		BESS
1.3 Subsystem	85-00		BESS Package (A-85000)

2 - OBSERVATION

Install three cranes in Battery rooms (BESS 1)

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	-
3.4 Activity code	CPY Company	Date	2024-11-28
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Name: Gerry McCann

Date: 2024-12-19

Signature: Digitaly signed by Gerry McCann 2024-12-19T12:42:16.688Z

6- CLEARANCE APPROVAL

Name: John Mackillop

Date: 2024-12-19

Signature: Digitaly signed by John Mackillop 2024-12-19T15:03:57.000Z

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30001015

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Mechanical
1.2 Item	A-85000		BESS
1.3 Subsystem	85-00		BESS Package (A-85000)

2 - OBSERVATION

Install three cranes in Battery rooms (BESS 2)

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	-
3.4 Activity code	CPY Company	Date	2024-11-28
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Name Gerry McCann

Date 2024-12-19

Signature Digitaly signed by Gerry McCann 2024-12-19T12:43:18.454Z

6- CLEARANCE APPROVAL

Name John Mackillop

Date 2024-12-19

Signature Digitaly signed by John Mackillop 2024-12-19T16:04:40.247Z

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30001016

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Mechanical
1.2 Item	A-85000		BESS
1.3 Subsystem	85-00		BESS Package (A-85000)

2 - OBSERVATION

Battery mounting brackets on floor need to be installed (BESS 1 - Battery Cabinets)

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	-
3.4 Activity code	CPY Company	Date	2024-11-28
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Name: Gerry McCann

Date: 2024-12-19

Signature: Digitaly signed by Gerry McCann 2024-12-19T12:43:57.216Z

6- CLEARANCE APPROVAL

Name: John Mackillop

Date: 2024-12-19

Signature: Digitaly signed by John Mackillop 2024-12-19T13:05:17.048Z

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30001017

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Mechanical
1.2 Item	A-85000	BESS	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

Battery mounting brackets on floor need to be installed (BESS 2 - Battery Cabinets)

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	-
3.4 Activity code	CPY Company	Date	2024-11-28
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Name Gerry McCann

Date 2024-12-19

Signature Digitaly signed by Gerry McCann 2024-12-19T12:44:29.732Z

6- CLEARANCE APPROVAL

Name John Mackillop

Date 2024-12-19

Signature Digitaly signed by John Mackillop 2024-12-19T15:06:03.976Z

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30004331

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Mechanical
1.2 Item	A-85000	BESS	
1.3 Subsystem	85-00	BESS Package (A-85000)	

2 - OBSERVATION

During execution of Cause & Effect OTP doc. n. 123A90-PML-COM-PRO-03054, it had been noted that on equipment packages provided with a dedicated PLC controller, it was not possible to remotely reset the C&E trip command. Equipment package PLC internal logic to be updated and tested from Yokogawa workstation

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Giandonato Delmissier
3.4 Activity code	COMM Commissioning	Date	2025-04-15
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

Ballard are performed the work

Name Paul Kyle

Date 2025-06-06

Signature Digitaly signed by Paul Kyle 2025-06-06T07:37:21.825Z

5 - CLEARANCE CHECK

“We also successfully tested the trip command from the SIS (80-XS-001), the corresponding feedback (80-XA-003) as well as the functionality of the reset push button from LP.”

Name Paul Kyle

Date 2025-06-06

Signature Digitaly signed by Paul Kyle 2025-06-06T07:38:25.237Z

6- CLEARANCE APPROVAL

Closed as per email dd. 6 June 2025

Name Jan Duinhoven

Date 2025-06-06

Signature Digitaly signed by Jan Duinhoven 2025-06-06T07:38:57.809Z

AlarmID	ID Prefix	ID Suffix	SubSystem	Alarm Name	Tagname	Unit	Operator	Limit	Severity	Description	Delay Time	State Enable Delay	Corrective Action	Remote Friendly	Modbus Address	Modbus Bit
1001	1	1	MainControl	MainSafetyOK	=LA01+UC20-KE10			FALSE	4	Main Safety needs Reset	3	3	Reset Main Safety Controller once it is safe to do so	No	1140	0
1002	1	2	MainControl	SafetymodbusCommsDriverError				TRUE	4	Safety Controller - Com Error	3	3	Inspect network connection between Safety Controllers and main controller, and fix loose cables, replace broken cables and check network switches	No	1140	1
1003	1	3	MainControl	ESTOPCustomer	<RM/BLPH Scope>			FALSE	4	E STOP BLPH Platform	3	3	ESTOP from BLPH - Correct BLPH error and reset safety system	No	1140	2
1004	1	4	MainControl	ESTOPcontrolCabinet	=LA01+UC20-SG10			FALSE	4	E STOP Control Cabinet	3	3	Release the safety button once it is safe to do so	No	1140	3
1005	1	5	MainControl	ESTOPContainerDoor	=LB02+DA01-SG23			FALSE	4	ESTOP Container Door	3	3	Release the safety button once it is safe to do so	No	1140	4
1006	1	6	MainControl	ESTOPcoolantSkid	=LB02+DA04-SG4			FALSE	4	E STOP Coolant Skid	3	3	Release the safety button once it is safe to do so	No	1140	5
1007	1	7	MainControl	EFIBusStatus1	=LA01+UC20-KE10			FALSE	4	Safety Controller - 40/10ft Com Ch 1	3	3	Inspect CANBus cables between Safety Controllers in UC20 and UC30, and fix loose cables or replace broken cables		1140	6
1008	1	8	MainControl	EFIBusStatus2	=LA01+UC20-KE10			FALSE	4	Safety Controller - 40/10ft Com Ch 2	3	3	Inspect CANBus cables between Safety Controllers in UC20 and UC30, and fix loose cables or replace broken cables		1140	7
1009	1	9	MainControl	ESTOP10ft	n/a			FALSE	4	Not Applicable	3	3	Not Applicable		1140	8
1010	1	10	MainControl	DoorRight_10ft	=LB02+DA03-BG01			FALSE	4	10ft Container - Door Right Open	3	3	Close door and check safety switch	No	1140	9
1011	1	11	MainControl	DoorLeft_10ft	=LB02+DA03-BG02			FALSE	4	10ft Container - Door Left Open	3	3	Close door and check safety switch	No	1140	10
1012	1	12	MainControl	smokeDetectorIntake	=JA01+DA01-BQ04			FALSE	4	Smoke Detector, 40ft Middle	3	3	Remove the cause of smoke. Reset sensor by disconnecting from base and reconnect.	No	1140	11
1013	1	13	MainControl	smokeDetectorOutletA	=JA01+DA01-BQ05			FALSE	4	Smoke Detector, 40ft Left	3	3	Remove the cause of smoke. Reset sensor by disconnecting from base and reconnect.	No	1140	12
1014	1	14	MainControl	smokeDetectorOutletB	=JA01+DA01-BQ06			FALSE	4	Smoke Detector, 40ft Right	3	3	Remove the cause of smoke. Reset sensor by disconnecting from base and reconnect.	No	1140	13
1015	1	15	MainControl	smokeDetector10ft	=JA01+DA03-BQ01			FALSE	4	Smoke Detector, 10ft	3	3	Remove the cause of smoke. Reset sensor by disconnecting from base and reconnect.	No	1140	14
1016	1	16	MainControl	hydrogenSensorVentIntakeok	=JA01+DA01-BQ01			FALSE	4	Hydrogen Detector, 40ft Middle	3	3	Check and fix any hydrogen leak.	No	1140	15
1017	1	17	MainControl	hydrogenSensorOutletAok	=JA01+DA01-BQ02			FALSE	4	Hydrogen Detector, 40ft Left	3	3	Check and fix any hydrogen leak.	No	1141	0
1018	1	18	MainControl	hydrogenSensorOutletBok	=JA01+DA01-BQ03			FALSE	4	Hydrogen Detector, 40ft Right	3	3	Check and fix any hydrogen leak.	No	1141	1
1019	1	19	MainControl	FCwave 1 Error				TRUE	3	FCwave 1 Control Error	0	0	Mitigate alarms in relevant subsystem	Yes	1141	2
1020	1	20	MainControl	FCwave 2 Error				TRUE	3	FCwave 2 Control Error	0	0	Mitigate alarms in relevant subsystem	Yes	1141	3
1021	1	21	MainControl	FCwave 3 Error				TRUE	3	FCwave 3 Control Error	0	0	Mitigate alarms in relevant subsystem	Yes	1141	4
1022	1	22	MainControl	FCwave 4 Error				TRUE	3	FCwave 4 Control Error	0	0	Mitigate alarms in relevant subsystem	Yes	1141	5
1023	1	23	MainControl	FCwave 5 Error				TRUE	3	FCwave 5 Control Error	0	0	Mitigate alarms in relevant subsystem	Yes	1141	6
1024	1	24	MainControl	FCwave 6 Error				TRUE	3	FCwave 6 Control Error	0	0	Mitigate alarms in relevant subsystem	Yes	1141	7
1025	1	25	MainControl	HT Cool 1 Error				TRUE	3	HT Coolant System 1 Error	0	0	Mitigate alarms in relevant subsystem	Yes	1141	8
1026	1	26	MainControl	HT Cool 2 Error				TRUE	3	HT Coolant System 2 Error	0	0	Mitigate alarms in relevant subsystem	Yes	1141	9
1027	1	27	MainControl	LT Cool Error				TRUE	3	LT Coolant System Error	0	0	Mitigate alarms in relevant subsystem	Yes	1141	10
1028	1	28	MainControl	Microgrid Error				TRUE	3	Microgrid Error	0	0	Mitigate alarms in relevant subsystem	Yes	1141	11
1029	1	29	MainControl	Nanogrid Error				TRUE	3	Nanogrid Error	0	0	Mitigate alarms in relevant subsystem	Yes	1141	12
1030	1	30	MainControl	Ventilation Error				TRUE	3	Ventilation Error	0	0	Mitigate alarms in relevant subsystem	Yes	1141	13
1031	1	31	MainControl	Climate 40ft Error				TRUE	3	40ft Climate Control Error	0	0	Mitigate alarms in relevant subsystem	Yes	1141	14
1032	1	32	MainControl	Climate 10ft Error				TRUE	3	10ft Climate Control Error	0	0	Mitigate alarms in relevant subsystem	Yes	1141	15
1033	1	33	MainControl	H2 Heating Error				TRUE	3	Hydrogen Heating System Error	0	0	Mitigate alarms in relevant subsystem	No	1142	0

Bits : 1 = Alarm active
0 = Healthy

Section 4 FUNCTIONAL TESTS SHEETS

Section 4.1 Electrical functional test sheets index

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

STATUS INDEX DETAIL

Filtered on subsystem: 85-00 & process: COMM & discipline : E

Electrical	85-00 BESS Package (A-85000)						
ITEM		TASK					
Code	Description	Location	Code	Form	Progress	Date	Certificate
A4/+04-QF1	AUX BESS PCS CABINET - A4/+04-QF1	ONSHORE	C10002952	FP00	100	2024-12-07	RFO 2
		ONSHORE	C10002953	FTR-2	100	2024-09-20	RFO 2
		ONSHORE	C10002954	FTR-6	100	2024-10-03	RFO 2
		ONSHORE	C10003025	FTR-5	100	2025-05-22	RFO 2
A6/+02-QF1	AUX BESS LV1 CABINET - A6/+02-QF1	ONSHORE	C10002955	FP00	100	2024-12-07	RFO 2
		ONSHORE	C10002956	FTR-2	100	2024-09-20	RFO 2
		ONSHORE	C10002957	FTR-6	100	2024-10-03	RFO 2
		ONSHORE	C10003026	FTR-5	100	2025-05-22	RFO 2
A6/+03-QF1	AUX BESS LV2 CABINET - A6/+03-QF1	ONSHORE	C10002958	FP00	100	2024-12-07	RFO 2
		ONSHORE	C10002959	FTR-2	100	2024-09-20	RFO 2
		ONSHORE	C10002960	FTR-6	100	2024-10-03	RFO 2
		ONSHORE	C10003027	FTR-5	100	2025-05-22	RFO 2

ROSETTI MARINO | PROVERLIS | CROSSWIND

ITEM	Tag	A4/+04-QF1	: AUX BESS PCS CABINET - A4/+04-QF1			Dwg	1723002197-EL-DG-00011
	S/Sys	85-00	: BESS Package (A-85000)			Module	
TASK	code	C10002952		Location	Onshore Activities	User	Rosetti Marino Quality Control
FORM	Process	PRE-COMM	Activity FTS	Discipline	Electrical	Form	FP00 Miscellaneous electrical Consumer

DATA

Switchboard	SG-200N1	Circuit ref:	SG-200N1-QF1
Breaker rating (A)	160A	Nominal current (A)	17.42A

FUNCTION TEST REQUIREMENT

1	Check pre-commissioning activities have been carried out				OK
2	Check equipment for cleaness				OK
3	Measure I/R value of equipment and feeder cable at 1000V (Min value: 10 Mohm)	>1000	MΩ		OK
4	Energise control of equipment feeder				OK
5	Full test feeder breaker operation in test position				OK
6	Check protection setting				OK
7	Test interface trips and signals (remote alarms & status). Check the relevant ITR presence in the system				OK
8	Test control and safety functions according to manufacturer's procedure.				OK
9	Energize				OK
10	Measure Voltage and Current values at feeder breaker	399	V	0.2 A	OK
11	Attach test procedure, if any				NA

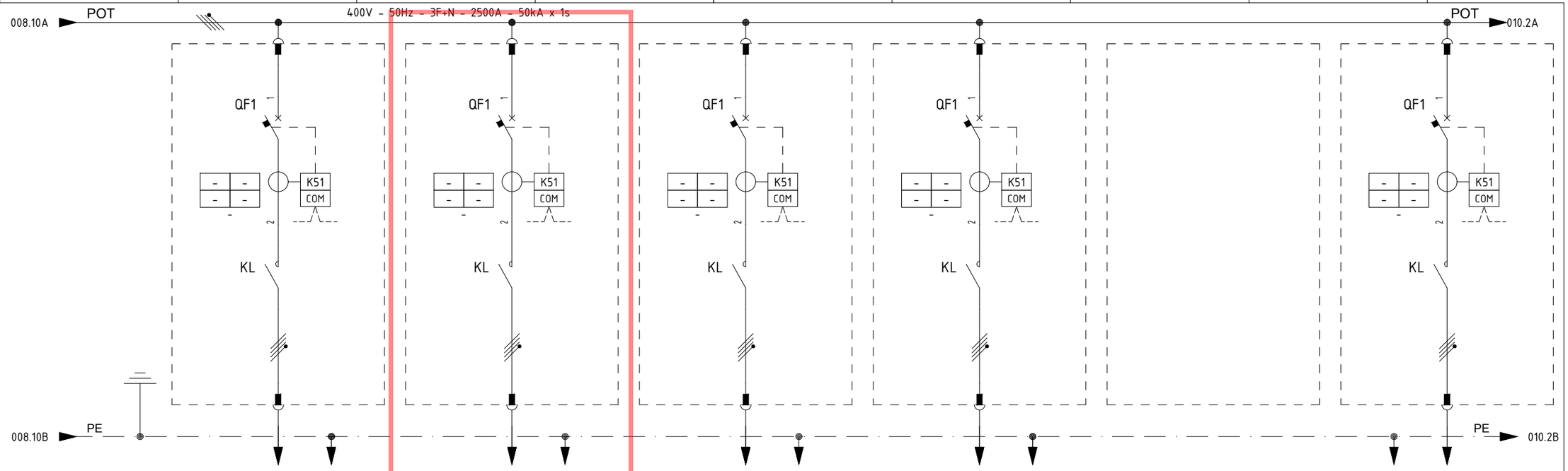
FUNCTION TEST REQUIREMENT	RESULT

Testing & measurement instruments used

Type	Serial n°	Calibration certificate	Validity
FLUKE 1663	5380144	7727/24	10/07/2025
FLUKE 376	A1711003	7710/24	10/07/2025

Comments:

Page 1/1	Performed by	☐ WITNESS ☑ REVIEW	☐ WITNESS ☐ REVIEW
Company	RM COMM	RM COMM	CPY NOT PRESENT
Name	Mattia Girotti	Kristian Castellani	Witness waived
Date	2024-12-03	2024-12-05	2024-12-07
Signature	PROVERLIS Digitaly signed by Mattia Girotti 2024-12-03T07:28:00.635Z	PROVERLIS Digitaly signed by Kristian Castellani 2024-12-05T09:30:08.686Z	PROVERLIS Digitaly signed by Witness waived 2024-12-07T10:35:20.203Z



ITEM			1	A-80000	CP-850F03	SPARE	SPARE		K-63001-A
UTILITY			2	FUEL CELL AUXILIARY LOAD	BESS PCS CABINET	SPARE	SPARE		INSTRUMENTS AIR PACKAGE 01A
COLUMN/CUBICLE			3	A4 / +03	A4 / +04	A4 / +05	A4 / +06		A4 / +08
RATED POWER | RATED CURRENT			4/5	20 kW | 32.84 A	11,09 kW | 17.42 A	- kW | - A	- kW | - A		68.75 kW | 111.24 A
TYPICAL FUNCTIONAL			6	LK1-63	LK1-40	LK1-40	LK1-40		LK2-160
CIRCUIT BREAKER (ABB)	TYPE		7	XT2S - 160	XT2S - 160	XT2S - 160	XT2S - 160		XT4S - 250
	VERSION		8	4P - FIXED	4P - FIXED	4P - FIXED	4P - FIXED		4P - FIXED
	TRIP UNITS		9	EKIP HI TOUCH LSIG (In = 63A)	EKIP HI TOUCH LSIG (In = 40A)	EKIP HI TOUCH LSIG (In = 40A)	EKIP HI TOUCH LSIG (In = 40A)		EKIP HI TOUCH LSIG (In = 160A)
	Icu	KA	10	50 kA	50 kA	50 kA	50 kA		50 kA
OVERLOAD	L	Range A	11	(0.4 - 1) x In	(0.4 - 1) x In	(0.4 - 1) x In	(0.4 - 1) x In		(0.4 - 1) x In
		Range t	12	k/I^2	k/I^2	k/I^2	k/I^2		k/I^2
SEL. SHORT-CIRCUIT	S	Range A	13	(0.6 - 10) x In	(0.6 - 10) x In	(0.6 - 10) x In	(0.6 - 10) x In		(0.6 - 10) x In
		Range t	14	0.05 - 0,4 sec / k/I^2	0.05 - 0,4 sec / k/I^2	0.05 - 0,4 sec / k/I^2	0.05 - 0,4 sec / k/I^2		0.05 - 0.4 sec / k/I^2
INST. SHORT-CIRCUIT	I	Range A	15	(1.5 - 15) x In	(1.5 - 15) x In	(1.5 - 15) x In	(1.5 - 15) x In		(1.5 - 15) x In
		Range t	16	instantaneous	instantaneous	instantaneous	instantaneous		instantaneous
EARTH FAULT PROTECTION	G	Range A	17	(0.1 - 1) x In	(0.1 - 1) x In	(0.1 - 1) x In	(0.1 - 1) x In		(0.1 - 1) x In
		Range t	18	t=k / t=k/I^2	t=k / t=k/I^2	t=k / t=k/I^2	t=k / t=k/I^2		t=k / t=k/I^2
CONTACTOR (ABB)			19	AF52-40-00-13 (100A-AC1); 100-250VAC/DC	AF40-40-00-13 (70A-AC1); 100-250VAC/DC	AF40-40-00-13 (70A-AC1); 100-250VAC/DC	AF40-40-00-13 (70A-AC1); 100-250VAC/DC		AF190-40-11-13 (275A-AC1); 100-250 VAC/DC
THERMAL OVERLOAD RELAY (ABB)			20	-	-	-	-		-
SURGE ARRESTER (DEHN)			21	-	-	-	-		-
TOROIDAL CURRENT TRANSFORMER (FRER)			22	-	-	-	-		-
FUSE HOLDER (ITALWEBER)			23	-	-	-	-		-
INDIRECT PROTECTION (ABB)			24	-	-	-	-		-
VOLTMETER			25	-	-	-	-		-
CURRENT TRANSFORMER FOR MEASURE (FRER)	TYPE		26	-	-	-	-		-
	PERFORMANCE/CLASS		27	-	-	-	-		-
VOLTAGE TRANSFORMER FOR MEASURE (FRER)	TYPE		28	-	-	-	-		-
	PERFORMANCE/CLASS		29	-	-	-	-		-
LOCK-OUT RELAY (-)			30	-	-	-	-		-
POWER CONDUCTOR		mmq	31	5G16	4 x 10	-	-		5G70

=

+

DWG n° : 231298/SD/11

Item n° : PF1002983/26

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
4	28/08/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
3	08/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
2	03/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
1	28/03/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
0	15/02/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

TITLE : "SG-200N1"

SINGLE LINE DIAGRAM

Single Line Drawing

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00011

SHEET 009

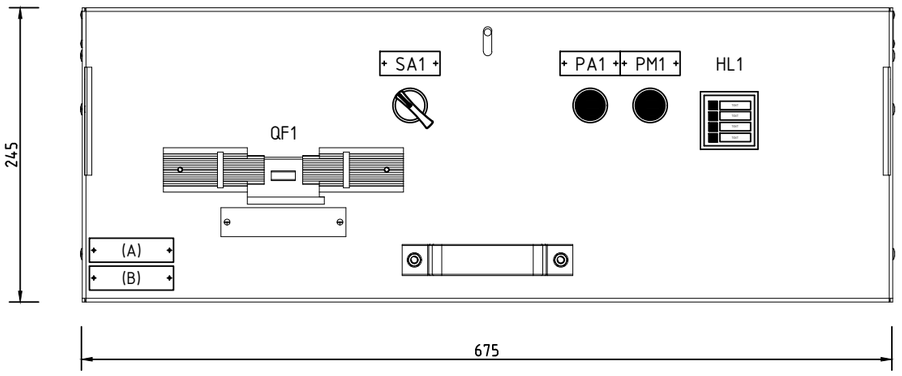
REV. 04

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00011 Rev. 04

DOOR FRONT LAY-OUT

TYPICAL : LINE FEEDER "LK1-n"

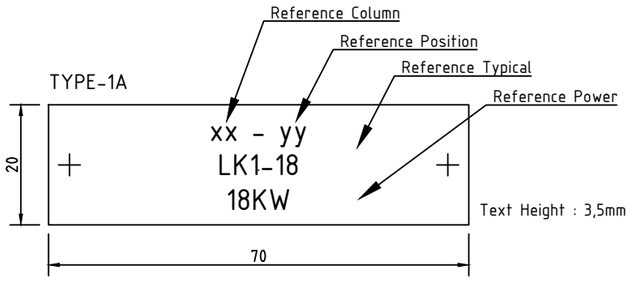


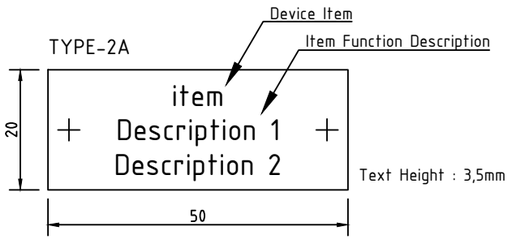
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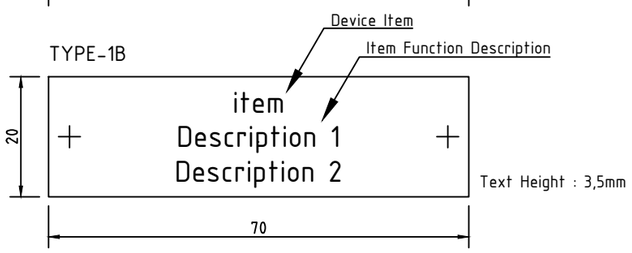
A) IDENTIFICATION name plate (type-1A) , with :
- Drawer position [Column / Position inside SWB]
- Typical name [reference applicability typical used]
- Power [reference applicability typical used]

B) USER name plate (type-1B), with :
- Item User [to see SLD diagrams]
- User Description [to see SLD diagrams]

DEVICES name plate			
ITEM	DESCRIPTION 1	DESCRIPTION 2	NOTE
QF1	Circuit Breaker		NO plate
SA1	LOC-REM	SELECTOR	Type-2A
PA1	STOP	MOTOR	Type-2A
PM1	RUN	MOTOR	Type-2A
HL1	Multiled	Signalling	NO plate







=	TYPICAL						
+	LK-x						
DWG n° :	231298/SD/31						
Item n° :	PF1002983/26						
		2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
		1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
		0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
		REV.	DATE	DRN	CHKD	APPD	DESCRIPTION

CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Door Front Lay-Out - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

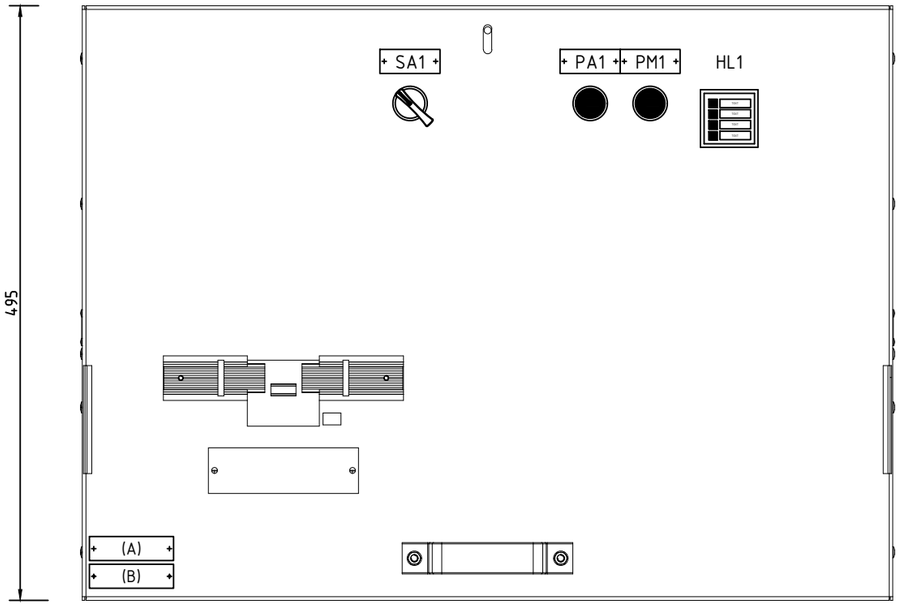
A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 034 | REV. 02

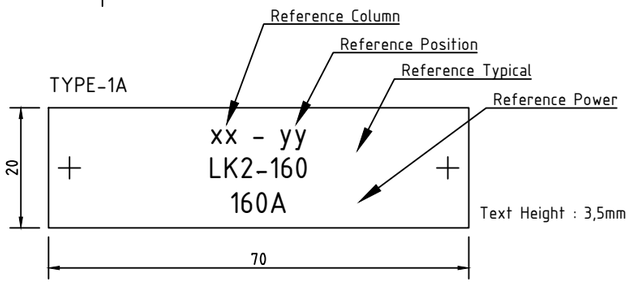
F.to UNI A3: 420mmx297mm

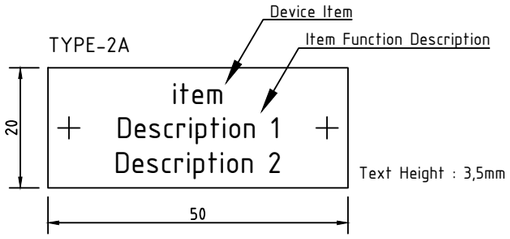
File Name : 1723002197-EL-DG-00031 Rev. 02

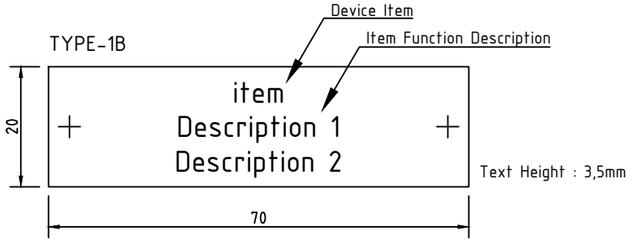
DOOR FRONT LAY-OUT

TYPICAL : LINE FEEDER "LK2-n"









NOTE :

A) IDENTIFICATION name plate (type-1A) , with :
- Drawer position [Column / Position inside SWB]
- Typical name [reference applicability typical used]
- Power [reference applicability typical used]

B) USER name plate (type-1B), with :
- Item User [to see SLD diagrams]
- User Description [to see SLD diagrams]

DEVICES name plate			
ITEM	DESCRIPTION 1	DESCRIPTION 2	NOTE
QF1	Circuit Breaker		NO plate
SA1	LOC-REM	SELECTOR	Type-2A
PA1	STOP	MOTOR	Type-2A
PM1	RUN	MOTOR	Type-2A
HL1	Multiled	Signalling	NO plate

=	TYPICAL
+	LK-x

DWG n° : 231298/SD/31

Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Door Front Lay-Out - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 035 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

USERS LEGEND

TYPICAL : LINE FEEDER "LK1-n" "LK2-n"

TYPICAL APPLICABILITY					
ITEM	ITEM TAG	DESCRIPTION TAG	REFERENCE POSITION (written on name name plate "type-1A)	REFERENCE NOMINAL CURRENT C.B. TRIP UNIT (written on name name plate "type-1A)	REFERENCE TYPICAL (written on name name plate "type-1A)
1	SPARE	SPARE	A2 / +05	40A	LK1-40
2	SPARE	SPARE	A3 / +02	40A	LK1-40
3	DP-200N1	DB-LIGHTING & SMALL POWER BoP	A3 / +03	100A	LK1-100
4	JB-200E3	CRANE	A3 / +04	63A	LK1-63
5	SPARE	SPARE	A3 / +05	40A	LK1-40
6	JB-500E8	WATER PACKAGE	A3 / +08	160A	LK2-160
7	B100-HSB-001	HVAC PANELS HV ROOM	A4 / +02	40A	LK1-40
8	A-80000	FUELL CELL AUXIALIRY LOAD	A4 / +03	63A	LK1-63
9	CP-850F03	BESS PCS CABINET	A4 / +04	40A	LK1-40
10	SPARE	SPARE	A4 / +05	40A	LK1-40
11	SPARE	SPARE	A4 / +06	40A	LK1-40
12	K-63001-A	INSTRUMENTS AIR PACKAGE 01A	A4 / +08	160A	LK2-160
13	SPARE	SPARE	A5 / +01	40A	LK1-40
14	B200-HSB-001	HVAC PANELS - LV ROOM	A5 / +02	40A	LK1-40
15	B300-HSB-001	HVAC PANELS - UPS ROOM	A5 / +03	63A	LK1-63
16	B400-HSB-001	HVAC PANELS - ITER	A5 / +04	63A	LK1-63
17	CN-200N1	IMPRESSED CURR. CATHODIC PROTECTION (ICCP) SYSTEM	A5 / +05	40A	LK1-40
18	SPARE	SPARE	A5 / +06	40A	LK1-40
19	K-63001-B	INSTRUMENTS AIR PACKAGE 01B	A5 / +08	160A	LK2-160
20	CP-850E1	BESS LV1 CABINAT (+DISTR 1)	A6 / +02	40A	LK1-40
21	CP-850E2	BESS LV2 CABINAT (+DISTR 2)	A6 / +03	40A	LK1-40
22	SPARE	SPARE	A6 / +04	40A	LK1-40

= TYPICAL
+ LK-x

DWG n° : 231298/SD/31
Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

TITLE : "SG-200N1"
LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS
Users Legend - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 036 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

ITEMS ACRONYM

TYPICAL : LINE FEEDER "LK1-n" "LK2-n"

Composition of Typical :

LK-x = Common Parts
LK1-"nn" or LK2-"nn"= Specific Parts

Example for Composition of LK1-63:
- to take "LK-x" plus "LK1-63"

Example for Composition of LK2-160:
- to take "LK-x" plus "LK2-160"

	ACRONYM ITEMS [Comun parts]	ACRONYM ITEMS [Specific parts]					
	LK-x	LK1-40 [In=40A] [Current Trip Unit]	LK1-63 [In=63A] [Current Trip Unit]	LK1-100 [In=100A] [Current Trip Unit]	LK2-160 [In=160A] [Current Trip Unit]		
ASSOCIATED TYPICAL	This Item include all devices that are comun for both "Specific Parts" Items	This Items include only devices that are detail for "Specific Parts" Items					
LK1-40	X	X					
LK1-63	X		X				
LK1-100	X			X			
LK2-160	X				X		
-							

=	TYPICAL					
+	LK-x					
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)	
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)	
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)	
REV.	DATE	DRN	CHKD	APPD	DESCRIPTION	

DWG n° : 231298/SD/31
Item n° : PF1002983/26

CROSSWIND

ROSETTI MARINO

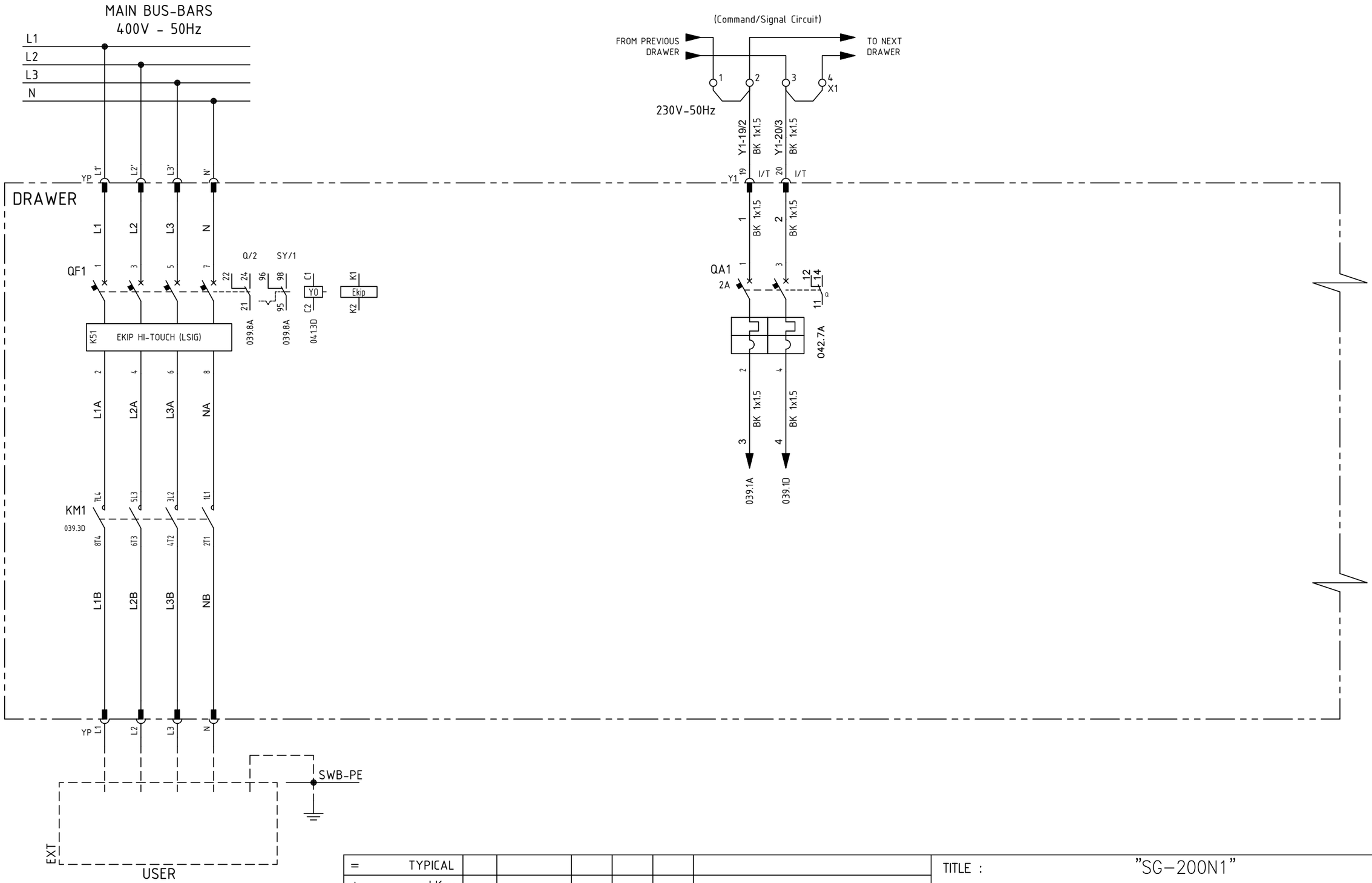
TITLE : "SG-200N1"
LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS
Items Acronym - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 037 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02



=	TYPICAL
+	LK-x

DWG n° : 231298/SD/31

Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

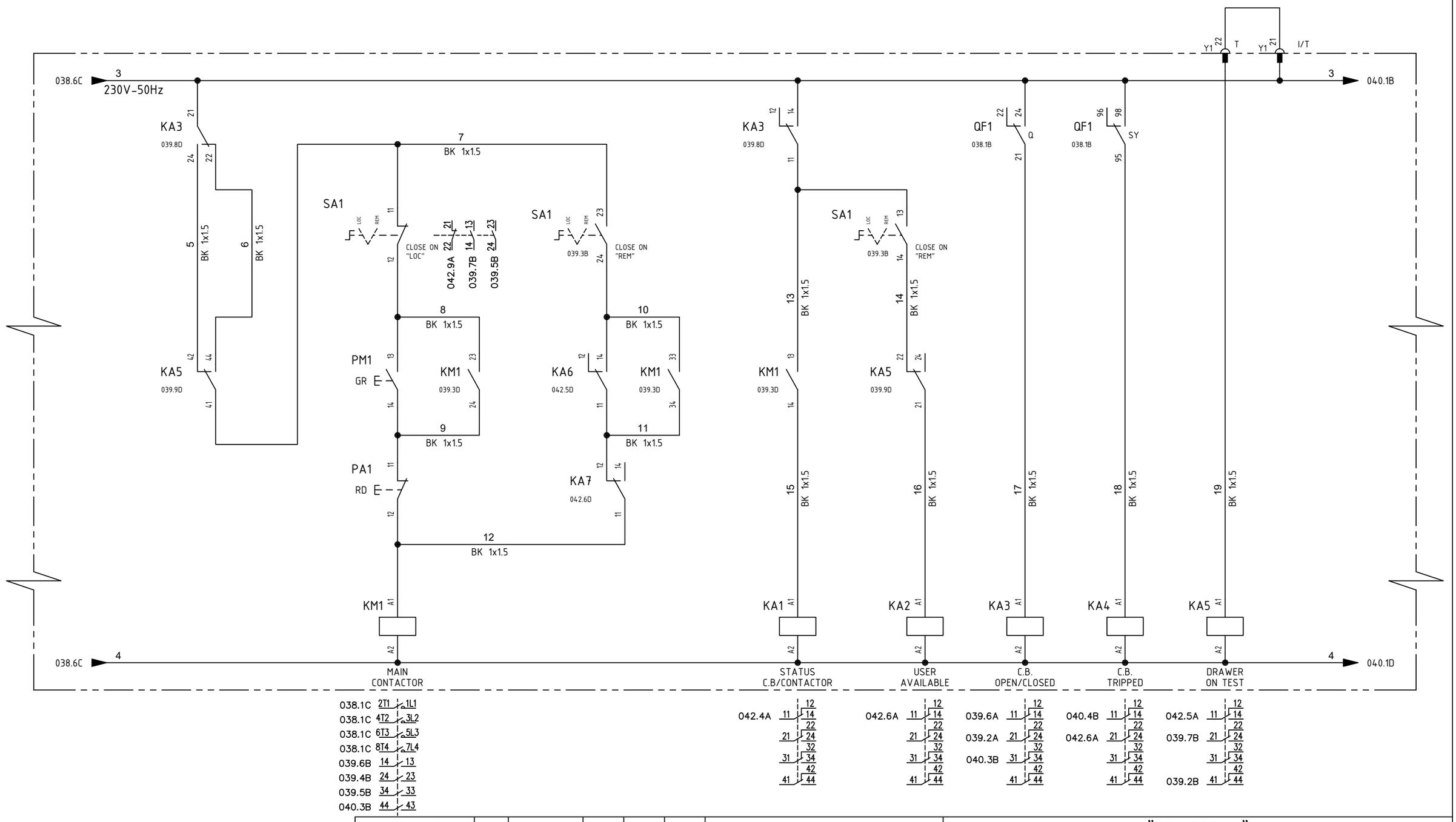
DRAWING NO. 1723002197-EL-DG-00031

SHEET 038

REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02



=	TYPICAL
+	LK-x

DWG n° : 231298/SD/31

Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

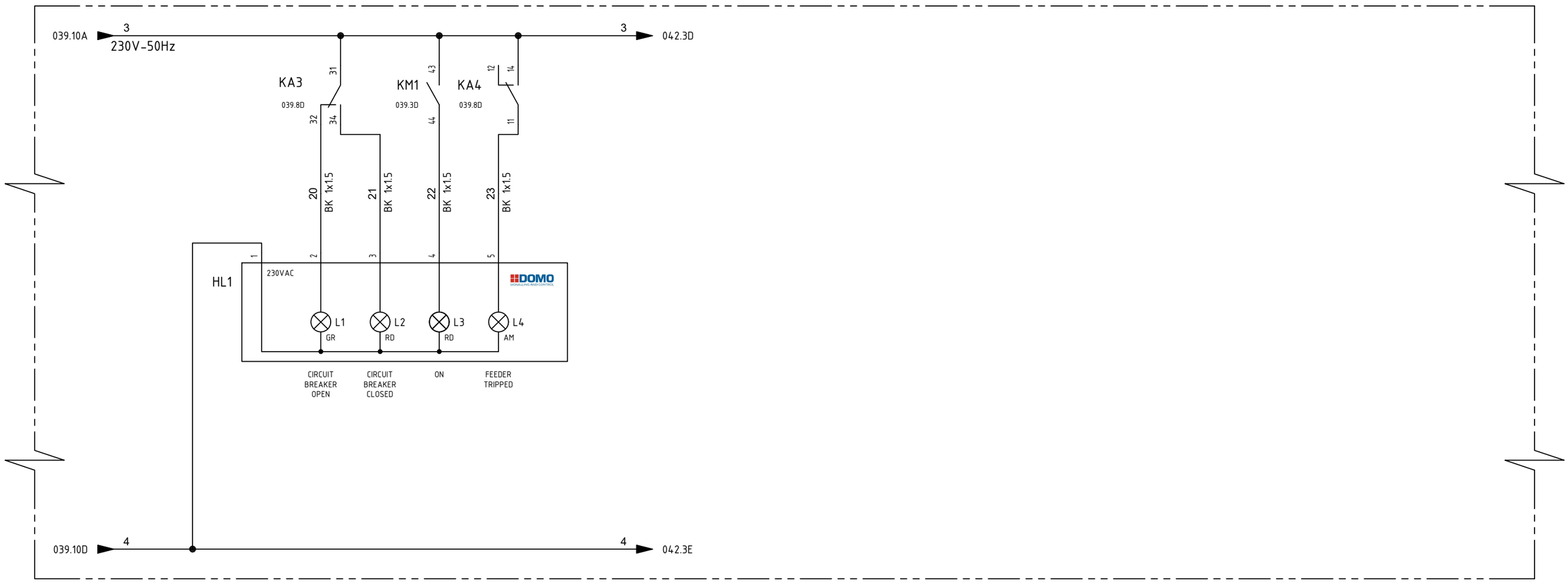
DRAWING NO. 1723002197-EL-DG-00031

SHEET 039

REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02



=	TYPICAL						
+	LK-x						
DWG n° : 231298/SD/31							
Item n° : PF1002983/26							
		2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
		1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
		0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
		REV.	DATE	DRN	CHKD	APPD	DESCRIPTION

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

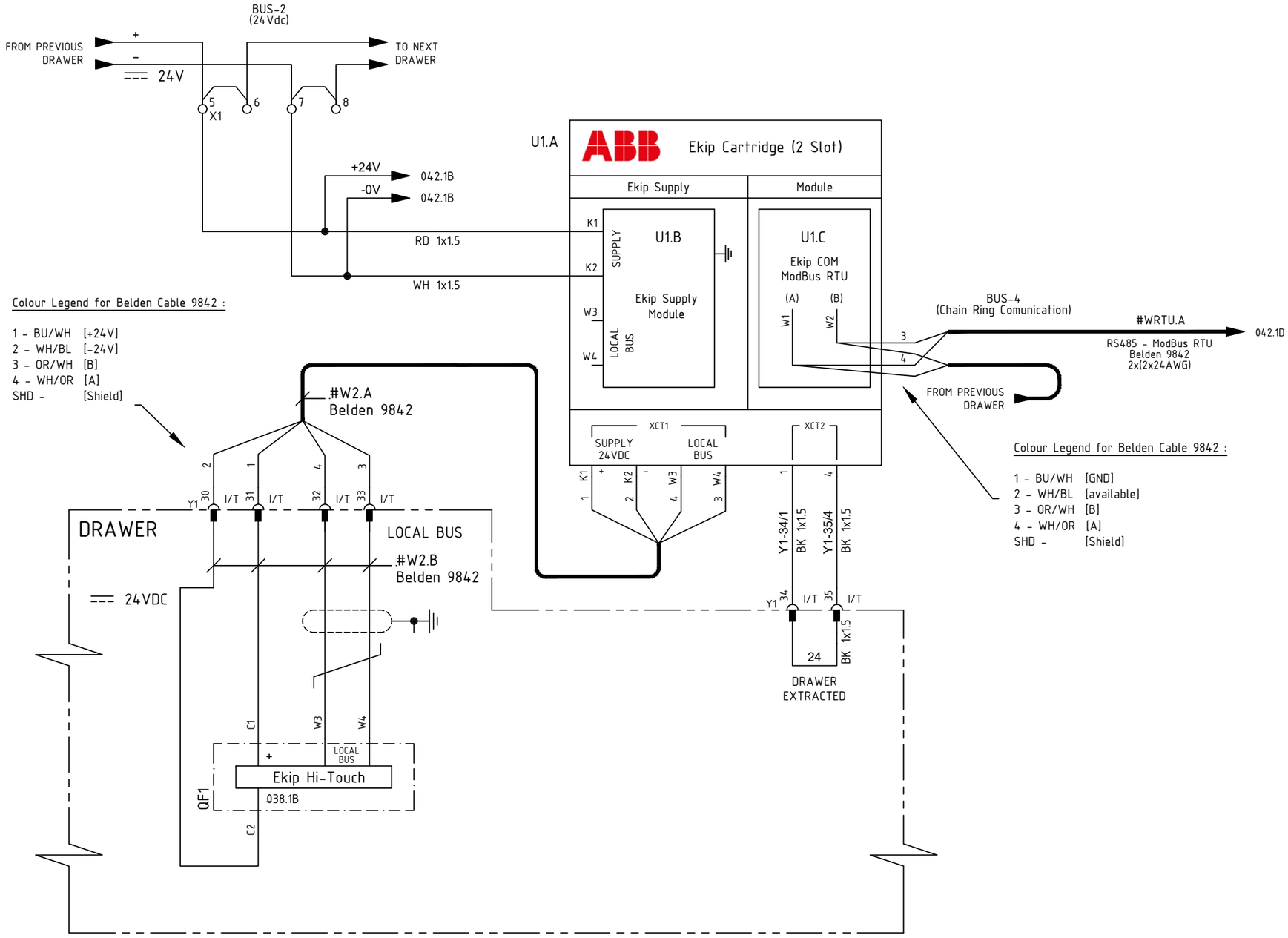
DRAWING NO. 1723002197-EL-DG-00031

SHEET 040

REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02



=	TYPICAL						
+	LK-x						
DWG n° : 231298/SD/31							
Item n° : PF1002983/26		2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
		1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
		0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
		REV.	DATE	DRN	CHKD	APPD	DESCRIPTION

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

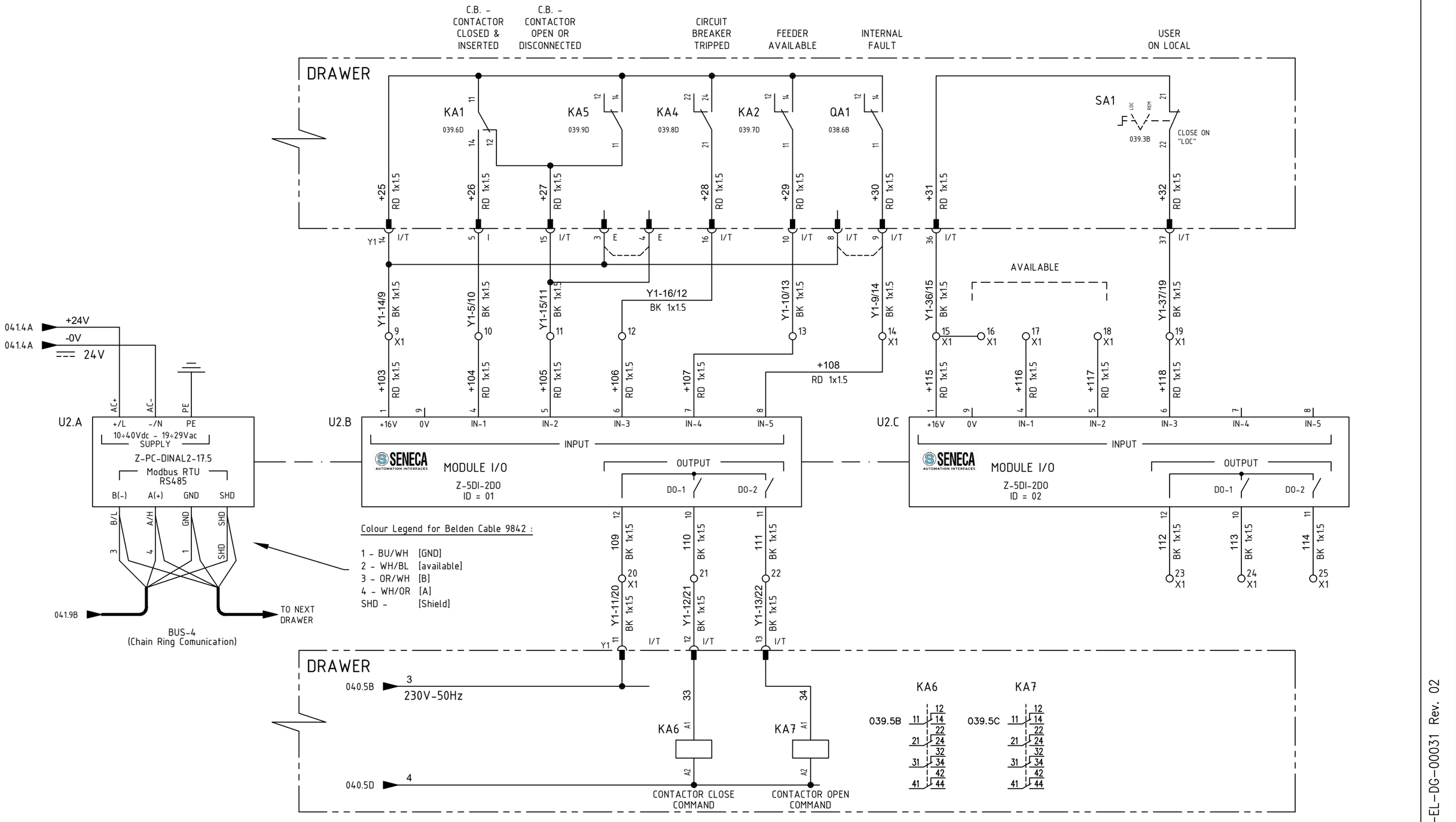
DRAWING NO. 1723002197-EL-DG-00031

SHEET 041

REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02



=	TYPICAL					
+	LK-x					
DWG n° : 231298/SD/31						
Item n° : PF1002983/26						
	2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
	1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
	0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
	REV.	DATE	DRN	CHKD	APPD	DESCRIPTION

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00031

SHEET 042

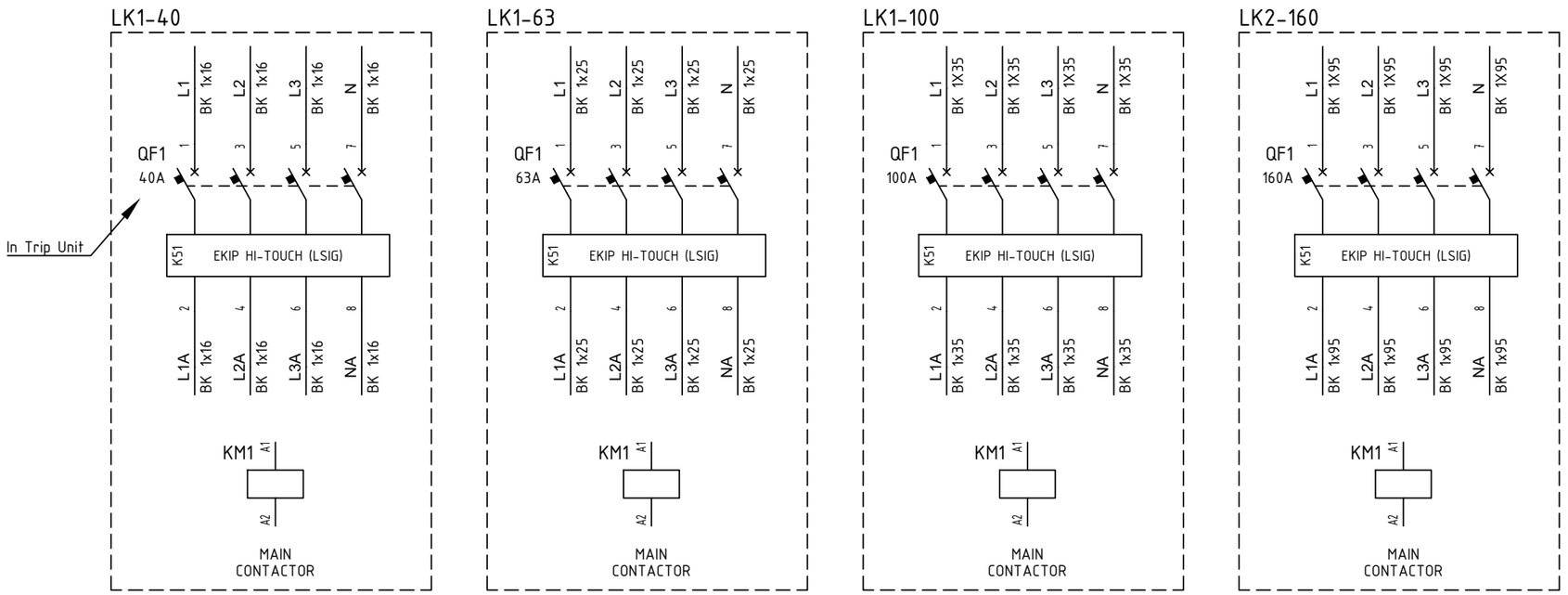
REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

SPECIFIC PARTS

TYPICAL : LINE FEEDER "LK1-n" "LK2-n"



=	TYPICAL						
+	LK-x						
DWG n° : 231298/SD/31							
Item n° : PF1002983/26		2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
		1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
		0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
		REV.	DATE	DRN	CHKD	APPD	DESCRIPTION

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00031

SHEET 043

REV. 02

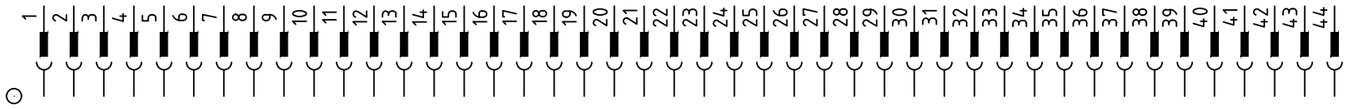
F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

TYPICAL - LK-x - Y1

AUXILIARY SOCKET
136450/001 (PF – 2 pcs) + 136458/004 (PM – 2 pcs)

N° PIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
JUMP			●	●				●	●																																			
RACKED-OUT			✕	✕				✕	✕																																			
TEST								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
RACKED-IN					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
PIN USED			042.5B	042.5B	042.4B			042.6B	042.7B	042.6B	042.5D	042.5D	042.6D	042.3B	042.4B	042.6B			038.6A	038.6A	039.9A	039.9A					041.3C	041.3C	041.4C	041.4C	041.6C	041.7C	042.7B	042.9B									



← FIELD WHIT "X" - CONTACT CLOSE WHEN DRAWER IS IN RACKED-OUT POSITION
← FIELD WHIT "X" - CONTACT CLOSE WHEN DRAWER IS IN TEST POSITION
← FIELD WHIT "X" - CONTACT CLOSE WHEN DRAWER IS IN RACKED-IN POSITION

← CROS-REFERENCE USED PIN

=	TYPICAL
+	LK-x

DWG n° : 231298/SD/31
Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"
LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS
Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 044 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

TYPICAL - LK-x

X1

NumM	Fg.	Sez.	Tipo	Descrizione	Costruttore
			BT003	BT/3 End bracket	Cabur
1	038.5A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
2	038.6A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
3	038.6A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
4	038.6A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
5	041.3A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
6	041.3A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
7	041.4A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
8	041.4A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
			HD101GR	HMD/PT/GR End section - Grey	Cabur
9	042.3B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
10	042.4B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
11	042.4B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
12	042.5B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
13	042.6B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
14	042.7B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
15	042.7B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
16	042.7B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
17	042.8B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
18	042.8B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
19	042.9B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
20	042.5C	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
21	042.5C	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
22	042.6C	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
23	042.9C	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
24	042.9C	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
25	042.10C	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
			HD201GR	HMD.1/PT/GR End section - Grey	Cabur
			BT003	BT/3 End bracket	Cabur

= TYPICAL

\+ LK-x

DWG n° : 231298/SD/31

Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
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CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00031

SHEET 045

REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

Nome/Item	Fg/Sh	Tipo/Type	Q.ta/Q.ty	Descrizione/Description	Costruttore/Manufacturer	Quadro (descrizione)
HL1	040	ML22/484L230STLTTR	1	MULTILED 48x48 - 4 LED - Vaux=230Vac/dc + LAMP TEST + TROP	DOMO	TYPICAL LK-x
KA1	039	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
KA2	039	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
KA3	039	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
KA4	039	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
KA5	039	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
KA6	042	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
KA7	042	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
PA1	039	KW 075 2	1	MP1-10R PUSH BUTTON RED WITH BLACK RING	ABB	TYPICAL LK-x
		EO 569 7	1	MCBH-00 FIXING SUPPORT 3 CONTACTS	ABB	TYPICAL LK-x
		EO 571 3	2	MCB-01 CONTACT NC FOR PUSHBUTTOM	ABB	TYPICAL LK-x
PM1	039	KW 076 0	1	MP1-10G PUSH BUTTON GREEN WITH BLACK RING	ABB	TYPICAL LK-x
		EO 569 7	1	MCBH-00 FIXING SUPPORT 3 CONTACTS	ABB	TYPICAL LK-x
		EO 570 5	2	MCB-10 CONTACT NO FOR PUSHBUTTONS	ABB	TYPICAL LK-x
QA1	038	S550239	1	S202M C 2 AUTOMATIC CIRCUIT BREAKER 10KA 2P	ABB	TYPICAL LK-x
		A563819	1	S2-CS/H6R AUXILIARY STATE CONTACT 1CO	ABB	TYPICAL LK-x
SA1	039	KW 329 3	1	M2SS2-10B HANDLE SELECTOR 2P 90° BLACK RING BLACK	ABB	TYPICAL LK-x
		EO 569 7	1	MCBH-00 FIXING SUPPORT 3 CONTACTS	ABB	TYPICAL LK-x
		EO 570 5	2	MCB-10 CONTACT NO FOR PUSHBUTTONS	ABB	TYPICAL LK-x
		EO 571 3	2	MCB-01 CONTACT NC FOR PUSHBUTTOM	ABB	TYPICAL LK-x
U1.2	041	1SDA074173R1	1	MODUL EKIP SUPPLY 24÷48VDC	ABB	TYPICAL LK-x
U1.3	041	1SDA105166R1	1	Module Ekip Com Modbus RS485 Tmax XT	ABB	TYPICAL LK-x
U1.A	041	1SDA105203R1	1	EKIP CARTRIDGE 2SLOT FOR XT2-XT4-XT5	ABB	TYPICAL LK-x
U2.A	042	Z-PC-DINAL2-17.5	1	DIN RAIL 2SLOT WITH HEAD FOR "Z-5DI-2DO"	SENECA	TYPICAL LK-x
U2.B	042	Z-5DI-2DO	1	I/O MODUL 5DI+2DO modbus RS485 Vaux=10÷40Vdc 19÷28Vac	SENECA	TYPICAL LK-x
U2.C	042	Z-5DI-2DO	1	I/O MODUL 5DI+2DO modbus RS485 Vaux=10÷40Vdc 19÷28Vac	SENECA	TYPICAL LK-x
X1		HD100GR__	8	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur	TYPICAL LK-x
		HD400GR__	17	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur	TYPICAL LK-x
		BT003	2	BT/3 End bracket	Cabur	TYPICAL LK-x
		HD101GR	1	HMD/PT/GR End section - Grey	Cabur	TYPICAL LK-x

= TYPICAL
\+ LK-x

DWG n° : 231298/SD/31
Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
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CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 046 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

Nome/Item	Fg/Sh	Tipo/Type	Q.ta/Q.ty	Descrizione/Description	Costruttore/Manufacturer	Quadro (descrizione)
X1		HD201GR	1	HMD.1/PT/GR End section - Grey	Cabur	TYPICAL LK-x

Nome/Item	Fg/Sh	Tipo/Type	Q.ta/Q.ty	Descrizione/Description	Costruttore/Manufacturer	Quadro (descrizione)
KM1	043	AF40400013	1	AF40-40-00-13 CONTACTOR 4P 40A 100-250VAC/DC	ABB	TYPICAL LK1-40
		CA440E	1	CA4-40E AUXILIARY FRONT CONTACT 4NO	ABB	TYPICAL LK1-40
QF1	043	1SDA068169R1	1	XT2S 160 BREAKING PART 4p F F	ABB	TYPICAL LK1-40
		1SDA100162R1	1	ELECTRONIC TRIP RELEASE Ekip Hi-Touch LSIG In=40A XT2 4p	ABB	TYPICAL LK1-40
		1SDA066431R1	1	AUX-C 1Q+1SY 250Vac/dc XT1..XT5 F/P	ABB	TYPICAL LK1-40

Nome/Item	Fg/Sh	Tipo/Type	Q.ta/Q.ty	Descrizione/Description	Costruttore/Manufacturer	Quadro (descrizione)
KM1	043	AF52400013	1	AF52-30-00-13 CONTACTOR 4P 53A(AC3) 100-250VAC/DC	ABB	TYPICAL LK1-63
		CA440E	1	CA4-40E AUXILIARY FRONT CONTACT 4NO	ABB	TYPICAL LK1-63
QF1	043	1SDA068169R1	1	XT2S 160 BREAKING PART 4p F F	ABB	TYPICAL LK1-63
		1SDA100163R1	1	ELECTRONIC TRIP RELEASE Ekip Hi-Touch LSIG In=63A XT2 4p	ABB	TYPICAL LK1-63
		1SDA066431R1	1	AUX-C 1Q+1SY 250Vac/dc XT1..XT5 F/P	ABB	TYPICAL LK1-63

Nome/Item	Fg/Sh	Tipo/Type	Q.ta/Q.ty	Descrizione/Description	Costruttore/Manufacturer	Quadro (descrizione)
KM1	043	AF80400013	1	AF80-30-00-13 CONTACTOR 4P 80A(AC3) 100-250VAC/DC	ABB	TYPICAL LK1-100
		CA440E	1	CA4-40E AUXILIARY FRONT CONTACT 4NO	ABB	TYPICAL LK1-100
QF1	043	1SDA068169R1	1	XT2S 160 BREAKING PART 4p F F	ABB	TYPICAL LK1-100
		1SDA100164R1	1	ELECTRONIC TRIP RELEASE Ekip Hi-Touch LSIG In=100A XT2 4p	ABB	TYPICAL LK1-100
		1SDA066431R1	1	AUX-C 1Q+1SY 250Vac/dc XT1..XT5 F/P	ABB	TYPICAL LK1-100

Nome/Item	Fg/Sh	Tipo/Type	Q.ta/Q.ty	Descrizione/Description	Costruttore/Manufacturer	Quadro (descrizione)
KM1	043	AF190401113	1	AF190-40-11-13 CONT 4P 190A AC3 100-250VAC/DC	ABB	TYPICAL LK2-160
		CAL1911	1	CAL19-11 CONTATTO AUSILIARIO 1NA+1NC PER AF116÷AF370	ABB	TYPICAL LK2-160
		CAL1911B	2	CAL19-11B AUXILIARY CONTACT 1NA+1NC PER AF116÷AF370	ABB	TYPICAL LK2-160
QF1	043	1SDA068179R1	1	XT4S 250 BREAKING PART 4p F F	ABB	TYPICAL LK2-160
		1SDA100334R1	1	ELECTRONIC TRIP RELEASE Ekip Hi-Touch LSIG In=160A XT4 4p	ABB	TYPICAL LK2-160
		1SDA066431R1	1	AUX-C 1Q+1SY 250Vac/dc XT1..XT5 F/P	ABB	TYPICAL LK2-160

= TYPICAL
+ LK-x

DWG n° : 231298/SD/31
Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
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TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 047 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

ITEM	Tag	A4/+04-QF1	: AUX BESS PCS CABINET - A4/+04-QF1	Dwg	1723002197-EL-DG-00011		
	S/Sys	85-00	: BESS Package (A-85000)	Module			
TASK	code	C10002953	Location	Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	PRE-COMM	Activity	FTS	Discipline	Electrical	Form	FTR-2		Protection Relay

FTR2 - Protection relay
Record sheet

RELAY DATA

Manufacturer:	ABB	Serial N°:	EF5000553690N000	Relay type:	EKIP HI TOUCH LSIG
Auxiliary supply:	24Vdc	Location:	B200	Cubicle:	A4/+04
Switchboard:	SG-200N1				

Current transformers

Tag	Number of	Ratio	Location

Voltage transformers

Tag	Number of	Ratio	Location

Test result (refer to manufacturer's procedure)

ANSI function	Setting	Injection	Trip value	Time delay	
				Setting	Trip value
L	20A			3s	
S	100A	120A		0.1ms	102ms
I	200A	400A		INSTANT	29ms
G	8A			0.1ms	

Testing & measurement instruments used

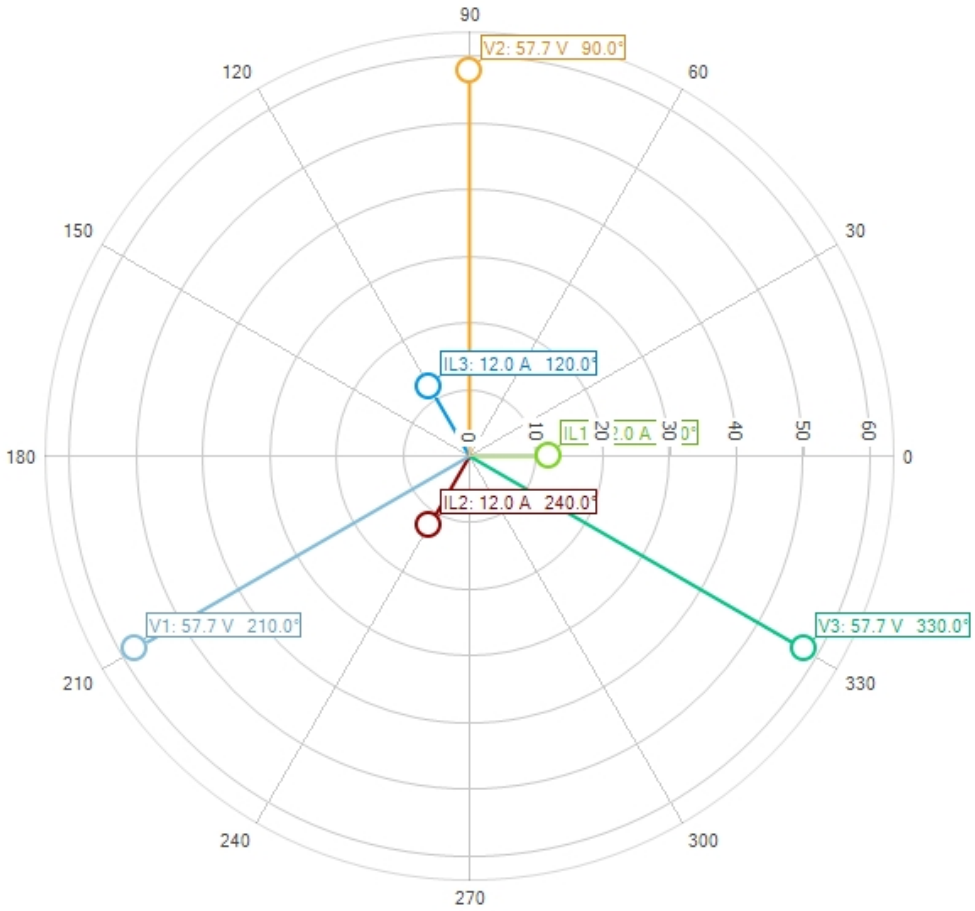
Type	Serial n°	Calibration certificate	Validity
ABB EKIP T&P	E34013804410W050		

Comments: See attachments for full tests

Page 1/1	Performed by	☐ WITNESS ☉ REVIEW	☐ WITNESS ☐ REVIEW
Company	RM COMM	RM COMM	CPY NOT PRESENT
Name	Mattia Girotti	Kristian Castellani	Witness waived
Date	2024-09-19	2024-09-19	2024-09-20
Signature	Digitaly signed by Mattia Girotti 2024-09-19T07:10:31.838Z	Digitaly signed by Kristian Castellani 2024-09-19T07:54:28.087Z	Digitaly signed by Witness waived 2024-09-20T06:28:17.118Z

Page Name	Group Name	Variable Name	Variable Value	Variable Unit
Settings A				
	Overload Protection (L - ANSI 49)			
		PU nominal current In	40	
		Status	Enabled	
		Function	t=k/i^2	
		Prealarm I1	90	% I1
		Threshold I1	0.500	In
		Time t1 std	3.00	s
		Thermal memory (TM)	Disabled	
		TM Algorithm	RMS-independent	
		TM Time	Automatic	
		TM custom time	830	s
	Time-delayed overcurrent protection (S - ANSI 50 TD/68/51)			
		Status	Enabled	
		Trip enable	Enabled	
		BlockOnStartUp	--------	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Function	t=k	
		Threshold I2 (t=k)	2.50	In
		Time t2 (t=k) IEC - UL489	0.10	s
		Startup enable	Disabled	
		Startup time	0.10	s
		Startup threshold	0.60	In
		Set Startup th. on ProgStatusD	--------	
		Thermal memory status	Disabled	
		Zone Selectivity status	Disabled	
		Zone Selectivity time	0.04	s
		Zone Selectivity Type	Logic and Hardware	
	Second time-delayed overcurrent protection (S2 - ANSI 50 TD)			
		Status	Disabled	
		Trip enable	Enabled	
		BlockOnStartUp	--------	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Threshold I5 (t=k)	2.00	In
		Time t5 (t=k)	0.05	s
		Startup enable	Disabled	
		Startup time	0.10	s
		Startup threshold	2.00	In
		Set Startup th. on ProgStatusD	--------	
		Zone Selectivity status	Disabled	
		Zone Selectivity time	0.04	s
		Zone Selectivity Type	Logic and Hardware	
	Instantaneous overcurrent protection (I - ANSI 50)			
		Status	Enabled	
		Threshold I3	5.00	In
		Startup enable	Disabled	
		Startup time	0.10	s
		Startup threshold	1.50	In
		Set Startup th. on ProgStatusD	--------	
		BlockOnStartUp	--------	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Zone Selectivity status	Disabled	
		Zone Selectivity Type	Logic and Hardware	
	Second I			
		Prot Second I	---	
		Status	Disabled	
		Threshold I31	1.50	In
		Zone Selectivity status	Disabled	
		Zone Selectivity Type	Logic and Hardware	
		Second I Mode	Function Dependent	
		Function	Disabled	
		Delay On	0.00	s
		Delay Off	0.00	s
	Earth fault protection (G - ANSI 50N TD/68/51N)			
		Status	Enabled	
		Trip enable	Enabled	
		BlockOnStartUp	--------	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Function	t=k	
		Prealarm I4	90	% I4
		Threshold I4 (t=k)	0.200	In
		Time t4 (t=k) IEC - UL489	0.10	s

		Startup enable	Disabled	
		Startup time	0.10	s
		Startup threshold	0.20	In
		Set Startup th. on ProgStatusD	--------	
		Zone selectivity status	Disabled	
		Zone selectivity time	0.04	s
		Zone Selectivity Type	Logic and Hardware	
	Directional overcurrent protection (D - ANSI 67/68)			
		Status	Disabled	
		Trip enable	Disabled	
		tripOnlyForward	--------	
		tripOnlyBackward	--------	
		BlockOnStartUp	--------	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Threshold I7 FWD	2.00	In
		Time t7 FWD	0.20	s
		Threshold I7 BWD	2.00	In
		Time t7 BWD	0.20	s
		Startup enable	Disabled	
		Startup time	0.10	s
		Startup threshold FWD	2.00	In
		Startup threshold BWD	2.00	In
		Set Startup th. on ProgStatusD	--------	
		Zone Selectivity status	Disabled	
		Zone Selectivity time FWD	0.13	s
		Zone Selectivity time BWD	0.13	s
		Zone Selectivity Type	Logic and Hardware	
		Direction minimum angle	3.6	°
	Closing on short-circuit protection (MCR)			
		Status	Disabled	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Threshold I3	6.00	In
		Time t3	0.04	s
		Zone Selectivity status	Disabled	
		Zone Selectivity Type	Logic and Hardware	
	Over Temperature (T)			
		Trip enable	Disabled	



Test

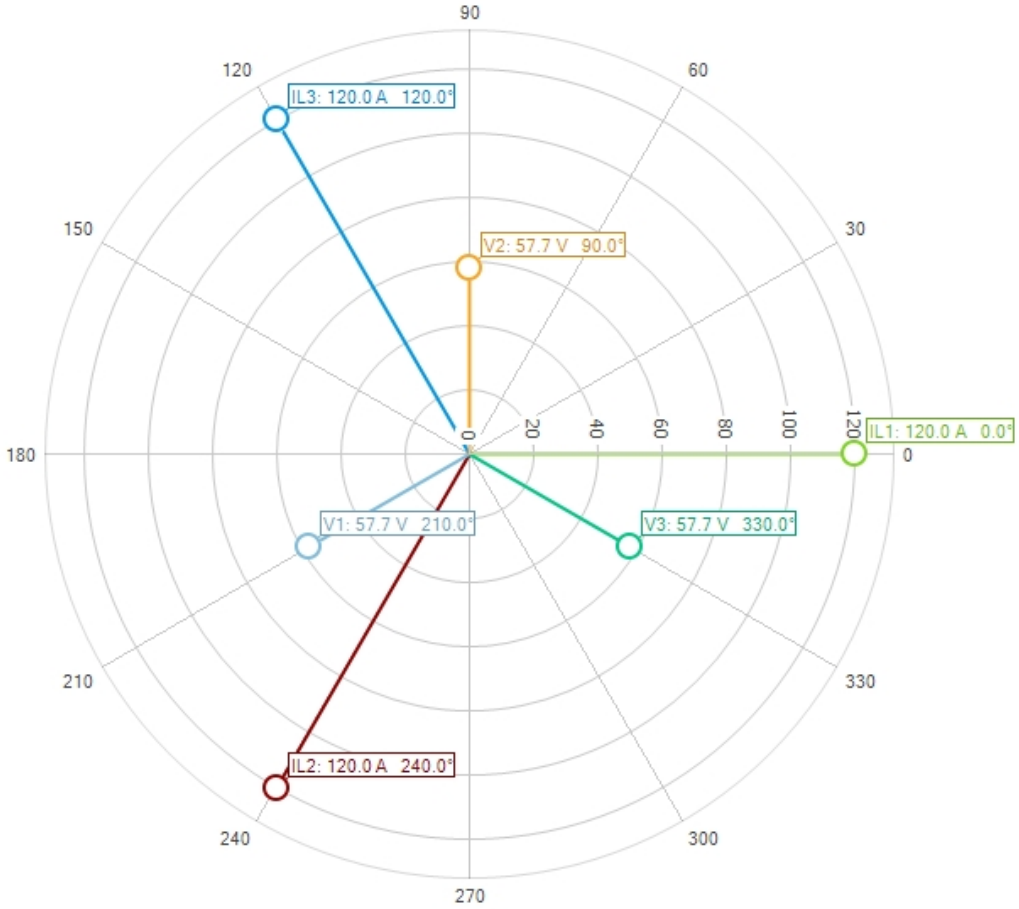
Name	Automatic test 1
Session	Default session
Customer	
Location	
Operator	

Device

Tag name	A4/+04
Relay Serial Number	EF5000553690N000
Circuit Breaker Serial Number	CE61041907number
	XT2/4
Device settings	In = 40 A Un = 100 V fn = 50 Hz
Protection Settings	Protection = L Curve type = t=k/i^2 Threshold = 0.500 In Time = 3.00 s Protection = S Curve type = t=k Threshold = 2.50 In Time = 0.10 s Protection = I Threshold = 5.00 In Protection = G Curve type = t=k Threshold = 0.200 In Time = 0.10 s
Preconditions	All preconditions satisfied.

Test result

⚠ Test completed without any trip in 3000 ms.



Test

Name	Automatic test 2
Session	Default session
Customer	
Location	
Operator	

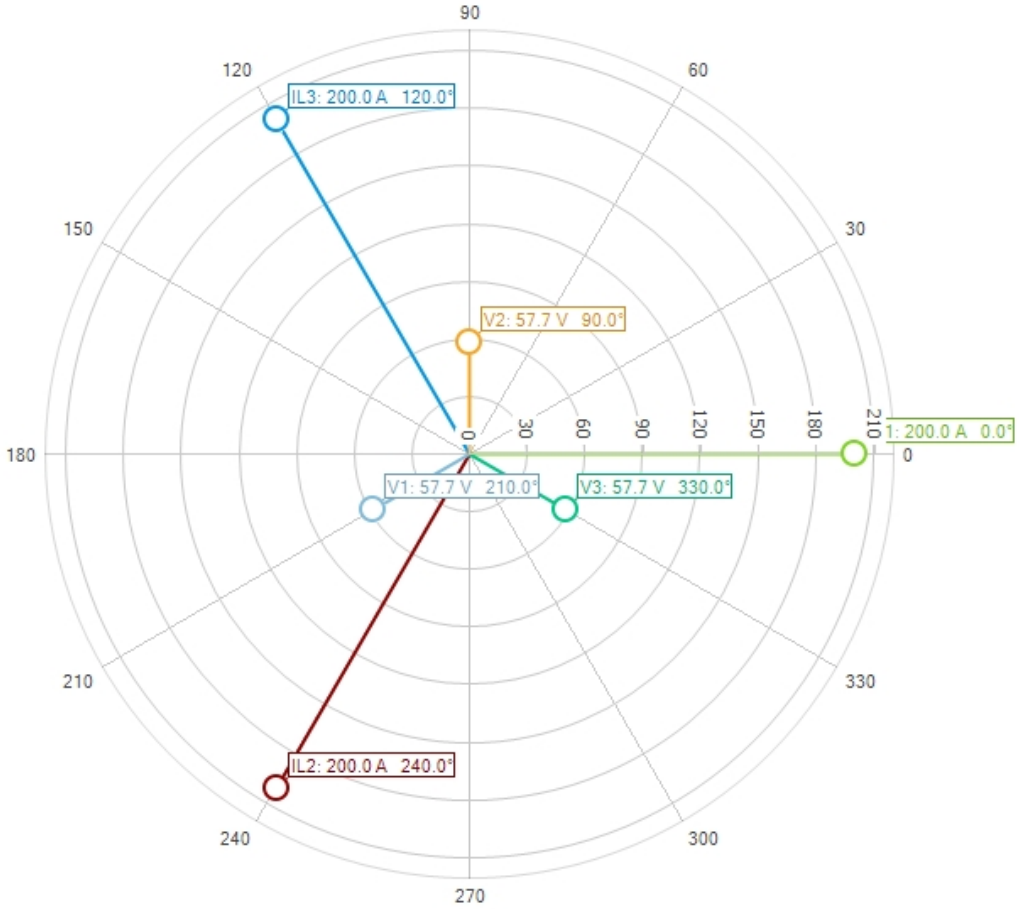
Device

Tag name	A4/+04
Relay Serial Number	EF5000553690N000
Circuit Breaker Serial Number	CE61041907number
	XT2/4
Device settings	In = 40 A Un = 100 V fn = 50 Hz
Protection Settings	Protection = L Curve type = t=k/i^2 Threshold = 0.500 In Time = 3.00 s Protection = S Curve type = t=k Threshold = 2.50 In Time = 0.10 s Protection = I Threshold = 5.00 In Protection = G Curve type = t=k Threshold = 0.200 In Time = 0.10 s
Preconditions	All preconditions satisfied.

Test result

Test completed with trip. Protection S tripped in 102 ms.
Trip time must be between 0 ms and 1000 ms

Trip time must be between 0 ms and 1000 ms.



Test

Name	Automatic test 3
Session	Default session
Customer	
Location	
Operator	

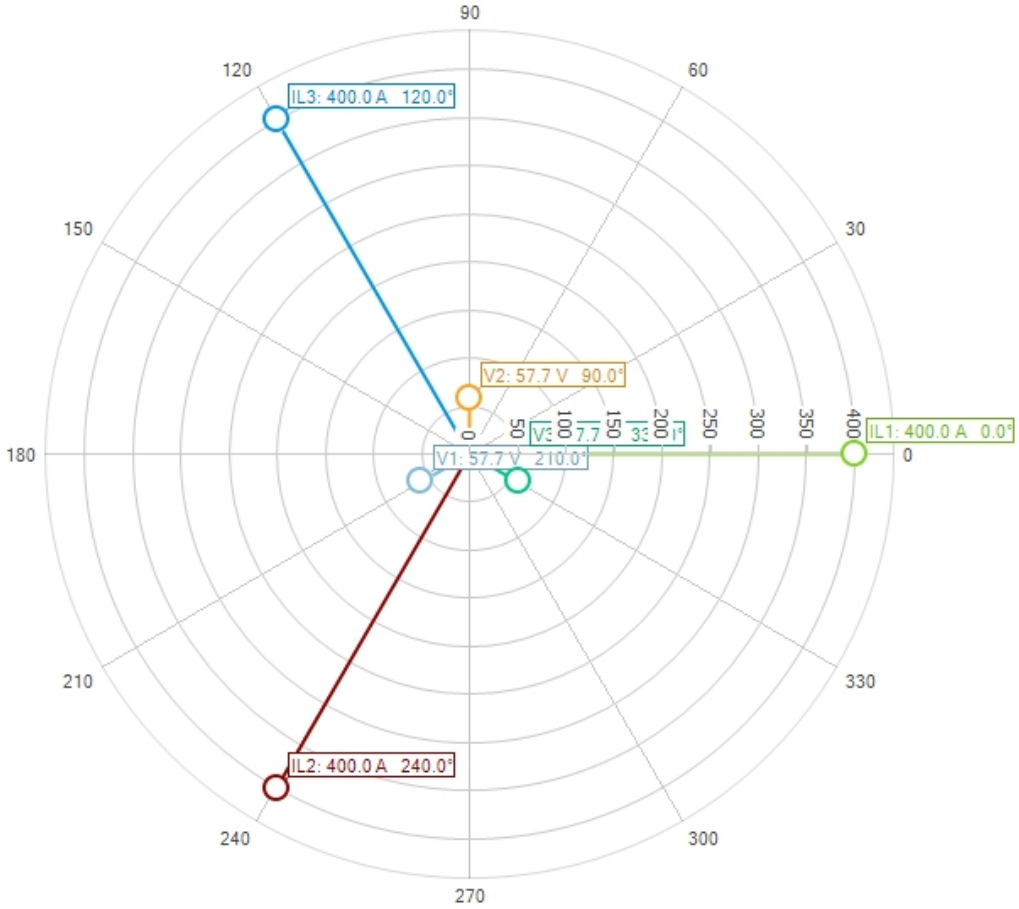
Device

Tag name	A4/+04
Relay Serial Number	EF5000553690N000
Circuit Breaker Serial Number	CE61041907number
	XT2/4
Device settings	In = 40 A Un = 100 V fn = 50 Hz
Protection Settings	Protection = L Curve type = t=k/i^2 Threshold = 0.500 In Time = 3.00 s Protection = S Curve type = t=k Threshold = 2.50 In Time = 0.10 s Protection = I Threshold = 5.00 In Protection = G Curve type = t=k Threshold = 0.200 In Time = 0.10 s
Preconditions	All preconditions satisfied.

Test result

Test completed with trip. Protection S tripped in 104 ms.
Trip time must be between 0 ms and 1000 ms

Trip time must be between 0 ms and 1000 ms.



Test

Name	Automatic test 4
Session	Default session
Customer	
Location	
Operator	

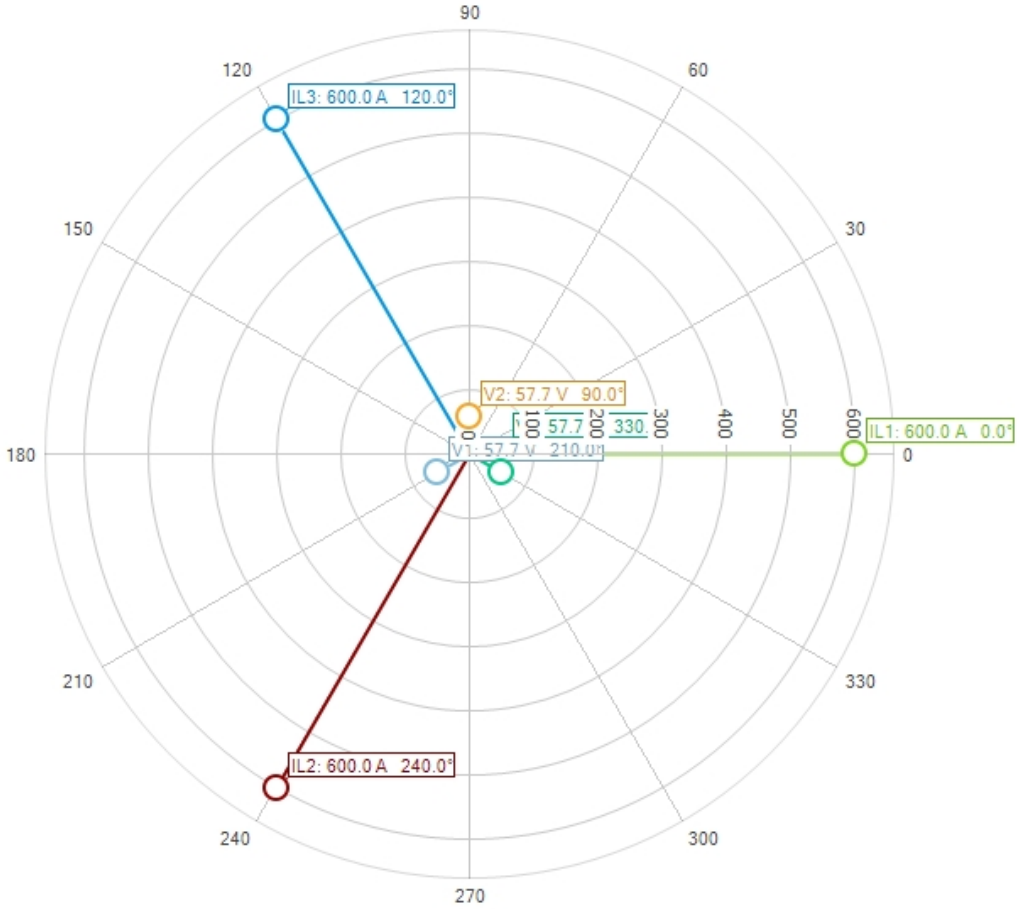
Device

Tag name	A4/+04
Relay Serial Number	EF5000553690N000
Circuit Breaker Serial Number	CE61041907number
	XT2/4
Device settings	In = 40 A Un = 100 V fn = 50 Hz
Protection Settings	Protection = L Curve type = t=k/i^2 Threshold = 0.500 In Time = 3.00 s Protection = S Curve type = t=k Threshold = 2.50 In Time = 0.10 s Protection = I Threshold = 5.00 In Protection = G Curve type = t=k Threshold = 0.200 In Time = 0.10 s
Preconditions	All preconditions satisfied.

Test result

Test completed with trip. Protection I tripped in 29 ms.
Trip time must be between 0 ms and 1000 ms

Trip time must be between 0 ms and 1000 ms.



Test

Name	Automatic test 5
Session	Default session
Customer	
Location	
Operator	

Device

Tag name	A4/+04
Relay Serial Number	EF5000553690N000
Circuit Breaker Serial Number	CE61041907number
	XT2/4
Device settings	In = 40 A Un = 100 V fn = 50 Hz
Protection Settings	Protection = L Curve type = t=k/i^2 Threshold = 0.500 In Time = 3.00 s Protection = S Curve type = t=k Threshold = 2.50 In Time = 0.10 s Protection = I Threshold = 5.00 In Protection = G Curve type = t=k Threshold = 0.200 In Time = 0.10 s
Preconditions	All preconditions satisfied.

Test result

Test completed with trip. Protection I tripped in 25 ms.
Trip time must be between 0 ms and 1000 ms

Trip time must be between 0 ms and 1000 ms.

ITEM	Tag	A4/+04-QF1	: AUX BESS PCS CABINET - A4/+04-QF1	Dwg	1723002197-EL-DG-00011	
	S/Sys	85-00	: BESS Package (A-85000)	Module		
TASK	code	C10002954	Location: Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	PRE-COMM	Activity: FTS	Discipline	Electrical	Form: FTR-6	Electrical IO

FTR 6 - Electrical I/O check record sheet

Equipment Tag:	AUX BESS PCS CABINET	Instrument Type / Serial N° :	FLUKE 175_17140769
Cubicle N°:	A4/+04	Calibration certificate date:	7715/24_10/07/2025

Link Type:	●	Hardwired	Communication	(strike through unapplicable type)
I/O Type:	●	Digital	Analogic	(strike through unapplicable type)

DIGITAL

Item	Signal description	Link Type (Hardwired/ Communication)	I/O Type (Digital/Analogic)	Point of Origin (From)	Point of Receival (to)	Text Labelling Display Satisfactory (Y/N)	Blinking/Static Display Satisfactory (Y/N)	Color Coding Satisfactory (Y/N)	Status Check			Time Stamping Satisfactory (Y/N)	Refresh Time (if >1s)	Appearing in all applicable display (Y/N)
									Event (Y/N)	Alarm (Y/N)	Fault (Y/N)			
1	CB CLOSED & INSERTED	HW	DI	A4/+04 - KA1/11-14	A4/+04 - X1/9-10	N/A	N/A	N/A	Y	N/A	N/A	N/A	N/A	N/A
2	CB OPEN OR DISCONNECTED	HW	DI	A4/+04 - KA1/11-12	A4/+04 - X1/9-11	N/A	N/A	N/A	Y	N/A	N/A	N/A	N/A	N/A
3	DRAWER ON TEST	HW	DI	A4/+04 - KA5/11-14	A4/+04 - X1/9-11	N/A	N/A	N/A	Y	N/A	N/A	N/A	N/A	N/A
4	CB TRIPPED	HW	DI	A4/+04 - KA4/21-24	A4/+04 - X1/9-12	N/A	N/A	N/A	N/A	N/A	Y	N/A	N/A	N/A
5	FEEDER AVAILABLE	HW	DI	A4/+04 - KA2/11-14	A4/+04 - X1/9-13	N/A	N/A	N/A	Y	N/A	N/A	N/A	N/A	N/A
6	INTERNAL FAULT	HW	DI	A4/+04 - QA1/11-14	A4/+04 - X1/9-14	N/A	N/A	N/A	N/A	N/A	Y	N/A	N/A	N/A
7	USER ON LOCAL	HW	DI	A4/+04 - SA1/21-22	A4/+04 - X1/15-19	N/A	N/A	N/A	Y	N/A	N/A	N/A	N/A	N/A
8														

ANALOGIC

Item	Signal description	Link Type (Hardwired/ Communication)	I/O Type (Digital/Analogic)	Point of Origin (From)	Point of Receival (to)	Min value sent	Min value received	Max value sent	Max value received	Intermediate value sent	Intermediate value received	Out of scale test (OK, Not OK)	Refresh time (if >2s)	Appearing in all applicable display (Y/N)
1														
2														
3														

Comments: The test of the cubicle was carried out on a test bench.

Page 1/1	Performed by	☐ WITNESS ☐ REVIEW	☐ WITNESS ☐ REVIEW
Company	RM COMM	RM COMM	CPY NOT PRESENT
Name	Davide Zucconelli	Kristian Castellani	Witness waived
Date	2024-10-03	2024-10-03	2024-10-03
Signature	PROVERLIS Digitaly signed by Davide Zucconelli 2024-10-03T08:37:38.870Z	PROVERLIS Digitaly signed by Kristian Castellani 2024-10-03T13:55:52.226Z	PROVERLIS Digitaly signed by Witness waived 2024-10-03T14:30:44.341Z

ROSETTI MARINO | PROVERLIS | CROSSWIND

ITEM	Tag	A6/+02-QF1	: AUX BESS LV1 CABINET - A6/+02-QF1			Dwg	1723002197-EL-DG-00011
	S/Sys	85-00	: BESS Package (A-85000)			Module	
TASK	code	C10002955		Location	Onshore Activities	User	Rosetti Marino Quality Control
FORM	Process	PRE-COMM	Activity FTS	Discipline	Electrical	Form	FP00 Miscellaneous electrical Consumer

DATA

Switchboard	SG-200N1	Circuit ref:	SG-200N1-QF1
Breaker rating (A)	160A	Nominal current (A)	18.9A

FUNCTION TEST REQUIREMENT

1	Check pre-commissioning activities have been carried out				OK
2	Check equipment for cleaness				OK
3	Measure I/R value of equipment and feeder cable at 1000V (Min value: 10 Mohm)	857	MΩ		OK
4	Energise control of equipment feeder				OK
5	Full test feeder breaker operation in test position				OK
6	Check protection setting				OK
7	Test interface trips and signals (remote alarms & status). Check the relevant ITR presence in the system				OK
8	Test control and safety functions according to manufacturer's procedure.				OK
9	Energize				OK
10	Measure Voltage and Current values at feeder breaker	399	V	0.1 A	OK
11	Attach test procedure, if any				NA

FUNCTION TEST REQUIREMENT	RESULT

Testing & measurement instruments used

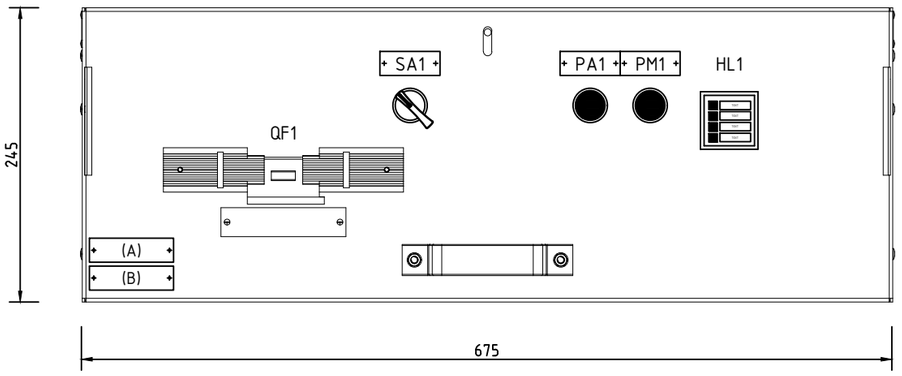
Type	Serial n°	Calibration certificate	Validity
FLUKE 1663	5380144	7727/24	10/07/2025
FLUKE 376	A1711003	7710/24	10/07/2025

Comments:

Page 1/1	Performed by	☐ WITNESS ☑ REVIEW	☐ WITNESS ☐ REVIEW
Company	RM COMM	RM COMM	CPY NOT PRESENT
Name	Mattia Girotti	Kristian Castellani	Witness waived
Date	2024-12-03	2024-12-05	2024-12-07
Signature	PROVERLIS Digitaly signed by Mattia Girotti 2024-12-03T07:40:39.177Z	PROVERLIS Digitaly signed by Kristian Castellani 2024-12-05T09:31:04.864Z	PROVERLIS Digitaly signed by Witness waived 2024-12-07T10:35:50.951Z

DOOR FRONT LAY-OUT

TYPICAL : LINE FEEDER "LK1-n"

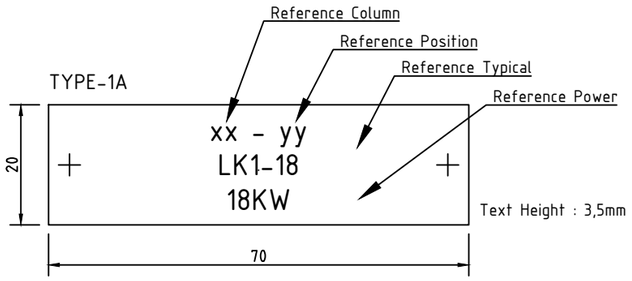


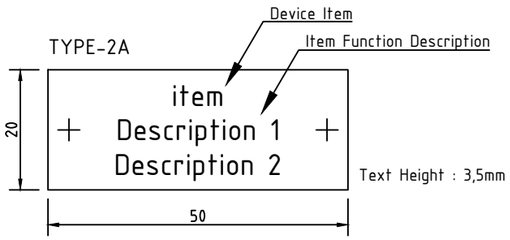
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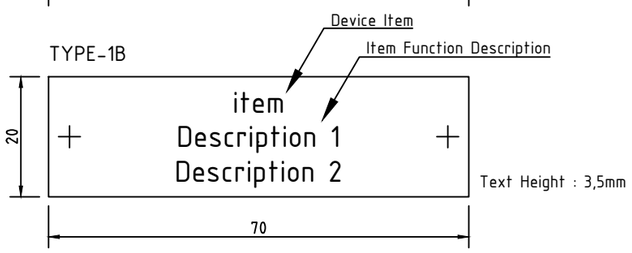
A) IDENTIFICATION name plate (type-1A) , with :
- Drawer position [Column / Position inside SWB]
- Typical name [reference applicability typical used]
- Power [reference applicability typical used]

B) USER name plate (type-1B), with :
- Item User [to see SLD diagrams]
- User Description [to see SLD diagrams]

DEVICES name plate			
ITEM	DESCRIPTION 1	DESCRIPTION 2	NOTE
QF1	Circuit Breaker		NO plate
SA1	LOC-REM	SELECTOR	Type-2A
PA1	STOP	MOTOR	Type-2A
PM1	RUN	MOTOR	Type-2A
HL1	Multiled	Signalling	NO plate







=	TYPICAL						
+	LK-x						
DWG n° :	231298/SD/31						
Item n° :	PF1002983/26						
		2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
		1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
		0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
		REV.	DATE	DRN	CHKD	APPD	DESCRIPTION

CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Door Front Lay-Out - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

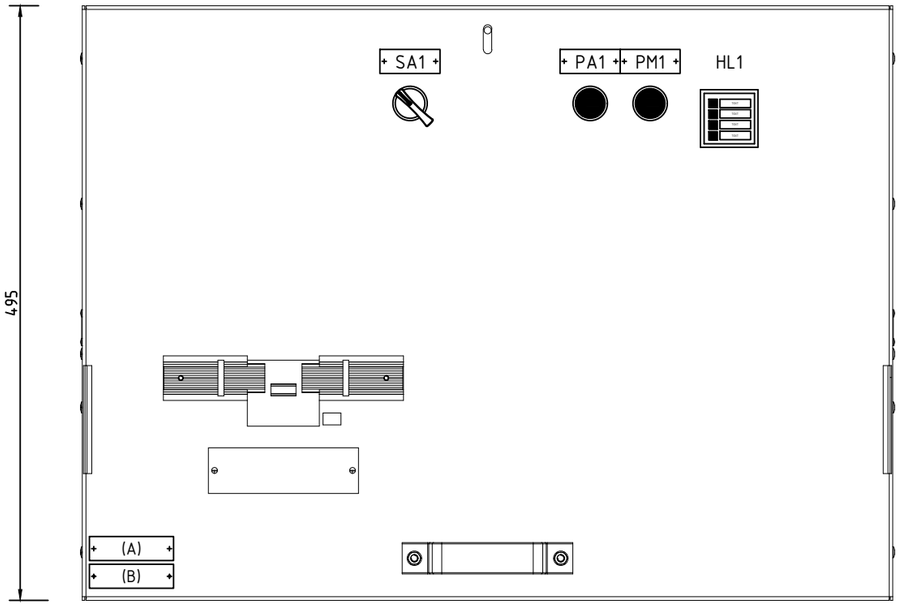
A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 034 | REV. 02

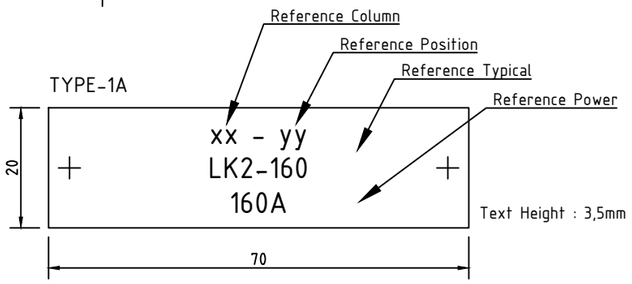
F.to UNI A3: 420mmx297mm

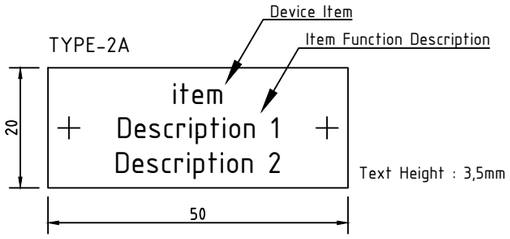
File Name : 1723002197-EL-DG-00031 Rev. 02

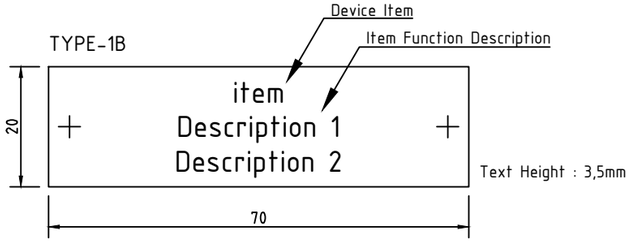
DOOR FRONT LAY-OUT

TYPICAL : LINE FEEDER "LK2-n"









NOTE :

A) IDENTIFICATION name plate (type-1A) , with :
- Drawer position [Column / Position inside SWB]
- Typical name [reference applicability typical used]
- Power [reference applicability typical used]

B) USER name plate (type-1B), with :
- Item User [to see SLD diagrams]
- User Description [to see SLD diagrams]

DEVICES name plate			
ITEM	DESCRIPTION 1	DESCRIPTION 2	NOTE
QF1	Circuit Breaker		NO plate
SA1	LOC-REM	SELECTOR	Type-2A
PA1	STOP	MOTOR	Type-2A
PM1	RUN	MOTOR	Type-2A
HL1	Multiled	Signalling	NO plate

=	TYPICAL
+	LK-x

DWG n° : 231298/SD/31

Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Door Front Lay-Out - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 035 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

USERS LEGEND

TYPICAL : LINE FEEDER "LK1-n" "LK2-n"

TYPICAL APPLICABILITY					
ITEM	ITEM TAG	DESCRIPTION TAG	REFERENCE POSITION (written on name name plate "type-1A)	REFERENCE NOMINAL CURRENT C.B. TRIP UNIT (written on name name plate "type-1A)	REFERENCE TYPICAL (written on name name plate "type-1A)
1	SPARE	SPARE	A2 / +05	40A	LK1-40
2	SPARE	SPARE	A3 / +02	40A	LK1-40
3	DP-200N1	DB-LIGHTING & SMALL POWER BoP	A3 / +03	100A	LK1-100
4	JB-200E3	CRANE	A3 / +04	63A	LK1-63
5	SPARE	SPARE	A3 / +05	40A	LK1-40
6	JB-500E8	WATER PACKAGE	A3 / +08	160A	LK2-160
7	B100-HSB-001	HVAC PANELS HV ROOM	A4 / +02	40A	LK1-40
8	A-80000	FUELL CELL AUXIALIRY LOAD	A4 / +03	63A	LK1-63
9	CP-850F03	BESS PCS CABINET	A4 / +04	40A	LK1-40
10	SPARE	SPARE	A4 / +05	40A	LK1-40
11	SPARE	SPARE	A4 / +06	40A	LK1-40
12	K-63001-A	INSTRUMENTS AIR PACKAGE 01A	A4 / +08	160A	LK2-160
13	SPARE	SPARE	A5 / +01	40A	LK1-40
14	B200-HSB-001	HVAC PANELS - LV ROOM	A5 / +02	40A	LK1-40
15	B300-HSB-001	HVAC PANELS - UPS ROOM	A5 / +03	63A	LK1-63
16	B400-HSB-001	HVAC PANELS - ITER	A5 / +04	63A	LK1-63
17	CN-200N1	IMPRESSED CURR. CATHODIC PROTECTION (ICCP) SYSTEM	A5 / +05	40A	LK1-40
18	SPARE	SPARE	A5 / +06	40A	LK1-40
19	K-63001-B	INSTRUMENTS AIR PACKAGE 01B	A5 / +08	160A	LK2-160
20	CP-850E1	BESS LV1 CABINAT (+DISTR 1)	A6 / +02	40A	LK1-40
21	CP-850E2	BESS LV2 CABINAT (+DISTR 2)	A6 / +03	40A	LK1-40
22	SPARE	SPARE	A6 / +04	40A	LK1-40

= TYPICAL
+ LK-x

DWG n° : 231298/SD/31
Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

TITLE : "SG-200N1"
LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS
Users Legend - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 036 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

ITEMS ACRONYM

TYPICAL : LINE FEEDER "LK1-n" "LK2-n"

Composition of Typical :

LK-x = Common Parts
LK1-"nn" or LK2-"nn"= Specific Parts

Example for Composition of LK1-63:
- to take "LK-x" plus "LK1-63"

Example for Composition of LK2-160:
- to take "LK-x" plus "LK2-160"

	ACRONYM ITEMS [Comun parts]	ACRONYM ITEMS [Specific parts]					
	LK-x	LK1-40 [In=40A] [Current Trip Unit]	LK1-63 [In=63A] [Current Trip Unit]	LK1-100 [In=100A] [Current Trip Unit]	LK2-160 [In=160A] [Current Trip Unit]		
ASSOCIATED TYPICAL	This Item include all devices that are comun for both "Specific Parts" Items	This Items include only devices that are detail for "Specific Parts" Items					
LK1-40	X	X					
LK1-63	X		X				
LK1-100	X			X			
LK2-160	X				X		
-							

=	TYPICAL					
+	LK-x					
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)	
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)	
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)	
REV.	DATE	DRN	CHKD	APPD	DESCRIPTION	

DWG n° : 231298/SD/31
Item n° : PF1002983/26

CROSSWIND

ROSETTI MARINO

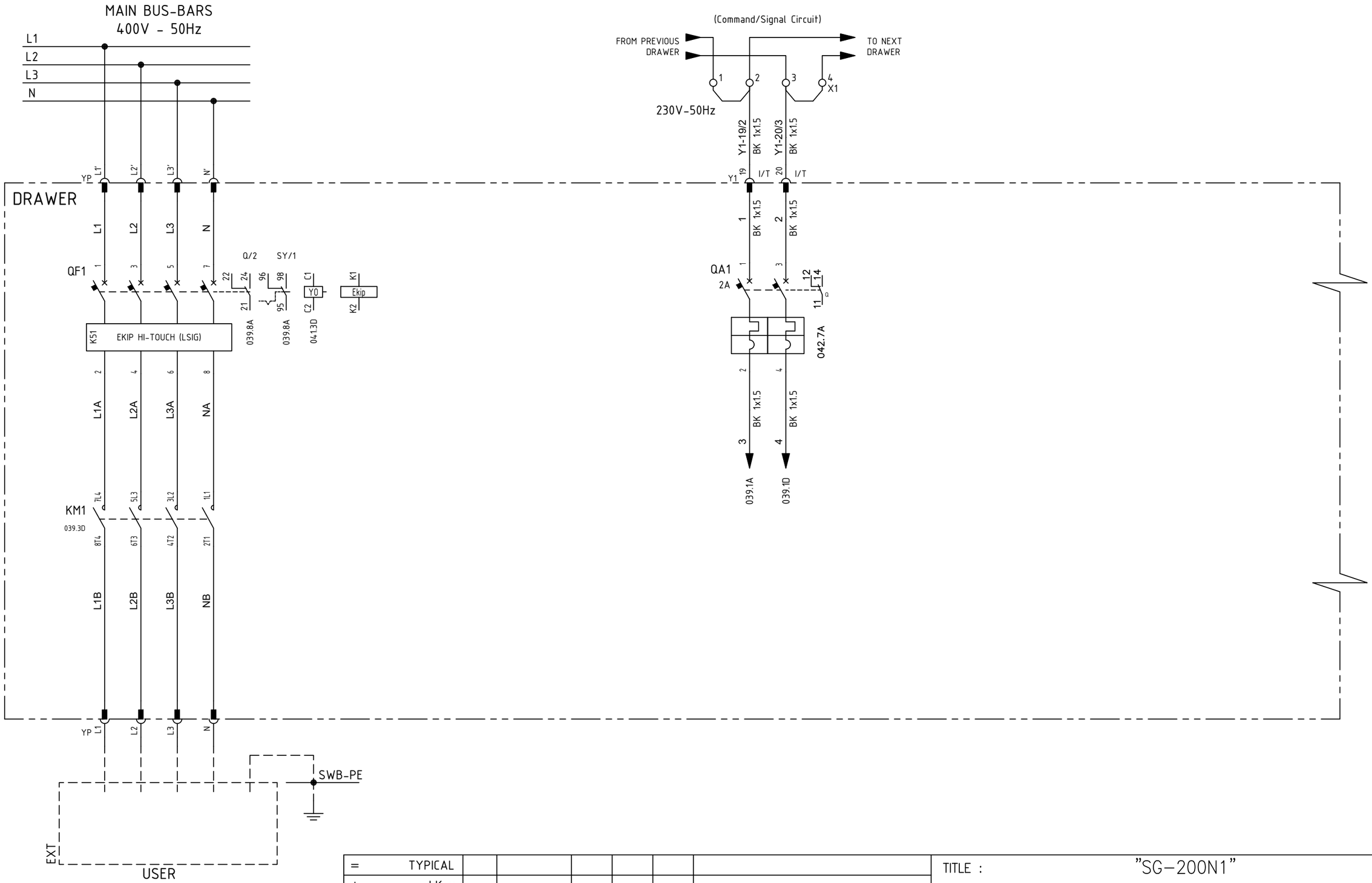
TITLE : "SG-200N1"
LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS
Items Acronym - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 037 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02



=	TYPICAL
+	LK-x

DWG n° : 231298/SD/31

Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

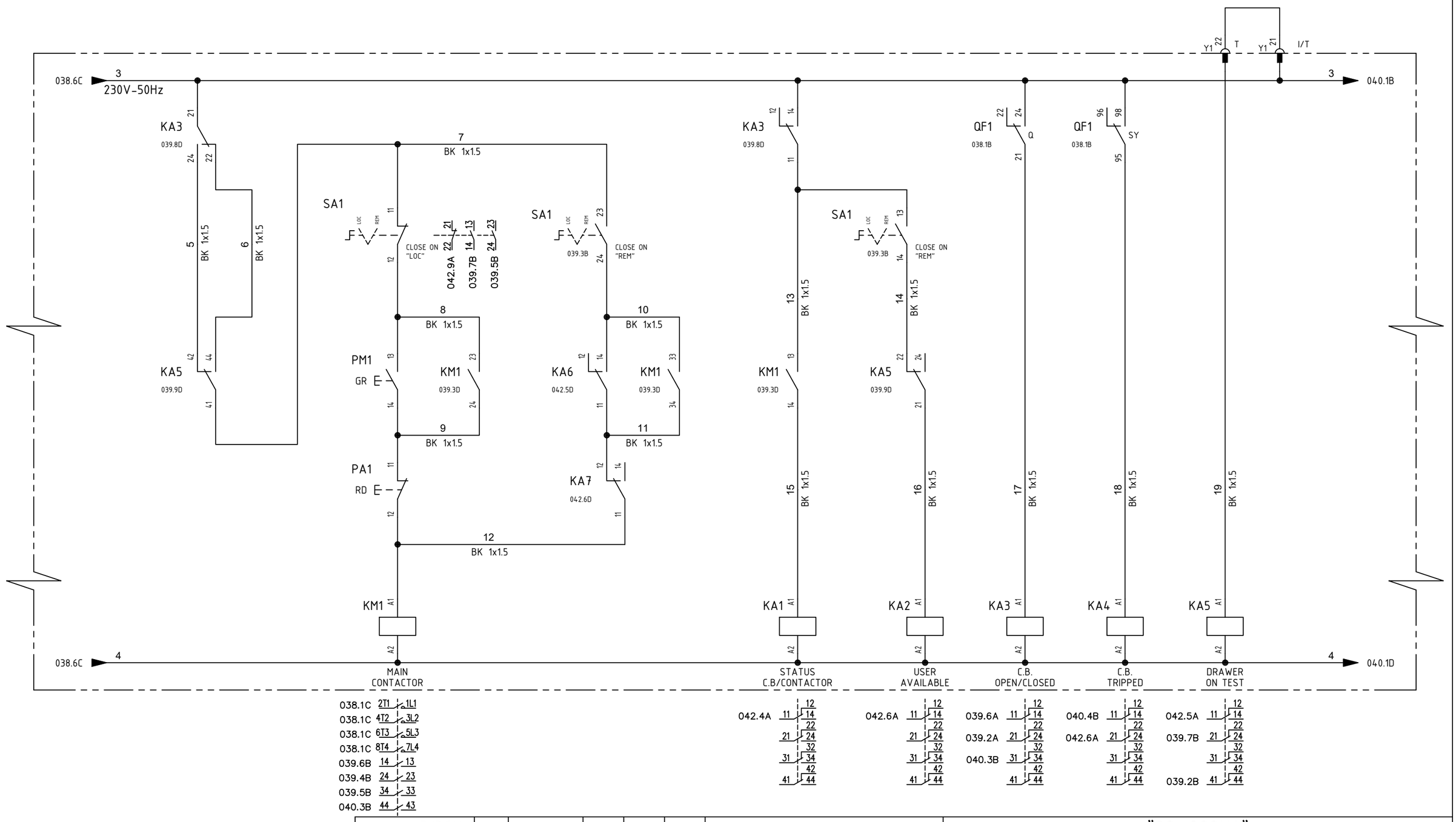
DRAWING NO. 1723002197-EL-DG-00031

SHEET 038

REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02



=	TYPICAL
+	LK-x

DWG n° : 231298/SD/31

Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

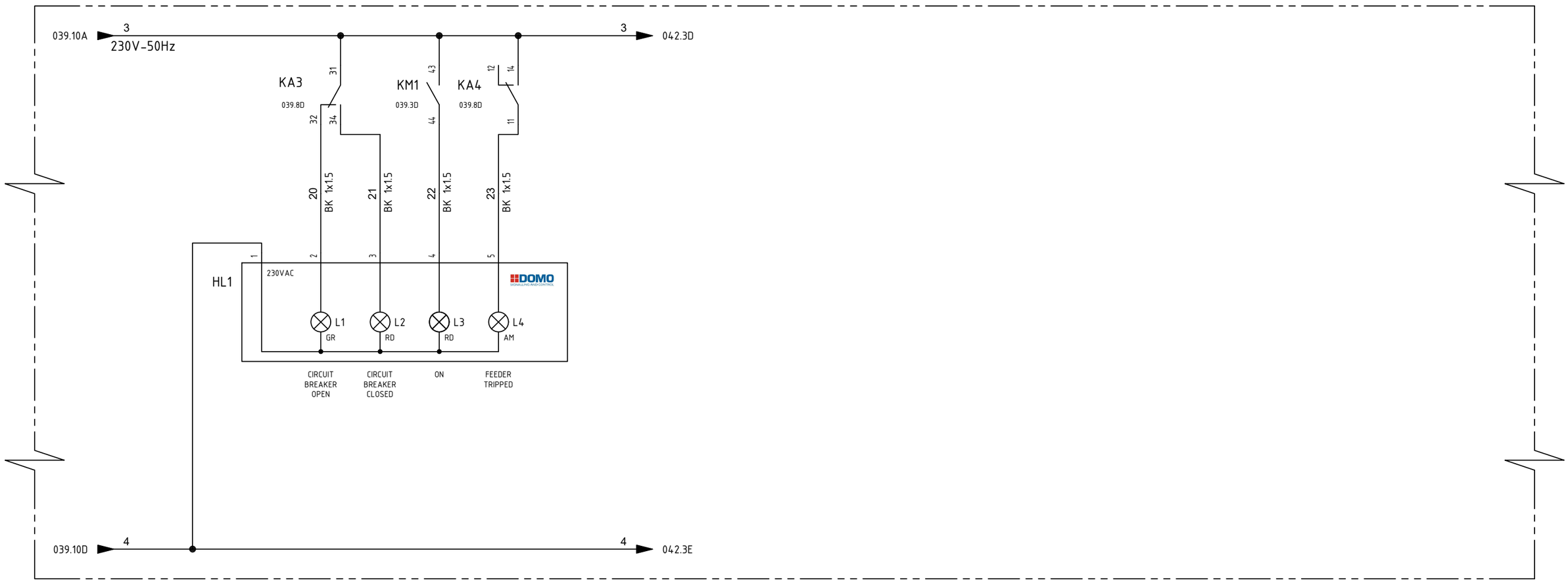
DRAWING NO. 1723002197-EL-DG-00031

SHEET 039

REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02



=	TYPICAL						
+	LK-x						
DWG n° : 231298/SD/31							
Item n° : PF1002983/26							
		2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
		1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
		0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
		REV.	DATE	DRN	CHKD	APPD	DESCRIPTION

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

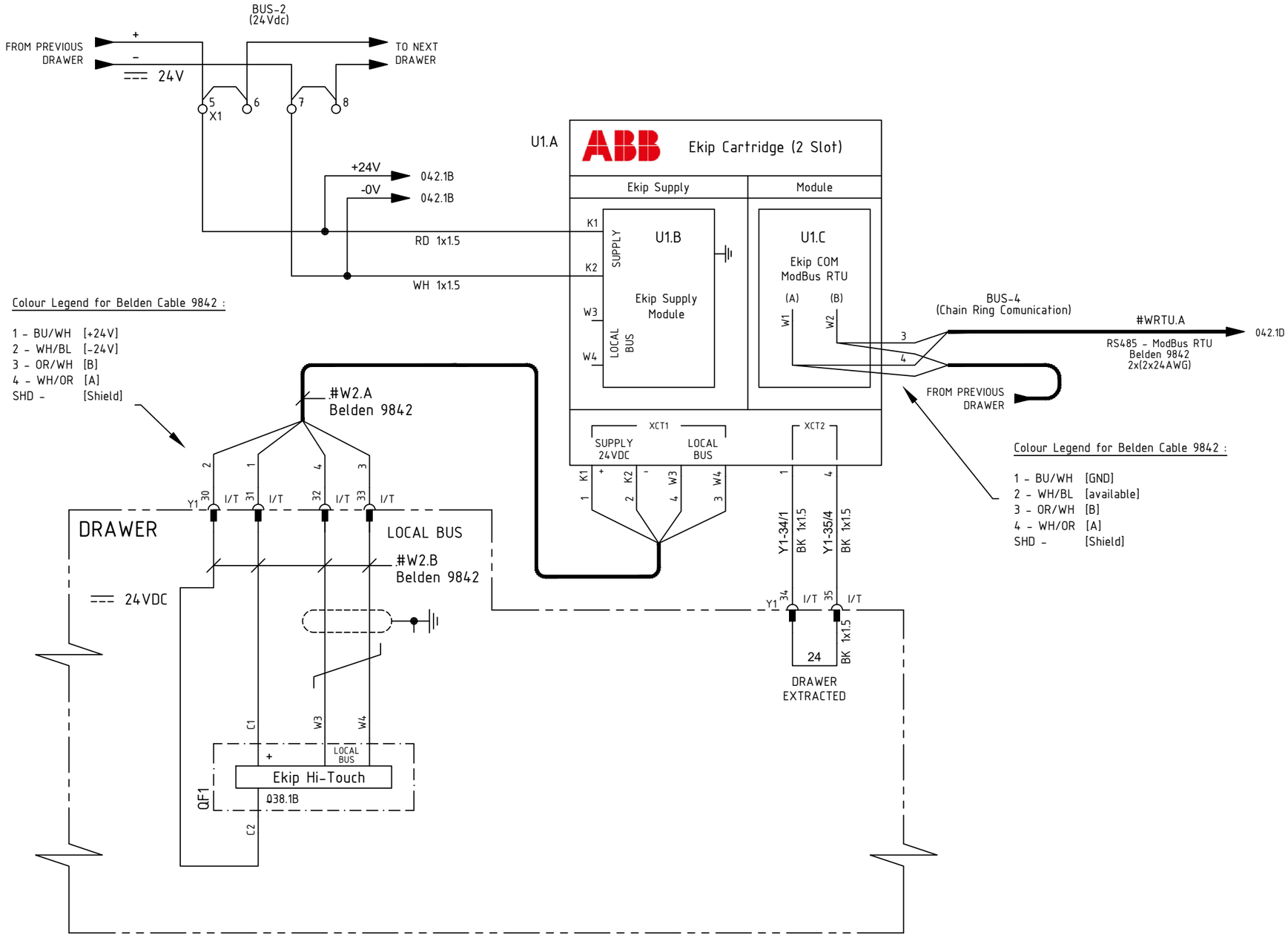
DRAWING NO. 1723002197-EL-DG-00031

SHEET 040

REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02



=	TYPICAL						
+	LK-x						
DWG n° : 231298/SD/31							
Item n° : PF1002983/26		2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
		1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
		0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
		REV.	DATE	DRN	CHKD	APPD	DESCRIPTION

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

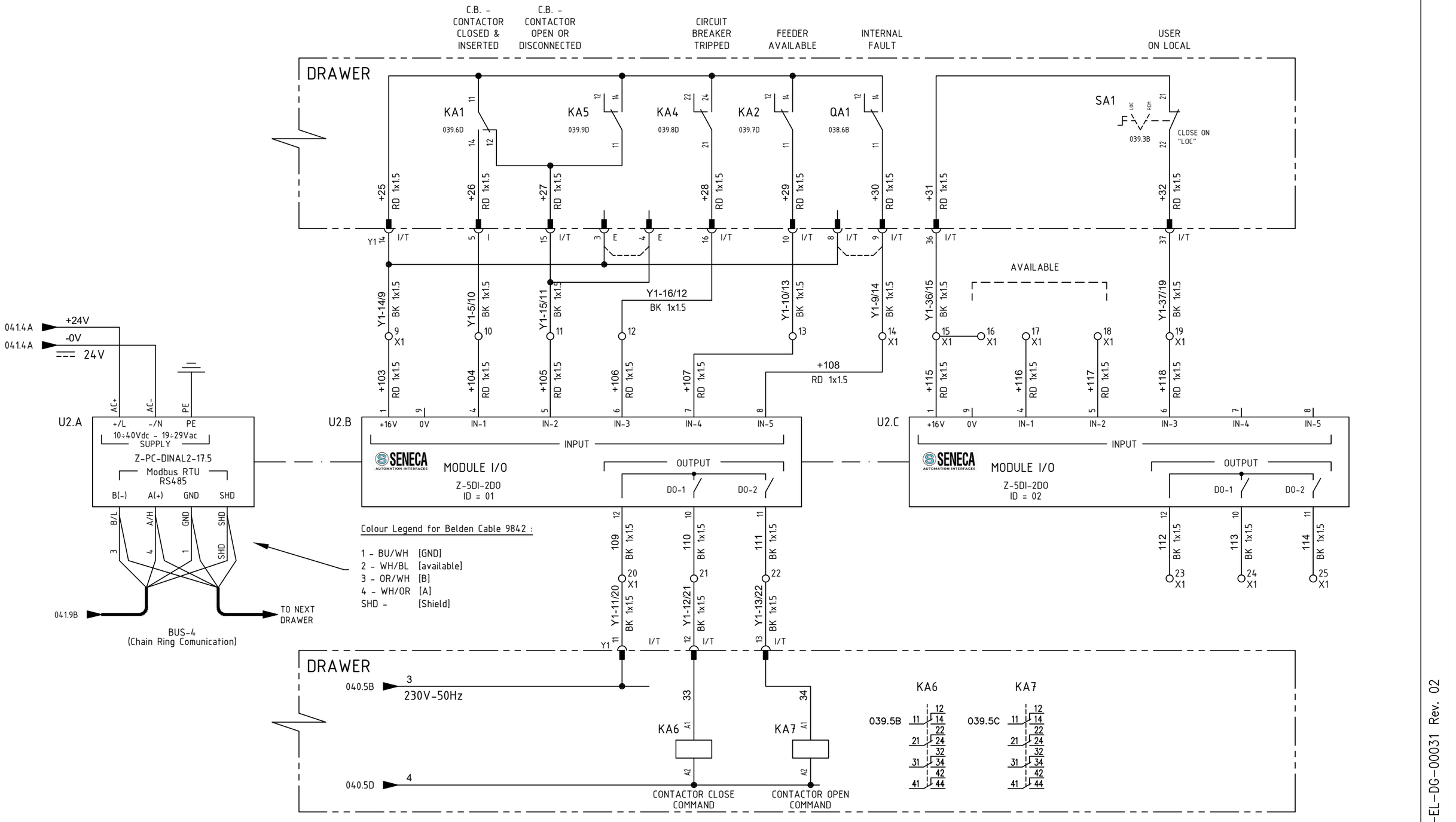
DRAWING NO. 1723002197-EL-DG-00031

SHEET 041

REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02



=	TYPICAL					
+	LK-x					
DWG n° : 231298/SD/31						
Item n° : PF1002983/26						
	2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
	1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
	0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
	REV.	DATE	DRN	CHKD	APPD	DESCRIPTION

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00031

SHEET 042

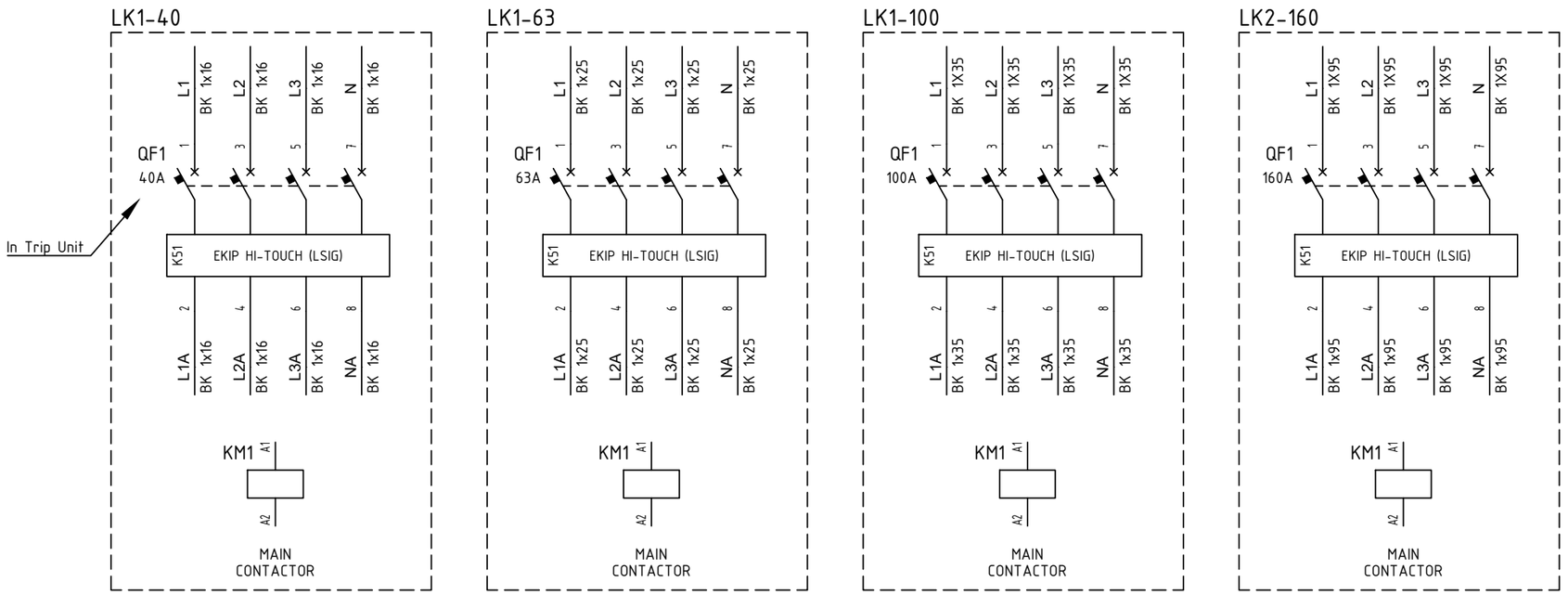
REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

SPECIFIC PARTS

TYPICAL : LINE FEEDER "LK1-n" "LK2-n"



=	TYPICAL						
+	LK-x						
DWG n° : 231298/SD/31							
Item n° : PF1002983/26		2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
		1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
		0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
		REV.	DATE	DRN	CHKD	APPD	DESCRIPTION

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00031

SHEET 043

REV. 02

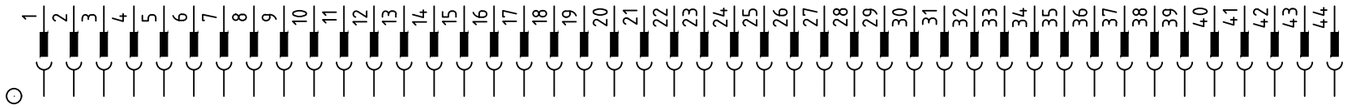
F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

TYPICAL - LK-x - Y1

AUXILIARY SOCKET
136450/001 (PF – 2 pcs) + 136458/004 (PM – 2 pcs)

N° PIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
JUMP			●	●				●	●																																			
RACKED-OUT			✕	✕				✕	✕																																			
TEST								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
RACKED-IN					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
PIN USED			042.5B	042.5B	042.4B			042.6B	042.7B	042.6B	042.5D	042.5D	042.6D	042.3B	042.4B	042.6B			038.6A	038.6A	039.9A	039.9A					041.3C	041.3C	041.4C	041.4C	041.6C	041.7C	042.7B	042.9B									



← FIELD WHIT "X" - CONTACT CLOSE WHEN DRAWER IS IN RACKED-OUT POSITION
← FIELD WHIT "X" - CONTACT CLOSE WHEN DRAWER IS IN TEST POSITION
← FIELD WHIT "X" - CONTACT CLOSE WHEN DRAWER IS IN RACKED-IN POSITION

← CROS-REFERENCE USED PIN

=	TYPICAL
+	LK-x

DWG n° : 231298/SD/31
Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
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0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"
LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS
Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 044 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

TYPICAL - LK-x

X1

NumM	Fg.	Sez.	Tipo	Descrizione	Costruttore
			BT003	BT/3 End bracket	Cabur
1	038.5A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
2	038.6A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
3	038.6A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
4	038.6A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
5	041.3A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
6	041.3A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
7	041.4A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
8	041.4A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
			HD101GR	HMD/PT/GR End section - Grey	Cabur
9	042.3B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
10	042.4B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
11	042.4B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
12	042.5B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
13	042.6B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
14	042.7B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
15	042.7B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
16	042.7B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
17	042.8B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
18	042.8B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
19	042.9B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
20	042.5C	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
21	042.5C	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
22	042.6C	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
23	042.9C	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
24	042.9C	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
25	042.10C	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
			HD201GR	HMD.1/PT/GR End section - Grey	Cabur
			BT003	BT/3 End bracket	Cabur

= TYPICAL

\+ LK-x

DWG n° : 231298/SD/31

Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00031

SHEET 045

REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

Nome/Item	Fg/Sh	Tipo/Type	Q.ta/Q.ty	Descrizione/Description	Costruttore/Manufacturer	Quadro (descrizione)
HL1	040	ML22/484L230STLTTR	1	MULTILED 48x48 - 4 LED - Vaux=230Vac/dc + LAMP TEST + TROP	DOMO	TYPICAL LK-x
KA1	039	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
KA2	039	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
KA3	039	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
KA4	039	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
KA5	039	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
KA6	042	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
KA7	042	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
PA1	039	KW 075 2	1	MP1-10R PUSH BUTTON RED WITH BLACK RING	ABB	TYPICAL LK-x
		EO 569 7	1	MCBH-00 FIXING SUPPORT 3 CONTACTS	ABB	TYPICAL LK-x
		EO 571 3	2	MCB-01 CONTACT NC FOR PUSHBUTTOM	ABB	TYPICAL LK-x
PM1	039	KW 076 0	1	MP1-10G PUSH BUTTON GREEN WITH BLACK RING	ABB	TYPICAL LK-x
		EO 569 7	1	MCBH-00 FIXING SUPPORT 3 CONTACTS	ABB	TYPICAL LK-x
		EO 570 5	2	MCB-10 CONTACT NO FOR PUSHBUTTONS	ABB	TYPICAL LK-x
QA1	038	S550239	1	S202M C 2 AUTOMATIC CIRCUIT BREAKER 10KA 2P	ABB	TYPICAL LK-x
		A563819	1	S2-CS/H6R AUXILIARY STATE CONTACT 1CO	ABB	TYPICAL LK-x
SA1	039	KW 329 3	1	M2SS2-10B HANDLE SELECTOR 2P 90° BLACK RING BLACK	ABB	TYPICAL LK-x
		EO 569 7	1	MCBH-00 FIXING SUPPORT 3 CONTACTS	ABB	TYPICAL LK-x
		EO 570 5	2	MCB-10 CONTACT NO FOR PUSHBUTTONS	ABB	TYPICAL LK-x
		EO 571 3	2	MCB-01 CONTACT NC FOR PUSHBUTTOM	ABB	TYPICAL LK-x
U1.2	041	1SDA074173R1	1	MODUL EKIP SUPPLY 24÷48VDC	ABB	TYPICAL LK-x
U1.3	041	1SDA105166R1	1	Module Ekip Com Modbus RS485 Tmax XT	ABB	TYPICAL LK-x
U1.A	041	1SDA105203R1	1	EKIP CARTRIDGE 2SLOT FOR XT2-XT4-XT5	ABB	TYPICAL LK-x
U2.A	042	Z-PC-DINAL2-17.5	1	DIN RAIL 2SLOT WITH HEAD FOR "Z-5DI-2DO"	SENECA	TYPICAL LK-x
U2.B	042	Z-5DI-2DO	1	I/O MODUL 5DI+2DO modbus RS485 Vaux=10÷40Vdc 19÷28Vac	SENECA	TYPICAL LK-x
U2.C	042	Z-5DI-2DO	1	I/O MODUL 5DI+2DO modbus RS485 Vaux=10÷40Vdc 19÷28Vac	SENECA	TYPICAL LK-x
X1		HD100GR__	8	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur	TYPICAL LK-x
		HD400GR__	17	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur	TYPICAL LK-x
		BT003	2	BT/3 End bracket	Cabur	TYPICAL LK-x
		HD101GR	1	HMD/PT/GR End section - Grey	Cabur	TYPICAL LK-x

= TYPICAL
\+ LK-x

DWG n° : 231298/SD/31
Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 046 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

Nome/Item	Fg/Sh	Tipo/Type	Q.ta/Q.ty	Descrizione/Description	Costruttore/Manufacturer	Quadro (descrizione)
X1		HD201GR	1	HMD.1/PT/GR End section - Grey	Cabur	TYPICAL LK-x

Nome/Item	Fg/Sh	Tipo/Type	Q.ta/Q.ty	Descrizione/Description	Costruttore/Manufacturer	Quadro (descrizione)
KM1	043	AF40400013	1	AF40-40-00-13 CONTACTOR 4P 40A 100-250VAC/DC	ABB	TYPICAL LK1-40
		CA440E	1	CA4-40E AUXILIARY FRONT CONTACT 4NO	ABB	TYPICAL LK1-40
QF1	043	1SDA068169R1	1	XT2S 160 BREAKING PART 4p F F	ABB	TYPICAL LK1-40
		1SDA100162R1	1	ELECTRONIC TRIP RELEASE Ekip Hi-Touch LSIG In=40A XT2 4p	ABB	TYPICAL LK1-40
		1SDA066431R1	1	AUX-C 1Q+1SY 250Vac/dc XT1..XT5 F/P	ABB	TYPICAL LK1-40

Nome/Item	Fg/Sh	Tipo/Type	Q.ta/Q.ty	Descrizione/Description	Costruttore/Manufacturer	Quadro (descrizione)
KM1	043	AF52400013	1	AF52-30-00-13 CONTACTOR 4P 53A(AC3) 100-250VAC/DC	ABB	TYPICAL LK1-63
		CA440E	1	CA4-40E AUXILIARY FRONT CONTACT 4NO	ABB	TYPICAL LK1-63
QF1	043	1SDA068169R1	1	XT2S 160 BREAKING PART 4p F F	ABB	TYPICAL LK1-63
		1SDA100163R1	1	ELECTRONIC TRIP RELEASE Ekip Hi-Touch LSIG In=63A XT2 4p	ABB	TYPICAL LK1-63
		1SDA066431R1	1	AUX-C 1Q+1SY 250Vac/dc XT1..XT5 F/P	ABB	TYPICAL LK1-63

Nome/Item	Fg/Sh	Tipo/Type	Q.ta/Q.ty	Descrizione/Description	Costruttore/Manufacturer	Quadro (descrizione)
KM1	043	AF80400013	1	AF80-30-00-13 CONTACTOR 4P 80A(AC3) 100-250VAC/DC	ABB	TYPICAL LK1-100
		CA440E	1	CA4-40E AUXILIARY FRONT CONTACT 4NO	ABB	TYPICAL LK1-100
QF1	043	1SDA068169R1	1	XT2S 160 BREAKING PART 4p F F	ABB	TYPICAL LK1-100
		1SDA100164R1	1	ELECTRONIC TRIP RELEASE Ekip Hi-Touch LSIG In=100A XT2 4p	ABB	TYPICAL LK1-100
		1SDA066431R1	1	AUX-C 1Q+1SY 250Vac/dc XT1..XT5 F/P	ABB	TYPICAL LK1-100

Nome/Item	Fg/Sh	Tipo/Type	Q.ta/Q.ty	Descrizione/Description	Costruttore/Manufacturer	Quadro (descrizione)
KM1	043	AF190401113	1	AF190-40-11-13 CONT 4P 190A AC3 100-250VAC/DC	ABB	TYPICAL LK2-160
		CAL1911	1	CAL19-11 CONTATTO AUSILIARIO 1NA+1NC PER AF116÷AF370	ABB	TYPICAL LK2-160
		CAL1911B	2	CAL19-11B AUXILIARY CONTACT 1NA+1NC PER AF116÷AF370	ABB	TYPICAL LK2-160
QF1	043	1SDA068179R1	1	XT4S 250 BREAKING PART 4p F F	ABB	TYPICAL LK2-160
		1SDA100334R1	1	ELECTRONIC TRIP RELEASE Ekip Hi-Touch LSIG In=160A XT4 4p	ABB	TYPICAL LK2-160
		1SDA066431R1	1	AUX-C 1Q+1SY 250Vac/dc XT1..XT5 F/P	ABB	TYPICAL LK2-160

= TYPICAL
+ LK-x

DWG n° : 231298/SD/31
Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 047 | REV. 02

F.to UNI A3: 420mmx297mm

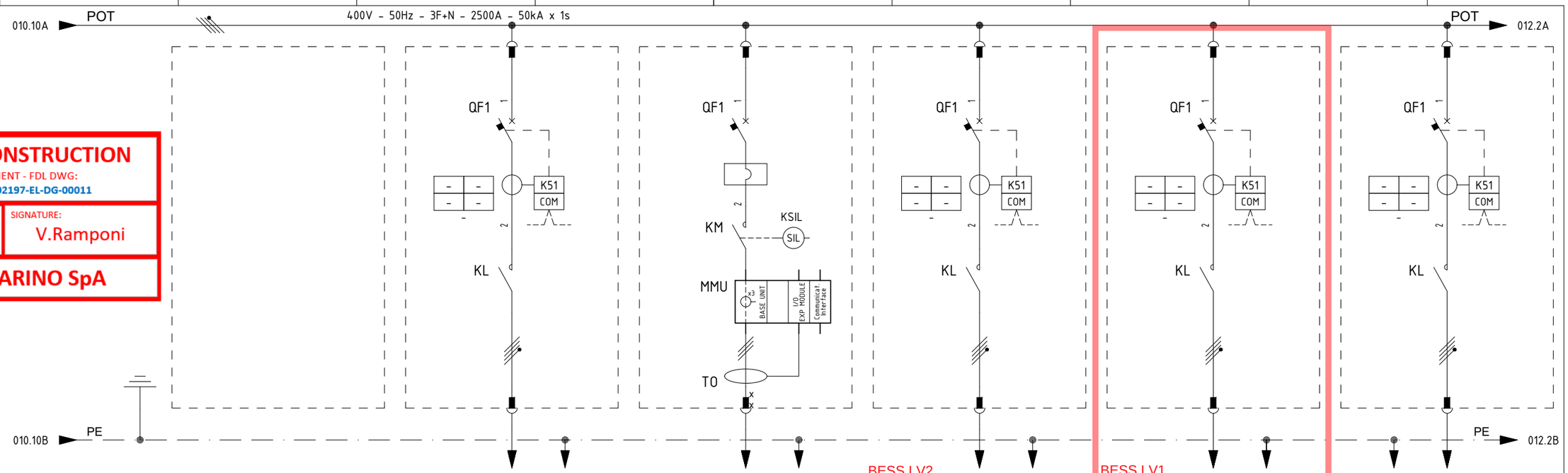
File Name : 1723002197-EL-DG-00031 Rev. 02

VALID FOR CONSTRUCTION

VENDOR DOCUMENT - FDL DWG:
123A90-FDL-1723002197-EL-DG-00011

REV.:	DATE:	SIGNATURE:
4_A	18/12/24	V.Ramponi

ROSETTI MARINO SpA



ITEM				K-63001-B	PM-50001 B	BESS LV2 CABINET (+DISTR 2) ~~CP-850E1~~ CP-850E2 ~~BESS LV1 CABINET (+DISTR 1)~~	BESS LV1 CABINET (+DISTR 1) ~~CP-850E2~~ CP-850E1 ~~BESS LV2 CABINET (+DISTR 2)~~	-
UTILITY				INSTRUMENTS AIR PACKAGE 01B	SEA WATER PUMP B			SPARE
COLUMN/CUBICLE				A5 / +08	A6 / +01	A6 / +02	A6 / +03	A6 / +04
RATED POWER | RATED CURRENT				68.75 kW | 111.24 A	6.1 kW | 11.0 A	11.28 kW | 18.09 A	11.28 kW | 18.09 A	- kW | - A
TYPICAL FUNCTIONAL				LK2-160	M1-6	LK1-40	LK1-40	LK1-40
CIRCUIT BREAKER (ABB)	TYPE			XT4S - 250	XT2S - 160	XT2S - 160	XT2S - 160	XT2S - 160
	VERSION			4P - FIXED	3P - FIXED	4P - FIXED	4P - FIXED	4P - FIXED
	TRIP UNITS			EKIP HI TOUCH LSIG (In = 160A)	MA (In = 20A)	EKIP HI TOUCH LSIG (In = 40A)	EKIP HI TOUCH LSIG (In = 40A)	EKIP HI TOUCH LSIG (In = 40A)
	Icu		KA	50 kA	-	50 kA	50 kA	50 kA
OVERLOAD	L	Range	A	(0.4 - 1) x In	-	(0.4 - 1) x In	(0.4 - 1) x In	(0.4 - 1) x In
		Range	t	k/I^2	-	k/I^2	k/I^2	k/I^2
SEL. SHORT-CIRCUIT	S	Range	A	(0.6 - 10) x In	-	(0.6 - 10) x In	(0.6 - 10) x In	(0.6 - 10) x In
		Range	t	0.05 - 0.4 sec / k/I^2	-	0.05 - 0,4 sec / k/I^2	0.05 - 0,4 sec / k/I^2	0.05 - 0,4 sec / k/I^2
INST. SHORT-CIRCUIT	I	Range	A	(1.5 - 15) x In	(6 - 14) x I	(1.5 - 15) x In	(1.5 - 15) x In	(1.5 - 15) x In
		Range	t	instantaneous	<= 0.02 sec	instantaneous	instantaneous	instantaneous
EARTH FAULT PROTECTION	G	Range	A	(0.1 - 1) x In	-	(0.1 - 1) x In	(0.1 - 1) x In	(0.1 - 1) x In
		Range	t	t=k / t=k/I^2	-	t=k / t=k/I^2	t=k / t=k/I^2	t=k / t=k/I^2
CONTACTOR (ABB)				AF190-40-11-13 (275A-AC1); 100-250 VAC/DC	AF38-30-00-13 (18.5 kW - AC3) - 100-250Vac/dc	AF40-40-00-13 (70A-AC1); 100-250VAC/DC	AF40-40-00-13 (70A-AC1); 100-250VAC/DC	AF40-40-00-13 (70A-AC1); 100-250VAC/DC
THERMAL OVERLOAD RELAY (ABB)				-	UMC100.3 UC (0.24 - 63A)	-	-	-
SURGE ARRESTER (DEHN)				-	-	-	-	-
TOROIDAL CURRENT TRANSFORMER (FRER)				-	-	-	-	-
FUSE HOLDER (ITALWEBER)				-	-	-	-	-
INDIRECT PROTECTION (ABB)				-	-	-	-	-
VOLTMETER				-	-	-	-	-
CURRENT TRANSFORMER FOR MEASURE (FRER)	TYPE			-	-	-	-	-
	PERFORMANCE/CLASS			-	-	-	-	-
VOLTAGE TRANSFORMER FOR MEASURE (FRER)	TYPE			-	-	-	-	-
	PERFORMANCE/CLASS			-	-	-	-	-
LOCK-OUT RELAY (-)				-	-	-	-	-
POWER CONDUCTOR			mmq	5G70	4G4	4 x (1 x 10)	4 x (1 x 10)	-

=
+
DWG n° : 231298/SD/11
Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
4	28/08/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
3	08/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
2	03/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
1	28/03/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
0	15/02/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"

SINGLE LINE DIAGRAM

Single Line Drawing

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00011 | SHEET 011 | REV. 04

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00011 Rev. 04

ITEM	Tag	A6/+02-QF1	: AUX BESS LV1 CABINET - A6/+02-QF1			Dwg	1723002197-EL-DG-00011
	S/Sys	85-00	: BESS Package (A-85000)			Module	
TASK	code	C10002956		Location	Onshore Activities	User	Rosetti Marino Quality Control
FORM	Process	PRE-COMM	Activity FTS	Discipline	Electrical	Form	FTR-2 Protection Relay

FTR2 - Protection relay
Record sheet

RELAY DATA

Manufacturer:	ABB	Serial N°:	EF5001353690N000	Relay type:	EKIP HI TOUCH LSIG
Auxiliary supply:	24 Vdc	Location:	B200	Cubicle:	A6/+02
Switchboard:	SG-200N1				

Current transformers

Tag	Number of	Ratio	Location

Voltage transformers

Tag	Number of	Ratio	Location

Test result (refer to manufacturer's procedure)

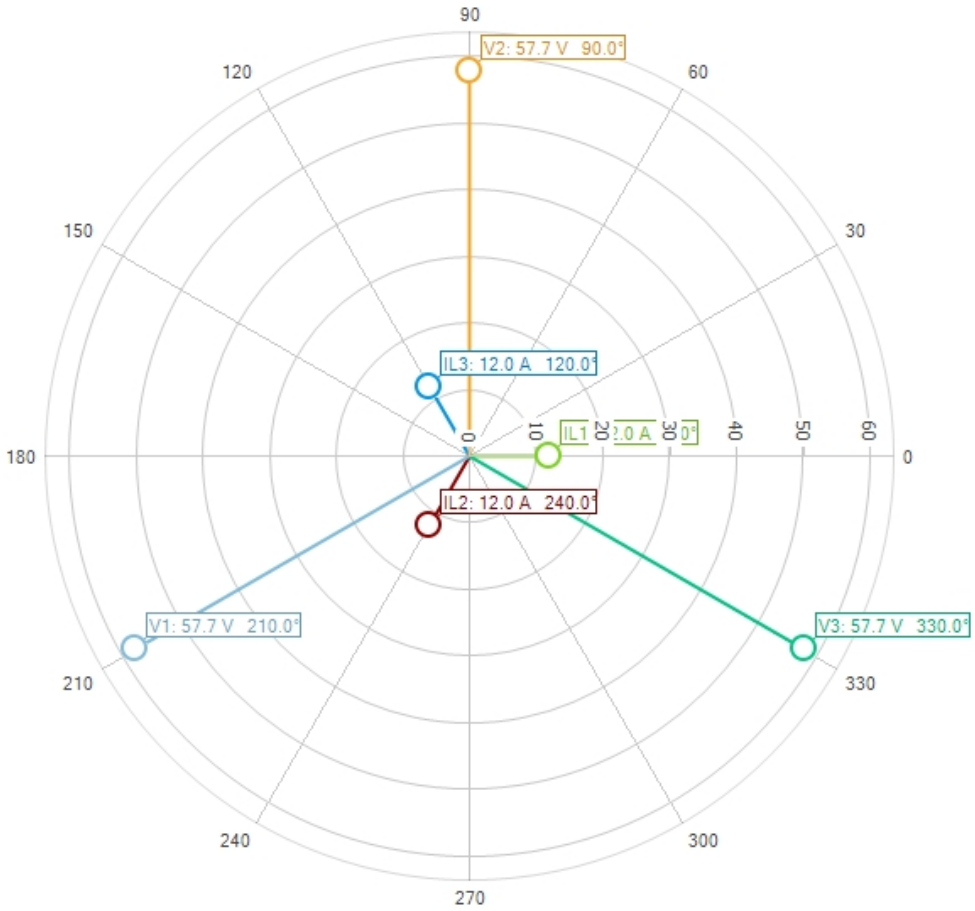
ANSI function	Setting	Injection	Trip value	Time delay Setting	Time delay Trip value
L-->49	18,8A			3s	
S-->50 TD/68/51	100A	120A		0.1s	102ms
I-->50	200A	400A		0.02s	28ms
G-->50N	8A			0.1s	

Testing & measurement instruments used

Type	Serial n°	Calibration certificate	Validity
ABB Ekip T&P	E34013804410W050		

Comments: See attachments for full tests (injection and trip value)

Page 1/1	Performed by	☐ WITNESS ☑ REVIEW	☐ WITNESS ☐ REVIEW
Company	RM COMM	RM COMM	CPY NOT PRESENT
Name	Mattia Girotti	Kristian Castellani	Witness waived
Date	2024-09-16	2024-09-18	2024-09-20
Signature	Digitaly signed by Mattia Girotti 2024-09-16T11:17:41.858Z	Digitaly signed by Kristian Castellani 2024-09-18T07:23:46.309Z	Digitaly signed by Witness waived 2024-09-20T06:28:36.545Z



Test

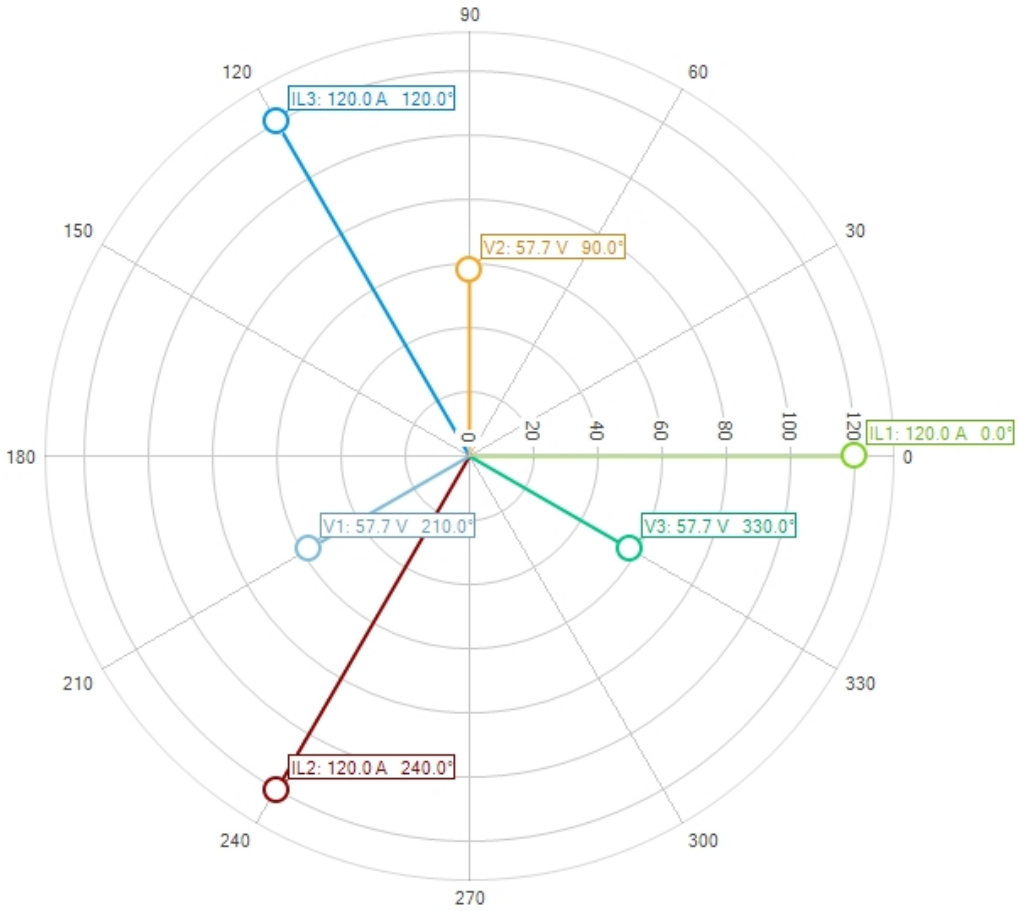
Name	Automatic test 1
Session	Default session
Customer	
Location	
Operator	

Device

Tag name	A6/+02
Relay Serial Number	EF5001353690N000
Circuit Breaker Serial Number	CE61041921number
	XT2/4
Device settings	In = 40 A Un = 100 V fn = 50 Hz
Protection Settings	Protection = L Curve type = t=k/i^2 Threshold = 0.470 In Time = 3.00 s Protection = S Curve type = t=k Threshold = 2.50 In Time = 0.10 s Protection = I Threshold = 5.00 In Protection = G Curve type = t=k Threshold = 0.200 In Time = 0.10 s
Preconditions	All preconditions satisfied.

Test result

⚠ Test completed without any trip in 3000 ms.



Test

Name	Automatic test 2
Session	Default session
Customer	
Location	
Operator	

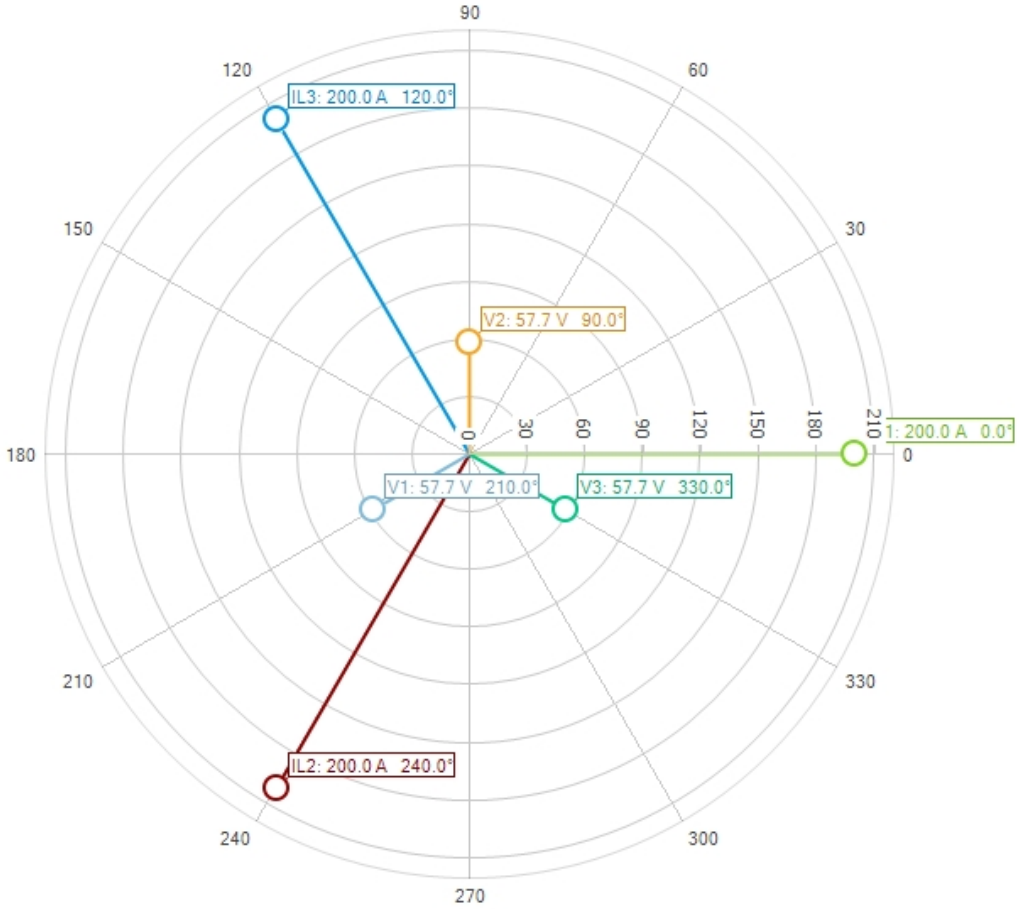
Device

Tag name	A6/+02
Relay Serial Number	EF5001353690N000
Circuit Breaker Serial Number	CE61041921number
	XT2/4
Device settings	In = 40 A Un = 100 V fn = 50 Hz
Protection Settings	Protection = L Curve type = t=k/i^2 Threshold = 0.470 In Time = 3.00 s Protection = S Curve type = t=k Threshold = 2.50 In Time = 0.10 s Protection = I Threshold = 5.00 In Protection = G Curve type = t=k Threshold = 0.200 In Time = 0.10 s
Preconditions	All preconditions satisfied.

Test result

Test completed with trip. Protection S tripped in 102 ms.
Trip time must be between 0 ms and 1000 ms

Trip time must be between 0 ms and 1000 ms.



Test

Name	Automatic test 3
Session	Default session
Customer	
Location	
Operator	

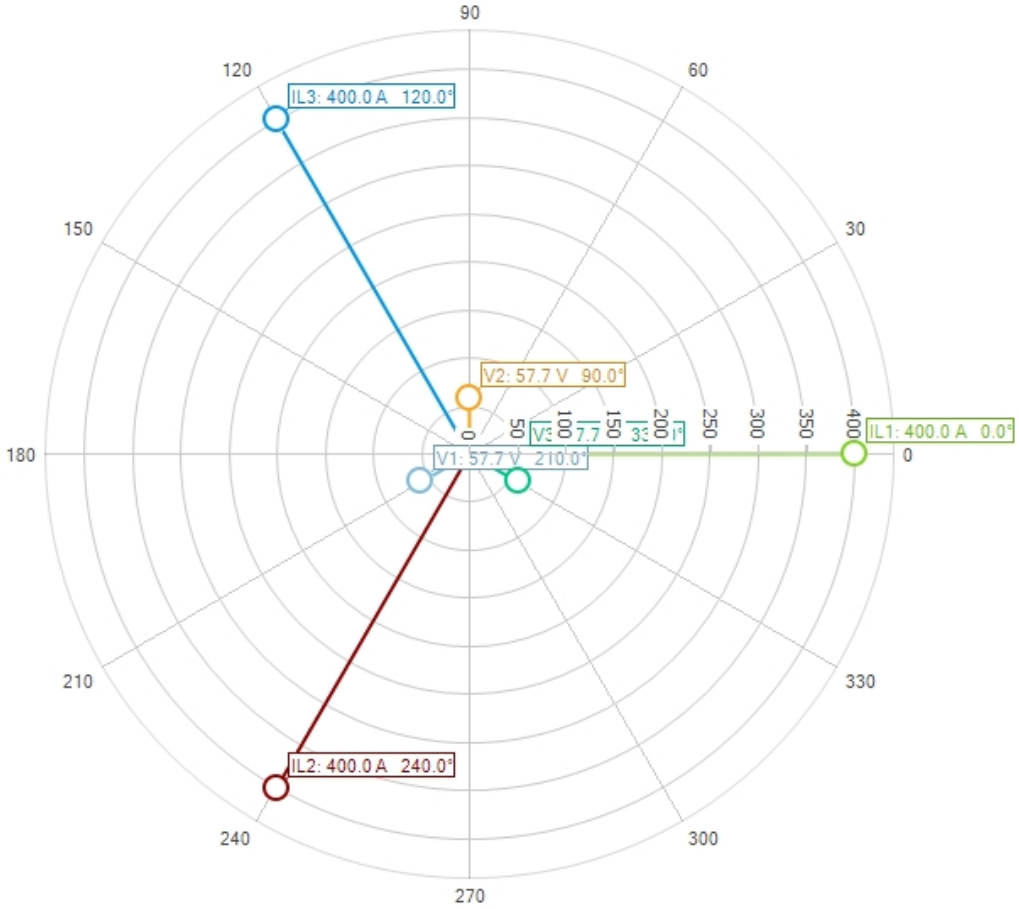
Device

Tag name	A6/+02
Relay Serial Number	EF5001353690N000
Circuit Breaker Serial Number	CE61041921number
	XT2/4
Device settings	In = 40 A Un = 100 V fn = 50 Hz
Protection Settings	Protection = L Curve type = t=k/i^2 Threshold = 0.470 In Time = 3.00 s Protection = S Curve type = t=k Threshold = 2.50 In Time = 0.10 s Protection = I Threshold = 5.00 In Protection = G Curve type = t=k Threshold = 0.200 In Time = 0.10 s
Preconditions	All preconditions satisfied.

Test result

Test completed with trip. Protection S tripped in 103 ms.
Trip time must be between 0 ms and 1000 ms

Trip time must be between 0 ms and 1000 ms.



Test

Name	Automatic test 4
Session	Default session
Customer	
Location	
Operator	

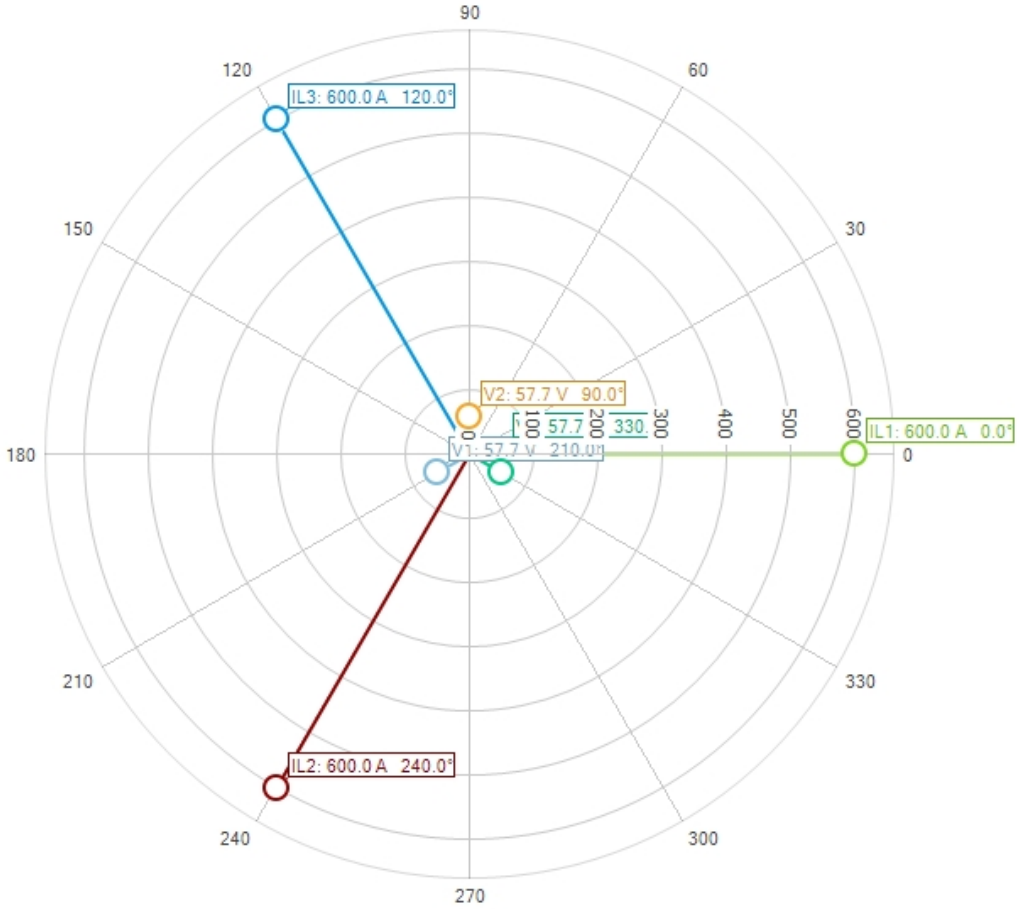
Device

Tag name	A6/+02
Relay Serial Number	EF5001353690N000
Circuit Breaker Serial Number	CE61041921number
	XT2/4
Device settings	In = 40 A Un = 100 V fn = 50 Hz
Protection Settings	Protection = L Curve type = t=k/i^2 Threshold = 0.470 In Time = 3.00 s Protection = S Curve type = t=k Threshold = 2.50 In Time = 0.10 s Protection = I Threshold = 5.00 In Protection = G Curve type = t=k Threshold = 0.200 In Time = 0.10 s
Preconditions	All preconditions satisfied.

Test result

Test completed with trip. Protection I tripped in 28 ms.
Trip time must be between 0 ms and 1000 ms

Trip time must be between 0 ms and 1000 ms.



Test

Name	Automatic test 5
Session	Default session
Customer	
Location	
Operator	

Device

Tag name	A6/+02
Relay Serial Number	EF5001353690N000
Circuit Breaker Serial Number	CE61041921number
	XT2/4
Device settings	In = 40 A Un = 100 V fn = 50 Hz
Protection Settings	Protection = L Curve type = t=k/i^2 Threshold = 0.470 In Time = 3.00 s Protection = S Curve type = t=k Threshold = 2.50 In Time = 0.10 s Protection = I Threshold = 5.00 In Protection = G Curve type = t=k Threshold = 0.200 In Time = 0.10 s
Preconditions	All preconditions satisfied.

Test result

Test completed with trip. Protection I tripped in 28 ms.
Trip time must be between 0 ms and 1000 ms

Trip time must be between 0 ms and 1000 ms.

Page Name	Group Name	Variable Name	Variable Value	Variable Unit
Settings A				
	Overload Protection (L - ANSI 49)			
		PU nominal current In	40	
		Status	Enabled	
		Function	t=k/i^2	
		Prealarm I1	90	% I1
		Threshold I1	0.470	In
		Time t1 std	3.00	s
		Thermal memory (TM)	Disabled	
		TM Algorithm	RMS-independent	
		TM Time	Automatic	
		TM custom time	830	s
	Time-delayed overcurrent protection (S - ANSI 50 TD/68/51)			
		Status	Enabled	
		Trip enable	Enabled	
		BlockOnStartUp	--------	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Function	t=k	
		Threshold I2 (t=k)	2.50	In
		Time t2 (t=k) IEC - UL489	0.10	s
		Startup enable	Disabled	
		Startup time	0.10	s
		Startup threshold	0.60	In
		Set Startup th. on ProgStatusD	--------	
		Thermal memory status	Disabled	
		Zone Selectivity status	Disabled	
		Zone Selectivity time	0.04	s
		Zone Selectivity Type	Logic and Hardware	
	Second time-delayed overcurrent protection (S2 - ANSI 50 TD)			
		Status	Disabled	
		Trip enable	Enabled	
		BlockOnStartUp	--------	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Threshold I5 (t=k)	2.00	In
		Time t5 (t=k)	0.05	s
		Startup enable	Disabled	
		Startup time	0.10	s
		Startup threshold	2.00	In
		Set Startup th. on ProgStatusD	--------	
		Zone Selectivity status	Disabled	
		Zone Selectivity time	0.04	s
		Zone Selectivity Type	Logic and Hardware	
	Instantaneous overcurrent protection (I - ANSI 50)			
		Status	Enabled	
		Threshold I3	5.00	In
		Startup enable	Disabled	
		Startup time	0.10	s
		Startup threshold	1.50	In
		Set Startup th. on ProgStatusD	--------	
		BlockOnStartUp	--------	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Zone Selectivity status	Disabled	
		Zone Selectivity Type	Logic and Hardware	
	Second I			
		Prot Second I	---	
		Status	Disabled	
		Threshold I31	1.50	In
		Zone Selectivity status	Disabled	
		Zone Selectivity Type	Logic and Hardware	
		Second I Mode	Function Dependent	
		Function	Disabled	
		Delay On	0.00	s
		Delay Off	15.00	s
	Earth fault protection (G - ANSI 50N TD/68/51N)			
		Status	Enabled	
		Trip enable	Enabled	
		BlockOnStartUp	--------	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Function	t=k	
		Prealarm I4	90	% I4
		Threshold I4 (t=k)	0.200	In

		Time t4 (t=k) IEC - UL489	0.10	s
		Startup enable	Disabled	
		Startup time	0.10	s
		Startup threshold	0.20	In
		Set Startup th. on ProgStatusD	--------	
		Zone selectivity status	Disabled	
		Zone selectivity time	0.04	s
		Zone Selectivity Type	Logic and Hardware	
	Directional overcurrent protection (D - ANSI 67/68)			
		Status	Disabled	
		Trip enable	Disabled	
		tripOnlyForward	--------	
		tripOnlyBackward	--------	
		BlockOnStartUp	--------	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Threshold I7 FWD	2.00	In
		Time t7 FWD	0.20	s
		Threshold I7 BWD	2.00	In
		Time t7 BWD	0.20	s
		Startup enable	Disabled	
		Startup time	0.10	s
		Startup threshold FWD	2.00	In
		Startup threshold BWD	2.00	In
		Set Startup th. on ProgStatusD	--------	
		Zone Selectivity status	Disabled	
		Zone Selectivity time FWD	0.13	s
		Zone Selectivity time BWD	0.13	s
		Zone Selectivity Type	Logic and Hardware	
		Direction minimum angle	3.6	°
	Closing on short-circuit protection (MCR)			
		Status	Disabled	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Threshold I3	6.00	In
		Time t3	0.04	s
		Zone Selectivity status	Disabled	
		Zone Selectivity Type	Logic and Hardware	
	Over Temperature (T)			
		Trip enable	Disabled	

ITEM	Tag	A6/+02-QF1	: AUX BESS LV1 CABINET - A6/+02-QF1	Dwg	1723002197-EL-DG-00011		
	S/Sys	85-00	: BESS Package (A-85000)	Module			
TASK	code	C10002957	Location	Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	PRE-COMM	Activity FTS	Discipline	Electrical	Form FTR-6	Electrical IO

FTR 6 - Electrical I/O check record sheet

Equipment Tag:	AUX BESS LV1 CABINET	Instrument Type / Serial N° :	FLUKE 175_17140769
Cubicle N°:	A6/+02	Calibration certificate date:	7715/24_10/07/2025

Link Type:	●	Hardwired	Communication	(strike through unapplicable type)
I/O Type:	●	Digital	Analogic	(strike through unapplicable type)

DIGITAL

Item	Signal description	Link Type (Hardwired/ Communication)	I/O Type (Digital/Analogic)	Point of Origin (From)	Point of Receival (to)	Text Labelling Display Satisfactory (Y/N)	Blinking/Static Display Satisfactory (Y/N)	Color Coding Satisfactory (Y/N)	Status Check			Time Stamping Satisfactory (Y/N)	Refresh Time (if >1s)	Appearing in all applicable display (Y/N)
									Event (Y/N)	Alarm (Y/N)	Fault (Y/N)			
1	CB CLOSED & INSERTED	HW	DI	A6/+02 - KA1/11-14	A6/+02 - X1/9-10	N/A	N/A	N/A	Y	N/A	N/A	N/A	N/A	N/A
2	CB OPEN OR DISCONNECTED	HW	DI	A6/+02 - KA1/11-12	A6/+02 - X1/9-11	N/A	N/A	N/A	Y	N/A	N/A	N/A	N/A	N/A
3	DRAWER ON TEST	HW	DI	A6/+02 - KA5/11-14	A6/+02 - X1/9-11	N/A	N/A	N/A	Y	N/A	N/A	N/A	N/A	N/A
4	CB TRIPPED	HW	DI	A6/+02 - KA4/21-24	A6/+02 - X1/9-12	N/A	N/A	N/A	N/A	N/A	Y	N/A	N/A	N/A
5	FEEDER AVAILABLE	HW	DI	A6/+02 - KA2/11-14	A6/+02 - X1/9-13	N/A	N/A	N/A	Y	N/A	N/A	N/A	N/A	N/A
6	INTERNAL FAULT	HW	DI	A6/+02 - QA1/11-14	A6/+02 - X1/9-14	N/A	N/A	N/A	N/A	N/A	Y	N/A	N/A	N/A
7	USER ON LOCAL	HW	DI	A6/+02 - SA1/21-22	A6/+02 - X1/15-19	N/A	N/A	N/A	Y	N/A	N/A	N/A	N/A	N/A
8														

ANALOGIC

Item	Signal description	Link Type (Hardwired/ Communication)	I/O Type (Digital/Analogic)	Point of Origin (From)	Point of Receival (to)	Min value sent	Min value received	Max value sent	Max value received	Intermediate value sent	Intermediate value received	Out of scale test (OK, Not OK)	Refresh time (if >2s)	Appearing in all applicable display (Y/N)
1														
2														
3														

Comments:

Page 1/1	Performed by	☐ WITNESS ☑ REVIEW	☐ WITNESS ☐ REVIEW
Company	RM COMM	RM COMM	CPY NOT PRESENT
Name	Davide Zucconelli	Kristian Castellani	Witness waived
Date	2024-10-02	2024-10-03	2024-10-03
Signature	Digitaly signed by Davide Zucconelli 2024-10-02T11:08:08.395Z	Digitaly signed by Kristian Castellani 2024-10-03T07:14:06.020Z	Digitaly signed by Witness waived 2024-10-03T14:30:57.963Z

ROSETTI MARINO | PROVERLIS | CROSSWIND

ITEM	Tag	A6/+03-QF1	: AUX BESS LV2 CABINET - A6/+03-QF1		Dwg	1723002197-EL-DG-00011	
	S/Sys	85-00	: BESS Package (A-85000)		Module		
TASK	code	C10002958	Location	Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	PRE-COMM	Activity	FTS	Discipline	Electrical	Form	FP00		Miscellaneous electrical Consumer

DATA

Switchboard	SG-200N1	Circuit ref:	SG-200N1-QF1
Breaker rating (A)	160A	Nominal current (A)	18.09A

FUNCTION TEST REQUIREMENT

1	Check pre-commissioning activities have been carried out				OK
2	Check equipment for cleaness				OK
3	Measure I/R value of equipment and feeder cable at 1000V (Min value: 10 Mohm)	>1000	MΩ		OK
4	Energise control of equipment feeder				OK
5	Full test feeder breaker operation in test position				OK
6	Check protection setting				OK
7	Test interface trips and signals (remote alarms & status). Check the relevant ITR presence in the system				OK
8	Test control and safety functions according to manufacturer's procedure.				OK
9	Energize				OK
10	Measure Voltage and Current values at feeder breaker	400	V	0.1 A	OK
11	Attach test procedure, if any				NA

FUNCTION TEST REQUIREMENT	RESULT

Testing & measurement instruments used

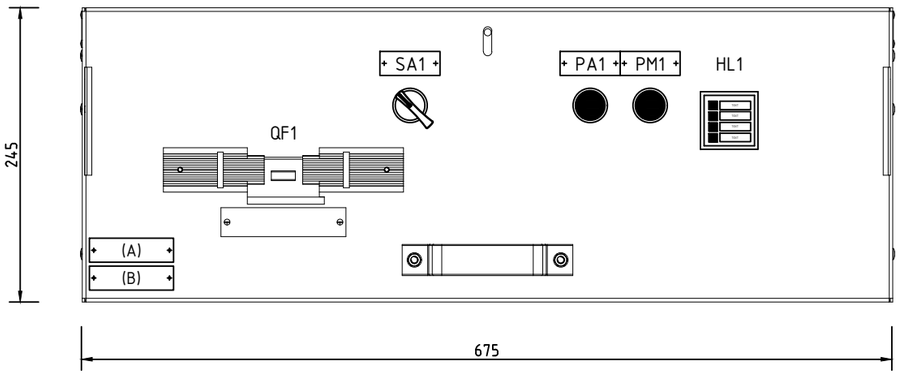
Type	Serial n°	Calibration certificate	Validity
FLUKE 1663	5380144	7727/24	10/07/2025
FLUKE 376	A1711003	7710/24	10/07/2025

Comments:

Page 1/1	Performed by	☐ WITNESS ☑ REVIEW	☐ WITNESS ☐ REVIEW
Company	RM COMM	RM COMM	CPY NOT PRESENT
Name	Mattia Girotti	Kristian Castellani	Witness waived
Date	2024-12-03	2024-12-05	2024-12-07
Signature	PROVERLIS Digitaly signed by Mattia Girotti 2024-12-03T07:44:29.035Z	PROVERLIS Digitaly signed by Kristian Castellani 2024-12-05T09:32:02.402Z	PROVERLIS Digitaly signed by Witness waived 2024-12-07T10:36:18.337Z

DOOR FRONT LAY-OUT

TYPICAL : LINE FEEDER "LK1-n"

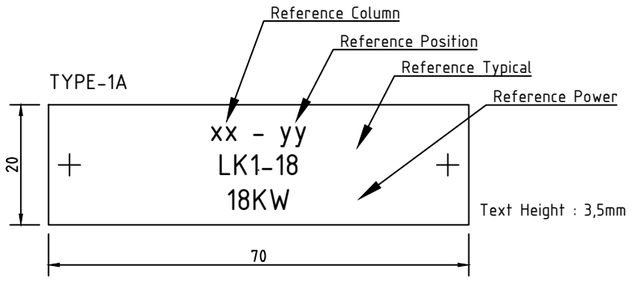


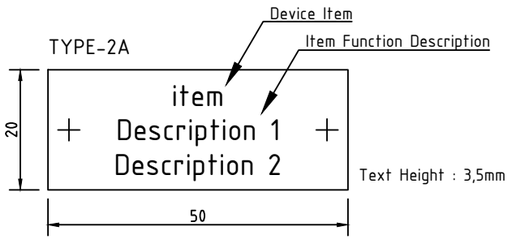
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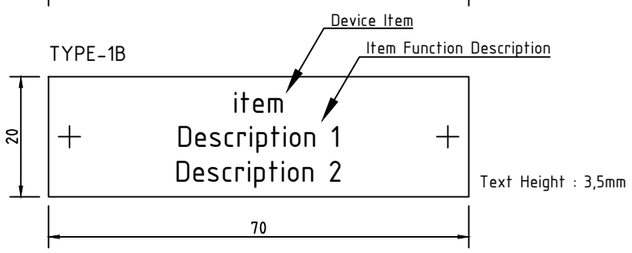
A) IDENTIFICATION name plate (type-1A) , with :
- Drawer position [Column / Position inside SWB]
- Typical name [reference applicability typical used]
- Power [reference applicability typical used]

B) USER name plate (type-1B), with :
- Item User [to see SLD diagrams]
- User Description [to see SLD diagrams]

DEVICES name plate			
ITEM	DESCRIPTION 1	DESCRIPTION 2	NOTE
QF1	Circuit Breaker		NO plate
SA1	LOC-REM	SELECTOR	Type-2A
PA1	STOP	MOTOR	Type-2A
PM1	RUN	MOTOR	Type-2A
HL1	Multiled	Signalling	NO plate







=	TYPICAL						
+	LK-x						
DWG n° :	231298/SD/31						
Item n° :	PF1002983/26						
		2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
		1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
		0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
		REV.	DATE	DRN	CHKD	APPD	DESCRIPTION

CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Door Front Lay-Out - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

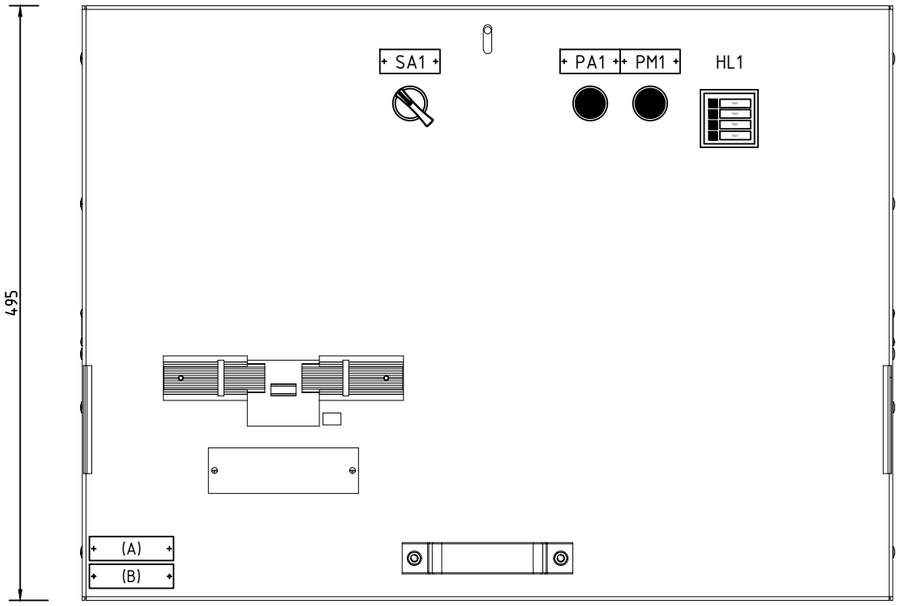
A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 034 | REV. 02

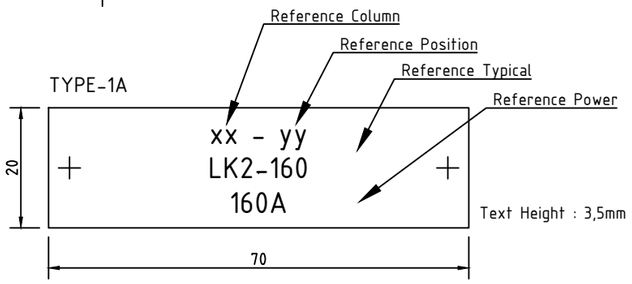
F.to UNI A3: 420mmx297mm

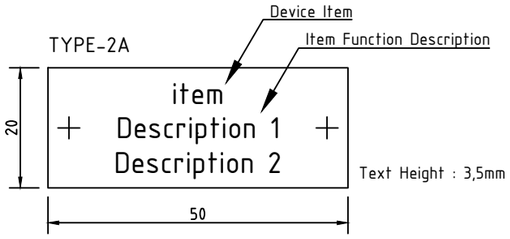
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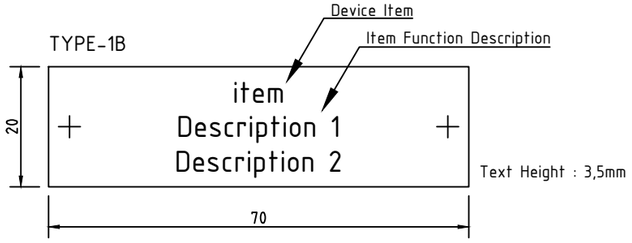
DOOR FRONT LAY-OUT

TYPICAL : LINE FEEDER "LK2-n"









NOTE :

A) IDENTIFICATION name plate (type-1A) , with :
- Drawer position [Column / Position inside SWB]
- Typical name [reference applicability typical used]
- Power [reference applicability typical used]

B) USER name plate (type-1B), with :
- Item User [to see SLD diagrams]
- User Description [to see SLD diagrams]

DEVICES name plate			
ITEM	DESCRIPTION 1	DESCRIPTION 2	NOTE
QF1	Circuit Breaker		NO plate
SA1	LOC-REM	SELECTOR	Type-2A
PA1	STOP	MOTOR	Type-2A
PM1	RUN	MOTOR	Type-2A
HL1	Multiled	Signalling	NO plate

=	TYPICAL
+	LK-x

DWG n° : 231298/SD/31

Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Door Front Lay-Out - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 035 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

USERS LEGEND

TYPICAL : LINE FEEDER "LK1-n" "LK2-n"

TYPICAL APPLICABILITY					
ITEM	ITEM TAG	DESCRIPTION TAG	REFERENCE POSITION (written on name name plate "type-1A)	REFERENCE NOMINAL CURRENT C.B. TRIP UNIT (written on name name plate "type-1A)	REFERENCE TYPICAL (written on name name plate "type-1A)
1	SPARE	SPARE	A2 / +05	40A	LK1-40
2	SPARE	SPARE	A3 / +02	40A	LK1-40
3	DP-200N1	DB-LIGHTING & SMALL POWER BoP	A3 / +03	100A	LK1-100
4	JB-200E3	CRANE	A3 / +04	63A	LK1-63
5	SPARE	SPARE	A3 / +05	40A	LK1-40
6	JB-500E8	WATER PACKAGE	A3 / +08	160A	LK2-160
7	B100-HSB-001	HVAC PANELS HV ROOM	A4 / +02	40A	LK1-40
8	A-80000	FUELL CELL AUXIALIRY LOAD	A4 / +03	63A	LK1-63
9	CP-850F03	BESS PCS CABINET	A4 / +04	40A	LK1-40
10	SPARE	SPARE	A4 / +05	40A	LK1-40
11	SPARE	SPARE	A4 / +06	40A	LK1-40
12	K-63001-A	INSTRUMENTS AIR PACKAGE 01A	A4 / +08	160A	LK2-160
13	SPARE	SPARE	A5 / +01	40A	LK1-40
14	B200-HSB-001	HVAC PANELS - LV ROOM	A5 / +02	40A	LK1-40
15	B300-HSB-001	HVAC PANELS - UPS ROOM	A5 / +03	63A	LK1-63
16	B400-HSB-001	HVAC PANELS - ITER	A5 / +04	63A	LK1-63
17	CN-200N1	IMPRESSED CURR. CATHODIC PROTECTION (ICCP) SYSTEM	A5 / +05	40A	LK1-40
18	SPARE	SPARE	A5 / +06	40A	LK1-40
19	K-63001-B	INSTRUMENTS AIR PACKAGE 01B	A5 / +08	160A	LK2-160
20	CP-850E1	BESS LV1 CABINAT (+DISTR 1)	A6 / +02	40A	LK1-40
21	CP-850E2	BESS LV2 CABINAT (+DISTR 2)	A6 / +03	40A	LK1-40
22	SPARE	SPARE	A6 / +04	40A	LK1-40

= TYPICAL
+ LK-x

DWG n° : 231298/SD/31
Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

TITLE : "SG-200N1"
LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS
Users Legend - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 036 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

ITEMS ACRONYM

TYPICAL : LINE FEEDER "LK1-n" "LK2-n"

Composition of Typical :

LK-x = Common Parts
LK1-"nn" or LK2-"nn"= Specific Parts

Example for Composition of LK1-63:
- to take "LK-x" plus "LK1-63"

Example for Composition of LK2-160:
- to take "LK-x" plus "LK2-160"

	ACRONYM ITEMS [Comun parts]	ACRONYM ITEMS [Specific parts]					
	LK-x	LK1-40 [In=40A] [Current Trip Unit]	LK1-63 [In=63A] [Current Trip Unit]	LK1-100 [In=100A] [Current Trip Unit]	LK2-160 [In=160A] [Current Trip Unit]		
ASSOCIATED TYPICAL	This Item include all devices that are comun for both "Specific Parts" Items	This Items include only devices that are detail for "Specific Parts" Items					
LK1-40	X	X					
LK1-63	X		X				
LK1-100	X			X			
LK2-160	X				X		
-							

=	TYPICAL					
+	LK-x					
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)	
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)	
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)	
REV.	DATE	DRN	CHKD	APPD	DESCRIPTION	

DWG n° : 231298/SD/31
Item n° : PF1002983/26

CROSSWIND

ROSETTI MARINO

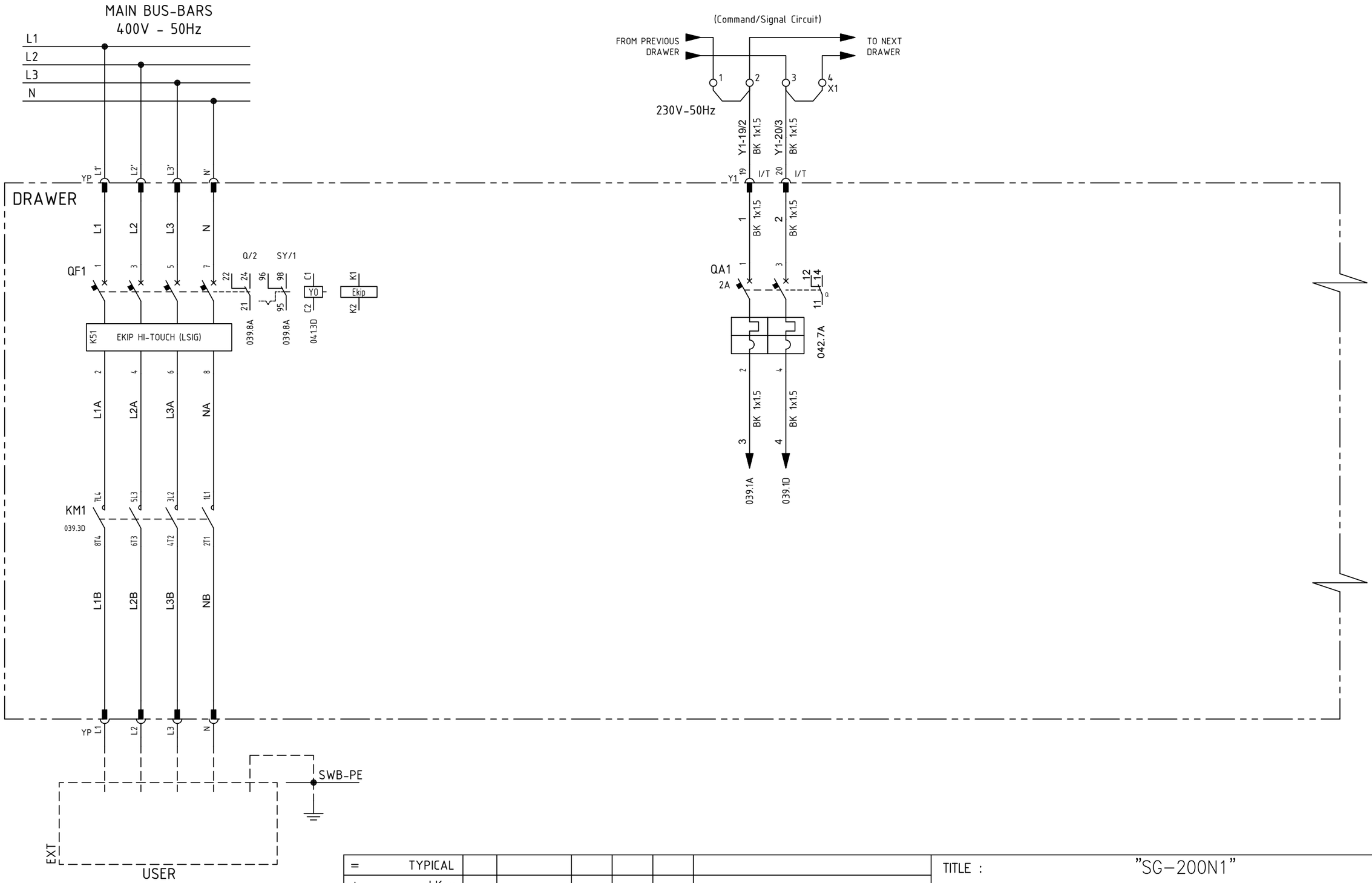
TITLE : "SG-200N1"
LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS
Items Acronym - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 037 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02



=	TYPICAL
+	LK-x

DWG n° : 231298/SD/31

Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

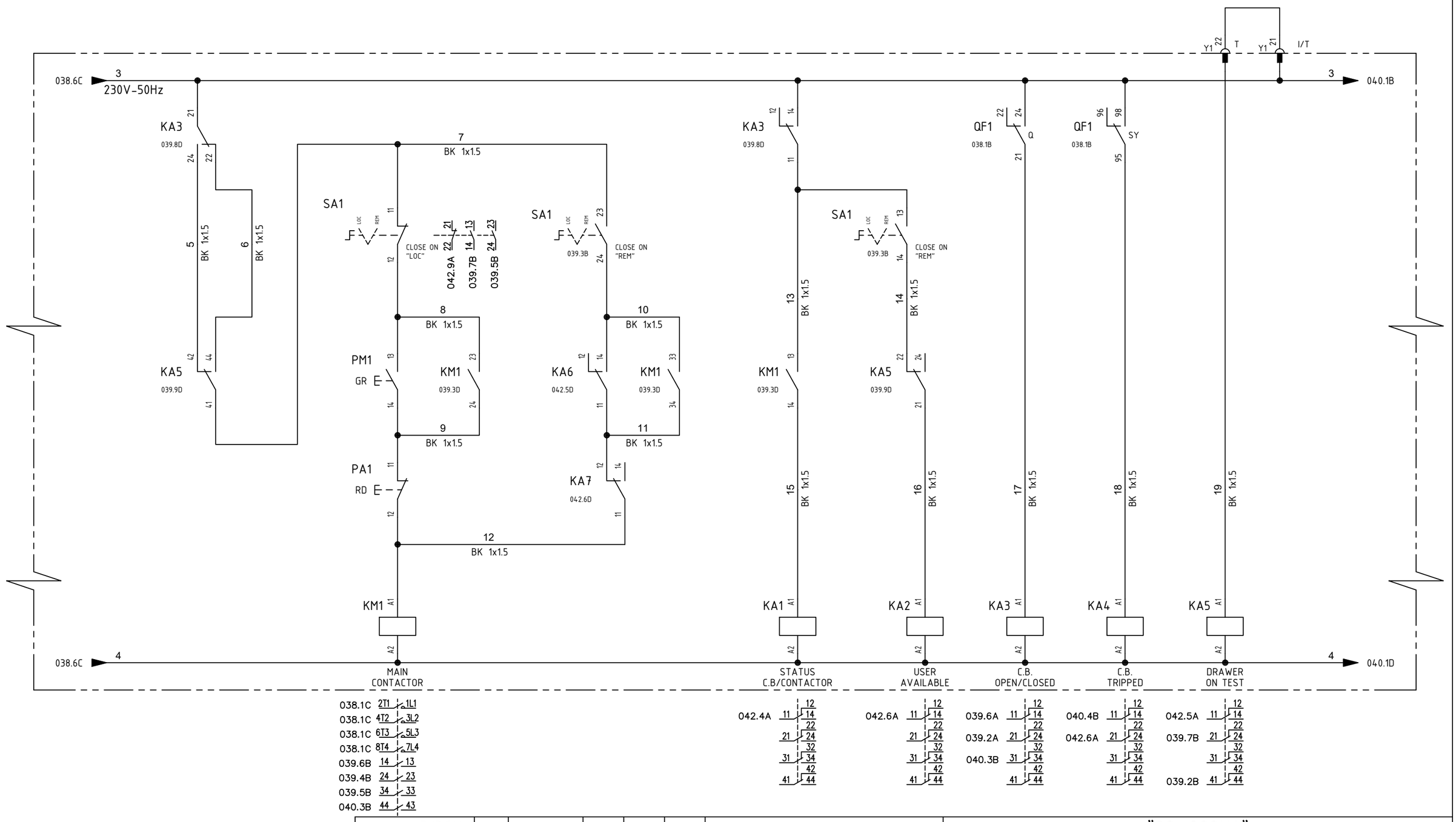
DRAWING NO. 1723002197-EL-DG-00031

SHEET 038

REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02



=	TYPICAL
+	LK-x

DWG n° : 231298/SD/31

Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

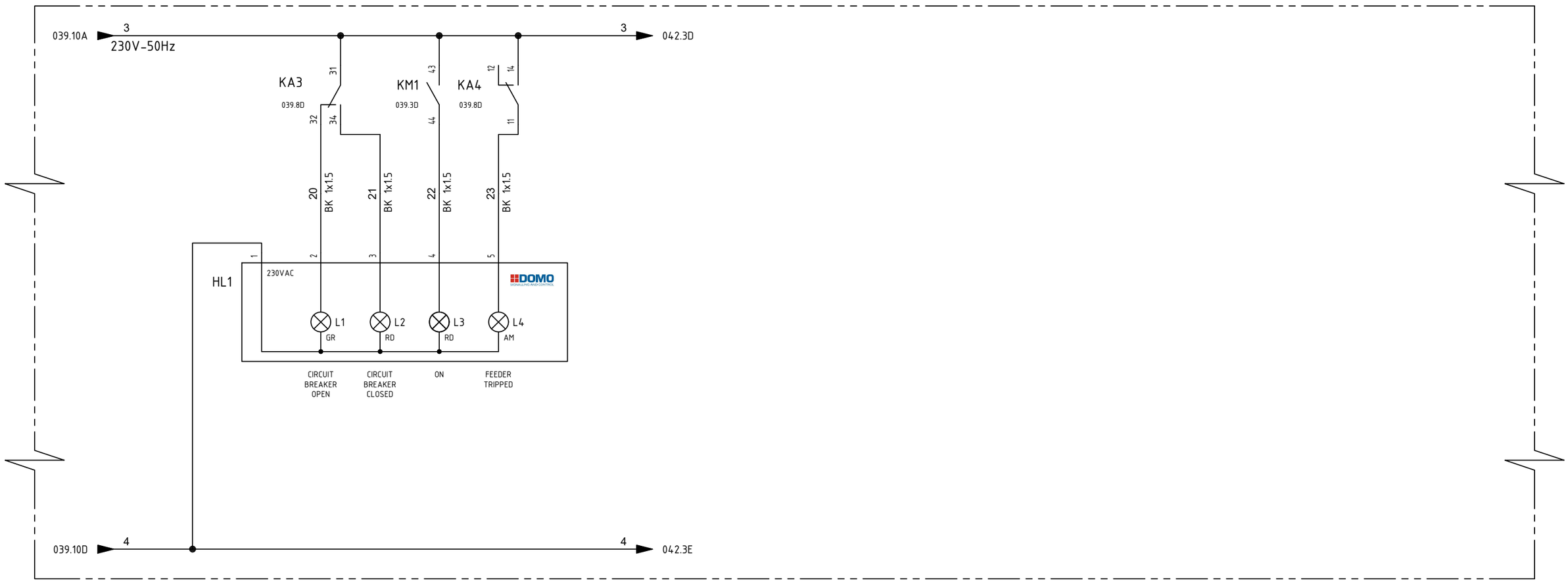
DRAWING NO. 1723002197-EL-DG-00031

SHEET 039

REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02



=	TYPICAL						
+	LK-x						
DWG n° : 231298/SD/31							
Item n° : PF1002983/26							
		2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
		1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
		0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
		REV.	DATE	DRN	CHKD	APPD	DESCRIPTION

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

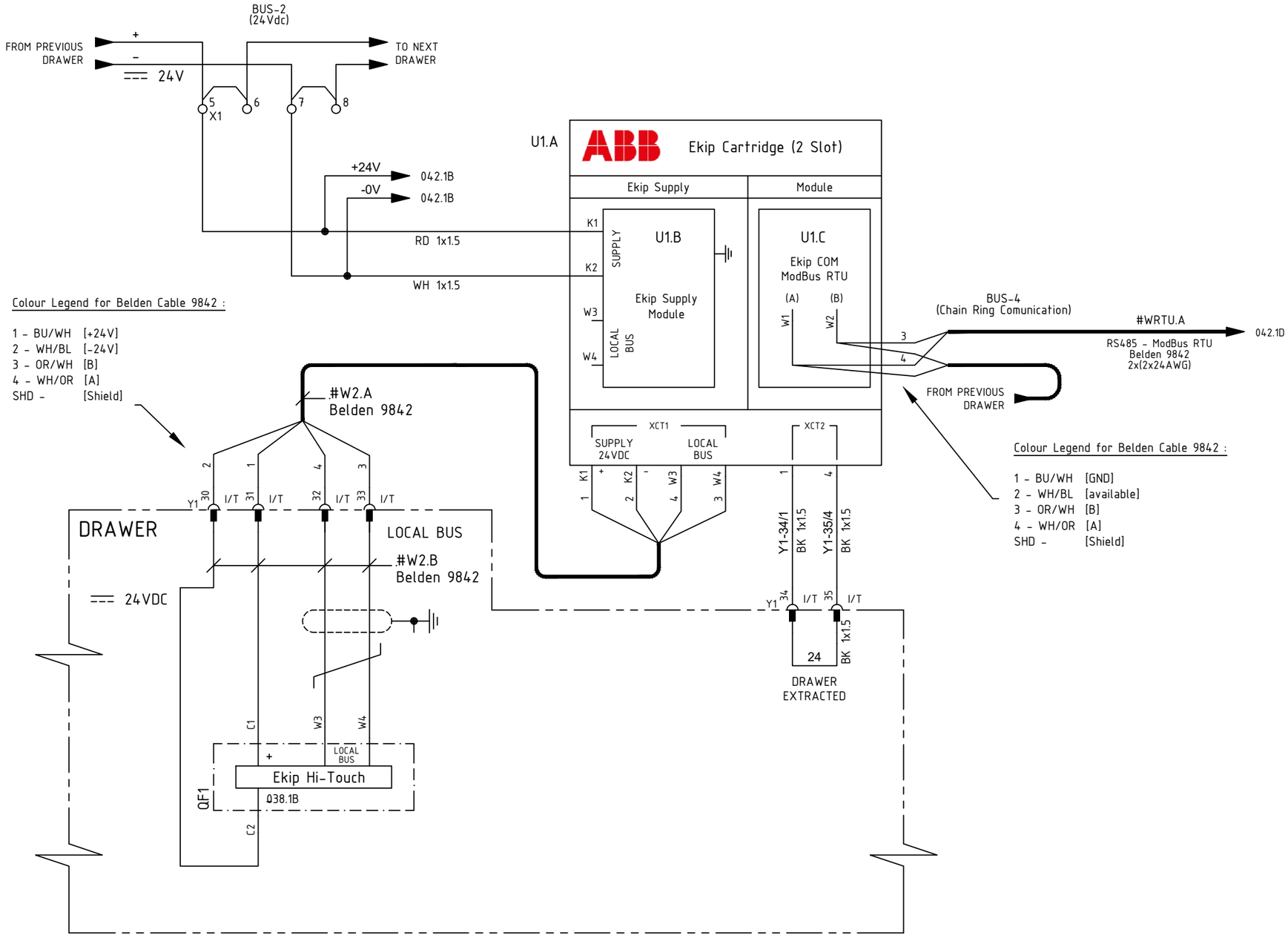
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SHEET 040

REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02



=	TYPICAL						
+	LK-x						
DWG n° : 231298/SD/31							
Item n° : PF1002983/26		2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
		1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
		0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
		REV.	DATE	DRN	CHKD	APPD	DESCRIPTION

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

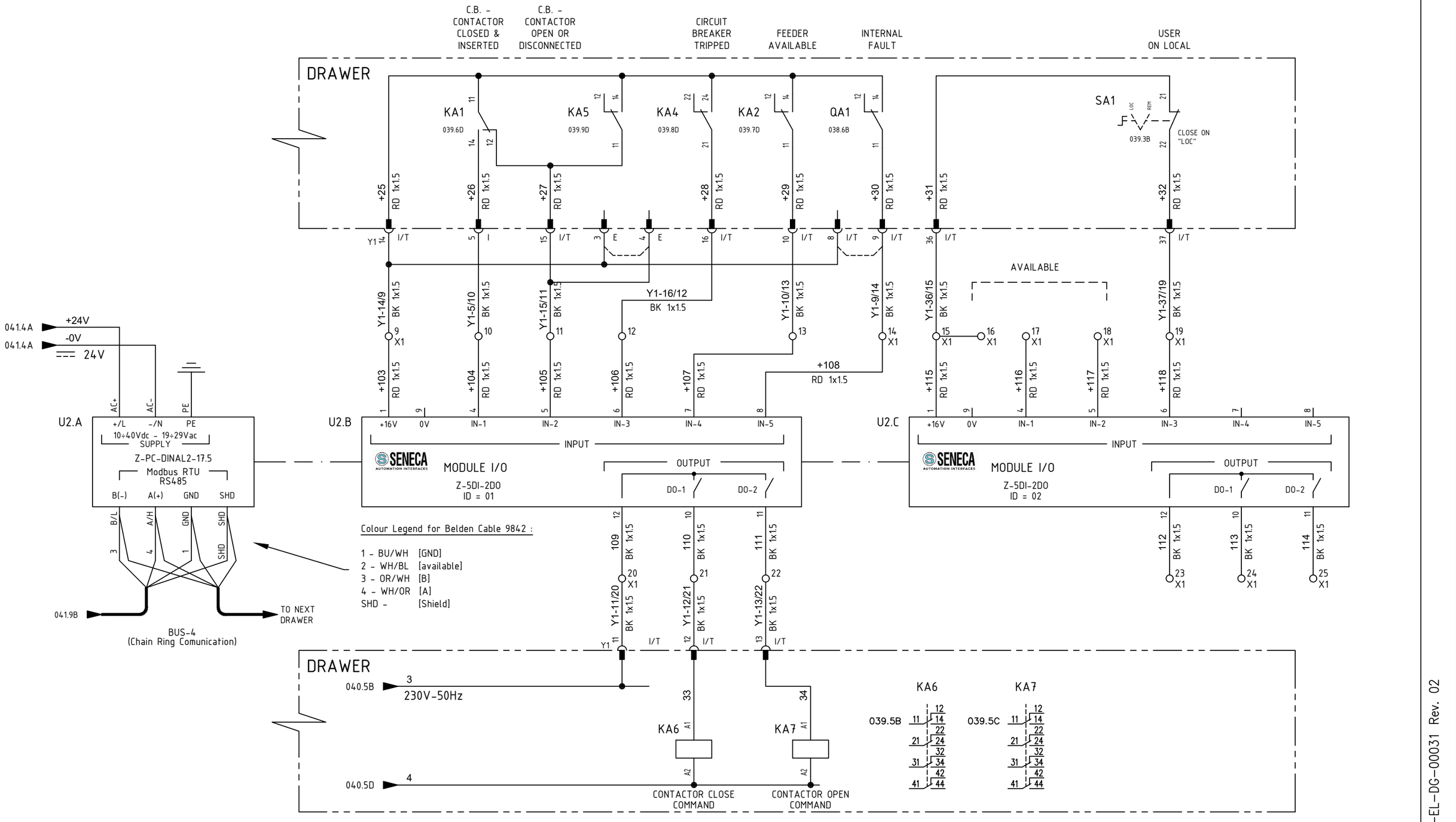
DRAWING NO. 1723002197-EL-DG-00031

SHEET 041

REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02



=	TYPICAL					
+	LK-x					
DWG n° : 231298/SD/31						
Item n° : PF1002983/26						
	2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
	1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
	0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
	REV.	DATE	DRN	CHKD	APPD	DESCRIPTION

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00031

SHEET 042

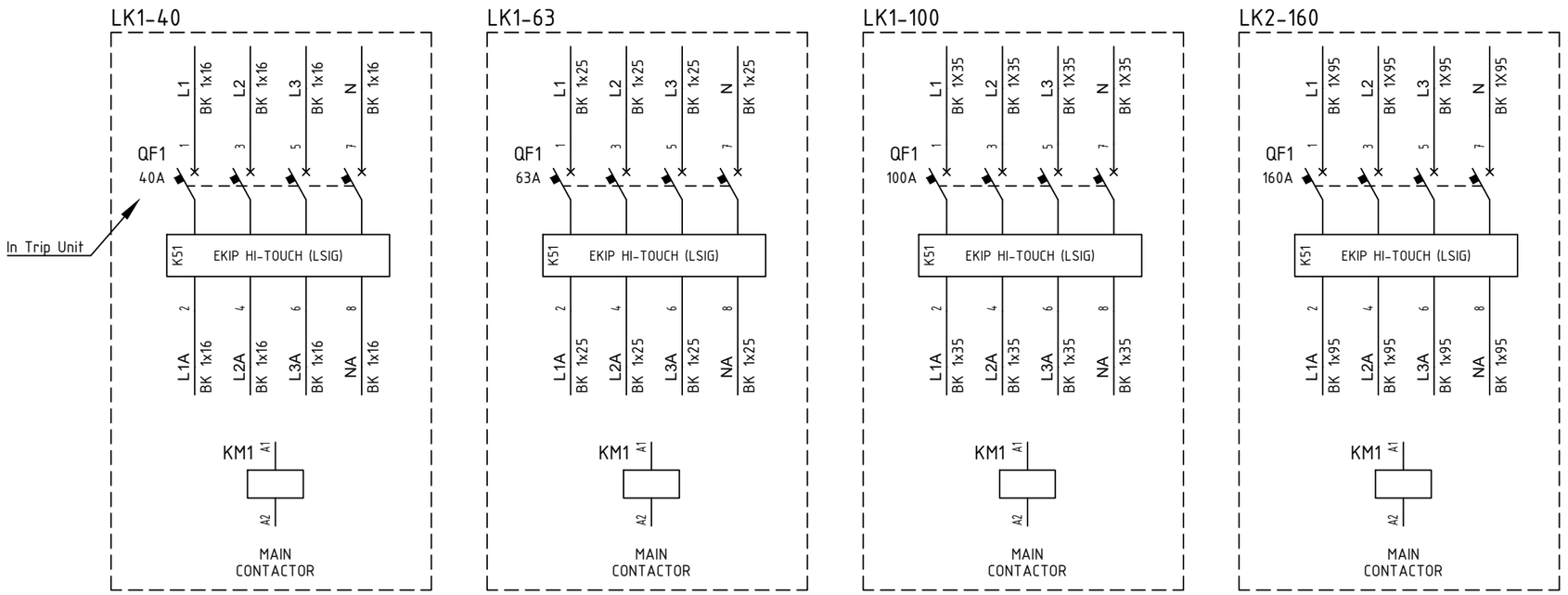
REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

SPECIFIC PARTS

TYPICAL : LINE FEEDER "LK1-n" "LK2-n"



=	TYPICAL						
+	LK-x						
DWG n° : 231298/SD/31							
Item n° : PF1002983/26		2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
		1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
		0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
		REV.	DATE	DRN	CHKD	APPD	DESCRIPTION

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00031

SHEET 043

REV. 02

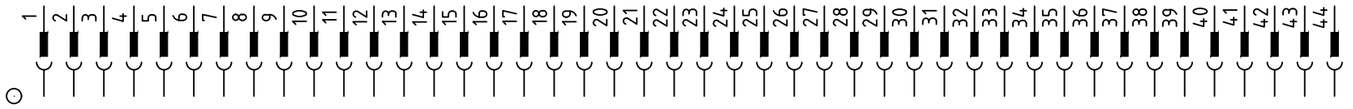
F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

TYPICAL - LK-x - Y1

AUXILIARY SOCKET
136450/001 (PF – 2 pcs) + 136458/004 (PM – 2 pcs)

N° PIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
JUMP			●	●				●	●																																			
RACKED-OUT			✕	✕				✕	✕																																			
TEST								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
RACKED-IN					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
PIN USED			042.5B	042.5B	042.4B			042.6B	042.7B	042.6B	042.5D	042.5D	042.6D	042.3B	042.4B	042.6B			038.6A	038.6A	039.9A	039.9A					041.3C	041.3C	041.4C	041.4C	041.6C	041.7C	042.7B	042.9B									



← FIELD WHIT "X" - CONTACT CLOSE WHEN DRAWER IS IN RACKED-OUT POSITION
← FIELD WHIT "X" - CONTACT CLOSE WHEN DRAWER IS IN TEST POSITION
← FIELD WHIT "X" - CONTACT CLOSE WHEN DRAWER IS IN RACKED-IN POSITION

← CROS-REFERENCE USED PIN

=	TYPICAL
+	LK-x

DWG n° : 231298/SD/31
Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"
LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS
Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 044 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

TYPICAL - LK-x

X1

NumM	Fg.	Sez.	Tipo	Descrizione	Costruttore
			BT003	BT/3 End bracket	Cabur
1	038.5A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
2	038.6A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
3	038.6A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
4	038.6A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
5	041.3A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
6	041.3A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
7	041.4A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
8	041.4A	2.5	HD100GR__	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
			HD101GR	HMD/PT/GR End section - Grey	Cabur
9	042.3B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
10	042.4B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
11	042.4B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
12	042.5B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
13	042.6B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
14	042.7B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
15	042.7B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
16	042.7B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
17	042.8B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
18	042.8B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
19	042.9B	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
20	042.5C	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
21	042.5C	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
22	042.6C	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
23	042.9C	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
24	042.9C	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
25	042.10C	2.5	HD400GR__	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
			HD201GR	HMD.1/PT/GR End section - Grey	Cabur
			BT003	BT/3 End bracket	Cabur

= TYPICAL

\+ LK-x

DWG n° : 231298/SD/31

Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00031

SHEET 045

REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

Nome/Item	Fg/Sh	Tipo/Type	Q.ta/Q.ty	Descrizione/Description	Costruttore/Manufacturer	Quadro (descrizione)
HL1	040	ML22/484L230STLTTR	1	MULTILED 48x48 - 4 LED - Vaux=230Vac/dc + LAMP TEST + TROP	DOMO	TYPICAL LK-x
KA1	039	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
KA2	039	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
KA3	039	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
KA4	039	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
KA5	039	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
KA6	042	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
KA7	042	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
PA1	039	KW 075 2	1	MP1-10R PUSH BUTTON RED WITH BLACK RING	ABB	TYPICAL LK-x
		EO 569 7	1	MCBH-00 FIXING SUPPORT 3 CONTACTS	ABB	TYPICAL LK-x
		EO 571 3	2	MCB-01 CONTACT NC FOR PUSHBUTTOM	ABB	TYPICAL LK-x
PM1	039	KW 076 0	1	MP1-10G PUSH BUTTON GREEN WITH BLACK RING	ABB	TYPICAL LK-x
		EO 569 7	1	MCBH-00 FIXING SUPPORT 3 CONTACTS	ABB	TYPICAL LK-x
		EO 570 5	2	MCB-10 CONTACT NO FOR PUSHBUTTONS	ABB	TYPICAL LK-x
QA1	038	S550239	1	S202M C 2 AUTOMATIC CIRCUIT BREAKER 10KA 2P	ABB	TYPICAL LK-x
		A563819	1	S2-CS/H6R AUXILIARY STATE CONTACT 1CO	ABB	TYPICAL LK-x
SA1	039	KW 329 3	1	M2SS2-10B HANDLE SELECTOR 2P 90° BLACK RING BLACK	ABB	TYPICAL LK-x
		EO 569 7	1	MCBH-00 FIXING SUPPORT 3 CONTACTS	ABB	TYPICAL LK-x
		EO 570 5	2	MCB-10 CONTACT NO FOR PUSHBUTTONS	ABB	TYPICAL LK-x
		EO 571 3	2	MCB-01 CONTACT NC FOR PUSHBUTTOM	ABB	TYPICAL LK-x
U1.2	041	1SDA074173R1	1	MODUL EKIP SUPPLY 24÷48VDC	ABB	TYPICAL LK-x
U1.3	041	1SDA105166R1	1	Module Ekip Com Modbus RS485 Tmax XT	ABB	TYPICAL LK-x
U1.A	041	1SDA105203R1	1	EKIP CARTRIDGE 2SLOT FOR XT2-XT4-XT5	ABB	TYPICAL LK-x
U2.A	042	Z-PC-DINAL2-17.5	1	DIN RAIL 2SLOT WITH HEAD FOR "Z-5DI-2DO"	SENECA	TYPICAL LK-x
U2.B	042	Z-5DI-2DO	1	I/O MODUL 5DI+2DO modbus RS485 Vaux=10÷40Vdc 19÷28Vac	SENECA	TYPICAL LK-x
U2.C	042	Z-5DI-2DO	1	I/O MODUL 5DI+2DO modbus RS485 Vaux=10÷40Vdc 19÷28Vac	SENECA	TYPICAL LK-x
X1		HD100GR__	8	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur	TYPICAL LK-x
		HD400GR__	17	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur	TYPICAL LK-x
		BT003	2	BT/3 End bracket	Cabur	TYPICAL LK-x
		HD101GR	1	HMD/PT/GR End section - Grey	Cabur	TYPICAL LK-x

= TYPICAL
\+ LK-x

DWG n° : 231298/SD/31
Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 046 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

Nome/Item	Fg/Sh	Tipo/Type	Q.ta/Q.ty	Descrizione/Description	Costruttore/Manufacturer	Quadro (descrizione)
X1		HD201GR	1	HMD.1/PT/GR End section - Grey	Cabur	TYPICAL LK-x

Nome/Item	Fg/Sh	Tipo/Type	Q.ta/Q.ty	Descrizione/Description	Costruttore/Manufacturer	Quadro (descrizione)
KM1	043	AF40400013	1	AF40-40-00-13 CONTACTOR 4P 40A 100-250VAC/DC	ABB	TYPICAL LK1-40
		CA440E	1	CA4-40E AUXILIARY FRONT CONTACT 4NO	ABB	TYPICAL LK1-40
QF1	043	1SDA068169R1	1	XT2S 160 BREAKING PART 4p F F	ABB	TYPICAL LK1-40
		1SDA100162R1	1	ELECTRONIC TRIP RELEASE Ekip Hi-Touch LSIG In=40A XT2 4p	ABB	TYPICAL LK1-40
		1SDA066431R1	1	AUX-C 1Q+1SY 250Vac/dc XT1..XT5 F/P	ABB	TYPICAL LK1-40

Nome/Item	Fg/Sh	Tipo/Type	Q.ta/Q.ty	Descrizione/Description	Costruttore/Manufacturer	Quadro (descrizione)
KM1	043	AF52400013	1	AF52-30-00-13 CONTACTOR 4P 53A(AC3) 100-250VAC/DC	ABB	TYPICAL LK1-63
		CA440E	1	CA4-40E AUXILIARY FRONT CONTACT 4NO	ABB	TYPICAL LK1-63
QF1	043	1SDA068169R1	1	XT2S 160 BREAKING PART 4p F F	ABB	TYPICAL LK1-63
		1SDA100163R1	1	ELECTRONIC TRIP RELEASE Ekip Hi-Touch LSIG In=63A XT2 4p	ABB	TYPICAL LK1-63
		1SDA066431R1	1	AUX-C 1Q+1SY 250Vac/dc XT1..XT5 F/P	ABB	TYPICAL LK1-63

Nome/Item	Fg/Sh	Tipo/Type	Q.ta/Q.ty	Descrizione/Description	Costruttore/Manufacturer	Quadro (descrizione)
KM1	043	AF80400013	1	AF80-30-00-13 CONTACTOR 4P 80A(AC3) 100-250VAC/DC	ABB	TYPICAL LK1-100
		CA440E	1	CA4-40E AUXILIARY FRONT CONTACT 4NO	ABB	TYPICAL LK1-100
QF1	043	1SDA068169R1	1	XT2S 160 BREAKING PART 4p F F	ABB	TYPICAL LK1-100
		1SDA100164R1	1	ELECTRONIC TRIP RELEASE Ekip Hi-Touch LSIG In=100A XT2 4p	ABB	TYPICAL LK1-100
		1SDA066431R1	1	AUX-C 1Q+1SY 250Vac/dc XT1..XT5 F/P	ABB	TYPICAL LK1-100

Nome/Item	Fg/Sh	Tipo/Type	Q.ta/Q.ty	Descrizione/Description	Costruttore/Manufacturer	Quadro (descrizione)
KM1	043	AF190401113	1	AF190-40-11-13 CONT 4P 190A AC3 100-250VAC/DC	ABB	TYPICAL LK2-160
		CAL1911	1	CAL19-11 CONTATTO AUSILIARIO 1NA+1NC PER AF116÷AF370	ABB	TYPICAL LK2-160
		CAL1911B	2	CAL19-11B AUXILIARY CONTACT 1NA+1NC PER AF116÷AF370	ABB	TYPICAL LK2-160
QF1	043	1SDA068179R1	1	XT4S 250 BREAKING PART 4p F F	ABB	TYPICAL LK2-160
		1SDA100334R1	1	ELECTRONIC TRIP RELEASE Ekip Hi-Touch LSIG In=160A XT4 4p	ABB	TYPICAL LK2-160
		1SDA066431R1	1	AUX-C 1Q+1SY 250Vac/dc XT1..XT5 F/P	ABB	TYPICAL LK2-160

= TYPICAL
+ LK-x

DWG n° : 231298/SD/31
Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
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0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 047 | REV. 02

F.to UNI A3: 420mmx297mm

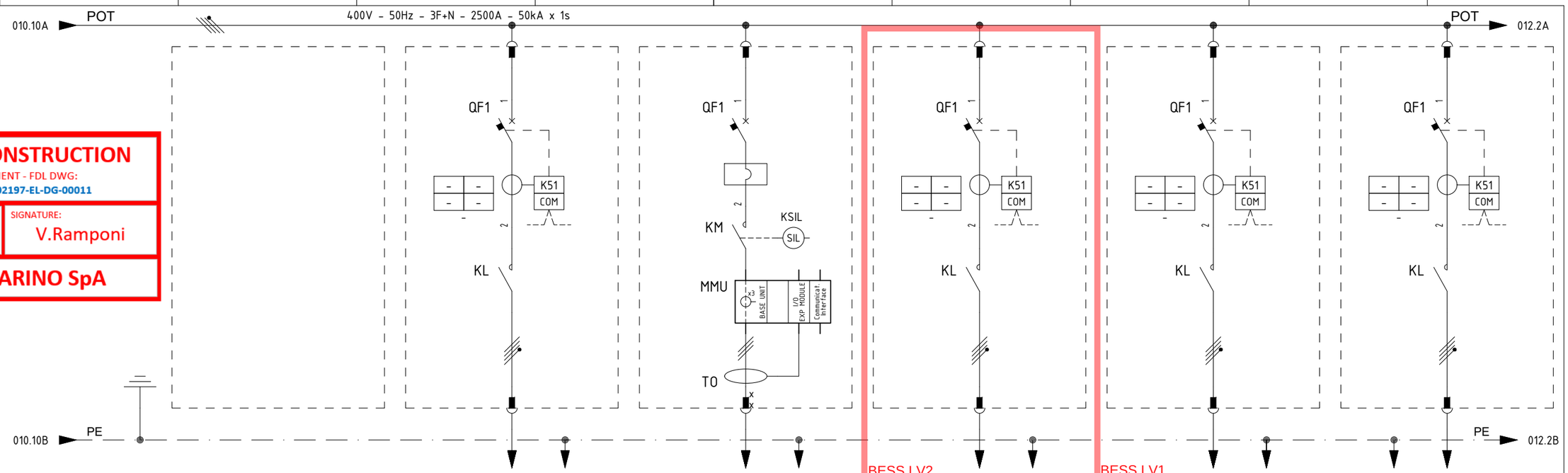
File Name : 1723002197-EL-DG-00031 Rev. 02

VALID FOR CONSTRUCTION

VENDOR DOCUMENT - FDL DWG:
123A90-FDL-1723002197-EL-DG-00011

REV.:	DATE:	SIGNATURE:
4_A	18/12/24	V.Ramponi

ROSETTI MARINO SpA



ITEM				K-63001-B	PM-50001 B	BESS LV2 CABINET (+DISTR 2) ~~CP-850E1~~ CP-850E2 ~~BESS LV1 CABINET (+DISTR 1)~~	BESS LV1 CABINET (+DISTR 1) ~~CP-850E2~~ CP-850E1 ~~BESS LV2 CABINET (+DISTR 2)~~	-
UTILITY			2	INSTRUMENTS AIR PACKAGE 01B	SEA WATER PUMP B			SPARE
COLUMN/CUBICLE			3	A5 / +08	A6 / +01	A6 / +02	A6 / +03	A6 / +04
RATED POWER | RATED CURRENT			4/5	68.75 kW | 111.24 A	6.1 kW | 11.0 A	11.28 kW | 18.09 A	11.28 kW | 18.09 A	- kW | - A
TYPICAL FUNCTIONAL			6	LK2-160	M1-6	LK1-40	LK1-40	LK1-40
CIRCUIT BREAKER (ABB)	TYPE		7	XT4S - 250	XT2S - 160	XT2S - 160	XT2S - 160	XT2S - 160
	VERSION		8	4P - FIXED	3P - FIXED	4P - FIXED	4P - FIXED	4P - FIXED
	TRIP UNITS		9	EKIP HI TOUCH LSIG (In = 160A)	MA (In = 20A)	EKIP HI TOUCH LSIG (In = 40A)	EKIP HI TOUCH LSIG (In = 40A)	EKIP HI TOUCH LSIG (In = 40A)
	Icu	KA	10	50 kA	-	50 kA	50 kA	50 kA
OVERLOAD	L	Range A	11	(0.4 - 1) x In	-	(0.4 - 1) x In	(0.4 - 1) x In	(0.4 - 1) x In
		Range t	12	k/I^2	-	k/I^2	k/I^2	k/I^2
SEL. SHORT-CIRCUIT	S	Range A	13	(0.6 - 10) x In	-	(0.6 - 10) x In	(0.6 - 10) x In	(0.6 - 10) x In
		Range t	14	0.05 - 0.4 sec / k/I^2	-	0.05 - 0,4 sec / k/I^2	0.05 - 0,4 sec / k/I^2	0.05 - 0,4 sec / k/I^2
INST. SHORT-CIRCUIT	I	Range A	15	(1.5 - 15) x In	(6 - 14) x I	(1.5 - 15) x In	(1.5 - 15) x In	(1.5 - 15) x In
		Range t	16	instantaneous	<= 0.02 sec	instantaneous	instantaneous	instantaneous
EARTH FAULT PROTECTION	G	Range A	17	(0.1 - 1) x In	-	(0.1 - 1) x In	(0.1 - 1) x In	(0.1 - 1) x In
		Range t	18	t=k / t=k/I^2	-	t=k / t=k/I^2	t=k / t=k/I^2	t=k / t=k/I^2
CONTACTOR (ABB)			19	AF190-40-11-13 (275A-AC1); 100-250 VAC/DC	AF38-30-00-13 (18.5 kW - AC3) - 100-250Vac/dc	AF40-40-00-13 (70A-AC1); 100-250VAC/DC	AF40-40-00-13 (70A-AC1); 100-250VAC/DC	AF40-40-00-13 (70A-AC1); 100-250VAC/DC
THERMAL OVERLOAD RELAY (ABB)			20	-	UMC100.3 UC (0.24 - 63A)	-	-	-
SURGE ARRESTER (DEHN)			21	-	-	-	-	-
TOROIDAL CURRENT TRANSFORMER (FRER)			22	-	-	-	-	-
FUSE HOLDER (ITALWEBER)			23	-	-	-	-	-
INDIRECT PROTECTION (ABB)			24	-	-	-	-	-
VOLTMETER			25	-	-	-	-	-
CURRENT TRANSFORMER FOR MEASURE (FRER)	TYPE		26	-	-	-	-	-
	PERFORMANCE/CLASS		27	-	-	-	-	-
VOLTAGE TRANSFORMER FOR MEASURE (FRER)	TYPE		28	-	-	-	-	-
	PERFORMANCE/CLASS		29	-	-	-	-	-
LOCK-OUT RELAY (-)			30	-	-	-	-	-
POWER CONDUCTOR		mmq	31	5G70	4G4	4 x (1 x 10)	4 x (1 x 10)	-

=
+
DWG n° : 231298/SD/11
Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
4	28/08/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
3	08/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
2	03/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
1	28/03/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
0	15/02/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"

SINGLE LINE DIAGRAM

Single Line Drawing

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

DRAWING NO. 1723002197-EL-DG-00011

SHEET 011

REV. 04

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00011 Rev. 04

ITEM	Tag	A6/+03-QF1	: AUX BESS LV2 CABINET - A6/+03-QF1			Dwg	1723002197-EL-DG-00011
	S/Sys	85-00	: BESS Package (A-85000)			Module	
TASK	code	C10002959		Location	Onshore Activities	User	Rosetti Marino Quality Control
FORM	Process	PRE-COMM	Activity FTS	Discipline	Electrical	Form	FTR-2 Protection Relay

FTR2 - Protection relay
Record sheet

RELAY DATA

Manufacturer:	ABB	Serial N°:	EF5000753690N000	Relay type:	Ekip HI TOUCH LSIG
Auxiliary supply:	24Vdc	Location:	B200	Cubicle:	A6/+03
Switchboard:	SG-200N1				

Current transformers

Tag	Number of	Ratio	Location

Voltage transformers

Tag	Number of	Ratio	Location

Test result (refer to manufacturer's procedure)

ANSI function	Setting	Injection	Trip value	Time delay Setting	Time delay Trip value
L	18.8A			3s	
S	100A			0.1s	
I	200A			INSTANT	
G	8A			0.1	

Testing & measurement instruments used

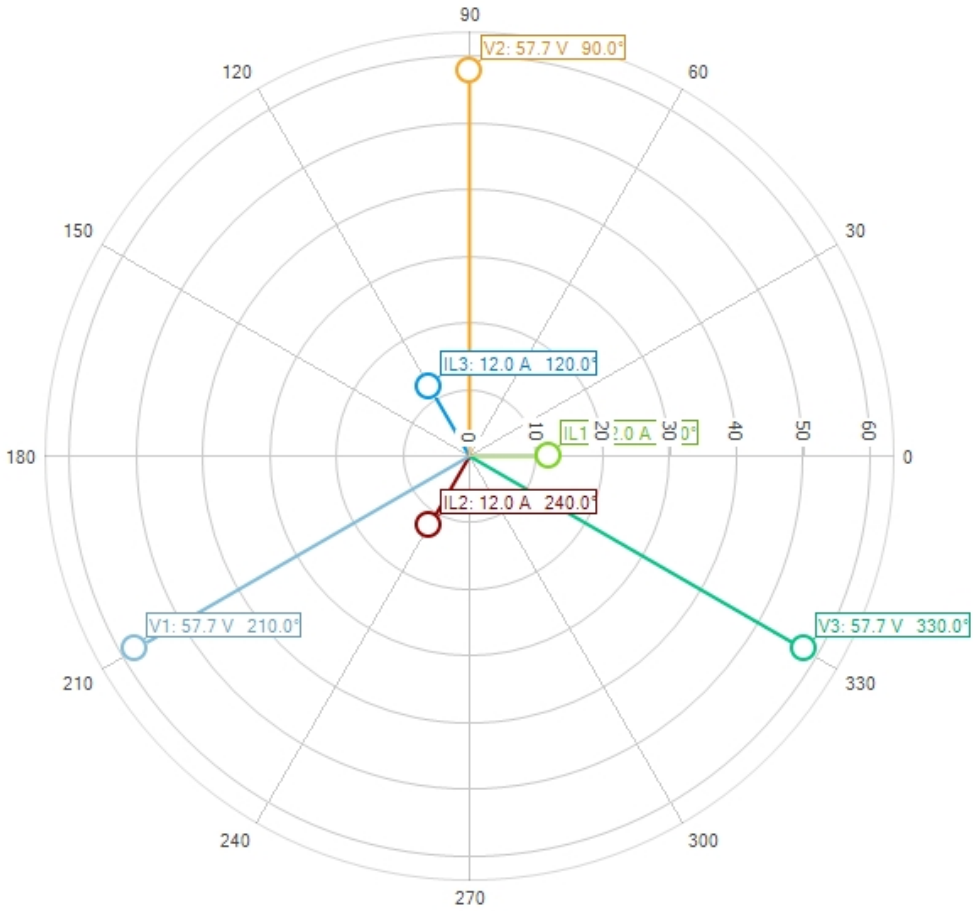
Type	Serial n°	Calibration certificate	Validity
ABB Ekip T&P	E34013804410W050		

Comments: See the attachments for full tests (injection, trip value)

Page 1/1	Performed by	☐ WITNESS ☑ REVIEW	☐ WITNESS ☐ REVIEW
Company	RM COMM	RM COMM	CPY NOT PRESENT
Name	Mattia Girotti	Kristian Castellani	Witness waived
Date	2024-09-16	2024-09-18	2024-09-20
Signature	Digitaly signed by Mattia Girotti 2024-09-16T11:54:31.710Z	Digitaly signed by Kristian Castellani 2024-09-18T07:24:17.113Z	Digitaly signed by Witness waived 2024-09-20T06:29:00.631Z

Page Name	Group Name	Variable Name	Variable Value	Variable Unit
Settings A				
	Overload Protection (L - ANSI 49)			
		PU nominal current In	40	
		Status	Enabled	
		Function	t=k/i^2	
		Prealarm I1	90	% I1
		Threshold I1	0.470	In
		Time t1 std	3.00	s
		Thermal memory (TM)	Disabled	
		TM Algorithm	RMS-independent	
		TM Time	Automatic	
		TM custom time	830	s
	Time-delayed overcurrent protection (S - ANSI 50 TD/68/51)			
		Status	Enabled	
		Trip enable	Enabled	
		BlockOnStartUp	--------	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Function	t=k	
		Threshold I2 (t=k)	2.50	In
		Time t2 (t=k) IEC - UL489	0.10	s
		Startup enable	Disabled	
		Startup time	0.10	s
		Startup threshold	0.60	In
		Set Startup th. on ProgStatusD	--------	
		Thermal memory status	Disabled	
		Zone Selectivity status	Disabled	
		Zone Selectivity time	0.04	s
		Zone Selectivity Type	Logic and Hardware	
	Second time-delayed overcurrent protection (S2 - ANSI 50 TD)			
		Status	Disabled	
		Trip enable	Enabled	
		BlockOnStartUp	--------	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Threshold I5 (t=k)	2.00	In
		Time t5 (t=k)	0.05	s
		Startup enable	Disabled	
		Startup time	0.10	s
		Startup threshold	2.00	In
		Set Startup th. on ProgStatusD	--------	
		Zone Selectivity status	Disabled	
		Zone Selectivity time	0.04	s
		Zone Selectivity Type	Logic and Hardware	
	Instantaneous overcurrent protection (I - ANSI 50)			
		Status	Enabled	
		Threshold I3	5.00	In
		Startup enable	Disabled	
		Startup time	0.10	s
		Startup threshold	1.50	In
		Set Startup th. on ProgStatusD	--------	
		BlockOnStartUp	--------	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Zone Selectivity status	Disabled	
		Zone Selectivity Type	Logic and Hardware	
	Second I			
		Prot Second I	---	
		Status	Disabled	
		Threshold I31	1.50	In
		Zone Selectivity status	Disabled	

		Zone Selectivity Type	Logic and Hardware	
		Second I Mode	Function Dependent	
		Function	Disabled	
		Delay On	0.00	s
		Delay Off	15.00	s
	Earth fault protection (G - ANSI 50N TD/68/51N)			
		Status	Enabled	
		Trip enable	Disabled	
		BlockOnStartUp	--------	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Function	t=k	
		Prealarm I4	90	% I4
		Threshold I4 (t=k)	0.200	In
		Time t4 (t=k) IEC - UL489	0.10	s
		Startup enable	Disabled	
		Startup time	0.10	s
		Startup threshold	0.20	In
		Set Startup th. on ProgStatusD	--------	
		Zone selectivity status	Disabled	
		Zone selectivity time	0.04	s
		Zone Selectivity Type	Logic and Hardware	
	Directional overcurrent protection (D - ANSI 67/68)			
		Status	Disabled	
		Trip enable	Disabled	
		tripOnlyForward	--------	
		tripOnlyBackward	--------	
		BlockOnStartUp	--------	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Threshold I7 FWD	2.00	In
		Time t7 FWD	0.20	s
		Threshold I7 BWD	2.00	In
		Time t7 BWD	0.20	s
		Startup enable	Disabled	
		Startup time	0.10	s
		Startup threshold FWD	2.00	In
		Startup threshold BWD	2.00	In
		Set Startup th. on ProgStatusD	--------	
		Zone Selectivity status	Disabled	
		Zone Selectivity time FWD	0.13	s
		Zone Selectivity time BWD	0.13	s
		Zone Selectivity Type	Logic and Hardware	
		Direction minimum angle	3.6	°
	Closing on short-circuit protection (MCR)			
		Status	Disabled	
		BlockOnOutOfFrequency	--------	
		BlockOnProgStatusA	--------	
		BlockOnProgStatusB	--------	
		BlockOnProgStatusC	--------	
		BlockOnProgStatusD	--------	
		Threshold I3	6.00	In
		Time t3	0.04	s
		Zone Selectivity status	Disabled	
		Zone Selectivity Type	Logic and Hardware	
	Over Temperature (T)			
		Trip enable	Disabled	



Test

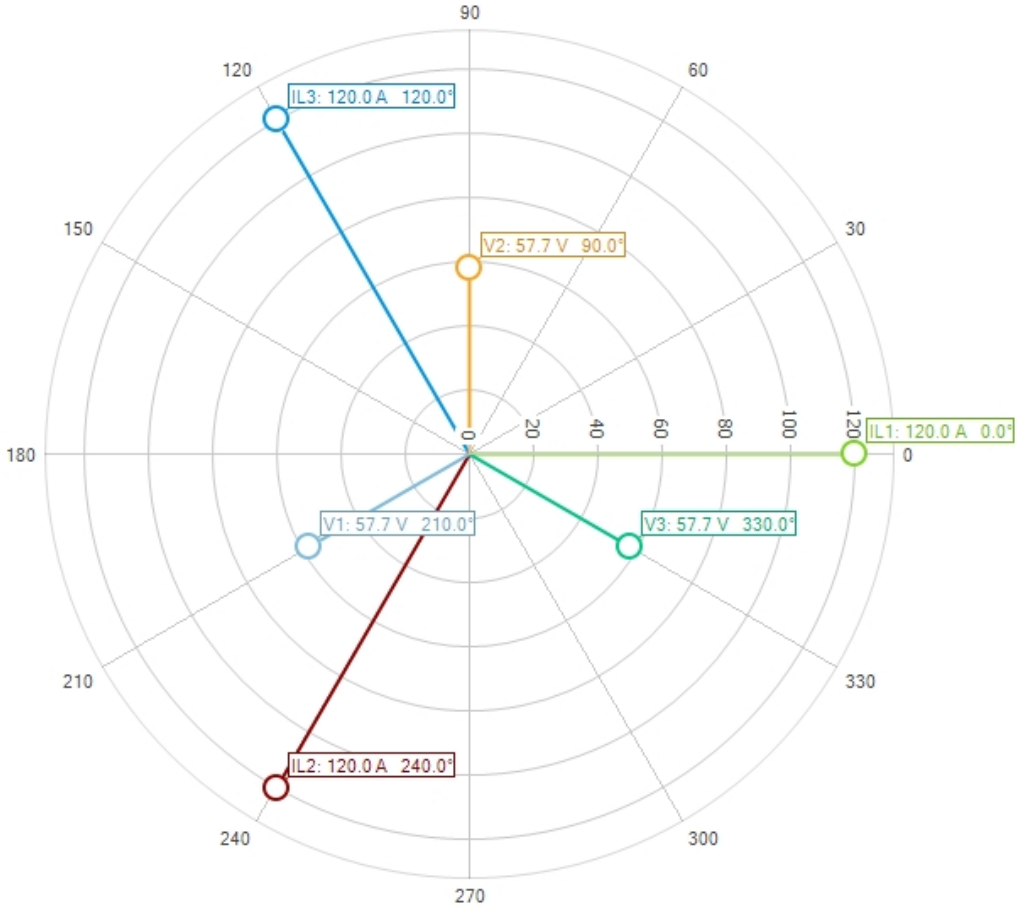
Name	Automatic test 1
Session	Default session
Customer	
Location	
Operator	

Device

Tag name	A6/+03
Relay Serial Number	EF5000753690N000
Circuit Breaker Serial Number	CE61041914number
	XT2/4
Device settings	In = 40 A Un = 100 V fn = 50 Hz
Protection Settings	Protection = L Curve type = t=k/i^2 Threshold = 0.470 In Time = 3.00 s Protection = S Curve type = t=k Threshold = 2.50 In Time = 0.10 s Protection = I Threshold = 5.00 In Protection = G Curve type = t=k Threshold = 0.200 In Time = 0.10 s
Preconditions	All preconditions satisfied.

Test result

⚠ Test completed without any trip in 3000 ms.



Test

Name	Automatic test 2
Session	Default session
Customer	
Location	
Operator	

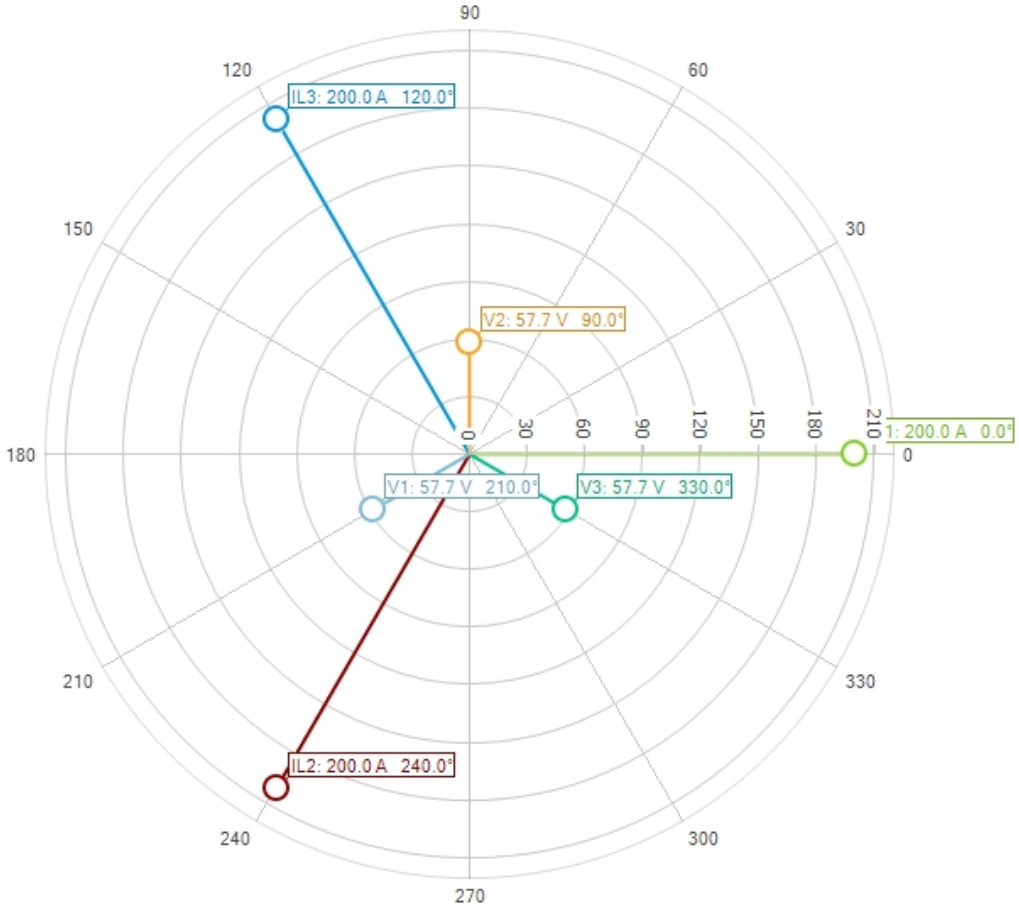
Device

Tag name	A6/+03
Relay Serial Number	EF5000753690N000
Circuit Breaker Serial Number	CE61041914number
	XT2/4
Device settings	In = 40 A Un = 100 V fn = 50 Hz
Protection Settings	Protection = L Curve type = t=k/i^2 Threshold = 0.470 In Time = 3.00 s Protection = S Curve type = t=k Threshold = 2.50 In Time = 0.10 s Protection = I Threshold = 5.00 In Protection = G Curve type = t=k Threshold = 0.200 In Time = 0.10 s
Preconditions	All preconditions satisfied.

Test result

Test completed with trip. Protection S tripped in 101 ms.
Trip time must be between 0 ms and 1000 ms

Trip time must be between 0 ms and 1000 ms.



Test

Name	Automatic test 3
Session	Default session
Customer	
Location	
Operator	

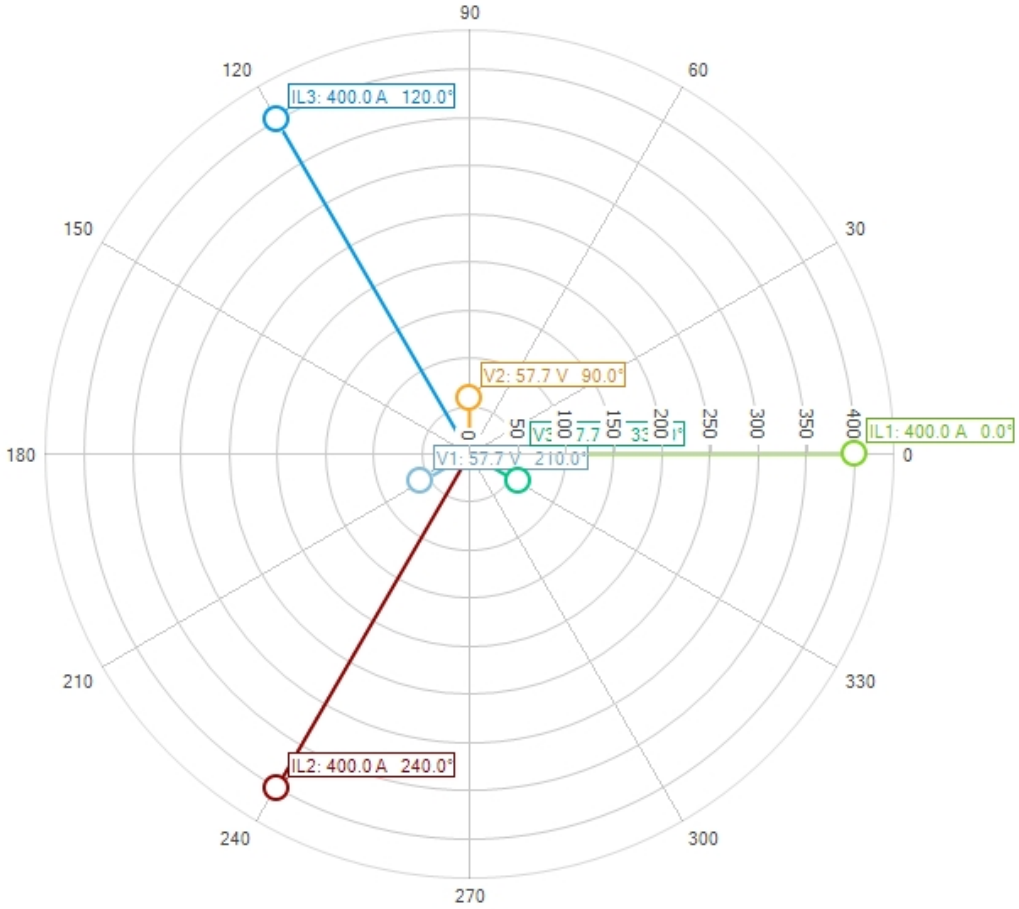
Device

Tag name	A6/+03
Relay Serial Number	EF5000753690N000
Circuit Breaker Serial Number	CE61041914number
	XT2/4
Device settings	In = 40 A Un = 100 V fn = 50 Hz
Protection Settings	Protection = L Curve type = t=k/i^2 Threshold = 0.470 In Time = 3.00 s Protection = S Curve type = t=k Threshold = 2.50 In Time = 0.10 s Protection = I Threshold = 5.00 In Protection = G Curve type = t=k Threshold = 0.200 In Time = 0.10 s
Preconditions	All preconditions satisfied.

Test result

Test completed with trip. Protection S tripped in 103 ms.
Trip time must be between 0 ms and 1000 ms

Trip time must be between 0 ms and 1000 ms.



Test

Name	Automatic test 4
Session	Default session
Customer	
Location	
Operator	

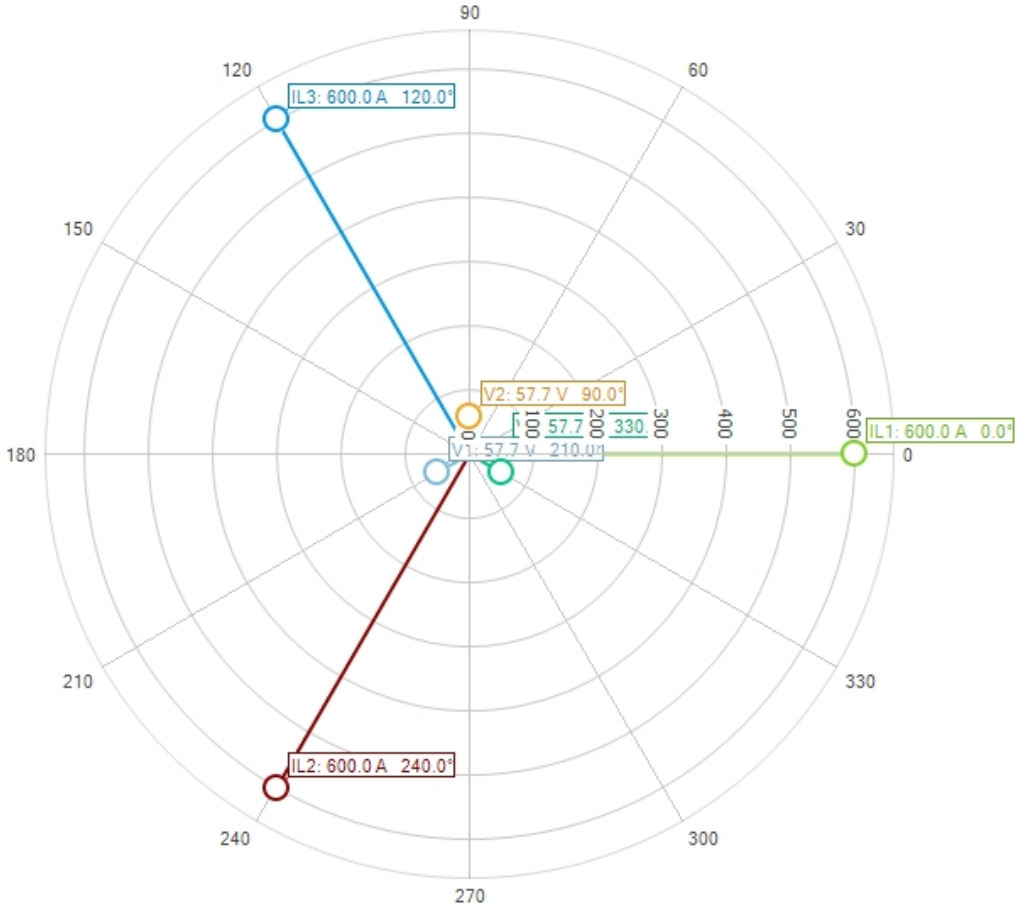
Device

Tag name	A6/+03
Relay Serial Number	EF5000753690N000
Circuit Breaker Serial Number	CE61041914number
	XT2/4
Device settings	In = 40 A Un = 100 V fn = 50 Hz
Protection Settings	Protection = L Curve type = t=k/i^2 Threshold = 0.470 In Time = 3.00 s Protection = S Curve type = t=k Threshold = 2.50 In Time = 0.10 s Protection = I Threshold = 5.00 In Protection = G Curve type = t=k Threshold = 0.200 In Time = 0.10 s
Preconditions	All preconditions satisfied.

Test result

Test completed with trip. Protection I tripped in 25 ms.
Trip time must be between 0 ms and 1000 ms

Trip time must be between 0 ms and 1000 ms.



Test

Name	Automatic test 5
Session	Default session
Customer	
Location	
Operator	

Device

Tag name	A6/+03
Relay Serial Number	EF5000753690N000
Circuit Breaker Serial Number	CE61041914number
	XT2/4
Device settings	In = 40 A Un = 100 V fn = 50 Hz
Protection Settings	Protection = L Curve type = t=k/i^2 Threshold = 0.470 In Time = 3.00 s Protection = S Curve type = t=k Threshold = 2.50 In Time = 0.10 s Protection = I Threshold = 5.00 In Protection = G Curve type = t=k Threshold = 0.200 In Time = 0.10 s
Preconditions	All preconditions satisfied.

Test result

Test completed with trip. Protection I tripped in 29 ms.
Trip time must be between 0 ms and 1000 ms

Trip time must be between 0 ms and 1000 ms.

ITEM	Tag	A6/+03-QF1	: AUX BESS LV2 CABINET - A6/+03-QF1	Dwg	1723002197-EL-DG-00011		
	S/Sys	85-00	: BESS Package (A-85000)	Module			
TASK	code	C10002960	Location	Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	PRE-COMM	Activity	FTS	Discipline	Electrical	Form	FTR-6		Electrical IO

FTR 6 - Electrical I/O check record sheet

Equipment Tag:	AUX BESS LV2 CABINET	Instrument Type / Serial N° :	FLUKE 175_17140769
Cubicle N°:	A6/+03	Calibration certificate date:	7715/24_10/07/2025

Link Type:	●	Hardwired	Communication	(strike through unapplicable type)
I/O Type:	●	Digital	Analogic	(strike through unapplicable type)

DIGITAL

Item	Signal description	Link Type (Hardwired/ Communication)	I/O Type (Digital/Analogic)	Point of Origin (From)	Point of Receival (to)	Text Labelling Display Satisfactory (Y/N)	Blinking/Static Display Satisfactory (Y/N)	Color Coding Satisfactory (Y/N)	Status Check			Time Stamping Satisfactory (Y/N)	Refresh Time (if >1s)	Appearing in all applicable display (Y/N)
									Event (Y/N)	Alarm (Y/N)	Fault (Y/N)			
1	CB CLOSED & INSERTED	HW	DI	A6/+03 - KA1/11-14	A6/+03 - X1/9-10	N/A	N/A	N/A	Y	N/A	N/A	N/A	N/A	N/A
2	CB OPEN OR DISCONNECTED	HW	DI	A6/+03 - KA1/11-12	A6/+03 - X1/9-11	N/A	N/A	N/A	Y	N/A	N/A	N/A	N/A	N/A
3	DRAWER ON TEST	HW	DI	A6/+03 - KA5/11-14	A6/+03 - X1/9-11	N/A	N/A	N/A	Y	N/A	N/A	N/A	N/A	N/A
4	CB TRIPPED	HW	DI	A6/+03 - KA4/21-24	A6/+03 - X1/9-12	N/A	N/A	N/A	N/A	N/A	Y	N/A	N/A	N/A
5	FEEDER AVAILABLE	HW	DI	A6/+03 - KA2/11-14	A6/+03 - X1/9-13	N/A	N/A	N/A	Y	N/A	N/A	N/A	N/A	N/A
6	INTERNAL FAULT	HW	DI	A6/+03 - QA1/11-14	A6/+03 - X1/9-14	N/A	N/A	N/A	N/A	N/A	Y	N/A	N/A	N/A
7	USER ON LOCAL	HW	DI	A6/+03 - SA1/21-22	A6/+03 - X1/15-19	N/A	N/A	N/A	Y	N/A	N/A	N/A	N/A	N/A
8														

ANALOGIC

Item	Signal description	Link Type (Hardwired/ Communication)	I/O Type (Digital/Analogic)	Point of Origin (From)	Point of Receival (to)	Min value sent	Min value received	Max value sent	Max value received	Intermediate value sent	Intermediate value received	Out of scale test (OK, Not OK)	Refresh time (if >2s)	Appearing in all applicable display (Y/N)
1														
2														
3														

Comments:

Page 1/1	Performed by	☐ WITNESS ☑ REVIEW	☐ WITNESS ☐ REVIEW
Company	RM COMM	RM COMM	CPY NOT PRESENT
Name	Davide Zucconelli	Kristian Castellani	Witness waived
Date	2024-10-02	2024-10-03	2024-10-03
Signature	PROVERLIS Digitaly signed by Davide Zucconelli 2024-10-02T11:23:00.484Z	PROVERLIS Digitaly signed by Kristian Castellani 2024-10-03T07:14:32.167Z	PROVERLIS Digitaly signed by Witness waived 2024-10-03T14:31:16.724Z

ITEM	Tag	A4/+04-QF1	: AUX BESS PCS CABINET - A4/+04-QF1			Dwg	1723002197-EL-DG-00011
	S/Sys	85-00	: BESS Package (A-85000)			Module	
TASK	code	C10003025		Location	Onshore Activities	User	Rosetti Marino Quality Control
FORM	Process	COMM	Activity FTS	Discipline	Electrical	Form	FTR-5 Remote Signalling

FTR5 - Remote signalling
Record sheet

DATA

Switchboard:	SG-200N1	Cubicle N°:	A4/+04

FUNCTION TEST

	Order/Inputs				Status/Output											
	Start order		Stop order		Run		Fault		Stop Signalisation		Available/Ready to start		TRIP		CB OPEN/CLOSED	
UCP																
ECS																
SSS																
PSS																
PCS	●	●	●	●	●	●	●	●			●	●	●	●	●	●
Control Station																
Control Panel																
HVAC Panel																
MCC	●	●	●	●	●	●							●	●	●	●

Column 1 (To check) to be filled during commissioning preparation stage - black if the check is asked
Column 2 (Checked) to be filled black if check is Ok

Comments: During the test, we tested all the Analog Input with success: Current "L1",Current "L2",Current "L3", Voltage "L1-L2", Voltage "L2-L3", Voltage "L1-L3", Frequency, Apparent Power, Real Power, Reactive Power and Power Factor.

	Performed by	☐ WITNESS ☐ REVIEW	☐ WITNESS ☐ REVIEW
Company	RM COMM	RM COMM	CPY NOT PRESENT
Name	Davide Zucconelli	Anthony Iveson	Witness waived
Date	2025-05-22	2025-05-22	2025-05-22
Signature	PROVERLIS Digitaly signed by Davide Zucconelli 2025-05-22T07:31:22.004Z	PROVERLIS Digitaly signed by Anthony Iveson 2025-05-22T08:30:55.407Z	PROVERLIS Digitaly signed by Witness waived 2025-05-22T08:40:26.531Z

ROSETTI MARINO | PROVERLIS | CROSSWIND

ITEM	Tag	A6/+02-QF1	: AUX BESS LV1 CABINET - A6/+02-QF1			Dwg	1723002197-EL-DG-00011
	S/Sys	85-00	: BESS Package (A-85000)			Module	
TASK	code	C10003026		Location	Onshore Activities	User	Rosetti Marino Quality Control
FORM	Process	COMM	Activity FTS	Discipline	Electrical	Form	FTR-5 Remote Signalling

FTR5 - Remote signalling
Record sheet

DATA

Switchboard:	SG-200N1	Cubicle N°:	A6/+02

FUNCTION TEST

	Order/Inputs				Status/Output											
	Start order		Stop order		Run		Fault		Stop Signalisation		Available/Ready to start		TRIP		CB OPEN/CLOSED	
UCP																
ECS																
SSS																
PSS																
PCS	●	●	●	●	●	●	●	●			●	●	●	●	●	●
Control Station																
Control Panel																
HVAC Panel																
MCC	●	●	●	●	●	●							●	●	●	●

Column 1 (To check) to be filled during commissioning preparation stage - black if the check is asked
Column 2 (Checked) to be filled black if check is Ok

Comments: During the test, we tested all the Analog Input with success: Current "L1",Current "L2",Current "L3", Voltage "L1-L2", Voltage "L2-L3", Voltage "L1-L3", Frequency, Apparent Power, Real Power, Reactive Power and Power Factor.

	Performed by	☐ WITNESS ☒ REVIEW	☐ WITNESS ☐ REVIEW
Company	RM COMM	RM COMM	CPY NOT PRESENT
Name	Davide Zucconelli	Anthony Iveson	Witness waived
Date	2025-05-22	2025-05-22	2025-05-22
Signature	PROVERLIS Digitaly signed by Davide Zucconelli 2025-05-22T07:31:47.771Z	PROVERLIS Digitaly signed by Anthony Iveson 2025-05-22T08:32:08.256Z	PROVERLIS Digitaly signed by Witness waived 2025-05-22T08:40:42.172Z

ROSETTI MARINO | PROVERLIS | CROSSWIND

ITEM	Tag	A6/+03-QF1	: AUX BESS LV2 CABINET - A6/+03-QF1			Dwg	1723002197-EL-DG-00011
	S/Sys	85-00	: BESS Package (A-85000)			Module	
TASK	code	C10003027		Location	Onshore Activities	User	Rosetti Marino Quality Control
FORM	Process	COMM	Activity FTS	Discipline	Electrical	Form	FTR-5 Remote Signalling

FTR5 - Remote signalling
Record sheet

DATA

Switchboard:	SG-200N1	Cubicle N°:	A6/+03

FUNCTION TEST

	Order/Inputs				Status/Output											
	Start order		Stop order		Run		Fault		Stop Signalisation		Available/Ready to start		TRIP		CB OPEN/CLOSED	
UCP																
ECS																
SSS																
PSS																
PCS	●	●	●	●	●	●	●	●			●	●	●	●	●	●
Control Station																
Control Panel																
HVAC Panel																
MCC	●	●	●	●	●	●							●	●	●	●

Column 1 (To check) to be filled during commissioning preparation stage - black if the check is asked
Column 2 (Checked) to be filled black if check is Ok

Comments: During the test, we tested all the Analog Input with success: Current "L1",Current "L2",Current "L3", Voltage "L1-L2", Voltage "L2-L3", Voltage "L1-L3", Frequency, Apparent Power, Real Power, Reactive Power and Power Factor.

	Performed by	☐ WITNESS ☒ REVIEW	☐ WITNESS ☐ REVIEW
Company	RM COMM	RM COMM	CPY NOT PRESENT
Name	Davide Zucconelli	Anthony Iveson	Witness waived
Date	2025-05-22	2025-05-22	2025-05-22
Signature	PROVERLIS Digitaly signed by Davide Zucconelli 2025-05-22T07:32:03.932Z	PROVERLIS Digitaly signed by Anthony Iveson 2025-05-22T08:33:14.453Z	PROVERLIS Digitaly signed by Witness waived 2025-05-22T08:40:57.417Z

Section 4.2 Electrical
“As-Commissioned” interconnection diagrams

FROM	TO

DESCRIPTION: EMCS
TAG NUMBER: B400-EMCS-001

COLUMN: -

-TB-DO
~~-TB-DI~~

TB-DO / 1 ~~TB-DI / 25~~ — 1
TB-DO / 2 ~~TB-DI / 26~~ — 2
3
4
5
6
7

NO MARK UP
MARCO MORETTO
20/3/25

BK — 85002-CEC — 7C X 1.5 mm²

DESCRIPTION: BESS
TAG NUMBER: A-85000

COLUMN: -

-XT1

BK

1
2
3
4
5
6
7

XT1 / 19 PERMISSIVE - BESS TO SWITCH TO GRID
XT1 / 20 FORMING MODE

DESCRIPTION: LCP GIS
TAG NUMBER: CP-100E1

COLUMN: -

-X1

ISLAND SIGNAL

X1 / 39 — 1
X1 / 40 — 2
X1 / 41 — 3
X1 / 42 — 4
X1 / 43 — 5
X1 / 44 — 6
7

NO MARK UP
MARCO MORETTO
21/3/25

BK — 81013-CEC — 7C X 1.5 mm²

AS COMMISSIONED: NATALIA GIROTTI
21/3/25

DESCRIPTION: 6.6KV HV SWITCHGEAR
TAG NUMBER: SG-100D1

COLUMN: A6

-XM

BK

1
2
3
4
5
6
7

XM / 43
XM / 44 66 KV CB OPEN STATUS
XM / 81
XM / 82 66 KV CB OPEN STATUS FOR ELECTROLYZER FEEDER
XM / 83
XM / 84 66 KV CB OPEN STATUS FOR BESS

VALID FOR CONSTRUCTION
FDL DWG: 123A90-FDL-EL-DG-20149

REV.:	DATE:	SIGNATURE:
2_L	13/03/25	G.Randi

ROSETTI MARINO SpA

CROSSWIND

ROSETTI MARINO

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	19/11/24	SAI	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	16/10/24	SAI	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	08/07/24	SAI	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL INTERCONNECTING WIRING DIAGRAM
INTERLOCKS BETWEEN LCP GIS&6.6KV HV SWITCHGEAR

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : 1:X

A3 | DRAWING NO. 123A90-DDL-EL-DG-20149 | SHEET 085 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 123A90-DDL-EL-DG-20149 Rev. 02

FROM	TO

DESCRIPTION: LV SWBD 800/460V
TAG NUMBER: SG-200D2

COLUMN: -

~~NO MARK UP~~

PERMISSIVES FROM SOLAR LV TO 6.6KV FEEDER CB AND EARTHING SWITCH

-X2

CB OPEN	X2 / 27	1
	X2 / 28	2
CB ISOLATED / TEST POSITION	X2 / 29	3
	X2 / 30	4
CB TRIPPED	X2 / 31	5
	X2 / 32	6
		7

BK

83015-CEC
7C X 1.5 mm²

BK

DESCRIPTION: 6.6KV HV SWITCHGEAR
TAG NUMBER: SG-100D1

COLUMN:
A2

-XM

	XM / 31	1
CB OPENED FROM LV SWBD 800/460V	XM / 32	2
	XM / 43	3
CB IN TEST POSITION FROM LV SWBD 800/460V	XM / 44	4
	XM / 45	5
FROM LV SWBD 800/460V TRIPPED	XM / 46	6
		7

MARCO MORETTO
10/1/25

DESCRIPTION: BESS
TAG NUMBER: A-85000

COLUMN: -

NO MARK UP
MARCO MORETTO
20/3/25

-XT1

INCOMING CB IS OPEN	17	1
	18	2
	13	3
PHASE IN SYNC	14	4
		5
		6
		7

BK

85001-CEC
7C X 1.5 mm²

BK

DESCRIPTION: 6.6KV HV SWITCHGEAR
TAG NUMBER: SG-100D1

COLUMN: A6

-XM

	XM / 59	1
CLOSING COMMAND BY SYNCHRO	XM / 60	2
	XM / 87	3
ISLAND SIGNAL	XM / 88	4
		5
		6
		7

AS COMMISSIONED: MATWA GIOTI
21/3/25

VALID FOR CONSTRUCTION
FDL DWG: **123A90-FDL-EL-DG-20149**

REV.:	DATE:	SIGNATURE:
2_F	09/01/25	G.Randi

ROSETTI MARINO SpA

CROSSWIND

ROSETTI MARINO

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	19/11/24	SAI	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	16/10/24	SAI	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	08/07/24	SAI	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL INTERCONNECTING WIRING DIAGRAM
INTERLOCKS BETWEEN BESS & 6.6KV HV SWITCHGEAR

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : 1:X

A3 | DRAWING NO. 123A90-DDL-EL-DG-20149 | SHEET 084 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 123A90-DDL-EL-DG-20149 Rev. 02

FROM	TO

DESCRIPTION: 6.6KV HV SWITCHGEAR
TAG NUMBER: SG-100D1

COLUMN/CUBIC.:A6

-XM

XM / 1	L1	VT INCOMING FOR SYNCHRONIZER
XM / 2	L2	
XM / 3	L3	
XM / 4	N	

BK — 82006-CEC 4C X 4 mm² — BK

NO MARK UP
MARCO MORETTO
20/3/25

COLUMN/CUBIC.:A5

-XM

XM / 11	L1	VT BUSBAR FOR SYNCHRONIZER
XM / 12	L2	
XM / 13	L3	
XM / 14	N	

BK — 82007-CEC 4C X 4 mm² — BK

NO MARK UP
MARCO MORETTO
21/3/25

DESCRIPTION: BESS UCP
TAG NUMBER: A85000

COLUMN/CUBIC.:-

+CTRL_2.1
-XE3

L1	1	PHASE VOLTAGE FROM 6.6KV	
L2	2		
L3	3		
N	4		

+CTRL_2.1
-XE3

L1	5	PHASE VOLTAGE FROM 6.6KV	
L2	6		
L3	7		
N	8		

AS COMMISSIONED: MATTIA GIOTTI
21/3/25

VALID FOR CONSTRUCTION
FDL DWG: **123A90-FDL-EL-DG-20149**

REV.:	DATE:	SIGNATURE:
2_F	09/01/25	G.Randi

ROSETTI MARINO SpA

CROSSWIND

ROSETTI MARINO

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	19/11/24	SAI	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	16/10/24	SAI	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	08/07/24	SAI	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL INTERCONNECTING WIRING DIAGRAM
BESS UCP SYNCHRONIZER VOLTAGE FROM 6.6KV

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : 1:X

A3 | DRAWING NO. 123A90-DDL-EL-DG-20149 | SHEET 074 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 123A90-DDL-EL-DG-20149 Rev. 02

FROM	TO

DESCRIPTION: LV Switchgear
TAG NUMBER: SG-200N1

COLUMN/CUBIC.: A4/+04

L1 — BN
L2 — BK
L3 — GY
N — BU

83011-CEL
4C X 10 mm²

NO MARK UP
MARCO MORETTO
20/3/25

COLUMN/CUBIC.: A6/+02

L1 — BN
L2 — BK
L3 — GY
N — BU

83014-CEL
4C X 10 mm²

NO MARK UP
MARCO MORETTO
21/3/25

COLUMN/CUBIC.: A6/+03

L1 — BN
L2 — BK
L3 — GY
N — BU

83015-CEL
4C X 10 mm²

DESCRIPTION: BESS PCS CABINET
TAG NUMBER: CP-850E3

-XE

BN	~~112~~ 1	-AUX_400V_L1
BK	~~132~~ 3	-AUX_400V_L2
GY	~~152~~ 5	-AUX_400V_L3
BU	~~1N2~~ N	-AUX_400V_N

02

DESCRIPTION: ~~BESS LV1 CABINET (+DISTR 1)~~ BESS LV2 CABINET (+DISTR 2)
TAG NUMBER: ~~CP-850E1~~ CP-850E2

-XES

BN	1
BK	3
GY	5
BU	N

DESCRIPTION: ~~BESS LV2 CABINET (+DISTR 2)~~ BESS LV1 CABINET (+DISTR 1)
TAG NUMBER: ~~CP-850E2~~ CP-850E1

-XES

BN	1
BK	3
GY	5
BU	N

AS COMMISSIONED : MATTIA GIACCI
21/3/25

VALID FOR CONSTRUCTION
FDL DWG: **123A90-FDL-EL-DG-20149**

REV.:	DATE:	SIGNATURE:
2_F	09/01/25	G.Randi

ROSETTI MARINO SpA

CROSSWIND

ROSETTI MARINO

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	19/11/24	SAI	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	16/10/24	SAI	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	08/07/24	SAI	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL INTERCONNECTING WIRING DIAGRAM
LV SWITCHGEAR SG-200N1

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : 1:X

A3	DRAWING NO.	SHEET	REV.
	123A90-DDL-EL-DG-20149	022	02

F.to UNI A3: 420mmx297mm

File Name : 123A90-DDL-EL-DG-20149 Rev. 02

Section 4.3 Instrumentation functional test sheets index

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

STATUS INDEX DETAIL

Filtered on subsystem: 85-00 & discipline : I

Instrumental	85-00 BESS Package (A-85000)						
ITEM		TASK					
Code	Description	Location	Code	Form	Progress	Date	Certificate
85-XA-001	A-85000 BESS PKG confirmed gas alarm	ONSHORE	C10004484	FJ01D	100	2025-03-03	RFO 2
85-XA-002	A-85000 BESS PKG confirmed fire alarm	ONSHORE	C10004485	FJ01D	100	2025-03-03	RFO 2
85-XA-003	A-85000 BESS PKG UCP fault	ONSHORE	C10004486	FJ01D	100	2025-03-03	RFO 2
85-XA-004	A-85000 BESS PKG UCP thermal run away	ONSHORE	C10004487	FJ01D	100	2025-03-03	RFO 2
85-XS-001	SHUT-DOWN A-85000 BESS PKG	ONSHORE	C10004488	FJ01D	100	2025-03-03	RFO 2
A-85000	BESS	ONSHORE	C10004887	FJ05	100	2025-03-26	RFO 2

ROSETTI MARINO | PROVERLIS | CROSSWIND

ITEM	Tag	85-XA-001	: A-85000 BESS PKG confirmed gas alarm	Dwg	123A90-DDL-IN-LIS-40089		
	S/Sys	85-00	: BESS Package (A-85000)	Module			
TASK	code	C10004484	Location	Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	PRE-COMM	Activity	FTS	Discipline	Instrumental	Form	FJ01D	Digital Loop

LOOP DATA

Loop TAG	85-XA-001				TSLD	123A90-FDL-IN-DG-40014 rev.1A			
IO Type	Input	Yes	Output	No	Energy by transmitter	No	Energy by system	Yes	
Marshalling	B400-FGS-001	Terminal	01A/01B		Slot	05	Rack	05	Chanel 01

LOOP TEST

1	Check earth isolation of the loop.					OK
2	Connect loop to terminal					OK
3	Energise Loop (close loop) and record status	Normal	Yes	Alarm/trip	No	OK
4	De-Energise Loop (open loop) and record status	Normal	No	Alarm/trip	Yes	OK
5	Record Fail Safe position	Open	NA	Closed	NA	NA

LOOP SERVICE

		Action	Alarm / Control			Display	
		Trip	GA	DCS	SOE	DCS	
6	Loop energized	No	NA	Yes	NA	OK	OK
7	Loop not energized	Yes	NA	Yes	NA	OK	OK
8	Checking of line monitoring	No	NA	No	NA	OK	OK
9	Checking of Maintenance Inhibition	NA	NA	NA	NA	NA	NA
10	Associated safety Level / bar	ESD-1D					OK
11	Associated outputs						

LOOP DOCUMENTATION

12	Loop diagram is marked up and attached to this test sheet	OK
13	Cause and effect chart is highlighted accordingly	
14	Any defect is recorded for punch list issuance	

TESTING & MEASUREMENT INSTRUMENT USED

Type	Serial N.	Calibration Certificate	Validity
MULTIMETER FLUKE 175	AW1/018 17140769	7715/24	10/07/2025

Comments:

	Performed by	☐ WITNESS ☐ REVIEW	☐ WITNESS ☐ REVIEW
Company	RM COMM	RM COMM	CW OPS
Name	Laurentiu Grozavu	Giandonato Delmissier	Jamie McAllister
Date	2025-02-28	2025-02-28	2025-03-03

PROVERLIS Digitaly signed by Laurentiu Grozavu 2025-02-28T07:27:32.558Z

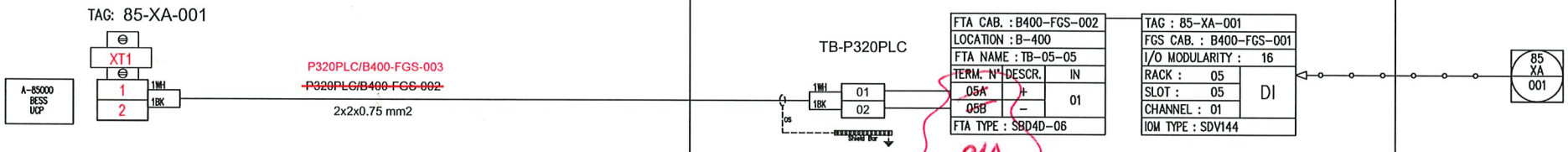
PROVERLIS Digitaly signed by Giandonato Delmissier 2025-02-28T09:05:13.453Z

PROVERLIS Digitaly signed by Jamie McAllister 2025-03-03T15:40:35.054Z

Signature			

DRAWING NO. 123A90-DDL-IN-DG-40014 REV. 01

FIELD	ITER – B400	CENTRAL CONTROL ROOM
	FIRE AND GAS SYSTEM	OPERATOR CONSOLE



01A
01B

26/02/25

CROSSWIND

ROSETTI MARINO

TITLE : TYPICAL LOOP DIAGRAM
85-XA-001
A-85000 BESS PKG CONFIRMED GAS ALARM

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
01	06/12/2024	VBA	LCA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	23/10/2024	VBA	LCA	DLO	ISSUE FOR REVIEW (IFR)

VALID FOR CONSTRUCTION
FDL DWG: 123A90-FDL-IN-DG-40014
REV: 1_A | DATE: 20/12/24 | SIGNATURE: C.Pilato
ROSETTI MARINO SpA

CONTRACT NO./TITLE CONTRACT_NO. | SCALE 1:1
DRAWN: VBA | CHECKED: LCA | APPROVED: DLO | DATE 23/10/2024

A3 | DRAWING NO. 123A90-DDL-IN-DG-40014 | SHEET 302 | REV. 01

File Name : 123A90-DDL-IN-DG-40014_REV.01

ROSETTI MARINO | PROVERLIS | CROSSWIND

ITEM	Tag	85-XA-002	: A-85000 BESS PKG confirmed fire alarm	Dwg	123A90-DDL-IN-LIS-40089		
	S/Sys	85-00	: BESS Package (A-85000)	Module			
TASK	code	C10004485	Location	Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	PRE-COMM	Activity	FTS	Discipline	Instrumental	Form	FJ01D	Digital Loop

LOOP DATA

Loop TAG	85-XA-002			TSLD	123A90-FDL-IN-DG-40014 rev.1A				
IO Type	Input	Yes	Output	No	Energy by transmitter	No	Energy by system	Yes	
Marshalling	B400-FGS-001	Terminal	02A/02B	Slot	05	Rack	05	Chanel	02

LOOP TEST

1	Check earth isolation of the loop.					OK
2	Connect loop to terminal					OK
3	Energise Loop (close loop) and record status	Normal	Yes	Alarm/trip	No	OK
4	De-Energise Loop (open loop) and record status	Normal	No	Alarm/trip	Yes	OK
5	Record Fail Safe position	Open	NA	Closed	NA	NA

LOOP SERVICE

		Action	Alarm / Control			Display	
		Trip	GA	DCS	SOE	DCS	
6	Loop energized	No	NA	Yes	NA	OK	OK
7	Loop not energized	Yes	NA	Yes	NA	OK	OK
8	Checking of line monitoring	No	NA	No	NA	OK	OK
9	Checking of Maintenance Inhibition	NA	NA	NA	NA	NA	NA
10	Associated safety Level / bar	ESD-1D					OK
11	Associated outputs						

LOOP DOCUMENTATION

12	Loop diagram is marked up and attached to this test sheet	OK
13	Cause and effect chart is highlighted accordingly	
14	Any defect is recorded for punch list issuance	

TESTING & MEASUREMENT INSTRUMENT USED

Type	Serial N.	Calibration Certificate	Validity
MULTIMETER FLUKE 175	AW1/018 17140769	7715/24	10/07/2025

Comments:

	Performed by	☐ WITNESS ☐ REVIEW	☐ WITNESS ☐ REVIEW
Company	RM COMM	RM COMM	CW Com
Name	Laurentiu Grozavu	Giandonato Delmissier	Jamie McAllister
Date	2025-02-28	2025-02-28	2025-03-03

PROVERLIS Digitaly signed by Laurentiu Grozavu 2025-02-28T07:29:32.762Z

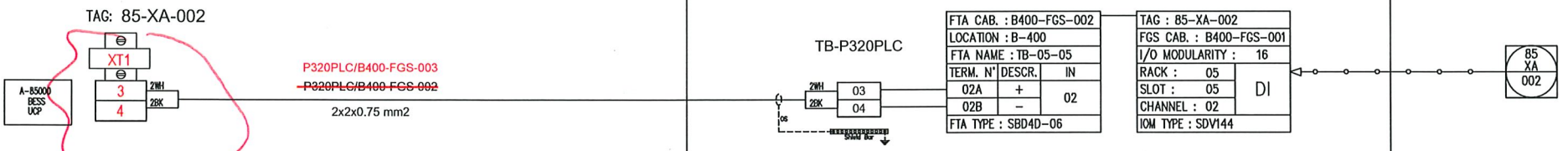
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PROVERLIS Digitaly signed by Jamie McAllister 2025-03-03T15:41:30.061Z

Signature			

DRAWING NO. 123A90-DDL-IN-DG-40014 REV. 01

FIELD	ITER – B400	CENTRAL CONTROL ROOM
	FIRE AND GAS SYSTEM	OPERATOR CONSOLE



L Grozan
26/02/05

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
01	06/12/2024	VBA	LCA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	23/10/2024	VBA	LCA	DLO	ISSUE FOR REVIEW (IFR)

VALID FOR CONSTRUCTION
FDL DWG: 123A90-FDL-IN-DG-40014
REV.: 1_A | DATE: 20/12/24 | SIGNATURE: C.Pilato
ROSETTI MARINO SpA

CROSSWIND

ROSETTI MARINO

TITLE : TYPICAL LOOP DIAGRAM
85-XA-002
A-85000 BESS PKG CONFIRMED FIRE ALARM

CONTRACT NO./TITLE CONTRACT_NO.			SCALE 1:1
DRAWN: VBA	CHECKED: LCA	APPROVED: DLO	DATE 23/10/2024

A3	DRAWING NO. 123A90-DDL-IN-DG-40014	SHEET 303	REV. 01

File Name : 123A90-DDL-IN-DG-40014_REV.01

ROSETTI MARINO | PROVERLIS | CROSSWIND

ITEM	Tag	85-XA-003	: A-85000 BESS PKG UCP fault			Dwg	123A90-DDL-IN-LIS-40089
	S/Sys	85-00	: BESS Package (A-85000)			Module	
TASK	code	C10004486		Location	Onshore Activities	User	Rosetti Marino Quality Control
FORM	Process	PRE-COMM	Activity FTS	Discipline	Instrumental	Form	FJ01D Digital Loop

LOOP DATA

Loop TAG	85-XA-003				TSLD	123A90-FDL-IN-DG-40014 rev.1A			
IO Type	Input	Yes	Output	No	Energy by transmitter	No	Energy by system	Yes	
Marshalling	B400-SIS-001	Terminal	01A/01B		Slot	01	Rack	03	Chanel 01

LOOP TEST

1	Check earth isolation of the loop.					OK
2	Connect loop to terminal					OK
3	Energise Loop (close loop) and record status	Normal	Yes	Alarm/trip	No	OK
4	De-Energise Loop (open loop) and record status	Normal	No	Alarm/trip	Yes	OK
5	Record Fail Safe position	Open	NA	Closed	NA	NA

LOOP SERVICE

		Action	Alarm / Control			Display	
		Trip	GA	DCS	SOE	DCS	
6	Loop energized	No	NA	Yes	NA	OK	OK
7	Loop not energized	Yes	NA	Yes	NA	OK	OK
8	Checking of line monitoring	No	NA	No	NA	OK	OK
9	Checking of Maintenance Inhibition	NA	NA	NA	NA	NA	NA
10	Associated safety Level / bar						
11	Associated outputs						

LOOP DOCUMENTATION

12	Loop diagram is marked up and attached to this test sheet	OK
13	Cause and effect chart is highlighted accordingly	
14	Any defect is recorded for punch list issuance	

TESTING & MEASUREMENT INSTRUMENT USED

Type	Serial N.	Calibration Certificate	Validity
MULTIMETER FLUKE 175	AW1/018 17140769	7715/24	10/07/2025

Comments:

Page 1/1

	Performed by	☐ WITNESS ☐ REVIEW	☐ WITNESS ☐ REVIEW
Company	RM COMM	RM COMM	CW com
Name	Laurentiu Grozavu	Giandonato Delmissier	Jamie McAllister
Date	2025-02-28	2025-02-28	2025-03-03

PROVERLIS Digitaly signed by Laurentiu Grozavu 2025-02-28T07:31:04.001Z

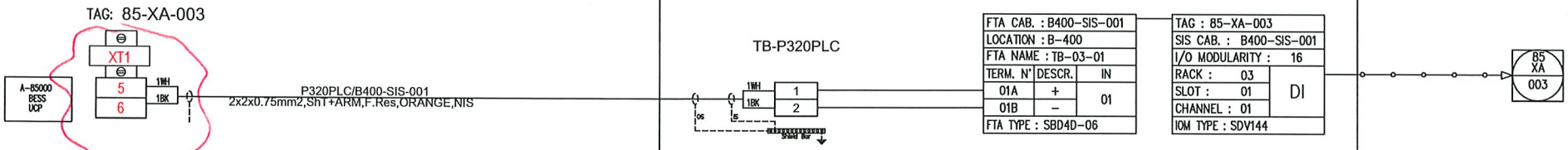
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PROVERLIS Digitaly signed by Jamie McAllister 2025-03-03T15:42:19.839Z

Signature			

DRAWING NO. 123A90-DDL-IN-DG-40014 REV. 01

FIELD	ITER – B400	CENTRAL CONTROL ROOM
	SAFETY INSTRUMENTED SYSTEM	OPERATOR CONSOLE



LOngnon
26/02/25

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
01	06/12/2024	VBA	LCA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	23/10/2024	VBA	LCA	DLO	ISSUE FOR REVIEW (IFR)

VALID FOR CONSTRUCTION
FDL DWG: 123A90-FDL-IN-DG-40014
REV: 1_A | DATE: 20/12/24 | SIGNATURE: C.Pilato
ROSETTI MARINO SpA

CROSSWIND

ROSETTI MARINO

TITLE : INSTRUMENT LOOP DIAGRAM
85-XA-003
A-85000 BESS PKG UCP FAULT

CONTRACT NO./TITLE CONTRACT_NO.			SCALE 1:1
DRAWN: VBA	CHECKED: LCA	APPROVED: DLO	DATE 23/10/2024

A3	DRAWING NO. 123A90-DDL-IN-DG-40014	SHEET 139	REV. 01

File Name : 123A90-DDL-IN-DG-40014_REV.01

ROSETTI MARINO | PROVERLIS | CROSSWIND

ITEM	Tag	85-XA-004	: A-85000 BESS PKG UCP thermal run away	Dwg	123A90-DDL-IN-LIS-40089		
	S/Sys	85-00	: BESS Package (A-85000)	Module			
TASK	code	C10004487	Location	Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	PRE-COMM	Activity	FTS	Discipline	Instrumental	Form	FJ01D		Digital Loop

LOOP DATA

Loop TAG	85-XA-004				TSLD	123A90-FDL-IN-DG-40014 rev.1A			
IO Type	Input	Yes	Output	No	Energy by transmitter	No	Energy by system	Yes	
Marshalling	B400-SIS-001	Terminal	12A/12B		Slot	01	Rack	03	Chanel	12

LOOP TEST

1	Check earth isolation of the loop.					OK
2	Connect loop to terminal					OK
3	Energise Loop (close loop) and record status	Normal	Yes	Alarm/trip	No	OK
4	De-Energise Loop (open loop) and record status	Normal	No	Alarm/trip	Yes	OK
5	Record Fail Safe position	Open	NA	Closed	NA	NA

LOOP SERVICE

		Action	Alarm / Control			Display	
		Trip	GA	DCS	SOE	DCS	
6	Loop energized	No	NA	Yes	NA	OK	OK
7	Loop not energized	Yes	NA	Yes	NA	OK	OK
8	Checking of line monitoring	No	NA	No	NA	OK	OK
9	Checking of Maintenance Inhibition	NA	NA	NA	NA	NA	NA
10	Associated safety Level / bar						
11	Associated outputs						

LOOP DOCUMENTATION

12	Loop diagram is marked up and attached to this test sheet	OK
13	Cause and effect chart is highlighted accordingly	
14	Any defect is recorded for punch list issuance	

TESTING & MEASUREMENT INSTRUMENT USED

Type	Serial N.	Calibration Certificate	Validity
MULTIMETER FLUKE 175	AW1/018 17140769	7715/24	10/07/2025

Comments:

Page 1/1	Performed by	☐ WITNESS ☐ REVIEW	☐ WITNESS ☐ REVIEW
Company	RM COMM	RM COMM	CW Com
Name	Laurentiu Grozavu	Giandonato Delmissier	Jamie McAllister
Date	2025-02-28	2025-02-28	2025-03-03

PROVERLIS Digitaly signed by Laurentiu Grozavu 2025-02-28T07:31:42.945Z

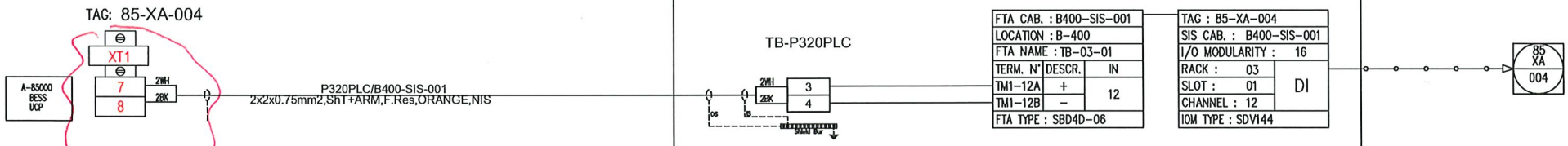
PROVERLIS Digitaly signed by Giandonato Delmissier 2025-02-28T09:07:09.923Z

PROVERLIS Digitaly signed by Jamie McAllister 2025-03-03T15:43:51.132Z

Signature			

DRAWING NO. 123A90-DDL-IN-DG-40014 REV. 01

FIELD	ITER – B400	CENTRAL CONTROL ROOM
	SAFETY INSTRUMENTED SYSTEM	OPERATOR CONSOLE



LGaigan
26/04/25

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
01	06/12/2024	VBA	LCA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	23/10/2024	VBA	LCA	DLO	ISSUE FOR REVIEW (IFR)

VALID FOR CONSTRUCTION
FDL DWG: 123A90-FDL-IN-DG-40014
REV: 1_A | DATE: 20/12/24 | SIGNATURE: C.Pilato
ROSETTI MARINO SpA

CROSSWIND

ROSETTI MARINO

TITLE : INSTRUMENT LOOP DIAGRAM
85-XA-004
A-85000 BESS THERMAL RUN AWAY

CONTRACT NO./TITLE CONTRACT_NO.			SCALE 1:1
DRAWN: VBA	CHECKED: LCA	APPROVED: DLO	DATE 23/10/2024
A3	DRAWING NO. 123A90-DDL-IN-DG-40014	SHEET 140	REV. 01

File Name : 123A90-DDL-IN-DG-40014_REV.01

ROSETTI MARINO | PROVERLIS | CROSSWIND

ITEM	Tag	85-XS-001	: SHUT-DOWN A-85000 BESS PKG	Dwg	123A90-DDL-IN-LIS-40089		
	S/Sys	85-00	: BESS Package (A-85000)	Module			
TASK	code	C10004488	Location	Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	COMM	Activity FTS	Discipline	Instrumental	Form FJ01D	Digital Loop

LOOP DATA

Loop TAG	85-XS-001			TSLD	123A90-FDL-IN-DG-40014 rev.1A				
IO Type	Input	No	Output	Yes	Energy by transmitter	No	Energy by system	Yes	
Marshalling	B400-SIS-001	Terminal	09A/09B	Slot	05	Rack	03	Chanel	09

LOOP TEST

1	Check earth isolation of the loop.					OK
2	Connect loop to terminal					OK
3	Energise Loop (close loop) and record status	Normal	Yes	Alarm/trip	No	OK
4	De-Energise Loop (open loop) and record status	Normal	No	Alarm/trip	Yes	OK
5	Record Fail Safe position	Open	NA	Closed	NA	NA

LOOP SERVICE

		Action	Alarm / Control			Display	
		Trip	GA	DCS	SOE	DCS	
6	Loop energized	No	NA	Yes	Yes	OK	OK
7	Loop not energized	Yes	NA	Yes	Yes	OK	OK
8	Checking of line monitoring	No	NA	No	NA	OK	OK
9	Checking of Maintenance Inhibition	NA	NA	NA	NA	NA	NA
10	Associated safety Level / bar						
11	Associated outputs						

LOOP DOCUMENTATION

12	Loop diagram is marked up and attached to this test sheet	OK
13	Cause and effect chart is highlighted accordingly	
14	Any defect is recorded for punch list issuance	

TESTING & MEASUREMENT INSTRUMENT USED

Type	Serial N.	Calibration Certificate	Validity
MULTIMETER FLUKE 175	AW1/018 17140769	7715/24	10/07/2025

Comments:

Page 1/1	Performed by	☐ WITNESS ☐ REVIEW	☐ WITNESS ☐ REVIEW
Company	RM COMM	RM COMM	CW Ops
Name	Laurentiu Grozavu	Giandonato Delmissier	Jamie McAllister
Date	2025-02-28	2025-02-28	2025-03-03

PROVERLIS Digitaly signed by Laurentiu Grozavu 2025-02-28T07:28:45.186Z

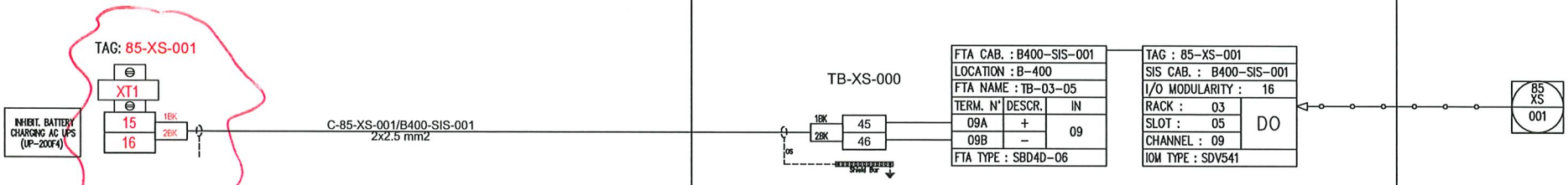
PROVERLIS Digitaly signed by Giandonato Delmissier 2025-02-28T09:07:32.635Z

PROVERLIS Digitaly signed by Jamie McAllister 2025-03-03T15:44:43.979Z

Signature			

DRAWING NO. 123A90-DDL-IN-DG-40014 REV. 01

FIELD	ITER – B400	CENTRAL CONTROL ROOM
	SAFETY INSTRUMENTED SYSTEM	OPERATOR CONSOLE



26/02/25

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
01	06/12/2024	VBA	LCA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	23/10/2024	VBA	LCA	DLO	ISSUE FOR REVIEW (IFR)

VALID FOR CONSTRUCTION
FDL DWG: 123A90-FDL-IN-DG-40014
REV: 1_A | DATE: 20/12/24 | SIGNATURE: C.Pilato
ROSETTI MARINO SpA

CROSSWIND

ROSETTI MARINO

TITLE : INSTRUMENT LOOP DIAGRAM
85-XS-001
SHUT-DOWN A-85000 BESS PKG

CONTRACT NO./TITLE CONTRACT_NO. | SCALE 1:1

DRAWN: VBA | CHECKED: LCA | APPROVED: DLO | DATE 23/10/2024

A3 | DRAWING NO. 123A90-DDL-IN-DG-40014 | SHEET 166 | REV. 01

File Name : 123A90-DDL-IN-DG-40014_REV.01

ITEM	Tag	A-85000	: BESS			Dwg	123A90-DDL-EL-DL-20101
	S/Sys	85-00	: BESS Package (A-85000)			Module	LD
TASK	code	C10004887		Location	Onshore Activities	User	Rosetti Marino Quality Control
FORM	Process	COMM	Activity FTS	Discipline	Instrumental Form FJ05		Serial Communication Test

SERIAL COMMUNICATION TEST

Reference document number: 23A2007_240628_PROFINET_Register BESS_V1_0_0_3

Associated subsystems: 80-00

Completion date: 13/03/2025

Comments/Remarks:

	Performed by	☑ WITNESS ☐ REVIEW	☐ WITNESS ☑ REVIEW
Company	Rosetti Marino	CROSSWIND	CROSSWIND
Name	Fabio Sirigu	PP Alessandro Sutto	PP Alessandro Sutto
Date	2025-03-19	2025-03-26	2025-03-26
Signature	Digitaly signed by Fabio Sirigu 2025-03-19T06:44:17.819Z	Digitaly signed by PP Alessandro Sutto 2025-03-26T09:58:45.601Z	Digitaly signed by PP Alessandro Sutto 2025-03-26T09:59:15.065Z

Legend: Changes to last version | Header

Profilbeschreibung:	Das Profil gibt Statuserte des gesamten Umrichters aus.
Profile description:	The profile can be used to monitor the whole Converter.

			Source							Medium			Target	Test Date:	
Way:										PN				Testing by changing the value and comparing with customer	
Structurename:			s_profile_freqcon_status_1							Modbus Adress	PN-PN Adress	I-Device Adress		working as intended:	
Byte	Bit	QW	Name	Datatyp	Range	Scaling	Resolution	Unit	Description	Beschreibung	(Standard)	(Standard)	(Standard)	Name	instance 1	instance 2
0			Statusword	WORD	0 - 65535	no	no	no			40000	1000	1500	**Statusword**		
	0		Warning		True/False	no	no	no	A warning message is active.	Eine Warnmeldung ist aktiv.	0	0	0	Warning	yes	yes
	1		Error		True/False	no	no	no	An error has occurred.	Ein Fehler ist aufgetreten.	1	1	1	Error	yes	yes
	2		Preheat State		True/False	no	no	no	The inverter is heated up to operating temperature.	Der Umrichter wird auf Betriebstemperatur aufgeheizt.	2	2	2	Preheat State	yes	yes
	3		Standby State		True/False	no	no	no	The inverter is at operating temperature.	Der Umrichter ist auf Betriebstemperatur.	3	3	3	Standby State	yes	yes
	4		Precharge State		True/False	no	no	no	The DC Link is precharged and the main switch is switched on.	Der Zwischenkreis wird vorgeladen und der Hauptschalter zugeschaltet.	4	4	4	Precharge State	yes	yes
	5		Ready State		True/False	no	no	no	The inverter is ready to switch on the IGBTs.	Der Umrichter ist Bereit, die IGBTs einzuschalten.	5	5	5	Ready State	yes	yes
	6		Active State "In Operation"		True/False	no	no	no	The inverter is in operation. The IGBTs are pulsing.	Der Umrichter ist In Betrieb. Die IGBTs pulsen.	6	6	6	Active State "In Operation"	yes	yes
	7	OffsetW	Safety relais triggered		True/False	no	no	no	The safety chain was interrupted. Except for the control energy, all energy sources are disconnected from the inverter.	Die Sicherheitskette wurde unterbrochen. Dies löst einen Not-Aus des Umrichters aus.Bis auf die Steuerenergie, werden alle Energiequellen vom Umrichter getrennt.	7	7	7	Safety relais triggered	yes	yes
1	8		Smoke detector triggered		True/False	no	no	no	The smoke alarm has triggered. The inverter switches off. Except for the control energy, all energy sources are disconnected from the inverter.	Der Rauchmelder hat ausgelöst. Der Umrichter Schaltet aus. Dies löst einen Not-Aus des Umrichters aus.Bis auf die Steuerenergie, werden alle Energiequellen vom Umrichter getrennt.	8	8	8	Smoke detector triggered	yes	yes
	9		main switch on		True/False	no	no	no	main switch is switched on	Hauptschalter ist eingeschaltet	9	9	9		yes	yes
	10										10	10	10			
	11										11	11	11			
	12										12	12	12			
	13				True/False	no	no	no								
	14				True/False	no	no	no								
	15				True/False	no	no	no								
2		OffsetW + 2	heartbeat signal	WORD	0 - 16383	1	0 - 16383	no	The heartbeat signal is increased by the value 1 in each cycle.The counter will be reset to 0 by a value of 16383.	Das Heartbeatsignal wird in jedem Zyklus um den Wert 1 erhöht. Ab einem . Wert von 16383 wird der Zähler auf 0 resettet.	40001	1001	1501	heartbeat signal	yes	yes
3																
4		OffsetW + 4	Control Cabinet temperature	SINT	-128 - 127	1	-128 - 127	°C	Cabinet temperature of the control cabinet +CTRL.	Schaltschranktemperatur des Steuerungsschranks +CTRL.	40002	1002	1502	Control Cabinet temperature		
5			Power Cabinet temperature	SINT	-128 - 127	1	-128 - 127	°C	Cabinet temperature of the +CON cabinet.	Schaltschranktemperatur des +CON Schranks.				Power Cabinet temperature		
6		OffsetW + 6	Add.1 Cabinet temperature	SINT	-128 - 127	1	-128 - 127	°C	Cabinet temperature of the first additional cabinet e.g. +IND or +CIR	Schaltschranktemperatur optioneller Temperaturüberwachung für z.B. +IND oder +CIR Schrank. Kann frei vergeben werden.	40003	1003	1503	Add. Cabinet temperature		
7																
8		OffsetW + 8	Cooling water temperature	SINT	-128 - 127	1	-128 - 127	°C	Cooling water temperature.	Kühlwassertemperatur.	40004	1004	1504	Cooling water temperature		
9			outside Temperature (Optional) — NA													
10		OffsetW + 10	room temperature (optional) — NA								40005	1005	1505			
11																
12		OffsetW + 12									40006	1006	1506			
13																
14		OffsetW + 14	actual records	INT	0-500	1	0-500	no	Shows the number of currently pending errors.	Zeigt die Anzahl aktuell anstehender Fehler.	40007	1007	1507	actual records		
15																
16		OffsetW + 16	record	INT	1-500	1	1-500	no	Via the variable "request an alarm record" in the profile "Profile Freqcon Con" the error entries 1-500 can be actively queried. Example: "actual records" reports that there are three errors. The second fault should be queried. For this purpose "request an alarm record" =2 is set. With the next processing cycle "records" is set =2. "Records" mirrors the current request.	Über die Variabel "request an alarm record" im Profil "Profile Freqcon Con" können die Fehler Einträge 1-500 aktiv abgefragt werden. Beispiel: "actual records" meldet, das drei Störungen vorliegen. Es soll die zweite Störung abgefragt werden. Hierzu wird "request an alarm record" =2 gesetzt. Mit dem nächsten Bearbeitungszyklus wird "records" =2 gesetzt. "Records" spiegelt die aktuelle anfrage.	40008	1008	1508	record		
17																
18											40009	1009	1509			
19		OffsetW + 18	record error number	UDINT		1		no	An error number is assigned to each error. This number is divided into the category, the error location in the program and a consecutive number.	Jedem Fehler ist eine Errornummer zugeordnet. Diese unterteilt sich in die Kategorie, den Fehlerort im Programm und einer laufenden Nummer.				record error number		
20											40010	1010	1510			
21																
22		OffsetW + 22	record error_level	INT	0-4	1	0-4	no	The error level of the currently queried error entry. 2 = Warning 3 = Switch off the power electronics, open the main switch Cooling continues. 4 = Switching off the power electronics, opening the main switch. Cooling is switched off.	Das Errorlevel des aktuell abgefragten Fehlereintrages. 2 = Warnung 3 = Abschaltung der Leistungselektronik, öffnen des Hauptschalters. Kühlung läuft weiter. 4 = Abschaltung der Leistungselektronik, öffnen des Hauptschalters. Kühlung wird abgeschaltet.	40011	1011	1511	record error_level		
23																
24											40012	1012	1512			
25		OffsetW + 24	record Timestamp_Date	UDINT	0 - 65535	1	0 - 65535	no	Date on which the error occurred. DATE#1990-01-01 --> (W#16#0000) D#2168-12-31--> (W#16#FF62) A variable with type DATE is stored in a word as an unsigned fixed point number. The content of this variable corresponds to the number of days elapsed since 1.1.1992.	Datum, an dem der Fehler auftrat. DATE#1990-01-01 --> (W#16#0000) D#2168-12-31--> (W#16#FF62) Eine Variable mit Typ DATE wird in einem Wort als vorzeichenlose Festpunktzahl abgelegt. Der Inhalt dieser Variable entspricht der Anzahl der seid dem 1.1.1992 verstrichenen Tage.				record Timestamp_Date		
26											40013	1013	1513			
27																
28											40014	1014	1514			
29		OffsetW + 28	record Timestamp_Time	UDINT	0 - 86399999	1	0 - 86399999	no	Time at which the error occurred. TIME_OF_DAY#00:00:00 --> (W#16#0000_0000) TOD#23:5:.59.999 -->(W#16#0526_5BFF) This type occupies a double word and contains the number of milliseconds since the beginning of the day (0:00).	Zeit, an dem der Fehler auftrat. TIME_OF_DAY#00:00:00 --> (W#16#0000_0000) TOD#23:5:.59.999 -->(W#16#0526_5BFF) Dieser Typ belegt ein Doppelwort und beinhaltet die anzahl der Millisekunden seid Tagesbeginn (0:00 Uhr).				record Timestamp_Time		
30											40015	1015	1515			
31																

13/03/2025
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M. Adnan
SYED ALI
SUTO

Legend: Changes to last version | Header

Profilbeschreibung:	Das Profil gibt Statuserte eines einzelnen IGBT Ports aus.
Profile description:	The profile can be used to monitor a single IGBT port.

		Source						Description	Beschreibung	Medium			Target	Test Date: 12.01.2023	
Way:										PN				Testing by changing the value and comparing with customer	
Structurename:		s_profile_freqcon_status_2								Modbus Adress (Standard)	PN-PN Adress (Standard)	I-Device Adress (Standard)		working as intended:	
Byte	Bit	QW	Name	Datatyp	Range	Scaling	Resolution	Unit					Name	instance 1	instance 2
0			Statusword	WORD	0 - 65535	no	no	no	This status word is freely assignable for specific PIII states such as hardware error or sttus messages of individual IGBTs.	Dieses Statuswort ist frei belegbar für spezifische PIII Stati wie z.B. Hardware Error oder Sttusmeldungen einzelner IGBTs.	40000	1032	1532	Statusword		
	0				True/False	no	no	no			0	0	0			
	1				True/False	no	no	no			1	1	1			
	2				True/False	no	no	no			2	2	2			
	3				True/False	no	no	no			3	3	3			
	4				True/False	no	no	no			4	4	4			
	5				True/False	no	no	no			5	5	5			
	6	OffsetW + 32			True/False	no	no	no			6	6	6			
	7				True/False	no	no	no			7	7	7			
1	8				True/False	no	no	no			8	8	8			
	9				True/False	no	no	no								
	10				True/False	no	no	no								
	11				True/False	no	no	no								
	12				True/False	no	no	no								
	13				True/False	no	no	no								
	14				True/False	no	no	no								
	15				True/False	no	no	no								
2		OffsetW + 34	IGBT 1 temperature	SINT	-128 - 127	1	-128 - 127	°C	Temperature IGBT 1.	Temperatur IGBT 1.	40001	1033	1533			
3			Inductor 1 temperature	SINT	-128 - 127	1	-128 - 127	°C	Temperature coil 1.	Temperatur Drossel 1.						
4		OffsetW + 36									40002	1034	1534			
5			IGBT 2 temperature	SINT	-128 - 127	1	-128 - 127	°C	Temperature IGBT 2.	Temperatur IGBT 2.						
6		OffsetW + 38	Inductor 2 temperature	SINT	-128 - 127	1	-128 - 127	°C	Temperature coil 2.	Temperatur Drossel 2.	40003	1035	1535			
7																
8		OffsetW + 40	IGBT 3 temperature	SINT	-128 - 127	1	-128 - 127	°C	Temperature IGBT 3.	Temperatur IGBT 3.	40004	1036	1536			
9			Inductor 3 temperature	SINT	-128 - 127	1	-128 - 127	°C	Temperature coil 3.	Temperatur Drossel 3.						
10		OffsetW + 42									40005	1037	1537			
11			IGBT 4 temperature	SINT	-128 - 127	1	-128 - 127	°C	Temperature IGBT 4.	Temperatur IGBT 4.						
12		OffsetW + 44	Inductor 4 temperature	SINT	-128 - 127	1	-128 - 127	°C	Temperature coil 4.	Temperatur Drossel 4.	40006	1038	1538			
13																
14		OffsetW + 46	IGBT 5 temperature	SINT	-128 - 127	1	-128 - 127	°C	Temperature IGBT 5.	Temperatur IGBT 5.	40007	1039	1539			
15			Inductor 5 temperature	SINT	-128 - 127	1	-128 - 127	°C	Temperature coil 5.	Temperatur Drossel 5.						
16		OffsetW + 48									40008	1040	1540			
17																
18		OffsetW + 50	grid frequency	UINT	0 - 65535	1000	0 - 65.535	Hz	actual grid frequency		40009	1041	1541		yes	yes
19																
20		OffsetW + 52	IGBT 1 RMS Voltage *1	INT	-32768 - 32767	10	-3276,8 - 3276.7	V	Voltage IGBT 1 AC Phase 1	Spannung am IGBT 1	40010	1042	1542		yes	yes
21																
22		OffsetW + 54	IGBT 2 RMS Voltage *1	INT	-32768 - 32767	10	-3276,8 - 3276.7	V	Voltage IGBT 2 AC Phase 2	Spannung am IGBT 2	40011	1043	1543		yes	yes
23																
24		OffsetW + 56	IGBT 3 RMS Voltage *1	INT	-32768 - 32767	10	-3276,8 - 3276.7	V	Voltage IGBT 3 AC Phase 3	Spannung am IGBT 3	40012	1044	1544		yes	yes
25																
26		OffsetW + 58	IGBT 1 RMS Current *1	INT	-32768 - 32767	10	-3276,8 - 3276.7	V	Current IGBT 1 AC Phase 1	Strom am IGBT 1	40013	1045	1545		yes	yes
27																
28		OffsetW + 60	IGBT 2 RMS Current *1	INT	-32768 - 32767	10	-3276,8 - 3276.7	V	Current IGBT 2 AC Phase 2	Strom am IGBT 2	40014	1046	1546		yes	yes
29																
30		OffsetW + 62	IGBT 3 RMS Current *1	INT	-32768 - 32767	10	-3276,8 - 3276.7	V	Current IGBT 3 AC Phase 3	Strom am IGBT 3	40015	1047	1547		yes	yes
31																

*1: The voltage is internal a REAL Value. The Origanal REAL Value is multiplied with the ScaleFactor and then turned into a rounded INTEGER Vallue.

13/03/2025
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M. Adnan Akın
SYED ALI
SUTTO

Legend: Changes to last version | Header

Profilbeschreibung:	
Profile description:	

			Source							Medium			Target	Test Date:		
Way:										PN				Testing by changing the value and comparing with customer		
Structurename:			s_profile_freqcon_status_1											working as intended:		
Byte	Bit	QW	Name	Datatyp	Range	Scaling	Resolution	Unit	Description	Beschreibung	Modbus Adress (Standard)	PN-PN Adress (Standard)	I-Device Adress (Standard)	Name	Instance 1	Instance 2	total
0			Statusword	WORD	0 - 65535	no	no	no			40000	1032	1532	Statusword			
	0		available		True/False	no	no	no	"1" means the Inverter is available for setpoint demand	„1" bedeutet verfügbar für OFE-Vorgabe (Sollwert Entladeleistung und Sollwert DV-Abschaltung), d.h. weder „Handbetrieb" noch „gestört" noch „Wartung"	0	0	0				
	1		PRL_active		True/False	no	no	no	PRL is active	PRL Funktion ist aktiv	1	1	1				
	2				True/False	no	no	no			2	2	2				
	3				True/False	no	no	no			3	3	3				
	4				True/False	no	no	no			4	4	4				
	5				True/False	no	no	no			5	5	5				
	6	OffsetW + 64			True/False	no	no	no			6	6	6				
	7				True/False	no	no	no			7	7	7				
1	8				True/False	no	no	no			8	8	8				
	9				True/False	no	no	no									
	10				True/False	no	no	no									
	11				True/False	no	no	no									
	12				True/False	no	no	no									
	13				True/False	no	no	no									
	14				True/False	no	no	no									
	15				True/False	no	no	no									
2																	
3		OffsetW + 66	active_power	INT	-32768 - 32767	10	-3276.8 - 3276.7	kW	actual active power >0 discharge to grid <0 charge from grid	>0 Entladung (nach Wechselrichter-&Ausspeicherverlusten, vor Trafoverlusten); <0: Beladung (vor Wechselrichter-&Einspeicherverlusten, nach Trafoverlusten)	40001	1033	1533		yes	yes	yes
4		OffsetW + 68	reactive_power	INT	-32768 - 32767	10	-3276.8 - 3276.7	KVAr	actual reactive power		40002	1034	1534		yes	yes	yes
5																	
6																	
7		OffsetW + 70	SOC	INT	-32768 - 32767	10	-3276.8 - 3276.7	%	State of charge 0 means storage empty 100 means fully charged	„0%" bedeutet Speicher entleert, „100%" bedeutet Speicher voll, jeweils bezogen auf die nutzbare Speicherkapazität	40003	1035	1535		yes	yes	yes
8																	
9		OffsetW + 72	SOH	INT	-32768 - 32767	10	-3276.8 - 3276.7	%	not used	nicht verwendet	40004	1036	1536		yes	yes	yes
10																	
11		OffsetW + 74	charge_power_max	INT	-32768 - 32767	10	-3276.8 - 3276.7	kW	maximum power demand for charging	Vor Wechselrichter-&Einspeicherverlusten, nach Trafoverlusten, ohne Batterieeigenverbrauch; Die maximale Ladeladeleistung reduziert sich im	40005	1037			yes	yes	yes
12																	
13		OffsetW + 76	discharge_power_max	INT	-32768 - 32767	10	-3276.8 - 3276.7	kW	maximum power demand for discharging	Nach Wechselrichter-&Ausspeicherverlusten, vor Trafoverlusten; Die maximale Entladeladeleistung reduziert sich im Falle technischer	40006	1038			yes	yes	yes
14																	
15		OffsetW + 78	charge_energy	INT	-32768 - 32767	10	-3276.8 - 3276.7	kWh	available charge energy	verfügbare Ladeenergie	40007	1039			yes	yes	yes
16																	
17		OffsetW + 80	discharge_energy	INT	-32768 - 32767	10	-3276.8 - 3276.7	kWh	available discharge energy	verfügbare Entladeenergie	40008	1040			yes	yes	yes
18																	
19		OffsetW + 82	spare								40009	1041					
20																	
21		OffsetW + 84	converter_operating_mode	SINT	0 - 7	1	-3276.8 - 3276.7	no	operating mode: 0 = Idle mode 1 = Charging mode 2 = Hot standby mode 3 = Discharge mode 4 = Cold standby mode 5 = Emergency mode 6 = Power out (blackout) mode 7 = Maintenance access mode		40010	1042					
22																	
23		OffsetW + 86									40011	1043					
24																	
25		OffsetW + 88									40012	1044					
26																	
27		OffsetW + 90									40013	1045					
28																	
29		OffsetW + 92									40014	1046					
30																	
31		OffsetW + 94									40015	1047	1				

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Profilbeschreibung:	Das Profil gibt Statuswerte für übergeordnete Steuer und Regelelnrichtingen wie z.B. Parkregler aus.
Profile description:	The profile outputs status values for higher-level control devices such as parking controllers.

			Source						Description	Beschreibung	Medium			Target	Test Date: 12.01.2023														
Way:											PN				Testing by changing the value and comparing with customer														
Structurename:			s_profile_freqcon_status_1								Modbus Adress (Standard)	PN-PN Adress (Standard)	I-Device Adress (Standard)		working as intended:														
Byte	Bit	QW	Name	Datatyp	Range	Scaling	Resolution	Unit						Name	Instance 1	Instance 2	Instance 3	Instance 4	Instance 5	Instance 6	Instance 7	Instance 8	Instance 9	Instance 10	Instance 11	Instance 12	Instance 13	Instance 14	Instance 15	Instance 16
0			Statusword	WORD	0 - 65535	no	no	no			40000	1032	1532	Statusword															
	0		balancing demand		True/False	no	no	no	Will be active if the converter hasnt balanced for a long time. Customer to either initate balancing through power setpoint or the enable balancing control bit.		...0	...0	...0																
	1		balancing active		True/False	no	no	no	balancing is active	balancing ist aktiv	...1	...1	...1																
	2		Battery rack 1 connected		True/False	no	no	no	battery rack 1 is connected and available for discharging and charging	Batterie 1 ist verbunden mit dem DC-Port	...2	...2	...2																
	3		Battery rack 2 connected		True/False	no	no	no	battery rack 2 is connected and available for discharging and charging	Batterie 2 ist verbunden mit dem DC-Port	...3	...3	...3																
	4		Battery rack 1 error		True/False	no	no	no	battery rack 1 is disconnected and has an error		...4	...4	...4																
	5		Battery rack 2 error		True/False	no	no	no	battery rack 2 is disconnected and has an error		...5	...5	...5																
	6		Smoke detector triggered battery rack 1		True/False	no	no	no	The smoke alarm has triggered. The Inverter switches off. Except for the control energy, all energy sources are disconnected from the Inverter.	Der Rauchmelder hat ausgelöst. Der Umrichter schaltet aus. Dies löst einen Not-Aus des Umrichters aus.Bis auf die Steuerenergie, werden alle Enerie'equellen vom Umrichter getrennt.	...6	...6	...6																
	7	OffsetW + 96	Smoke detector triggered battery rack 2		True/False	no	no	no	The smoke alarm has triggered. The Inverter switches off. Except for the control energy, all energy sources are disconnected from the Inverter.	Der Rauchmelder hat ausgelöst. Der Umrichter schaltet aus. Dies löst einen Not-Aus des Umrichters aus.Bis auf die Steuerenergie, werden alle Enerie'equellen vom Umrichter getrennt.	...7	...7	...7																
1	8		gas alarm battery rack 1		True/False	no	no	no	The gas alarm has triggered. The Inverter switches off. Except for the control energy, all energy sources are disconnected from the Inverter.	Der Gasalarm hat ausgelöst. Der Umrichter schaltet aus. Dies löst einen Not-Aus des Umrichters aus.Bis auf die Steuerenergie, werden alle Enerie'equellen vom Umrichter getrennt.	...8	...8	...8																
	9		gas alarm battery rack 2		True/False	no	no	no	The gas alarm has triggered. The Inverter switches off. Except for the control energy, all energy sources are disconnected from the Inverter.	Der Gasalarm hat ausgelöst. Der Umrichter schaltet aus. Dies löst einen Not-Aus des Umrichters aus.Bis auf die Steuerenergie, werden alle Enerie'equellen vom Umrichter getrennt.																			
	10				True/False	no	no	no																					
	11				True/False	no	no	no																					
	12				True/False	no	no	no																					
	13				True/False	no	no	no																					
	14				True/False	no	no	no																					
	15				True/False	no	no	no																					
2		OffsetW + 98	current_1	INT	-32768 - 32767	10	-3276.8 - 3276.7	A	Current of this Rack		40001	1033	1533		yes	yes	yes	yes	yes	yes	yes								
3																													
4		OffsetW + 100	voltage_1	INT	-32768 - 32767	10	-3276.8 - 3276.7	V	Total voltage of this Rack		40002	1034	1534		yes	yes	yes	yes	yes	yes	yes								
5																													
6		OffsetW + 102	cell_voltage_min_1	INT	-32768 - 32767	10	-3276.8 - 3276.7	V	minimum cell voltage		40003	1035	1535		yes	yes	yes	yes	yes	yes	yes								
7																													
8		OffsetW + 104	cell_voltage_max_1	INT	-32768 - 32767	10	-3276.8 - 3276.7	V	maximum cell voltage		40004	1036	1536		yes	yes	yes	yes	yes	yes	yes								
9																													
10		OffsetW + 106	cell_temp_min_1	INT	-32768 - 32767	10	-3276.8 - 3276.7	degC	minimum temperature		40005	1037																	
11																													
12		OffsetW + 108	cell_temp_max_1	INT	-32768 - 32767	10	-3276.8 - 3276.7	degC	maximum temperature		40006	1038																	
13																													
14		OffsetW + 110	SOC_1	INT	-32768 - 32767	10	-3276.8 - 3276.7	%	state of charge		40007	1039																	
15																													
16		OffsetW + 112	current_2	INT	-32768 - 32767	10	-3276.8 - 3276.7	A	Current of this Rack		40008	1040			yes	yes	yes	yes	yes	yes	yes								
17																													
18		OffsetW + 114	voltage_2	INT	-32768 - 32767	10	-3276.8 - 3276.7	V	Total voltage of this Rack		40009	1041			yes	yes	yes	yes	yes	yes	yes								
19																													
20		OffsetW + 116	cell_voltage_min_2	INT	-32768 - 32767	10	-3276.8 - 3276.7	V	minimum cell voltage		40010	1042																	
21																													
22		OffsetW + 118	cell_voltage_max_2	INT	-32768 - 32767	10	-3276.8 - 3276.7	V	maximum cell voltage		40011	1043																	
23																													
24		OffsetW + 120	cell_temp_min_2	INT	-32768 - 32767	10	-3276.8 - 3276.7	degC	minimum temperature		40012	1044			yes	yes	yes	yes	yes	yes	yes								
25																													
26		OffsetW + 122	cell_temp_max_2	INT	-32768 - 32767	10	-3276.8 - 3276.7	degC	maximum temperature		40013	1045			yes	yes	yes	yes	yes	yes	yes								
27																													
28		OffsetW + 124	SOC_2	INT	-32768 - 32767	10	-3276.8 - 3276.7	%	state of charge		40014	1046			yes	yes	yes	yes	yes	yes	yes								
29																													
30		OffsetW + 126	IGBT 1 temperature	SINT	-128 - 127	1	-128 - 127	°C	Temperature IGBT for this rack	Temperatur IGBT für diesen Batterieschrank	40015	1047	1		no, not read by cu	no, not read by cu	no, not read by cu	no, not read by cu	no, not read by cust	no, not read by cu	no, not read by cu	no, not read by cu	no, not read by cu	no, not read by cu	no, not read by cu	no, not read by cust	no, not read by cu	no, not read by cu	no, not read by custom	no, not read by custo
31			inductor 1 temperature	SINT	-128 - 127	1	-128 - 127	°C	Temperature coil for this rack	Temperatur Drossel für diesen Batterieschrank																			

Ok for all racks

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Profilbeschreibung:	Das Profil dient zur Steueurng des Umrichters.
Profile description:	The converter can be controled over this profile.

			Target							Description	Beschreibung	Medium			Source	Test Date: 12.01.2023	
Way:												PN				Testing by changing the valu	
Structurename:			s_profile_freqcon_control_1									Modbus Adress	PN-PN Adress	I-Device Adress		working as intended:	
Byte	Bit	IW	Name	Datatyp	Range	Scalingfactor	Resolution	Unit				(Standard)	(Standard)	(Standard)	Name	instance 1	instance 2
0			Controlword	WORD	0 - 65535	no	no	no				44000	1000	1500			
	0		Reset		True/False	no	no	no		Reset of errors.	Quittierung von Fehlern.	0	0	0			
	1		Enable pre-heating entire system		True/False	no	no	no		Start the preheating. The cooling is started. The circulation pump, the heat exchanger and, if necessary, the heating are switched on.	Starten des Vorheizens. Die Kühlung wird gestartet. Die Umlaufpunmpe , der Wärmetauscher und ggf. die Heizung werden eingeschaltet.	1	1	1			
	2		Enable pre-charging DC-link		True/False	no	no	no		Start the preload. The intermediate crystals are preloaded and the main switch is switched on.	Starten des Vorladens. Der Zwischenkries wird vorgeladen und der Hauptschalter wird eingeschaltet.	2	2	2			
	3		Enable primary control mode(s)		True/False	no	no	no		Enable to pulse the primary IGBTs. These usually supply the DC link and are connected to the public grid.	Freigabe zum pulsen der primär IGBTs. Diese versorgen i.d.R.den Zwischenkreis und sind mit dem öffentlichen Netz verbunden.	3	3	3			
	4		Enable Balancing DCDC 1		True/False	no	no	no		Enable balancing of this DC port		4	4	4			
	5		Enable Balancing DCDC 2		True/False	no	no	no		Enable balancing of this DC port		5	5	5			
	6		Enable Balancing DCDC 3		True/False	no	no	no		Enable balancing of this DC port		6	6	6			
	7		Enable Balancing DCDC 4		True/False	no	no	no		Enable balancing of this DC port		7	7	7			
1	8		Enable Balancing DCDC 5		True/False	no	no	no		Enable balancing of this DC port		8	8	8			
	9		Enable Balancing DCDC 6		True/False	no	no	no		Enable balancing of this DC port							
	10		Enable Balancing DCDC 7		True/False	no	no	no									
	11		Enable Balancing DCDC 8		True/False	no	no	no									
	12		Enable Balancing DCDC 9		True/False	no	no	no									
	13		Startsignal from EMCS		True/False	no	no	no		Start signal to run the converter; 1 = start; 0 = stop							
	14				True/False	no	no	no									
	15				True/False	no	no	no									
2																	
3		OffsetR + 2	heartbeat signal	WORD	0 - 16383	no		no		Expects a value that changes with each (bus) cycle in the range of (16#1 to 16#FFFF).	Erwartet einen Wordwert der sich mit jedem (Bus) Zyklus ändert im Bereich von (16#1 bis 16#FFFF).	44001	1001	1501			
4		OffsetR + 4	Heartbeat timeout	INT	0..30	1		s		The TimeOut time specifies the time after which a communication error message appears if the heartbeat no longer changes.	Die TimeOutZeit gibt an, nach welcher Zeit eine Kommunikations Fehlermeldung erscheint, wenn sich der Heartbeat nicht mehr ändert.	44002	1002	1502			
5																	
6		OffsetR + 6	request an alarm record	INT	0..500	1		no		Via the variable "request an alarm record" in the profile "Profile Freqcon Con" the error entries 0-500 can be actively queried. Example: "actual records" reports that there are three errors. The second fault should be queried. For this purpose "request an alarm record" =2 is set. With the next processing cycle the error entry is output via the profile "s_profile_freqcon_status_1_struct"	Über die Variabel "request an alarm record" im Profil "Profile Freqcon Con" können die Fehler Einträge 0-500 aktiv abgefragt werden. Beispiel: "actual records" meldet, das drei Störungen vorliegen. Es soll die zweite Störung abgefragt werden. Hierzu wird "request an alarm record" =2 gesetzt. Mit dem nächsten Bearbeitungszyklus wird der Fehlereintrag über das Profil "s_profile_freqcon_status_1_struct" ausgegeben	44003	1003	1503			
7																	
8																	
9		OffsetR + 8	active power	INT	-10000 - 10000	0.0001	-1000.0 - 1000.0	kW		Active power setpoint input to the inverter.	Wirkleistungssollwertvorgabe an den Umrichter.	44004	1004	1504			
10																	
11		OffsetR + 10	reactive power	INT	-10000 - 10000	0.0001	-1000.0 - 1000.0	kVAr		Reactive power setpoint input to the inverter.	Blindleistungssollwertvorgabe an den Umrichter.	44005	1005	1505			
12																	
13		OffsetR + 12										44006	1006	1506			
14																	
15		OffsetR + 14										44007	1007	1507			
16																	
17		OffsetR + 16										44008	1008	1508			
18																	
19		OffsetR + 18										44009	1009	1509			
20																	
21		OffsetR + 20										44010	1010	1510			
22																	
23		OffsetR + 22										44011	1011	1511			
24																	
25		OffsetR + 24										44012	1012	1512			
26																	
27		OffsetR + 26										44013	1013	1513			
28																	
29		OffsetR + 28										44014	1014	1514			
30																	
31		OffsetR + 30										44015	1015	1515			

13/03/2025
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SUTHO ALEXANDRE

Section 4.4 Instrumentation “As-Commissioned” interconnection diagrams

NOT APPLICABLE

Section 4.5 Telecommunication functional test sheets index

NOT APPLICABLE

Section 4.6 Telecommunication
“As-Commissioned” I.C.D. / TSLD's

NOT APPLICABLE

Section 5 SITE / OPERATIONAL

Section 5.1 Operational Test Procedure

Section 5.2 Operational Test Certificates

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

STATUS INDEX DETAIL

Filtered on subsystem: 85-00

Miscellaneous	85-00 BESS Package (A-85000)						
ITEM		TASK					
Code	Description	Location	Code	Form	Progress	Date	Certificate
123A90-PML-COM-PRO-03063	OTP – BESS (CPI)	ONSHORE	C10004630	5300	100	2025-06-28	RFO 2

ITEM	Tag	123A90-PML-COM-PRO-03063 : OTP – BESS (CPI)				Dwg	123A90-PML-COM-PRO-03063
	S/Sys	85-00 : BESS Package (A-85000)				Module	
TASK	code	C10004630		Location	Onshore Activities	User	Rosetti Marino Quality Control
FORM	Process	COMM	Activity OTS	Discipline	Miscellaneous Form 5300		Operational Test Procedure

OTP - OPERATIONAL TEST PROCEDURE

Attached procedure number: 123A90-PML-COM-PRO-03063

Associated subsystems: 85-00

Completion date: 26/06/2025

Comments/Remarks:

	Performed by	☐ WITNESS ☐ REVIEW	☐ WITNESS ☐ REVIEW
	COMMISSIONING DISCIPLINE LEAD	RM COMMISSIONING MANAGER	CPY COMMISSIONING MANAGER
Name	Fabio Sirigu	Anthony Iveson	Martin Taylor
Date	2025-06-27	2025-06-28	2025-06-28
Signature	PROVERLIS Digitaly signed by Fabio Sirigu 2025-06-27T10:55:47.039Z	PROVERLIS Digitaly signed by Anthony Iveson 2025-06-28T06:18:50.367Z	PROVERLIS Digitaly signed by Martin Taylor 2025-06-28T09:27:17.566Z

Base Load Power Hub (BLPH)

OTP – BESS Battery Energy Storage System

Document Number: 123A90-PML-COM-PRO-03063

Document Class: 2

{ DOCUMENT PREPARED IN COLLABORATION WITH CROSSWIND PMT }

01	24/03/2025	Accepted for Construction (AFC)	F. SIRIGU	A. IVESON	M. BRUNELLI
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Rev.	Date	Description	Prepared	Reviewed	Approved

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Revision / Change Log

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00	Issue for Review (IFR)
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HOLDS LIST

No.	Description
1	
2	
3	
4	

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1 INTRODUCTION

1.1 Project Overview

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.

Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.2 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.



Figure 1 - HOLLANDSE KUST NOORD WIND PARK Location Map



Figure 2 - Wind Park Details

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile is located on coordinates E 590719.1, N 5841602.3 and is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

1.3 Project Concept

All components included in the BLPH will be integrated onshore on a topside and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.

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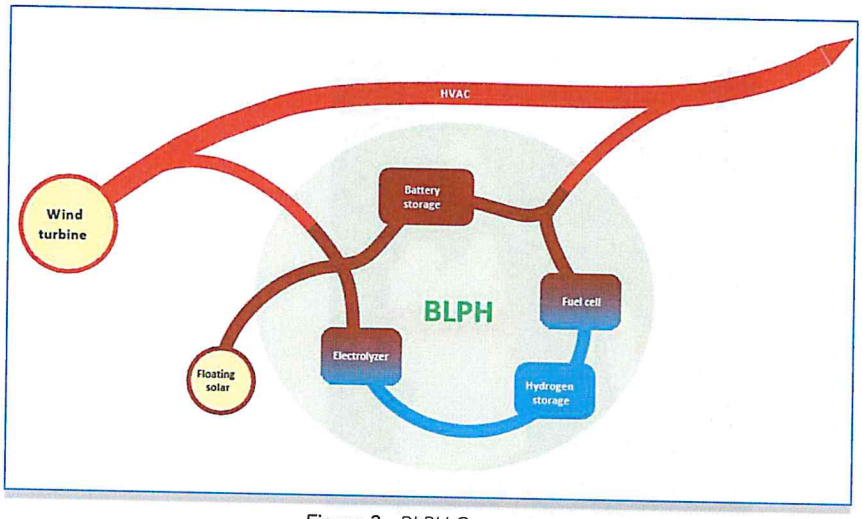


Figure 3 – BLPH Concept

Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.
The purpose of the BLPH is to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

2 DOCUMENT SCOPE

The purpose of this document is to describe the dedicated Commissioning procedure together with the detailed test steps to be implemented for the preparation and execution of the operation testing of the BESS Package.

The document will cover all related test steps to be performed at both the onshore Worksite construction yard and the offshore SITE.

3 OTP SUMMARY

3.1 Test Objective

The operating test of the BESS system is executed to ensure that the system is started up in a safe and controlled manner and to verify the correct operation according to the project requirements.

Aim of this document is to provide the sequence and appropriate actions to test the power connections (400VAC and 6.6kVAC) and main operations of the BESS package.

Please note that Pre-commissioning activities are described in detail in the SAT. For the sake of completeness, these activities will be mentioned here (**Phases 1 & 2**) as part of necessary steps but will not be part of the OTP.

Activities shall be developed as follows:

- Onshore pre-commissioning and commissioning activities at Contractor site (WORKSITE)
  - **PHASE 1**: PCS and BESS containers AUX with power supply from temporary 400V Diesel Generator (from yard 400V supply)/ Energized from TR-200DE1 and 6.6kV Switchboard SG-100D1 via 6,6 kV temporary yard facilities.
  - **PHASE 2**: Test BESS system communication with EMCS system.
  - **PHASE 3**: Complete BESS system connected to 6.6kVAC via 18T1.
  - **PHASE 4**: Integrated function test of BESS package (ONSHORE)

- Offshore commissioning (SITE)
  - **PHASE 5**: Integrated function test of BESS package (OFFSHORE).

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3.2 System Boundary Limits

See below the interested systems and subsystems on the Overall Single Line Diagram

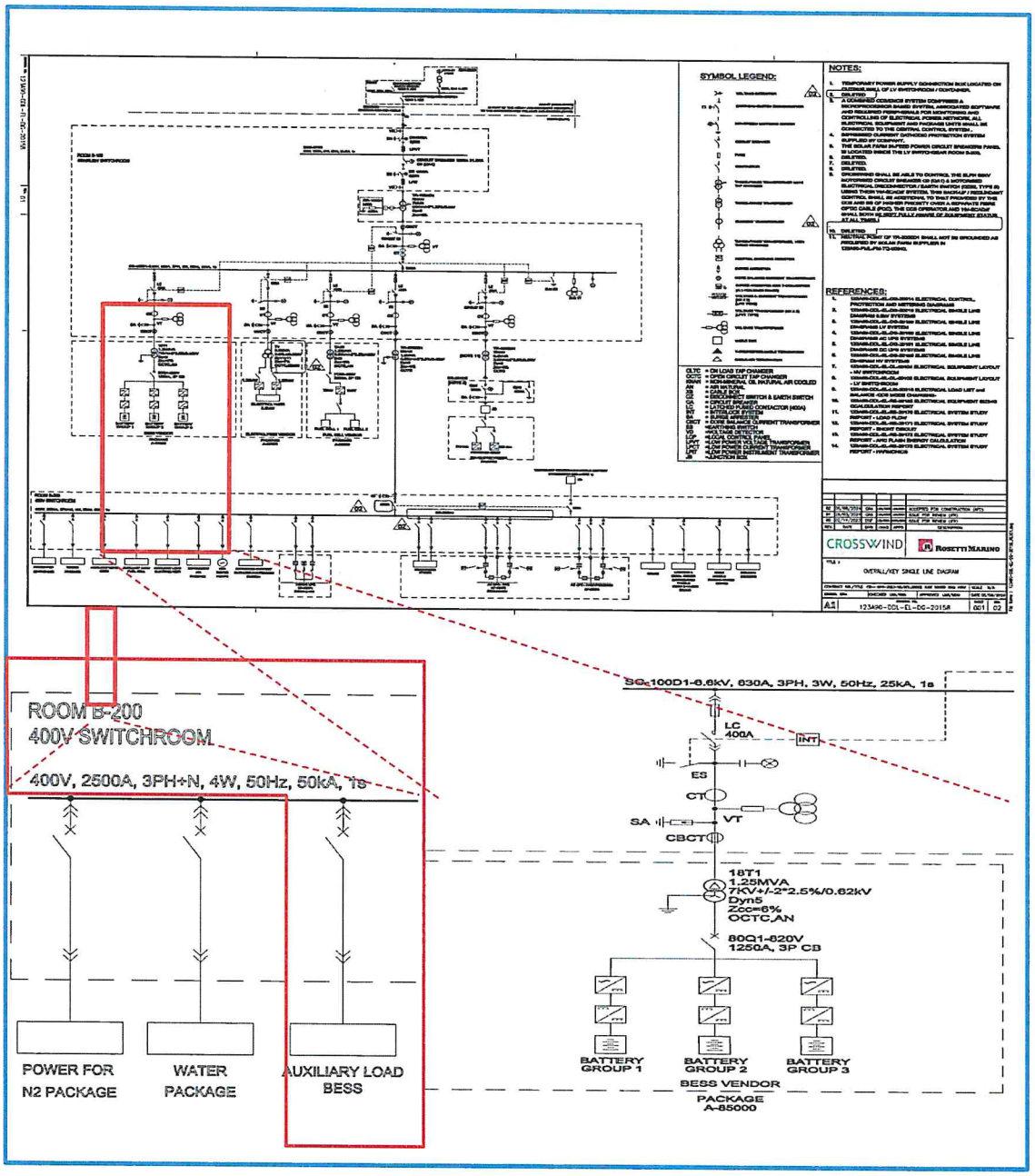


Figure 4 – OTP System Boundary Limits

3.3 Test and System Description

This document is specifically related to the following system:

- 85-00: Battery Energy and Storage System

All equipment must be properly installed in accordance with the following vendor documents:

- K559-2254-CWIWP4202201-E01-001 - Interconnection Diagram
- K559-2254-CWIWP4202201-E03-001 - Panel Cabinet Layout
- K559-2254-CWIWP4202201-E04-001 - Terminal Block Diagrams
- K559-2254-CWIWP4202201-E06-001 - Computer System Documentation
- K559-2254-CWIWP4202201-E07-001 - Control Diagrams
- K559-2254-CWIWP4202201-E08-001 - Electrical Termination & Hook Up Details
- K559-2254-CWIWP4202201-C10-001 - Electrical Schematics
- K559-2254-CWIWP4202201-B01-001 - General Arrangements
- K559-2254-CWIWP4202201-F01-001 - Detail Drawings (all equipment items)

These parts of the system shall be tested on worksite and on site.

Main components of the package:

- PCS (Converter System)
- BESS Container 1
- BESS Container 2

3.4 Safety Devices

- Appropriate Personnel Protective Equipment (PPE) and safety equipment e.g., safety shoes, hand gloves, helmet, earplugs etc. are available and must be used in line with the site requirements.
- For entry into the PCS container under full load, Arc Flash Risk Category 2 PPE must be worn. This consists of:
  - Arc Rated clothing (AR long sleeve shirt with AR trousers or AR coveralls, AR hood/face shield/balaclava.
  - Hearing protection with inserts.
  - Heavy duty leather gloves.
  - Leather footwear

  This is in addition to all normal PPE in line with site requirements.
- Warning safety signs are to be posted with restricted access to essential personnel only.
- Adequate firefighting equipment.

3.5 HSE Management

All necessary safety precautions must be taken to avoid any risk for personnel injury.

- All personnel involved in this operational test shall be competent for the tasks they will be required to undertake
- Place safety / warning signs and segregate the entire area with barrier tapes (safety barriers) of a colour distinguished (blue and white) from those used for construction activities
- Restrict access into area only to authorized personnel
- Conduct "Toolbox Talk" with all personnel prior to starting test work
- Appropriate Personnel Protective Equipment (PPE) and safety equipment e.g. safety shoes, hand gloves, helmet, earplugs etc. are available and must be used in line with the site requirements

- All activities carried out on the project shall be performed in accordance with the "Permit to Work" system Doc. PRO-HSE-23
- Electrical and mechanical isolations are to be assured as per Doc. PRO-HSE-08 and "Commissioning and start-up operation" procedure.
- Observe and enforce all international codes and regulations to safeguard personnel, plant and environment.
- Ensure that the working area is clean, tidy, well illuminated and that access and escape routes are free from obstructions.

Before starting work on any of the activities in this OTP it is the responsibility of the persons performing the work to:

- Familiarize themselves with the plant/equipment to be worked on
- Ensure they are aware of all other work activities that are taking place, or due to take place
- If necessary, re-plan any situation/activity
- Ensure proper communications between parties involved in the execution of the OTP
- Read the relevant Vendor documentation for the equipment covered by this OTP and observe any special requirements and limitations recommended or imposed by Vendor
- Verify that all personnel involved in the implementation of this procedure are familiar with its content as well as the associated safety requirements (Toolbox Talk)

3.6 Acceptance Criteria

Before Power ON:
Visual inspection and verification are a crucial step to identify any obvious issues with the installation, such as loose connections, missing components, or damage to the equipment.

Crosschecking the installation with engineering documentation ensures that the installation is done correctly and according to the manufacturer's guidelines. These steps can help identify any missing or incorrect components, and wrong connections - – Refer to SAT chapters 4.3, 4.4, 4.5, 4.6, 5.3, 5.4.
Apply padlocks on all feeder Breakers, the incomer breakers and on auxiliary MCB as per LOTO Procedure.

Applicable panels:

- 400 V Switchboard & Connection Box (SG-200N1)
- BESS package PCS Ctrl1, Ctrl2 & Converter
- Battery cabinets 1-11 in BESS1 and BESS2 containers

Powering ON the unit is an essential step to verify that the equipment is functioning correctly. Observing if everything is OK and any alarm will help detect possible errors or malfunctions.

Phase 1 will prove correct: (not part of OTP Scope)

- Energization of the AUX circuits is successful; all the subsystems are working according to specification.
- All necessary Software updates are performed and the package internal communication within the BMS is proven successful.
- The safety critical functions integrated in the BESS package are working according to specification.

Phase 2 will prove correct: (not part of OTP scope)

- The communication with the EMCS.

Phase 3 will prove correct:

- Functionality of power converters units.
- BESS package operability and response to commands (Charge/Discharge).

Phase 4 will prove correct:

- Functionality of the BESS package in coordination with the other packages on BLPH.

Phase 5 will prove correct:

- Functionality of the BESS package in coordination with the other packages on BLPH (OFFSHORE).

Performing the steps in this OTP as per engineering documents is crucial to ensure that the equipment is operating correctly and that it meets the desired design specifications. Observing the results will help identify any issues that may arise during the operation.

Overall, following these steps shall provide a comprehensive and effective way to verify the equipment installation and functionality.

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4 DOCUMENTS REFERENCES AND ABBREVIATIONS

4.1 Reference Documents

4.1.1 Company Documents and Standards

Document ID	Document Title
[1] K559-2254-CG-PHI-001	Commissioning Philosophy
[2] K559-2254-EL-ELL-002	BLPH Electrical Load List (CCS MODE 2(A) 'HOT STANDBY')
[3] K559-2254-EL-ELL-003	BLPH Electrical Load List (CCS MODE 3(C) 'DISCHARGING')
[4] K559-2254-EL-ELL-004	BLPH Electrical Load List (CCS MODE 4(A) 'COLD STANDBY')
[5] K559-2254-EL-ELL-005	BLPH Electrical Load List (CCS MODE 4A(D) 'EMERGENCY MODE (Island))
[6] K559-2254-EL-ELL-006	BLPH Electrical Load List (CCS MODE 5(D) 'POWER OUT (Blackout))
[7] K559-2254-PR-PHI-001	Main process control philosophy

Table 1: Company Documents and Standards

4.1.2 Project Documents

Document ID	Document Title
[1] 123A90-PML-PM-LIS-01001	Master Document Register
[2] 123A90-PML-PM-PL-00001	Project Execution Plan
[3] 123A90-PML-QHSE-PL-00001	Project HSE Plan
[4] 123A90-PRO-HSE-23	RM Yard Permit To Work Procedure
[5] 123A90-PML-COM-PL-03002	Mechanical Completion & Commissioning Execution Plan
[6] 123A90-PML-COM-PRO-03007	Commissioning Strategy
[7] 123A90-PML-COM-LIS-03011	System/Sub-Systems List
[8] 123A90-PML-COM-LIS-03012	System/Sub-System Boundary Limit Diagrams
[9] 123A90-PML-COM-PRO-03038	Leak Test Procedure
[10]123A90-PML-COM-SP-03032	Pre-Commissioning Functional Test Sheet Template Collection (ITR-B)
[11]123A90-PML-COM-SP-03014	Commissioning TDS - Temporary Equipment & Facilities
[12]123A90-PML-COM-PRO-03019	OTP – Onshore Performance & Integrated Test Procedure
[13]123A90-PML-COM-LIS-03034	Inhibit-Override Register
[14]123A90-PML-COM-LIS-03035	PSV Calibration Register

Document ID	Document Title
[15]123A90-PML-COM-PRO-03036	OTP - Black Start Procedure
[16]123A90-PML-COM-LIS-03024	Commissioning Spare Parts and Consumables List
[17]123A90-PML-COM-PRO-03022	Initial offshore START-UP procedures
[18]123A90-PML-COM-SP-03057	Worksite WEF (Work Execution Flow Scheme)
[19]123A90-PML-COM-SP-03058	Site WEF (Work Execution Flow Scheme)
[20]123A90-PML-COM-RE-03001	Commissioning Final Dossier (ITR-B)
[21]123A90-PML-QHSE-PRO-00116	Flushing and Cleaning Procedures
[22]123A90-PML-QHSE-SP-00118	Mechanical Completion Check Sheet Template Collection (ITR-A)
[23]123A90-PML-QHSE-RE-00115	Mechanical Completion Final Dossier (ITR-A)
[24]123A90-PML-QHSE-PRO-00117	Punch list Management Procedure
[25]123A90-PML-COM-PRO-03041	OTP - Hydrogen Storage & Venting Systems
[26]123A90-PML-COM-PRO-03042	OTP - Sea Water Intake & Fresh Water Treatment Systems
[27]123A90-PML-COM-PRO-03043	OTP - Instrument Air System
[28]123A90-PML-COM-PRO-03055	OTP - Nitrogen Generation System
[29]123A90-PML-COM-PRO-03044	OTP - HVAC Systems
[30]123A90-PML-COM-PRO-03045	OTP - HV Switchgear & 66 kV Transformer Systems
[31]123A90-PML-COM-PRO-03046	OTP - 6.6 kV Switchgear & Transformer Systems
[32]123A90-PML-COM-PRO-03047	OTP - LV Switch Boards & LV Distribution Board Systems
[33]123A90-PML-COM-PRO-03048	OTP - Lighting & Small Power Systems
[34]123A90-PML-COM-PRO-03049	OTP - Electrical Heat Tracing Systems
[35]123A90-PML-COM-PRO-03050	OTP - UPS Systems
[36]123A90-PML-COM-PRO-03051	OTP - Data Network Systems
[37]123A90-PML-COM-PRO-03052	OTP - Telecom & Surveillance Systems
[38]123A90-PML-COM-PRO-03053	OTP - Navaid System
[39]123A90-PML-COM-PRO-03054	OTP - F&G and ESD C&E Logics
[40]123A90-PML-QHSE-PRO-00120	Proverlis Management Procedure
[41]123A90-PML-COM-PRO-03056	OTP – Document Template
[42]123A90-DDL-IN-RE-40095	Process Control Logics Description

Table 1: Reference Project Deliverables

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4.1.3 Vendor Documents

Document ID	Document Title
[1] 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh	Overall Schematics
[2] 23A2007 BLPH BESS complete system	GA drawing as build
[3] 10354_23A2007_240911	Operating and maintenance manual
[4] 23A2007_240708_FAT_BESS_Converter_EN_v2.0_Signed	FAT report
[5] 23A2007_240628_PROFINET_Register BESS_V1_0_0_3	Profinet interface list
[6] 23A2007_241030_SAT_BESS_EN_v2.0	SAT protocol

Table 2: Vendor Reference Documentation

4.2 Acronyms and Abbreviations

Acronyms / Abbreviations	Description
BESS	Battery Energy Storage System
BLPH	Base Load Power Hub
CO	Carbon monoxide
EMCS	Electrical Monitoring & Control System
ESD	Emergency Stop Devices
FAT	Factory Acceptance Test
F&G	Fire and Gas
FTE	Full Time Employees
ITR	Inspection & Test Record
LOTO	Lock Out Tag Out
PCS	Power Conversion System
OTP	Operational Test Procedure
PPE	Personal Protective Equipment
SAT	Site Acceptance Test
SOC	State Of Charge

Table 3: Acronyms and Abbreviations

5 OTP AT ONSHORE WORKSITE

This chapter refer to the activities on the Contractor worksite (construction yard).

5.1 Planning and Manpower

5.1.1 Planned tasks with estimated manpower

Estimated manpower for the different phases of the OTP are:

- 2 Vendor FTE.
- 1 Commissioning Supervisor from Company
- 1 Commissioning Supervisor from Contractor
- 1 Operator from EMCS vendor
- 1 Operations Engineer from Company.

5.1.2 Test duration estimate

The test duration should be as follows:

- 3 days approx.

5.1.3 Vendor Assistance

Vendor Freqcon GmbH will lead and/or supervise the onshore commissioning activities. For offshore commissioning Freqcon GmbH will provide remote support.

5.1.4 Items Postponed to C&E OTP.

- *Not Applicable.*

5.1.5 Summary of items HARDWIRED to be tested: -

- *Not Applicable*

5.1.6 Summary of items HARDWIRED and PROFINET to be tested: -

Signal Tag:	*Signal Description:*
85-XA-001	*Confirmed gas (H2 Detection in BESS)*
85-XA-002	*Confirmed Smoke (Smoke detection in PCS)*
85-XA-003	*PLC fault*
85-XA-004	*Confirmed Thermal Runaway (temperature, CO, Smoke detection in BESS)*
85-XS-001	*Shut down to BESS*
HW SIGNAL 1	*Grid status island condition (HV C/B OPEN)*
HW SIGNAL 2	*Permissive – allow incoming 6.6kV C/B to Close*
HW SIGNAL 3	*6.6kV Grid phase voltage (PTT stotz QV2)*
HW SIGNAL 4	*6.6kV Bus phase voltage (PTT stotz QV4)*
HW SIGNAL 5	*Permissive – BESS to switch to grid forming mode*
MODBUS	*Refer to MODBUS interface list (23A2007_240628_PROFINET_Register BESS_V1_0_0_3)*

Table 4: Items HARDWIRED and MODBUS to be tested

5.2 OTP Test Requirements – Onshore WORKSITE

5.2.1 Pre-Commissioning Achievement

Prior to commencement of commissioning activities, the relevant pre-commissioning SAT steps should be fully signed i.e. Phases 1-3 as described earlier in section 3.1)

5.2.2 Commissioning Achievement

The commissioning achievement will be the full successful operation, functionality and integration of the BESS package installed on BLPH.

- 82-10 Power Transformer 1.25 MVA (1BT1 BESS)
- 85-00 BESS Package (A-85000

5.2.3 Status of Required Associated Subsystems

- PHASE 3

Subsystems required RFC for Commissioning of BESS Package

- 83-00 400V Switchboard SG200N1
- 83-00 Auxiliary power supply
- 83-20 Distribution board
- 88-00: Earthing System
- 83-99: Temporary Yard 400/230V Main and auxiliary power supplies
- 82-00: MV 6.6 kV Switchboard (SG-100D1)
- 82-10: Power Transformer 1.25 MVA
- 82-99: MV 6.6 kV Temporary Yard Supply Integrated Test

- PHASE 4

Subsystems required RFC for Commissioning of BESS Package

- 83-00 400V Switchboard SG200N1
- 83-00 Auxiliary power supply
- 83-20 Distribution board
- 88-00: Earthing System
- 83-99: Temporary Yard 400/230V Main and auxiliary power supplies
- 87-00: EMCS
- 87-10: PCS
- 82-00: MV 6.6 kV Switchboard (SG-100D1)
- 82-10: Power Transformer 1.25 MVA
- 82-99: MV 6.6 kV Temporary Yard Supply Integrated Test
- 70-00: F&G Control System

- PHASE 5

Subsystems required RFC for OFFSHORE Commissioning of BESS Package

- 83-00 400V Switchboard SG200N1
- 83-00 Auxiliary power supply
- 83-20 Distribution board
- 88-00: Earthing System
- 87-00: EMCS
- 87-10: PCS
- 82-00: MV 6.6 kV Switchboard (SG-100D1)

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- 82-10: Power Transformer 1.25 MVA
- 70-00: F&G Control System
- 81-20: Power Transformer 7 MVA (TR-100AD1)
- 81-10: GIS 66 kV (HNA6-AFA70)
- 81-00: 66 kV Subsea Cable

5.2.4 Special Tools & Test Equipment

The following special tool and Test Equipment are required (see vendor document 1723002197-EL-LIS-00053):

- Voltage, frequency, continuity tester (Multimeter)
- Service Laptop for remote connection to UCP (monitoring & control)
- Test gas/smoke spray for CO, H2 & smoke
- LOTO Equipment

TESTING & MEASUREMENT INSTRUMENT USED			
Type	Serial N.	Calibration certificate	Validity

5.2.5 Consumable List

- Not Applicable.

5.2.6 Commissioning Spare Parts

5 spare battery modules will be available during the ONSHORE commissioning activities for quick replacement if required.
Note – check to confirm their availability required.

5.2.7 Temporary Facilities

Phase 4: Temporary emergency stop and/or fire and gas detection may be required if deemed necessary after suitable risk assessment. This will depend on the availability of interacting sub-systems.

5.3 OTP Description – Onshore WORKSITE

5.3.1 OTP Test Preparation

Step	Description	Result	Verified by	Date
1	System Ready for Commissioning Certificate (RFC) is issued and approved.	issued	A SUTTO	27/06/25
2	No Mechanical Completion or Pre-commissioning punch list 'A' items are outstanding against the system to be commissioned.	ok	A SUTTO	27/06/25

Step	Description	Result	Verified by	Date
3	Factory Acceptance Test Procedure has been carried out successfully (refer to Doc. 23A2007_240708_FAT_BESS_Converter_EN_v2.0_Signed)	issued on Apr 25	A SUTTO	27/06/25
4	All personnel involved in the implementation of this procedure are familiar with its content as well as with associated safety requirements (Toolbox Talk to be conducted before initiation of activities).		A SUTTO	27/06/25
5	A final walkdown of the system has been completed, to ensure that the system and the area are ready for commissioning.		A SUTTO	27/06/25
6	Check that areas are free for work and escape routes are clear of any obstructions.		A SUTTO	27/06/25
7	All safety barriers and warning signs have been installed.		A SUTTO	27/06/25
8	Ensure that proper communications have been established between parties involved in the implementation of the procedure.		A SUTTO	27/06/25
9	Verify availability of test equipment and spares as per section 5.2.		A SUTTO	27/06/25
10	With reference to Commissioning Temporary equipment & Facilities (refer on Doc. 123A90-PML-COM-SP-03014), check that power is available to any temporary equipment or test equipment (if any).		A SUTTO	27/06/25
11	System(s) isolations as per LOTO procedure defined within HSSE Permits to Work and Commissioning procedures duly prepared and approved		A SUTTO	27/06/25
12	All yard personnel have been duly notified by dedicated LUN (Livening Up Notification) that the system(s) is ready for commissioning.	LUN 011	A SUTTO	27/06/25

5.3.2 Electrical Preparation

Step	Description	Result	Verified by	Date
1	Check related punch list 'B' items and confirm acceptability for start of commissioning activities.	OK	A SUTTO	27/06/25
2	Verify that all relevant associated systems / subsystems are completed.	Ok	A SUTTO	27/06/25
3	Check that grounding and bonding are in accordance with applicable documents.	Ok	A SUTTO	27/06/25
4	Verify and confirm the correct circuit breaker protection settings according to latest protection study revision.	Ok	A SUTTO	27/06/25

Step	Description	Result	Verified by	Date
5	Verify and confirm the completion of the final connections between the LV 400V Switchboard and the BESS, the MV 6.6kV and BESS and the EMCS.	OK	ASUTTO	27/06/25
6	Assess the need for additional temporary F&G or E-Stop protection during ONSHORE phases and implement necessary changes.	TEMP F&G sounder was in place before final comm. of F&G system	ASUTTO	27/06/25

5.3.3 Mechanical Preparation

- Not applicable.

5.3.4 Instrument Preparation

Step	Description	Result	Verified by	Date
1	Check related punch list 'B' items and confirm acceptability for start of commissioning activities.		ASUTTO	27/06/25
2	Verify that all relevant associated systems / subsystems are ready.	OK	ASUTTO	27/06/25
3	Check Inhibit and Override register has been prepared and validated.		ASUTTO	27/06/25
4	Verify that relevant equipment/ components are available and in operation for start of commissioning activities.	OK	ASUTTO	27/06/25
5	Verify availability of test equipment as per section 5.2.4.	OK	ASUTTO	27/06/25

5.3.5 Piping Preparation

- Not applicable

5.3.6 Additional Discipline Preparation

- Not applicable.

5.4 OTP Test Steps – Onshore WORKSITE - PHASES 1 & 2

The previous chapters must be successfully performed prior to commissioning of the BESS Battery Energy Storage System Package.

Please refer to SAT document 23A2007_241030_SAT_BESS_EN_v2.0 ***sections 1 to 6*** for Phase 1 & 2 pre-commissioning Onshore activities.

5.4.1 OTP Steps WORKSITE - PHASE 3

It is foreseen that previous sections are successfully performed.

Please refer to SAT document 23A2007_241030_SAT_BESS_EN_v2.0 ***section 7*** for Phase 3 commissioning Onshore activities.

5.4.2 OTP Steps WORKSITE - PHASE 4

It is foreseen that previous sections are successfully performed.

In the following steps the functionality of the BESS package shall be tested for operation in all BLPH operating modes.

5.4.2.1 BESS Integrated Testing ONSHORE

Step	Description	Result	Verified by	Date
BESS operating modes to be controlled from PCS via ECMS.				
1	Ensure that EMCS parameter **Available Energy for charging**, tag *Profile_converter_status_3, charge_energy*, is set at the minimum allowable range of ~~54kW~~. 300 kW		F Surian	26/6/25
2	Confirm on PCS that CCS operating mode is in "IDLE". Confirm BESS Package is charging at 54kW.	SEE NOTES SH. 25	F Surian	26/6/25
3	Adjust EMCS parameter **Available Energy for charging**, tag *Profile_converter_status_3, charge_energy,* to the following values: a. 200 kW b. 400 kW c. 600 kW d. 800 kW e. 1 MW At each value confirm that BESS charges correspondingly.	POWER STEPS TESTED DURING RESEARCH MODE TESTING	F Surian	26/6/25
4	On PCS, change CCS operating mode to "IMPORT". Confirm no change at BESS.	SEE NOTES SH. 25	F Surian	26/6/25
5	On PCS, change CCS operating mode to "HOT STANDBY". Confirm BESS is now Ready to Operate.	SEE NOTES SH. 25	F Surian	26/6/25
6	Ensure that EMCS parameter **Available Energy for discharging**, tag *Profile_converter_status_3, discharge_energy*, is set at the minimum allowable range of ~~54kW.~~ 300 kW		F Surian	26/6/25

Step	Description	Result	Verified by	Date
7	On PCS, change CCS operating mode to "EXPORT". Confirm BESS commences discharge of power at 54kW	SEE NOTES SH.25	FBURGH	26/6/25
8	Adjust EMCS parameter **Available Energy for discharging**, tag *Profile_converter_status_3, discharge_energy*, to the following values: a. 200 kW b. 400 kW c. 600 kW d. 800 kW e. 1 MW At each value confirm that BESS discharges correspondingly.	POWER STEPS TESTED DURING RESEARCH MODE TESTING	FBURGH	26/6/25
9	On PCS, change CCS operating mode to "COLD STANDBY". Confirm BESS ceases discharge of power.	SEE NOTES SH.25	FBURGH	26/6/25
10	On PCS, change CCS operating mode to "EMERGENCY (Island Mode)". Confirm BESS recommences discharge of power.	TO BE TESTED DURING O IT		
11	On PCS, change CCS operating mode to "MAINTENANCE". Confirm BESS can only be operated locally.			
12	On PCS, return CCS operating mode to "EXPORT". Initiate BESS F&G event via agreed method and confirm successful shutdown of system.	SEE NOTES SH.25	FBURGH	26/6/25
BESS operations while in "EMERGENCY (Island Mode)".				
13	While in "EMERGENCY (Island Mode)" BESS shall support all ongoing operation. The electrical protections shall be tested to ensure they are able to clear any fault. Platform side A second set of configurations have been selected for Emergency mode and tested during controller FAT. The thresholds are identified in the attachment B of the coordination study (doc v 123A90-DDL-EL-RE-20168)			

Step	Description	Result	Verified by	Date
	BESS side 1. Configure the current limit of BESS converter, to a current that can be driven during OTP Phase 4. This current can and will be lower than the rated current (suggested 200A – depends on load bank). 2. Configure the Time after the converter shall trip (suggested 250ms). 3. Bring the system to Emergency (island) mode 4. Increase the load until the specified current (limit) is reached and the converter is starting to limit the current. 5. When current limit is reached after nominated time period, confirm the Converter is switched off and the CB is tripped. The test is passed if the converter trips after the specified time.			

Full details of the EMCS HMI control graphics can be found in Document Number: **123A90-DDL-EL-SP-20039 Functional and Technical Design Specification, IDS and DDS for Electrical Monitoring and Control System (EMCS)**

5.4.2.2 BESS Integrated Testing ONSHORE Notes and Remarks

- SET EMCS IN AUTOMATIC MODE
- SIMULATE HNA5 POWER >1 <2 MW
  - → EMCS TRANSITION TO IMPORT NOT ABLE TO CHARGE (1B)
  - → BESS START, NOT CHARGING
- SIMULATE HNA5 POWER <1 MW
  - → EMCS TRANSITION TO EXPORT (3)
  - → BESS DISCHARGE LIMITED TO 0,3 MW - FC START RAMPUP TO 0,3 MW & BESS RAMP DOWN TO 0 MW
- SIMULATE BESS MIN ~~SOC~~ THRESHOLD AT 64% + H2 VESSEL ~~FULL~~ EMPTY
  - → BESS DISCHARGED DOWN AT 64%
  - → EMCS TRANSITION TO COLD STAND-BY (4) → BESS STOP DISCHARGE
- RESTORED BESS MIN SOC THRESHOLD AT 20%
- SIMULATE HNA5 POWER > 2MW
  - → EMCS TRANSITION TO IMPORT ABLE TO CHARGE (1A)
  - → BESS CHARGE LIMITED TO 0,3 MW
- SIMULATE HNA5 POWER > 46 MW
  - → EMCS STARTS ELECTROLYSER AT FULL POWER
- SIMULATE BESS MAX SOC THRESHOLT AT 65% + VESSEL ~~EMPTY~~ FULL
  - → BESS CHARGED UP TO 65%
  - → EMCS TRANSITION TO HOT STAND-BY (2) → BESS STOP CHARGE
- RESTORED BESS MAX SOC THRESHOLD AT 90%
- SIMULATE HNA5 POWER ≥1 <2 MW
  - → EMCS TRANSITION TO IMPORT NOT ABLE TO CHARGE (1B)
- SIMULATE HNA5 FAULT
  - → ECMS TRANSITION TO IDLE MODE (0)
  - → BESS ~~STA~~ CHARGE LIMITED AT 0,3 MW

FIRIGM 26/6/25

NOTE = FC, ELECTR, H2 STORAGE SIMULATED IN EMCS SOFTWARE

BESS MAX CHARGE/DISCHARGE POWER AT 300 KW

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File: 123A90-PML-COM-PRO-03063

5.4.2.3 BESS Integrated Testing ONSHORE - Certifying Authority Table of Attendances

Name and Surname	Certifying Authority	Position	Signature
~~FABIO SIRIGU~~			

5.4.2.4 BESS Integrated Testing ONSHORE - Final Signatures and Company Acceptance

Name and Surname	Company Representative	Position	Signature
ALESSANDRO SUTTO	CROSSWIND	BESS LEAD	
FABIO SIRIGU	ROSETTI MARINO	LEAD AUT COMM	
RAMESH MURTHI	FREQCON		

5.5 Post-test Conditions

Throughout Phase 1 to 4, AUX power shall be maintained active to ensure monitoring of the package and functionality of its safety features.
All other sub-systems shall be de-energized and, if deemed necessary, LOTO.
Between Phase 4 and 5, battery modules shall be kept at circa 30% SOC to ensure safe transport between the onshore and offshore site.
No AUX power will be provided during sea transport.

5.6 Reinstatement and Preservation Tasks

Generally, the system/ sub-system shall be reinstated at its initial condition; and the following activities must be carried out as minimum:

- all inhibition performed for the test shall be removed (as per Inhibit / Override List)
- all equipment/devices shall be returned in healthy functional conditions.

6 OTP AT SITE

6.1 Planning and Manpower

6.1.1 Offshore Site overview

It is expected that all precommissioning tests, systems energization and commissioning steps will have been successfully performed during the Onshore Phases.
Consequently, during the offshore SITE phase, the respective systems will be inspected prior to re-energization. No additional test steps will be required on these items of equipment, correct operation and functioning will be verified.

6.1.2 Planned tasks with estimated manpower

Estimated manpower for the entire duration of the Test:

- 1 Commissioning Supervisor from Contractor
- 1 Commissioning Supervisor from Company
- 1 Operator from EMCS vendor
- 1 Operations Engineer from Company.

6.1.3 Test duration estimate

The test duration should be as follows:

- 3 days approx.

6.1.4 Vendor Assistance

- For offshore commissioning Freqcon GmbH will provide remote support.

6.1.5 Items Postponed to C&E OTP

- Not Applicable

6.1.6 HOLDS

- Not Applicable

6.2 OTP Test Requirements – Offshore SITE

6.2.1 Pre-Commissioning Achievement

- Not applicable

6.2.2 Commissioning Achievement

The commissioning achievement will be the full successful operation, functionality and integration of the BESS package installed on BLPH.

The successful commissioning result, achieved during the WORKSITE commissioning phase for the functionality and safeguard of the BESS Battery Energy Storage System, will allow for a smoother commissioning phase of the offshore SITE.

6.2.3 Status of Required Associated Subsystems

The systems and subsystems involved:

- 83-00 400V Switchboard SG200N1
- 83-00 Auxiliary power supply
- 83-20 Distribution board
- 88-00: Earthing System
- 87-00: EMCS
- 87-10: PCS
- 82-00: MV 6.6 kV Switchboard (SG-100D1)
- 82-10: Power Transformer 1.25 MVA
- 70-00: F&G Control System
- 81-20: Power Transformer 7 MVA (TR-100AD1)
- 81-10: GIS 66 kV (HNA6-AFA70)
- 81-00: 66 kV Subsea Cable

6.2.4 Special Tools & Test Equipment

The following special tool and Test Equipment may be required

- Voltage, frequency, continuity tester (Multimeter)
- Service Laptop for remote connection to UCP (monitoring & control)
- Test gas/smoke spray for CO, H2 & smoke

TESTING & MEASUREMENT INSTRUMENT USED			
Type	Serial N.	Calibration certificate	Validity

6.2.5 Consumable List

- Not applicable

6.2.6 Commissioning Spare Parts

A number of spare battery modules will be made available during the OFFSHORE commissioning activities for quick replacement if required.
Note – check to confirm their availability if required.

6.2.7 Temporary Facilities

- Not applicable

6.3 OTP Description – SITE

The SITE test will consist of a repeat of the onshore integration testing with the BLPH now installed situ to it's permanent connections. In the following steps the functionality of the BESS package shall be tested for operation in all BLPH operating modes.

6.3.1 OTP Test Preparation

Step	Description	Result	Verified by	Date
1	System Ready for Operation ((RFO) from ONSHORE) Certificate is issued and approved.			
2	No blocking punch list items are outstanding against the system to be commissioned.			
3	System(s), (de)isolations as per LOTO procedure enclosed within commissioning Work Permits procedures prepared and approved			
4	Verify and confirm that all steps performed at WORKSITE of this procedure are completed without any pending issues that would prevent from proceeding with the offshore SITE PROCEDURE			
5	All personnel involved in the implementation of this procedure are familiar with this procedure as well as with associated safety requirements (Toolbox Talk to be conducted before initiation of activities).			
6	A final walkdown after hook-up of the system has been completed, any preservation items have been removed and to ensure that the system and the area are ready for energization.			
7	Check that areas are free for work and escape routes are clear of any obstructions.			
8	Ensure that proper communications have been established between parties involved in the implementation of the procedure.			
9	Verify availability of test equipment and consumables as per chapters 6.2.4.			
10	All personnel have been duly notified during dedicated daily SIMOPS meetings that the system(s) is ready for operation.			

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6.3.2 Electrical Preparation

Step	Description	Result	Verified by	Date
1	No blocking punch list items are outstanding against the system to be commissioned.			
2	Review and confirm no changes are required to be performed on existing protection settings.			
3	Verify that all relevant associated systems / subsystems are ready			

6.3.3 Mechanical Preparation

- Not applicable.

6.3.4 Instrument Preparation

- Not applicable.

6.3.5 Piping Preparation

- Not applicable

6.3.6 Additional Discipline Preparation

- Not applicable.

6.4 OTP Test Steps – Offshore PHASE 5

The previous chapters must be successfully performed prior to final operational test of the BESS Battery Energy Storage System

6.4.1.1 BESS Integrated Testing OFFSHORE

Step	Description	Result	Verified by	Date
	BESS operating modes to be controlled from PCS via ECMS.			
1	Ensure that EMCS parameter **Available Energy for charging**, tag *Profile_converter_status_3, charge_energy*, is set at the minimum allowable range of 54kW.			
2	Confirm on PCS that CCS operating mode is in "IDLE". Confirm BESS Package is charging at 54kW.			

3	Adjust EMCS parameter **Available Energy for charging**, tag *Profile_converter_status_3, charge_energy,* to the following values: a. 200 kW b. 400 kW c. 600 kW d. 800 kW e. 1 MW At each value confirm that BESS charges correspondingly.			
4	On PCS, change CCS operating mode to "IMPORT". Confirm no change at BESS.			
5	On PCS, change CCS operating mode to "HOT STANDBY". Confirm BESS is now Ready to Operate.			
6	Ensure that EMCS parameter **Available Energy for discharging**, tag *Profile_converter_status_3, discharge_energy*, is set at the minimum allowable range of 54kW.			
7	On PCS, change CCS operating mode to "EXPORT". Confirm BESS commences discharge of power at 54kW			
8	Adjust EMCS parameter **Available Energy for discharging**, tag *Profile_converter_status_3, discharge_energy,* to the following values: a. 200 kW b. 400 kW c. 600 kW d. 800 kW e. 1 MW At each value confirm that BESS discharges correspondingly.			
9	On PCS, change CCS operating mode to "COLD STANDBY". Confirm BESS ceases discharge of power.			
10	On PCS, change CCS operating mode to "EMERGENCY (Island Mode)". Confirm BESS recommences discharge of power.			
11	On PCS, change CCS operating mode to "MAINTENANCE". Confirm BESS can only be operated locally.			
12	On PCS, return CCS operating mode to "EXPORT". Initiate BESS F&G event via agreed method and confirm successful shutdown of system.			

Full details of the EMCS HMI control graphics can be found in Document Number: **123A90-DDL-EL-SP-20039 Functional and Technical Design Specification, IDS and DDS for Electrical Monitoring and Control System (EMCS)**

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6.4.1.2 BESS Integrated Testing OFFSHORE Notes and Remarks

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6.4.1.3 BESS Integrated Testing OFFSHORE - Certifying Authority Table of Attendances

Name and Surename	Certifying Authority	Position	Signature

6.4.1.4 BESS Integrated Testing OFFSHORE - Final Signatures and Company Acceptance

Name and Surname	Company Representative	Position	Signature
Name and Surename	**Certifying Authority**	**Position**	**Signature**

6.5 Post-test Conditions

After functional tests have been completed, system / sub-systems are left in healthy and safety condition and operational.

6.6 Reinstatement tasks

Generally, the system/ sub-system shall be reinstated at its initial condition; and the following activities must be carried out as minimum:

- all inhibition done for the test shall be removed (as per Inhibit / Override List)
- all equipment/devices shall be returned in healthy functional conditions.

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7 APPENDICES

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7.1 Vendor SAT Procedure

Please refer to 23A2007_241030_SAT_BESS_EN_v2.1

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7.2 Proverlis Summary System Reports

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7.3 Equipment Related Technical Queries

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7.4 As Built Documentation

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7.5 Management of Change – Summary Table of Tasks and Details of Affected Related Documentation

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Section 6 PIPING AND VESSEL PREPARATION

Section 6.1 Final Mechanical / Vessel Inspection Checks Index

NOT APPLICABLE

Section 6.2 Leak Test / Drying / Inerting Test Sheets Index

NOT APPLICABLE

Section 6.3 Chemical Loading & First Fill records Index

NOT APPLICABLE

Section 6.4 Chemical Cleaning Reports and Records Index

NOT APPLICABLE

Section 6.5 Lubrication Schedule

NOT APPLICABLE

Section 7 VENDOR

Section 7.1 Vendor Package Summary Index

NOT APPLICABLE

Section 7.2 SAT Procedure with associated punch list and reference (Front Page)

NOT APPLICABLE

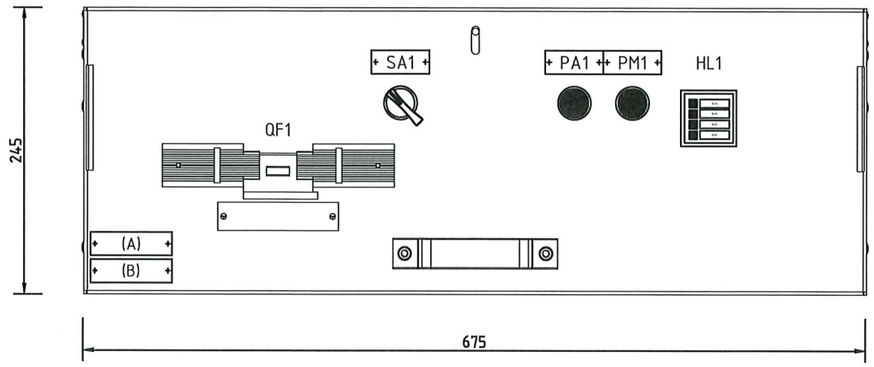
Section 7.3 Vendor Spares & Special Tools lists references

NOT APPLICABLE

Section 7.4 Vendor Data / Operations / Maintenance Manuals References

DOOR FRONT LAY-OUT

TYPICAL : LINE FEEDER "LK1-n"

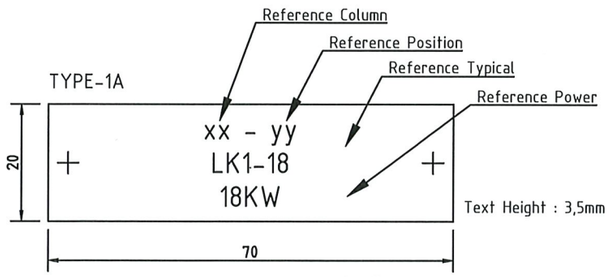


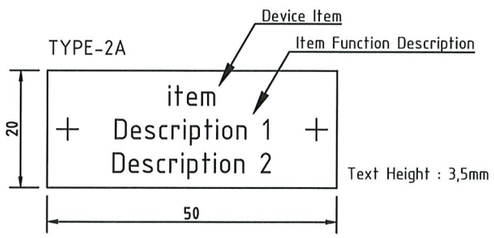
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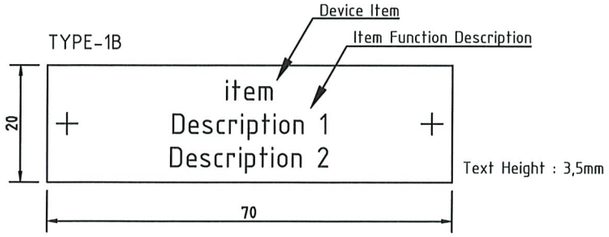
A) IDENTIFICATION name plate (type-1A) , with :
- Drawer position [Column / Position inside SWB]
- Typical name [reference applicability typical used]
- Power [reference applicability typical used]

B) USER name plate (type-1B), with :
- Item User [to see SLD diagrams]
- User Description [to see SLD diagrams]

DEVICES name plate			
ITEM	DESCRIPTION 1	DESCRIPTION 2	NOTE
QF1	Circuit Breaker		NO plate
SA1	LOC-REM	SELECTOR	Type-2A
PA1	STOP	MOTOR	Type-2A
PM1	RUN	MOTOR	Type-2A
HL1	Multiled	Signalling	NO plate







AS COMMISSIONED : NAOWA GIROW
26/3/25
NO MARK UP

VALID FOR CONSTRUCTION
VENDOR DOCUMENT - FDL DWG:
123A90-FDL-1724002197-EL-DG-00031
REV.: 2_A | DATE: 18/03/25 | SIGNATURE: G.Randi
ROSETTI MARINO SpA

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

= TYPICAL
+ LK-x
DWG n° : 231298/SD/31
Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

TITLE : "SG-200N1"
LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS
Door Front Lay-Out - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

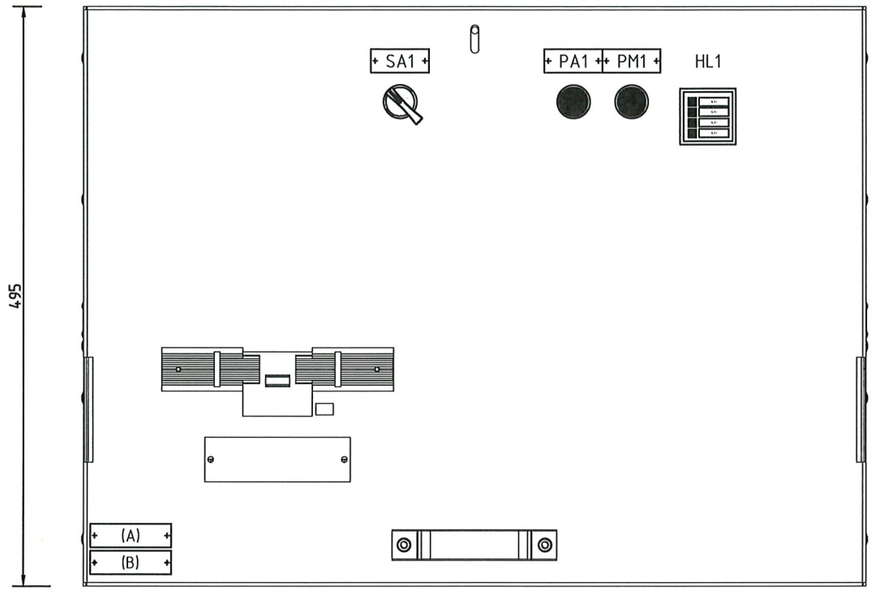
A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 034 | REV. 02

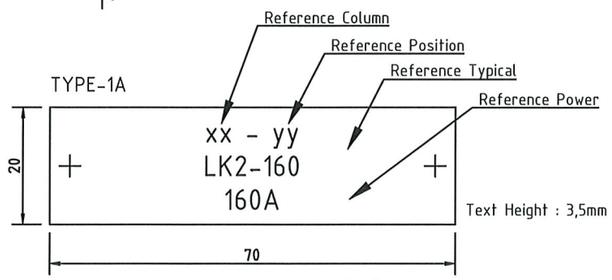
F.to UNI A3: 420mmx297mm

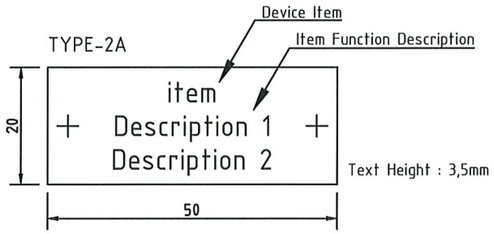
File Name : 1723002197-EL-DG-00031 Rev. 02

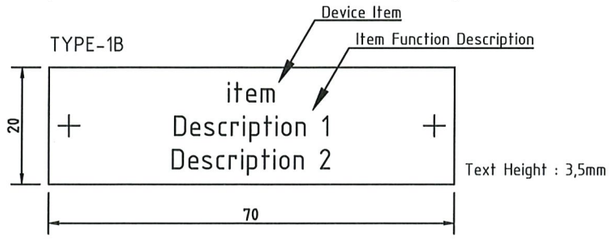
DOOR FRONT LAY-OUT

TYPICAL : LINE FEEDER "LK2-n"









NOTE :

A) IDENTIFICATION name plate (type-1A) , with :
- Drawer position [Column / Position inside SWB]
- Typical name [reference applicability typical used]
- Power [reference applicability typical used]

B) USER name plate (type-1B), with :
- Item User [to see SLD diagrams]
- User Description [to see SLD diagrams]

DEVICES name plate			
ITEM	DESCRIPTION 1	DESCRIPTION 2	NOTE
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SA1	LOC-REM	SELECTOR	Type-2A
PA1	STOP	MOTOR	Type-2A
PM1	RUN	MOTOR	Type-2A
HL1	Multiled	Signalling	NO plate

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24/3/25
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REV.: 2_A | DATE: 18/03/25 | SIGNATURE: G.Randi
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DWG n° : 231298/SD/31
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LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS
Door Front Lay-Out - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 035 | REV. 02

File Name : 1723002197-EL-DG-00031 Rev. 02

F.to UNI A3: 420mmx297mm

USERS LEGEND

TYPICAL : LINE FEEDER "LK1-n" "LK2-n"

TYPICAL APPLICABILITY					
ITEM	ITEM TAG	DESCRIPTION TAG	REFERENCE POSITION (written on name name plate "type-1A)	REFERENCE NOMINAL CURRENT C.B. TRIP UNIT (written on name name plate "type-1A)	REFERENCE TYPICAL (written on name name plate "type-1A)
1	SPARE	SPARE	A2 / +05	40A	LK1-40
2	SPARE	SPARE	A3 / +02	40A	LK1-40
3	DP-200N1	DB-LIGHTING & SMALL POWER BoP	A3 / +03	100A	LK1-100
4	JB-200E3	CRANE	A3 / +04	63A	LK1-63
5	SPARE	SPARE	A3 / +05	40A	LK1-40
6	JB-500E8	WATER PACKAGE	A3 / +08	160A	LK2-160
7	B100-HSB-001	HVAC PANELS HV ROOM	A4 / +02	40A	LK1-40
8	A-80000	FUELL CELL AUXIALIRY LOAD	A4 / +03	63A	LK1-63
9	CP-850F03	BESS PCS CABINET	A4 / +04	40A	LK1-40
10	SPARE	SPARE	A4 / +05	40A	LK1-40
11	SPARE	SPARE	A4 / +06	40A	LK1-40
12	K-63001-A	INSTRUMENTS AIR PACKAGE 01A	A4 / +08	160A	LK2-160
13	SPARE	SPARE	A5 / +01	40A	LK1-40
14	B200-HSB-001	HVAC PANELS - LV ROOM	A5 / +02	40A	LK1-40
15	B300-HSB-001	HVAC PANELS - UPS ROOM	A5 / +03	63A	LK1-63
16	B400-HSB-001	HVAC PANELS - ITER	A5 / +04	63A	LK1-63
17	CN-200N1	IMPRESSED CURR. CATHODIC PROTECTION (ICCP) SYSTEM	A5 / +05	40A	LK1-40
18	SPARE	SPARE	A5 / +06	40A	LK1-40
19	K-63001-B	INSTRUMENTS AIR PACKAGE 01B	A5 / +08	160A	LK2-160
20	CP-850E1	BESS LV1 CABINAT (+DISTR 1)	A6 / +02	40A	LK1-40
21	CP-850E2	BESS LV2 CABINAT (+DISTR 2)	A6 / +03	40A	LK1-40
22	SPARE	SPARE	A6 / +04	40A	LK1-40

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24/3/25
NO MARK UP

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123A90-FDL-1724002197-EL-DG-00031
REV.: 2_A | DATE: 18/03/25 | SIGNATURE: G.Randi
ROSETTI MARINO SpA

CROSSWIND

IMESA ELECTRICAL ENGINEERING

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DWG n° : 231298/SD/31
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TITLE : "SG-200N1"
LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS
Users Legend - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 036 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

ITEMS ACRONYM

TYPICAL : LINE FEEDER "LK1-n" "LK2-n"

Composition of Typical :

LK-x = Common Parts
LK1-"nn" or LK2-"nn"= Specific Parts

Example for Composition of LK1-63:
- to take "LK-x" plus "LK1-63"

Example for Composition of LK2-160:
- to take "LK-x" plus "LK2-160"

	ACRONYM ITEMS (Comun parts)	ACRONYM ITEMS (Specific parts)					
	LK-x	LK1-40 (In=40A) (Current Trip Unit)	LK1-63 (In=63A) (Current Trip Unit)	LK1-100 (In=100A) (Current Trip Unit)	LK2-160 (In=160A) (Current Trip Unit)		
ASSOCIATED TYPICAL	This Item include all devices that are comun for both "Specific Parts" Items	This Items include only devices that are detail for "Specific Parts" Items					
LK1-40	X	X					
LK1-63	X		X				
LK1-100	X			X			
LK2-160	X				X		
-							

AS COMMISSIONED: NATWA GIRGIN
24/3/25
NO MARK UP

VALID FOR CONSTRUCTION
VENDOR DOCUMENT - FDL DWG:
123A90-FDL-1724002197-EL-DG-00031

REV.:	DATE:	SIGNATURE:
2_A	18/03/25	G.Randi

ROSETTI MARINO SpA

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

= TYPICAL
+ LK-x

DWG n° : 231298/SD/31
Item n° : PF1002983/26

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1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

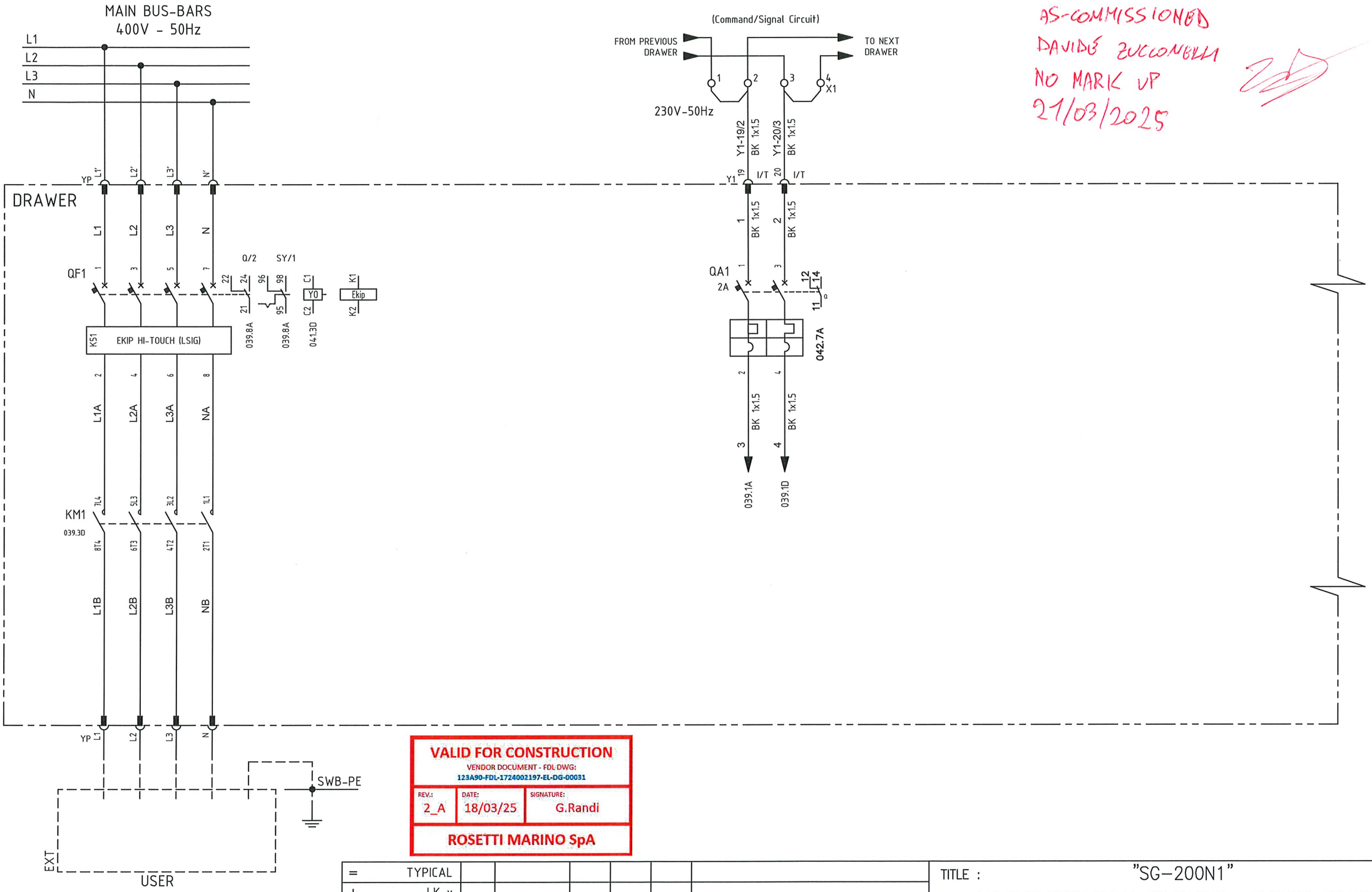
TITLE : "SG-200N1"
LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS
Items Acronym - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 037 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02



AS-COMMISSIONED
DAVIDE ZUCCONELLI
NO MARK UP
21/03/2025

VALID FOR CONSTRUCTION
VENDOR DOCUMENT - FDL DWG:
123A90-FDL-1724002197-EL-DG-00031

REV.:	DATE:	SIGNATURE:
2_A	18/03/25	G.Randi

ROSETTI MARINO SpA

=	TYPICAL
+	LK-x

DWG n° : 231298/SD/31
Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

IMESA ELECTRICAL ENGINEERING

CROSSWIND

ROSETTI MARINO

TITLE : "SG-200N1"
LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS
Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK

SCALE : NTS

A3

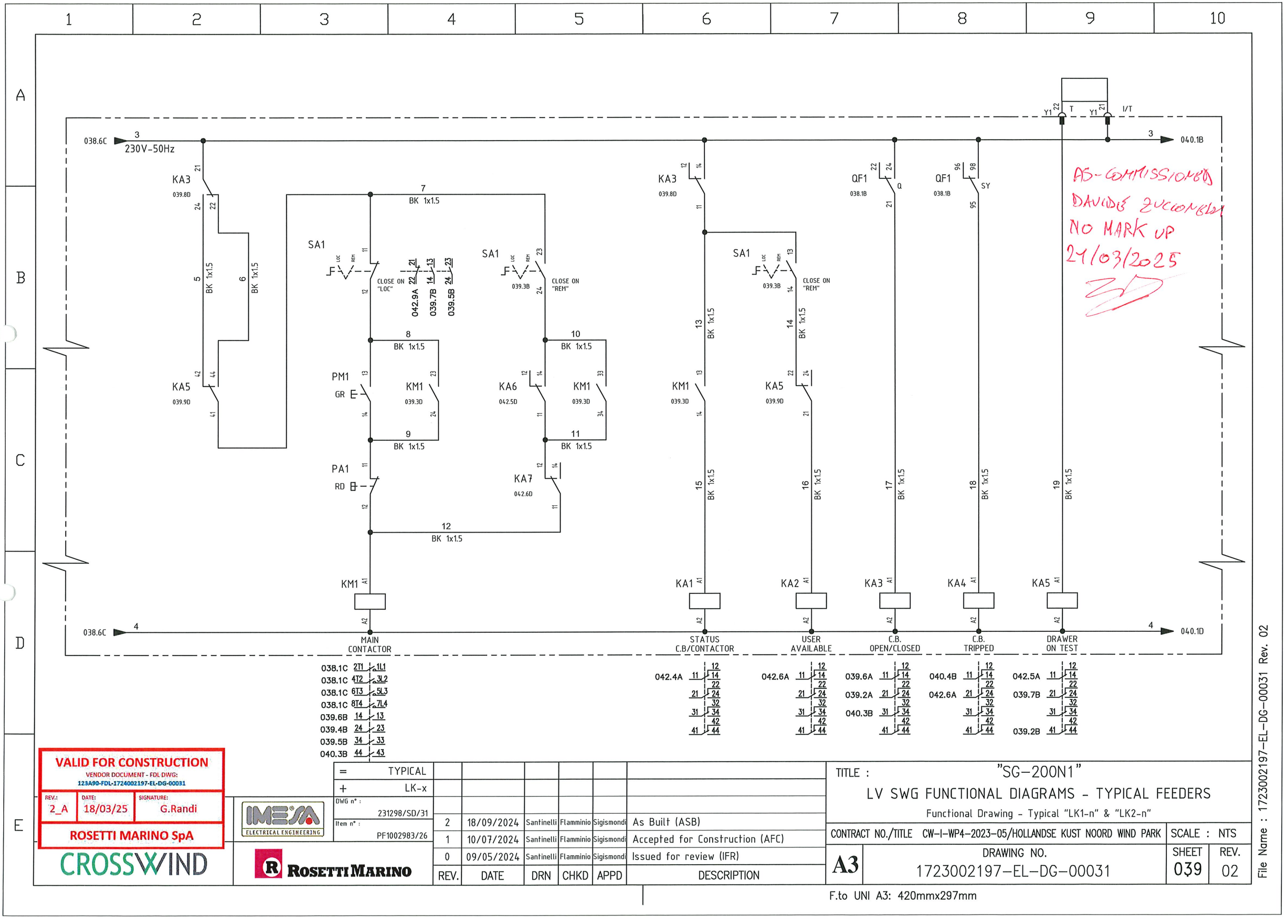
DRAWING NO. 1723002197-EL-DG-00031

SHEET 038

REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02



VALID FOR CONSTRUCTION
VENDOR DOCUMENT - FDL DWG:
123A90-FDL-1724002197-EL-DG-00031

REV.:	DATE:	SIGNATURE:
2_A	18/03/25	G.Randi

ROSETTI MARINO SpA

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

= TYPICAL
+ LK-x
DWG n° : 231298/SD/31
Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
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0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

TITLE : "SG-200N1"
LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS
Functional Drawing - Typical "LK1-n" & "LK2-n"

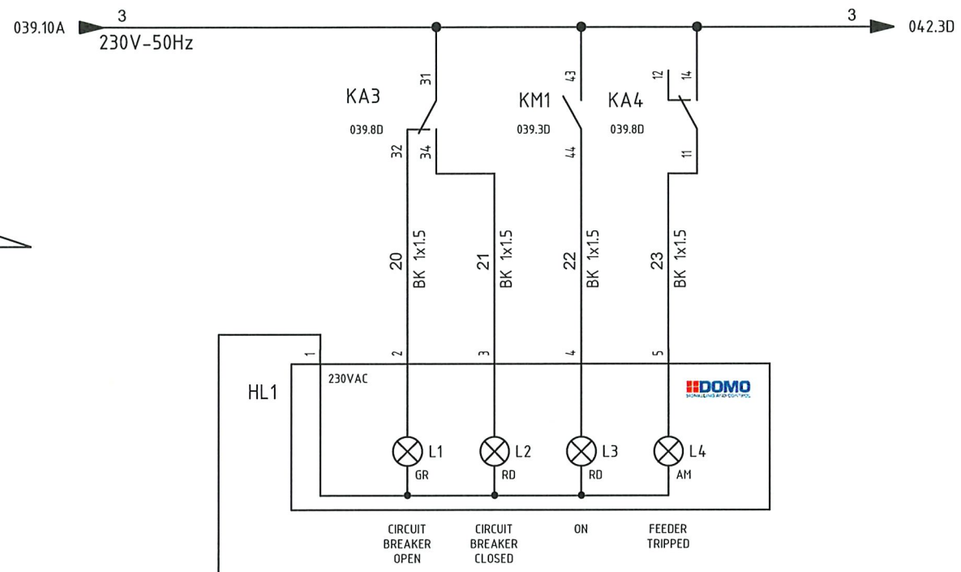
CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 039 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

AS-COMMISSIONED
DAVIDE ZUCCONELLI
NO MARK UP
27/03/2025



VALID FOR CONSTRUCTION
VENDOR DOCUMENT - FDL DWG:
123A90-FDL-1724002197-EL-DG-00031

REV.:	DATE:	SIGNATURE:
2_A	18/03/25	G.Randi

ROSETTI MARINO SpA

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

=	TYPICAL
+	LK-x
DWG n° :	231298/SD/31
Item n° :	PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

TITLE : "SG-200N1"
LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS
Functional Drawing - Typical "LK1-n" & "LK2-n"

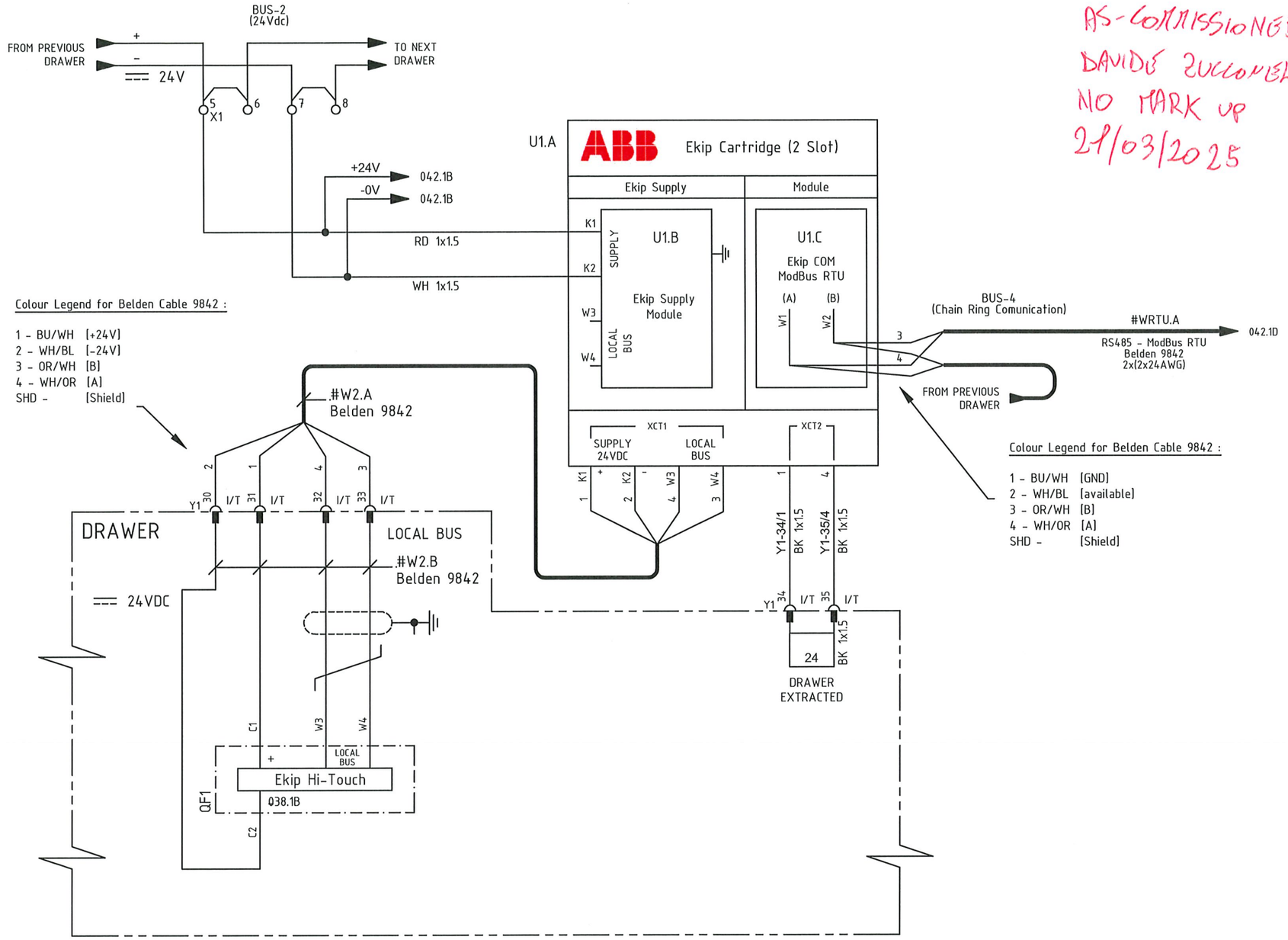
CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 040 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

AS-COMMISSIONED
DAVIDE ZUCCONELLI
NO MARK UP
21/03/2025



VALID FOR CONSTRUCTION
VENDOR DOCUMENT - FDL DWG:
123A90-FDL-1724002197-EL-DG-00031
REV.: 2_A | DATE: 18/03/25 | SIGNATURE: G.Randi
ROSETTI MARINO SpA

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

=	TYPICAL						
+	LK-x						
DWG n° :	231298/SD/31						
Item n° :	PF1002983/26						
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)		
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)		
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)		
REV.	DATE	DRN	CHKD	APPD	DESCRIPTION		

TITLE : "SG-200N1"
LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS
Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 041 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

AS-COMMISSIONED
DAVIDE ZUCCOMELLI
NO MARK UP
21/03/2025

DRAWER

C.B. - CONTACTOR CLOSED & INSERTED
C.B. - CONTACTOR OPEN OR DISCONNECTED
CIRCUIT BREAKER TRIPPED
FEEDER AVAILABLE
INTERNAL FAULT
USER ON LOCAL

KA1 039.6D
KA5 039.9D
KA4 039.8D
KA2 039.7D
QA1 038.6B
SA1 039.3B
CLOSE ON "LOC"

+25 RD 1x1.5 · +26 RD 1x1.5 · +27 RD 1x1.5 · +28 RD 1x1.5 · +29 RD 1x1.5 · +30 RD 1x1.5 · +31 RD 1x1.5 · +32 RD 1x1.5

Y1 14 I/T · 5 I · 15 I/T · 3 E · 4 E · 16 I/T · 10 I/T · 8 I/T · 9 I/T · 36 I/T · 37 I/T

Y1-14/9 BK 1x1.5 · Y1-5/10 BK 1x1.5 · Y1-15/11 BK 1x1.5 · Y1-16/12 BK 1x1.5 · Y1-10/13 BK 1x1.5 · Y1-9/14 BK 1x1.5 · Y1-36/15 BK 1x1.5 · Y1-37/19 BK 1x1.5

AVAILABLE

+103 RD 1x1.5 · +104 RD 1x1.5 · +105 RD 1x1.5 · +106 RD 1x1.5 · +107 RD 1x1.5 · +108 RD 1x1.5 · +115 RD 1x1.5 · +116 RD 1x1.5 · +117 RD 1x1.5 · +118 RD 1x1.5

041.4A +24V
041.4A -0V
=== 24V

U2.A
AC+ AC- PE
+/L -/N PE
10÷40Vdc - 19÷29Vac SUPPLY
Z-PC-DINAL2-17.5
Modbus RTU RS485
B(-) A(+) GND SHD
B/L A/H GND SHD
3 4 1 SHD
041.9B
TO NEXT DRAWER
BUS-4 (Chain Ring Comunication)

U2.B
+16V 0V IN-1 IN-2 IN-3 IN-4 IN-5
INPUT
SENECA AUTOMATION INTERFACES
MODULE I/O
Z-5DI-2DO
ID = 01
OUTPUT
DO-1 DO-2

U2.C
+16V 0V IN-1 IN-2 IN-3 IN-4 IN-5
INPUT
SENECA AUTOMATION INTERFACES
MODULE I/O
Z-5DI-2DO
ID = 02
OUTPUT
DO-1 DO-2

Colour Legend for Belden Cable 9842 :

1 - BU/WH [GND]
2 - WH/BL [available]
3 - OR/WH [B]
4 - WH/OR [A]
SHD - [Shield]

109 BK 1x1.5 · 110 BK 1x1.5 · 111 BK 1x1.5 · 112 BK 1x1.5 · 113 BK 1x1.5 · 114 BK 1x1.5

Y1-11/20 BK 1x1.5 · Y1-12/21 BK 1x1.5 · Y1-13/22 BK 1x1.5

Y1 11 I/T · 12 I/T · 13 I/T

DRAWER

040.5B 3 230V-50Hz

KA6 A1 33 · KA7 A1 34

040.5D 4

KA6 A2 CONTACTOR CLOSE COMMAND
KA7 A2 CONTACTOR OPEN COMMAND

KA6 039.5B · KA7 039.5C

VALID FOR CONSTRUCTION
VENDOR DOCUMENT - FDL DWG:
123A90-FDL-1724002197-EL-DG-00031
REV.: 2_A | DATE: 18/03/25 | SIGNATURE: G.Randi
ROSETTI MARINO SpA

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

= TYPICAL
+ LK-x
DWG n° : 231298/SD/31
Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

TITLE : "SG-200N1"
LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS
Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK
SCALE : NTS
A3
DRAWING NO. 1723002197-EL-DG-00031
SHEET 042
REV. 02

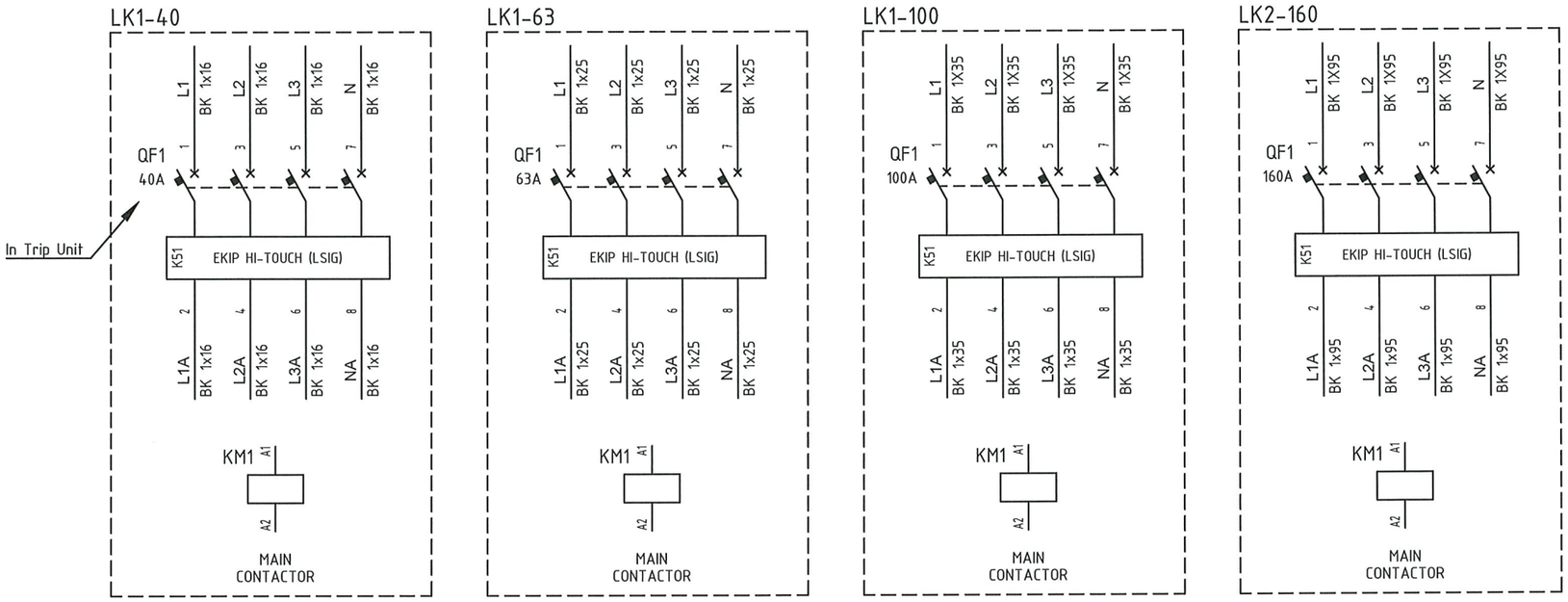
F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

SPECIFIC PARTS

TYPICAL : LINE FEEDER "LK1-n" "LK2-n"

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21/03/2025



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VENDOR DOCUMENT - FDL DWG:
123A90-FDL-1724002197-EL-DG-00031
REV.: 2_A | DATE: 18/03/25 | SIGNATURE: G.Randi
ROSETTI MARINO SpA

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

= TYPICAL
+ LK-x
DWG n° : 231298/SD/31
Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
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TITLE : "SG-200N1"
LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS
Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 043 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

TYPICAL - LK-x - Y1

AUXILIARY SOCKET
136450/001 (PF – 2 pcs) + 136458/004 (PM – 2 pcs)

N° PIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
JUMP			●	●				●	●																																			
RACKED-OUT			✕	✕				✕	✕																																			
TEST								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
RACKED-IN					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
PIN USED			042.5B	042.5B	042.4B			042.6B	042.7B	042.6B	042.5D	042.5D	042.6D	042.3B	042.4B	042.6B			038.6A	038.6A	039.9A	039.9A								041.3C	041.3C	041.4C	041.4C	041.6C	041.7C	042.7B	042.9B							

← FIELD WHIT "X" - CONTACT CLOSE WHEN DRAWER IS IN RACKED-OUT POSITION
← FIELD WHIT "X" - CONTACT CLOSE WHEN DRAWER IS IN TEST POSITION
← FIELD WHIT "X" - CONTACT CLOSE WHEN DRAWER IS IN RACKED-IN POSITION

← CROS-REFERENCE USED PIN

AS COMMISSIONED
DAVIDE ZUCCONELLI
NO MARK UP
21/03/2025

VALID FOR CONSTRUCTION
VENDOR DOCUMENT - FDL DWG:
123A90-FDL-1724002197-EL-DG-00031
REV.: 2_A | DATE: 18/03/25 | SIGNATURE: G.Randi
ROSETTI MARINO SpA

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

= TYPICAL
+ LK-x
DWG n° : 231298/SD/31
Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
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TITLE : "SG-200N1"
LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS
Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 044 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

TYPICAL - LK-x X1					
NumM	Fg.	Sez.	Tipo	Descrizione	Costruttore
			BT003	BT/3 End bracket	Cabur
1	038.5A	2.5	HD100GR_	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
2	038.6A	2.5	HD100GR_	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
3	038.6A	2.5	HD100GR_	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
4	038.6A	2.5	HD100GR_	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
5	041.3A	2.5	HD100GR_	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
6	041.3A	2.5	HD100GR_	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
7	041.4A	2.5	HD100GR_	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
8	041.4A	2.5	HD100GR_	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
			HD101GR	HMD/PT/GR End section - Grey	Cabur
9	042.3B	2.5	HD400GR_	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
10	042.4B	2.5	HD400GR_	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
11	042.4B	2.5	HD400GR_	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
12	042.5B	2.5	HD400GR_	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
13	042.6B	2.5	HD400GR_	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
14	042.7B	2.5	HD400GR_	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
15	042.7B	2.5	HD400GR_	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
16	042.7B	2.5	HD400GR_	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
17	042.8B	2.5	HD400GR_	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
18	042.8B	2.5	HD400GR_	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
19	042.9B	2.5	HD400GR_	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
20	042.5C	2.5	HD400GR_	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
21	042.5C	2.5	HD400GR_	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
22	042.6C	2.5	HD400GR_	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
23	042.9C	2.5	HD400GR_	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
24	042.9C	2.5	HD400GR_	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
25	042.10C	2.5	HD400GR_	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur
			HD201GR	HMD.1/PT/GR End section - Grey	Cabur
			BT003	BT/3 End bracket	Cabur

AS-COMMISSIONED
DAVIDE ZUCCHINELLI
NO MARK UP
21/03/2025

VALID FOR CONSTRUCTION
VENDOR DOCUMENT - FDL DWG:
123A90-FDL-1724002197-EL-DG-00031
REV.: 2_A | DATE: 18/03/25 | SIGNATURE: G.Randi
ROSETTI MARINO SpA

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

= TYPICAL
+ LK-x
DWG n° : 231298/SD/31
Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
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0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

TITLE : "SG-200N1"
LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS
Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 045 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

Nome/Item	Fg/Sh	Tipo/Type	Q.ta/Q.ty	Descrizione/Description	Costruttore/Manufacturer	Quadro (descrizione)
HL1	040	ML22/484L230STLTTR	1	MULTILED 48x48 - 4 LED - Vaux=230Vac/dc + LAMP TEST + TROP	DOMO	TYPICAL LK-x
KA1	039	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
KA2	039	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
KA3	039	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
KA4	039	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
KA5	039	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
KA6	042	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
KA7	042	ER 592 6	1	CR-M230AC4L SUPPLY 230VAC 4C/O 250V/6A LED	ABB	TYPICAL LK-x
		ER 609 8	1	CR-MH HOLDER FOR CR-M RELAY	ABB	TYPICAL LK-x
		ER 686 6	1	CR-M4SS SOCKET STANDARD X 2/4 C/O(CR-M)	ABB	TYPICAL LK-x
PA1	039	KW 075 2	1	MP1-10R PUSH BUTTON RED WITH BLACK RING	ABB	TYPICAL LK-x
		EO 569 7	1	MCBH-00 FIXING SUPPORT 3 CONTACTS	ABB	TYPICAL LK-x
		EO 571 3	2	MCB-01 CONTACT NC FOR PUSHBUTTOM	ABB	TYPICAL LK-x
PM1	039	KW 076 0	1	MP1-10G PUSH BUTTON GREEN WITH BLACK RING	ABB	TYPICAL LK-x
		EO 569 7	1	MCBH-00 FIXING SUPPORT 3 CONTACTS	ABB	TYPICAL LK-x
		EO 570 5	2	MCB-10 CONTACT NO FOR PUSHBUTTONS	ABB	TYPICAL LK-x
QA1	038	S550239	1	S202M C 2 AUTOMATIC CIRCUIT BREAKER 10KA 2P	ABB	TYPICAL LK-x
		A563819	1	S2-CS/H6R AUXILIARY STATE CONTACT 1CO	ABB	TYPICAL LK-x
SA1	039	KW 329 3	1	M2SS2-10B HANDLE SELECTOR 2P 90° BLACK RING BLACK	ABB	TYPICAL LK-x
		EO 569 7	1	MCBH-00 FIXING SUPPORT 3 CONTACTS	ABB	TYPICAL LK-x
		EO 570 5	2	MCB-10 CONTACT NO FOR PUSHBUTTONS	ABB	TYPICAL LK-x
		EO 571 3	2	MCB-01 CONTACT NC FOR PUSHBUTTOM	ABB	TYPICAL LK-x
U1.2	041	1SDA074173R1	1	MODUL EKIP SUPPLY 24÷48VDC	ABB	TYPICAL LK-x
U1.3	041	1SDA105166R1	1	Module Ekip Com Modbus RS485 Tmax XT	ABB	TYPICAL LK-x
U1.A	041	1SDA105203R1	1	EKIP CARTRIDGE 2SLOT FOR XT2-XT4-XT5	ABB	TYPICAL LK-x
U2.A	042	Z-PC-DINAL2-17.5	1	DIN RAIL 2SLOT WITH HEAD FOR "Z-5DI-2DO"	SENECA	TYPICAL LK-x
U2.B	042	Z-5DI-2DO	1	I/O MODUL 5DI+2DO modbus RS485 Vaux=10÷40Vdc 19÷28Vac	SENECA	TYPICAL LK-x
U2.C	042	Z-5DI-2DO	1	I/O MODUL 5DI+2DO modbus RS485 Vaux=10÷40Vdc 19÷28Vac	SENECA	TYPICAL LK-x
X1		HD100GR_	8	HMD.2/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur	TYPICAL LK-x
		HD400GR_	17	HMD.2N/GR Two-level feed-through Terminal Block - Grey (2.5 mmq) - Spring type	Cabur	TYPICAL LK-x
		BT003	2	BT/3 End bracket	Cabur	TYPICAL LK-x
		HD101GR	1	HMD/PT/GR End section - Grey	Cabur	TYPICAL LK-x

VALID FOR CONSTRUCTION
VENDOR DOCUMENT - FDL DWG:
123A90-FDL-1724002197-EL-DG-00031
REV.: 2_A | DATE: 18/03/25 | SIGNATURE: G.Randi
ROSETTI MARINO SpA

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

= TYPICAL
+ LK-x
DWG n° : 231298/SD/31
Item n° : PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

TITLE : "SG-200N1"
LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS
Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 046 | REV. 02

File Name : 1723002197-EL-DG-00031 Rev. 02

AS-COMMISSIONED DAVIDE ZUCCONELLI NO MARK UP 21/03/2025

Fito UNI A3: 420mmx297mm

Nome/Item	Fg/Sh	Tipo/Type	Q.ta/Q.ty	Descrizione/Description	Costruttore/Manufacturer	Quadro (descrizione)
X1		HD201GR	1	HMD.1/PT/GR End section - Grey	Cabur	TYPICAL LK-x

AS-COMMISSIONED
DAVIDE ZUCCOMELLI

NO MARK UP
21/03/2025

Nome/Item	Fg/Sh	Tipo/Type	Q.ta/Q.ty	Descrizione/Description	Costruttore/Manufacturer	Quadro (descrizione)
KM1	043	AF40400013	1	AF40-40-00-13 CONTACTOR 4P 40A 100-250VAC/DC	ABB	TYPICAL LK1-40
		CA440E	1	CA4-40E AUXILIARY FRONT CONTACT 4NO	ABB	TYPICAL LK1-40
QF1	043	1SDA068169R1	1	XT2S 160 BREAKING PART 4p F F	ABB	TYPICAL LK1-40
		1SDA100162R1	1	ELECTRONIC TRIP RELEASE Ekip Hi-Touch LSIG In=40A XT2 4p	ABB	TYPICAL LK1-40
		1SDA066431R1	1	AUX-C 1Q+1SY 250Vac/dc XT1..XT5 F/P	ABB	TYPICAL LK1-40

Nome/Item	Fg/Sh	Tipo/Type	Q.ta/Q.ty	Descrizione/Description	Costruttore/Manufacturer	Quadro (descrizione)
KM1	043	AF52400013	1	AF52-30-00-13 CONTACTOR 4P 53A(AC3) 100-250VAC/DC	ABB	TYPICAL LK1-63
		CA440E	1	CA4-40E AUXILIARY FRONT CONTACT 4NO	ABB	TYPICAL LK1-63
QF1	043	1SDA068169R1	1	XT2S 160 BREAKING PART 4p F F	ABB	TYPICAL LK1-63
		1SDA100163R1	1	ELECTRONIC TRIP RELEASE Ekip Hi-Touch LSIG In=63A XT2 4p	ABB	TYPICAL LK1-63
		1SDA066431R1	1	AUX-C 1Q+1SY 250Vac/dc XT1..XT5 F/P	ABB	TYPICAL LK1-63

Nome/Item	Fg/Sh	Tipo/Type	Q.ta/Q.ty	Descrizione/Description	Costruttore/Manufacturer	Quadro (descrizione)
KM1	043	AF80400013	1	AF80-30-00-13 CONTACTOR 4P 80A(AC3) 100-250VAC/DC	ABB	TYPICAL LK1-100
		CA440E	1	CA4-40E AUXILIARY FRONT CONTACT 4NO	ABB	TYPICAL LK1-100
QF1	043	1SDA068169R1	1	XT2S 160 BREAKING PART 4p F F	ABB	TYPICAL LK1-100
		1SDA100164R1	1	ELECTRONIC TRIP RELEASE Ekip Hi-Touch LSIG In=100A XT2 4p	ABB	TYPICAL LK1-100
		1SDA066431R1	1	AUX-C 1Q+1SY 250Vac/dc XT1..XT5 F/P	ABB	TYPICAL LK1-100

Nome/Item	Fg/Sh	Tipo/Type	Q.ta/Q.ty	Descrizione/Description	Costruttore/Manufacturer	Quadro (descrizione)
KM1	043	AF190401113	1	AF190-40-11-13 CONT 4P 190A AC3 100-250VAC/DC	ABB	TYPICAL LK2-160
		CAL1911	1	CAL19-11 CONTATTO AUSILIARIO 1NA+1NC PER AF116÷AF370	ABB	TYPICAL LK2-160
		CAL1911B	2	CAL19-11B AUXILIARY CONTACT 1NA+1NC PER AF116÷AF370	ABB	TYPICAL LK2-160
QF1	043	1SDA068179R1	1	XT4S 250 BREAKING PART 4p F F	ABB	TYPICAL LK2-160
		1SDA100334R1	1	ELECTRONIC TRIP RELEASE Ekip Hi-Touch LSIG In=160A XT4 4p	ABB	TYPICAL LK2-160
		1SDA066431R1	1	AUX-C 1Q+1SY 250Vac/dc XT1..XT5 F/P	ABB	TYPICAL LK2-160

VALID FOR CONSTRUCTION
VENDOR DOCUMENT - FDL DWG:
123A90-FDL-1724002197-EL-DG-00031

REV.:	DATE:	SIGNATURE:
2_A	18/03/25	G.Randi

ROSETTI MARINO SpA

CROSSWIND

IMESA ELECTRICAL ENGINEERING

ROSETTI MARINO

=	TYPICAL
+	LK-x
DWG n° :	231298/SD/31
Item n° :	PF1002983/26

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
2	18/09/2024	Santinelli	Flamminio	Sigismondi	As Built (ASB)
1	10/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for Construction (AFC)
0	09/05/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

TITLE : "SG-200N1"

LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS

Functional Drawing - Typical "LK1-n" & "LK2-n"

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : NTS

A3 | DRAWING NO. 1723002197-EL-DG-00031 | SHEET 047 | REV. 02

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00031 Rev. 02

Section 8 LIST OF MODIFICATIONS

NOT APPLICABLE

Section 8.1 List of changes

NOT APPLICABLE

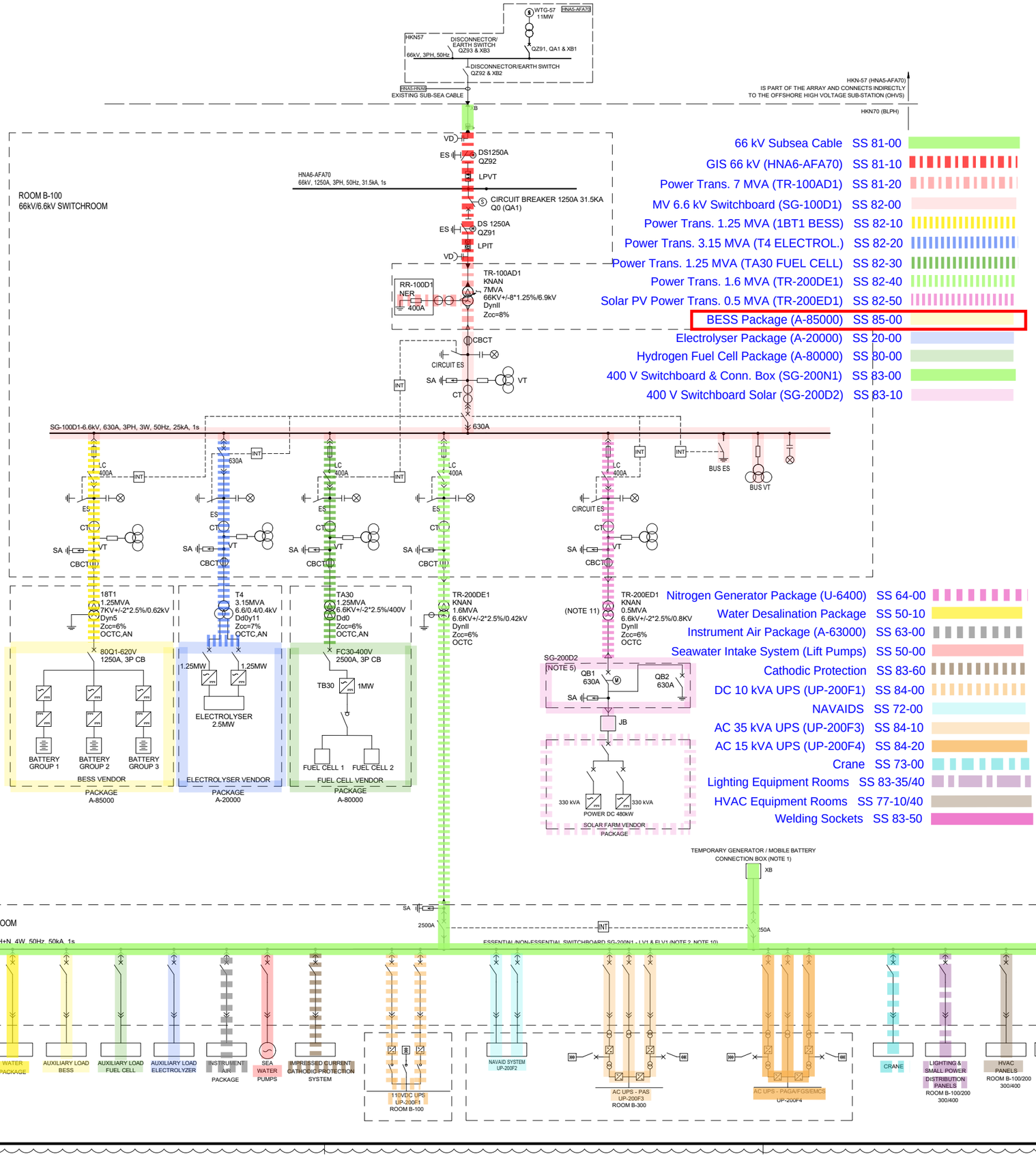
Section 9 SUPPORTING DOCUMENTS

CROSSWIND	123A90 - HOLLANDSE KUST NOORD WIND PARK BLPH Project COMMISSIONING DOSSIER INDEX	ROSETTI MARINO

BESS Package

01 Sub System Definition

DRAWING NO. 123A90-DDL-EL-DG-20158 REV. 01



SYMBOL LEGEND:

- VOLTAGE DETECTOR
- EARTHING SWITCH DISCONNECTOR
- MOTORIZED EARTHING SWITCH
- CIRCUIT BREAKER
- FUSE
- CONTACTOR
- THREE-PHASE TRANSFORMER WITH TAP CHANGER
- THREE-PHASE TRANSFORMER
- CURRENT TRANSFORMER
- THREE-PHASE TRANSFORMER, WITH THREE WINDINGS
- NEUTRAL EARTHING RESISTOR
- SURGE ARRESTER
- CORE BALANCE CURRENT TRANSFORMER
- SURGE ARRESTOR FOR T-CONNECTOR (N.1 FOR EACH PHASE)
- VOLTAGE & CURRENT TRANSFORMER (3Ø X 2) (LPIT TYPE)
- VOLTAGE TRANSFORMER (3Ø X 2) (LPVT TYPE)
- VOLTAGE TRANSFORMER
- CABLE BOX
- T-CONNECTOR CABLE TERMINATION
- CABLE AIR TERMINATION

OLTC	= ON LOAD TAP CHANGER
OCTC	= OPEN CIRCUIT TAP CHANGER
KNAN	= NON-MINERAL OIL NATURAL AIR COOLED
AN	= AIR NATURAL
XB	= CABLE BOX
QZ	= DISCONNECT SWITCH & EARTH SWITCH
QA	= CIRCUIT BREAKER
LC	= LATCHED FUSED CONTACTOR (400A)
INT	= INTERLOCK SYSTEM
SA	= SURGE ARRESTER
CBCT	= CORE BALANCE CURRENT TRANSFORMER
ES	=EARTHING SWITCH
VD	=VOLTAGE DETECTOR
LCP	=LOCAL CONTROL PANEL
LPVT	=LOW POWER VOLTAGE TRANSFORMER
LPCT	=LOW POWER CURRENT TRANSFORMER
LPIT	=LOW POWER INSTRUMENT TRANSFORMER
JB	=JUNCTION BOX

NOTES:

1. TEMPORARY POWER SUPPLY CONNECTION BOX LOCATED ON OUTSIDE WALL OF LV SWITCHROOM / CONTAINER.
2. LOAD DEFINITION 'ESSENTIAL' / 'NON-ESSENTIAL' IS SHOWN IN THE LOAD LIST. THE CCS, EMCS AND 'SMART' SWITCHGEAR WILL OPEN / CLOSE CIRCUIT BREAKERS AS REQUIRED.
3. A COMBINED CCS/EMCS SYSTEM COMPRISES A MICROPROCESSOR BASED SYSTEM, ASSOCIATED SOFTWARE AND REQUIRED PERIPHERALS FOR MONITORING AND CONTROLLING OF ELECTRICAL POWER NETWORK. ALL ELECTRICAL EQUIPMENT AND PACKAGE UNITS SHALL BE CONNECTED TO THE CENTRAL CONTROL SYSTEM .
4. IMPRESSED CURRENT CATHODIC PROTECTION SYSTEM SUPPLIED BY COMPANY.
5. THE SOLAR FARM IN-FEED POWER CIRCUIT BREAKERS PANEL IS LOCATED INSIDE THE LV SWITCHGEAR ROOM B-200.
6. DELETED.
7. DELETED.
8. DELETED.
9. CROSSWIND SHALL BE ABLE TO CONTROL THE BLPH 66KV MOTORISED CIRCUIT BREAKER Q0 (QA1) & MOTORISED ELECTRICAL DISCONNECTOR / EARTH SWITCH (QZ92, TYPE B) USING THEIR 'HV-SCADA' SYSTEM. THIS BACK-UP / REDUNDANT CONTROL SHALL BE ADDITIONAL TO THAT PROVIDED BY THE CCS AND BE OF HIGHER PRIORITY OVER A SEPARATE FIBRE OPTIC CABLE (FOC). THE CCS OPERATOR AND 'HV-SCADA' SHALL BOTH BE KEPT FULLY AWARE OF EQUIPMENT STATUS AT ALL TIMES. INTERTRIPPING, INHIBITS & INTERLOCKING FOR BLPH 66KV EQUIPMENT SHALL BE AS PER THE WIND FARM.
10. THE LOADS IN THE LOW VOLTAGE SWITCHGEAR AND THE CURRENT VALUES OF THE CIRCUIT BREAKERS ARE ONLY INDICATIVE.
11. NEUTRAL POINT OF TR-200ED1 SHALL NOT BE GROUNDED AS REQUIRED BY SOLAR FARM SUPPLIER IN 123A90-PML-PM-TQ-00040.

REFERENCES:

1. 123A90-DDL-EL-DG-20014 ELECTRICAL CONTROL, PROTECTION AND METERING DIAGRAMS
2. 123A90-DDL-EL-DG-20015 ELECTRICAL SINGLE LINE DIAGRAM 6.6kV SYSTEMS
3. 123A90-DDL-EL-DG-20159 ELECTRICAL SINGLE LINE DIAGRAMS LV SYSTEM
4. 123A90-DDL-EL-DG-20160 ELECTRICAL SINGLE LINE DIAGRAMS AC UPS SYSTEMS
5. 123A90-DDL-EL-DG-20161 ELECTRICAL SINGLE LINE DIAGRAMS DC UPS SYSTEMS
6. 123A90-DDL-EL-DG-20185 ELECTRICAL SINGLE LINE DIAGRAM HV SYSTEMS
7. 123A90-DDL-EL-DL-20104 ELECTRICAL EQUIPMENT LAYOUT - HV SWITCHROOM
8. 123A90-DDL-EL-DL-20105 ELECTRICAL EQUIPMENT LAYOUT - LV SWITCHROOM
9. 123A90-DDL-EL-LIS-20016 ELECTRICAL LOAD LIST and BALANCE -CCS MODE CHARGING-
10. 123A90-DDL-EL-RE-20152 ELECTRICAL EQUIPMENT SIZING CCALCULATION REPORT
11. 123A90-DDL-EL-RE-20170 ELECTRICAL SYSTEM STUDY REPORT - LOAD FLOW
12. 123A90-DDL-EL-RE-20171 ELECTRICAL SYSTEM STUDY REPORT - SHORT CIRCUIT
13. 123A90-DDL-EL-RE-20172 ELECTRICAL SYSTEM STUDY REPORT - ARC FLASH ENERGY CALCULATION
14. 123A90-DDL-EL-RE-20173 ELECTRICAL SYSTEM STUDY REPORT - HARMONICS

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
01	26/03/2024	GPA	LMA/AMA	LMA/MDO	ISSUE FOR REVIEW (IFR)
00	02/11/2023	DSF	CB/AMA	OYFO/MDO	ISSUE FOR REVIEW (IFR)

CROSSWIND

ROSETTI MARINO

TITLE :

OVERALL/KEY SINGLE LINE DIAGRAM

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK			SCALE N/A
DRAWN GPA	CHECKED LMA/AMA	APPROVED LMA/MDO	DATE 26/03/2023
A1	DRAWING NO. 123A90-DDL-EL-DG-20158	SHEET 001	REV. 01

01

File Name : 123A90-DDL-EL-DG-20158_REV01.dwg

Battery Energy Storage System (BESS)
BASE LOAD POWER HUB

Statron ref. 331497

Project Code: K559-2254
Purchase Order Number: CW-I-WP4-2022-01

SDRL Code: C04
Sequence Number: 001
Rev: 003
Document number: K559-2254-CWIWP4202201-C04-001
Document description: Bill of Materials

Revision	Date	Name	Description
001	31.03.2023	CPA / ADI	First Version
002	20.11.2024	CPA/ADI	First Revision
003	21.01.2025	MMÜ	Second revision

Bill of Materials
C04

for Base Load Power Hub (BLPH) Project

Classification: confidential

Document no.	C04
Document name	Bill of Materials
Component / System	BESS
Project code	K559-2254

Version	Date	Name	Description
1.0	2023-03-30	C. Palenzuela	First version
2.0	2024-11-20	M. Müller	First revision
3.0	2025-01-21	M. Müller	Second revision

Table 1: Version overview

	Date	Name
Editor	2024-11-20	M. Müller
Checked by	2024-12-03	C. Palenzuela
Approved by	2024-12-03	C. Palenzuela

Table 2: Approval overview

Imprint

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Contact details

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You can also visit us on our website **http://www.freqcon.com** to find more information about our products and solutions.

Content

1 Introduction 7
1.1 About this Document 7
1.2 Other Applicable Documents 7
1.3 Generic Terms and Abbreviations Used 7
2 General 8
3 Appendix 9

Identification

Product Version / Document Version

Product version
Prototype

Document release date
January 2025

Doc Code
K559-2254-CWIWP4202201-C04-001

Name and Address of Manufacturer

Manufacturer of the product
FREQCON GmbH
Bürgerwiesenweg 5
D-27336 Rethem, Germany

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Original document

This document is an original document of FREQCON GmbH.

1 Introduction

1.1 About this Document

This document is part of the documentation for the Base Load Power Hub (BLPH) Project (K559-2254). In case of any contradiction resulting by the information or specification given in this document, phase 2 or later documents supersede the information provided in this document.

1.2 Other Applicable Documents

The following documents are applicable:

Document type	Document Name
Bill of Materials	Bill_of_Materials.zip

Table 1: Other applicable documents

1.3 Generic Terms and Abbreviations Used

This following list should help you understand some of the abbreviations used in this document.

Generic Term and Abbreviation	Description
BESS	Battery Energy Storage System
BLPH	Base Load Power Hub
BoM	Bill of Materials
PCS	Power Conversion System

Table 2: Generic terms and abbreviations used

2 General

The bill of materials of the main system components are attached to this document (*see section 1.3 "Other Applicable Documents"*).

File name: Bill_of_Materials.zip

3 Appendix

1. Electrical Bill of Materials
   - Bill of Materials PCS:
     10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_Bill of Materials PCS
   - Bill of Materials Battery Container 1:
     10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_Bill of Materials Battery 1
   - Bill of Materials Battery Container 2:
     10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_Bill of Materials Battery 2

2. Mechanical Bill of Materials
   - Bill of Materials PCS:
     Mechanical_BoM_PCS Container
   - Bill of Materials Battery Container 1:
     Mechanical_BoM_Battery_Container 1
   - Bill of Materials Battery Container 2:
     Mechanical_BoM_Battery_Container 2
   - Bill of Materials Overall System:
     Mechanical_BoM_Overall_System

STATRON
NON STOP POWER

Battery Energy Storage System (BESS)
BASE LOAD POWER HUB

Statron ref. 331497

Project Code: K559-2254
Purchase Order Number: CW-I-WP4-2022-01

SDRL Code: D03
Sequence Number: 001
Rev: 002
Document number: K559-2254-CWIWP4202201-D03-001
Document description: Data Sheets

Revision	Date	Name	Description
001	31.03.2023	CPA / ADI	First Version
002	15.06.2023	CPA / ADI	Second Version

Data Sheets
D03

for Base Load Power Hub (BLPH) Project

Classification: confidential

Document no.	D03
Document name	Data Sheets
Component / System	BESS
Project code	K559-2254

Version	Date	Name	Description
1.0	2023-03-30	C. Palenzuela	First version
2.0	2023-06-15	C. Palenzuela	Second version

Table 1: Version overview

	Date	Name
Editor	2023-03-31	C. Palenzuela
Checked by	2023-03-31	A. Fritz
Approved by	2023-03-31	M. Maaz

Table 2: Approval overview

Imprint

Hardware Development and Production Centre
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Bürgerwiesenweg 5
D-27336 Rethem, Germany

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For further information please contact us by phone or send us a mail to **info@freqcon.de**.
You can also visit us on our website **http://www.freqcon.com** to find more information about our products and solutions.

Content

1 Introduction 7
1.1 About this Document 7
1.2 Display Elements 7
1.3 Other Applicable Documents 7
1.4 Generic Terms and Abbreviations Used 7
2 General 8
3 Appendix 9

Identification

Product Version / Document Version

Product version
Prototype

Document release date
March 2023

Doc Code
K559-2254-CWIWP4202201-D03-001

Name and Address of Manufacturer

Manufacturer of the product
FREQCON GmbH
Bürgerwiesenweg 5
D-27336 Rethem, Germany

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Original document

This document is an original document of FREQCON GmbH.

1 Introduction

1.1 About this Document

This document is part of project phase “Detailed Design Engineering” for the Base Load Power Hub (BLPH) Project (K559-2254). In case of any contradiction resulting by the information or specification given in this document, phase 2 or later documents supersede the information provided in this document.

1.2 Display Elements

Symbol	Meaning
➜	Action with one or several steps for which the sequence is irrelevant.
Step 1 : **Step 2 :**	Action with several steps for which the sequence is relevant.
•	First level of list.
-	Second level of list.

Table 1: Display Elements

1.3 Other Applicable Documents

The following documents are applicable:

Document type	Document Name
Archive with PCS and BESS main components data sheets	Data Sheets PCS & BESS.zip

Table 2: Other applicable documents

1.4 Generic Terms and Abbreviations Used

This following list should help you understand some of the abbreviations used in this document.

Generic Term and Abbreviation	Description
BESS	Battery Energy Storage System
BLPH	Base Load Power Hub
PCS	Power Conversion System

Table 3: Generic terms and abbreviations used

2 General

The data sheets of the main system components are attached to this document (*see section 1.3 "Other Applicable Documents"*).

File name: Data Sheets PCS & BESS.zip

3 Appendix

1. Data Sheets PCS & BESS.zip

Battery Energy Storage System (BESS)
BASE LOAD POWER HUB

Statron ref. 331497

Project Code: K559-2254
Purchase Order Number: CW-I-WP4-2022-01

SDRL Code: D05
Sequence Number: 001
Document number: K559-2254-CWIWP4202201-D05-001
Document description: Material Safety Data Sheets

Revision	Date	Name	Description
001	20.02.2023	CPA / ADI	First Version

Material Safety Data Sheets
D05

for Base Load Power Hub (BLPH) Project

Classification: confidential

Document no.	D05
Document name	Material Safety Data Sheets
Component / System	BESS
Project code	K559-2254

Version	Date	Name	Description
1.0	2023-20-02	C. Palenzuela	First version

Table 1: Version overview

	Date	Name
Editor	2023-20-02	C. Palenzuela
Checked by	2023-28-02	A. Fritz
Approved by	2023-28-02	M. Maaz

Table 2: Approval overview

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Identification

Product Version / Document Version

Product version
Prototype

Document release date
March 2023

Doc Code
K559-2254-CWIWP4202201-D05-001

Name and Address of Manufacturer

Manufacturer of the product
FREQCON GmbH
Bürgerwiesenweg 5
D-27336 Rethem, Germany

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Original document

This document is an original document of FREQCON GmbH.

1 Introduction

1.1 About this Document

This document is part of project phase “Detailed Design Engineering” for the Base Load Power Hub (BLPH) Project (K559-2254). In case of any contradiction resulting by the information or specification given in this document, phase 2 or later documents supersede the information provided in this document.

1.2 Display Elements

Symbol	Meaning
➜	Action with one or several steps for which the sequence is irrelevant.
Step 1 : **Step 2 :**	Action with several steps for which the sequence is relevant.
•	First level of list.
-	Second level of list.

Table 1: Display Elements

1.3 Other Applicable Documents

The following documents are applicable:

Document type	Document Name
Battery Cells LF280K - Material Safety Data Sheet	LF280K MSDS.pdf
Stat-X – Material Safety Data Sheet	19012.10-SDSR-Stat-X-Class-1.4S
Antifrogen N coolant - Material Safety Data Sheet	MSDS-Antifrogen-N_EN_2019-1.pdf

Table 2: Other applicable documents

1.4 Generic Terms and Abbreviations Used

This following list should help you understand some of the abbreviations used in this document.

Generic Term and Abbreviation	Description
BESS	Battery Energy Storage System
BLPH	Base Load Power Hub
PCS	Power Conversion System
MSDS	Material Safety Data Sheet

Table 3: Generic terms and abbreviations used

2 General

The following components of the proposed PCS and BESS unit are falling under REACH regulation and thereby require a Material Safety Data Sheet (MSDS):

Item	Component	Purpose	Manufacturer	Type
1	Battery cells	Used for energy storage, packed inside modules	EVE	LF280K
2	Fire suppression aerosol cartridges	Fire suppression system inside battery cabinets	Stat-X	Aero-X Stat-X 60E Aerosol Extinguisher
3	Coolant	Coolant used for PCS water-cooling system	Clariant	Antifrogen N

Table 4: Other applicable documents

The Material Safety Data Sheets are attached to this document (*see section 1.3 "Other Applicable Documents"*).

3 Appendix

1. MSDS - Battery cells - EVE LF280K
2. MSDS - Fire suppression aerosol cartridges – Aero-X Stat-X 60E Aerosol Extinguisher
3. MSDS - Coolant – Clariant Antifrogen N

Material Safety Data Sheet

Section 1 – IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Product Name: Li-ion Battery

Battery type: Li-ion Battery

Model	Voltage	Capacity（Ah）			Energy（Wh）
		Typical	Min	MAX	
LF280K	3.2V	280	/	/	896

Product Use: Energy Storage System

MSDS Date of Preparation: April 6th, 2021 ； Updated：/

Company Identification:

Name： EVE POWER Co., Ltd.

Address: No.68, Jingnan Avenue, Jingmen Hi-teck Zone, 448000 Jingmen City, Hubei Province

Post Code: 448000

Tel: +86-724-6079630

Fax:+86-724-6079688

Section 2 - Hazards Identification

- **Health Hazards (Acute and Chronic)**

These chemicals are contained in a sealed Al foil. Risk of exposure occurs only if the battery is mechanically or electrically abused. Contact of electrolyte with skin and eyes should be avoided.

- **Sign/Symptoms of Exposure**

A shorted battery can cause thermal and chemical burns upon contact with the skin. Maybe a reproductive hazard.

These products are classified as Articles under REACH and are not subject to the requirements for Information in the Supply Chain (Safety Data Sheets and Labels). While batteries may release hazardous substances if damaged, this is not an intended release as defined under REACH. Batteries are not classified as hazardous under the CLP.

The following information is provided to assist in the safe use of our products.

CAUTION: Battery can explode or leak if heated, disassembled, shorted, recharged, exposed to fire or high temperature or inserted incorrectly. Keep in original package until ready to use. Do not carry batteries

loose in your pocket or purse. Keep batteries away from children. If swallowed, consult a physician at once.

Under certain misuse conditions and by abusively opening the battery, exposed lithium can react with water or moisture in the air causing potential thermal burns or fire.

Section 3 – Composition/Information on Ingredient

Material or ingredient	Chemical Formula	CAS No.	Wt %

Lithium iron phosphate	$LiFePO_4$	/	37.0
Phosphate(1-),hexafluoro,lithium	$LiPF_6$	(CAS-No.)21324-40-3 (EC-No.)244-334-7	3.2
Graphite	C	(CAS-No.)7782-42-5 (EC-No.)231-955-3	19.1
Aluminum	Al	(CAS-No.)7429-90-5 (EC-No.)231-072-3 (EC Index-No.)013-002-00-1	4.6
Copper	Cu	(CAS-No.)7440-50-8 (EC-No.)231-159-6	7.5
Polypropylene	PP	(CAS-No.) 9003-07-0 (EC-No.)618-352-4	4.8

Section 4 - First Aid Measures

- **General Advice**

  The chemicals in this product are contained in a sealed package. Exposure to the contents will not occur unless the battery leaks, is exposed to high temperatures or is mechanically, physically, or electrically abused.

- **Eye**

  Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

- **Skin**

  Remove contaminated clothes and rinse skin with plenty of water or shower for 15 minutes. Get medical aid.

- **Inhalation**

  Remove from exposure and move to fresh air immediately. Use oxygen if available.

- **Ingestion**

  Give at least 2 glasses of milk or water. Induce vomiting unless patient is unconscious. Call a physician.

- **Note to Physician**

  Published reports recommend removal from the esophagus be done endoscopically (under direct visualization). Batteries beyond the esophagus need not be retrieved unless there are signs of injury to the GI tract or a large diameter battery fails to pass the pylorus. If asymptomatic, follow up x rays are necessary only to confirm the passage of larger batteries. Confirmation by stool inspection is preferable under most circumstances. Potential leakage of less than 50 milligrams of dimethoxyethane and propylene carbonate. Dimethoxyethane rapidly evaporates. Do not give ipecac.

Section 5 - Fire Fighting Measures

- **Fire and Explosion Hazards**: Batteries may burst and release hazardous decomposition products when exposed to a fire situation.
- **Extinguishing Media**

  CO_2.

- **Special Fire-Fighting Procedures**

  Self-contained breathing apparatus.
- **Unusual Fire and Explosion Hazards**

  Cell may vent when subjected to excessive heat-exposing battery contents.
- **Hazardous Combustion Products**

  Carbon monoxide, carbon dioxide, lithium oxide fumes.

Section 6 - Accidental Release Measures

- **Steps to be Taken in case Material is Released or Spilled**

  If the battery material is released, remove personnel from area until fumes dissipate. Provide maximum ventilation to clear out hazardous gases. Wipe it up with a cloth, and dispose of it in a plastic bag and put into a steel can. The preferred response is to leave the area and allow the battery to cool and vapors to dissipate. Provide maximum ventilation. Avoid skin and eye contact or inhalation of vapors. Remove spilled liquid with absorbent and incinerate.
- **Waste Disposal Method**

  It is recommended to discharge the battery to the end, handing in the abandoned batteries to related department unified, dispose of the batteries in accordance with approved local, state, and federal requirements. Consult state environmental protection agency and/or federal EPA.

Section 7 - Handling and Storage

The battery should not be opened, destroyed or incinerate, since they may leak or rupture and release to the environment the ingredients that they contain in the hermetically sealed container.

Do not short circuit terminals, or over charge the battery, forced over-discharge, throw to fire. Do not crush or puncture the battery, or immerse in liquids.

- **Precautions to be taken in Handling and Storing**

  Avoid mechanical or electrical abuse. Storage preferably in cool, dry and ventilated area, which is subject to little temperature change. Storage at high temperatures should be avoided.

  Do not place the battery near heating equipment, nor expose to direct sunlight for long periods.
- **Other Precautions**

  The battery may explode or cause burns, if disassembled, crushed or exposed to fire or high temperatures.

  Do not short or install with incorrect polarity.
- **Storage**

  Store batteries in a dry place at normal room temperature.

Section 8 - Exposure Controls, Personal Protection

- **Exposure Limits**: No exposure to the battery components should occur during normal use.
- **Ventilation:** Not necessary under conditions of normal use.
- **Respiratory Protection**

  In case of battery venting, provide as much ventilation as possible. Avoid confined areas with venting cell cores. Respiratory Protection is not necessary under conditions of normal use.
- **Skin Protection:** None required for normal use. Use butyl rubber gloves when handling leaking

batteries..

- **Eye Protection:** None required for normal use. Wear safety goggles when handling leaking batteries.
- **Protective Gloves**

  Not need
- **Other Protective Clothing or Equipment**

  Not necessary under conditions of normal use.

  Personal Protection is recommended for venting battery: Respiratory protection, Protective gloves, protective clothing and safety glass with side shields.

Section 9 - Physical and Chemical Properties

Appearance and Odor: prismatic cell, no odor.

Water Solubility: Insoluble

Flash Point: Not Applicable

Section 10 - Stability and Reactivity

- **Stability**

  Stable
- **Conditions to Avoid**

  Heating, mechanical abuse and electrical abuse.
- **Hazardous Decomposition Products**

  N/A.
- **Hazardous Polymerization**

  N/A.

Section 11 - Toxicological Information

- **Potential Health Effects**: The chemicals in this product are contained in a sealed package. Exposure to the contents will not occur unless the battery leaks, is exposed to high temperatures or is mechanically, physically, or electrically abused.
- **Eye Contact**: Contact with battery contents may cause irritation.
- **Skin Contact**: Contact with battery contents may cause irritation.
- **Inhalation**: Inhalation of vapors or fumes released due to heat or a large number of leaking batteries may cause respiratory and eye irritation.
- **Ingestion**: Seek immediate medical advice. Batteries lodged in the esophagus should be removed immediately since leakage, caustic burns and perforation package occur as soon as two hours after ingestion. Irritation to the internal/external mouth areas, may occur following exposure to a leaking battery.

Section 12 - Ecological Information

When promptly used or disposed the battery does not present environmental hazard. When disposed, keep away from water, rain and snow.

Section 13 - Disposal Considerations

- **APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION**

  If batteries are still fully charged or only partially discharged, they can be considered a reactive hazardous waste because of significant amount of not reaction or unconsumed lithium remaining in the spent battery. The battery must be neutralized through an approved secondary treatment facility prior to disposal as a hazardous waste. Recycling of battery can be done in authorized facility, through licensed waste carrier.

  lithium ion cell batteries are labeled in compliance with the EU Battery Directive 2006/66/EC.

Section 14 - Transport Information

Emergency Phone Number:

CHEMTREC 24 Hour Emergency Response Hotline （+86-752-2606966）

Persons who prepare or offer lithium batteries for transport are required by regulation to be trained and certified.

The information provided below is for informational purposes only.

Lithium Ion Batteries
UN No.：UN3480
EmS No.:F-A,S-I
Marine pollutant:No
Proper shipping name:Lithium ion battery（Including lithium ion ploymer batteries）
Hazard classification: The goods shall be complied with the requirements of section IA of Packing Instructions 965 of 61 th DGR Manual of IATA（2020）Edition and special provision 188 of IMDG CODE（Amdt.39-18）Edition,including the passing of the UN38.3 test.

The products meet all the requirements of the IATA DGR 61th edition, under special provisions including UN 38.3 test . If the package exceeds the table 965 - the - standard, so it belongs to the ninth category of dangerous goods. Only cargo transport. According to the packing instructions 965 Part IA IATA 61th version of the DGR requirements.

Lithium ion cells and batteries must be offered for transport at a state of charge (SoC) not exceeding 30% of their rated design capacity from 1 April 2016.

Shipping packages containing rechargeable lithium batteries must be labeled, regardless of size or number of batteries, with a lithium battery handling label.

More information concerning shipping, testing, marking and packaging can be obtained from Label master at http://www.labelmaster.com.

Separate battery when shipping to prevent short-circuiting. They should be packed in strong packaging for support during transport. Take in a cargo of them without falling, dropping, and breakage. Prevent

collapse of cargo piles and wet by rain.

Section 15 - Regulatory Information

- **Law Information**

  《Dangerous Goods Regulation》

  《Recommendations on the Transport of Dangerous Goods Model Regulations》

  《International Maritime Dangerous Goods》

  《Technical Instructions for the Safe Transport of Dangerous Goods》

  《Classification and code of dangerous goods》

  《Occupational Safety and Health Act》(OSHA)

  《Toxic Substances Control Act》(TSCA)

  《Consumer Product Safety Act》(CPSA)

  《Federal Environmental Pollution Control Act》(FEPCA)

  《The Oil Pollution Act》(OPA)

  《Superfund Amendments and Reauthorization Act Title III (302/311/312/313)》(SARA)

  《Resource Conservation and Recovery Act》(RCRA)

  《Safety Drinking Water Act》(CWA)

  《California Proposition 65》

  《Code of Federal Regulations》(CFR)

EU BATTERY DIRECTIVE: These batteries comply with the Directive substance limits and labeling requirements.

EU REACH REGISTRATION: These products are manufactured articles and not subject to REACH registration requirements.

EU Labeling: lithium ion cell batteries are labeled in compliance with the EU Battery Directive 2006/66/EC.

Section 16 – Other Information

EVE Hazard Rating: Health: 0 Fire: 0 Reactivity: 0

==========

Data supplied is for use only in connection with occupational safety and health.

DISCLAIMER: This MSDS is intended to provide a brief summary of our knowledge and guidance regarding the use of this material. The information contained here has been compiled from sources considered by EVE to be dependable and is accurate to the best of the Company's knowledge. It is not meant to be an all inclusive document on worldwide hazard communication regulations.

Stat-X® Aerosol Fire Suppression

Fireaway

Safety Data Sheet according to Regulation (EC) No. 1907/2006 & Amendment 987/2008 (REACH) & HazCom 2012

5852 Baker Road
Minnetonka, MN
55345
USA

SDSR# FU011B
DATE: 11/18

SECTION 1: Identification of the Substance/Mixture and of the Company/undertaking Product Identifier

Stat-X® Condensed Aerosol Generators - Models 30 to 2500.

Details of the supplier of the safety data sheet:
Fireaway Inc., 5852 Baker Road, Minnetonka, MN, 55345, USA
Telephone +1 (952) 935-9745, Fax +1 (952) 935-9757
Email address of the competent person: info@statx.com

For information only, call 1-952-935-9745.
For emergencies, call
INFOTRAC
USA & CANADA: +1-800-535-5053
INTERNATIONAL: +1-352-323-3500 (collect)

Only Representative Contact:
Blue Frog Scientific Limited, Quantum House,
91 George Street, Edinburgh, EH2 3ES
+44 (0) 131 523 1412

SECTION 2: Hazards Identification

Possible exposure to aerosol suppression agent if generator is activated. May cause temporary, mild irritation of mucous membranes if inhaled. US EPA listed under US EPA SNAP List for use as a total flooding fire suppression agent in normally occupied spaces.

2.1 Classification

OSHA Regulatory Status

All 3 chemicals listed below are not stored as raw loose powder but homogenously blended and pressed into a single solid aerosol forming compound pellet. Exposure to raw dust from the pellet is very limited which may contain any of the 3 chemicals listed in Section 3.

Potassium nitrate: Oxidizer solid

Dicyandiamide: Not a hazardous substance or mixture

Phonolic resin: This chemical is considered hazardous under 29 CFR 1910.1200 (Hazard Communication)

2.2 Label Elements

Signal Word

WARNING



Hazard Statements

Potassium nitrate dust:

May intensity fire; oxidizer (H272)

Dicyandiamide dust: Not a hazardous substance or mixture

Phenolic Resin dust:

Causes skin irritation (H315)

Causes eye irritation (H319)

May cause respiratory irritation (H335)

Precautionary Statements

Potassium nitrate: Keep/store away from clothing/combustible materials

Prevention

Wash face, hands and any exposed skin thoroughly after handling. Wear protective gloves/protective clothing/eye protection/face protection. Avoid breathing particles/dust/gas. Handle in accordance with good industrial hygiene and safety practice. Keep away from heat.

Response

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rising. If eye irritation persists: Get medical advice/attention.

IF ON SKIN: Wash with plenty of soap and water. If skin irritation or rash occurs: Get medical advice/attention.

IF ON CLOTHING: Dispose of contaminated clothing and gloves after use in accordance with applicable laws and good industrial hygiene practices. Contaminated clothing should not be allowed out of the workplace unless well rinsed with water.

Disposal

Dispose of contents/container to an approved waste disposal plant.

2.3 Hazards Not Otherwise Classified (HNOC)

Not applicable.

SECTION 3: Composition/Information on Ingredients

Hazardous components: Does not contain dangerous materials as defined by ordinance on hazardous materials.

Components – Chemical (Hazardous Components ≥ 1%)	**CAS#**	**Weight %**	**COMMENTS:**
Potassium Nitrate ECHA Registration no. 01-2119488224-35-0066	7757-79-1	75.0	Components are blended and pressed into a highly stable, molded form. Molded composition is contained within a sealed double-walled stainless steel housing – no environmental exposure. Upon generator unit activation these chemical elements are not discharged from the unit but are fully consumed by an internal chemical reaction.
DCDA	461-58-5	16.5	
Organic Resin	9003-35-4	8.5	
Appearance & Odor:			Beige to white in color. No odor.
Auto-Ignition Temperature:			300^0 C
Solubility in Water:			Slightly Soluble

SECTION 4: First aid measures

Contact Method:	**Procedure:**
Inhalation	Remove to fresh air
Eye Contact	Flush with water
Skin Contact	Wash with soap and water.
Ingestion	Not a likely route of exposure.
Seek medical attention for further treatment, observation, and support if necessary.	

SECTION 5: Firefighting Measures

In the event of a fire, evacuate the area and inform emergency services. Ignition of Stat-X produces a fire-suppression aerosol. Water may be used as an additional suppression agent.

SECTION 6: Accidental Release Measures

If these devices are spilled they can be safely recovered by hand and should be inspected for damage prior to repacking. Suspect or damaged articles should be labeled and consigned for correct destruction.

SECTION 7: Handling and Storage

Store in temperate conditions. Avoid shock, electric currents, static discharge, excessive heat and extended periods of storage at temperatures greater than 65°C.

SECTION 8: Exposure Controls/Personal Protection

Respiratory Protection	Ventilate area completely after discharge. Do not enter area prior to complete venting of enclosure. Use filter mask as necessary during clean-up.
Hand Protection	Wear gloves if handling generators prior to cooling.
Eye Protection	Safety glasses are advisable.
Skin Protection	N/A

SECTION 9: Physical and Chemical Properties

Appearance:	Stainless Steel Cylinder up to 270 mm in length

SECTION 10: Stability and Reactivity

These devices are extremely stable below 125°C. They are packaged to protect the articles from electrical power and shock. As with any stored products, stored packaging should be protected from fire and high temperatures.

SECTION 11: Toxicological Information

Toxic by-products of combustion are extremely low. Main by-products are listed below with 15-minute TWA values for a maximum 100g/m^3 concentration in a hermetically sealed volume.

Gas	15 minute Time Weighted Average in parts per million
NO_2	1.08
NO	0.97
CO	84.20

SECTION 12: Ecological Information

These devices are sealed and present no ecological hazards. The aerosol produced upon ignition has very low global warming potential and an ozone depletion potential = 0.

SECTION 13: Disposal Considerations

Comply with all local, state, and federal/international regulations.

SECTION 14: Transport Information

UN Number: 0432	Authorized Modes of Transport: Motor Vehicle, Rail, Cargo Vessel, Cargo and Passenger Air
UN Classification: Class 1.4S Articles Pyrotechnic for Technical Purposes	Shipping Limitations: Cargo Aircraft: Max single packaging – 100 kg. Passenger Aircraft: Max single packaging – 25 kg.

SECTION 15: Regulatory Information

Safety, health and environmental regulations/legislation specific for the substance or mixture
EU regulations

Phenolic Resin:

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I, as amended:
Not listed.
Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex II, as amended:
Not listed.
Regulation (EC) No. 850/2004 On persistent organic pollutants, Annex I as amended:
Not listed.
Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 1 as amended:
Not listed.
Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 2 as amended:
Not listed.
Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 3 as Amended:
Not listed.
Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex V as amended
Not listed.
Regulation (EC) No. 166/2006 Annex II Pollutant Release and Transfer Registry, as amended
Not listed.
Regulation (EC) No. 1907/2006, REACH Article 59(1) Candidate List as currently published by ECHA
Not listed.

Authorizations

Regulation (EC) No. 143/2011 Annex XIV Substances Subject to Authorization:
Not listed.
Regulation (EC) No. 1907/2006, REACH Annex XIV Substances subject to authorization, as amended:
FORMALDEHYDE (CAS 50-00-0):

Restrictions on use

Regulation (EC) No. 1907/2006, REACH Annex XVII Substances subject to restriction on marketing and use as amended

FORMALDEHYDE (CAS 50-00-0)

Directive 2004/37/EC: on the protection of workers from the risks related to exposure to carcinogens and mutagens at work, as amended:

FORMALDEHYDE (CAS 50-00-0)

Directive 92/85/EEC: on the safety and health of pregnant workers and workers who have recently given birth or are breastfeeding, as amended:

FORMALDEHYDE (CAS 50-00-0)

Other EU regulations

Directive 2012/18/EU on major accident hazards involving dangerous substances:

FORMALDEHYDE (CAS 50-00-0)

Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work, as amended:

FORMALDEHYDE (CAS 50-00-0)

Directive 94/33/EC on the protection of young people at work, as amended

FORMALDEHYDE (CAS 50-00-0)

Other regulations

The product is classified and labelled in accordance with EC directives or respective national laws.

National regulations

This preparation is not classified as dangerous according to European Union legislation. Young people under 18 years old are not allowed to work with this product according to EU Directive 94/33/EC on the protection of young people at work. Follow national regulation for work with chemical agents.

U.S. INFORMATION

Potassium Nitrate:

TSCA 8(b) inventory: Potassium Nitrate
CALIFORNIA PROPOSITION 65: Potassium Nitrate (CAS 7757-79-1) is not listed.
Clean Water Act (CWA): No product found

Phenolic Resin:

CALIFORNIA PROPOSITION 65: Formaldehyde (CAS 50-00-0) is listed.
Clean Water Act (CWA): Hazardous substance

SECTION 16: Other Information

Comply with manufacturer's installation and maintenance procedures.

Disclaimer: The information contained herein is accurate to the best knowledge and belief of Fireaway Inc., and is intended to describe the product for health, safety, and environmental requirements only. It is not intended and should not be construed as a warranty. Consult Fireaway for further information.

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Trade name
ANTIFROGEN N

Material number: 107601

Chemical nature: Monoethylene glycol (1,2-ethane diol) with corrosion inhibitors

1.2. Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses of the substance or mixture

Industry sector :	Functional Fluids
Type of use :	Brine for refrigeration

Exposure scenarios: see annex

1.3. Details of the supplier of the safety data sheet

Identification of the company
Clariant Produkte (Deutschland) GmbH
65926 Frankfurt am Main
Telephone no. : +49 69 305 18000

Information about the substance/mixture
BU Industrial & Consumer Specialties
Product Stewardship
e-mail: SDS.Europe@clariant.com

1.4. Emergency telephone number

00800-5121 5121 (24 h)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification (REGULATION (EC) No 1272/2008)

Acute toxicity, Category 4	H302: Harmful if swallowed.
Specific target organ toxicity - repeated exposure, Category 2	H373: May cause damage to organs through prolonged or repeated exposure.

2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008)

Hazard pictograms :



Signal word : Warning

Hazard statements : H302 Harmful if swallowed.

H373 May cause damage to organs through prolonged or repeated exposure.

Precautionary statements :

Prevention:

P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response:

P314 Get medical advice/ attention if you feel unwell.
P337 + P313 If eye irritation persists: Get medical advice/ attention.

Disposal:

P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Other hazards

After consideration of all available toxicity and ecotoxicity data it is concluded that the substance does not fulfil the PBT or vPvB criteria.

No additional hazards are known except those derived from the labelling.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Hazardous components

Chemical name	CAS-No. EC-No. Index-No. Registration number	Classification	Concentration (% w/w)
Ethanediol	107-21-1 203-473-3 603-027-00-1 01-2119456816-28 01-2119456816-28-0000 01-2119456816-28-0003 01-2119456816-28-0038 01-2119456816-28-XXXX	STOT RE 2; H373 Acute Tox. 4; H302	>= 90 - <= 95

For explanation of abbreviations see section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice : Remove/Take off immediately all contaminated clothing.

If inhaled	:	Get medical attention if symptoms occur.
In case of skin contact	:	In case of contact, immediately flush skin with plenty of water.
In case of eye contact	:	In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
If swallowed	:	Get medical attention immediately.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms	:	No symptoms known currently.
Risks	:	No hazards known at this time.

4.3 Indication of any immediate medical attention and special treatment needed

Treatment	:	Treat symptomatically.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media	:	Water spray jet Alcohol-resistant foam Carbon dioxide (CO2) Dry powder

5.2 Special hazards arising from the substance or mixture

Specific hazards during firefighting	:	In case of fires, hazardous combustion gases are formed: Carbon monoxide (CO) Nitrogen oxides (NOx)

5.3 Advice for firefighters

Special protective equipment for firefighters	:	Self-contained breathing apparatus

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions	:	Ensure adequate ventilation. Wear suitable protective equipment.

6.2 Environmental precautions

Environmental precautions	:	Do not allow to enter drains or waterways

6.3 Methods and material for containment and cleaning up

Methods for cleaning up : Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust).

Can be landfilled or incinerated, when in compliance with local regulations.

6.4 Reference to other sections

Information regarding Safe handling, see chapter 7., For personal protection see section 8., For disposal considerations see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling : Handle and open container with care.
Provide adequate ventilation.

Advice on protection against fire and explosion : Observe the general rules of industrial fire protection

Hygiene measures : Keep away from food and drink.

7.2 Conditions for safe storage, including any incompatibilities

Advice on common storage : Do not store with alkalies
Do not store with strong oxidizing agents

7.3 Specific end use(s)

Specific use(s) : No further recommendations.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure Limits

Components	CAS-No.	Value type (Form of exposure)	Control parameters	Basis
Ethanediol	107-21-1	TWA	20 ppm 52 mg/m3	2000/39/EC
Further information	Identifies the possibility of significant uptake through the skin, Indicative			
		STEL	40 ppm 104 mg/m3	2000/39/EC
Further information	Identifies the possibility of significant uptake through the skin, Indicative			

Derived No Effect Level (DNEL) according to Regulation (EC) No. 1907/2006:

Substance name	End Use	Exposure routes	Potential health effects	Value
Ethanediol CAS-No.: 107-21-1	Workers	Dermal	Long-term systemic effects	106 mg/kg bw/day

Remarks:	DNEL			
	Workers	Inhalation	Long-term local effects	35 mg/m3
Remarks:	DNEL			
	General population	Dermal	Long-term systemic effects	53 mg/kg bw/day
Remarks:	DNEL			
	General population	Inhalation	Long-term local effects	7 mg/m3

Predicted No Effect Concentration (PNEC) according to Regulation (EC) No. 1907/2006:

Substance name	Environmental Compartment	Value
Ethanediol CAS-No.: 107-21-1	Fresh water	10 mg/l
	salt water	1 mg/l
	Water (intermittent release)	10 mg/l
	Fresh water sediment	37 mg/kg dry weight (d.w.)
	Soil	1,53 mg/kg dry weight (d.w.)
	Sewage treatment plant	199,5 mg/l
	Marine sediment	3,7 mg/kg dry weight (d.w.)

8.2 Exposure controls

Personal protective equipment

Eye protection : Depending on the risk, wear sufficient eye protection (safety glasses with side protection or goggles, and if necessary, face shield.)

Hand protection
- Break through time : 480 min
- Glove thickness : 0,7 mm
- Remarks : Long-term exposure Impervious butyl rubber gloves

- Break through time : 30 min
- Glove thickness : 0,4 mm
- Remarks : For short-term exposure (splash protection): Nitrile rubber gloves.

- Remarks : These types of protective gloves are offered by various manufacturers. Please note the manufacturers´ detailed statements, especially about the minimum thickness and the minimum breakthrough time. Consider also the particular working conditions under which the gloves are being used.

Respiratory protection : Use respiratory protection in case of insufficient exhaust ventilation or prolonged exposure
Full mask to standard DIN EN 136
Filter A (organic gases and vapours) to standard DIN EN 141
The use of filter apparatus presupposes that the environment atmosphere contains at least 17% oxygen by volume, and does not exceed the maximum gas concentration, usually

0.5% by volume. Relevant guidelines to be considered include EN 136/141/143/371/372 as well as other national regulations.

Protective measures : Do not inhale vapours
Avoid contact with skin and eyes.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance	:	Liquid
Colour	:	yellow
Odour	:	slightly perceptible
Odour Threshold	:	not tested.
pH	:	approx. 8 (20 °C) Concentration: 100 g/l Method: DIN 19268
Melting point	:	-32 °C Method: DIN 51583
Boiling point	:	approx. 165 °C (1.013 hPa) Method: ASTM D 1120 166 °C (1.013 hPa) Method: ASTM D 1120
Flash point	:	119 °C Method: ASTM D6450 (closed cup)
Evaporation rate	:	not tested.
Flammability (solid, gas)	:	Not applicable
Burning number	:	Not applicable
Upper explosion limit / upper flammability limit	:	not tested.
Lower explosion limit / Lower flammability limit	:	3 %(V) Data relate to solvent
Vapour pressure	:	< 0,01 kPa (20 °C) Method: Calculated by Syracuse.
Relative vapour density	:	not tested.

Density	:	1,1138 g/cm3 (20 °C) Method: DIN 51757
Bulk density	:	Not applicable
Solubility(ies)		
Water solubility	:	completely miscible (20 °C)
Solubility in other solvents	:	not tested. Solvent: fat
Partition coefficient: n-octanol/water	:	Not applicable
Auto-ignition temperature	:	> 400 °C Method: DIN 51794
Decomposition temperature	:	> 300 °C Method: DSC Measurement under nitrogen No decomposition up to 300 °C.
Viscosity		
Viscosity, dynamic	:	20,3 mPa.s (20 °C)
Viscosity, kinematic	:	20,3 mm2/s (20 °C) Method: DIN 51562
Explosive properties	:	Not explosive Method: Expert judgement
Oxidizing properties	:	The substance or mixture is not classified as oxidizing. Method: Expert judgement

9.2 Other information

Surface tension	:	33,8 mN/m
Molecular weight	:	Not applicable
Metal corrosion rate	:	< 6,25 mm/a
Minimum ignition energy	:	not tested.
Particle size	:	Not applicable
Self-ignition	:	Not applicable

SECTION 10: Stability and reactivity

10.1 Reactivity

See section 10.3. "Possibility of hazardous reactions"

10.2 Chemical stability

Stable under normal conditions.
hygroscopic

10.3 Possibility of hazardous reactions

Hazardous reactions : Reactions with alkalies.
Reactions with oxidising agents.

Stable

10.4 Conditions to avoid

Conditions to avoid : None known.

10.5 Incompatible materials

Materials to avoid : not known

10.6 Hazardous decomposition products

When handled and stored appropriately, no dangerous decomposition products are known

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Product:

Acute oral toxicity : Acute toxicity estimate: 519,54 mg/kg
Method: Calculation method

Acute inhalation toxicity : LC50 (Rat, male and female): > 2,5 mg/l
Exposure time: 6 h
Test atmosphere: dust/mist
Remarks: Information refers to the main component.

Acute dermal toxicity : LD50 (Mouse, male and female): > 3.500 mg/kg
Remarks: Information refers to the main component.

Components:

Ethanediol:

Acute oral toxicity : LD50 (Rat, male and female): 22.000 mg/kg
Method: Other
GLP: no

Acute inhalation toxicity : LC50 (Rat, male and female): > 2,5 mg/l
Exposure time: 6 h

Test atmosphere: dust/mist
Method: Other
GLP: yes

Acute dermal toxicity : LD50 (Mouse, male and female): > 3.500 mg/kg
Method: Other
GLP: yes

Skin corrosion/irritation

Product:

Species : Rabbit
Result : No skin irritation
Remarks : Information refers to the main component.

Components:

Ethanediol:

Species : Rabbit
Exposure time : 20 h
Method : Other
Result : No skin irritation
GLP : no

Serious eye damage/eye irritation

Product:

Remarks : no data available

Components:

Ethanediol:

Species : Rabbit
Exposure time : 24 h
Method : Other
Result : No eye irritation
GLP : no

Respiratory or skin sensitisation

Product:

Test Type : Guinea pig maximization test
Species : Guinea pig
Method : Magnusson/Kligman
Result : non-sensitizing
Remarks : Information refers to the main component.

Components:

Ethanediol:

Test Type : Maximisation Test
Exposure routes : Dermal

Species	:	Guinea pig
Method	:	OECD Test Guideline 406
Result	:	Not a skin sensitizer.
GLP	:	yes

Assessment : Harmful if swallowed.

Germ cell mutagenicity

Product:

Germ cell mutagenicity- Assessment : It is concluded that the product is not mutagenic based on evaluation of several mutagenicity tests.

Information refers to the main component.

Components:

Ethanediol:

Genotoxicity in vitro :
Test Type: Ames test
Test system: Salmonella typhimurium
Concentration: 33 - 5000 µg/plate
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
GLP: yes

Test Type: Ames test
Test system: Escherichia coli
Concentration: 33 - 5000 µg/plate
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
GLP: yes

Test Type: Chromosome aberration test in vitro
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Method: Other
Result: negative
GLP: yes

Test Type: In vitro mammalian cell gene mutation test
Test system: mouse lymphoma cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: negative
GLP: yes

Genotoxicity in vivo :
Test Type: Dominant lethal assay
Species: Rat (male and female)
Strain: Fischer F344
Application Route: oral (feed)

Exposure time: 3 generation
Dose: 40 - 200 - 1000 mg/kg
Method: Other
Result: negative
GLP: no

Germ cell mutagenicity-Assessment : It is concluded that the product is not mutagenic based on evaluation of several mutagenicity tests.

Carcinogenicity

Product:

Carcinogenicity - Assessment : No evidence of carcinogenicity in animal studies.

Information refers to the main component.

Components:

Ethanediol:

Species	:	Mouse, male and female
Application Route	:	oral (feed)
Exposure time	:	2 a
Dose	:	6250-12500-25000-50000 ppm
Group	:	yes
Frequency of Treatment	:	daily
NOAEL	:	1.500 mg/kg bw/day
Method	:	Other
GLP	:	yes

Carcinogenicity - Assessment : Not classifiable as a human carcinogen.

Reproductive toxicity

Product:

Reproductive toxicity - Assessment : No indications of toxic effects were observed in reproduction studies in animals.

No reproductive toxicity to be expected.

Information refers to the main component.

Information refers to the main component.

Components:

Ethanediol:

Effects on fertility : Test Type: Three-generation study
Species: Rat, male and female
Strain: Fischer F344
Application Route: oral (feed)
Dose: 40 - 200 - 1000

General Toxicity - Parent: NOAEL: > 1.000 mg/kg body weight
General Toxicity F1: NOAEL: > 1.000 mg/kg body weight
General Toxicity F2: NOAEL: > 1.000 mg/kg body weight
Method: Other
GLP: no

Effects on foetal development	:	Test Type: reproductive and developmental toxicity study Species: Rat, female Strain: Sprague-Dawley Application Route: oral (gavage) Dose: 150 - 500 - 1000 - 2500 mg/kg Duration of Single Treatment: 9 d General Toxicity Maternal: NOEL: 1.500 mg/kg body weight Teratogenicity: NOEL: 150 mg/kg body weight Method: Other GLP: yes
Reproductive toxicity - Assessment	:	No reproductive toxicity to be expected. No teratogenic effects to be expected.

STOT - single exposure

Product:

Remarks : no data available

Components:

Ethanediol:

Assessment : The substance or mixture is not classified as specific target organ toxicant, single exposure.

STOT - repeated exposure

Product:

Remarks : no data available

Components:

Ethanediol:

Target Organs : Kidney
Assessment : May cause damage to organs through prolonged or repeated exposure.

Repeated dose toxicity

Product:

Species : Rat, male and female
NOAEL : 200 mg/kg
Application Route : oral (gavage)
Method : OECD Test Guideline 407
Remarks : Information refers to the main component.

Species	:	Rat, male
NOAEL	:	150 mg/kg
Application Route	:	oral (feed)
Method	:	OECD Test Guideline 408
Remarks	:	Information refers to the main component.

Species	:	Dog, male
NOAEL	:	2,22 mg/kg
Application Route	:	Dermal
Method	:	OECD Test Guideline 410
Remarks	:	Information refers to the main component.

Components:

Ethanediol:

Species	:	Rat, male
NOAEL	:	150 mg/kg bw/day
Application Route	:	oral (feed)
Exposure time	:	16 w
Number of exposures	:	daily
Dose	:	50 - 150 - 500 - 1000 mg/kg
Group	:	yes
Method	:	OECD Test Guideline 408
GLP	:	No information available.

Species	:	Dog, male
NOAEL	:	2.200 - 4.400 mg/kg bw/day
Application Route	:	Dermal
Exposure time	:	4 w
Number of exposures	:	daily
Dose	:	2 - 4 mL/kg bw
Group	:	yes
Method	:	OECD Test Guideline 410
GLP	:	yes

Aspiration toxicity

Product:

no data available

Components:

Ethanediol:

No aspiration toxicity classification

Further information

Product:

Remarks	:	Kidney injury may occur.
Remarks	:	Poisoning affects the central nervous system
Remarks	:	The classification was made by the conventional (calculation)

method of the CLP Regulation (EC) No 1272/2008.

SECTION 12: Ecological information

12.1 Toxicity

Product:

Toxicity to fish	:	LC0 (Leuciscus idus (Golden orfe)): 1.000 mg/l LL50 (Danio rerio (zebra fish)): > 100 mg/l Exposure time: 96 h Test Type: static test Method: OECD Test Guideline 203 GLP: yes Remarks: By analogy with a product of similar composition
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): > 100 mg/l Exposure time: 48 h Method: OECD Test Guideline 202 Remarks: Information refers to the main component.
Toxicity to algae	:	EC50 (Selenastrum capricornutum (green algae)): 6.500 - 13.000 mg/l Exposure time: 96 h Remarks: Information refers to the main component.
Toxicity to microorganisms	:	EC20 (activated sludge): > 1.995 mg/l Exposure time: 30 min Method: ISO 8192 Remarks: Information refers to the main component.

Components:

Ethanediol:

Toxicity to fish	:	LC50 (Pimephales promelas (fathead minnow)): 72.860 mg/l Exposure time: 96 h Test Type: static test Analytical monitoring: yes Method: EPA GLP: no Remarks: The details of the toxic effect relate to the nominal concentration.
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): > 100 mg/l Exposure time: 48 h Test Type: static test Analytical monitoring: yes Method: OECD Test Guideline 202 GLP: yes
Toxicity to algae	:	EC50 (Pseudokirchneriella subcapitata (green algae)): 6.500 - 13.000 mg/l End point: Growth rate

Exposure time: 7 d
Test Type: static test
Analytical monitoring: no data available
Method: EPA
GLP: No information available.

Toxicity to microorganisms : EC20 (activated sludge, domestic): > 1.995 mg/l
End point: Bacteria toxicity (respiration inhibition)
Exposure time: 0,5 h
Analytical monitoring: no
Method: ISO 8192
GLP: no

Toxicity to fish (Chronic toxicity) : Chronic Toxicity Value: 2.629 mg/l
End point: Other
Exposure time: 30 d
Species: Fish
Method: Other
GLP: no
Remarks: The value is given based on a SAR/AAR approach using OECD Toolbox, DEREK, VEGA QSAR models (CAESAR models), etc.

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC: 8.590 mg/l
End point: Reproduction rate
Exposure time: 7 d
Species: Ceriodaphnia spec.
Test Type: semi-static test
Analytical monitoring: yes
Method: Other
GLP: No information available.
Remarks: The details of the toxic effect relate to the nominal concentration.

12.2 Persistence and degradability

Product:

Biodegradability : Biodegradation: 90 - 100 %
Exposure time: 10 d
Method: OECD Test Guideline 301A
Remarks: Readily biodegradable, according to appropriate OECD test.
Information refers to the main component.

Components:

Ethanediol:

Biodegradability : Test Type: aerobic
Inoculum: activated sludge
Concentration: 53 mg/l
Result: Readily biodegradable.
Biodegradation: 90 - 100 %
Related to: Dissolved organic carbon (DOC)

Exposure time: 10 d
Method: OECD Test Guideline 301A
GLP: yes

12.3 Bioaccumulative potential

Product:

Bioaccumulation	:	Remarks: no data available

Components:

Ethanediol:

Bioaccumulation	:	Remarks: Due to the low logPow bioaccumulation is not expected
Partition coefficient: n-octanol/water	:	log Pow: -1,36 Method: estimated GLP: no

12.4 Mobility in soil

Product:

Distribution among environmental compartments	:	Remarks: no data available

Components:

Ethanediol:

Distribution among environmental compartments	:	Adsorption/Soil Medium: water - soil log Koc: 0 Method: other (calculated)

12.5 Results of PBT and vPvB assessment

Product:

Assessment	:	After consideration of all available toxicity and ecotoxicity data it is concluded that the substance does not fulfil the PBT or vPvB criteria. . Remarks: Information refers to the main component.

Components:

Ethanediol:

Assessment	:	This substance is not considered to be persistent, bioaccumulating and toxic (PBT)..

12.6 Other adverse effects

Product:

Additional ecological information	:	If handled correctly it causes no disturbance in treatment plants. The classification was made by the conventional (calculation) method of the CLP Regulation (EC) No 1272/2008.

Components:

Ethanediol:

Environmental fate and pathways	:	not available
Additional ecological information	:	Do not allow to enter ground water, waterways or waste water.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product	:	Dispose of in accordance with local regulations.
Contaminated packaging	:	Uncontaminated packaging may be reused Packaging that cannot be cleaned should be disposed of as product waste

SECTION 14: Transport information

Section 14.1. to 14.5.

ADR	not restricted
ADN	not restricted
RID	not restricted
IATA	not restricted
IMDG	not restricted

14.6. Special precautions for user

See sections 6 to 8 of this Safety Data Sheet.

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code (International Bulk Chemicals Code)

No transport as bulk according IBC - Code.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Volatile organic compounds	:	Directive 1999/13/EC on the limitation of emissions of volatile organic compounds According to the composition the product contains no VOC

component as defined by Directive 1999/13/EC.

Directive 2004/42/EC
According to the composition, the product contains no VOC components as defined by Directive 2004/42/EC.

Other regulations:

Apart from the data/regulations specified in this chapter, no further information is available concerning safety, health and environmental protection.

15.2 Chemical safety assessment

Chemical Safety Assessments (CSAs) are available for one or more of the component substances contained in this product.

SECTION 16: Other information

Full text of H-Statements

H302	:	Harmful if swallowed.
H373	:	May cause damage to organs through prolonged or repeated exposure if swallowed.

Full text of other abbreviations

Acute Tox.	:	Acute toxicity
STOT RE	:	Specific target organ toxicity - repeated exposure
2000/39/EC	:	Europe. Commission Directive 2000/39/EC establishing a first list of indicative occupational exposure limit values
2000/39/EC / TWA	:	Limit Value - eight hours
2000/39/EC / STEL	:	Short term exposure limit

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - European Agreement concerning the International Carriage of Dangerous Goods by Road; AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECHA - European Chemicals Agency; EC-Number - European Community number; ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention;

PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; SVHC - Substance of Very High Concern; TCSI - Taiwan Chemical Substance Inventory; TRGS - Technical Rule for Hazardous Substances; TSCA - Toxic Substances Control Act (United States); UN - United Nations; vPvB - Very Persistent and Very Bioaccumulative

Further information

Other information : Observe national and local legal requirements

Classification of the mixture:		**Classification procedure:**
Acute Tox. 4	H302	Calculation method
STOT RE 2	H373	Calculation method

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REG_EU / EN

Exposure scenario

Number	Title
ES 1	**Industrial use; Use as an intermediate** PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC15 - ERC6a Ethane-1,2-diol
ES 2	**Industrial use; Use of non-reactive processing aid at industrial site (no inclusion into or onto article)** PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC13, PROC14, PROC15 - ERC4 Ethane-1,2-diol
ES 3	**Industrial use; Distribution of substance** PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9, PROC15 - ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7 Ethane-1,2-diol
ES 4	**Industrial use; Formulation [mixing] of preparations and/or re-packaging** PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15 - ERC2 Ethane-1,2-diol
ES 5	**Industrial use; Use in polymer production** PROC1, PROC2, PROC3, PROC4, PROC5, PROC6, PROC8a, PROC8b, PROC9, PROC15 - ERC6c Ethane-1,2-diol
ES 6	**Industrial use; Coatings and paints, thinners, paint removers** PROC1, PROC2, PROC3, PROC4, PROC5, PROC7, PROC8a, PROC8b, PROC10, PROC13, PROC15 - ERC4 Ethane-1,2-diol
ES 7	**Professional use; Coatings and paints, thinners, paint removers, Adhesives, sealants, Foaming, Use in polymer processing** PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC10, PROC11, PROC13, PROC14, PROC15, PROC19 - ERC8a, ERC8c, ERC8d, ERC8f Ethane-1,2-diol
ES 8	**Consumer use; Coatings and paints, thinners, paint removers, Surface treatment** PC9a, PC15, PC18, PC31, PC24, PC34 - ERC8a, ERC8c, ERC8d, ERC8f Ethane-1,2-diol
ES 9	**Industrial use; Use in cleaning agents** PROC1, PROC2, PROC3, PROC4, PROC7, PROC8a, PROC8b, PROC10, PROC13 - ERC4 Ethane-1,2-diol
ES 10	**Professional use; Use in cleaning agents**

	PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC10, PROC11, PROC13 - ERC8a, ERC8d Ethane-1,2-diol
ES 11	**Consumer use; Use in cleaning agents** PC35 - ERC8a, ERC8d Ethane-1,2-diol
ES 12	**Industrial use; Use in lubricants** PROC1, PROC2, PROC3, PROC4, PROC5, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC17, PROC18 - ERC4, ERC7 Ethane-1,2-diol
ES 13	**Industrial use; Metal working fluids** PROC1, PROC2, PROC3, PROC4, PROC5, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC17 - ERC4 Ethane-1,2-diol
ES 14	**Professional use; Metal working fluids** PROC1, PROC2, PROC3, PROC5, PROC8a, PROC8b, PROC9, PROC10, PROC11, PROC13, PROC17 - ERC8a, ERC8d Ethane-1,2-diol
ES 15	**Professional use; Use in agrochemicals** PROC1, PROC2, PROC4, PROC8a, PROC8b, PROC9, PROC11, PROC13 - ERC8a, ERC8d Ethane-1,2-diol
ES 16	**Industrial use; Use in functional fluids** PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9 - ERC7 Ethane-1,2-diol
ES 17	**Professional use; Use in functional fluids** PROC1, PROC2, PROC3, PROC4, PROC8a, PROC9, PROC20 - ERC9a, ERC9b Ethane-1,2-diol
ES 18	**Consumer use; Heat transfer fluids, Hydraulic fluids** PC16, PC17 - ERC9a, ERC9b Ethane-1,2-diol
ES 19	**Professional use; Anti-freeze and de-icing products** PROC1, PROC2, PROC8a, PROC8b, PROC11 - ERC8d Ethane-1,2-diol
ES 20	**Consumer use; Anti-freeze and de-icing products** PC4 - ERC8d Ethane-1,2-diol
ES 21	**Industrial use, Professional use; Use in laboratories** PROC15 - ERC8a Ethane-1,2-diol
ES 22	**Industrial use; Use in water treatment agents**

	PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC13 - ERC3, ERC4 Ethane-1,2-diol
ES 23	**Consumer use; Adhesives, sealants** PC1 - ERC8c, ERC8f Ethane-1,2-diol
ES 24	**Industrial use; Manufacture of substance, Adhesives, sealants, Foaming, Use in coatings, Use in polymer production** PROC1, PROC2, PROC3, PROC4, PROC5, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC14, PROC15 - ERC2, ERC3, ERC5, ERC6c Ethane-1,2-diol
ES 25	**Consumer use; Insulation foams** PC32 - ERC8c, ERC8f Ethane-1,2-diol

1. ES 1: Industrial use; Use as an intermediate

1.1. Title section

Environment		
CS1:	Industrial use (Use of intermediate)	ERC6a
Workers		
CS2:	Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	PROC1
CS3:	Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC2
CS4:	Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Mixing or blending in batch processes)	PROC5
CS6:	Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS7:	Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS8:	Industrial use (Use as laboratory reagent)	PROC15

1.2. ES 1 Conditions of use affecting exposure

1.2.1 ES 1 - CS 1: Control of environmental exposure: Industrial use (Use of intermediate) (ERC6a)

Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

1.2.2 ES 1 - CS 2: Control of worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

1.2.3 ES 1 - CS 3: Control of worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

1.2.4 ES 1 - CS 4: Control of worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Note	:	Chemical production where opportunity for exposure arises No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

1.2.5 ES 1 - CS 5: Control of worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

1.2.6 ES 1 - CS 6: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.

Covers skin contact area up to : 960 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : inhalative
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 90 %
Personal protective measures : If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

1.2.7 ES 1 - CS 7: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

1.2.8 ES 1 - CS 8: Control of worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Product characteristics
Concentration of the Substance in : <= 100 %

Mixture/Article

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Amount used
Storage : < 1 kg, < 1 l

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 240 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Use as laboratory reagent
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

1.3. ES 1 Exposure estimation and reference to its source

1.3.2 ES 1 - CS 2: Worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,004

1.3.3 ES 1 - CS 3: Worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,08

1.3.4 ES 1 - CS 4: Worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,003
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,06
combined routes	ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises	0,43

1.3.5 ES 1 - CS 5: Worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,38

1.3.6 ES 1 - CS 6: Worker exposure: Industrial use (Transfer of substance or mixture

(charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,20

1.3.7 ES 1 - CS 7: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities	0,43
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,43

1.3.8 ES 1 - CS 8: Worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,37

1.4. ES 1 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

2. ES 2: Industrial use; Use of non-reactive processing aid at industrial site (no inclusion into or onto article)

2.1. Title section

Environment		
CS1:	Industrial use (Use of non-reactive processing aid at industrial site (no inclusion into or onto article))	ERC4
Workers		
CS2:	Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	PROC1
CS3:	Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC2
CS4:	Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Mixing or blending in batch processes)	PROC5
CS6:	Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS7:	Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS8:	Industrial use (Treatment of articles by dipping and pouring)	PROC13
CS9:	Industrial use (Tabletting, compression, extrusion, pelettisation, granulation)	PROC14
CS10:	Industrial use (Use as laboratory reagent)	PROC15

2.2. ES 2 Conditions of use affecting exposure

2.2.1 ES 2 - CS 1: Control of environmental exposure: Industrial use (Use of non-reactive processing aid at industrial site (no inclusion into or onto article)) (ERC4)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

2.2.2 ES 2 - CS 2: Control of worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent

containment conditions) (PROC1)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

2.2.3 ES 2 - CS 3: Control of worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

2.2.4 ES 2 - CS 4: Control of worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Note	:	Chemical production where opportunity for exposure arises No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

2.2.5 ES 2 - CS 5: Control of worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

2.2.6 ES 2 - CS 6: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative

Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

2.2.7 ES 2 - CS 7: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

2.2.8 ES 2 - CS 8: Control of worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min

Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : dermal
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

2.2.9 ES 2 - CS 9: Control of worker exposure: Industrial use (Tabletting, compression, extrusion, pelettisation, granulation) (PROC14)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

2.2.10 ES 2 - CS 10: Control of worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Product characteristics
Concentration of the Substance in : <= 100 %

Mixture/Article

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Amount used
Storage : < 1 kg, < 1 l

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 240 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Use as laboratory reagent
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

2.3. ES 2 Exposure estimation and reference to its source

2.3.2 ES 2 - CS 2: Worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,004

2.3.3 ES 2 - CS 3: Worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,08

2.3.4 ES 2 - CS 4: Worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,003
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,06
combined routes	ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises	0,43

2.3.5 ES 2 - CS 5: Worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,38

2.3.6 ES 2 - CS 6: Worker exposure: Industrial use (Transfer of substance or mixture

(charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,20

2.3.7 ES 2 - CS 7: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities	0,43
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,43

2.3.8 ES 2 - CS 8: Worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,87 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,75

2.3.9 ES 2 - CS 9: Worker exposure: Industrial use (Tabletting, compression, extrusion, pelettisation, granulation) (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	3,43 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03
combined routes	ECETOC TRA worker v2.0	0,40

2.3.10 ES 2 - CS 10: Worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,37

2.4. ES 2 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

3. ES 3: Industrial use; Distribution of substance

3.1. Title section

Environment		
CS1:	Industrial use (Manufacture of the substance, Formulation into mixture, Formulation into solid matrix, Use of non-reactive processing aid at industrial site (no inclusion into or onto article), Use at industrial site leading to inclusion into/onto article, Use of intermediate, Use of reactive processing aid at industrial site (no inclusion into or onto article), Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article), Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article), Use of functional fluid at industrial site)	ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7
Workers		
CS2:	Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	PROC1
CS3:	Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with	PROC2

	equivalent containment conditions)	
CS4:	Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS6:	Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS7:	Industrial use (Use as laboratory reagent)	PROC15

3.2. ES 3 Conditions of use affecting exposure

3.2.1 ES 3 - CS 1: Control of environmental exposure: Industrial use (Manufacture of the substance, Formulation into mixture, Formulation into solid matrix, Use of non-reactive processing aid at industrial site (no inclusion into or onto article), Use at industrial site leading to inclusion into/onto article, Use of intermediate, Use of reactive processing aid at industrial site (no inclusion into or onto article), Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article), Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article), Use of functional fluid at industrial site) (ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

3.2.2 ES 3 - CS 2: Control of worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Product characteristics

Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use

Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management

Dermal exposure : Palm of one hand
Covers skin contact area up to : 240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor use

Risk Management Measures
Technical conditions and measures : Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

3.2.3 ES 3 - CS 3: Control of worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm^2

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

3.2.4 ES 3 - CS 4: Control of worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Note	:	Chemical production where opportunity for exposure arises No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

3.2.5 ES 3 - CS 5: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

3.2.6 ES 3 - CS 6: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

3.2.7 ES 3 - CS 7: Control of worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Amount used
Storage : < 1 kg, < 1 l

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 240 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Use as laboratory reagent
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

3.3. ES 3 Exposure estimation and reference to its source

3.3.2 ES 3 - CS 2: Worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,004

3.3.3 ES 3 - CS 3: Worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term -	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01

systemic		
combined routes	ECETOC TRA worker v2.0	0,08

3.3.4 ES 3 - CS 4: Worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,003
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,06
combined routes	ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises	0,43

3.3.5 ES 3 - CS 5: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,20

3.3.6 ES 3 - CS 6: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type	Exposure estimate	RCR

of effects		
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities	0,43
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,43

3.3.7 ES 3 - CS 7: Worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,37

3.4. ES 3 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

4. ES 4: Industrial use; Formulation [mixing] of preparations and/or re-packaging

4.1. Title section

Environment	
CS1: Industrial use (Formulation into mixture)	ERC2
Workers	

CS2:	Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	PROC1
CS3:	Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC2
CS4:	Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Mixing or blending in batch processes)	PROC5
CS6:	Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS7:	Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS8:	Industrial use (Tabletting, compression, extrusion, pelettisation, granulation)	PROC14
CS9:	Industrial use (Use as laboratory reagent)	PROC15

4.2. ES 4 Conditions of use affecting exposure

4.2.1 ES 4 - CS 1: Control of environmental exposure: Industrial use (Formulation into mixture) (ERC2)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

4.2.2 ES 4 - CS 2: Control of worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Product characteristics

Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use

Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management

Dermal exposure : Palm of one hand
Covers skin contact area up to : 240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor use

Risk Management Measures
Technical conditions and measures : Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

4.2.3 ES 4 - CS 3: Control of worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm^2

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

4.2.4 ES 4 - CS 4: Control of worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Note	:	Chemical production where opportunity for exposure arises No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

4.2.5 ES 4 - CS 5: Control of worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

4.2.6 ES 4 - CS 6: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

4.2.7 ES 4 - CS 7: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

4.2.8 ES 4 - CS 8: Control of worker exposure: Industrial use (Tabletting, compression, extrusion, pelettisation, granulation) (PROC14)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

4.2.9 ES 4 - CS 9: Control of worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Amount used
Storage : < 1 kg, < 1 l

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 240 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Use as laboratory reagent
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

4.3. ES 4 Exposure estimation and reference to its source

4.3.2 ES 4 - CS 2: Worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,004

4.3.3 ES 4 - CS 3: Worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,08

4.3.4 ES 4 - CS 4: Worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,003
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,06
combined routes	ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises	0,43

4.3.5 ES 4 - CS 5: Worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,38

4.3.6 ES 4 - CS 6: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,20

4.3.7 ES 4 - CS 7: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities	0,43
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,43

4.3.8 ES 4 - CS 8: Worker exposure: Industrial use (Tabletting, compression, extrusion, pelettisation, granulation) (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	3,43 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03
combined routes	ECETOC TRA worker v2.0	0,40

4.3.9 ES 4 - CS 9: Worker exposure: Industrial use (Use as laboratory reagent)

(PROC15)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,37

4.4. ES 4 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

5. ES 5: Industrial use; Use in polymer production

5.1. Title section

Environment		
CS1:	Industrial use (Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article))	ERC6c
Workers		
CS2:	Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	PROC1
CS3:	Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC2
CS4:	Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Mixing or blending in batch processes)	PROC5
CS6:	Industrial use (Calendering operations)	PROC6
CS7:	Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS8:	Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS9:	Industrial use (Use as laboratory reagent)	PROC15

5.2. ES 5 Conditions of use affecting exposure

5.2.1 ES 5 - CS 1: Control of environmental exposure: Industrial use (Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)) (ERC6c)

Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

5.2.2 ES 5 - CS 2: Control of worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

5.2.3 ES 5 - CS 3: Control of worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

5.2.4 ES 5 - CS 4: Control of worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Note	:	Chemical production where opportunity for exposure arises No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

5.2.5 ES 5 - CS 5: Control of worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

5.2.6 ES 5 - CS 6: Control of worker exposure: Industrial use (Calendering operations) (PROC6)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

5.2.7 ES 5 - CS 7: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

5.2.8 ES 5 - CS 8: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

5.2.9 ES 5 - CS 9: Control of worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Amount used

Storage	:	< 1 kg, < 1 l

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Use as laboratory reagent
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

5.3. ES 5 Exposure estimation and reference to its source

5.3.2 ES 5 - CS 2: Worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,004

5.3.3 ES 5 - CS 3: Worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,08

5.3.4 ES 5 - CS 4: Worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or	0,22

- local and systemic	formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,003
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,06
combined routes	ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises	0,43

5.3.5 ES 5 - CS 5: Worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,38

5.3.6 ES 5 - CS 6: Worker exposure: Industrial use (Calendering operations) (PROC6)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03
combined routes	ECETOC TRA worker v2.0	0,40

5.3.7 ES 5 - CS 7: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07

Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,20

5.3.8 ES 5 - CS 8: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities	0,43
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,43

5.3.9 ES 5 - CS 9: Worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,37

5.4. ES 5 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

6. ES 6: Industrial use; Coatings and paints, thinners, paint

removers

6.1. Title section

Environment		
CS1:	Industrial use (Use of non-reactive processing aid at industrial site (no inclusion into or onto article))	ERC4
Workers		
CS2:	Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	PROC1
CS3:	Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC2
CS4:	Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Mixing or blending in batch processes)	PROC5
CS6:	Industrial use (Industrial spraying)	PROC7
CS7:	Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS8:	Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities)	PROC8b
CS9:	Industrial use (Roller application or brushing)	PROC10
CS10:	Industrial use (Treatment of articles by dipping and pouring)	PROC13
CS11:	Industrial use (Use as laboratory reagent)	PROC15

6.2. ES 6 Conditions of use affecting exposure

6.2.1 ES 6 - CS 1: Control of environmental exposure: Industrial use (Use of non-reactive processing aid at industrial site (no inclusion into or onto article)) (ERC4)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

6.2.2 ES 6 - CS 2: Control of worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Product characteristics

Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Palm of one hand
Covers skin contact area up to : 240 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Technical conditions and measures : Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

6.2.3 ES 6 - CS 3: Control of worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

6.2.4 ES 6 - CS 4: Control of worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Note	:	Chemical production where opportunity for exposure arises No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

6.2.5 ES 6 - CS 5: Control of worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

6.2.6 ES 6 - CS 6: Control of worker exposure: Industrial use (Industrial spraying) (PROC7)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	0,6 L/min

Frequency and duration of use

Exposure duration	:	360 min
Frequency of use	:	<= 5 days per week

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	> 1000 m3

Risk Management Measures

Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	50 %
Note	:	Ensure that the direction of airflow is clearly away from the worker.
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %

Personal protective measures	:	Wear suitable protective clothing. Wear suitable coveralls to prevent exposure to the skin.
Effectiveness (of a measure)	:	80 %
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the distance from worker to task is greater than 1 m.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that direction of application is only horizontal or downward.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of work area
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of equipment
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure regular inspection, cleaning and maintenance of equipment and machines.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

6.2.7 ES 6 - CS 7: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation

Effectiveness (of a measure)	:	90 %
Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

6.2.8 ES 6 - CS 8: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities) (PROC8b)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	Transfer of substance or mixture (charging/discharging) at dedicated facilities No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

6.2.9 ES 6 - CS 9: Control of worker exposure: Industrial use (Roller application or brushing) (PROC10)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : dermal
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

6.2.10 ES 6 - CS 10: Control of worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : dermal
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

6.2.11 ES 6 - CS 11: Control of worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Amount used
Storage : < 1 kg, < 1 l

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 240 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Use as laboratory reagent
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

6.3. ES 6 Exposure estimation and reference to its source

6.3.2 ES 6 - CS 2: Worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,004

6.3.3 ES 6 - CS 3: Worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Route of exposure and type	Exposure estimate	RCR

of effects		
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,08

6.3.4 ES 6 - CS 4: Worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,003
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,06
combined routes	ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises	0,43

6.3.5 ES 6 - CS 5: Worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,38

6.3.6 ES 6 - CS 6: Worker exposure: Industrial use (Industrial spraying) (PROC7)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	9,79 mg/m³ (Stoffenmanager v4.0)	0,28
Worker - dermal, long-term - systemic	54,6 mg/kg bw/day (RISKOFDERM v2.1)	0,52
combined routes	Not applicable	0,80

6.3.7 ES 6 - CS 7: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,20

6.3.8 ES 6 - CS 8: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities) (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0)	0,06
combined routes	ECETOC TRA worker v2.0	0,43

6.3.9 ES 6 - CS 9: Worker exposure: Industrial use (Roller application or brushing) (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,87 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03
combined routes	ECETOC TRA worker v2.0	0,77

6.3.10 ES 6 - CS 10: Worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Route of exposure and type	Exposure estimate	RCR

of effects		
Worker - inhalative, long-term - local and systemic	25,87 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,75

6.3.11 ES 6 - CS 11: Worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,37

6.4. ES 6 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

7. ES 7: Professional use; Coatings and paints, thinners, paint removers, Adhesives, sealants, Foaming, Use in polymer processing

7.1. Title section

Environment		
CS1:	Professional use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor), Widespread use leading to inclusion into/onto article (indoor), Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor), Widespread use leading to inclusion into/onto article (outdoor))	ERC8a, ERC8c, ERC8d, ERC8f
Workers		
CS2:	Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	PROC1, PROC2, PROC3

CS3:	Professional use (Chemical production where opportunity for exposure arises, Mixing or blending in batch processes)	PROC4, PROC5
CS4:	Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS5:	Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS6:	Professional use (Roller application or brushing)	PROC10
CS7:	Professional use (Non-industrial spraying)	PROC11
CS8:	Professional use (Treatment of articles by dipping and pouring, Tabletting, compression, extrusion, pelettisation, granulation)	PROC13, PROC14
CS9:	Professional use (Use as laboratory reagent)	PROC15
CS10:	Professional use (Manual activities involving hand contact)	PROC19

7.2. ES 7 Conditions of use affecting exposure

7.2.1 ES 7 - CS 1: Control of environmental exposure: Professional use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor), Widespread use leading to inclusion into/onto article (indoor), Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor), Widespread use leading to inclusion into/onto article (outdoor)) (ERC8a, ERC8c, ERC8d, ERC8f)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

7.2.2 ES 7 - CS 2: Control of worker exposure: Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition) (PROC1, PROC2, PROC3)

Product characteristics

Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use

Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management

Dermal exposure : Palm of one hand
Covers skin contact area up to : 240 cm²

Remarks	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions Sample via a closed loop or other system to avoid exposure.
Technical conditions and measures	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition With occasional controlled exposure

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

7.2.3 ES 7 - CS 3: Control of worker exposure: Professional use (Chemical production where opportunity for exposure arises, Mixing or blending in batch processes) (PROC4, PROC5)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

7.2.4 ES 7 - CS 4: Control of worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : inhalative
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 80 %
Personal protective measures : If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure) : 80 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

7.2.5 ES 7 - CS 5: Control of worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

7.2.6 ES 7 - CS 6: Control of worker exposure: Professional use (Roller application or brushing) (PROC10)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : dermal
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Exposure routes : inhalative
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 80 %

Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	80 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

7.2.7 ES 7 - CS 7: Control of worker exposure: Professional use (Non-industrial spraying) (PROC11)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	0,05 L/min

Frequency and duration of use

Exposure duration	:	150 min
Frequency of use	:	<= 5 days per week

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	<= 1000 m3

Risk Management Measures

Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	Wear suitable protective clothing. Wear suitable coveralls to prevent exposure to the skin.
Effectiveness (of a measure)	:	80 %
Personal protective measures	:	Wear a respirator conforming to EN140.
Effectiveness (of a measure)	:	40 %
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that direction of application is only horizontal or downward.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the distance from worker to task is greater than 1 m.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the direction of airflow is clearly away from the worker.
Note	:	Not applicable

Organisational measures to prevent /limit releases, dispersion and exposure	:	Provide enhanced general ventilation by mechanical means.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of work area
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of equipment
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure regular inspection, cleaning and maintenance of equipment and machines.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the task is not carried out by more than one worker simultaneously.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

7.2.8 ES 7 - CS 8: Control of worker exposure: Professional use (Treatment of articles by dipping and pouring, Tabletting, compression, extrusion, pelettisation, granulation) (PROC13, PROC14)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %
Note	:	Treatment of articles by dipping and pouring

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

7.2.9 ES 7 - CS 9: Control of worker exposure: Professional use (Use as laboratory reagent) (PROC15)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Amount used
Storage : < 1 kg, < 1 l

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 240 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Use as laboratory reagent
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

7.2.10 ES 7 - CS 10: Control of worker exposure: Professional use (Manual activities involving hand contact) (PROC19)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : < 15 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to hands and forearms.
Covers skin contact area up to : 1980 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

7.3. ES 7 Exposure estimation and reference to its source

7.3.2 ES 7 - CS 2: Worker exposure: Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition) (PROC1, PROC2, PROC3)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	0,003
combined routes	ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	0,004
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	0,01
combined routes	ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	0,38
Worker - inhalative, long-term	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or	0,22

- local and systemic	formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,003
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23

7.3.3 ES 7 - CS 3: Worker exposure: Professional use (Chemical production where opportunity for exposure arises, Mixing or blending in batch processes) (PROC4, PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,06
combined routes	ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises	0,80
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Mixing or blending in batch processes)	0,74
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0, Mixing or blending in batch processes)	0,01
combined routes	ECETOC TRA worker v2.0, Mixing or blending in batch processes	0,75

7.3.4 ES 7 - CS 4: Worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,50

7.3.5 ES 7 - CS 5: Worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities	0,80
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,80

7.3.6 ES 7 - CS 6: Worker exposure: Professional use (Roller application or brushing) (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03
combined routes	ECETOC TRA worker v2.0	0,40

7.3.7 ES 7 - CS 7: Worker exposure: Professional use (Non-industrial spraying) (PROC11)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	14,05 mg/m³ (Stoffenmanager v4.0)	0,40
Worker - dermal, long-term - systemic	53,75 mg/kg bw/day (RISKOFDERM v2.1)	0,51
combined routes	Not applicable	0,91

7.3.8 ES 7 - CS 8: Worker exposure: Professional use (Treatment of articles by dipping and pouring, Tabletting, compression, extrusion, pelettisation, granulation) (PROC13, PROC14)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Treatment of articles by dipping and pouring)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0, Treatment of articles by dipping and pouring)	0,01
combined routes	ECETOC TRA worker v2.0, Treatment of articles by dipping and pouring	0,75
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Tabletting, compression, extrusion, pelettisation, granulation)	0,74
Worker - dermal, long-term - systemic	3,43 mg/kg bw/day (ECETOC TRA worker v2.0, Tabletting, compression, extrusion, pelettisation, granulation)	0,03
combined routes	ECETOC TRA worker v2.0, Tabletting, compression, extrusion, pelettisation, granulation	0,77

7.3.9 ES 7 - CS 9: Worker exposure: Professional use (Use as laboratory reagent) (PROC15)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,37

7.3.10 ES 7 - CS 10: Worker exposure: Professional use (Manual activities involving hand contact) (PROC19)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	6,47 mg/m³ (ECETOC TRA worker v2.0)	0,18
Worker - dermal, long-term - systemic	14,14 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,31

7.4. ES 7 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

8. ES 8: Consumer use; Coatings and paints, thinners, paint removers, Surface treatment

8.1. Title section

Coatings and paints, thinners, paint removers (PC9a) Non-metal surface treatment products (PC15) Ink and toners (PC18) Polishes and wax blends (PC31) Lubricants, greases, release products (PC24) Textile dyes and impregnating products (PC34)		
Environment		
CS1:	Consumer use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor), Widespread use leading to inclusion into/onto article (indoor), Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor), Widespread use leading to inclusion into/onto article (outdoor))	ERC8a, ERC8c, ERC8d, ERC8f
Consumer		
CS2:	Consumer use (Coatings and paints, thinners, paint removers, Non-metal surface treatment products)	PC9a, PC15
CS3:	Consumer use (Coatings and paints, thinners, paint removers, Non-metal surface treatment products)	PC9a, PC15
CS4:	Consumer use (Ink and toners)	PC18
CS5:	Consumer use (Ink and toners)	PC18
CS6:	Consumer use (Polishes and wax blends)	PC31

8.2. ES 8 Conditions of use affecting exposure

8.2.1 ES 8 - CS 1: Control of environmental exposure: Consumer use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor), Widespread use leading to inclusion into/onto article (indoor), Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor), Widespread use leading to inclusion into/onto article (outdoor)) (ERC8a, ERC8c, ERC8d, ERC8f)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

8.2.2 ES 8 - CS 2: Control of consumer exposure: Consumer use (Coatings and paints, thinners, paint removers, Non-metal surface treatment products) (PC9a, PC15)

Remarks : Waterborne paint
Rolling, Brushing
No spraying

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 5 %
Molecular weight	:	45 g/mol
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	1,25 kg/day

Frequency and duration of use

Application duration	:	120 min
Frequency of use	:	1 days per year
Exposure duration	:	132 min

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands and forearms.
Covers skin contact area up to	:	1900 cm²
dermal	:	0,00003 kg/min

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	20 m3
Temperature	:	25 °C
Ventilation rate per hour	:	0,6
Mass transfer rate	:	0,331 m/min
Release area	:	10 m2

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures	:	No specific measures identified.

8.2.3 ES 8 - CS 3: Control of consumer exposure: Consumer use (Coatings and paints, thinners, paint removers, Non-metal surface treatment products) (PC9a, PC15)

Remarks	:	Spraying

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 5 %
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	0,0198 kg/min

Frequency and duration of use

Application duration	:	15 min
Frequency of use	:	2 days per year
Exposure duration	:	15 min

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands and forearms.
Covers skin contact area up to	:	1900 cm²
dermal	:	0,0001 kg/min
Uptake fraction, oral	:	100 %

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	34 m3
Temperature	:	25 °C
Ventilation rate per hour	:	1,5
Room height	:	2,25 m
Weight percent	:	30 %
Remarks	:	Non-Volatile
Density	:	1,5 g/cm3
Remarks	:	Non-Volatile
Airborne fraction	:	100 %
Remarks	:	Non-Volatile
Inhalation cut-off diameter	:	0,015 mm

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures	:	Ensure spraying away from persons.

8.2.4 ES 8 - CS 4: Control of consumer exposure: Consumer use (Ink and toners) (PC18)

Remarks	:	Refilling

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 5 %
Molecular weight	:	22 g/mol
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	0,123 hPa

Amount used

Amount per use	:	0,05 kg

Frequency and duration of use

Application duration	:	0,3 min
Frequency of use	:	104 days per year
Exposure duration	:	0,75 min

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	215 cm²

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	:	Indoor use
Temperature	:	25 °C
Ventilation rate per hour	:	0,5
Mass transfer rate	:	0,331 m/min
Release area	:	20 cm²

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures	:	No specific measures identified.

8.2.5 ES 8 - CS 5: Control of consumer exposure: Consumer use (Ink and toners) (PC18)

Remarks	:	Printing process

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 5 %
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	0,123 hPa

Amount used

: 0,016 kg/day

Frequency and duration of use

Exposure duration	:	600 min
Frequency of use	:	365 days per year

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	25 m3
Temperature	:	25 °C
Ventilation rate per hour	:	0,6

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures	:	No specific measures identified.

8.2.6 ES 8 - CS 6: Control of consumer exposure: Consumer use (Polishes and wax blends) (PC31)

Remarks	:	No spraying

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 2,5 %
Molecular weight	:	272 g/mol
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	0,123 hPa

Amount used
: 0,55 kg/day

Frequency and duration of use
Application duration : 900 min
Frequency of use : 1 days per year
Release duration : 120 min
Exposure duration : 240 min

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 430 cm²
dermal : 0,00003 kg/min

Other given operational conditions affecting consumers exposure
Outdoor / Indoor : Indoor use
Room size : 58 m3
Temperature : 25 °C
Ventilation rate per hour : 0,5

Mass transfer rate : 4740 m/min
Release area : 22 m2

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)
Consumer Measures : No specific measures identified.

8.3. ES 8 Exposure estimation and reference to its source

8.3.2 ES 8 - CS 2: Consumer exposure: Consumer use (Coatings and paints, thinners, paint removers, Non-metal surface treatment products) (PC9a, PC15)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,72 mg/m³ (Consexpo v4.1)	0,10
Chronic dermal systemic exposure	2,77 mg/kg bw/day (Consexpo v4.1)	0,05
Consumer - oral, long-term - systemic	Consexpo v4.1, Not applicable	
combined routes	Consexpo v4.1	0,15

8.3.3 ES 8 - CS 3: Consumer exposure: Consumer use (Coatings and paints, thinners, paint removers, Non-metal surface treatment products) (PC9a, PC15)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,26 mg/m³ (Consexpo v4.1)	0,04
Chronic dermal systemic exposure	1,15 mg/kg bw/day (Consexpo v4.1)	0,02
Consumer - oral, long-term - systemic	0,13 mg/kg bw/day (Consexpo v4.1, Risk management measures are based on qualitative risk characterisation.)	
combined routes	Consexpo v4.1	0,06

8.3.4 ES 8 - CS 4: Consumer exposure: Consumer use (Ink and toners) (PC18)

Route of exposure and type of effects	Exposure estimate	RCR
Chronic dermal systemic exposure	0,008 mg/kg bw/day (Consexpo v4.1)	0,0002

8.3.5 ES 8 - CS 5: Consumer exposure: Consumer use (Ink and toners) (PC18)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	1,29 mg/m³ (Consexpo v4.1)	0,18

8.3.6 ES 8 - CS 6: Consumer exposure: Consumer use (Polishes and wax blends) (PC31)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	3,93 mg/m³ (Consexpo v4.1)	0,56
Chronic dermal systemic exposure	2,12 mg/kg bw/day (Consexpo v4.1)	0,04
combined routes	Consexpo v4.1	0,60

8.4. ES 8 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

9. ES 9: Industrial use; Use in cleaning agents

9.1. Title section

Environment		
CS1:	Industrial use (Use of non-reactive processing aid at industrial site (no inclusion into or onto article))	ERC4
Workers		
CS2:	Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	PROC1
CS3:	Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC2
CS4:	Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Industrial spraying)	PROC7
CS6:	Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS7:	Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities)	PROC8b
CS8:	Industrial use (Roller application or brushing)	PROC10
CS9:	Industrial use (Treatment of articles by dipping and pouring)	PROC13

9.2. ES 9 Conditions of use affecting exposure

9.2.1 ES 9 - CS 1: Control of environmental exposure: Industrial use (Use of non-reactive processing aid at industrial site (no inclusion into or onto article)) (ERC4)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

Concentration of the Substance in Mixture/Article : <= 100 %

9.2.2 ES 9 - CS 2: Control of worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Product characteristics

Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use

Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Palm of one hand
Covers skin contact area up to : 240 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Technical conditions and measures : Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

9.2.3 ES 9 - CS 3: Control of worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

9.2.4 ES 9 - CS 4: Control of worker exposure: Industrial use (Manufacture or

formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Note	:	Chemical production where opportunity for exposure arises No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

9.2.5 ES 9 - CS 5: Control of worker exposure: Industrial use (Industrial spraying) (PROC7)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	0,6 L/min

Frequency and duration of use

Exposure duration	:	360 min
Frequency of use	:	<= 5 days per week

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	> 1000 m3

Risk Management Measures

Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	50 %
Note	:	Ensure that the direction of airflow is clearly away from the worker.
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	Wear suitable protective clothing. Wear suitable coveralls to prevent exposure to the skin.
Effectiveness (of a measure)	:	80 %
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the distance from worker to task is greater than 1 m.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that direction of application is only horizontal or downward.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of work area
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of equipment
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure regular inspection, cleaning and maintenance of equipment and machines.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

9.2.6 ES 9 - CS 6: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %

Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

9.2.7 ES 9 - CS 7: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities) (PROC8b)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	Transfer of substance or mixture (charging/discharging) at dedicated facilities No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

9.2.8 ES 9 - CS 8: Control of worker exposure: Industrial use (Roller application or brushing) (PROC10)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : dermal
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

9.2.9 ES 9 - CS 9: Control of worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : dermal
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

9.3. ES 9 Exposure estimation and reference to its source

9.3.2 ES 9 - CS 2: Worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,004

9.3.3 ES 9 - CS 3: Worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,08

9.3.4 ES 9 - CS 4: Worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,003
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,06
combined routes	ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises	0,43

9.3.5 ES 9 - CS 5: Worker exposure: Industrial use (Industrial spraying) (PROC7)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	9,79 mg/m³ (Stoffenmanager v4.0)	0,28
Worker - dermal, long-term - systemic	54,6 mg/kg bw/day (RISKOFDERM v2.1)	0,52
combined routes	Not applicable	0,80

9.3.6 ES 9 - CS 6: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,20

9.3.7 ES 9 - CS 7: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities) (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0)	0,06
combined routes	ECETOC TRA worker v2.0	0,43

9.3.8 ES 9 - CS 8: Worker exposure: Industrial use (Roller application or brushing) (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,87 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03
combined routes	ECETOC TRA worker v2.0	0,77

9.3.9 ES 9 - CS 9: Worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,87 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,75

9.4. ES 9 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

10. ES 10: Professional use; Use in cleaning agents

10.1. Title section

Environment		
CS1:	Professional use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor), Widespread use of non-reactive	ERC8a, ERC8d

	processing aid (no inclusion into or onto article, outdoor))	
Workers		
CS2:	Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	PROC1, PROC2, PROC3
CS3:	Professional use (Chemical production where opportunity for exposure arises)	PROC4
CS4:	Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS5:	Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities)	PROC8b
CS6:	Professional use (Roller application or brushing)	PROC10
CS7:	Professional use (Non-industrial spraying)	PROC11
CS8:	Professional use (Treatment of articles by dipping and pouring)	PROC13

10.2. ES 10 Conditions of use affecting exposure

10.2.1 ES 10 - CS 1: Control of environmental exposure: Professional use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor), Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)) (ERC8a, ERC8d)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

10.2.2 ES 10 - CS 2: Control of worker exposure: Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition) (PROC1, PROC2, PROC3)

Product characteristics

Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use

Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions Sample via a closed loop or other system to avoid exposure.
Technical conditions and measures	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition With occasional controlled exposure

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

10.2.3 ES 10 - CS 3: Control of worker exposure: Professional use (Chemical production where opportunity for exposure arises) (PROC4)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside

hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

10.2.4 ES 10 - CS 4: Control of worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : inhalative
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 80 %
Personal protective measures : If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure) : 80 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

10.2.5 ES 10 - CS 5: Control of worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities) (PROC8b)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

10.2.6 ES 10 - CS 6: Control of worker exposure: Professional use (Roller application or brushing) (PROC10)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : inhalative
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 80 %
Personal protective measures : If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure) : 80 %

Exposure routes : dermal

Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

10.2.7 ES 10 - CS 7: Control of worker exposure: Professional use (Non-industrial spraying) (PROC11)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	0,05 L/min

Frequency and duration of use

Exposure duration	:	150 min
Frequency of use	:	<= 5 days per week

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	<= 1000 m3

Risk Management Measures

Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	Wear suitable protective clothing. Wear suitable coveralls to prevent exposure to the skin.
Effectiveness (of a measure)	:	80 %
Personal protective measures	:	Wear a respirator conforming to EN140.
Effectiveness (of a measure)	:	40 %
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that direction of application is only horizontal or downward.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the distance from worker to task is greater than 1 m.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the direction of airflow is clearly away from the worker.
Note	:	Not applicable

Organisational measures to prevent /limit releases, dispersion and exposure	:	Provide enhanced general ventilation by mechanical means.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of work area
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of equipment
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure regular inspection, cleaning and maintenance of equipment and machines.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the task is not carried out by more than one worker simultaneously.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

10.2.8 ES 10 - CS 8: Control of worker exposure: Professional use (Treatment of articles by dipping and pouring) (PROC13)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

10.3. ES 10 Exposure estimation and reference to its source

10.3.2 ES 10 - CS 2: Worker exposure: Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition) (PROC1, PROC2, PROC3)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	0,003
combined routes	ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	0,004
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	0,01
combined routes	ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	0,38
Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,003

combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23

10.3.3 ES 10 - CS 3: Worker exposure: Professional use (Chemical production where opportunity for exposure arises) (PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0)	0,06
combined routes	ECETOC TRA worker v2.0	0,80

10.3.4 ES 10 - CS 4: Worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,50

10.3.5 ES 10 - CS 5: Worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities) (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities	0,80

10.3.6 ES 10 - CS 6: Worker exposure: Professional use (Roller application or brushing) (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR

Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03
combined routes	ECETOC TRA worker v2.0	0,40

10.3.7 ES 10 - CS 7: Worker exposure: Professional use (Non-industrial spraying) (PROC11)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	14,05 mg/m³ (Stoffenmanager v4.0)	0,40
Worker - dermal, long-term - systemic	53,75 mg/kg bw/day (RISKOFDERM v2.1)	0,51
combined routes	Not applicable	0,91

10.3.8 ES 10 - CS 8: Worker exposure: Professional use (Treatment of articles by dipping and pouring) (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Treatment of articles by dipping and pouring)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0, Treatment of articles by dipping and pouring)	0,01
combined routes	ECETOC TRA worker v2.0, Treatment of articles by dipping and pouring	0,75

10.4. ES 10 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

11. ES 11: Consumer use; Use in cleaning agents

11.1. Title section

Washing and cleaning products (PC35)		
Environment		
CS1:	Consumer use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor), Widespread use of non-reactive	ERC8a, ERC8d

	processing aid (no inclusion into or onto article, outdoor))	
Consumer		
CS2:	Consumer use (Washing and cleaning products)	PC35
CS3:	Consumer use (Washing and cleaning products)	PC35
CS4:	Consumer use (Washing and cleaning products)	PC35
CS5:	Consumer use (Washing and cleaning products)	PC35
CS6:	Consumer use (Washing and cleaning products)	PC35
CS7:	Consumer use (Washing and cleaning products)	PC35

11.2. ES 11 Conditions of use affecting exposure

11.2.1 ES 11 - CS 1: Control of environmental exposure: Consumer use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor), Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)) (ERC8a, ERC8d)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

11.2.2 ES 11 - CS 2: Control of consumer exposure: Consumer use (Washing and cleaning products) (PC35)

Remarks : No spraying
Default database: cleaning and washing/all purpose cleaner/liquid/mixing and loading

Product characteristics

Concentration of the Substance in Mixture/Article : <= 20 %

Molecular weight : 22 g/mol
Physical Form (at time of use) : Liquid
Vapour pressure : 0,123 hPa

Amount used

Amounts used : 0,5 kg/day

Frequency and duration of use

Application duration : 0,3 min
Frequency of use : 104 days per year
Exposure duration : 0,75 min

Human factors not influenced by risk management

Dermal exposure : Palm of one hand
Covers skin contact area up to : 215 cm^2

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	:	Indoor use
Temperature	:	25 °C
Ventilation rate per hour	:	0,5
Mass transfer rate	:	4740 m/min
Release area	:	20 cm²

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures	:	No specific measures identified.

11.2.3 ES 11 - CS 3: Control of consumer exposure: Consumer use (Washing and cleaning products) (PC35)

Remarks	:	No spraying Application

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 4 %
Molecular weight	:	18 g/mol
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	0,4 kg/day

Frequency and duration of use

Application duration	:	20 min
Frequency of use	:	104 days per year
Exposure duration	:	240 min

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	215 cm²

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	58 m3
Temperature	:	25 °C
Ventilation rate per hour	:	0,5
Mass transfer rate	:	4740 m/min
Release area	:	10 m2

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures	:	No specific measures identified.

11.2.4 ES 11 - CS 4: Control of consumer exposure: Consumer use (Washing and cleaning products) (PC35)

Remarks	:	Sprays Spraying

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 5 %
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	0,0468 kg/min

Frequency and duration of use

Spray duration	:	0,41 min
Frequency of use	:	365 days per year
Exposure duration	:	60 min
Release duration	:	2,6 s

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands and forearms.
Covers skin contact area up to	:	1900 cm²
dermal	:	0,000046 kg/min
Uptake fraction, oral	:	100 %

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	15 m3
Temperature	:	25 °C
Ventilation rate per hour	:	2,5
Room height	:	2,5 m
Weight percent	:	5 %
Remarks	:	Non-Volatile
Density	:	1,8 g/cm3
Remarks	:	Non-Volatile
Airborne fraction	:	20 %
Remarks	:	Non-Volatile
Inhalation cut-off diameter	:	0,015 mm

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures	:	Ensure spraying away from persons.

11.2.5 ES 11 - CS 5: Control of consumer exposure: Consumer use (Washing and cleaning products) (PC35)

Remarks	:	Sprays Cleaning

Product characteristics

Concentration of the Substance in	:	<= 5 %

Mixture/Article

Molecular weight	:	22 g/mol
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	0,0162 kg/day

Frequency and duration of use

Application duration	:	10 min
Frequency of use	:	365 days per year
Exposure duration	:	60 min

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	215 cm²

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	15 m3
Temperature	:	25 °C
Ventilation rate per hour	:	2,5
Mass transfer rate	:	4740 m/min
Release area	:	17100 cm²

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures	:	No specific measures identified.

11.2.6 ES 11 - CS 6: Control of consumer exposure: Consumer use (Washing and cleaning products) (PC35)

Remarks	:	Floor cleaning (liquids) Mixing operations (open systems) Loading of application equipment

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 2,5 %
Molecular weight	:	22 g/mol
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	0,5 kg/day

Frequency and duration of use

Application duration	:	0,3 min
Frequency of use	:	104 days per year
Exposure duration	:	0,75 min

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	215 cm²

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	:	Indoor use
Temperature	:	25 °C
Ventilation rate per hour	:	1,0
Mass transfer rate	:	4740 m/min
Release area	:	20 cm²

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures	:	No specific measures identified.

11.2.7 ES 11 - CS 7: Control of consumer exposure: Consumer use (Washing and cleaning products) (PC35)

Remarks	:	Floor cleaning (liquids) Application

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 2,5 %
Molecular weight	:	18 g/mol
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	0,88 kg/day

Frequency and duration of use

Application duration	:	30 min
Frequency of use	:	104 days per year
Exposure duration	:	240 min

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	215 cm²

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	58 m3
Temperature	:	25 °C
Ventilation rate per hour	:	0,5
Mass transfer rate	:	4740 m/min
Release area	:	22 m2

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)
Consumer Measures : No specific measures identified.

11.3. ES 11 Exposure estimation and reference to its source

11.3.2 ES 11 - CS 2: Consumer exposure: Consumer use (Washing and cleaning products) (PC35)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,01 mg/m³ (Consexpo v4.1)	0,001
Chronic dermal systemic exposure	0,03 mg/kg bw/day (Consexpo v4.1)	0,0006
Consumer - oral, long-term - systemic	Consexpo v4.1, Not applicable	
combined routes	Consexpo v4.1	0,002

11.3.3 ES 11 - CS 3: Consumer exposure: Consumer use (Washing and cleaning products) (PC35)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,61 mg/m³ (Consexpo v4.1)	0,09
Chronic dermal systemic exposure	11,70 mg/kg bw/day (Consexpo v4.1)	0,22
Consumer - oral, long-term - systemic	Consexpo v4.1, Not applicable	
combined routes	Consexpo v4.1	0,31

11.3.4 ES 11 - CS 4: Consumer exposure: Consumer use (Washing and cleaning products) (PC35)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,000011 mg/m³ (Consexpo v4.1)	
Chronic dermal systemic exposure	0,01 mg/kg bw/day (Consexpo v4.1)	0,0002
Consumer - oral, long-term - systemic	0,0006 mg/kg bw/day (Consexpo v4.1)	
combined routes	Consexpo v4.1	0,0002

11.3.5 ES 11 - CS 5: Consumer exposure: Consumer use (Washing and cleaning products) (PC35)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,11 mg/m³ (Consexpo v4.1)	0,02
Chronic dermal systemic exposure	0,12 mg/kg bw/day (Consexpo v4.1)	0,002
Consumer - oral, long-term - systemic	Consexpo v4.1, Not applicable	
combined routes	Consexpo v4.1	0,02

11.3.6 ES 11 - CS 6: Consumer exposure: Consumer use (Washing and cleaning products) (PC35)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,01 mg/m³ (Consexpo v4.1)	0,001
Chronic dermal systemic exposure	0,04 mg/kg bw/day (Consexpo v4.1)	0,0008
Consumer - oral, long-term - systemic	Consexpo v4.1, Not applicable	
combined routes	Consexpo v4.1	0,002

11.3.7 ES 11 - CS 7: Consumer exposure: Consumer use (Washing and cleaning products) (PC35)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,38 mg/m³ (Consexpo v4.1)	0,05
Chronic dermal systemic exposure	7,31 mg/kg bw/day (Consexpo v4.1)	0,14
Consumer - oral, long-term - systemic	Consexpo v4.1, Not applicable	
combined routes	Consexpo v4.1	0,19

11.4. ES 11 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

12. ES 12: Industrial use; Use in lubricants

12.1. Title section

Environment		
CS1:	Industrial use (Use of non-reactive processing aid at industrial site (no inclusion into or onto article), Use of functional fluid at industrial site)	ERC4, ERC7
Workers		
CS2:	Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	PROC1
CS3:	Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC2
CS4:	Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Mixing or blending in batch processes)	PROC5
CS6:	Industrial use (Industrial spraying)	PROC7
CS7:	Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS8:	Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS9:	Industrial use (Roller application or brushing)	PROC10
CS10:	Industrial use (Treatment of articles by dipping and pouring)	PROC13
CS11:	Industrial use (Lubrication at high energy conditions in metal working operations, General greasing/lubrication at high kinetic energy conditions)	PROC17, PROC18

12.2. ES 12 Conditions of use affecting exposure

12.2.1 ES 12 - CS 1: Control of environmental exposure: Industrial use (Use of non-reactive processing aid at industrial site (no inclusion into or onto article), Use of functional fluid at industrial site) (ERC4, ERC7)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

12.2.2 ES 12 - CS 2: Control of worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

12.2.3 ES 12 - CS 3: Control of worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	Chemical production or refinery in closed continuous process

with occasional controlled exposure or processes with equivalent containment conditions
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

12.2.4 ES 12 - CS 4: Control of worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Note	:	Chemical production where opportunity for exposure arises No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

12.2.5 ES 12 - CS 5: Control of worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Product characteristics

Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : dermal
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

12.2.6 ES 12 - CS 6: Control of worker exposure: Industrial use (Industrial spraying) (PROC7)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Amount used
Amounts used : 0,6 L/min

Frequency and duration of use
Exposure duration : 360 min
Frequency of use : <= 5 days per week

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use
Room size : > 1000 m3

Risk Management Measures
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 50 %

Note	:	Ensure that the direction of airflow is clearly away from the worker.
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	Wear suitable protective clothing. Wear suitable coveralls to prevent exposure to the skin.
Effectiveness (of a measure)	:	80 %
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the distance from worker to task is greater than 1 m.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that direction of application is only horizontal or downward.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of work area
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of equipment
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure regular inspection, cleaning and maintenance of equipment and machines.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

12.2.7 ES 12 - CS 7: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

12.2.8 ES 12 - CS 8: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

12.2.9 ES 12 - CS 9: Control of worker exposure: Industrial use (Roller application or brushing) (PROC10)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid

Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : dermal
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

12.2.10 ES 12 - CS 10: Control of worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : dermal
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

12.2.11 ES 12 - CS 11: Control of worker exposure: Industrial use (Lubrication at high energy conditions in metal working operations, General greasing/lubrication at high kinetic energy conditions) (PROC17, PROC18)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	90 %
Exposure routes	:	dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %
Note	:	Lubrication at high energy conditions in metal working operations

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

12.3. ES 12 Exposure estimation and reference to its source

12.3.2 ES 12 - CS 2: Worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR

Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,004

12.3.3 ES 12 - CS 3: Worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,08

12.3.4 ES 12 - CS 4: Worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,003
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,06
combined routes	ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises	0,43

12.3.5 ES 12 - CS 5: Worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,38

12.3.6 ES 12 - CS 6: Worker exposure: Industrial use (Industrial spraying) (PROC7)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	9,79 mg/m³ (Stoffenmanager v4.0)	0,28
Worker - dermal, long-term - systemic	54,6 mg/kg bw/day (RISKOFDERM v2.1)	0,52
combined routes	Not applicable	0,80

12.3.7 ES 12 - CS 7: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,20

12.3.8 ES 12 - CS 8: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities	0,43
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated	0,37

	filling line, including weighing))	
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,43

12.3.9 ES 12 - CS 9: Worker exposure: Industrial use (Roller application or brushing) (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,87 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03
combined routes	ECETOC TRA worker v2.0	0,77

12.3.10 ES 12 - CS 10: Worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,87 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,75

12.3.11 ES 12 - CS 11: Worker exposure: Industrial use (Lubrication at high energy conditions in metal working operations, General greasing/lubrication at high kinetic energy conditions) (PROC17, PROC18)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0, Lubrication at high energy conditions in metal working operations)	0,07
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA worker v2.0, Lubrication at high energy conditions in metal working operations)	0,03
combined routes	ECETOC TRA worker v2.0, Lubrication at high energy conditions in metal working operations	0,10
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0, General greasing/lubrication at high kinetic energy conditions)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0, General greasing/lubrication at high kinetic energy conditions)	0,13

combined routes	ECETOC TRA worker v2.0, General greasing/lubrication at high kinetic energy conditions	0,20

12.4. ES 12 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

13. ES 13: Industrial use; Metal working fluids

13.1. Title section

Environment		
CS1:	Industrial use (Use of non-reactive processing aid at industrial site (no inclusion into or onto article))	ERC4
Workers		
CS2:	Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	PROC1
CS3:	Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC2
CS4:	Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Mixing or blending in batch processes)	PROC5
CS6:	Industrial use (Industrial spraying)	PROC7
CS7:	Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS8:	Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS9:	Industrial use (Roller application or brushing)	PROC10
CS10:	Industrial use (Treatment of articles by dipping and pouring)	PROC13
CS11:	Industrial use (Lubrication at high energy conditions in metal working operations)	PROC17

13.2. ES 13 Conditions of use affecting exposure

13.2.1 ES 13 - CS 1: Control of environmental exposure: Industrial use (Use of non-reactive processing aid at industrial site (no inclusion into or onto article)) (ERC4)

Remarks : As no environmental hazard was identified no environmental-

related exposure assessment and risk characterization was performed.

13.2.2 ES 13 - CS 2: Control of worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

13.2.3 ES 13 - CS 3: Control of worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside

hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

13.2.4 ES 13 - CS 4: Control of worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Palm of one hand
Covers skin contact area up to : 240 cm²
Remarks : Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²
Remarks : Chemical production where opportunity for exposure arises

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Technical conditions and measures : Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Note : Chemical production where opportunity for exposure arises
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

13.2.5 ES 13 - CS 5: Control of worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm^2

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : dermal
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

13.2.6 ES 13 - CS 6: Control of worker exposure: Industrial use (Industrial spraying) (PROC7)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Amount used
Amounts used : 0,6 L/min

Frequency and duration of use
Exposure duration : 360 min
Frequency of use : <= 5 days per week

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	> 1000 m3

Risk Management Measures

Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	50 %
Note	:	Ensure that the direction of airflow is clearly away from the worker.
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	Wear suitable protective clothing. Wear suitable coveralls to prevent exposure to the skin.
Effectiveness (of a measure)	:	80 %
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the distance from worker to task is greater than 1 m.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that direction of application is only horizontal or downward.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of work area
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of equipment
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure regular inspection, cleaning and maintenance of equipment and machines.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

13.2.7 ES 13 - CS 7: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min

Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : inhalative
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 90 %
Personal protective measures : If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

13.2.8 ES 13 - CS 8: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

13.2.9 ES 13 - CS 9: Control of worker exposure: Industrial use (Roller application or

brushing) (PROC10)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

13.2.10 ES 13 - CS 10: Control of worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

13.2.11 ES 13 - CS 11: Control of worker exposure: Industrial use (Lubrication at high energy conditions in metal working operations) (PROC17)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	90 %
Exposure routes	:	dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

13.3. ES 13 Exposure estimation and reference to its source

13.3.2 ES 13 - CS 2: Worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,004

13.3.3 ES 13 - CS 3: Worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,08

13.3.4 ES 13 - CS 4: Worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,003
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,06
combined routes	ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises	0,43

13.3.5 ES 13 - CS 5: Worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,38

13.3.6 ES 13 - CS 6: Worker exposure: Industrial use (Industrial spraying) (PROC7)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	9,79 mg/m³ (Stoffenmanager v4.0)	0,28
Worker - dermal, long-term - systemic	54,6 mg/kg bw/day (RISKOFDERM v2.1)	0,52
combined routes	Not applicable	0,80

13.3.7 ES 13 - CS 7: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,20

13.3.8 ES 13 - CS 8: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or	0,43

	mixture (charging/discharging) at dedicated facilities	
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,43

13.3.9 ES 13 - CS 9: Worker exposure: Industrial use (Roller application or brushing) (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,87 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03
combined routes	ECETOC TRA worker v2.0	0,77

13.3.10 ES 13 - CS 10: Worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,87 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,75

13.3.11 ES 13 - CS 11: Worker exposure: Industrial use (Lubrication at high energy conditions in metal working operations) (PROC17)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0, Lubrication at high energy conditions in metal working operations)	0,07
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA worker v2.0, Lubrication at high energy conditions in metal working operations)	0,03
combined routes	ECETOC TRA worker v2.0, Lubrication at high energy conditions in metal working operations	0,10

13.4. ES 13 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

14. ES 14: Professional use; Metal working fluids

14.1. Title section

Environment		
CS1:	Professional use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor), Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor))	ERC8a, ERC8d
Workers		
CS2:	Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	PROC1, PROC2, PROC3
CS3:	Professional use (Mixing or blending in batch processes)	PROC5
CS4:	Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS5:	Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS6:	Professional use (Roller application or brushing)	PROC10
CS7:	Professional use (Non-industrial spraying)	PROC11
CS8:	Professional use (Treatment of articles by dipping and pouring)	PROC13
CS9:	Professional use (Lubrication at high energy conditions in metal working operations)	PROC17

14.2. ES 14 Conditions of use affecting exposure

14.2.1 ES 14 - CS 1: Control of environmental exposure: Professional use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor), Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)) (ERC8a, ERC8d)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

14.2.2 ES 14 - CS 2: Control of worker exposure: Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition) (PROC1, PROC2, PROC3)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions Sample via a closed loop or other system to avoid exposure.
Technical conditions and measures	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition With occasional controlled exposure

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

14.2.3 ES 14 - CS 3: Control of worker exposure: Professional use (Mixing or blending in batch processes) (PROC5)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

14.2.4 ES 14 - CS 4: Control of worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	80 %
Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	80 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

14.2.5 ES 14 - CS 5: Control of worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

14.2.6 ES 14 - CS 6: Control of worker exposure: Professional use (Roller application or brushing) (PROC10)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	80 %
Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	80 %
Exposure routes	:	dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

14.2.7 ES 14 - CS 7: Control of worker exposure: Professional use (Non-industrial spraying) (PROC11)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	0,05 L/min

Frequency and duration of use

Exposure duration	:	150 min
Frequency of use	:	<= 5 days per week

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	<= 1000 m3

Risk Management Measures

Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Effectiveness (of a measure)	:	90 %
Personal protective measures	:	Wear suitable protective clothing. Wear suitable coveralls to prevent exposure to the skin.
Effectiveness (of a measure)	:	80 %
Personal protective measures	:	Wear a respirator conforming to EN140.
Effectiveness (of a measure)	:	40 %
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that direction of application is only horizontal or downward.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the distance from worker to task is greater than 1 m.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the direction of airflow is clearly away from the worker.
Note	:	Not applicable
Organisational measures to prevent /limit releases, dispersion and exposure	:	Provide enhanced general ventilation by mechanical means.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of work area
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of equipment
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure regular inspection, cleaning and maintenance of equipment and machines.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the task is not carried out by more than one worker simultaneously.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

14.2.8 ES 14 - CS 8: Control of worker exposure: Professional use (Treatment of articles by dipping and pouring) (PROC13)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid

Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

14.2.9 ES 14 - CS 9: Control of worker exposure: Professional use (Lubrication at high energy conditions in metal working operations) (PROC17)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : inhalative
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 90 %

Exposure routes : dermal
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

14.3. ES 14 Exposure estimation and reference to its source

14.3.2 ES 14 - CS 2: Worker exposure: Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition) (PROC1, PROC2, PROC3)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	0,003
combined routes	ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	0,004
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	0,01
combined routes	ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	0,38
Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled	0,003

	exposure or processes with equivalent containment condition)	
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23

14.3.3 ES 14 - CS 3: Worker exposure: Professional use (Mixing or blending in batch processes) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Mixing or blending in batch processes)	0,74
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0, Mixing or blending in batch processes)	0,01
combined routes	ECETOC TRA worker v2.0, Mixing or blending in batch processes	0,75

14.3.4 ES 14 - CS 4: Worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,50

14.3.5 ES 14 - CS 5: Worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities	0,80
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,74

Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,80

14.3.6 ES 14 - CS 6: Worker exposure: Professional use (Roller application or brushing) (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03
combined routes	ECETOC TRA worker v2.0	0,40

14.3.7 ES 14 - CS 7: Worker exposure: Professional use (Non-industrial spraying) (PROC11)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	14,05 mg/m³ (Stoffenmanager v4.0)	0,40
Worker - dermal, long-term - systemic	53,75 mg/kg bw/day (RISKOFDERM v2.1)	0,51
combined routes	Not applicable	0,91

14.3.8 ES 14 - CS 8: Worker exposure: Professional use (Treatment of articles by dipping and pouring) (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,75

14.3.9 ES 14 - CS 9: Worker exposure: Professional use (Lubrication at high energy conditions in metal working operations) (PROC17)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37

- local and systemic		
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03
combined routes	ECETOC TRA worker v2.0	0,40

14.4. ES 14 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

15. ES 15: Professional use; Use in agrochemicals

15.1. Title section

Environment		
CS1:	Professional use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor), Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor))	ERC8a, ERC8d
Workers		
CS2:	Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC1, PROC2
CS3:	Professional use (Chemical production where opportunity for exposure arises)	PROC4
CS4:	Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS5:	Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS6:	Professional use (Non-industrial spraying)	PROC11
CS7:	Professional use (Treatment of articles by dipping and pouring)	PROC13

15.2. ES 15 Conditions of use affecting exposure

15.2.1 ES 15 - CS 1: Control of environmental exposure: Professional use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor), Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)) (ERC8a, ERC8d)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was

performed.

15.2.2 ES 15 - CS 2: Control of worker exposure: Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC1, PROC2)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions Sample via a closed loop or other system to avoid exposure.
Technical conditions and measures	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

15.2.3 ES 15 - CS 3: Control of worker exposure: Professional use (Chemical production where opportunity for exposure arises) (PROC4)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

15.2.4 ES 15 - CS 4: Control of worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and	:	Local exhaust ventilation

measures
Effectiveness (of a measure) : 80 %
Personal protective measures : If technical measures not practical:
Wear suitable respiratory protection.
Effectiveness (of a measure) : 80 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

15.2.5 ES 15 - CS 5: Control of worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

15.2.6 ES 15 - CS 6: Control of worker exposure: Professional use (Non-industrial spraying) (PROC11)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Amount used
Amounts used : 0,05 L/min

Frequency and duration of use

Exposure duration	:	150 min
Frequency of use	:	<= 5 days per week

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	<= 1000 m3

Risk Management Measures

Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	Wear suitable protective clothing. Wear suitable coveralls to prevent exposure to the skin.
Effectiveness (of a measure)	:	80 %
Personal protective measures	:	Wear a respirator conforming to EN140.
Effectiveness (of a measure)	:	40 %
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that direction of application is only horizontal or downward.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the distance from worker to task is greater than 1 m.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the direction of airflow is clearly away from the worker.
Note	:	Not applicable
Organisational measures to prevent /limit releases, dispersion and exposure	:	Provide enhanced general ventilation by mechanical means.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of work area
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of equipment
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure regular inspection, cleaning and maintenance of equipment and machines.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the task is not carried out by more than one worker simultaneously.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

15.2.7 ES 15 - CS 7: Control of worker exposure: Professional use (Treatment of articles by dipping and pouring) (PROC13)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm^2

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

15.3. ES 15 Exposure estimation and reference to its source

15.3.2 ES 15 - CS 2: Worker exposure: Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC1, PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m^3 (ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	0,0007

Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	0,003
combined routes	ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	0,004
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	0,01
combined routes	ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	0,38

15.3.3 ES 15 - CS 3: Worker exposure: Professional use (Chemical production where opportunity for exposure arises) (PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0)	0,06
combined routes	ECETOC TRA worker v2.0	0,80

15.3.4 ES 15 - CS 4: Worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,50

15.3.5 ES 15 - CS 5: Worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type	Exposure estimate	RCR

of effects		
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities	0,80
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,80

15.3.6 ES 15 - CS 6: Worker exposure: Professional use (Non-industrial spraying) (PROC11)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	14,05 mg/m³ (Stoffenmanager v4.0)	0,40
Worker - dermal, long-term - systemic	53,75 mg/kg bw/day (RISKOFDERM v2.1)	0,51
combined routes	Not applicable	0,91

15.3.7 ES 15 - CS 7: Worker exposure: Professional use (Treatment of articles by dipping and pouring) (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,75

15.4. ES 15 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

16. ES 16: Industrial use; Use in functional fluids

16.1. Title section

Environment		
CS1:	Industrial use (Use of functional fluid at industrial site)	ERC7
Workers		
CS2:	Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	PROC1
CS3:	Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC2
CS4:	Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS6:	Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	PROC8b, PROC9

16.2. ES 16 Conditions of use affecting exposure

16.2.1 ES 16 - CS 1: Control of environmental exposure: Industrial use (Use of functional fluid at industrial site) (ERC7)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

16.2.2 ES 16 - CS 2: Control of worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Product characteristics

Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use

Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

16.2.3 ES 16 - CS 3: Control of worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

16.2.4 ES 16 - CS 4: Control of worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical

production where opportunity for exposure arises) (PROC3, PROC4)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Note	:	Chemical production where opportunity for exposure arises No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

16.2.5 ES 16 - CS 5: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

16.2.6 ES 16 - CS 6: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year
Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use
Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	No specific measures identified.

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

16.3. ES 16 Exposure estimation and reference to its source

16.3.2 ES 16 - CS 2: Worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,004

16.3.3 ES 16 - CS 3: Worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,08

16.3.4 ES 16 - CS 4: Worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term -	0,34 mg/kg bw/day (ECETOC TRA worker v2.0,	0,003

systemic	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,06
combined routes	ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises	0,43

16.3.5 ES 16 - CS 5: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,20

16.3.6 ES 16 - CS 6: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,37
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities	0,43
combined routes	ECETOC TRA worker v2.0, Transfer of substance or	0,43

	mixture (charging/discharging) at dedicated facilities	
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,37
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,43
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,43

16.4. ES 16 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

17. ES 17: Professional use; Use in functional fluids

17.1. Title section

Environment		
CS1:	Professional use (Widespread use of functional fluid (indoor), Widespread use of functional fluid (outdoor))	ERC9a, ERC9b
Workers		
CS2:	Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	PROC1, PROC2, PROC3
CS3:	Professional use (Chemical production where opportunity for exposure arises)	PROC4
CS4:	Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS5:	Professional use (Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	PROC9

CS6: Professional use (Use of functional fluids in small devices)	PROC20

17.2. ES 17 Conditions of use affecting exposure

17.2.1 ES 17 - CS 1: Control of environmental exposure: Professional use (Widespread use of functional fluid (indoor), Widespread use of functional fluid (outdoor)) (ERC9a, ERC9b)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

17.2.2 ES 17 - CS 2: Control of worker exposure: Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition) (PROC1, PROC2, PROC3)

Product characteristics

Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use

Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management

Dermal exposure : Palm of one hand
Covers skin contact area up to : 240 cm²
Remarks : Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²
Remarks : Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions Sample via a closed loop or other system to avoid exposure.
Technical conditions and measures	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition With occasional controlled exposure

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

17.2.3 ES 17 - CS 3: Control of worker exposure: Professional use (Chemical production where opportunity for exposure arises) (PROC4)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

17.2.4 ES 17 - CS 4: Control of worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in	:	<= 100 %

Mixture/Article

Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	80 %
Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	80 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

17.2.5 ES 17 - CS 5: Control of worker exposure: Professional use (Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC9)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

17.2.6 ES 17 - CS 6: Control of worker exposure: Professional use (Use of functional fluids in small devices) (PROC20)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

17.3. ES 17 Exposure estimation and reference to its source

17.3.2 ES 17 - CS 2: Worker exposure: Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition) (PROC1, PROC2, PROC3)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood	0,0007

	of exposure or processes with equivalent containment conditions)	
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	0,003
combined routes	ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	0,004
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	0,01
combined routes	ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	0,38
Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,003
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23

17.3.3 ES 17 - CS 3: Worker exposure: Professional use (Chemical production where opportunity for exposure arises) (PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0)	0,06
combined routes	ECETOC TRA worker v2.0	0,80

17.3.4 ES 17 - CS 4: Worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type	Exposure estimate	RCR

of effects		
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,50

17.3.5 ES 17 - CS 5: Worker exposure: Professional use (Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,80

17.3.6 ES 17 - CS 6: Worker exposure: Professional use (Use of functional fluids in small devices) (PROC20)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	1,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,02
combined routes	ECETOC TRA worker v2.0	0,39

17.4. ES 17 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

18. ES 18: Consumer use; Heat transfer fluids, Hydraulic fluids

18.1. Title section

Heat transfer fluids (PC16)		
Hydraulic fluids (PC17)		
Environment		
CS1:	Consumer use (Widespread use of functional fluid (indoor), Widespread use of functional fluid (outdoor))	ERC9a, ERC9b
Consumer		
CS2:	Consumer use (Heat transfer fluids, Hydraulic fluids)	PC16, PC17

18.2. ES 18 Conditions of use affecting exposure

18.2.1 ES 18 - CS 1: Control of environmental exposure: Consumer use (Widespread use of functional fluid (indoor), Widespread use of functional fluid (outdoor)) (ERC9a, ERC9b)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

18.2.2 ES 18 - CS 2: Control of consumer exposure: Consumer use (Heat transfer fluids, Hydraulic fluids) (PC16, PC17)

Remarks : Transfer of substance or mixture (charging/discharging) at non dedicated-facilities

Product characteristics

Concentration of the Substance in Mixture/Article : <= 30 %

Physical Form (at time of use) : Liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use

Exposure duration : < 15 min

Human factors not influenced by risk management

Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm²

Other given operational conditions affecting consumers exposure

Outdoor / Indoor : Indoor use
Temperature : 25 °C

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures : No specific measures identified.

18.3. ES 18 Exposure estimation and reference to its source

18.3.2 ES 18 - CS 2: Consumer exposure: Consumer use (Heat transfer fluids, Hydraulic fluids) (PC16, PC17)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	1,93 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	0,28
Worker - dermal, long-term - systemic	4,11 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	0,08
oral	Not applicable	
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at non dedicated-facilities	0,36

18.4. ES 18 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

19. ES 19: Professional use; Anti-freeze and de-icing products

19.1. Title section

Environment		
CS1:	Professional use (Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor))	ERC8d
Workers		
CS2:	Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC1, PROC2
CS3:	Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS4:	Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities)	PROC8b
CS5:	Professional use (Non-industrial spraying)	PROC11

19.2. ES 19 Conditions of use affecting exposure

19.2.1 ES 19 - CS 1: Control of environmental exposure: Professional use (Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)) (ERC8d)

Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

19.2.2 ES 19 - CS 2: Control of worker exposure: Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC1, PROC2)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent

containment conditions
Sample via a closed loop or other system to avoid exposure.

Technical conditions and measures : Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

19.2.3 ES 19 - CS 3: Control of worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : inhalative
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 80 %
Personal protective measures : If technical measures not practical:
Wear suitable respiratory protection.
Effectiveness (of a measure) : 80 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

19.2.4 ES 19 - CS 4: Control of worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities) (PROC8b)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm^2

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

19.2.5 ES 19 - CS 5: Control of worker exposure: Professional use (Non-industrial spraying) (PROC11)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Amount used
Amounts used : 0,05 L/min

Frequency and duration of use
Exposure duration : 150 min
Frequency of use : <= 5 days per week

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use
Room size : <= 1000 m3

Risk Management Measures
Personal protective measures : Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure) : 90 %

Personal protective measures : Wear suitable protective clothing.
Wear suitable coveralls to prevent exposure to the skin.
Effectiveness (of a measure) : 80 %

Personal protective measures : Wear a respirator conforming to EN140.
Effectiveness (of a measure) : 40 %

Organisational measures to : Ensure that direction of application is only horizontal or

prevent /limit releases, dispersion and exposure		downward.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the distance from worker to task is greater than 1 m.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the direction of airflow is clearly away from the worker.
Note	:	Not applicable
Organisational measures to prevent /limit releases, dispersion and exposure	:	Provide enhanced general ventilation by mechanical means.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of work area
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of equipment
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure regular inspection, cleaning and maintenance of equipment and machines.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the task is not carried out by more than one worker simultaneously.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

19.3. ES 19 Exposure estimation and reference to its source

19.3.2 ES 19 - CS 2: Worker exposure: Professional use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC1, PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment	0,0007

	conditions)	
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	0,003
combined routes	ECETOC TRA worker v2.0, Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions	0,004
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	0,01
combined routes	ECETOC TRA worker v2.0, Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions	0,38

19.3.3 ES 19 - CS 3: Worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,50

19.3.4 ES 19 - CS 4: Worker exposure: Professional use (Transfer of substance or mixture (charging/discharging) at dedicated facilities) (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,88 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,74
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities	0,80

19.3.5 ES 19 - CS 5: Worker exposure: Professional use (Non-industrial spraying) (PROC11)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	14,05 mg/m³ (Stoffenmanager v4.0)	0,40
Worker - dermal, long-term - systemic	53,75 mg/kg bw/day (RISKOFDERM v2.1)	0,51
combined routes	Not applicable	0,91

19.4. ES 19 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

20. ES 20: Consumer use; Anti-freeze and de-icing products

20.1. Title section

Anti-freeze and de-icing products (PC4)	
Environment	
CS1: Consumer use (Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor))	ERC8d
Consumer	
CS2: Consumer use (Anti-freeze and de-icing products)	PC4
CS3: Consumer use (Anti-freeze and de-icing products)	PC4
CS4: Consumer use (Anti-freeze and de-icing products)	PC4

20.2. ES 20 Conditions of use affecting exposure

20.2.1 ES 20 - CS 1: Control of environmental exposure: Consumer use (Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)) (ERC8d)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

20.2.2 ES 20 - CS 2: Control of consumer exposure: Consumer use (Anti-freeze and de-icing products) (PC4)

Remarks : De-icing of vehicles and similar equipment by spraying

Spraying

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	0,0468 kg/min

Frequency and duration of use

Spray duration	:	0,7 min
Frequency of use	:	365 days per year
Exposure duration	:	240 min

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands and forearms.
Covers skin contact area up to	:	1900 cm²
dermal	:	0,000046 kg/min
Uptake fraction, oral	:	100 %

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	58 m3
Temperature	:	25 °C
Ventilation rate per hour	:	0,5
Room height	:	2,5 m
Weight percent	:	100 %
Remarks	:	Non-Volatile
Density	:	1,8 g/cm3
Remarks	:	Non-Volatile
Airborne fraction	:	100 %
Remarks	:	Non-Volatile
Inhalation cut-off diameter	:	0,015 mm

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures	:	Ensure spraying away from persons.

20.2.3 ES 20 - CS 3: Control of consumer exposure: Consumer use (Anti-freeze and de-icing products) (PC4)

Remarks	:	De-icing of vehicles and similar equipment by spraying Cleaning

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %

Physical Form (at time of use) : Liquid
Vapour pressure : 0,123 hPa

Amount used
Amounts used : 0,00029 kg/day

Frequency and duration of use
Frequency of use : 365 days per year

Human factors not influenced by risk management
Dermal exposure : Palm of one hand
Covers skin contact area up to : 215 cm²

Other given operational conditions affecting consumers exposure
Temperature : 25 °C

20.2.4 ES 20 - CS 4: Control of consumer exposure: Consumer use (Anti-freeze and de-icing products) (PC4)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 30 %

Physical Form (at time of use) : Liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : < 15 min

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm²

Other given operational conditions affecting consumers exposure
Outdoor / Indoor : Indoor use
Temperature : 25 °C

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)
Consumer Measures : No specific measures identified.

20.3. ES 20 Exposure estimation and reference to its source

20.3.2 ES 20 - CS 2: Consumer exposure: Consumer use (Anti-freeze and de-icing products) (PC4)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,0006 mg/m³ (Consexpo v4.1)	0,0001
Chronic dermal systemic exposure	0,50 mg/kg bw/day (Consexpo v4.1)	0,009
Consumer - oral, long-term - systemic	0,005 mg/kg bw/day (Consexpo v4.1)	
combined routes	Consexpo v4.1	0,009

20.3.3 ES 20 - CS 3: Consumer exposure: Consumer use (Anti-freeze and de-icing products) (PC4)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	Not applicable	
Chronic dermal systemic exposure	4,46 mg/kg bw/day (Consexpo v4.1)	0,08
Consumer - oral, long-term - systemic	Not applicable	
combined routes	Consexpo v4.1	0,08

20.3.4 ES 20 - CS 4: Consumer exposure: Consumer use (Anti-freeze and de-icing products) (PC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	1,93 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	0,28
Worker - dermal, long-term - systemic	4,11 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	0,08
oral	Not applicable	
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at non dedicated-facilities	0,36

20.4. ES 20 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

21. ES 21: Industrial use, Professional use; Use in

laboratories

21.1. Title section

Environment		
CS1:	Industrial use, Professional use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor))	ERC8a
Workers		
CS2:	Industrial use, Professional use (Use as laboratory reagent)	PROC15

21.2. ES 21 Conditions of use affecting exposure

21.2.1 ES 21 - CS 1: Control of environmental exposure: Industrial use, Professional use (Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)) (ERC8a)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

21.2.2 ES 21 - CS 2: Control of worker exposure: Industrial use, Professional use (Use as laboratory reagent) (PROC15)

Product characteristics

Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use

Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management

Dermal exposure : Palm of one hand
Covers skin contact area up to : 240 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor use

Risk Management Measures

Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice : Wear solely goggles.

21.3. ES 21 Exposure estimation and reference to its source

21.3.2 ES 21 - CS 2: Worker exposure: Industrial use, Professional use (Use as laboratory reagent) (PROC15)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,004

21.4. ES 21 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

22. ES 22: Industrial use; Use in water treatment agents

22.1. Title section

Environment		
CS1:	Industrial use (Formulation into solid matrix, Use of non-reactive processing aid at industrial site (no inclusion into or onto article))	ERC3, ERC4
Workers		
CS2:	Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	PROC1
CS3:	Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC2
CS4:	Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS6:	Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities)	PROC8b
CS7:	Industrial use (Treatment of articles by dipping and pouring)	PROC13

22.2. ES 22 Conditions of use affecting exposure

22.2.1 ES 22 - CS 1: Control of environmental exposure: Industrial use (Formulation into solid matrix, Use of non-reactive processing aid at industrial site (no inclusion into or onto article)) (ERC3, ERC4)

Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

22.2.2 ES 22 - CS 2: Control of worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

22.2.3 ES 22 - CS 3: Control of worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Product characteristics

Concentration of the Substance in	:	<= 100 %

Mixture/Article

Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

22.2.4 ES 22 - CS 4: Control of worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production where opportunity for exposure arises

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Technical conditions and measures : Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Note : Chemical production where opportunity for exposure arises
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

22.2.5 ES 22 - CS 5: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to : 960 cm^2

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Exposure routes : inhalative
Technical conditions and measures : Local exhaust ventilation
Effectiveness (of a measure) : 90 %
Personal protective measures : If technical measures not practical:
Wear suitable respiratory protection.
Effectiveness (of a measure) : 90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

22.2.6 ES 22 - CS 6: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities) (PROC8b)

Product characteristics
Concentration of the Substance in : <= 100 %

Mixture/Article

Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	Transfer of substance or mixture (charging/discharging) at dedicated facilities No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

22.2.7 ES 22 - CS 7: Control of worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

22.3. ES 22 Exposure estimation and reference to its source

22.3.2 ES 22 - CS 2: Worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,004

22.3.3 ES 22 - CS 3: Worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,08

22.3.4 ES 22 - CS 4: Worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled	0,003

	exposure or processes with equivalent containment condition)	
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,06
combined routes	ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises	0,43

22.3.5 ES 22 - CS 5: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,20

22.3.6 ES 22 - CS 6: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities) (PROC8b)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0)	0,06
combined routes	ECETOC TRA worker v2.0	0,43

22.3.7 ES 22 - CS 7: Worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,87 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,75

22.4. ES 22 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

23. ES 23: Consumer use; Adhesives, sealants

23.1. Title section

Adhesives, sealants (PC1)		
Environment		
CS1:	Consumer use (Widespread use leading to inclusion into/onto article (indoor), Widespread use leading to inclusion into/onto article (outdoor))	ERC8c, ERC8f
Consumer		
CS2:	Consumer use (Adhesives, sealants)	PC1

23.2. ES 23 Conditions of use affecting exposure

23.2.1 ES 23 - CS 1: Control of environmental exposure: Consumer use (Widespread use leading to inclusion into/onto article (indoor), Widespread use leading to inclusion into/onto article (outdoor)) (ERC8c, ERC8f)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

23.2.2 ES 23 - CS 2: Control of consumer exposure: Consumer use (Adhesives, sealants) (PC1)

Remarks : Worst case assumption
Mixing operations (open systems)
Loading of application equipment

Product characteristics

Concentration of the Substance in Mixture/Article : <= 0,075 %

Molecular weight : 3.000 g/mol
Physical Form (at time of use) : Liquid
Vapour pressure : 0,123 hPa

Amount used

Amounts used : 9 kg/day

Frequency and duration of use

Application duration	:	75 min
Frequency of use	:	0,25 days per year
Exposure duration	:	75 min

Human factors not influenced by risk management

Covers skin contact area up to	:	110 cm²
dermal	:	0,00003 kg/min

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	58 m3
Temperature	:	25 °C
Ventilation rate per hour	:	0,5
Mass transfer rate	:	4740 m/min
Release area	:	4 m2

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures	:	No specific measures identified.

23.3. ES 23 Exposure estimation and reference to its source

23.3.2 ES 23 - CS 2: Consumer exposure: Consumer use (Adhesives, sealants) (PC1)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	4,1 mg/m³ (Consexpo v4.1)	0,59
Chronic dermal systemic exposure	0,26 mg/kg bw/day (Consexpo v4.1)	0,005
Consumer - oral, long-term - systemic	Not applicable	
combined routes	Consexpo v4.1	0,60

23.4. ES 23 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

24. ES 24: Industrial use; Manufacture of substance,

Adhesives, sealants, Foaming, Use in coatings, Use in polymer production

24.1. Title section

Environment		
CS1:	Industrial use (Formulation into mixture, Formulation into solid matrix, Use at industrial site leading to inclusion into/onto article, Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article))	ERC2, ERC3, ERC5, ERC6c
Workers		
CS2:	Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions)	PROC1
CS3:	Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions)	PROC2
CS4:	Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises)	PROC3, PROC4
CS5:	Industrial use (Mixing or blending in batch processes)	PROC5
CS6:	Industrial use (Industrial spraying)	PROC7
CS7:	Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities)	PROC8a
CS8:	Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	PROC8b, PROC9
CS9:	Industrial use (Roller application or brushing)	PROC10
CS10:	Industrial use (Treatment of articles by dipping and pouring)	PROC13
CS11:	Industrial use (Tabletting, compression, extrusion, pelettisation, granulation)	PROC14
CS12:	Industrial use (Use as laboratory reagent)	PROC15

24.2. ES 24 Conditions of use affecting exposure

24.2.1 ES 24 - CS 1: Control of environmental exposure: Industrial use (Formulation into mixture, Formulation into solid matrix, Use at industrial site leading to inclusion into/onto article, Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)) (ERC2, ERC3, ERC5, ERC6c)

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

24.2.2 ES 24 - CS 2: Control of worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with

equivalent containment conditions) (PROC1)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions Sample via a closed loop or other system to avoid exposure.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

24.2.3 ES 24 - CS 3: Control of worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

24.2.4 ES 24 - CS 4: Control of worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Palm of one hand
Covers skin contact area up to	:	240 cm²
Remarks	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²
Remarks	:	Chemical production where opportunity for exposure arises

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Technical conditions and measures	:	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Note	:	Chemical production where opportunity for exposure arises No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

24.2.5 ES 24 - CS 5: Control of worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

24.2.6 ES 24 - CS 6: Control of worker exposure: Industrial use (Industrial spraying) (PROC7)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Amount used

Amounts used	:	0,6 L/min

Frequency and duration of use

Exposure duration	:	360 min
Frequency of use	:	<= 5 days per week

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	> 1000 m3

Risk Management Measures

Technical conditions and	:	Local exhaust ventilation

measures		
Effectiveness (of a measure)	:	50 %
Note	:	Ensure that the direction of airflow is clearly away from the worker.
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	Wear suitable protective clothing. Wear suitable coveralls to prevent exposure to the skin.
Effectiveness (of a measure)	:	80 %
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that the distance from worker to task is greater than 1 m.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure that direction of application is only horizontal or downward.
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of work area
Organisational measures to prevent /limit releases, dispersion and exposure	:	Regular cleaning of equipment
Organisational measures to prevent /limit releases, dispersion and exposure	:	Ensure regular inspection, cleaning and maintenance of equipment and machines.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

24.2.7 ES 24 - CS 7: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	inhalative
Technical conditions and measures	:	Local exhaust ventilation
Effectiveness (of a measure)	:	90 %
Personal protective measures	:	If technical measures not practical: Wear suitable respiratory protection.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

24.2.8 ES 24 - CS 8: Control of worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Note	:	No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

24.2.9 ES 24 - CS 9: Control of worker exposure: Industrial use (Roller application or brushing) (PROC10)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %

Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to hands.
Covers skin contact area up to	:	960 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment

Additional good practice advice	:	Wear solely goggles.

24.2.10 ES 24 - CS 10: Control of worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 100 %
Physical Form (at time of use)	:	Low volatile liquid
Vapour pressure	:	0,123 hPa

Frequency and duration of use

Exposure duration	:	<= 480 min
Frequency of use	:	<= 240 days per year

Human factors not influenced by risk management

Dermal exposure	:	Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use

Risk Management Measures

Exposure routes	:	dermal
Personal protective measures	:	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Effectiveness (of a measure)	:	90 %

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

24.2.11 ES 24 - CS 11: Control of worker exposure: Industrial use (Tabletting, compression, extrusion, pelettisation, granulation) (PROC14)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 480 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

24.2.12 ES 24 - CS 12: Control of worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Product characteristics
Concentration of the Substance in Mixture/Article : <= 100 %

Physical Form (at time of use) : Low volatile liquid
Vapour pressure : 0,123 hPa

Amount used
Storage : < 1 kg, < 1 l

Frequency and duration of use
Exposure duration : <= 480 min
Frequency of use : <= 240 days per year

Human factors not influenced by risk management
Dermal exposure : Assumes that potential dermal contact is limited to inside hands / one hand / palm of hands.
Covers skin contact area up to : 240 cm²

Other operational conditions affecting workers exposure
Outdoor / Indoor : Indoor use

Risk Management Measures
Note : Use as laboratory reagent
No specific measures identified.

Additional good practice advice beyond the REACH Chemical Safety Assessment
Additional good practice advice : Wear solely goggles.

24.3. ES 24 Exposure estimation and reference to its source

24.3.2 ES 24 - CS 2: Worker exposure: Industrial use (Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions) (PROC1)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	0,03 mg/m³ (ECETOC TRA worker v2.0)	0,0007
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,004

24.3.3 ES 24 - CS 3: Worker exposure: Industrial use (Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions) (PROC2)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,08

24.3.4 ES 24 - CS 4: Worker exposure: Industrial use (Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Chemical production where opportunity for exposure arises) (PROC3, PROC4)

Route of exposure and type of effects	Exposure estimate	RCR

Worker - inhalative, long-term - local and systemic	7,76 mg/m³ (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,22
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition)	0,003
combined routes	ECETOC TRA worker v2.0, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition	0,23
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises)	0,06
combined routes	ECETOC TRA worker v2.0, Chemical production where opportunity for exposure arises	0,43

24.3.5 ES 24 - CS 5: Worker exposure: Industrial use (Mixing or blending in batch processes) (PROC5)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,38

24.3.6 ES 24 - CS 6: Worker exposure: Industrial use (Industrial spraying) (PROC7)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	9,79 mg/m³ (Stoffenmanager v4.0)	0,28
Worker - dermal, long-term - systemic	54,6 mg/kg bw/day (RISKOFDERM v2.1)	0,52
combined routes	Not applicable	0,80

24.3.7 ES 24 - CS 7: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at non dedicated-facilities) (PROC8a)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term	2,59 mg/m³ (ECETOC TRA worker v2.0)	0,07

- local and systemic		
Worker - dermal, long-term - systemic	13,71 mg/kg bw/day (ECETOC TRA worker v2.0)	0,13
combined routes	ECETOC TRA worker v2.0	0,20

24.3.8 ES 24 - CS 8: Worker exposure: Industrial use (Transfer of substance or mixture (charging/discharging) at dedicated facilities, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)) (PROC8b, PROC9)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities)	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture (charging/discharging) at dedicated facilities	0,43
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,37
Worker - dermal, long-term - systemic	6,86 mg/kg bw/day (ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing))	0,06
combined routes	ECETOC TRA worker v2.0, Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	0,43

24.3.9 ES 24 - CS 9: Worker exposure: Industrial use (Roller application or brushing) (PROC10)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	25,87 mg/m³ (ECETOC TRA worker v2.0)	0,74
Worker - dermal, long-term - systemic	2,74 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03
combined routes	ECETOC TRA worker v2.0	0,77

24.3.10 ES 24 - CS 10: Worker exposure: Industrial use (Treatment of articles by dipping and pouring) (PROC13)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term	25,87 mg/m³ (ECETOC TRA worker v2.0)	0,74

- local and systemic		
Worker - dermal, long-term - systemic	1,37 mg/kg bw/day (ECETOC TRA worker v2.0)	0,01
combined routes	ECETOC TRA worker v2.0	0,75

24.3.11 ES 24 - CS 11: Worker exposure: Industrial use (Tabletting, compression, extrusion, pelettisation, granulation) (PROC14)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	3,43 mg/kg bw/day (ECETOC TRA worker v2.0)	0,03
combined routes	ECETOC TRA worker v2.0	0,40

24.3.12 ES 24 - CS 12: Worker exposure: Industrial use (Use as laboratory reagent) (PROC15)

Route of exposure and type of effects	Exposure estimate	RCR
Worker - inhalative, long-term - local and systemic	12,94 mg/m³ (ECETOC TRA worker v2.0)	0,37
Worker - dermal, long-term - systemic	0,34 mg/kg bw/day (ECETOC TRA worker v2.0)	0,003
combined routes	ECETOC TRA worker v2.0	0,37

24.4. ES 24 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

25. ES 25: Consumer use; Insulation foams

25.1. Title section

Polymer preparations and compounds (PC32)	
Environment	
CS1: Consumer use (Widespread use leading to inclusion into/onto article (indoor), Widespread use leading to inclusion into/onto article (outdoor))	ERC8c, ERC8f
Consumer	
CS2: Consumer use (Polymer preparations and compounds)	PC32

25.2. ES 25 Conditions of use affecting exposure

25.2.1 ES 25 - CS 1: Control of environmental exposure: Consumer use (Widespread use leading to inclusion into/onto article (indoor), Widespread use leading to inclusion into/onto article (outdoor)) (ERC8c, ERC8f)

Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

25.2.2 ES 25 - CS 2: Control of consumer exposure: Consumer use (Polymer preparations and compounds) (PC32)

Product characteristics

Concentration of the Substance in Mixture/Article	:	<= 5 %
Physical Form (at time of use)	:	Liquid
Vapour pressure	:	0,123 hPa

Amount used

Amount per use	:	0,825 kg

Frequency and duration of use

Exposure duration	:	30 min
Frequency of use	:	0,2 days per year

Human factors not influenced by risk management

Covers skin contact area up to	:	1900 cm^2
Breathing volume	:	1,5 m3/day

Other given operational conditions affecting consumers exposure

Outdoor / Indoor	:	Indoor use
Room size	:	57,5 m3
Temperature	:	25 °C

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)

Consumer Measures	:	No specific measures identified.

25.3. ES 25 Exposure estimation and reference to its source

25.3.2 ES 25 - CS 2: Consumer exposure: Consumer use (Polymer preparations and compounds) (PC32)

Route of exposure and type of effects	Exposure estimate	RCR
Consumer- inhalative, long-term - local and systemic	0,06 mg/m³ (Consexpo v4.1)	0,009
Chronic dermal systemic exposure	0,007 mg/kg bw/day (Consexpo v4.1)	0,0008
Consumer - oral, long-term - systemic	Not applicable	
combined routes	Consexpo v4.1	0,01

25.4. ES 25 Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

ECHA guidance for downstream users
Section 2

Battery Energy Storage System (BESS)
BASE LOAD POWER HUB

Statron ref. 331497

Project Code: K559-2254
Purchase Order Number: CW-I-WP4-2022-01

SDRL Code: E99-06
Sequence Number: 006
Rev: 001
Document number: K559-2254-CWIWP4202201-E99-006
Document description: Overall Electrical Model

Revision	Date	Name	Description
001	17.03.2023	CPA / ADI	First Version

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Overall Electrical Model
E99-06

for Base Load Power Hub (BLPH) Project

Classification: confidential

Document no.	E99-06
Document name	Overall Electrical Model
Component / System	BESS
Project code	K559-2254

Version	Date	Name	Description
1.0	2023-03-15	C. Palenzuela	First version

Table 1: Version overview

	Date	Name
Editor	2023-03-15	C. Palenzuela
Checked by	2023-03-16	A. Fritz
Approved by	2023-03-16	C. Palenzuela

Table 2: Approval overview

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Identification

Product Version / Document Version

Product version
Prototype

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Doc Code
K559-2254-CWIWP4202201-E99-006

Name and Address of Manufacturer

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Original document

This document is an original document of FREQCON GmbH.

1 Introduction

1.1 About this Document

This document is part of project phase “Detailed Design Engineering” for the Base Load Power Hub (BLPH) Project (K559-2254). In case of any contradiction resulting by the information or specification given in this document, phase 2 or later documents supersede the information provided in this document.

1.2 Display Elements

Symbol	Meaning
➜	Action with one or several steps for which the sequence is irrelevant.
Step 1 : **Step 2 :**	Action with several steps for which the sequence is relevant.
•	First level of list.
-	Second level of list.

Table 1: Display Elements

1.3 Other Applicable Documents

The following documents are applicable:

Document type	Document Name
Electric Model of MSC converter family as PowerFactory model	Freqcon_VDE_4110_4120_4130_rel_enc_v4
Documentation for MSC converter model in PowerFactory	Documentation_Freqcon_Inverter_Model_VDE_v4
MSC converter parameter lists	Parameters_Freqcon_MSC_Family

Table 2: Other applicable documents

1.4 Generic Terms and Abbreviations Used

This following list should help you understand some of the abbreviations used in this document.

Generic Term and Abbreviation	Description
BESS	Battery Energy Storage System
BLPH	Base Load Power Hub
PCS	Power Conversion System

Table 3: Generic terms and abbreviations used

2 General

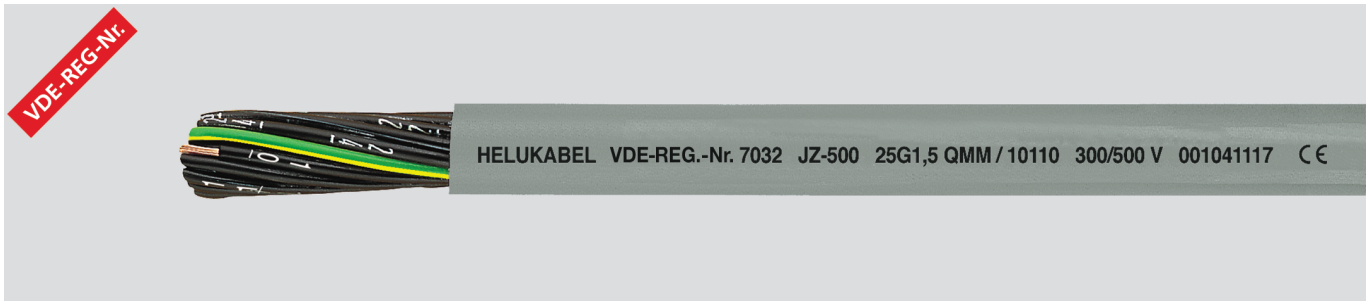
The overall electric model of the proposed converter system as PowerFactory model, as well as the accompanying documentation and parameter lists are attached to this document (*see section 1.3 "Other Applicable Documents"*).

3 Appendix

1. Freqcon_VDE_4110_4120_4130_rel_enc_v4.pfd
2. Documentation_Freqcon_Inverter_Model_VDE_v4
3. Parameters_Freqcon_MSC_Family

JZ-500

flexible, number coded, meter marking



Technical data

- PVC cable adapted to DIN VDE 0285-525-2-51 / DIN EN 50525-2-51
- **Temperature range** flexing -15°C to +80°C fixed installation -40°C to +80°C
- **Nominal voltage** U_0/U 300/500 V
- **Test voltage** 4000 V
- **Breakdown voltage** min. 8000 V
- **Minimum bending radius** flexing 7,5x cable Ø fixed installation 4x cable Ø

Cable structure

- Bare copper conductor, fine wire acc. to DIN VDE 0295 cl.5 / IEC 60228 cl.5
- Core insulation of PVC compound type Z 7225
- Core identification to DIN VDE 0293 black cores with continuous white numbering
- GN-YE conductor, 3 cores and above in the outer layer
- Cores stranded in layers with optimal lay length
- Outer sheath of PVC compound type TM2 to DIN VDE 0207-363-4-1 / DIN EN 50363-4-1
- Sheath colour: grey (RAL 7001)
- With meter marking

Properties

- Extensively oil resistant, oil-/chemical resistance see "Technical Information"
- Conditional drag chain compatible
- Conditional suitability for torsion
- The materials used during manufacturing are cadmium-free, contain no silicone and are free from substances harmful to the wetting properties of lacquers

Tests

- Flame retardant acc. to DIN VDE 0482-332-1-2 / DIN EN 60332-1-2 / IEC 60332-1-2

Note

- G = with GN-YE conductor x = without GN-YE conductor (OZ)
- Please note "cleanroom qualified" when ordering.
- AWG sizes are approximate equivalent values. The actual cross section is in mm².
- Screened analogue type: **F-CY-JZ, F-CY-OZ (LiY-CY), Y-CY-JB, Y-CY-JZ**

Application

These cables are appropriate for flexible use with medium mechanical stresses, and free movement without tensile stress or forced movements in dry, moist and wet rooms but not open air. Suitable to be used as connecting and control cables in tool machines, conveyor belts, assembly lines, plant engineering, AC technology, steel production and other manufacturing environments. Selected PVC compounds guarantee good flexibility as well as an economic and fast installation.

CE = Product conforms with Low-Voltage Directive 2014/35/EU.

Part no.	No.cores x cross-sec. mm²	Outer Ø app. mm	Cop. weight kg / km	Weight app. kg / km	AWG-No.
10001	2 x 0,5	4,8	9,6	40,0	20
10002	3 G 0,5	5,1	14,4	46,0	20
10003	3 x 0,5	5,1	14,4	46,0	20
10004	4 G 0,5	5,5	19,0	56,0	20
10005	4 x 0,5	5,5	19,0	56,0	20
10006	5 G 0,5	6,2	24,0	65,0	20
10007	5 x 0,5	6,2	24,0	65,0	20
10008	6 G 0,5	6,7	29,0	75,0	20
10009	7 G 0,5	6,7	33,6	80,0	20
10010	7 x 0,5	6,7	33,6	80,0	20
10011	8 G 0,5	7,4	38,0	97,0	20
10172	8 x 0,5	7,4	38,0	97,0	20
10012	10 G 0,5	8,6	48,0	116,0	20
10013	12 G 0,5	9,1	58,0	135,0	20
10014	12 x 0,5	9,1	58,0	135,0	20
10015	14 G 0,5	9,5	67,0	150,0	20

Part no.	No.cores x cross-sec. mm²	Outer Ø app. mm	Cop. weight kg / km	Weight app. kg / km	AWG-No.
10183	16 G 0,5	10,0	76,0	175,0	20
10016	18 G 0,5	10,7	86,0	196,0	20
10017	20 G 0,5	11,3	96,0	215,0	20
10018	21 G 0,5	11,3	101,0	240,0	20
10019	25 G 0,5	12,6	120,0	270,0	20
10020	30 G 0,5	13,5	144,0	310,0	20
10021	32 G 0,5	14,0	154,0	323,0	20
10022	34 G 0,5	14,7	163,0	362,0	20
10023	40 G 0,5	15,3	192,0	434,0	20
10024	42 G 0,5	15,8	202,0	449,0	20
10025	50 G 0,5	17,3	240,0	513,0	20
10169	52 G 0,5	17,3	252,0	534,0	20
10026	61 G 0,5	18,5	293,0	625,0	20
10027	65 G 0,5	19,2	312,0	682,0	20
10028	80 G 0,5	21,3	384,0	780,0	20
10029	100 G 0,5	23,8	480,0	980,0	20

Continuation ▸

02.05.2019 / Dimensions and specifications may be changed without prior notice.

JZ-500

flexible, number coded, meter marking

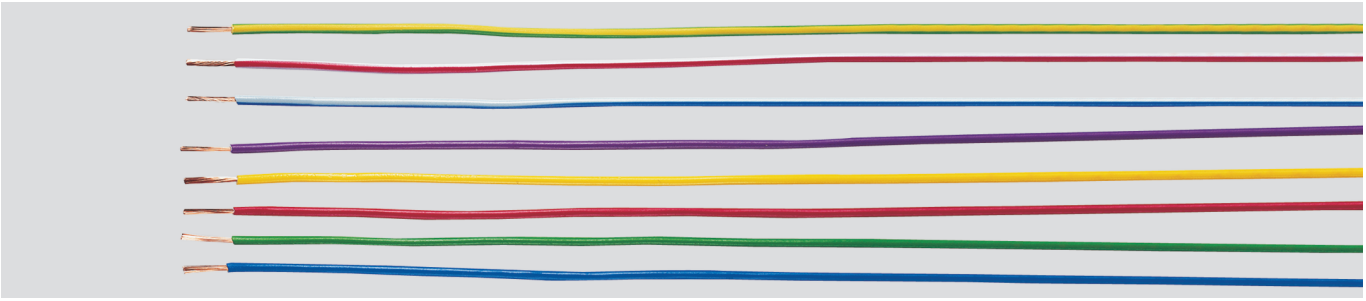
Part no.	No.cores x cross-sec. mm²	Outer Ø app. mm	Cop. weight kg / km	Weight app. kg / km	AWG-No.
10030	2 x 0,75	5,3	14,4	46,0	19
10031	3 G 0,75	5,6	21,6	54,0	19
10032	3 x 0,75	5,6	21,6	54,0	19
10033	4 G 0,75	6,3	28,8	66,0	19
10034	4 x 0,75	6,3	28,8	66,0	19
10035	5 G 0,75	6,9	36,0	80,0	19
10036	5 x 0,75	6,9	36,0	80,0	19
10037	6 G 0,75	7,7	43,0	99,0	19
10177	6 x 0,75	7,7	43,0	99,0	19
10038	7 G 0,75	7,7	50,0	110,0	19
10039	7 x 0,75	7,7	50,0	110,0	19
10040	8 G 0,75	8,3	58,0	130,0	19
10173	8 x 0,75	8,3	58,0	130,0	19
10041	9 G 0,75	9,1	65,0	153,0	19
10042	10 G 0,75	9,8	72,0	162,0	19
10043	12 G 0,75	10,1	86,0	179,0	19
10044	12 x 0,75	10,1	86,0	179,0	19
10045	14 G 0,75	10,8	101,0	214,0	19
10046	15 G 0,75	11,4	108,0	218,0	19
10047	18 G 0,75	12,2	130,0	257,0	19
10533	19 G 0,75	12,2	137,0	264,0	19
10048	20 G 0,75	12,8	144,0	286,0	19
10049	21 G 0,75	12,8	151,0	320,0	19
10050	25 G 0,75	14,3	180,0	365,0	19
10534	27 G 0,75	14,5	195,0	382,0	19
10051	32 G 0,75	15,9	230,0	455,0	19
10052	34 G 0,75	16,7	245,0	510,0	19
10182	37 G 0,75	16,7	266,0	537,0	19
10053	40 G 0,75	17,3	288,0	595,0	19
10054	41 G 0,75	18,1	296,0	607,0	19
10055	42 G 0,75	18,1	302,0	612,0	19
10056	50 G 0,75	19,8	360,0	735,0	19
10057	61 G 0,75	21,2	439,0	845,0	19
10178	65 G 0,75	22,0	468,0	895,0	19
10058	80 G 0,75	24,3	576,0	1070,0	19
10059	100 G 0,75	27,1	720,0	1322,0	19
10060	2 x 1	5,6	19,2	60,0	18
10061	3 G 1	6,1	29,0	72,0	18
10062	3 x 1	6,1	29,0	72,0	18
10063	4 G 1	6,6	38,0	86,0	18
10064	4 x 1	6,6	38,0	86,0	18
10065	5 G 1	7,5	48,0	104,0	18
10066	5 x 1	7,5	48,0	104,0	18
10067	6 G 1	8,1	58,0	125,0	18
10068	7 G 1	8,1	67,0	141,0	18
10069	7 x 1	8,1	67,0	141,0	18
10070	8 G 1	9,0	77,0	175,0	18
10071	9 G 1	9,8	86,0	200,0	18
10180	10 G 1	10,6	96,0	217,0	18
10170	10 x 1	10,6	96,0	217,0	18
10072	12 G 1	10,9	115,0	230,0	18
10073	12 x 1	10,9	115,0	230,0	18
10074	14 G 1	11,5	134,0	271,0	18
10075	16 G 1	12,3	154,0	300,0	18
10076	18 G 1	12,9	173,0	343,0	18
10174	18 x 1	12,9	173,0	343,0	18
10197	19 G 1	12,9	182,0	355,0	18
10077	20 G 1	13,8	192,0	375,0	18
10184	20 x 1	13,8	192,0	375,0	18
10179	21 G 1	13,8	205,0	420,0	18
10175	24 G 1	15,4	230,0	440,0	18
10078	25 G 1	15,4	240,0	485,0	18
10176	25 x 1	15,4	240,0	485,0	18
10196	26 G 1	15,4	252,0	500,0	18
10198	27 G 1	15,4	259,0	534,0	18
10168	30 x 1	16,5	288,0	550,0	18
10079	34 G 1	17,9	326,0	650,0	18
10080	36 G 1	17,9	346,0	668,0	18
10199	37 G 1	17,9	355,0	701,0	18
10081	40 G 1	18,6	384,0	755,0	18
10167	40 x 1	18,6	384,0	755,0	18
10082	41 G 1	19,4	394,0	770,0	18
10083	42 G 1	19,4	403,0	810,0	18
10084	50 G 1	21,3	480,0	936,0	18
10085	56 G 1	22,1	538,0	920,0	18
10086	61 G 1	22,7	586,0	1100,0	18
10087	65 G 1	23,6	628,0	1180,0	18
10088	80 G 1	26,3	768,0	1294,0	18
10089	100 G 1	29,3	960,0	1644,0	18
10090	2 x 1,5	6,4	29,0	70,0	16
10091	3 G 1,5	6,8	43,0	90,0	16
10092	3 x 1,5	6,8	43,0	90,0	16
10093	4 G 1,5	7,6	58,0	109,0	16
10094	4 x 1,5	7,6	58,0	109,0	16
10095	5 G 1,5	8,3	72,0	131,0	16
10096	5 x 1,5	8,3	72,0	131,0	16
10097	6 G 1,5	9,2	86,0	157,0	16
10098	7 G 1,5	9,2	101,0	184,0	16
10099	7 x 1,5	9,2	101,0	184,0	16
10100	8 G 1,5	10,1	115,0	216,0	16
11007735	8 x 1,5	10,1	115,0	216,0	16
10101	9 G 1,5	11,1	129,0	259,0	16
10181	10 G 1,5	12,0	144,0	275,0	16
10102	11 G 1,5	12,0	158,0	300,0	16
10103	12 G 1,5	12,4	173,0	309,0	16
10104	12 x 1,5	12,4	173,0	309,0	16
10105	14 G 1,5	13,0	202,0	345,0	16
10106	16 G 1,5	13,9	230,0	386,0	16
10107	18 G 1,5	14,8	259,0	440,0	16
10185	19 G 1,5	14,8	279,0	445,0	16
10108	20 G 1,5	15,6	288,0	490,0	16
10109	21 G 1,5	15,6	302,0	555,0	16
10110	25 G 1,5	17,6	360,0	620,0	16
10535	27 G 1,5	17,6	389,0	670,0	16
10111	32 G 1,5	19,5	461,0	790,0	16
10112	34 G 1,5	20,2	490,0	830,0	16
10536	37 G 1,5	20,2	533,0	892,0	16
10113	41 G 1,5	22,1	591,0	996,0	16
10114	42 G 1,5	22,1	605,0	1007,0	16
10115	50 G 1,5	24,2	720,0	1250,0	16
10116	56 G 1,5	25,1	806,0	1332,0	16
10117	61 G 1,5	25,8	878,0	1440,0	16
10187	65 G 1,5	26,9	936,0	1602,0	16
10118	80 G 1,5	29,8	1152,0	1871,0	16
10119	100 G 1,5	33,2	1440,0	2353,0	16
10120	2 x 2,5	7,8	48,0	112,0	14
10121	3 G 2,5	8,3	72,0	148,0	14
10122	3 x 2,5	8,3	72,0	148,0	14
10123	4 G 2,5	9,2	96,0	178,0	14
10124	4 x 2,5	9,2	96,0	178,0	14
10125	5 G 2,5	10,1	120,0	221,0	14
10126	5 x 2,5	10,1	120,0	221,0	14
10127	7 G 2,5	11,2	168,0	306,0	14
10128	7 x 2,5	11,2	168,0	306,0	14
10129	8 G 2,5	12,3	192,0	363,0	14
11007736	8 x 2,5	12,3	192,0	363,0	14
10548	10 G 2,5	14,8	240,0	429,0	14
10130	12 G 2,5	15,3	288,0	498,0	14
10131	14 G 2,5	16,2	336,0	569,0	14
10132	18 G 2,5	18,2	432,0	764,0	14
10133	21 G 2,5	19,4	504,0	914,0	14
10134	25 G 2,5	21,6	600,0	1044,0	14
10135	34 G 2,5	25,2	816,0	1470,0	14
10136	42 G 2,5	27,3	1008,0	1790,0	14
10137	50 G 2,5	30,0	1200,0	2095,0	14
10138	61 G 2,5	32,2	1464,0	2750,0	14
10139	100 G 2,5	41,4	2400,0	4450,0	14
10140	2 x 4	9,2	77,0	195,0	12
10141	3 G 4	9,7	115,0	230,0	12
10142	4 G 4	10,8	154,0	295,0	12
10143	5 G 4	12,1	192,0	361,0	12
10144	7 G 4	13,4	269,0	458,0	12
10145	8 G 4	14,7	307,0	590,0	12
10549	10 G 4	17,6	384,0	687,0	12
10146	12 G 4	18,2	461,0	790,0	12
10147	3 G 6	11,9	173,0	355,0	10
10148	4 G 6	13,2	230,0	424,0	10
10149	5 G 6	14,7	288,0	525,0	10
10150	7 G 6	16,2	403,0	625,0	10
10151	3 G 10	14,8	288,0	540,0	8
10152	4 G 10	16,4	384,0	701,0	8
10153	5 G 10	18,3	480,0	858,0	8
10154	7 G 10	20,2	672,0	1106,0	8
10190	3 G 16	18,4	461,0	827,0	6
10155	4 G 16	20,4	614,0	1035,0	6
10156	5 G 16	22,8	768,0	1259,0	6
10157	7 G 16	25,2	1075,0	1780,0	6
10191	3 G 25	22,4	720,0	1186,0	4
10158	4 G 25	25,1	960,0	1582,0	4
10159	5 G 25	27,9	1200,0	1999,0	4
10160	7 G 25	30,8	1680,0	2825,0	4
10192	3 G 35	25,2	1008,0	1585,0	2
10161	4 G 35	27,9	1344,0	2105,0	2
10162	5 G 35	31,0	1680,0	2633,0	2
10193	3 G 50	29,9	1440,0	2550,0	1
10163	4 G 50	33,0	1920,0	2940,0	1
10188	5 G 50	37,0	2400,0	2936,0	1
10194	3 G 70	34,1	2016,0	3180,0	2/0
10164	4 G 70	37,9	2688,0	4090,0	2/0
10189	5 G 70	42,4	3360,0	5443,0	2/0
10195	3 G 95	39,6	2736,0	4680,0	3/0
10165	4 G 95	43,9	3648,0	5540,0	3/0
10333	5 G 95	49,0	4560,0	6931,0	3/0
10166	4 G 120	48,8	4608,0	7000,0	4/0
13139	4 G 150	54,4	5760,0	8340,0	300 kcmil
13140	4 G 185	62,3	7104,0	9904,0	350 kcmil

Dimensions and specifications may be changed without prior notice. (RA01)

02.05.2019 / Dimensions and specifications may be changed without prior notice.

H07V-K / (H)07V-K

PVC-Single Cores, fine wire stranded



Technical data

- PVC single cores to DIN VDE 0285-525-2-31/ DIN EN 50525-2-31 and IEC 60227-3
- **Temperature range** flexing -5°C to +70°C fixed installation -30°C to +80°C
- **Nominal voltage** U_0/U 450/750 V
- **Test voltage** 2500 V
- **Insulation resistance** min. 10 MOhm x km
- **Minimum bending radius** fixed installation core Ø ⩽ 8 mm: 4x core Ø core Ø> 8-1 2 mm: 5x core Ø core Ø> 12 mm: 6x core Ø
- **Radiation resistance** up to 80x10^6 cJ/kg (up to 80 Mrad)

Cable structure

- Bare Cu-conductor, to DIN VDE 0295 cl.5, fine wire, BS 6360 cl.5, IEC 60228 cl.5
- Core insulation of PVC compound type TI1 to DIN VDE 0207-363-3 / DIN EN 50363-3 and IEC 60227-3
- Core identification: see table below

Properties

- The materials used during manufacturing are cadmium-free, contain no silicone and are free from substances harmful to the wetting properties of lacquers

Tests

- PVC self-extinguishing and flame retardant acc. to DIN VDE 0482-332-1-2, DIN EN 60332-1-2, IEC 60332-1-2 (equivalent DIN VDE 0472 part 804 test method B)

Note

- The following colours are recommended (only single colour): black, white, blue, grey, brown, red, orange, turquoise, violet and pink. Two-coloured combinations are not allowed, with exceptions of green-yellow.
- Colours yellow, green, transparent only in (H)07V-K available.
- Two-coloured combination is only permitted for (H)07V-K.

Application

These single cores are suitable for laying in tubes, under and surface mounting of plasters and also in closed installation conduits. These are not allowed to install for direct laying on cable trays, channels or tanks. These types are permitted for the inner wiring of equipment, distributor and switchboards and also for protective laying to the lightings with a nominal voltage up to 1000 V alternating current or up to 750 V direct current against earth.

CE = Product conforms with Low-Voltage Directive 2014/35/EU.

H07V-K, (H)07V-K

Cross-sec. mm²	Outer Ø min. - max. mm	Cop. weight kg / km	BK	GN-YE	BU	BN	RD	WH	GY	VT	YE	PK	GN	TRANS	D-BU	OG	2-col.	U-BU
app. RAL			9005	-	5015	8003	3000	9003	7001	4005	1021	3015	6018	-	5010	2003	-	5002
Packing			**Coil in cardboard (100m)**															
H07V-K coil																		
Part no.			29129	29130	29131	29132	29133	29134	29135	29136	29137	29138	29139	29140	29141	29142	29144	26395
1,5	2,8 - 3,4	14,4																
Part no.			29145	29146	29147	29148	29149	29150	29151	29152	29153	29154	29155	29156	29157	29158	29160	26396
2,5	3,4 - 4,1	24,0																
Part no.			29161	29162	29163	29164	29165	29166	29167	29168	29169	29170	29171	29172	29173	29174	29176	26397
4	3,9 - 4,8	38,0																
Part no.			29177	29178	29179	29180	29181	29182	29183	29184	29185	29186	29187	29188	29189	29190	29192	26398
6	4,4 - 5,3	58,0																
Packing			**Spool (with various capacity)**															
H07V-K spool																		
Part no.			26690	26691	26692	26693	26694	26695	26696	26697	26698	26699	26700	26701	26702	26703	26705	26399
1,5	2,8 - 3,4	14,4																
Part no.			26706	26707	26708	26709	26710	26711	26712	26713	26714	26715	26716	26717	26718	26719	26721	26400
2,5	3,4 - 4,1	24,0																
Part no.			26722	26723	26724	26725	26726	26727	26728	26729	26730	26731	26732	26733	26734	26735	26737	26401
4	3,9 - 4,8	38,0																
Part no.			26738	26739	26740	26741	26742	26743	26744	26745	26746	26747	26748	26749	26750	26751	26753	26402
6	4,4 - 5,3	58,0																

Continuation ▸

27.09.2016 / Dimensions and specifications may be changed without prior notice.

H07V-K / (H)07V-K

PVC-Single Cores, fine wire stranded

H05V-U, (H)05V-U, (H)07V-U

Cross-sec. mm²	Outer Ø min. - max. mm	Cop. weight kg / km	BK	GN-YE	BU	BN	RD	WH	GY	VT	YE	PK	GN	TRANS	D-BU	OG	2-col.	U-BU
app. RAL			9005	-	5015	8003	3000	9003	7001	4005	1021	3015	6018	-	5010	2003	-	5002



Packing — **Barrel (with various capacity)**

H07V-K barrel																		
Part no.			26755	26756	26757	26758	26759	26760	26761	26762	26763	26764	26765	26766	26767	26768	26770	26403
1,5	2,8 - 3,4	14,4																
Part no.			26771	26772	26773	26774	26775	26776	26777	26778	26779	26780	26781	26782	26783	26784	26786	26404
2,5	3,4 - 4,1	24,0																
Part no.			26787	26788	26789	26790	26791	26792	26793	26794	26795	26796	26797	26798	26799	26800	26802	26819
4	3,9 - 4,8	38,0																
Part no.			26803	26804	26805	26806	26807	26808	26809	26810	26811	26812	26813	26814	26815	26816	26818	26820
6	4,4 - 5,3	58,0																



Packing — **Coil in foil (100m)**

H07V-K coil																		
Part no.			26060	26061	26062	26063	26064	26065	26066	26067	26068	26069	26092	26099	26108	26109	26111	26821
1,5	2,8 - 3,4	14,4																
Part no.			26112	26113	26114	26115	26116	26117	26118	26119	29855	29856	29857	29858	29859	29890	29892	26822
2,5	3,4 - 4,1	24,0																
Part no.			29893	29894	29895	29896	29897	29898	29899	29905	29906	29907	29908	29909	29910	29911	29913	26823
4	3,9 - 4,8	38,0																
Part no.			29914	29915	29916	29917	29918	29919	29921	29922	29923	29924	29925	29926	29927	29928	29933	26824
6	4,4 - 5,3	58,0																
Part no.			29193	29194	29195	29196	29197	29198	29199	29200	29201	29202	29203	29204	29205	29206	29208	-
10	5,7 - 6,8	96,0																
Part no.			29209	29210	29211	29212	29213	29214	29215	29216	29217	29218	29219	29220	29221	29222	29224	-
16	6,7 - 8,1	154,0																
Part no.			29225	29226	29227	29228	29229	29230	29231	29232	29233	29234	29235	29236	29237	29238	29240	-
25	8,4 - 10,2	240,0																
Part no.			29241	29242	29243	29244	29245	29246	29247	29248	29249	29250	29251	29252	29253	29254	29256	-
35	9,7 - 11,7	336,0																
Part no.			29257	29258	29259	29260	29261	29262	29263	29264	29265	29266	29267	29268	29269	29270	29272	-
50	11,5 - 13,9	480,0																
Part no.			29273	29274	29275	29276	29277	29278	29279	29280	29281	29282	29283	29284	29285	29286	29288	-
70	13,2 - 16,0	672,0																
Part no.			29289	29290	29291	29292	29293	29294	29295	29296	29297	29298	29299	29300	29301	29302	29304	-
95	15,1 - 18,2	912,0																
Part no.			29418	29419	29420	29421	29422	29423	29424	29425	29426	29427	29428	29429	29430	29431	29433	-
120	16,7 - 20,2	1152,0																
Part no.			29434	29435	29436	29437	29438	29439	29440	29441	29442	29443	29444	29445	29446	29447	29449	-
150	18,6 - 22,5	1440,0																
Part no.			29494	29495	29496	29497	29498	29499	29590	29591	29592	29593	29594	29595	29596	29597	29599	-
185	20,6 - 24,9	1776,0																
Part no.			29813	29814	29815	29816	29817	29818	29819	29840	29841	29842	29843	29844	29845	29846	29848	-
240	23,5 - 28,4	2304,0																



Packing — **Drum**

H07V-K drum																		
Part no.			26825	26826	26827	26828	26829	26830	26831	26832	26833	26834	26835	26836	26837	26838	26840	-
10	5,7 - 6,8	96,0																
Part no.			26841	26842	26843	26844	26845	26846	26847	26848	26849	26850	26851	26852	26853	26854	26856	-
16	6,7 - 8,1	154,0																
Part no.			26857	26858	26859	26860	26861	26862	26863	26864	26865	26866	26867	26868	26869	26870	26872	-
25	8,4 - 10,2	240,0																
Part no.			26873	26874	26875	26876	26877	26878	26879	26880	26881	26882	26883	26884	26885	26886	26888	-
35	9,7 - 11,7	336,0																
Part no.			26889	26890	26891	26892	26893	26894	26895	26896	26897	26898	26899	26900	26901	26902	26904	-
50	11,5 - 13,9	480,0																
Part no.			26905	26906	26907	26908	26909	26910	26911	26912	26913	26914	26915	26916	26917	26918	26920	-
70	13,2 - 16,0	672,0																
Part no.			26921	26922	26923	26924	26925	26926	26927	26928	26929	26930	26931	26932	26933	26934	26936	-
95	15,1 - 18,2	912,0																
Part no.			29305	29306	29307	29308	29309	29310	29311	29312	29313	29314	29315	29316	29317	29318	29320	-
120	16,7 - 20,2	1152,0																
Part no.			29321	29322	29323	29324	29325	29326	29327	29328	29329	29330	29331	29332	29333	29334	29336	-
150	18,6 - 22,5	1440,0																
Part no.			29337	29338	29339	29340	29341	29342	29343	29344	29345	29346	29347	29348	29349	29350	29352	-
185	20,6 - 24,9	1776,0																
Part no.			29353	29354	29355	29356	29357	29358	29359	29360	29361	29362	29363	29364	29365	29366	29368	-
240	23,5 - 28,4	2304,0																
Part no.			28878	28879	28880	28881	28882	28883	28884	28885	28886	28887	28888	-	28889	28890	28891	-
300	26,0 - 30,5	2880,0																

Dimensions and specifications may be changed without prior notice. (RK01)

27.09.2016 / Dimensions and specifications may be changed without prior notice.

NSGAFÖU 3 kV

Special Rubber-Insulated Cable, VDE approved, short-circuit up to 1000 V



Technical data

- Special rubber-insulated single core cables to DIN VDE 0250 part 602
- **Temperature range**
  flexing -25°C to +80°C
  fixed installation -40°C to +80°C
- Permissible conductor **operating temperature** +90°C
- **Nominal voltage**
  U_0/U 1,8/3 kV
- Max. permissible **operating voltage**
  - 3-Phase and single phase operation 2,1/3,6 kV
  - DC operation 2,7/5,4 kV
- **Test voltage**
  6 kV
- **Minimum bending radius**
  flexing 10x outer Ø
  fixed installation 6x outer Ø

Cable structure

- Tinned copper conductor, to DIN VDE 0295 cl.5, fine wire, BS 6360 cl.5, IEC 60228 cl.5
- EPR-insulation, compound type 3GI3 to DIN VDE 0207-20
- Outer casing: Polychloroprene 5GM3 acc. to DIN VDE 0207-21
- Sheath colour black or orange

Properties

Tests

- Oil resistant acc. to DIN VDE 0473-811-404/DIN EN 60811-404
- Behaviour in fire acc. to DIN VDE 0482-332-1-2 / DIN EN 60332-1-2 / IEC 60332-1-2

Note

- Considered as being short circuit safe and inherently earth-fault-proof are those operating materials and conducting assemblies where because of suitable measures and/or means applied, neither a short circuit nor a short to ground is to be expected under operating conditions which are in accordance with those specified for the intended application.
- Version in 6 kV available on request.
- AWG sizes are approximate equivalent values. The actual cross section is in mm².

Application

Particularly suitable for protection against short circuits in laying and for inherently earth-fault-proof routing in rail vehicles and omnibuses. Also suitable for laying in dry environments.

Sheath colour black

Part no.	No.cores x cross-sec. mm²	Outer Ø max. mm	Cop. weight kg / km	Weight app. kg / km	AWG-No.
38501	1 x 1,5	7,0	14,4	62,0	16
38502	1 x 2,5	7,5	24,0	76,0	14
38503	1 x 4	9,0	38,0	95,0	12
38504	1 x 6	9,5	58,0	140,0	10
38505	1 x 10	11,0	96,0	190,0	8
38506	1 x 16	13,0	154,0	270,0	6
38507	1 x 25	15,0	240,0	410,0	4
38508	1 x 35	16,5	336,0	490,0	2
38509	1 x 50	18,0	480,0	650,0	1
38510	1 x 70	20,5	672,0	900,0	2/0
38511	1 x 95	24,0	912,0	1200,0	3/0
38513	1 x 120	26,0	1152,0	1450,0	4/0
38514	1 x 150	28,0	1440,0	1800,0	300 kcmil
38512	1 x 185	31,0	1776,0	2200,0	350 kcmil
38515	1 x 240	34,5	2304,0	2650,0	500 kcmil
38516	1 x 300	38,0	2880,0	3250,0	600 kcmil

Sheath colour orange

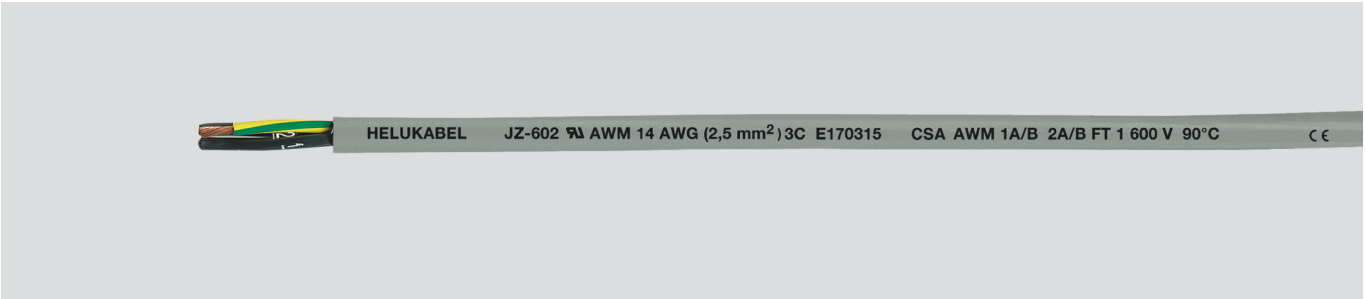
Part no.	No.cores x cross-sec. mm²	Outer Ø max. mm	Cop. weight kg / km	Weight app. kg / km	AWG-No.
710665	1 x 2,5	7,5	24,0	76,0	14
710666	1 x 4	9,0	38,0	95,0	12
710223	1 x 6	9,5	58,0	140,0	10

Dimensions and specifications may be changed without prior notice. (RK01)

11.04.2019 / Dimensions and specifications may be changed without prior notice.

JZ-602

two approval control cable, 90°C, 600 V, meter marking



Technical data

- Control cable of special-PVC acc. to UL CSA AWM I/II A/B Style 2587 and CSA
- **Temperature range**
  flexing -5°C to +90°C
  fixed installation -40°C to +90°C
- **Nominal voltage**
  UL/CSA 600 V
- **Test voltage**
  3000 V
- **Breakdown voltage**
  min. 6000 V
- **Minimum bending radius**
  flexing 7,5x cable Ø
  fixed installation 4x cable Ø

Cable structure

- Bare copper conductor, fine wire acc. to DIN VDE 0295 cl.5 / IEC 60228 cl.5
- Core insulation PVC
  UL type 90°C acc. to UL Std. 758 as well as CSA Std. C22.2 No.210
- Core identification to DIN VDE 0293 black cores with continuous white numbering
- GN-YE conductor, 3 cores and above in the outer layer
- Cores stranded in layers with optimal selected lay length
- Outer sheath PVC
  UL type 90°C acc. to UL Std. 758 as well as CSA Std. C22.2 No.210
- Sheath colour: grey (RAL 7001)
- With meter marking

Properties

- Extensively oil resistant
- The materials used during manufacturing are cadmium-free, contain no silicone and are free from substances harmful to the wetting properties of lacquers

Tests

- Flame retardant
  acc. to DIN VDE 0482-332-1-2 / DIN EN 60332-1-2 / IEC 60332-1-2 / UL VW-1 / CSA FT1

Note

- G = with GN-YE conductor
  x = without GN-YE conductor (OZ)
- Please note "cleanroom qualified" when ordering.
- AWG sizes are approximate equivalent values. The actual cross section is in mm².
- Screened analogue type:
  JZ-602-CY

Application

UL-approved and CSA certified flexible control cable rated at 600 V. Used in machine tools, control systems, connection between control panels and machines, assembly lines and other industrial equipment. Suitable for installation in dry, moist or wet environment and moderate flexing applications.
CE = Product conforms with Low-Voltage Directive 2014/35/EU.

Part no.	No.cores x cross-sec. mm²	AWG-No.	Outer Ø app. mm	Cop. weight kg / km	Weight app. kg / km
83090	2 x 0,5	20	5,0	9,6	49,0
83091	3 G 0,5	20	5,3	14,0	58,0
83092	4 G 0,5	20	5,7	19,0	69,0
83093	5 G 0,5	20	6,2	24,0	84,0
83094	7 G 0,5	20	6,7	34,0	123,0
83100	8 G 0,5	20	7,2	38,4	140,0
83101	9 G 0,5	20	7,8	43,2	177,0
83095	12 G 0,5	20	8,8	58,0	192,0
83096	18 G 0,5	20	10,5	86,0	256,0
83097	25 G 0,5	20	12,4	120,0	358,0
83098	34 G 0,5	20	14,3	163,0	487,0
83099	41 G 0,5	20	15,4	197,0	580,0
83080	2 x 1	18	5,8	19,2	53,0
83081	3 G 1	18	6,1	27,0	61,0
83565	3 x 1	18	6,1	27,0	61,0
83082	4 G 1	18	6,6	38,4	74,0
83083	5 G 1	18	7,3	48,0	90,0
83084	7 G 1	18	7,9	67,0	130,0
83102	8 G 1	18	8,8	76,8	144,0
83103	9 G 1	18	9,4	86,4	180,0
83085	12 G 1	18	10,6	115,2	198,0
83086	18 G 1	18	12,7	173,0	274,0
83087	25 G 1	18	15,0	240,0	384,0
83088	34 G 1	18	17,5	326,0	494,0
83089	41 G 1	18	18,8	394,0	508,0
83070	2 x 1,5	16	6,4	28,8	73,0
83071	3 G 1,5	16	6,8	44,0	94,0
83072	4 G 1,5	16	7,4	58,0	117,0
83073	5 G 1,5	16	8,1	72,0	140,0
83074	7 G 1,5	16	9,0	101,0	186,0
83104	9 G 1,5	16	10,7	129,7	244,0
83075	12 G 1,5	16	11,8	173,0	319,0
83076	18 G 1,5	16	14,4	260,0	451,0
83077	25 G 1,5	16	17,0	360,0	625,0
83078	34 G 1,5	16	19,8	490,0	840,0
83079	41 G 1,5	16	21,5	590,0	1032,0
83060	2 x 2,5	14	7,6	48,0	115,0
83061	3 G 2,5	14	8,1	72,0	143,0
83062	4 G 2,5	14	9,0	96,0	185,0
83063	5 G 2,5	14	9,9	120,0	221,0
83064	7 G 2,5	14	11,0	168,0	293,0
83065	9 G 2,5	14	13,1	216,0	429,0
83066	12 G 2,5	14	14,7	288,0	563,0
83067	18 G 2,5	14	17,8	432,0	854,0
83068	19 G 2,5	14	17,8	456,0	914,0
83069	25 G 2,5	14	21,2	600,0	1188,0
83051	3 G 4	12	9,5	115,0	232,0
83052	4 G 4	12	10,6	154,0	298,0
83053	5 G 4	12	11,7	192,0	358,0
83054	7 G 4	12	13,0	269,0	460,0
83041	3 G 6	10	11,5	173,0	360,0
83042	4 G 6	10	12,8	231,0	402,0
83043	5 G 6	10	14,3	288,0	484,0
83044	7 G 6	10	15,8	403,0	630,0
83031	3 G 10	8	14,9	288,0	535,0
83032	4 G 10	8	16,5	384,0	653,0
83033	5 G 10	8	18,5	480,0	786,0
83034	7 G 10	8	20,4	672,0	1100,0

Continuation ▸

13.02.2019 / Dimensions and specifications may be changed without prior notice.

JZ-602

two approval control cable, 90°C, 600 V, meter marking

Part no.	No.cores x cross-sec. mm²	AWG-No.	Outer Ø app. mm	Cop. weight kg / km	Weight app. kg / km
83020	2 x 16	6	17,6	307,0	640,0
83021	3 G 16	6	18,6	461,0	810,0
83022	4 G 16	6	20,5	615,0	1045,0
83023	5 G 16	6	23,0	768,0	1260,0
83024	7 G 16	6	25,2	1075,0	1760,0
83011	3 G 25	4	23,1	720,0	1180,0
83012	4 G 25	4	25,4	960,0	1507,0
83013	5 G 25	4	28,4	1200,0	1858,0
83014	7 G 25	4	31,4	1680,0	2830,0
83001	3 G 35	2	25,4	1008,0	1590,0
83002	4 G 35	2	28,2	1344,0	2123,0
83003	5 G 35	2	31,5	1680,0	2612,0

Part no.	No.cores x cross-sec. mm²	AWG-No.	Outer Ø app. mm	Cop. weight kg / km	Weight app. kg / km
83004	3 G 50	1	30,1	1440,0	2652,0
83005	4 G 50	1	33,4	1920,0	3058,0
83006	5 G 50	1	37,3	2400,0	4093,0
83007	3 G 70	2/0	34,2	2016,0	3307,0
83008	4 G 70	2/0	37,9	2688,0	4254,0
83009	5 G 70	2/0	42,4	3360,0	5661,0
83010	3 G 95	3/0	38,6	2736,0	4867,0
83015	4 G 95	3/0	42,7	3648,0	5762,0
83016	5 G 95	3/0	47,8	4560,0	7208,0
83017	3 G 120	4/0	42,9	3456,0	5580,0
83018	4 G 120	4/0	47,6	4608,0	7280,0
83019	5 G 120	4/0	53,1	5760,0	8692,0

Dimensions and specifications may be changed without prior notice. (RN01)

13.02.2019 / Dimensions and specifications may be changed without prior notice.

SIEMENS

Datenblatt 3NP1153-1DA10



SENTRON, Sicherungslasttrennschalter 3NP1, 3-polig, NH2, 400 A, für Aufbau und Einbau auf Montageplatte, Flachanschluss, Abdeckebene 70mm

Ausführung	
Produkt-Markenname	SENTRON
Produkt-Bezeichnung	Sicherungslasttrennschalter 3NP1
Ausführung des Produkts	Abdeckebene 70 mm
Ausführung der Sicherungsüberwachung	ohne
Ausführung des Betätigungselements	Deckelgriff
Ausführung des Lastschalters / Leistenform	Nein
Ausführung des Schaltantriebs / Motorantrieb	Nein
Allgemeine technische Daten	
Polzahl	3
Bauart des Geräts	für Aufbau und Einbau auf Montageplatte
Baugröße der Trennlasche	2 und 1
Baugröße des Sicherungseinsatzes	NH1, NH2
Durchlassstrom / bei geschlossenem Schalter / maximal zulässig	40 kA
mechanische Lebensdauer (Schaltspiele) / typisch	1 000
Leistungsfaktor	
● bei AC-22 B	0,65
● bei AC-23 B	0,35
● bei kapazitiver Last	-0,25
Sicherungssystem	NH-Sicherung
Verschmutzungsgrad	3
Spannung	
Isolationsspannung	
● Bemessungswert	690 V
● bei Verschmutzungsgrad 3 / bei AC / Bemessungswert	690 V
● bei Verschmutzungsgrad 2 / bei AC / Bemessungswert	1 000 V
Leistungsfaktor / bei AC-21 B	0,95
Stoßspannungsfestigkeit / Bemessungswert	8 kV
Betriebsspannung	
● bei AC / Bemessungswert / maximal	690 V
● bei DC / Bemessungswert	440 V
● bei DC / Bemessungswert / maximal	440 V
Schutzart und Schutzklasse	
Schutzart IP	
● bei geschlossenem Schalter / mit Blende oder	IP40

Änderungen vorbehalten
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Kabelschuhabdeckung	
● bei geschlossenem Schalter / ohne Blende oder Kabelschuhabdeckung	IP30
● frontseitig	IP40
● offen	IP20
Verlustleistung	
Verlustleistung [W]	
● bei konventionellem thermischen Bemessungsstrom / ohne Sicherung / je Pol	14 W
● bei konventionellem thermischen Bemessungsstrom / ohne Sicherung / je Gerät	42 W
● bei Bemessungswert Strom / bei AC / bei warmem Betriebszustand / je Pol	48 W
● der Sicherung / je Sicherung / maximal	34 W
Strom	
Betriebsstrom	
● bei 35 °C / Bemessungswert	400 A
● bei 40 °C / Bemessungswert	400 A
● bei 45 °C / Bemessungswert	392 A
● bei 50 °C / Bemessungswert	372 A
● bei 55 °C / Bemessungswert	356 A
● bei AC / Bemessungswert	400 A
● bei AC-23 B / bei 690 V / Bemessungswert	125 A
● bei AC-23 B / bei 500 V / Bemessungswert	315 A
● bei AC-23 B / bei 400 V / Bemessungswert	400 A
● bei AC-23 B / bei 240 V / Bemessungswert	400 A
● bei AC-22 B / bei 690 V / Bemessungswert	400 A
● bei AC-22 B / bei 500 V / Bemessungswert	400 A
● bei AC-22 B / bei 400 V / Bemessungswert	400 A
● bei AC-22 B / bei 240 V / Bemessungswert	400 A
● bei AC-21 B / bei 690 V / Bemessungswert	400 A
● bei AC-21 B / bei 500 V / Bemessungswert	400 A
● bei AC-21 B / bei 400 V / Bemessungswert	400 A
● bei AC-21 B / bei 240 V / Bemessungswert	400 A
● bei DC-23 B / bei 440 V / Bemessungswert	160 A
● bei DC-23 B / bei 240 V / Bemessungswert	250 A
● bei DC-23 B / bei 120 V / Bemessungswert	250 A
● bei DC-22 B / bei 440 V / Bemessungswert	315 A
● bei DC-22 B / bei 240 V / Bemessungswert	400 A
● bei DC-22 B / bei 120 V / Bemessungswert	400 A
● bei DC-21 B / bei 440 V / Bemessungswert	400 A
● bei DC-21 B / bei 240 V / Bemessungswert	400 A
● bei DC-21 B / bei 120 V / Bemessungswert	400 A
Durchlassstrom / bei zügigem Einschalten / maximal zulässig	40 kA
Hauptstromkreis	
Betriebsstrom	
● Bemessungswert	400 A
● bei kapazitiver Last / bei 400 V / Bemessungswert	72 A
● bei kapazitiver Last / bei 500 V / Bemessungswert	55 A
Hilfsstromkreis	
Anzahl der Wechsler / für Hilfskontakte	0
Anzahl der Öffner / für Hilfskontakte	0
Anzahl der Schließer / für Hilfskontakte	0
Eignung	
Eignung zur Verwendung	
● Hauptschalter	Nein
● Lasttrennschalter	Ja
● NOT-AUS-Schalter	Nein

Änderungen vorbehalten
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● Sicherheitsschalter	Ja
● Wartungs-/Reparaturschalter	Ja
Produktdetails	
Produktausstattung / Verriegelung	Ja
● Produktbestandteil / Ausgelöstmelder	Nein
● Produktfunktion / Phasenausfallüberwachung	Nein
● Produktbestandteil / Unterspannungsauslöser	Nein
● Produktbestandteil / Unterspannungsauslöser mit voreilendem Kontakt	Nein
Produkteigenschaft / plombierbar	Ja
Produkterweiterung / Hilfsschalter	Ja
Produkterweiterung / optional	
● Abschließbarkeit	Ja
● Motorantrieb	Nein
● Phasenausfallüberwachung	Ja
● Sicherungsüberwachung	Ja
● Spannungsauslöser	Nein
● Überspannungsschutzüberwachung	Ja
Produktfunktion	
Produktfunktion	
● Sicherungsüberwachung	Nein
● Überspannungsschutzüberwachung	Nein
Kurzschluss	
● bedingter Kurzschlussstrom (Iq) / Bemessungswert	80 kA
● bedingter Kurzschlussstrom (Iq) / bei AC / bei 240 V / bei zügigem Einschalten / Bemessungswert	80 kA
● bedingter Kurzschlussstrom (Iq) / bei AC / bei 500 V / bei zügigem Einschalten / Bemessungswert	80 kA
● bedingter Kurzschlussstrom (Iq) / bei AC / bei 690 V / bei zügigem Einschalten / Bemessungswert	50 kA
● bedingter Kurzschlussstrom (Iq) / bei geschlossenem Schalter / bei AC / bei 240 V / Bemessungswert	100 kA
● bedingter Kurzschlussstrom (Iq) / bei geschlossenem Schalter / bei AC / bei 500 V / Bemessungswert	100 kA
● bedingter Kurzschlussstrom (Iq) / bei geschlossenem Schalter / bei AC / bei 690 V / Bemessungswert	100 kA
Anschlüsse	
Anordnung des elektrischen Anschlusses / für Hauptstromkreis	sonstige
anschließbarer Leiterquerschnitt / für Hauptkontakte	
● eindrähtig oder mehrdrähtig / minimal	25 mm²
● eindrähtig oder mehrdrähtig / maximal	240 mm²
● mehrdrähtig / minimal	25 mm²
● mehrdrähtig / maximal	240 mm²
Anzugsdrehmoment / bei Schraubanschluss	
● minimal	10 N·m
● maximal	12 N·m
Art der anschließbaren Leiterquerschnitte / der lamellierten Leiter / maximal	34 x 18 mm
Art der Anschlusstechnik	Flachanschluss
Ausführung des elektrischen Anschlusses / für Hauptstromkreis	Schienenanschluss
Mechanischer Aufbau	
Höhe	306 mm
Breite	209,4 mm
Tiefe	130 mm
Befestigungsart	Montageplatte

Änderungen vorbehalten
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Befestigungsart	
● Bodenmontage	Ja
● Frontmontage mit 4-Loch Befestigung	Nein
● Frontmontage mit Zentralbefestigung	Nein
● Schienen-Montage	Nein
Einbaulage	horizontal/vertikal
Nettogewicht	4,21 kg

Umgebungsbedingungen

Umgebungstemperatur / während Betrieb	
● minimal	-25 °C
● maximal	55 °C
Umgebungstemperatur / während Lagerung	
● minimal	-50 °C
● maximal	80 °C

allgemeine Produktzulassung | **Konformitätserklärung**

CCC UR VDE Sonstige EAC EG-Konf.

Prüfbescheinigungen | **Marine / Schiffbau**

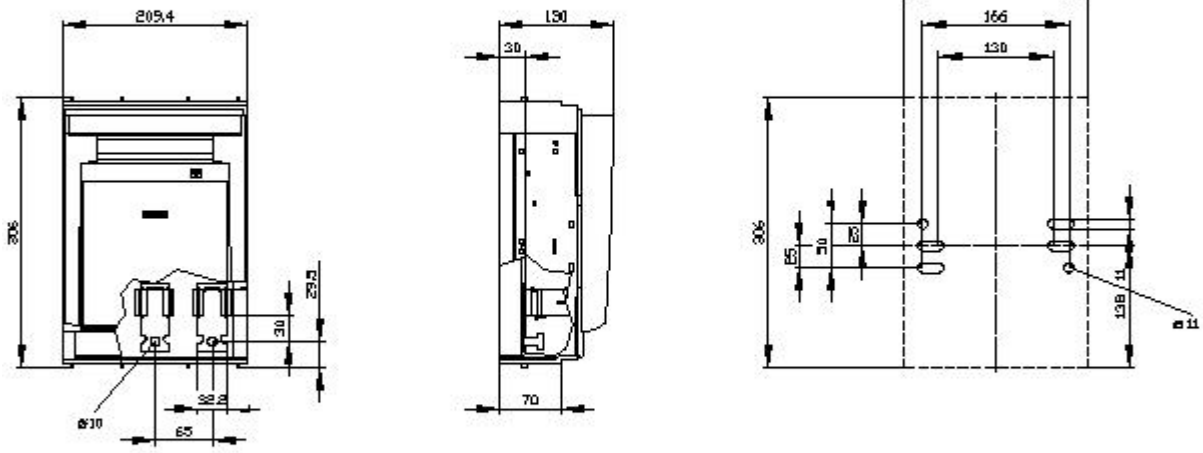
spezielle Prüfbescheinigungen | Typprüfbescheinigung/Werkszeugnis

LRS

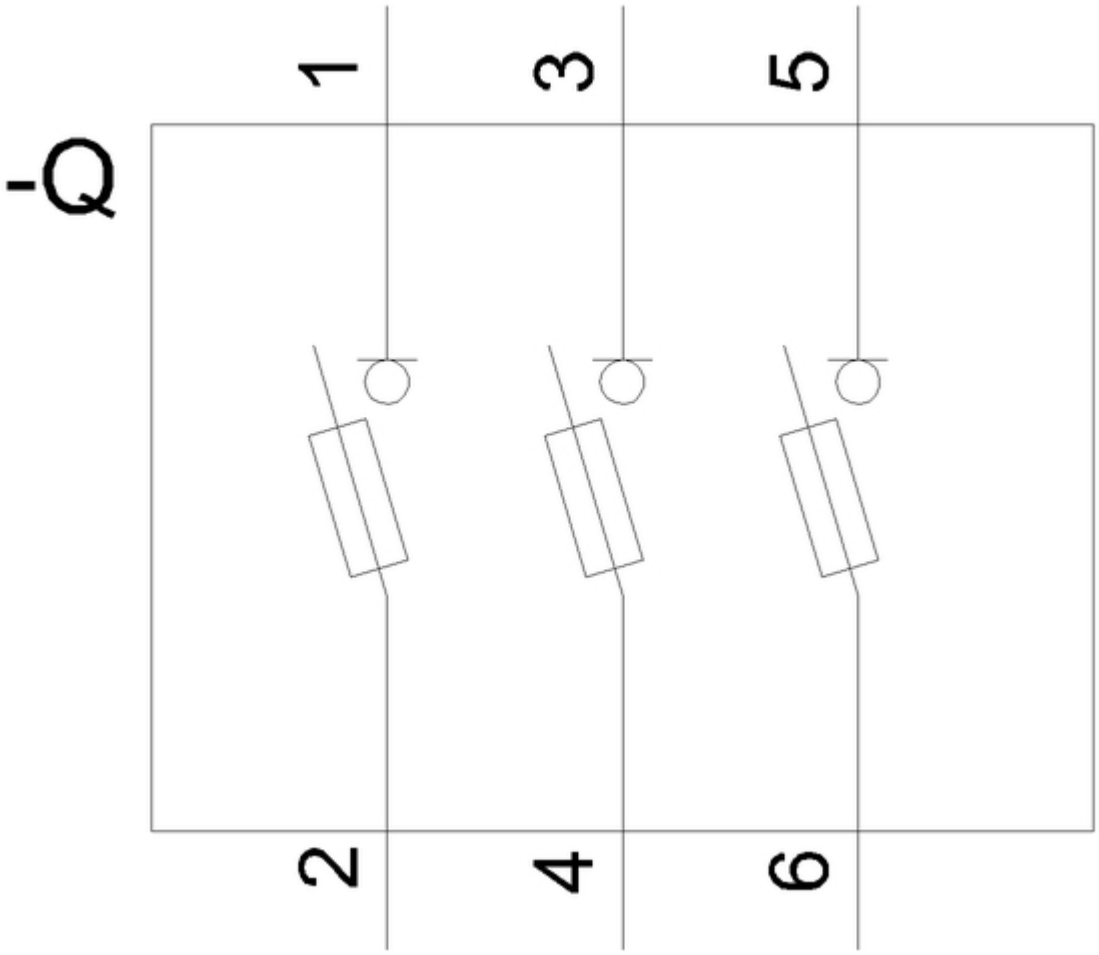
Weitere Informationen

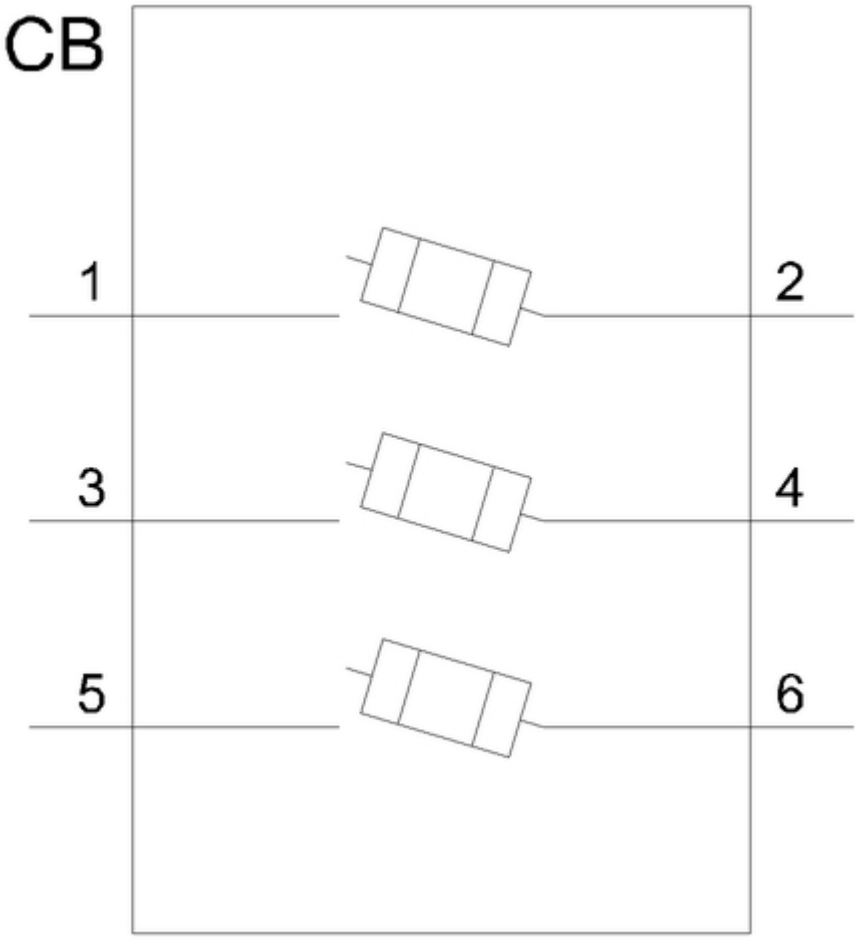
Information- and Downloadcenter (Kataloge, Broschüren,…)
http://www.siemens.de/lowvoltage/kataloge
Industry Mall (Online-Bestellsystem)
https://mall.industry.siemens.com/mall/de/de/Catalog/product?mlfb=3NP1153-1DA10
Service&Support (Handbücher, Betriebsanleitungen, Zertifikate, Kennlinien, FAQs,…)
https://support.industry.siemens.com/cs/ww/de/ps/3NP1153-1DA10
Bilddatenbank (Produktfotos, 2D-Maßzeichnungen, 3D-Modelle, Geräteschaltpläne, …)
http://www.automation.siemens.com/bilddb/cax_de.aspx?mlfb=3NP1153-1DA10
CAx-Online-Generator
http://www.siemens.com/cax
Ausschreibungstexte (Leistungsverzeichnisse)
http://www.siemens.de/ausschreibungstexte

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SIMOTION Control Unit



Figure similar

MLFB-Ordering data : **6AU1320-4DE65-3AF0**

Client order no. :
Order no. :
Offer no. :
Remarks :

Item no. :
Consignment no. :
Project :

Product brand name	SIMOTION P
Product type designation	P320-4 E

Technical data are subject to change! There may be discrepancies between calculated and rating plate values.

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Data sheet 6EP1961-2BA41



SITOP PSE200U SELECTIVITY MODULE 10A
SITOP PSE200U 10 A Selectivity module 4-channel input: 24 V DC/40 A output: 24 V DC/4x 10 A Level adjustable 3-10 A mit status message for each output

Input	
Type of the power supply network	Controlled DC voltage
Supply voltage / at DC / Rated value	24 V
Input voltage / at DC	22 ... 30 V
Overvoltage overload capability	35 V
Input current / at rated input voltage 24 V / Rated value	40 A

Output	
Voltage curve / at output	controlled DC voltage
Formula for output voltage	Vin - approx. 0.2 V
Relative overall tolerance / of the voltage / Note	In accordance with the supplying input voltage
Number of outputs	4
Output current / up to 60 °C / per output / rated value	10 A
Adjustable pick-up value current / of the current-dependent overload release	3 ... 10 A
Type of response value setting	via potentiometer
Product feature / parallel switching of outputs	No
Product feature / bridging of equipments	Yes

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Type of outputs connection	Simultaneous connection of all outputs after power up of the supply voltage > 20 V, delay time of 25 ms, 100 ms or adjustable "load optimised" via DIP switch for sequential connection
Efficiency	
Efficiency in percent	99 %
Power loss [W] / at rated output current / for rated value of the output current / typical	10 W
Switch-off characteristic per output	
Switching characteristic	
• of the excess current	Iout = 1.0 ...1.5 x set value, switch-off after approx. 5 s
• of the current limitation	Iout = 1.5 x set value, switch-off after typ. 100 ms
• of the immediate switch-off	Iout > set value and Vin < 20 V, switch-off after approx. 0.5 ms
Residual current at switch-off / typical	1 mA
Design of the reset device/resetting mechanism	via sensor per output
Remote reset function	Non-electrically isolated 24 V input (signal level "high" at > 15 V)
Protection and monitoring	
Fuse protection type / at input	15 A per output (not accessible)
Display version / for normal operation	Three-color LED per output: green LED for "Output switched through"; yellow LED for "Output switched off manually"; red LED for "Output switched off due to overcurrent"
Design of the switching contact / for signaling function	Status signal output (pulse/pause signal, can be evaluated via Simatic function block)
Safety	
Galvanic isolation / between input and output at switch-off	No
Operating resource protection class	Class III
Certificate of suitability	
• CE marking	Yes
• as approval for USA	UL-Recognized (UL 2367) File E328600; cULus-Listed (UL 508, CSA C22.2 No. 107.1) File E197259
Standard / for safety	according to EN 60950-1 and EN 50178
Certificate of suitability / relating to ATEX	IECEx Ex nA IIC T4 Gc; ATEX (EX) II 3G Ex nA IIC T4 Gc; cULus Class I, Div. 2, Group ABCD, T4
Shipbuilding approval	DNV GL, ABS
Protection class IP	IP20
EMC	
Standard	
• for emitted interference	EN 55022 Class B
• for interference immunity	EN 61000-6-2
Operating data	
Ambient temperature	
• during operation	-25 ... +60 °C

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— Note	with natural convection
• during transport	-40 ... +85 °C
• during storage	-40 ... +85 °C
Environmental category / acc. to IEC 60721	Climate class 3K3, no condensation

Mechanics

Type of electrical connection	screw-type terminals
• at input	+24 V: 2 screw terminals for 0.5 ... 16 mm²; 0 V: 2 screw terminals for 0.5 ... 4 mm²
• at output	Output 1 ... 4: 1 screw terminal each for 0.5 ... 4 mm²
• for signaling contact	1 screw terminal for 0.5 ... 4 mm²
• for auxiliary contacts	Remote reset: 1 screw terminal for 0.5 ... 4 mm²
Width / of the enclosure	72 mm
Height / of the enclosure	80 mm
Depth / of the enclosure	72 mm
Installation width	72 mm
Mounting height	180 mm
Net weight	0.2 kg
Mounting type	Snaps onto DIN rail EN 60715 35x7.5/15
Mechanical accessories	Device identification label 20 mm × 7 mm, TI-grey 3RT2900-1SB20
MTBF / at 40 °C	540 979 h
Other information	Specifications at rated input voltage and ambient temperature +25 °C (unless otherwise specified)

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Datenblatt 6ES7214-1AG40-0XB0



SIMATIC S7-1200, CPU 1214C, Kompakt-CPU, DC/DC/DC, onboard I/O: 14 DI DC 24V; 10 DO 24V DC; 2 AI 0-10V DC, Stromversorgung: DC 20,4-28,8V DC, Programm-/Datenspeicher 100 KB

Allgemeine Informationen	
Produkttyp-Bezeichnung	CPU 1214C DC/DC/DC
Firmware-Version	V4.4
Engineering mit	
● Programmierpaket	ab STEP 7 V16
Versorgungsspannung	
Nennwert (DC)	
● DC 24 V	Ja
zulässiger Bereich, untere Grenze (DC)	20,4 V
zulässiger Bereich, obere Grenze (DC)	28,8 V
Verpolschutz	Ja
Lastspannung L+	
● Nennwert (DC)	24 V
● zulässiger Bereich, untere Grenze (DC)	20,4 V
● zulässiger Bereich, obere Grenze (DC)	28,8 V
Eingangsstrom	
Stromaufnahme (Nennwert)	500 mA; nur CPU
Stromaufnahme, max.	1 500 mA; CPU mit allen Erweiterungsbaugruppen
Einschaltstrom, max.	12 A; bei 28,8 V
I^2t	0,5 $A^2 \cdot s$
Ausgangsstrom	
für Rückwandbus (DC 5 V), max.	1 600 mA; max. DC 5 V für SM und CM
Geberversorgung	
24 V-Geberversorgung	
● 24 V	L+ minus 4 V DC min.
Verlustleistung	
Verlustleistung, typ.	12 W
Speicher	
Arbeitsspeicher	
● integriert	100 kbyte
● erweiterbar	Nein
Ladespeicher	
● integriert	4 Mbyte
● steckbar (SIMATIC Memory Card), max.	mit SIMATIC Memory Card
Pufferung	
● vorhanden	Ja
● wartungsfrei	Ja

Änderungen vorbehalten
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• ohne Batterie	Ja
CPU-Bearbeitungszeiten	
für Bitoperationen, typ.	0,08 µs; / instruction
für Wortoperationen, typ.	1,7 µs; / instruction
für Gleitpunktarithmetik, typ.	2,3 µs; / instruction
CPU-Bausteine	
Anzahl Bausteine (gesamt)	DBs, FCs, FBs, Zähler und Timer. Die maximale Anzahl adressierbarer Bausteine reicht von 1 bis 65535. Es besteht keine Einschränkung, Nutzung des gesamten Arbeitsspeichers
OB	
• Anzahl, max.	Begrenzung nur durch Arbeitsspeicher für Code
Datenbereiche und deren Remanenz	
remanenter Datenbereich (inklusive Zeiten, Zähler, Merker), max.	10 kbyte
Merker	
• Anzahl, max.	8 kbyte; Größe des Merkerbereichs
Lokaldaten	
• je Prioritätsklasse, max.	16 kbyte; Prioritätsklasse 1 (Programmzyklus): 16 kbyte, Prioritätsklasse 2 bis 26: 6 kbyte
Adressbereich	
Prozessabbild	
• Eingänge, einstellbar	1 kbyte
• Ausgänge, einstellbar	1 kbyte
Hardware-Ausbau	
Anzahl Baugruppen je System, max.	3 Communication Module, 1 Signal Board, 8 Signal Module
Uhrzeit	
Uhr	
• Hardware-Uhr (Echtzeituhr)	Ja
• Pufferungsdauer	480 h; typisch
• Abweichung pro Tag, max.	±60 s/Monat bei 25 °C
Digitaleingaben	
Anzahl der Eingänge	14; integriert
• davon für technologische Funktionen nutzbare Eingänge	6; HSC (High Speed Counting)
M/P-lesend	Ja
Anzahl gleichzeitig ansteuerbarer Eingänge	
alle Einbaulagen	
— bis 40 °C, max.	14
Eingangsspannung	
• Nennwert (DC)	24 V
• für Signal "0"	DC 5 V bei 1 mA
• für Signal "1"	DC 15 V bei 2,5 mA
Eingangsverzögerung (bei Nennwert der Eingangsspannung)	
für Standardeingänge	
— parametrierbar	0,2 ms, 0,4 ms, 0,8 ms, 1,6 ms, 3,2 ms, 6,4 ms und 12,8 ms, wählbar in 4er Gruppen
— bei "0" nach "1", min.	0,2 ms
— bei "0" nach "1", max.	12,8 ms
für Alarmeingänge	
— parametrierbar	Ja
für Technologische Funktionen	
— parametrierbar	Einphasig: 3 @ 100 kHz & 3 @ 30 kHz, Differenziell: 3 @ 80 kHz & 3 @ 30 kHz
Leitungslänge	
• geschirmt, max.	500 m; 50 m für technologische Funktionen
• ungeschirmt, max.	300 m; für technologische Funktionen: Nein
Digitalausgaben	
Anzahl der Ausgänge	10
• davon schnelle Ausgänge	4; 100 kHz Impulsfolge

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Begrenzung der induktiven Abschaltspannung auf	L+ (-48 V)
Schaltvermögen der Ausgänge	
● bei ohmscher Last, max.	0,5 A
● bei Lampenlast, max.	5 W
Ausgangsspannung	
● für Signal "0", max.	0,1 V; mit 10 kOhm Last
● für Signal "1", min.	20 V
Ausgangsstrom	
● für Signal "1" Nennwert	0,5 A
● für Signal "0" Reststrom, max.	0,1 mA
Ausgangsverzögerung bei ohmscher Last	
● "0" nach "1", max.	1 µs
● "1" nach "0", max.	5 µs
Schaltfrequenz	
● der Impulsausgänge, bei ohmscher Last, max.	100 kHz
Relaisausgänge	
● Anzahl Relaisausgänge	0
Leitungslänge	
● geschirmt, max.	500 m
● ungeschirmt, max.	150 m
Analogeingaben	
Anzahl Analogeingänge	2
Eingangsbereiche	
● Spannung	Ja
Eingangsbereiche (Nennwerte), Spannungen	
● 0 bis +10 V	Ja
— Eingangswiderstand (0 bis 10 V)	≥100 KOhm
Leitungslänge	
● geschirmt, max.	100 m; verdreht und geschirmt
Analogausgaben	
Anzahl Analogausgänge	0
Analogwertbildung für die Eingänge	
Integrations- und Wandlungszeit/Auflösung pro Kanal	
● Auflösung mit Übersteuerungsbereich (Bit inklusive Vorzeichen), max.	10 bit
● Integrationszeit parametrierbar	Ja
● Wandlungszeit (pro Kanal)	625 µs
Geber	
Anschließbare Geber	
● 2-Draht-Sensor	Ja
1. Schnittstelle	
Schnittstellentyp	PROFINET
potenzialgetrennt	Ja
automatische Ermittlung der Übertragungsgeschwindigkeit	Ja
Autonegotiation	Ja
Autocrossing	Ja
Schnittstellenphysik	
● RJ 45 (Ethernet)	Ja
● Anzahl der Ports	1
● integrierter Switch	Nein
Protokolle	
● PROFINET IO-Controller	Ja
● PROFINET IO-Device	Ja
● SIMATIC-Kommunikation	Ja
● Offene IE-Kommunikation	Ja; optional auch verschlüsselt möglich
● Webserver	Ja
● Medienredundanz	Nein
PROFINET IO-Controller	

Änderungen vorbehalten
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● Übertragungsgeschwindigkeit, max.	100 Mbit/s
Dienste	
— PG/OP-Kommunikation	Ja
— Taktsynchronität	Nein
— IRT	Nein
— PROFIenergy	Nein
— Priorisierter Hochlauf	Ja
— Anzahl IO-Devices mit priorisiertem Hochlauf, max.	16
— Anzahl anschließbarer IO-Device, max.	16
— Anzahl anschließbarer IO-Device für RT, max.	16
— davon in Linie, max.	16
— Aktivieren/Deaktivieren von IO-Devices	Ja
— Anzahl gleichzeitig aktivierbarer/deaktivierbarer IO-Devices, max.	8
— Aktualisierungszeit	Der Minimalwert der Aktualisierungszeit ist auch abhängig vom eingestellten Kommunikationsanteil für PROFINET IO, von der Anzahl der IO-Devices und der projektierten Nutzdaten.
PROFINET IO-Device	
Dienste	
— PG/OP-Kommunikation	Ja
— Taktsynchronität	Nein
— IRT	Nein
— PROFIenergy	Ja
— Shared Device	Ja
— Anzahl IO-Controller bei Shared Device, max.	2
Protokolle	
PROFINET IO	Ja
PROFIBUS	Ja; CM 1243-5 (Master) oder CM 1242-5 (Slave) erforderlich
AS-Interface	Ja; CM 1243-2 notwendig
Protokolle (Ethernet)	
● TCP/IP	Ja
● DHCP	Nein
● SNMP	Ja
● DCP	Ja
● LLDP	Ja
Redundanzbetrieb	
Medienredundanz	
— MRP	Nein
— MRPD	Nein
SIMATIC-Kommunikation	
● S7-Routing	Ja
Offene IE-Kommunikation	
● TCP/IP	Ja
— Datenlänge, max.	8 kbyte
● ISO-on-TCP (RFC1006)	Ja
— Datenlänge, max.	8 kbyte
● UDP	Ja
— Datenlänge, max.	1 472 byte
Webserver	
● unterstützt	Ja
● anwenderdefinierte Webseiten	Ja
OPC UA	
● Runtime-Lizenz erforderlich	Ja; Lizenz "Basic" erforderlich
● OPC UA Server	Ja; Data Access (Read, Write, Subscribe), Runtime-Lizenz erforderlich
— Applikations-Authentifizierung	verfügbare Security Policies: None, Basic128Rsa15, Basic256Rsa15, Basic256Sha256
— Benutzer-Authentifizierung	"Anonym" oder mittels Benutzername & Passwort
— Anzahl Sessions, max.	5

Änderungen vorbehalten
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— Anzahl erreichbarer Variablen, max.	1 000
— Anzahl Subscriptions je Session, max.	5
— Abtastintervall, min.	100 ms
— Sendeintervall, min.	200 ms
— Anzahl überwachter Elemente (monitored items), max.	500
— Anzahl der Server-Schnittstellen, max.	2
— Anzahl Knoten bei benutzerdefinierten Server-Schnittstellen, max.	1 000
Weitere Protokolle	
• MODBUS	Ja
Kommunikationsfunktionen	
S7-Kommunikation	
• unterstützt	Ja
• als Server	Ja
• als Client	Ja
• Nutzdaten pro Auftrag, max.	siehe Online-Hilfe (S7 communication, User data size)
Anzahl Verbindungen	
• gesamt	8 Verbindungen für die offene Benutzerkommunikation (aktiv oder passiv): TSEND_C, TRCV_C, TCON, TDISCON, TSEND und TRCV, 8 CPU/CPU-Verbindungen (Client oder Server) für GET/PUT-Daten, 6 Verbindungen für dynamische Zuordnung zu GET/PUT oder offener Benutzerkommunikation
Test- Inbetriebnahmefunktionen	
Status/Steuern	
• Status/Steuern Variable	Ja
• Variablen	Ein-/Ausgänge, Merker, DB, Peripherieein-/ausgänge, Zeiten, Zähler
Forcen	
• Forcen	Ja
Diagnosepuffer	
• vorhanden	Ja
Traces	
• Anzahl projektierbarer Traces	2
• Speichergröße je Trace, max.	512 kbyte
Alarme/Diagnosen/Statusinformationen	
Diagnoseanzeige LED	
• RUN/STOP-LED	Ja
• ERROR-LED	Ja
• MAINT-LED	Ja
Integrierte Funktionen	
Anzahl Zähler	6
Zählfrequenz (Zähler) max.	100 kHz
Frequenzmessung	Ja
gesteuertes Positionieren	Ja
Anzahl lagegeregelte Positionierachsen, max.	8
Anzahl Positionierachsen über Puls-Richtungs-Schnittstelle	4; mit integrierten Ausgängen
PID-Regler	Ja
Anzahl Alarmeingänge	4
Anzahl Impulsausgänge	4
Grenzfrequenz (Impuls)	100 kHz
Potenzialtrennung	
Potenzialtrennung Digitaleingaben	
• Potenzialtrennung Digitaleingaben	Nein
• zwischen den Kanälen, in Gruppen zu	1
Potenzialtrennung Digitalausgaben	
• Potenzialtrennung Digitalausgaben	Ja
• zwischen den Kanälen	Nein
• zwischen den Kanälen, in Gruppen zu	1

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EMV	
Störfestigkeit gegen Entladen statischer Elektrizität	
● Störfestigkeit gegen Entladen statischer Elektrizität nach IEC 61000-4-2	Ja
— Prüfspannung bei Luftentladung	8 kV
— Prüfspannung bei Kontaktentladung	6 kV
Störfestigkeit gegen leitungsgebundene Störgrößen	
● Störfestigkeit auf Versorgungsleitungen nach IEC 61000-4-4	Ja
● Störfestigkeit auf Signalleitungen nach IEC 61000-4-4	Ja
Störfestigkeit gegen Stoßspannungen (Surge)	
● Störfestigkeit auf Versorgungsleitungen nach IEC 61000-4-5	Ja
Störfestigkeit gegen leitungsgeführte Störgrößen, induziert durch hochfrequente Felder	
● Störfestigkeit gegen Hochfrequenzeinstrahlung nach IEC 61000-4-6	Ja
Emission von Funkstörungen nach EN 55 011	
● Grenzwertklasse A, für den Einsatz im Industriebereich	Ja; Gruppe 1
● Grenzwertklasse B, für den Einsatz in Wohngebieten	Ja; wenn durch geeignete Maßnahmen gewährleistet wird, dass die Grenzwerte für Klasse B nach EN 55011 eingehalten werden
Schutzart und Schutzklasse	
Schutzart IP	IP20
Normen, Zulassungen, Zertifikate	
CE-Kennzeichen	Ja
UL-Zulassung	Ja
cULus	Ja
FM-Zulassung	Ja
RCM (ehemals C-TICK)	Ja
KC-Zulassung	Ja
Schiffbau-Zulassung	Ja
Umgebungsbedingungen	
Freier Fall	
● Fallhöhe, max.	0,3 m; fünfmal, in Versandverpackung
Umgebungstemperatur im Betrieb	
● min.	-20 °C
● max.	60 °C; Anzahl gleichzeitig eingeschalteter Ein- bzw. Ausgänge: 7 bzw. 5 (keine benachbarten Punkte) bei 60 °C horizontal oder 50 °C vertikal, 14 bzw. 10 bei 55 °C horizontal oder 45 °C vertikal
● waagerechte Einbaulage, min.	-20 °C
● waagerechte Einbaulage, max.	60 °C
● senkrechte Einbaulage, min.	-20 °C
● senkrechte Einbaulage, max.	50 °C
Umgebungstemperatur bei Lagerung/Transport	
● min.	-40 °C
● max.	70 °C
Luftdruck nach IEC 60068-2-13	
● Betrieb, min.	795 hPa
● Betrieb, max.	1 080 hPa
● Lagerung/Transport, min.	660 hPa
● Lagerung/Transport, max.	1 080 hPa
Höhe im Betrieb bezogen auf Meeresspiegel	
● Aufstellungshöhe, min.	-1 000 m
● Aufstellungshöhe, max.	2 000 m
Relative Luftfeuchte	
● Betrieb, max.	95 %; keine Betauung
Schwingungen	
● Schwingfestigkeit während Betrieb gemäß IEC 60068-2-6	2 g (m/s²) Wandmontage, 1 g (m/s²) DIN Hutschiene

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● Betrieb, geprüft nach IEC 60068-2-6	Ja
Schockprüfung	
● geprüft nach IEC 60068-2-27	Ja; IEC 68, Teil 2-27; Halbsinus: Stärke des Stoßes 15 g (Scheitelwert), Dauer 11 ms
Schadstoff-Konzentrationen	
● SO2 bei RH < 60% ohne Kondensation	S02: < 0.5 ppm; H2S: < 0.1 ppm; RH < 60% kondensationsfrei
Projektierung	
Programmierung	
Programmiersprache	
— KOP	Ja
— FUP	Ja
— SCL	Ja
Know-how-Schutz	
● Anwenderprogrammschutz/Passwortschutz	Ja
● Kopierschutz	Ja
● Bausteinschutz	Ja
Zugriffschutz	
● Schutzstufe: Schreibschutz	Ja
● Schutzstufe: Schreib-/Leseschutz	Ja
● Schutzstufe: Complete Protection	Ja
Zykluszeitüberwachung	
● einstellbar	Ja
Maße	
Breite	110 mm
Höhe	100 mm
Tiefe	75 mm
Gewichte	
Gewicht, ca.	415 g

letzte Änderung: 16.01.2021

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Datenblatt 6ES7241-1CH30-1XB0



SIMATIC S7-1200, Communication Board CB 1241, RS-485, Klemmenblock, unterstützt Freeport

Allgemeine Informationen	
Produkttyp-Bezeichnung	CB 1241 RS 485
Eingangsstrom	
aus Rückwandbus DC 5 V, typ.	50 mA
Verlustleistung	
Verlustleistung, typ.	1,5 W
Schnittstellen	
Punkt-zu-Punkt-Kopplung	
● Leitungslänge, max.	1 000 m
Integrierte Protokolltreiber	
— Freeport	Ja
— ASCII	Ja; als Bibliotheksfunktion verfügbar
— Modbus RTU Master	Ja
— Modbus RTU Slave	Ja
— USS	Ja; als Bibliotheksfunktion verfügbar
Protokolle	
Integrierte Protokolle	
Freeport	
— Telegrammlänge, max.	1 kbyte
— Bit pro Zeichen	7 oder 8
— Anzahl Stoppbits	1 (Standard), 2
— Parity	keine Parität (Standard); gerade, ungerade, Mark (Paritätsbit immer auf 1); Space (Paritätsbit immer auf 0)
3964 (R)	
— Telegrammlänge, max.	1 kbyte
— Bit pro Zeichen	7 oder 8
— Anzahl Stoppbits	1 (Standard), 2
— Parity	keine Parität (Standard); gerade, ungerade, Mark (Paritätsbit immer auf 1); Space (Paritätsbit immer auf 0)
Modbus RTU Master	
— Adressbereich	1 bis 49 999 (Standard-Modbus-Adressierung)
— Anzahl Slaves, max.	247; Slave-Nummern 1 bis 247, über Modbus-Netzwerksegment max. 32 Geräte, weitere Repeater sind notwendig, um das Netzwerk maximal zu erweitern
Modbus RTU Slave	
— Adressbereich	1 bis 49 999 (Standard-Modbus-Adressierung)
Alarme/Diagnosen/Statusinformationen	
Diagnosefunktion	Ja

Änderungen vorbehalten
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Schutzart und Schutzklasse	
Schutzart IP	IP20
Normen, Zulassungen, Zertifikate	
CE-Kennzeichen	Ja
CSA-Zulassung	Ja
UL-Zulassung	Ja
cULus	Ja
FM-Zulassung	Ja
RCM (ehemals C-TICK)	Ja
KC-Zulassung	Ja
Schiffbau-Zulassung	Ja
Umgebungsbedingungen	
Freier Fall	
• Fallhöhe, max.	0,3 m; fünfmal, in Versandverpackung
Umgebungstemperatur im Betrieb	
• min.	-20 °C
• max.	60 °C
• waagerechte Einbaulage, min.	-20 °C
• waagerechte Einbaulage, max.	60 °C
• senkrechte Einbaulage, min.	-20 °C
• senkrechte Einbaulage, max.	50 °C
• zulässige Temperaturänderung	5 °C bis 55 °C, 3 °C / Minute
Umgebungstemperatur bei Lagerung/Transport	
• min.	-40 °C
• max.	70 °C
Luftdruck nach IEC 60068-2-13	
• Betrieb, min.	795 hPa
• Betrieb, max.	1 080 hPa
• Lagerung/Transport, min.	660 hPa
• Lagerung/Transport, max.	1 080 hPa
Relative Luftfeuchte	
• Betrieb bei 25 °C ohne Kondensation, max.	95 %
Mechanik/Material	
Material des Gehäuses (frontseitig)	
• Kunststoff	Ja
Maße	
Breite	38 mm
Höhe	62 mm
Tiefe	21 mm
Gewichte	
Gewicht, ca.	40 g

letzte Änderung: 05.08.2020

Änderungen vorbehalten
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PROFINET IRT IGBT Interface

Part No. 504890

Version 2.6 v4



Application

The FREQCON PROFINET IRT IGBT Interface (PIII) introduces the smartest way to control IGBT modules used in MW frequency converters for battery or solar applications. The PIII interface is able to control high power IGBTs directly via a standard industrial PLC.

For additional information, see circuit diagram and parts list of PROFINET IRT IGBT Interface PIII.

Communication

The PIII can communicate with the PROFINET IRT+ protocol, DDP (dynamic data packaging) allowing data trans-mission with a cycle time of 250 µs and down to 32.5 µs. One PIII device is able to control up to seven IGBT modules (seventh IGBT as break chopper).

Interface

The PIII housing is equipped with eight 25 Pin DSUB connectors (7x IGBT, 1x HVIO) on the bottom side of the housing.

Housing

The FREQCON PIII module is housed in a 420 mm x 240 mm x 56 mm aluminum case.

Technical Data

Technical Data PIII 2.6 v4	
Input Voltage	24 V DC (±10%)
Operation current (without IGBT connected)	300 mA
Max. current	6 A
Operating temperature range	0 °C … +50 °C
Storage and transport temperature range	-30 °C … +50 °C
IGBT Interfaces	8 x 25-pole DSUB female
Protection class	IP50
Weight	3 kg
Dimensions (W x H x D)	500 x 240 x 65 mm

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Topology

The following scheme depicts the topology of a system with several interconnected PIII modules.

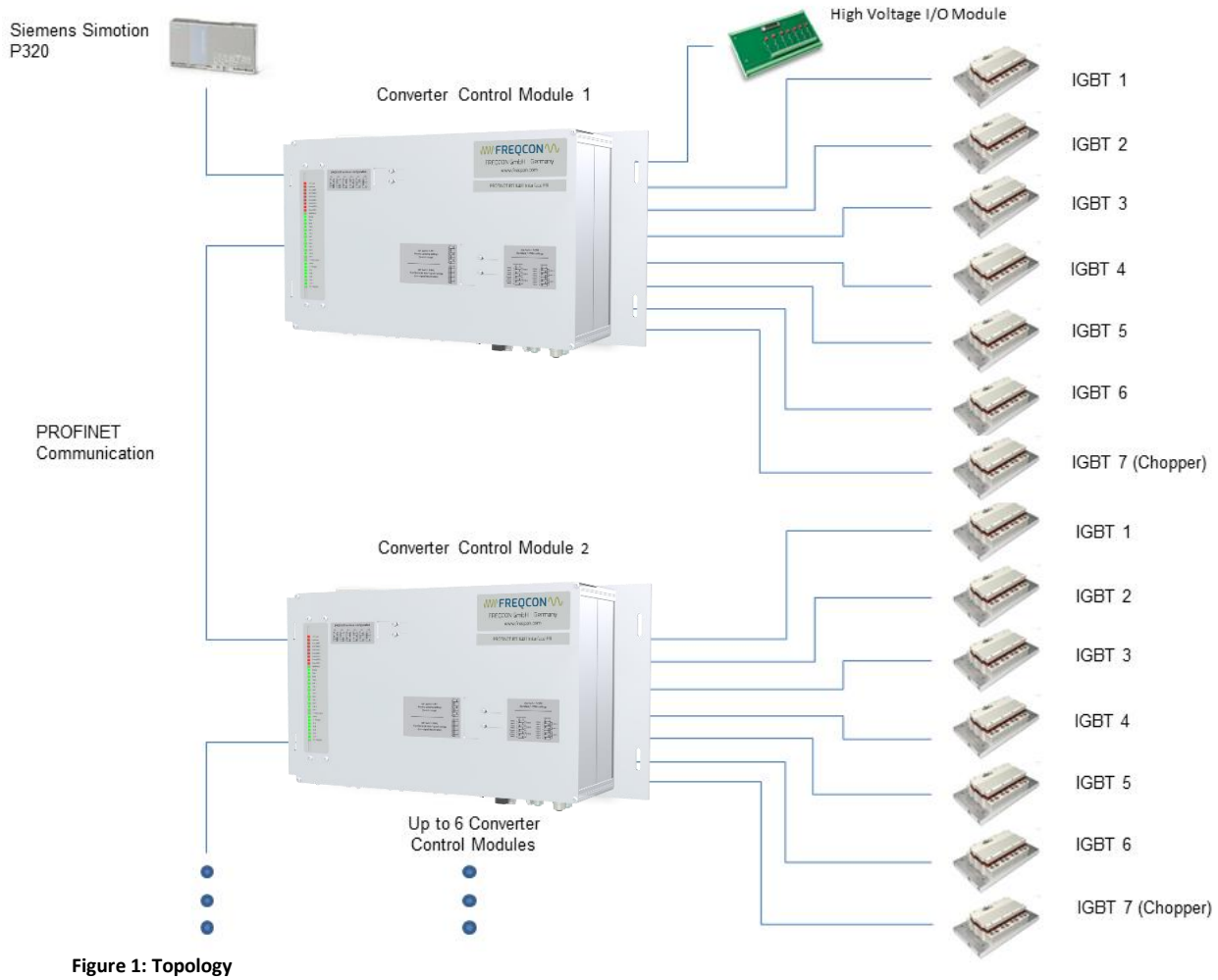


Figure 1: Topology

System Design

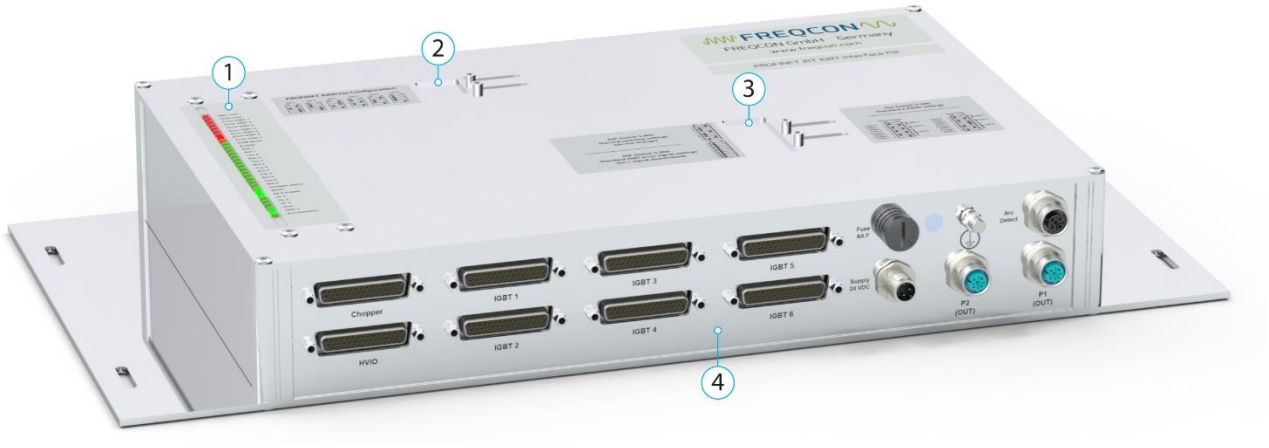


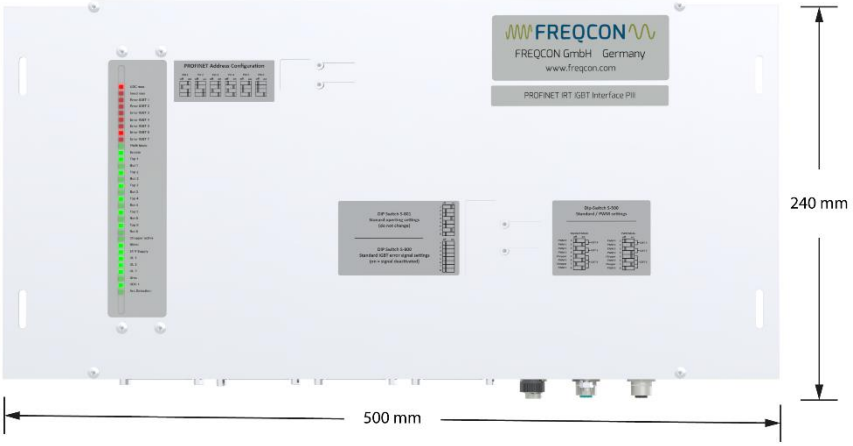
Figure 2: System design

Pos.	Component(s)
①	LED indication lights
②	Housing window - Dip switches for PROFINET setting configuration
③	Housing window – Dip switches for operating/error signal settings configuration
④	Connectors (IGBT/24 VDC supply/COM In/ COM Out/Arc detection)

Dimensions

(in mm)

Front View



Side View



Figure 3: Dimensions

Interfaces

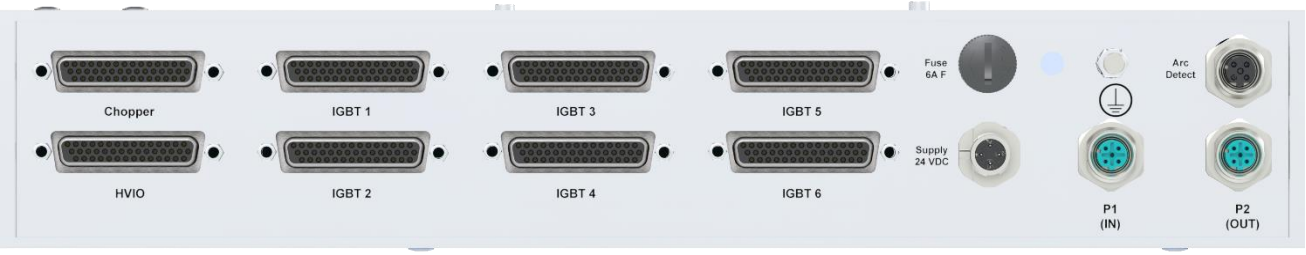


Figure 4: Interfaces 2mql out

Chopper-IGBT Connector: 25-Pole DSUB female

DSUB No.	Description
1	+24 V IGBT
2	+24 V IGBT
3	+24 V IGBT
4	
5	
6	
7	
8	Top 7
9	
10	
11	
12	
13	
14	GND 24V IGBT
15	GND 24V IGBT
16	GND 24V IGBT
17	
18	Error 7
19	
20	
21	Bot 7
22	GND (Top / Bot)
23	
24	
25	Shield

HVIO Connector: 25-Pole DSUB female

DSUB No.	Description
1	PEN
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	GND
15	Phase L3
16	Phase L2
17	Phase L1
18	DC Link+
19	DC Link-
20	REC+ Voltage
21	
22	
23	
24	
25	

IGBT 1 Connector: 25-Pole DSUB female

DSUB No.	Description
1	+24 V IGBT
2	+24 V IGBT
3	+24 V IGBT
4	
5	
6	Temperature analogue 1
7	
8	Top 1
9	
10	Current actual value 1
11	
12	
13	
14	GND 24V IGBT
15	GND 24V IGBT
16	GND 24V IGBT
17	
18	Error 1
19	GND (temperature analogue)
20	
21	Bot 1
22	GND (Top / Bot)
23	GND (current actual value)
24	
25	Shield

IGBT 2 Connector: 25-Pole DSUB female

DSUB No.	Description
1	+24 V IGBT
2	+24 V IGBT
3	+24 V IGBT
4	
5	
6	Temperature analogue2
7	
8	Top 2
9	
10	Current actual value 2
11	
12	
13	
14	GND 24V IGBT
15	GND 24V IGBT
16	GND 24V IGBT
17	
18	Error 2
19	GND (temperature analogue)
20	
21	Bot 2
22	GND (Top / Bot)
23	GND (current actual value)
24	
25	Shield

IGBT 3 Connector: 25-Pole DSUB female

DSUB No.	Description
1	+24 V IGBT
2	+24 V IGBT
3	+24 V IGBT
4	
5	
6	Temperature analogue 3
7	
8	Top 3
9	
10	Current actual value 3
11	
12	
13	
14	GND 24V IGBT
15	GND 24V IGBT
16	GND 24V IGBT
17	
18	Error 3
19	GND (temperature analogue)
20	
21	Bot 3
22	GND (Top / Bot)
23	GND (current actual value)
24	
25	Shield

IGBT 4 Connector: 25-Pole DSUB female

DSUB No.	Description
1	+24 V IGBT
2	+24 V IGBT
3	+24 V IGBT
4	
5	
6	Temperature analogue 4
7	
8	Top 4
9	
10	Current actual value 4
11	
12	
13	
14	GND 24V IGBT
15	GND 24V IGBT
16	GND 24V IGBT
17	
18	Error 4
19	GND (temperature analogue)
20	
21	Bot 4
22	GND (Top / Bot)
23	GND (current actual value)
24	
25	Shield

IGBT 5 Connector: 25-Pole DSUB female

DSUB No.	Description
1	+24 V IGBT
2	+24 V IGBT
3	+24 V IGBT
4	
5	
6	Temperature analogue 5
7	
8	Top 5
9	
10	Current actual value 5
11	
12	
13	
14	GND 24V IGBT
15	GND 24V IGBT
16	GND 24V IGBT
17	
18	Error 5
19	GND (temperature analogue)
20	
21	Bot 5
22	GND (Top / Bot)
23	GND (current actual value)
24	
25	Shield

IGBT 6 Connector: 25-Pole DSUB female

DSUB No.	Description
1	+24 V IGBT
2	+24 V IGBT
3	+24 V IGBT
4	
5	
6	Temperature analogue 6
7	
8	Top 6
9	
10	Current actual value 6
11	
12	
13	
14	GND 24V IGBT
15	GND 24V IGBT
16	GND 24V IGBT
17	
18	Error 6
19	GND (temperature analogue)
20	
21	Bot 6
22	GND (Top / Bot)
23	GND (current actual value)
24	
25	Shield

PROFINET Input Connector (P1 IN)

Connector M12, 4-pos., female, D-coded, for rear mounting, with Ethernet cable AWG 26 stranded Phoenix Contact Type: VS-DSIV-M12FSD/0.5-RJ45.

Pin No.	Signal	Description
1	TD+	Transmission data +
2	TD-	Transmission data -
3	RD+	Receiver data +
4	RD-	Receiver data -

PROFINET Output Connector (P2 OUT)

Connector M12, 4-pos., female, D-coded, for rear mounting, with Ethernet cable AWG 26 stranded Phoenix Contact Type: VS-DSIV-M12FSD/0.5-RJ45.

Pin No.	Signal	Description
1	TD+	Transmission data +
2	TD-	Transmission data -
3	RD+	Receiver data +
4	RD-	Receiver data -

Power Supply 24VDC Connector

Connector M12, 4-pole, female, A-coded.
Phoenix Contact Type: SACC-ES-MS-4CON-M16/0.5 SCO.

Pin No.	Description
1	+24 V
2	PE
3	GND
4	Not connected

Arc Detection Connector

Connector M12, 5-pole, female, A-coded.
CONEC Type: SAL-12-FKH5-0,5-9

Pin No.	Description
1	GND
2	5 V
3	Input arc detect signal
4	Shield
5	Not connected

LED Indication Lights

Label	Description
UDC max	DC Link Voltage too high
Imod max	Current of one or more IGBT´s too high
Error IGBT 1	Error detected on IGBT 1
Error IGBT 2	Error detected on IGBT 2
Error IGBT 3	Error detected on IGBT 3
Error IGBT 4	Error detected on IGBT 4
Error IGBT 5	Error detected on IGBT 5
Error IGBT 6	Error detected on IGBT 6
Error IGBT 7	Error detected on IGBT 7 (chopper)
PWM Mode	IGBT 1 to 3 in PWM Mode
Enable	IGBT 1 to 6 ready for operation
Top 1	Top 1 activated
Bot 1	Bot 1 activated
Top 2	Top 2 activated
Bot 2	Bot 2 activated
Top 3	Top 3 activated
Bot 3	Bot 3 activated
Top 4	Top 4 activated
Bot 4	Bot 4 activated
Top 5	Top 5 activated
Bot 5	Bot 5 activated
Top 6	Top 6 activated
Bot 6	Bot 6 activated
Chopper active	Chopper is active
Blinki	Profinet communication between PLC and PIII is established
24 V Supply	24 V input supply is connected
UL 1	L1 voltage is present
UL 2	L2 voltage is present
UL 3	L3 voltage is present
Urec	Booster voltage on rectifier is present
UDC +	DC Link voltage is present
Arc Detection	Arc detection triggered

If an error occurs (indicated by the LED´s 1 to 7) the IGBT´s 1 to 6 are deactivated by the PIII, until a reset is performed by the simotion controller.

Dip Switch Description

Three DIP switches are located on the interface board and are accessible via protection windows on the casing (*see figure 2*). The standard DIP switch settings are described on page 15.

Dip Switch -801

Standard operating setting - do not change:

Dip Switch No.	Description
1 on	Phase L3 measurement activated
1 off	Phase L3 measurement deactivated
2 on	For factory testing only
2 off	Normal operation setting
3 on	For factory testing only
3 off	Normal operation setting
4 on	Phase L2 measurement activated
4 off	Phase L2 measurement deactivated
5 on	For factory testing only
5 off	Normal operation setting
6 on	For factory testing only
6 off	Normal operation setting
7 on	Phase L1 measurement activated
7 off	Phase L1 measurement deactivated
8 on	For factory testing only
8 off	Normal operation setting

Dip Switch -800

Standard IGBT error signal settings:

Dip Switch No.	Description
1 on	Error1 disabled
1 off	Error1 enabled
2 on	Error2 disabled
2 off	Error2 enabled
3 on	Error3 disabled
3 off	Error3 enabled
4 on	Error4 disabled
4 off	Error4 enabled
5 on	Error5 disabled
5 off	Error5 enabled
6 on	Error6 disabled
6 off	Error6 enabled
7 on	Error7 disabled
7 off	Error7 enabled
8 on	No function
8 off	No function

Standard Operating Settings

The DIP switches S-801 and S-800 are located on the interface board and are accessible by a small protection window (*see figure 5*).

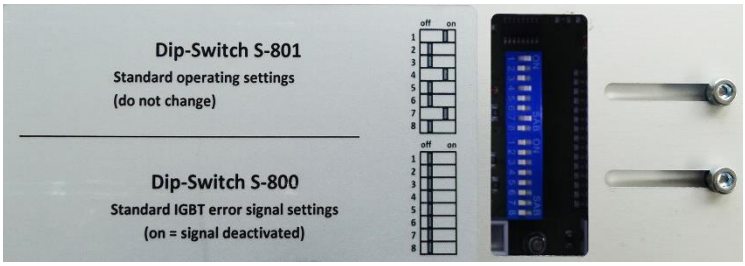


Figure 5: DIP switches in housing

In order to set the DIP switches, the screws of the protection window are to be untightened and the protection plate must be slide to the side.

After access to the S-801 and S-800 DIP switches is provided, the switches must be set as follows:

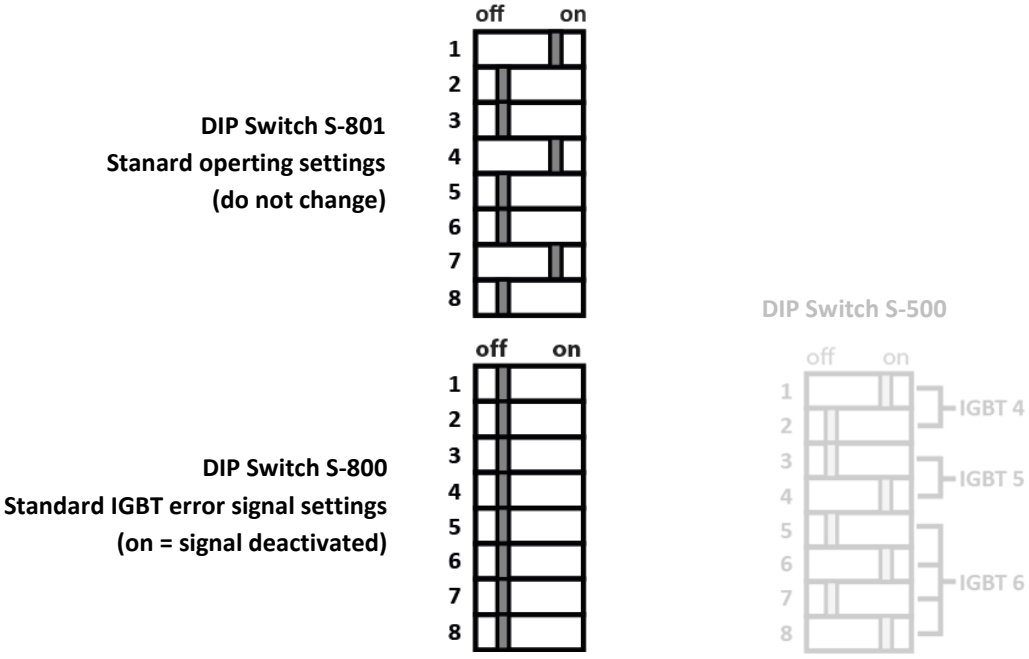


Figure 6: Depiction of dip switches S-801 and S-800

Operating Mode Settings

The DIP switch S-500 is located on the interface board to the right of the S-800 and S-801 DIP and is accessible by a small protection window. The S-500 DIP switch is used to connect the IGBTs 4, 5, 6 to different PWM signal generation sources.

In order to set the DIP switches, the screws of the protection window are to be untightened and the protection plate must be slide to the side.

After access to the S-500 DIP switch is provided, the switch must be set as follows for universal mode:

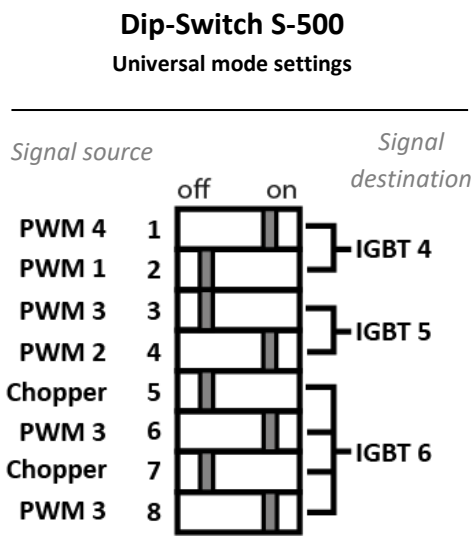


Figure 7: Depiction of DIP switch S-500

Detailed explanation of the switches:

If switch 1 is on and switch 2 off, the signal source for IGBT 4 is data word “PWM 4”,
If switch 1 is off and switch 2 is on, the signal source for IGBT 4 is data word “PWM 1”.

If switch 3 is on and switch 4 off, the signal source for IGBT 5 is data word “PWM 3”,
If switch 3 is off and switch 4 is on, the signal source for IGBT 5 is data word “PWM 2”.

If switch 5 and 7 is on and switch 5 and 8 is off, IGBT 6 is controlled by the chopper hardware logic.
If switch 7 and 7 is off and switch 5 and 8 is on, IGBT 6 is controlled by the data word “PWM 3”.

PROFINET Standard Configuration

It is possible to connect up to six PIII devices to a single main PLC. Therefore, each PIII that is connected to the main PLC must be assigned with an individual PROFINET address (see Figure 9: PROFINET address topology).

A DIP switch for PROFINET address configuration is located on the interface board and is accessible by a small protection window (*see figure 2*).

In order to set the DIP switch, the screws of the protection window are to be untightened and the protection plate must be slide to the side.

After access to the PROFINET configuration DIP switch is provided, the PROFINET configuration switches must be set as follows:

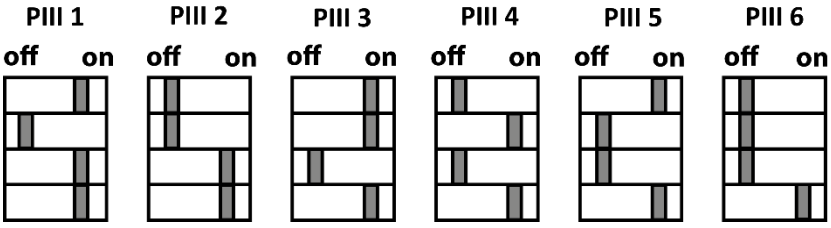


Figure 8: PROFINET address configuration

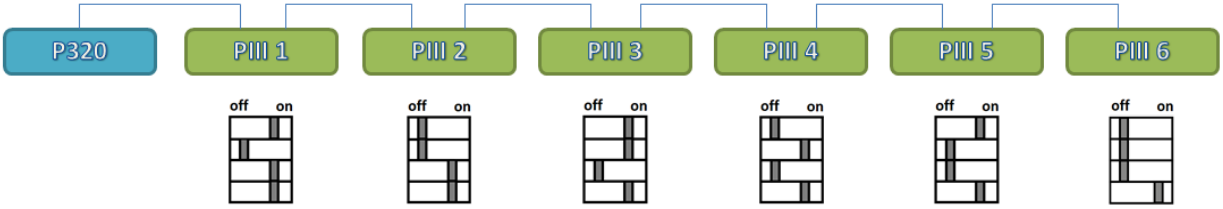


Figure 9: PROFINET address topology

Arc Detection

The FREQCON PIII is able to detect electric arcs inside its installation site. The detection is ensured by a light sensor cable (③) that can be connected to the PIII device via female M12 5-pole connector (②). The sensor (①) constantly measures the light intensity of the PIII installation environment.



Figure 10: Arc detection sensor cable

Pos.	Component
1	Light sensor socket
2	Connector 5-pole M12
3	Sensor cable 4*0.14 mm² shielded / 4.5mm outer diameter
4	Clamp-on ferrite bead

Note: The external arc detection sensor with cable is not part of the scope of supply and must be ordered separately.

The following external arc detection sensors with cable can be ordered:

Order No.	Component	Cable length
500402	External arc sensor with cable	3.5 m
500403	External arc sensor with cable	4.5 m
500404	External arc sensor with cable	5.5 m

Arc Detection Cable Installation

- ➜ Install the arc detection sensor inside the switch cabinet where the IGBT PowerStacks are installed, since potentially occurring arcs will be created in this cabinet.
- ➜ The arc detection sensor head must be installed on the front side of the cabinet frame inside the switch cabinet.
- ➜ If there is only one IGBT PowerStack installed inside the switch cabinet, install the sensor head at the height of the IGBT PowerStacks´ center.
- ➜ If more than one IGBT PowerStack is installed inside the switch cabinet, install the sensor head at the height of the center of all installed PowerStacks.
- ➜ **Do not cover the external arc detection sensor window! Covering the arc detection window leads to measurement errors of the light sensor!**

Observe the following instruction for the installation of the external arc detection sensor cable.

Task 1: **Install mounting bracket to the switch cabinet frame**

Step 1: Install the delivered mounting bracket to the frame of the switch cabinet where the power modules are located by using suitable connection material. Use the two drill holes (①) for installation to the switch cabinet frame.

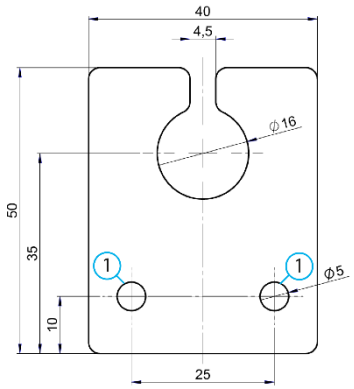


Figure 11: Mounting bracket with drill holes

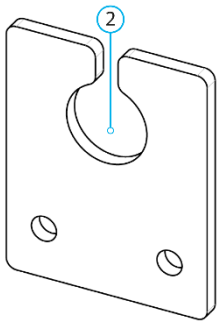


Figure 12: Mounting bracket recess

Step 2: Lead the sensor head of the delivered arc detection sensor cable through the recess of the mounting bracket (②) and finally slide it down the recess until the catches snap into place.

Step 3: Lead the other end of the arc detection sensor cable to the cabinet where the PIII converter interface is installed. Lay and fix the cable properly.

Step 4: Loop the cable once and lay the cable loop inside the delivered clamp-on ferrite bead.

Step 5: Close the clamp-on ferrite bead.

Step 6: Connect the arc detection sensor cable plug to the “ARC Detect” connector at the front side of the PIII housing.

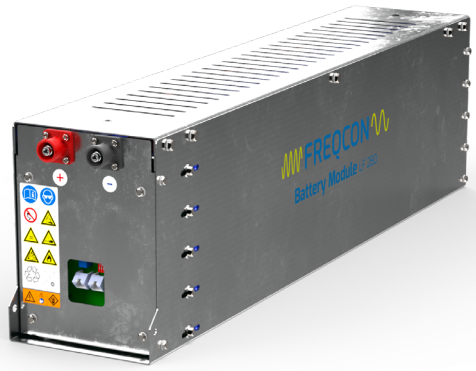
Version Overview

Version	Date	Name	Description
1.0	2019-08-21	C. Palenzuela	First version
1.1	2022-02-04	C. Palenzuela	Updated several pages

Battery Module LF280

Key component of FREQCON LFP battery energy storage solutions

FREQCON



- Safest LFP chemistry, thermally and structurally stable design for robustness and longest battery lifetime
- Compatible for all long duration applications (up to 1C operation)
- Active battery monitoring with individual PCB and numerous sensors per module
- Compact design with high energy density (137 Wh/kg)

High Energy Density for all Applications

- 4x higher density than lead-acid batteries
- Up to 1C continuous operation for applications such as long duration UPS, grid ancillary services, off-grid storage and more

Longest Lifetime

- > 6000 full load cycles at 0.5C operation
- LFP batteries have no memory effect with very little calendar life degradation

Active Monitoring

- Each battery module is equipped with monitoring PCB, temperature sensors, thermal runaway detectors
- Data exchange per module provides high resolution data for increased analysis and safety

Safe and Robust Design

- Safest LFP batteries on the market
- Thermally and structurally stable housing design to secure batteries during operation and transport
- Highly recyclable environmentally friendly solution

Function

The LF280 Battery Module is the central component in turnkey energy storage systems provided by FREQCON GmbH. The modules are an ideal economical solution for a variety of applications. Each module consists of 10 powerful lithium iron phosphate cells, offering many safety advantages. The corresponding reliable BMS ensures high longevity of the battery cells. Each cabinet is equipped with 28 battery modules and a control system.

System Design

The lithium iron phosphate cells (LiFePO4) inside the LFP battery modules are connected in series and provide a total energy content of 8.96 kWh per module.

Each module is equipped with a monitoring PCB, providing the following functions:

- Voltage monitoring of single cells for charging and discharging
- Battery temperature monitoring
- Selective cell balancing
- Data exchange with central BESS controller
- Local insulation measurement
- Robust industrial design for transport, assembly and operation

Battery cabinet with 28 modules in series

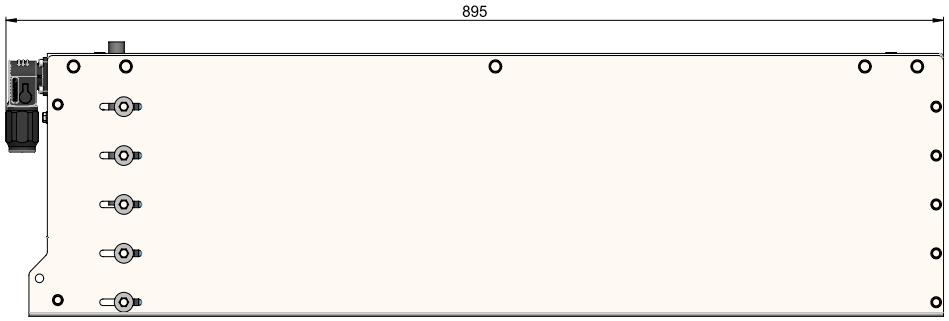


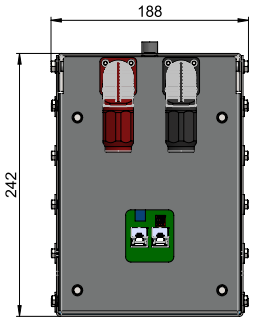
FREQCON GmbH Bürgerwiesenweg 5 27336 Rethem +49 (0) 5165 291760-0 sales@freqcon.com www.freqcon.com

Technical Data
Battery Module

Module Data	Value
Part number	52365 / 52375 / 52157
Voltage (rated)	32 V DC
Total capacity	280 Ah
Number of cells per battery module	10
Stored energy	8960 Wh
Maximum voltage	36 V DC
Max. current	280 A
Max. charge and discharge rate (continuous)	1 C
Temperature range (storage)	-20 °C … +45 °C (long-term storage at 0…35°C)
Temperature range (continuous operation)	0 °C … +55 °C
Connections for DC+ / DC-	Surlock Plus
Communication connections	RJ45
Protection class	IP 20
Weight	65.3 kg
Dimensions (WxHxD)	188 mm x 239 mm x 908 mm
Single Cell Data	
Type	Prismatic cells
Capacity (typ.)	280 Ah
Voltage (typ.)	3.2 V
Voltage (max.)	3.65 V
Voltage (min.)	2.5 V
Battery life (@1C continuous operation)	>3500 cycles (80% remaining capacity)
Impedance (AC)	<0.25 mΩ
BMS Back Universal	
Power supply (external)	24 V DC (rated), <0.5 W
Power supply (internal)	36 V DC (max.), < 0.2 W
Communication	EIA-485, Modbus RTU
Baud rate (max.)	19200 Bit/s
Bus participants (max.)	32
Balancer Design	Load resistor
Balancer current @3.5 V	1.06 A
Voltage measurement	10 measurements per 14-bit resolution
Temperature measurements	8x NTC 10 kΩ (up to 14 bit analogue/digital converter) / 1x PT100 (12 bit analogue/digital converter)
Isolation measurement	Earth fault monitoring

Dimensions





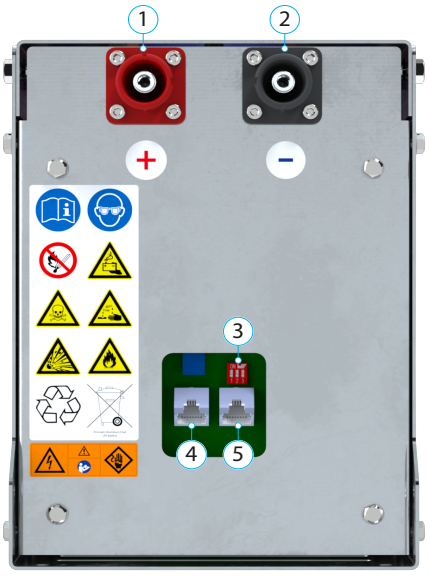
FREQCON
Battery Module LF280

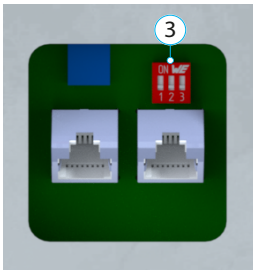
System Overview



Pos.	Component
1	Battery module LF280
2	Boreholes for lifting device (M6)
3	DC positive (+) socket
4	DC negative (-) socket
5	COM-Connection RJ45 and DIP-switches
6	Boreholes for transport handle mounting
7	Label with safety and warning instructions

Connections and Operating Elements





Connection Elements

Pos.	Terminal	Description	Connection type	Cable
1	X1	DC + Battery module	10.3 mm Surlock Plus	Pay attention to cable routing in cabinet
2	X2	DC – Battery module	10.3 mm Surlock Plus	Pay attention to cable routing in cabinet
4	X3	Communication (input)	RJ45, 45°	PiMF, 4x2 min. AWG 27/7
5	X4	Communication (Output)	RJ45, 45°	PiMF, 4x2 min. AWG 27/7

Operating Elements

Pos.	Design.	Description	Function
3	S1	Dip switch for termination resistor and safety chain	ON (first switch): activates termination resistor for EIA-485 communication and safety chain (for last battery module)

The dip switch located on the modules front side is used for activation of the termination resistor and the safety chain of the system and must be set to "ON" position at the last module of a string connected in series.

"ON" switch position for **last module:**



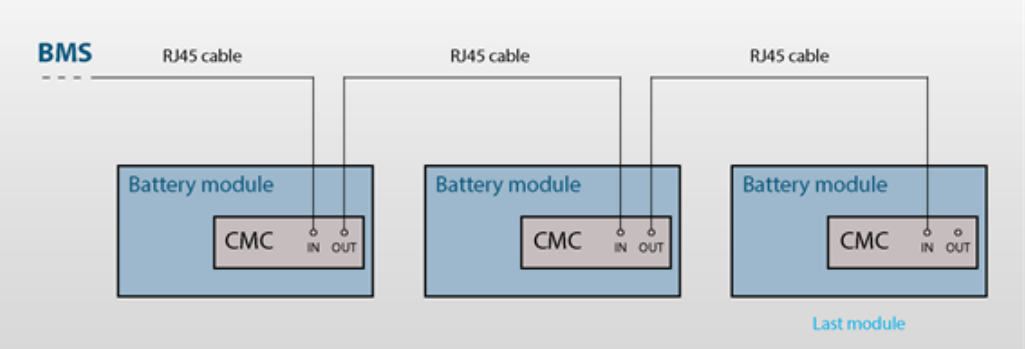
Only first dip switch set to ON position

"OFF" switch positions for **all remaining modules:**



All three dip switches set to OFF position

BMS Communication



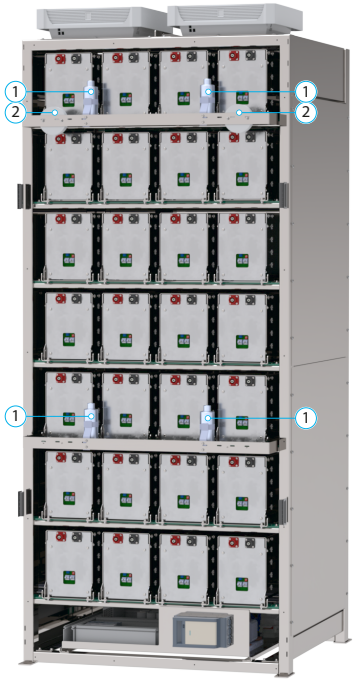
Energy Storage System



Turnkey Battery Energy Storage System (BESS) equipped with battery cabinets and active cooling system housed in a 20ft HC container with side doors.

(2 MWh installed per 20 ft HC container)

Battery Cabinets



Fully equipped battery cabinet with smoke detectors and active fire extinguishing system consisting of self-activating aerosol cartridges.

Pos.	Component
1	Active Stat-X aerosol cartridge
2	Smoke detector

Battery Module LF280

Part No. 52365 /52375 / 52157

Version 1.0



The LF280 Battery Module is the central component in turnkey energy storage systems provided by FREQCON GmbH.

The modules are an ideal economical solution for a variety of applications. Each module consists of 10 powerful lithium iron phosphate cells, offering many safety advantages. The corresponding reliable BMS ensures high longevity of the battery cells. Each cabinet is equipped with 28 battery modules and a battery control system.

System Design

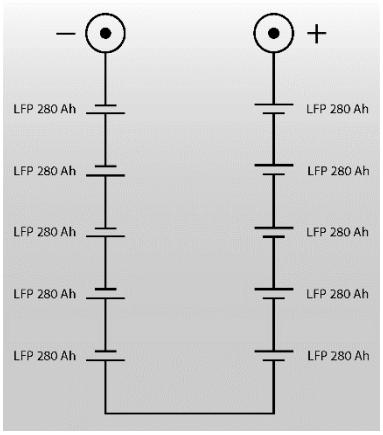
The lithium iron phosphate cells ($LiFePO_4$) inside the L280 battery modules are connected in series and provide a total energy content of 8.96 kWh per module.

Each module is equipped with a monitoring PCB, providing the following functions:

- Voltage monitoring of single cells for charging and discharging
- Battery temperature monitoring
- Selective cell balancing
- Data exchange with central BESS controller
- Local insulation measurement
- Robust industrial design for transport, assembly und operation

Battery cabinet
28 modules connected in series







FREQCON BESS
Battery Storage Container

FREQCON GmbH
Bürgerwiesenweg 5
27336 Rethem
Tel: +49 (0) 5165 – 291 760 – 0
www.freqcon.com

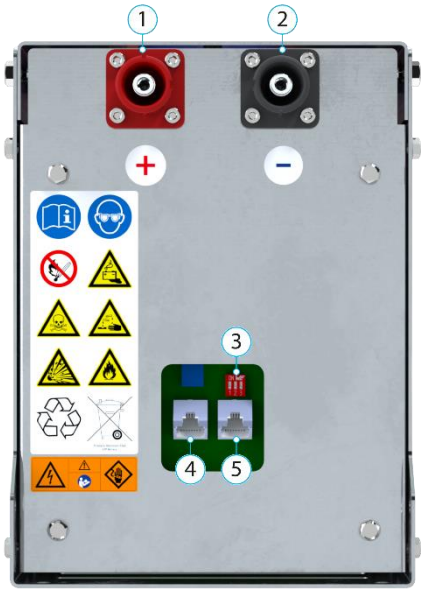
Technical Data

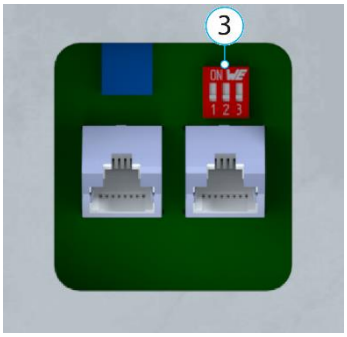
Technical Data Battery Module LF280	
FREQCON Order No.	52365 / 52375 / 52157
Voltage (rated)	32 V DC
Total capacity	280 Ah
Number of cells per battery module	10
Stored energy	8960 Wh
Maximum voltage	36 V DC
Max. current	280 A
Max. charge and discharge rate	1 C
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Temperature range operation	0 °C … +55 °C
Connections for DC+ / DC-	Surlock Plus
Communication connections	RJ 45
Protection class	IP 20
Weight	65.3 kg
Dimensions (WxHxD)	188 mm x 239 mm x 908 mm
Cell Data (Single Cell)	
Type	Prismatic cells
Capacity (typ.)	280 Ah
Voltage (typ.)	3.2 V
Voltage (max.)	3.65 V
Voltage (min.)	2.5 V
Battery life	>3500 cycles (80% remaining capacity)
Impedance (AC)	<0.25 mΩ
BMS Pack Universal	
Power supply (external)	24 V DC (rated), <0.5 W
Power supply (internal)	36 V DC (max.), < 0.2 W
Communication	EIA-485, Modbus RTU
Baud rate (max.)	19200 Bit/s
Bus participants (max.)	32
Balancer Design	Load resistor
Balancer current @3.5 V	1.06 A
Voltage measurement	10 measurements per 14-bit resolution
Temperature measurements	8x NTC 10 kΩ (up to 14 bit analogue/digital converter) 1x PT100 (12 bit analogue/digital converter)
Isolation measurement	Earth fault monitoring



No.	Component
①	Battery module LF280
②	Boreholes for lifting device (M6)
③	DC positive (+) socket
④	DC negative (-) socket
⑤	COM-Connection RJ45 and DIP-switches
⑥	Boreholes for transport handle mounting
⑦	Label with safety and warning instructions

Connections and Operating Elements





Connection Elements

Pos.	Terminal	Description	Connection type	Cable
①	X1	DC + Battery module	10.3 mm Surlock Plus	Pay attention to cable routing in cabinet
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⑤	X4	Communication (Output)	RJ45, 45°	PiMF, 4x2 min. AWG 27/7

Operation Elements

Pos.	Designator	Description	Function
③	S1	Dip switch for termination resistor and safety chain	ON (first switch): activates termination resistor for EIA-485 communication and safety chain (for last battery module)

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"ON" switch position for **last module:**



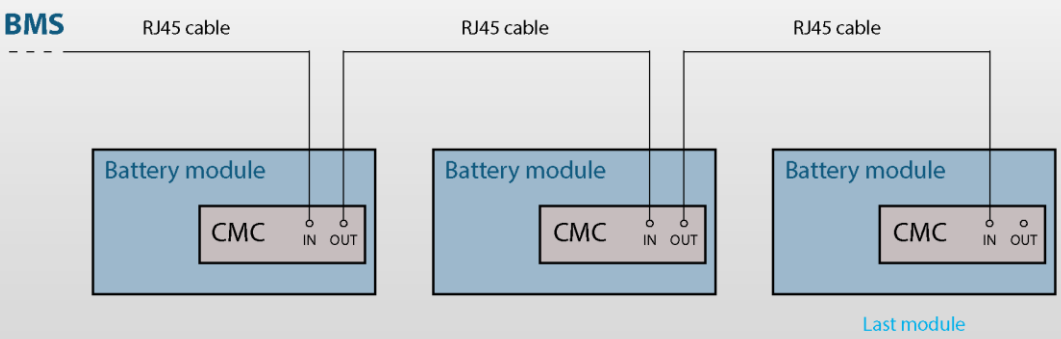
Only first dip switch set to ON position

"OFF" switch positions for **all remaining modules:**



All three dip switches set to OFF position

BMS Communication



Version Overview

Version	Date	Name	Description
v1.0	2022-03-08	Carlos Palenzuela	First final version

Power FULL STOP
... nothing else

TECHNICAL DATA THREE-PHASE CAST RESIN TRANSFORMER

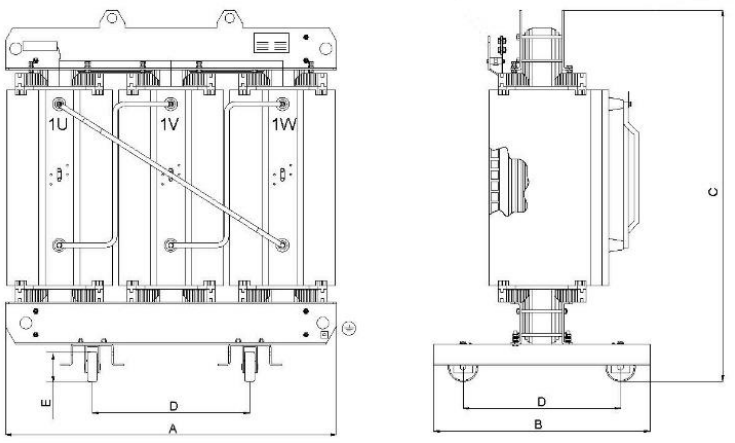
Position	1			
Reference Standards	IEC 60076-1,IEC 60076-11, EU 548/2014,EN 50588-1			
Type	TPZ3K7.2.1250	**Application**	Converter	6 Pulse
Rated Power – AN	1250 kVA	**Duty Class**	I	
Type of Cooling	AN	**Frequency**	50 Hz	
Degree of Protection	IP00			

CHARACTERISTICS

	HV	**LV**		
Voltage	7 kV	0,62 kV		
Insulation Class	7.2/20/60 kV	1,1/3/- kV		
Tapping	±2x2,5%	-		
Material	Aluminium	Aluminium		
Insulation class	F	F		
Temperature rise	100 K	100 K		
Connections location	Top	Top		
Vector Group	Dyn5			
Level of losses	EcoDesign TIER II			
No-Load Losses (Po)	1620 W			
On-Load Losses 120°C (Pcc)	11000 W			
Tolerance on the losses	0%			
Impedance 120°C (Uk%)	6%			
Power Noise (Lwa)	≤ 66 dB(A)			
Pressure Noise (Lpa)	≤ 52 dB(A)			
Ambient Temperature	-25°C ; + 40°C			
Installation	≤ 1.000 m			
Fire (F), Environmental (E), Climatic (C) Classes	F1/E2/C2			
HV/LV earth screen	YES			
Dimensions IP00 (AxBxC)	1680x1050x1990 mm	**Wheel Base (D)**	820 mm	
Wheels Dimensions (E)	160 mm	**Total Weight IP00**	3600 Kg	

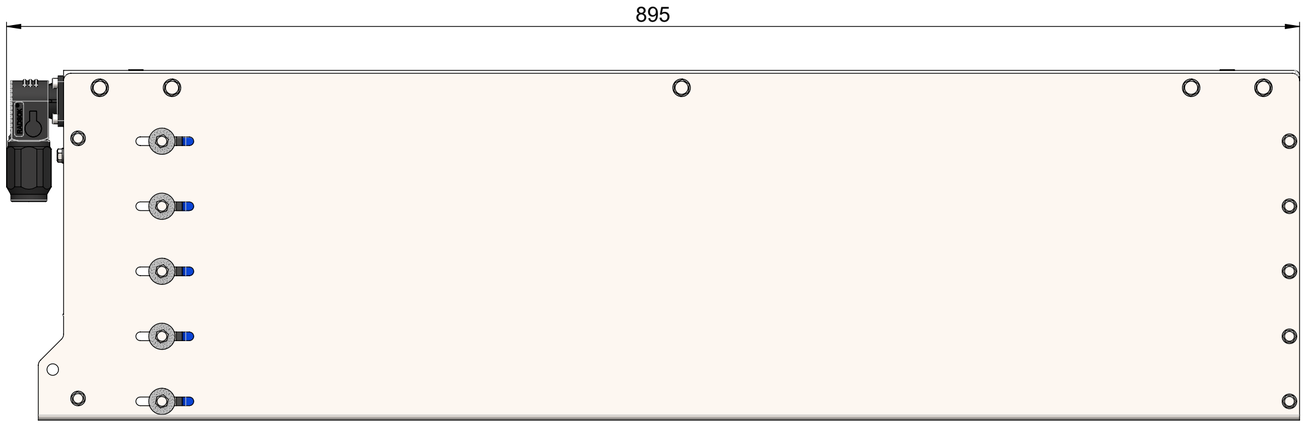
STANDARD ACCESSORIES

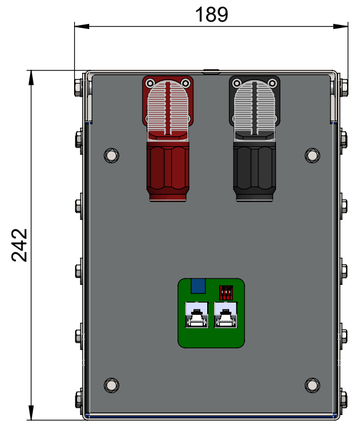
Earthing terminal
Primary voltage tapping
MV output insulators
Output bars from LV windings
4 orthogonal revolving wheels
Name plate IEC 60076
Eyesbolts for Horizontal and Vertical movements
3 thermal sensors PT100 for temperature control
Routine tests report according to IEC 60076



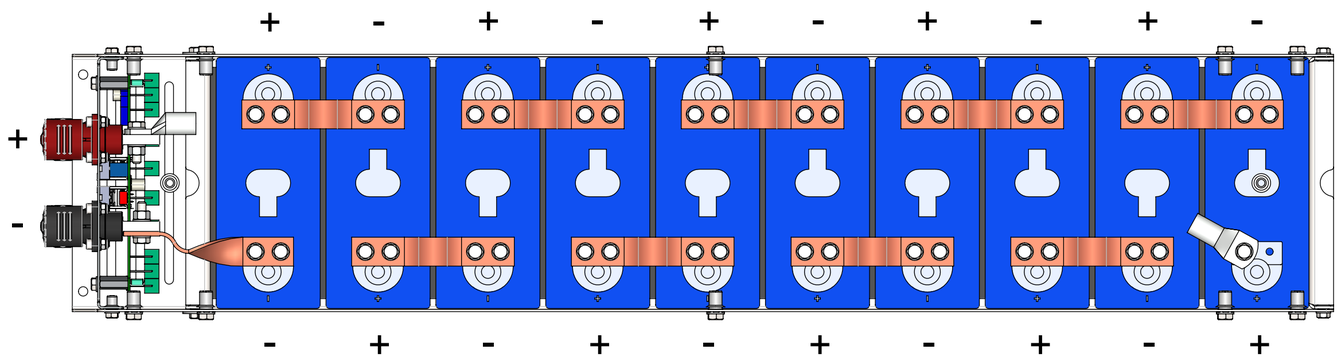
„Power." Sp. z o.o.
ul. Chemiczna 14
41-100 Siemianowice Śląskie, Poland
Tel.: +48 32 7240531
Fax: +48 32 7882271
NIP: PL 646-280-34-52
email: office@powerfullstop.com

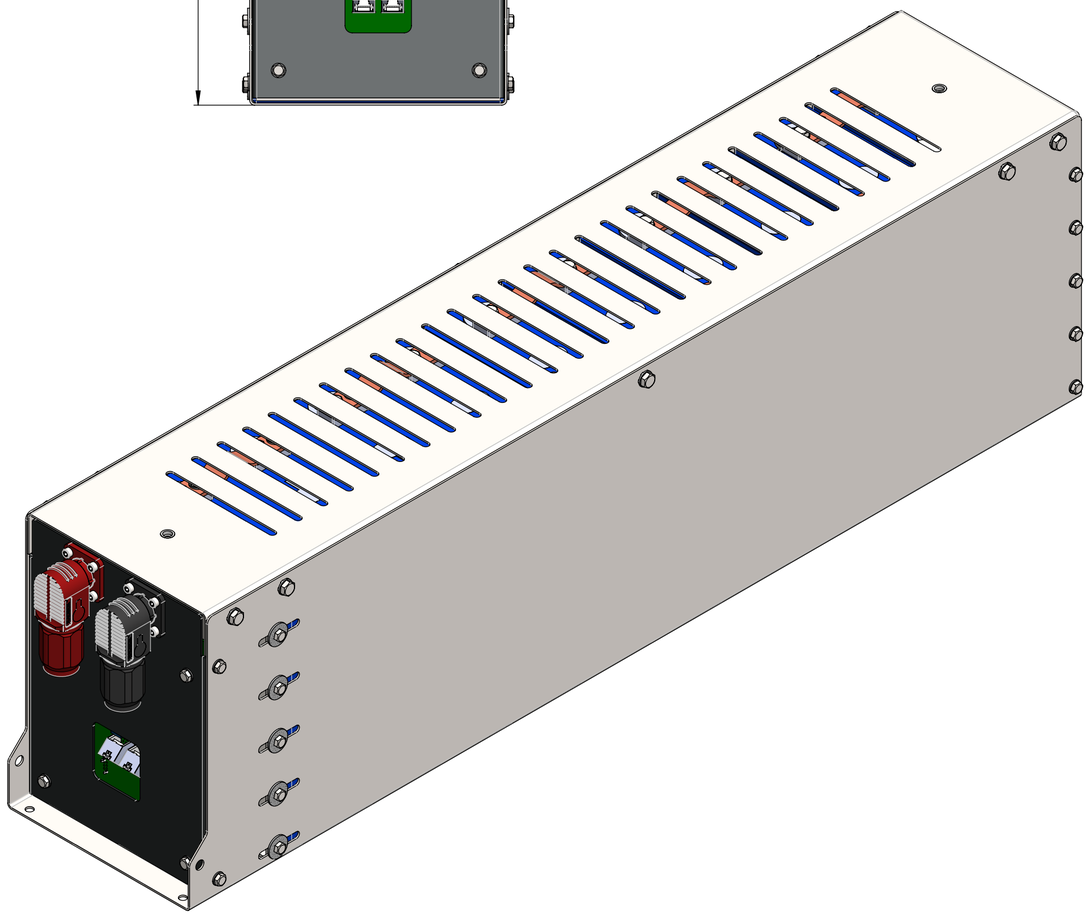
PN-EN ISO 9001 ISOCERT CERTYFIKAT
PN-EN ISO 14001 ISOCERT CERTYFIKAT





Polausrichtungen
Abdeckhaube ausgelendet





Pos. Nr.	Menge	Bezeichnung	Art.-Nr.	Lieferant	Lieferanten Nr.
1	1	Batterietrog	52363		
2	1	Abdeckhaube	52367		
3	12	Blindnietmutter M6 KSGRSO (e=0,5-3,0)	501165	Böllhoff	34367060230
4	20	Blindnietmutter M5 KSGRSO (e=0,5-3,0)	501164		34367050230
5	4	Blindnietmutter M5 KSGRSO (e=0,5-3,0)	501164		34367050230
6	49	Sechskantschraube ISO 4017 - M6 x 16 - 8.8 - St.	503733	--	--
7	20	Sechskantschraube ISO 4017 - M5 x 16 - 8.8 - St.	505256	--	--
8	2	Sechskantschraube ISO 4017 - M6 x 25 - 8.8 - St.	503774	--	--
9	8	Sechskantschraube ISO 4017 - M5 x 12 - 8.8 - St.	505319	--	--
10	10	Sperrkantscheibe - NSK K - M6	505906	--	--
11	18	Sperrkantscheibe - Form S - M5	504284	--	--
12	43	Sperrkantscheibe - Form S - M6	503797	--	--
13	10	LFP Power Battery	52368	EVE Energy	LF 280K
14	10	Ausgleichsplatte	52110		Ethafoam10
15	2	Spannplatte	52137	--	--

Pos. Nr.	Menge	Bezeichnung	Art.-Nr.	Lieferant	Lieferanten Nr.
16	10	Sperrkantscheibe - Form B - M5	505747	--	--
17	8	Scheibe ISO 7089- 4 - 200 HV	503707	--	--
18	2	Sechskantmutter ISO 4032 - M6 - 8	501045	--	--
19	8	Zylinderschraube mit ISK ISO 4762 - M4 x 12 - 8.8 - St.	500964	--	--
20	9	Verbinder aus Kupfergeflecht	52380	--	--
21	1	Verbinder aus Kupfergeflecht	52381	--	--
22	1	Surlock Plus Buchse 10,3mm - rot	52140	Amphenol	SLPIRCBPSR0
23	1	Surlock Plus Buchse 10,3mm - schwarz	52139	Amphenol	SLPIRCBPSB0
24	1	Abdeckung Leiterplatte	52370		
25	1	BMS Pack Universal	507198	FREQCON	507198
26	2	70²-M6 Rohrkabelschuh Cu vz	52299	Weitkowitz	13229
27	8	Sechskantmutter mit Klemmteil DIN 985 - M4 - 8	501051	--	--

Rev.		Datum (Date):	Name:
A	geprüft	03.09.2021	JK
B	Drehmoment MA005 angepasst	12.01.2022	MH

Änderung (changes):

Allgemeintoleranzen für Längenmaße DIN ISO 2768-mK

Genauigkeitsgrad	Abmaße in mm für Nennmaßbereiche						
	0.5 ... 3	> 3 ... 6	> 6 ... 30	> 30 ... 120	> 120 ... 400	> 400 ... 1000	> 1000 ... 2000
m (mittel)	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2

ISO 13715

	Datum (Date):	Name:
Drawn:	01.07.2021	J. Klettke
Checked:	12.01.2022	M. Horstmann

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FREQCON
Freqcon GmbH
Bürgerwiesenweg 5
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+49 (0) 5165 291760-0

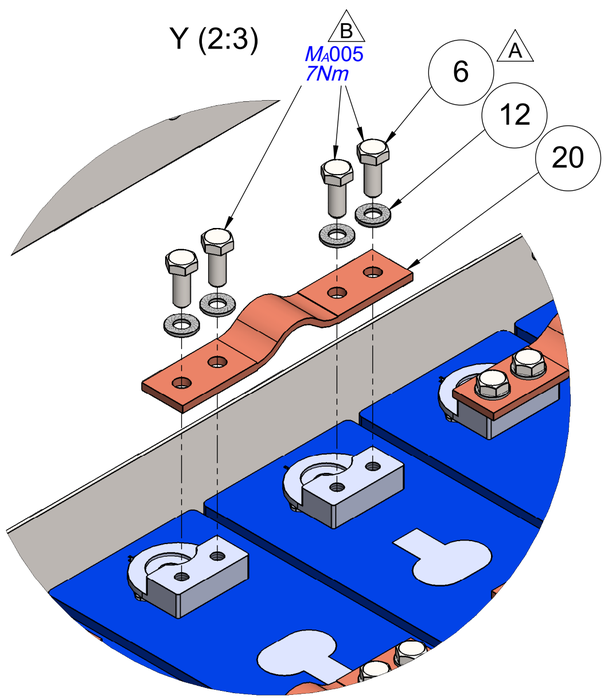
Oberfläche: (surface) -
Werkstoff (material):
Gewicht (weight): 67.41 kg

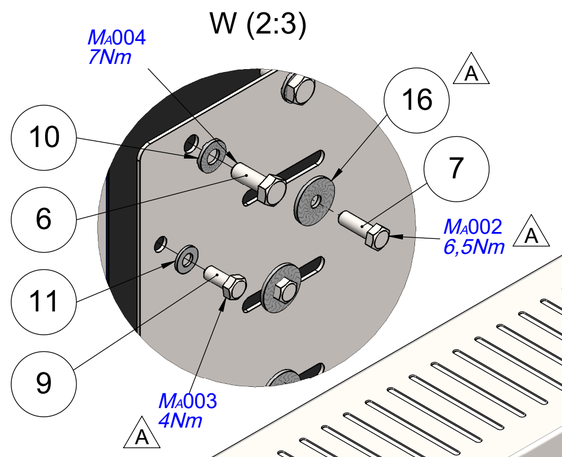
Bezeichnung (description):
Batteriemodul LF 280K
Battery module LF280K

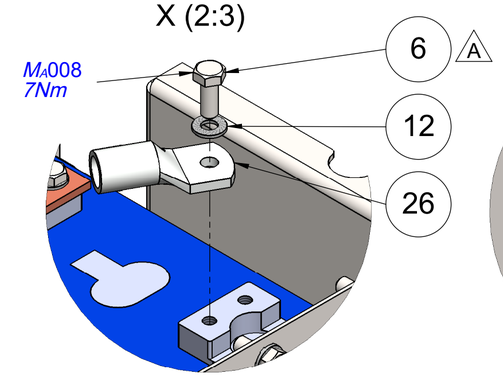
Scale: 1:3
Sheet: 1 (A2)
1 of: 2
Revision: B

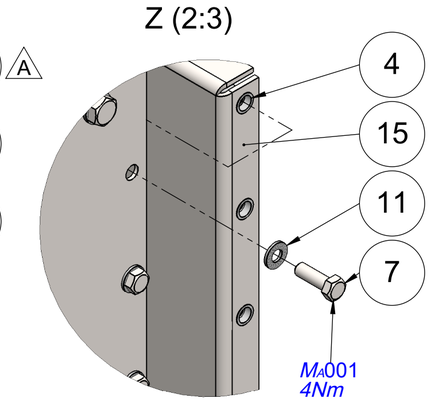
Artikel-Nr. (article number): 52365
alte Zeichnungs-Nr. (old drawing number):

CAD System SolidWorks
Status: Freigegeben









Pos. Nr.	Menge	Bezeichnung	Art.-Nr.	Lieferant	Lieferanten Nr.
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15	2	Spannplatte	52137	--	--
16	10	Sperrkantscheibe - Form B - M5	505747	--	--
17	8	Scheibe ISO 7089- 4 - 200 HV	503707	--	--
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A	geprüft	03.09.2021	JK
B	Drehmoment MA005 angepasst	12.01.2022	MH

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m (mittel)	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2

Oberfläche: (surface) -

Werkstoff (material):

Gewicht (weight): 67.41 kg

ISO 13715

	Datum (Date):	Name:
Drawn:	01.07.2021	J. Klettke
Checked:	12.01.2022	M. Horstmann

Bezeichnung (description):

Batteriemodul LF 280K

Battery module LF280K

Scale: 2:7

Sheet: 2 (A2)

2 of: 2

Revision: B

Artikel-Nr. (article number): 52365

alte Zeichnungs-Nr. (old drawing number):

CAD System SolidWorks

Status: Freigegeben

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FREQCON
Freqcon GmbH
Bürgerwiesenweg 5
D-27336 Rethem
+49 (0) 5165 291760-0

12 V Optical Smoke Detector

Art. no. RM1000



- Suitable for connecting to alarm and fire detection systems
- Detects visible smoke particles
- Self-adjusting
- Potential-free alarm relay
- Tested according to EN54-7

The 12 V optical smoke detector reacts to visible smoke particles. If too much smoke enters its measuring chamber, an alarm is triggered. In the measuring chamber, an integrated infrared light source generates a light pulse every 8 seconds. Smoke particles from a fire change the light signal received by the light diode. A relay trips and the alarm center reports a fire alarm. The 12 V optical smoke detector is mounted on the ceiling in the center of the room. The minimum distance to the side wall should be 30cm. We recommend a separate smoke detector for each entrance area, staircase, living-room, and bedroom. By changing a jumper, you can configure the optical smoke detector as NO or as NC detector. It is therefore suitable for every wired alarm system. The smoke detector is supplied externally with 12V operating voltage and is EN54 certified.

Technical Data:

Dimensions	(HxD) 46x100 mm
Connections	Screw terminal NO or NC, 1A at 30V DC
Width	100 mm
Type of detection	Optical
Housing material	ABS
Height	46 mm
Power consumption	0,368
Max. operating temperature	50 °C
Max. humidity	95 %

Installation location	Ceiling
Net weight	0.13 kg
Sensor type	Photodiode
DC voltage supply	10,5-13,8 V
Status display	Yes
Power consumption	35 mA
Certifications	EN54-7

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12 V Optical Smoke Detector

Art. no. RM1000



- Suitable for connecting to alarm and fire detection systems
- Detects visible smoke particles
- Self-adjusting
- Potential-free alarm relay
- Tested according to EN54-7

The 12 V optical smoke detector reacts to visible smoke particles. If too much smoke enters its measuring chamber, an alarm is triggered. In the measuring chamber, an integrated infrared light source generates a light pulse every 8 seconds. Smoke particles from a fire change the light signal received by the light diode. A relay trips and the alarm center reports a fire alarm. The 12 V optical smoke detector is mounted on the ceiling in the center of the room. The minimum distance to the side wall should be 30cm. We recommend a separate smoke detector for each entrance area, staircase, living-room, and bedroom. By changing a jumper, you can configure the optical smoke detector as NO or as NC detector. It is therefore suitable for every wired alarm system. The smoke detector is supplied externally with 12V operating voltage and is EN54 certified.

Technical Data:

Dimensions	(HxD) 46x100 mm
Connections	Screw terminal NO or NC, 1A at 30V DC
Width	100 mm
Type of detection	Optical
Housing material	ABS
Height	46 mm
Power consumption	0,368
Max. operating temperature	50 °C
Max. humidity	95 %

Installation location	Ceiling
Net weight	0.13 kg
Sensor type	Photodiode
DC voltage supply	10,5-13,8 V
Status display	Yes
Power consumption	35 mA
Certifications	EN54-7

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Enclosure heater with fan – SK 3105.400

Date : Jun 3, 2019

ENCLOSURES POWER DISTRIBUTION CLIMATE CONTROL IT INFRASTRUCTURE SOFTWARE & SERVICES

FRIEDHELM LOH GROUP

Enclosure heater with fan – SK 3105.400

created: 03.06.2019 build on www.rittal.com/uk-en



Product description

Supply includes:	PTC heater with fan Quick-connection terminal Assembly parts
Note:	For precise temperature control inside the enclosure, we recommend the enclosure internal thermostat or the digital enclosure internal temperature display and thermostat. In order to prevent condensation on assemblies, a hygrostat is recommended to regulate heating. In larger enclosures, even heat distribution is best achieved by installing several low-output heaters. The installation of heaters is generally advisable, in order to prevent condensation.

Product features

Continuous thermal output at 10 °C:	800 W - 870 W Note: Continuous thermal output with fan
Rated operating voltage:	230 V, 1~, 50 Hz/60 Hz
Dimensions:	Width: 103 mm Height: 200 mm Depth: 103 mm
Miniature circuit-breaker/fuse:	6 A
Fans pre-integrated:	yes
Packs of:	1 pc(s).
Weight/pack:	1.22 kg

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EAN:	4028177662889
Customs tariff number:	85162999
ETIM 6.0:	EC000737
ETIM 5.0:	EC000737
eCl@ss 8.0/8.1:	27180710
eCl@ss 7.0/7.1:	27180710
eCl@ss 6.0/6.1:	27180710
eCl@ss 5.1/5.1.4:	27180710
Product description:	SK enclosure heater, with fan, 800/870 W, 230 V, 1~, 50/60 Hz, WHD: 103 x 200 x 103 mm

Approvals

Approvals:	Approval overview CSA UR + C-UR VDE
Certificates:	EAC
Declarations:	Declaration of conformity

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Dachlüfter, Dachentlüftung – SK 3140.100

erstellt am: 12.07.2021 auf www.rittal.com/de-de



Produktbeschreibung

Beschreibung:	Dachlüfter mit hoher Schutzart und flexibler Montage von innen oder außen.
Farbe:	RAL 7035
Schutzart IP nach IEC 60 529:	IP 21 ohne Filtermatte IP 55 inkl. Filtermatte
Schutzart NEMA:	NEMA 12
Lieferumfang:	Komplett einbaufertige Einheit, inkl. Filtermatte
Hinweis:	Zur Verbesserung der Energieeffizienz und Erhöhung der Gerätelebensdauer wird der Einsatz von Temperaturreglern oder -anzeigen empfohlen.

Produktbeschreibung

Luftleistung (freiblasend):	873 m³/h
Luftleistung freiblasend (ohne Filtermatten):	873 m³/h / 965 m³/h
Luftleistung freiblasend (mit Filtermatten):	725 m³/h / 759 m³/h
Bemessungsbetriebsspannung:	220 V - 240 V, 1~, 50 Hz/60 Hz
Abmessungen:	Breite: 400 mm Höhe: 133 mm Tiefe: 400 mm

Erforderlicher Montageausbruch:	Breite: 258 mm Tiefe: 258 mm
Einbautiefe:	34,6 mm
Temperaturbereich:	Lagerung: -40 °C...+70 °C Betrieb (Umgebung): -20 °C...+55 °C
Nennleistung P_{el}:	Bei 50 Hz: 99 W Bei 60 Hz: 130 W
Bemessungsstrom max.:	Bei 50 Hz: 0,43 A Bei 60 Hz: 0,56 A
Sicherungsautomat/Schmelzsicherung:	3 A
Lebensdauer bei 50 Hz:	62800 h
Lebensdauer bei 60 Hz:	65800 h
Schalldruckpegel:	Bei 50 Hz: 58 dB(A) Bei 60 Hz: 60 dB(A)
Ventilator:	Radial, Kondensatormotor
eCl@ss 8.0/8.1:	27180716
Verpackungseinheit:	1 St.
Gewicht/VE:	6 kg
EAN:	4028177709140
Zolltarifnummer:	84145915
ETIM 7.0:	EC000320
ETIM 6.0:	EC000320
eCl@ss 8.0/8.1:	27180716
eCl@ss 6.0/6.1:	27180716
Produktbeschreibung:	SK Dachlüfter TopTherm, 873/965 m³/h, 220-240 V, 1~, 50/60 Hz, BHT: 400 x 133 x 400 mm

Approbationen

Approbationen:	Approbationsübersicht CSA TÜV-geprüfte Sicherheit UL + C-UL - FTTA UR + C-UR
Zertifikate:	EAC
Erklärungen:	Konformitätserklärung

Ausschreibungstext

Die neue Dachlüfter-Generation ist ein System für alle Größen: es wird
Nennleistung 50/60 Hz: 99 / 130 W

Bemessungsstrom 50/60 Hz: 0,43 / 0,56 A

Bemessungsbetriebsspannung: 220-240 V, 1~, 50/60 Hz,,

Ausführung Ventilator: Radial, Kondensatormotor

Abmessungen [BxHxT]: 400x133x400 mm
Einbautiefe: 34,6 mm
Erforderlicher Montageausbruch [BxT]: 258x258 mm

Betriebstemperatur: -20°C bis +55°C
Lagertemperatur: -40°C bis +70°C

Farbe: RAL 7035

Schutzart NEMA: NEMA 12

Schalldruckpegel 50/60 Hz: 58 / 60 dB(A)

Lebensdauer 50/60 Hz: 62.800 / 65.800 h

Gewicht: 6 kg

Certificate of Compliance

Certificate: 70071163 **Master Contract:** 153184

Project: 70071163 **Date Issued:** 2016-04-10

Issued to: **Rittal GmbH & Co. KG**
Auf dem Stuetzelberg
Herborn, 35745
GERMANY

Attention: Thorsten Heimberg

The products listed below are eligible to bear the CSA Mark shown

Issued by: Sven Renke
Sven Renke

PRODUCTS

CLASS 3211 02 - INDUSTRIAL CONTROL EQUIPMENT - Kits

Filter fan kits, models SK 3139.100, 3139.110, 3140.100, 3140.110, 3140.140, 3140.500, 3140.510
Filter kits, models SK 3138.000
Filter mat, accessory, cat. No.: 3174.100

RATINGS
Filter fan kits bear the following ratings.

Model Cat. No.	Voltage	AC/DC	Frequency	Wattage	Max. Surrounding temp.
	[V]		[Hz]	[W]	[°C]
3139.100	230	ac	50 / 60	52 / 65	55
3139.110	115	ac	50 / 60	53 / 66	55
3140.100	230	ac	50 / 60	102 / 135	55

3140.110	115	ac	50 / 60	105 / 140	55
3140.140	400	ac	50 / 60	98 / 130	55
3140.500	230	ac	50 / 60	168	55
3140.510	115	ac	50 / 60	170	55

Filter kit bear the following ratings.

Model Cat. No.	Voltage	AC/DC	Frequency	Wattage	Max. Surrounding temp.
	[V]		[Hz]	[W]	[°C]
3138.000	N/A	N/A	N/A	N/A	55

Notes:

1. These devices have been evaluated for environmental Type Ratings, Type 12, if mounted according to manufacturing instruction and used with manufacturer's filter mat, cat. No.: 3174.100.
2. The suitability of these fans for use with a solid state control has not been evaluated.
3. Filter mat, accessory, cat. No.: 3174.100 is intended for use with filter fan kits, cat. No.: 3139.100, 3139.110, 3140.100, 3140.110, 3140.140, 3140.500, 3140.510 and filter kits, cat. No.: 3138.000. Suitability with other than the above noted models was not evaluated and shall be considered in the end use.

APPLICABLE REQUIREMENTS

CSA C22.2 No.14-13 - Industrial control equipment - Twelfth Edition
CSA C22.2 NO.94.1-15 - Enclosures for electrical equipment, non-environmental considerations - Second Edition
CSA C22.2 NO.94.2-15 - Enclosures for electrical equipment, environmental considerations - Second Edition

Supplement to Certificate of Compliance

Certificate: 70071163 (059132_0_000) **Master Contract:** 153184

The products listed, including the latest revision described below, are eligible to be marked in accordance with the referenced Certificate.

Product Certification History

Project	Date	Description
70071163	2016-04-10	Original certification of Filter fan kits type SK31xx.

EU-Konformitätserklärung / EU Declaration of Conformity

Dri171781400

Wir, / We,

Rittal GmbH & Co. KG • Auf dem Stützelberg • 35745 Herborn

Erklären, dass die Produkte / declare that the products

Dachlüfter
Roof Mounted Fan

SK 3138.000 SK 3139.100 SK 3139.110 SK 3140.100 SK 3140.110 SK 3140.140
SK 3140.500 SK 3140.510

folgenden Richtlinien entsprechen: / conform to the following Directives

Maschinenrichtlinie 2006/42/EG - Machinery Directive 2006/42/EC
EMV-Richtlinie 2014/30/EU – EMC Directive 2014/30/EU

Angewandte harmonisierte Normen: / Applied harmonised standards

EN ISO 12100
Sicherheit von Maschinen – Allgemeine Gestaltungsleitsätze – Risikobeurteilung und Risikominderung
Safety of machinery – General principles for design – Risk assessment and risk reduction
EN 60335-1
Sicherheit elektrischer Geräte für den Hausgebrauch und ähnliche Zwecke – Teil 1: Allgemeine Anforderungen
Household and similar electrical appliances – Safety – Part 1: General requirements
EN 60529
Schutzarten durch Gehäuse (IP-Code)
Degrees of protection provided by enclosures (IP code)
EN 61000-6-2:2005
Elektromagnetische Verträglichkeit (EMV) – Teil 6-2: Fachgrundnormen; Störfestigkeit ....
Electromagnetic compatibility (EMC) – Part 6-2: Generic standards; Immunity ...
EN 61000-6-3:2007, A1:2011
Elektromagnetische Verträglichkeit (EMV) – Teil 6-3: Fachgrundnormen; Störaussendung....
Electromagnetic compatibility (EMC) – Part 6-3: Generic standards; Emission ...
EN 61000-3-2:2014
Elektromagnetische Verträglichkeit (EMV) - Teil 3-2: Grenzwerte - Grenzwerte für Oberschwingungsströme
Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions
EN 61000-3-3:2013
Elektromagnetische Verträglichkeit (EMV) - Teil 3-3: Grenzwerte - Begrenzung von Spannungsänderungen...
Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes

Herborn, 01.03.19

Verantwortlich für Dokumentation
responsible for documentation

Rittal GmbH & Co. KG
Auf dem Stützelberg
35745 Herborn

Frank Himmelhuber, Geschäftsbereichsleiter FuE
Executive Vice President R&D

Bei einer nicht mit uns abgestimmten Änderung des Produkts verliert diese EU-Konformitätserklärung ihre Gültigkeit.
In case of any amendments to the assembly not explicitly agreed with us, this EU Declaration of Conformity shall be invalidated.

Id. Nr. 335612
Dok. Nr. D-0000-00000434.

ZERTIFIKAT
CERTIFICATE

Hiermit wird bescheinigt, dass die Firma / *This certifies that the company*

Rittal GmbH & Co. KG
Auf dem Stüzelberg 18
35745 Herborn
Deutschland

berechtigt ist, das unten genannte Produkt mit dem abgebildeten Zeichen zu kennzeichnen
is authorized to provide the product mentioned below with the mark as illustrated

Fertigungsstätte *Manufacturing plant*	**LKH Kunststoffwerk Heiligenroth GmbH & Co.KG** **Auf der Birke 2** **56412 Heiligenroth** **Deutschland**
Beschreibung des Produktes (Details s. Anlage 1) *Description of product* *(Details see Annex 1)*	**Einbauventilatoren für Schaltschränke (Dachlüfter)** **Typen SK 3139.100,SK 3140.100** *Built-in fans for cabinets (roof fans)* *models SK 3139.100, SK 3140.100*
Geprüft nach *Tested in accordance with*	**DIN EN 60335-1 : 2012-10**

Das Produkt entspricht den Anforderungen des Produktsicherheitsgesetzes ProdSG § 21
The product is conform with the requirements of the Product Safety Act - ProdSG § 21

Registrier-Nr. / *Registered No.* 44 327 13151207
Prüfbericht Nr. / *Test Report No.* 3518 9050
Aktenzeichen / *File reference* 2.4-4156/16

Gültigkeit / Validity
von / *from* 2019-03-29
bis / *until* 2024-03-28

TÜV NORD CERT GmbH
Zertifizierungsstelle Konsumgüter

Essen, 2019-03-29

TÜV NORD CERT GmbH Langemarckstraße 20 45141 Essen www.tuev-nord-cert.de prodcert@tuev-nord.de

Bitte beachten Sie auch die umseitigen Hinweise
Please also pay attention to the information stated overleaf

ANLAGE
ANNEX

zum Zertifikat Registrier-Nr. / *to Certificate Registration No.* 44 327 13151207

Typbezeichnung: *Type designation:*	**SK 3139.100, SK 3140.100**
Bemessungsspannung: *Rated voltage:*	**220 – 240 V**
Bemessungsaufnahme: *Rated input:*	**51 / 62 W (SK 3139.100), 99 / 130 W (SK 3140.100)**
Bemessungsfrequenz: *Rated frequency:*	**50 / 60 Hz**
Schutzklasse: *Protection Class:*	**I**
Schutzart: *Degree of protection:* **Innen- / Aussenkreislauf**	**IP 55 (Gehäuse Kategorie 2)**
Netzanschluss: *Main connection:*	**Spannungsversorgung durch Endgerät über eine Steckverbindung**

TÜV NORD CERT GmbH
Zertifizierungsstelle Konsumgüter

Essen, 2019-03-29

TÜV NORD CERT GmbH Langemarckstraße 20 45141 Essen www.tuev-nord-cert.de prodcert@tuev-nord.de

CERTIFICATE OF COMPLIANCE

Certificate Number	UL-US-L491171-12-10607102
Report Reference	E491171-20170601
Date	21-Dec-2021
Issued to:	RITTAL GmbH & Co. KG Auf dem Stuetzelberg Herborn Germany 35745
This is to certify that representative samples of	FTTA - Environmental-rated Accessories for Enclosures See Addendum Page for Product Designation(s).
	Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.
Standard(s) for Safety:	UL 508A, 3rd Ed., Issue Date: 2018-04-24, Revision Date: 2021-08-05
Additional Information:	See the UL Online Certifications Directory at https://iq.ulprospector.com for additional information

This Certificate of Compliance does not provide authorization to apply the UL Mark. Only the UL Follow-Up Services Procedure provides authorization to apply the UL Mark.

Only those products bearing the UL Mark should be considered as being UL Certified and covered under UL's Follow-Up Services.

Look for the UL Certification Mark on the product.

Bruce Mahrenholz, Director North American Certification Program

UL LLC

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CERTIFICATE OF COMPLIANCE

Certificate Number UL-US-L491171-12-10607102
Report Reference E491171-20170601
Date 21-Dec-2021

This is to certify that representative samples of the product as specified on this certificate were tested according to the current UL requirements

Model	Category Description	Environmental Type Rating
3138.000	Filter Kits	Type 12
3139.100	Filter Fan Kits	Type 12
3139.110	Filter Fan Kits	Type 12
3140.100	Filter Fan Kits	Type 12
3140.110	Filter Fan Kits	Type 12
3140.140	Filter Fan Kits	Type 12
3140.500	Filter Fan Kits	Type 12
3140.510	Filter Fan Kits	Type 12

Bruce Mahrenholz, Director North American Certification Program

UL LLC

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CERTIFICATE OF COMPLIANCE

Certificate Number	UL-CA-L491171-32-10607102
Report Reference	E491171-20170601
Date	21-Dec-2021
Issued to:	RITTAL GmbH & Co. KG Auf dem Stuetzelberg Herborn Germany 35745
This is to certify that representative samples of	FTTA7 - Environmental-rated Accessories for Enclosures Certified for Canada See Addendum Page for Product Designation(s). Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.
Standard(s) for Safety:	CSA C22.2 NO. 14-18, 13th Ed., Issue Date: 2018-03-01
Additional Information:	See the UL Online Certifications Directory at https://iq.ulprospector.com for additional information

This Certificate of Compliance does not provide authorization to apply the UL Mark. Only the UL Follow-Up Services Procedure provides authorization to apply the UL Mark.

Only those products bearing the UL Mark should be considered as being UL Certified and covered under UL's Follow-Up Services.

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CERTIFICATE OF COMPLIANCE

Certificate Number UL-CA-L491171-32-10607102
Report Reference E491171-20170601
Date 21-Dec-2021

This is to certify that representative samples of the product as specified on this certificate were tested according to the current UL requirements

Model	Category Description	Environmental Type Rating
3138.000	Filter Kits	Type 12
3139.100	Filter Fan Kits	Type 12
3139.110	Filter Fan Kits	Type 12
3140.100	Filter Fan Kits	Type 12
3140.110	Filter Fan Kits	Type 12
3140.140	Filter Fan Kits	Type 12
3140.500	Filter Fan Kits	Type 12
3140.510	Filter Fan Kits	Type 12

Bruce Mahrenholz, Director North American Certification Program

UL LLC

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TopTherm fan-and-filter units – SK 3241.100

Date : May 10, 2019

ENCLOSURES POWER DISTRIBUTION CLIMATE CONTROL IT INFRASTRUCTURE SOFTWARE & SERVICES

FRIEDHELM LOH GROUP

TopTherm fan-and-filter units – SK 3241.100

created: 10.05.2019 build on www.rittal.com/uk-en



Product description

Colour:	RAL 7035
Protection category IP to IEC 60 529:	IP 54 with standard filter and additional fine filter mat: IP 55 with standard filter and hose-proof hood: IP 56
Protection category NEMA:	with standard filter: Type 12 with standard filter and additional fine filter mat: Type 12 with standard filter and hose-proof hood: Type 3, 3R, 4, 4X
Supply includes:	Complete unit ready to install, including filter mat
Note:	With the fan-and-filter unit 3237.XXX, electrical connection is made via two single wires on the unit; for all other fan-and-filter units, a screwless spring terminal is used.

Product features

Air throughput (unimpeded air flow):	At 50 Hz: 230 m³/h At 60 Hz: 250 m³/h
Air throughput with outlet filter including standard filter mat (quantity x order number, output 50/60 Hz):	1 x 3240200: 183/205 m³/h 2 x 3240200: 203/220 m³/h 1 x 3243200: 203/230 m³/h
Rated operating voltage:	230 V, 1~, 50 Hz/60 Hz
Dimensions:	Width: 255 mm Height: 255 mm

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Required mounting cut-out:	Width: 224 mm Height: 224 mm
Build depth:	25 mm
Installation depth:	107 mm
Temperature range:	Bearing: -30°C…+70°C Operation (environment): -30°C...+55°C
Power consumption P---sub---el---subcl---:	At 50 Hz: 40 W At 60 Hz: 42 W
Rated current (max.):	At 50 Hz: 0.26 A At 60 Hz: 0.24 A
Miniature circuit-breaker/fuse:	4 A
Noise level:	At 50 Hz: 54 dB(A) At 60 Hz: 56 dB(A)
Diagonal fan:	Diagonal, self-starting shaded pole motor
Packs of:	1 pc(s).
Weight/pack:	2.24 kg
EAN:	4028177651982
Customs tariff number:	84145915
ETIM 6.0:	EC000320
ETIM 5.0:	EC000320
eCl@ss 8.0/8.1:	27180716
eCl@ss 7.0/7.1:	27180716
eCl@ss 6.0/6.1:	27180716
eCl@ss 5.1/5.1.4:	27180705
Product description:	SK fan and filter units TopTherm, 230/250 m³/h, 230 V, 1~, 50/60 Hz, WHD: 255 x 255 x 25 mm

Approvals

© Rittal 2019

Approvals:	Approval overview CSA UL + C-UL - FTTA UR + C-UR
Certificates:	EAC
Declarations:	Declaration of conformity

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Rittal – The System.

Faster – better – everywhere.

TopTherm fan-and-filter units – SK 3241.100

Date : May 10, 2019

ENCLOSURES POWER DISTRIBUTION CLIMATE CONTROL IT INFRASTRUCTURE SOFTWARE & SERVICES

FRIEDHELM LOH GROUP

TopTherm fan-and-filter units – SK 3241.100

created: 10.05.2019 build on www.rittal.com/uk-en



Product description

Colour:	RAL 7035
Protection category IP to IEC 60 529:	IP 54 with standard filter and additional fine filter mat: IP 55 with standard filter and hose-proof hood: IP 56
Protection category NEMA:	with standard filter: Type 12 with standard filter and additional fine filter mat: Type 12 with standard filter and hose-proof hood: Type 3, 3R, 4, 4X
Supply includes:	Complete unit ready to install, including filter mat
Note:	With the fan-and-filter unit 3237.XXX, electrical connection is made via two single wires on the unit; for all other fan-and-filter units, a screwless spring terminal is used.

Product features

Air throughput (unimpeded air flow):	At 50 Hz: 230 m³/h At 60 Hz: 250 m³/h
Air throughput with outlet filter including standard filter mat (quantity x order number, output 50/60 Hz):	1 x 3240200: 183/205 m³/h 2 x 3240200: 203/220 m³/h 1 x 3243200: 203/230 m³/h
Rated operating voltage:	230 V, 1~, 50 Hz/60 Hz
Dimensions:	Width: 255 mm Height: 255 mm

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Required mounting cut-out:	Width: 224 mm Height: 224 mm
Build depth:	25 mm
Installation depth:	107 mm
Temperature range:	Bearing: -30°C…+70°C Operation (environment): -30°C...+55°C
Power consumption P---sub---el---subcl---:	At 50 Hz: 40 W At 60 Hz: 42 W
Rated current (max.):	At 50 Hz: 0.26 A At 60 Hz: 0.24 A
Miniature circuit-breaker/fuse:	4 A
Noise level:	At 50 Hz: 54 dB(A) At 60 Hz: 56 dB(A)
Diagonal fan:	Diagonal, self-starting shaded pole motor
Packs of:	1 pc(s).
Weight/pack:	2.24 kg
EAN:	4028177651982
Customs tariff number:	84145915
ETIM 6.0:	EC000320
ETIM 5.0:	EC000320
eCl@ss 8.0/8.1:	27180716
eCl@ss 7.0/7.1:	27180716
eCl@ss 6.0/6.1:	27180716
eCl@ss 5.1/5.1.4:	27180705
Product description:	SK fan and filter units TopTherm, 230/250 m³/h, 230 V, 1~, 50/60 Hz, WHD: 255 x 255 x 25 mm

Approvals

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Approvals:	Approval overview CSA UL + C-UL - FTTA UR + C-UR
Certificates:	EAC
Declarations:	Declaration of conformity

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SIEMENS

Sicherungslasttrennschalter Baugrößen (BG) 1, 2, 3 — **3NP1143**
Fuse switch disconnector frame size (FS) 1, 2, 3 — **3NP1153**
Fusible-interrupteur-sectionneur désignation de carcasse 1, 2, 3 — **3NP1163**
Interruptor-seccionador-fusible tamaños 1, 2, 3 — **3NP1943**
Sezionatore sottocarico con fusibili, dimensioni costruttive 1, 2, 3 — **3NP1953**
Seccionador de carga com fusíveis, tamanhos 1, 2, 3 — **3NP1963**
Sigortalı yük kesici Ebatlar 1, 2, 3
Разъединитель-предохранитель, типоразмеры 1, 2, 3
熔断器式负载隔离开关结构尺寸 1, 2, 3

Betriebsanleitung | **Operating Instructions** | **Instructions de service** | **Instructivo** | **Istruzioni operative**
Instruções de Serviço | **İşletme kılavuzu** | **Руководство по эксплуатации** | **使用说明**

	Deutsch	English	Français
	Vor der Installation, dem Betrieb oder der Wartung des Geräts muss diese Anleitung gelesen und verstanden werden.	Read and understand these instructions before installing, operating, or maintaining the equipment.	Ne pas installer, utiliser ou intervenir sur cet équipement avant d'avoir lu et assimilé les présentes instructions et notamment les conseils de sécurité et mises en garde qui y figurent.
	⚠ GEFAHR	**⚠ DANGER**	**⚠ DANGER**
	Gefährliche Spannung. **Lebensgefahr oder schwere Verletzungsgefahr.** Vor Beginn der Arbeiten Anlage und Gerät spannungsfrei schalten.	**Hazardous voltage.** **Will cause death or serious injury.** Turn off and lock out all power supplying this device before working on this device.	**Tension électrique.** **Danger de mort ou risque de blessures graves.** Mettre hors tension avant d'intervenir sur l'appareil.
	VORSICHT	**CAUTION**	**PRUDENCE**
	Eine sichere Gerätefunktion ist nur mit zertifizierten Komponenten gewährleistet!	Reliable functioning of the equipment is only ensured with certified components.	La sécurité de fonctionnement de l'appareil n'est garantie qu'avec des composants certifiés.

	Español	Italiano	Português
	Leer y comprender este instructivo antes de la instalación, operación o mantenimiento del equipo.	Leggere con attenzione queste istruzioni prima di installare, utilizzare o eseguire manutenzione su questa apparecchiatura.	Ler e compreender estas instruções antes da instalação, operação ou manutenção do equipamento.
	⚠ PELIGRO	**⚠ PERICOLO**	**⚠ PERIGO**
	Tensión peligrosa. **Puede causar la muerte o lesiones graves.** Desconectar la alimentación eléctrica antes de trabajar en el equipo.	**Tensione pericolosa.** **Può provocare morte o lesioni gravi.** Scollegare l'alimentazione prima di eseguire interventi sull'apparecchiatura.	**Tensão perigosa.** **Perigo de morte ou ferimentos graves.** Desligue a alimentação elétrica e proteja contra o religamento, antes de iniciar o trabalho no equipamento.
	PRECAUCIÓN	**CAUTELA**	**CUIDADO**
	El funcionamiento seguro del aparato sólo está garantizado con componentes certificados.	Il funzionamento sicuro dell'apparecchiatura è garantito soltanto con componenti certificati.	O funcionamento seguro do aparelho apenas pode ser garantido se forem utilizados os componentes certificados.

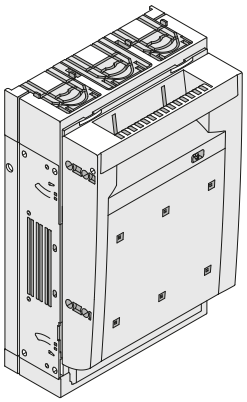
	Türkçe	Русский	中文
	Cihazın kurulumundan, çalıştırılmasından veya bakıma tabi tutulmasından önce, bu kılavuz okunmuş ve anlanmış olması gerekmektedir.	Перед установкой, вводом в эксплуатацию или обслуживанием устройства необходимо прочесть и понять данное руководство.	安装、使用和维修本设备前必须先阅读并理解本说明。
	⚠ TEHLİKE	**⚠ ОПАСНО**	**⚠ 危险**
	Tehlikeli gerilim. **Ölüm tehlikesi veya ağır yaralanma tehlikesi.** Çalışmalara başlamadan önce, sistemin ve cihazın gerilim beslemesini kapatınız.	**Опасное напряжение.** **Опасность для жизни или возможность тяжелых травм.** Перед началом работ отключить подачу питания к установке и к устройству.	**危险电压。** **可能导致生命危险或重伤危险。** 操作设备时必须确保切断电源。
	DİKKAT	**ОСТОРОЖНО**	**小心**
	Cihazın güvenli çalışması ancak sertifikalı bileşenler kullanılması halinde garanti edilebilir.	Безопасность работы устройства гарантировано только при использовании сертифицированных компонентов.	只有使用经过认证的部件才能保证设备的正常运转！

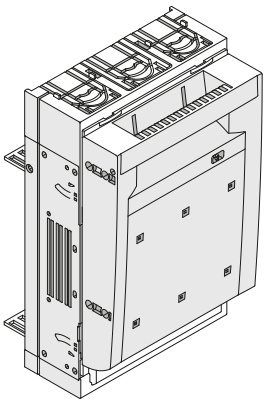
Technical Support: Internet: http://www.siemens.de/lowvoltage/technical-support

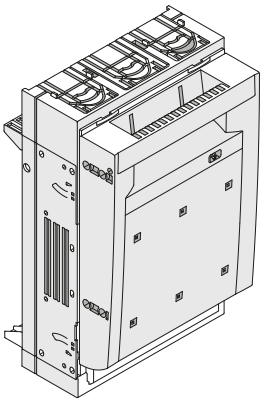
GWA 4NEB 711 2902-10 DS 05 — Last update: 23 July 2019
Bestell-Nr. / Order No.: 3ZX1012-0NP11-4CA1

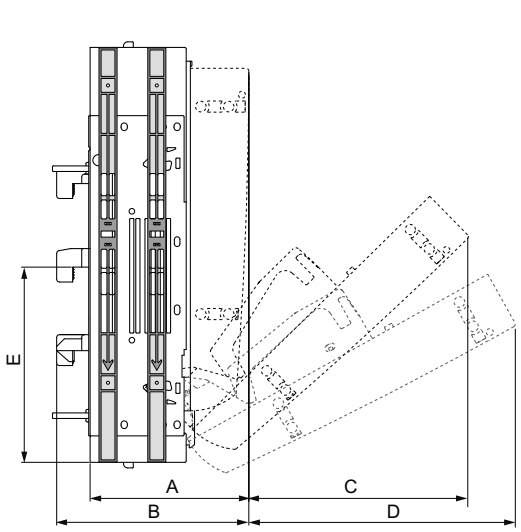
UL4248		
3NP114	600 V	250 A
3NP115	600 V	400 A
3NP1163-1__1_	600 V	630 A
3NP1163-1__2_	600 V	420 A

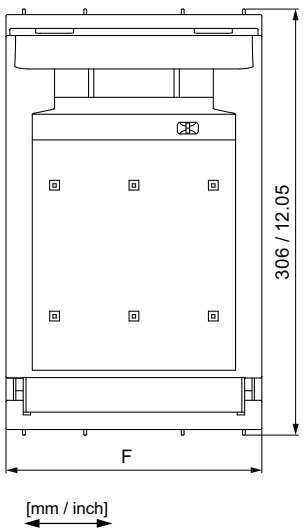
UL-File			
E171267	Vol 2	Sec 2	Fuseholders
E337672	Vol 1	Sec 1	Fuseholder Accessories

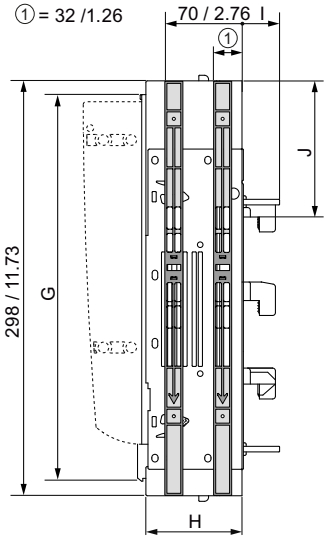


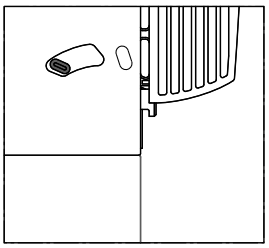


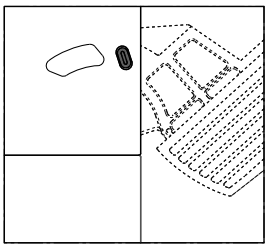


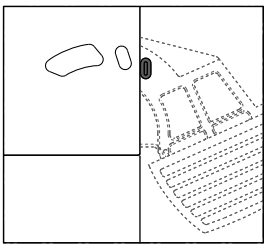






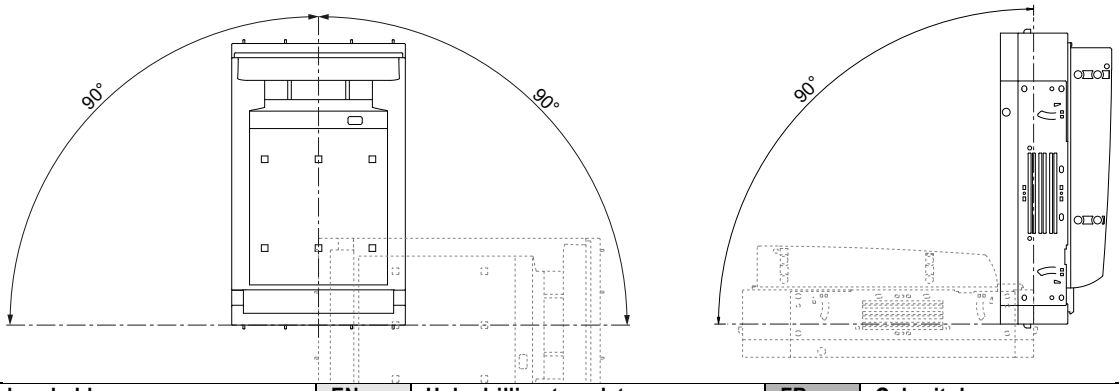






mm / inch	A	B	C	D	E	F	G	H	I	J
3NP1143-1CA_0	115 / 4.52	—	180 / 7.08	186 / 7.32	—	183,7 / 7.23	275,6 / 10.85	—	—	—
3NP1153-1CA_0	129,9 / 5.11	—	200 / 7.87	207 / 8.15	—	209,4 / 8.24	280 / 11.02	90 / 3.54	—	—
3NP1163-1CA_0	138,5 / 5.45	—	200 / 7.87	207 / 8.15	—	249,4 / 9.82	280 / 11.02	90 / 3.54	—	—
3NP1143-_BC_0	115 / 4.52	138 / 5.43	180 / 7.08	186 / 7.32	144,2 / 5.68	183,7 / 7.23	275,6 / 10.85	—	26 / 1.02	97,8 / 3.85
3NP1153-_BC_0	129,9 / 5.11	153 / 6.02	200 / 7.87	207 / 8.15	144,2 / 5.68	209,4 / 8.24	280 / 11.02	90 / 3.54	26 / 1.02	97,8 / 3.85
3NP1163-_BC_0	138,5 / 5.45	161,5 / 6.36	200 / 7.87	207 / 8.15	144,2 / 5.68	249,4 / 9.82	280 / 11.02	90 / 3.54	26 / 1.02	97,8 / 3.85

DE	Einbaulage	EN	Mounting position	FR	Position de montage
ES	Posición de montaje	IT	Posizione di montaggio	PT	Posição de montagem
TR	Montaj pozisyonu	РУ	Монтажное положение	中文	安装位置



DE	Bohrschablone	EN	Hole drilling template	FR	Gabarit de perçage
ES	Plantilla para taladrado	IT	Schema di foratura	PT	Gabarito de furação
TR	Delme şablonu	РУ	Шаблон для сверления	中文	钻模

ACHTUNG

Nicht korrekt platzierte Bohrlöcher durch Verwendung dieser Zeichnung als Bohrschablone.
Diese Bohrschablone ist nicht im Maßstab 1:1 dargestellt. Fertigen Sie auf Grundlage der Zeichnung eine korrekte Bohrschablone an.

ATTENTION

Incorrectly placed drill holes as a result of using this drawing as a drilling template.
This hole drilling template is not exactly to scale (1:1). Please make a correct hole drilling template on the basis of the drawing.

ATTENTION

Ce dessin ne peut pas être utilisé comme gabarit de perçage.
En effet, il n'est pas à l'échelle. Il peut cependant être utilisé pour créer un gabarit à l'échelle.

ATENCIÓN

Taladros de fijación mal posicionados si este dibujo se usa como plantilla para taladrar.
Este dibujo no está a escala 1:1, por ello no sirve como plantilla. Elabore una plantilla correcta en base a las dimensiones reales indicadas en el dibujo.

ATTENZIONE

Fori situati non correttamente a causa dell'utilizzo di questo disegno quale schema di foratura.
Questo schema di foratura non è raffigurato in scala 1:1. Preparare uno schema di foratura corretto sulla base del disegno.

ATENÇÃO

Furos posicionados incorretamente devido ao uso do presente desenho como gabarito de furação.
O gabarito de furação não está representado em escala 1:1. Produza um gabarito de furação correto com base no desenho.

DİKKAT

Delik şablonu olarak bu çizimin kullanılması nedeniyle doğru yerleştirilmemiş matkap delikleri.
Bu delik şablonu 1:1 ölçekte gösterilmemektedir. Çizimi temel alarak doğru bir delik şablonu hazırlayın.

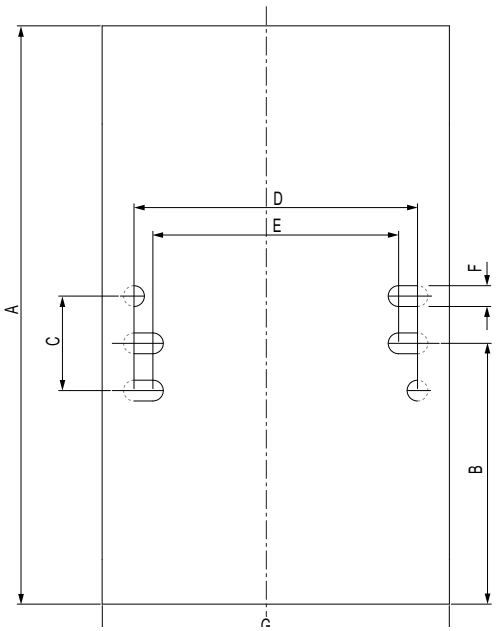
ВНИМАНИЕ

Неправильное положение просверленных отверстий при использовании данного чертежа в качестве шаблона для сверления.
Данный шаблон для сверления представлен не в масштабе 1:1. На основе чертежа подготовьте правильный шаблон для сверления.

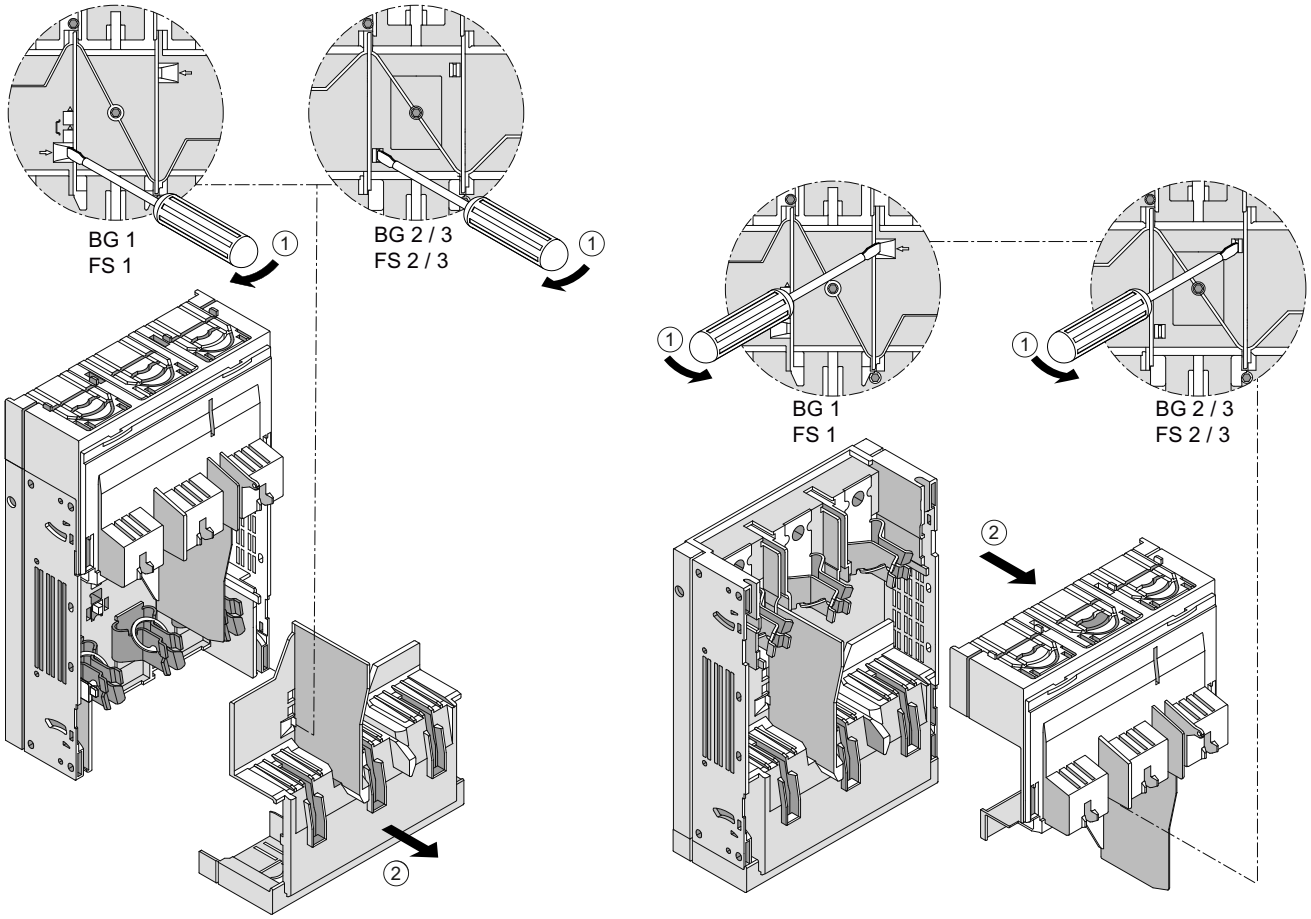
注意

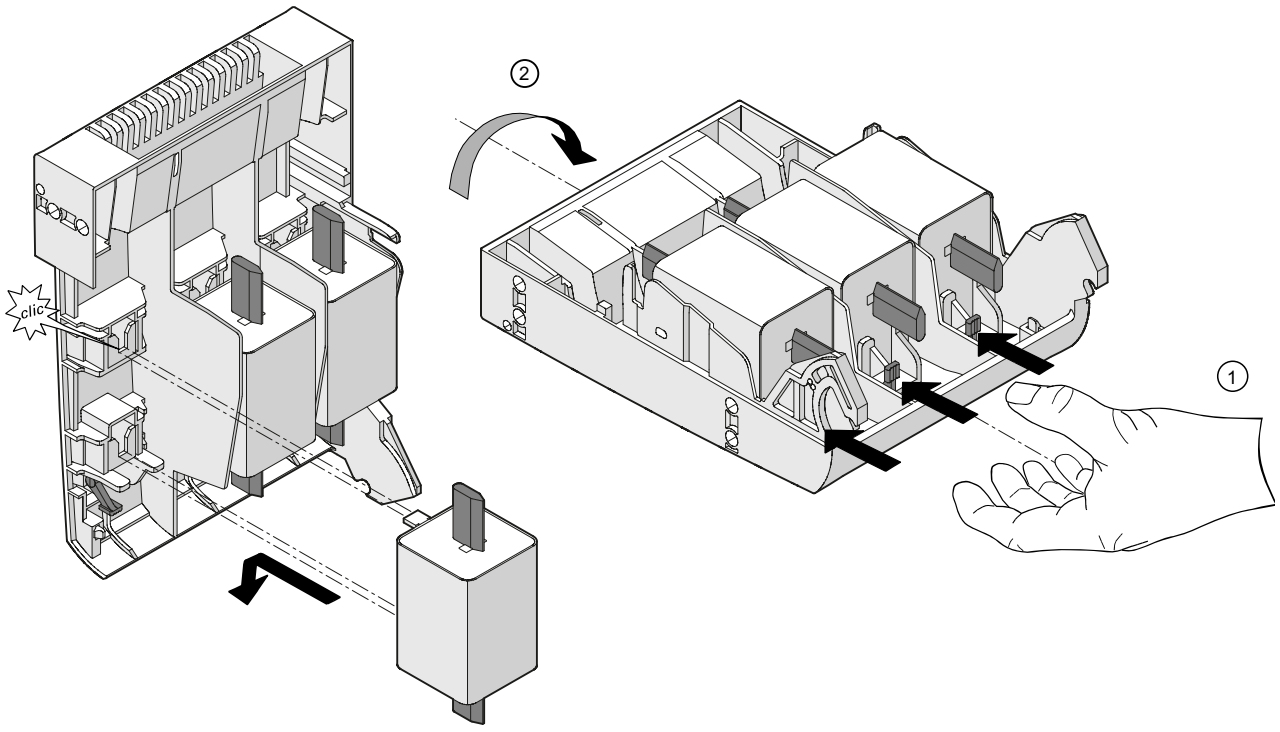
使用该图纸作为钻孔模板导致钻孔选位错误。

该钻孔模板的比例不正好是 1:1。请根据图纸制作正确的钻孔模板。



mm / inch	A	B	C	D	E	F	G
3NP1143-1CA_0	306 / 12.05	138 / 5.43	50 / 1.97	150 / 5.91	130 / 5.12	11 / 0.43	183,7 / 7.23
3NP1153-1CA_0	306 / 12.05	138 / 5.43	50 / 1.97	166 / 6.54	130 / 5.12	11 / 0.43	209,4 / 8.24
3NP1163-1CA_0	306 / 12.05	138 / 5.43	50 / 1.97	195 / 7.68	160 / 6.30	11 / 0.43	249,4 / 9.82

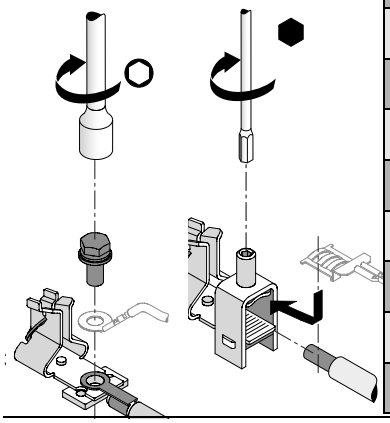

BG 1
FS 1
BG 2 / 3
FS 2 / 3
1
2


clic
2
1

					WxT	+
3NP1143-1__10	○ 17 mm / 0.67 inch	10 ... 12 Nm / 88.5 ... 106.2 lbf in	16 ... 150 mm² / 6 AWG ... 300 kcmil 2 x 120 mm² / 2 x 250 kcmil	–	–	3NP1943-1BG10
3NP1153-1__10	○ 17 mm / 0.67 inch	10 ... 12 Nm / 88.5 ... 106.2 lbf in	25 ... 240 mm² / 4 AWG ... 500 kcmil 2 x 185 mm² / 2 x 350 kcmil	–	–	3NP1943-1BG10
3NP1163-1__10	○ 17 mm / 0.67 inch	25 Nm / 221.3 lbf in	50 ... 300 mm² / 1/0 AWG ... 600 kcmil 2 x 240 mm² / 2 x 500 kcmil	–	–	3NP1943-1BG10
3NP1143-1__20	◢ 5 mm / 0.20 inch	10 Nm / 88.5 lbf in	70 ... 185 mm² / 2/0 AWG ... 350 kcmil	70 ... 120 mm² 2/0 AWG ... 250 kcmil	20 mm x 10 mm / 0.79 inch x 0.39 inch	3NP1943-1BG40
3NP1153-1__20	◢ 8 mm / 0.31 inch	25 Nm / 221.3 lbf in	120 ... 300 mm² / 250 kcmil ... 600 kcmil	120 ... 240 mm² 250 kcmil ... 500 kcmil	32 mm x 10 mm / 1.26 inch x 0.39 inch	3NP1953-1BG40
3NP1163-1__20	◢ 8 mm / 0.31 inch	25 Nm / 221.3 lbf in	120 ... 300 mm² / 250 kcmil ... 600 kcmil UL no standard cable Flexibar 32 mm x 14 mm / 1.26 inch x 0.55 inch	120 ... 240 mm² 250 kcmil ... 500 kcmil UL no standard cable	32 mm x 20 mm / 1.26 inch x 0.79 inch	3NP1953-1BG40

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DE	Hilfsleiteranschluss	**EN**	Auxiliary conductor connection	**FR**	Raccordement de connecteur auxiliaire
ES	Conexión de conductor auxiliar	**IT**	Collegamento conduttore ausiliario	**PT**	Conexão de condutor auxiliar
TR	Yardımcı iletken bağlantısı	**РУ**	Подключение вспомогательного провода	**中文**	辅助导线连接

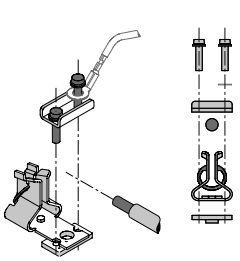


DE	**ACHTUNG**	Höhere Verlustleitung durch höhere Erwärmungswerte, wenn bei 3NP11_3-1__20 die Kabel nicht mittig angeschlossen sind. Schließen Sie bei 3NP11_3-1__20 die Kabel immer mittig an.
EN	**ATTENTION**	Higher power losses as a result of higher heat rise values if the cables are not connected in the center on 3NP11_3-1__20. On 3NP11_3-1__20 always connect the cables in the center
FR	**ATTENTION**	La puissance dissipée en raison de l'échauffement est plus élevée lorsque les câbles ne sont pas raccordés au milieu pour 3NP11_3-1__20. Veiller à raccorder les câble au milieu sur 3NP11_3-1__20.
ES	**ATENCIÓN**	Mayores pérdidas debido a mayor calentamiento si en el 3NP11_3-1__20 los cable no se conectan centrados. Conecte en el 3NP11_3-1__20 los cables siempre centrados.
IT	**ATTENZIONE**	Potenza dissipata più elevata a causa di valori termici più alti, se non si collegano i cavi del 3NP11_3-1__20 al centro. Collegare i cavi del 3NP11_3-1__20 sempre al centro
PT	**ATENÇÃO**	O valores de aquecimento superiores fazem aumentar a potência dissipada, quando os cabos não estão conectados no meio no 3NP11_3-1__20. No 3NP11_3-1__20 sempre conectar o cabo no meio.
TR	**DİKKAT**	3NP11_3-1__20'de kablolar ortaya bağlanmamışsa, artan ısınma kayıpları nedeniyle daha yüksek kayıp güç. 3NP11_3-1__20'de kabloları her zaman ortaya bağlayın
РУ	**ВНИМАНИЕ**	Из-за более высоких показателей нагрева возникают большие потери мощности, если в 3NP11_3-1__20 кабели подсоединены не по центру. В 3NP11_3-1__20 кабель всегда подсоединять по центру.
中文	**注意**	如果电缆没有连接到 3NP11_3-1__20 的中心位置，将由于温升较高而导致更高的功率损耗。请始终将电缆连接到 3NP11_3-1__20 的中心位置。

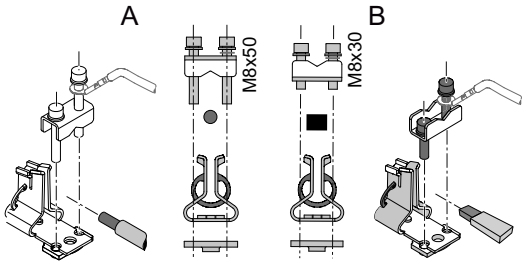
					WxT	+
3NP1943-1BA00	◢ 5 mm / 0.20 inch	6 Nm / 53.1 lbf in	70 ... 120 mm² / 2/0 AWG ... 250 kcmil	70 ... 120 mm² / 2/0 AWG ... 250 kcmil	18 mm x 10 mm 0.71 inch x 0.39 inch	3NP1943-1BG30
3NP1953-1BA00 A/B	◢ 6 mm / 0.24 inch	8 Nm / 8 Nm, 70.8 lbf in / 70.8 lbf in	120 .... 240 mm² / 250 kcmil ... 500 kcmil	120 ... 240 mm² / 250 kcmil ... 500 kcmil	20 mm x 12 mm 0.79 inch x 0.47 inch	3NP1953-1BG30
3NP1963-1BA00 A/B	◢ 6 mm / 0.24 inch	10 Nm / 8 Nm, 88.5 lbf in / 70.8 lbf in	150 .... 300 mm² / 300 kcmil ... 600 kcmil	150 ... 300 mm² / 300 kcmil ... 600 kcmi	24 mm x 16 mm 0.94 inch x 0.63 inch	3NP1953-1BG30
3NP1943-1BB10	◢ 5 mm / 0.20 inch	6 Nm / 53.1 lbf in	70 ... 150 mm² / 2/0 AWG ... 300 kcmil	70 ... 150 mm² / 2/0 AWG ... 300 kcmil	18 mm x 10 mm 0.71 inch x 0.39 inch	3NP1943-1BG30
3NP1953-1BB10	◢ 6 mm / 0.24 inch	8 Nm / 70.8 lbf in	120 .... 240 mm² / 250 kcmil ... 500 kcmil	120 ... 240 mm² /250 kcmil ... 500 kcmi	20 mm x 10 mm 0.79 inch x 0.39 inch	3NP1953-1BG30
3NP1963-1BB10	○ 13 mm / 0.51 inch	25 Nm / 221.3 lbf in	150 .... 300 mm² / 300 kcmil ... 600 kcmil	150 ... 300 mm² / 300 kcmil ... 600 kcmil	24 mm x 10 mm 0.94 inch x 0.39 inch	3NP1953-1BG30
3NP1943-1BB20	◢ 5 mm / 0.20 inch	6 Nm / 53.1 lbf in	2 x 35 .... 70 mm² / 2 x 2AWG ... 2/0 AWG	2 x 35 .... 70 mm² / 2 x 2AWG ... 2/0 AWG	–	3NP1943-1BG30
3NP1953-1BB20	◢ 6 mm / 0.24 inch	8 Nm / 70.8 lbf in	2 x 70 ... 120 mm² 2 x 2/0 AWG ... 250 kcmil	2 x 70 ... 120 mm² / 2 x 2/0 AWG ... 250 kcmil	–	3NP1953-1BG30
3NP1963-1BB20	○ 13 mm / 0.51 inch	25 Nm / 221.3 lbf in	2 x 150 .... 185 mm² 2 x 300 kcmil ... 350 kcmil	2 x 150 ... 185 mm² 2 x 300 kcmil ... 350 kcmil	–	3NP1953-1BG30

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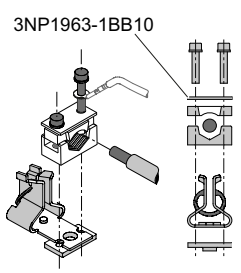
DE	Hilfsleiteranschluss	**EN**	Auxiliary conductor connection	**FR**	Raccordement de connecteur auxiliaire
ES	Conexión de conductor auxiliar	**IT**	Collegamento conduttore ausiliario	**PT**	Conexão de condutor auxiliar
TR	Yardımcı iletken bağlantısı	**РУ**	Подключение вспомогательного провода	**中文**	辅助导线连接



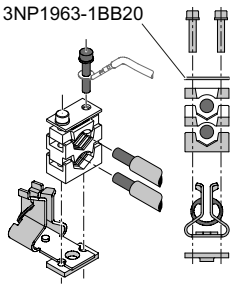
3NP1943-1BA00



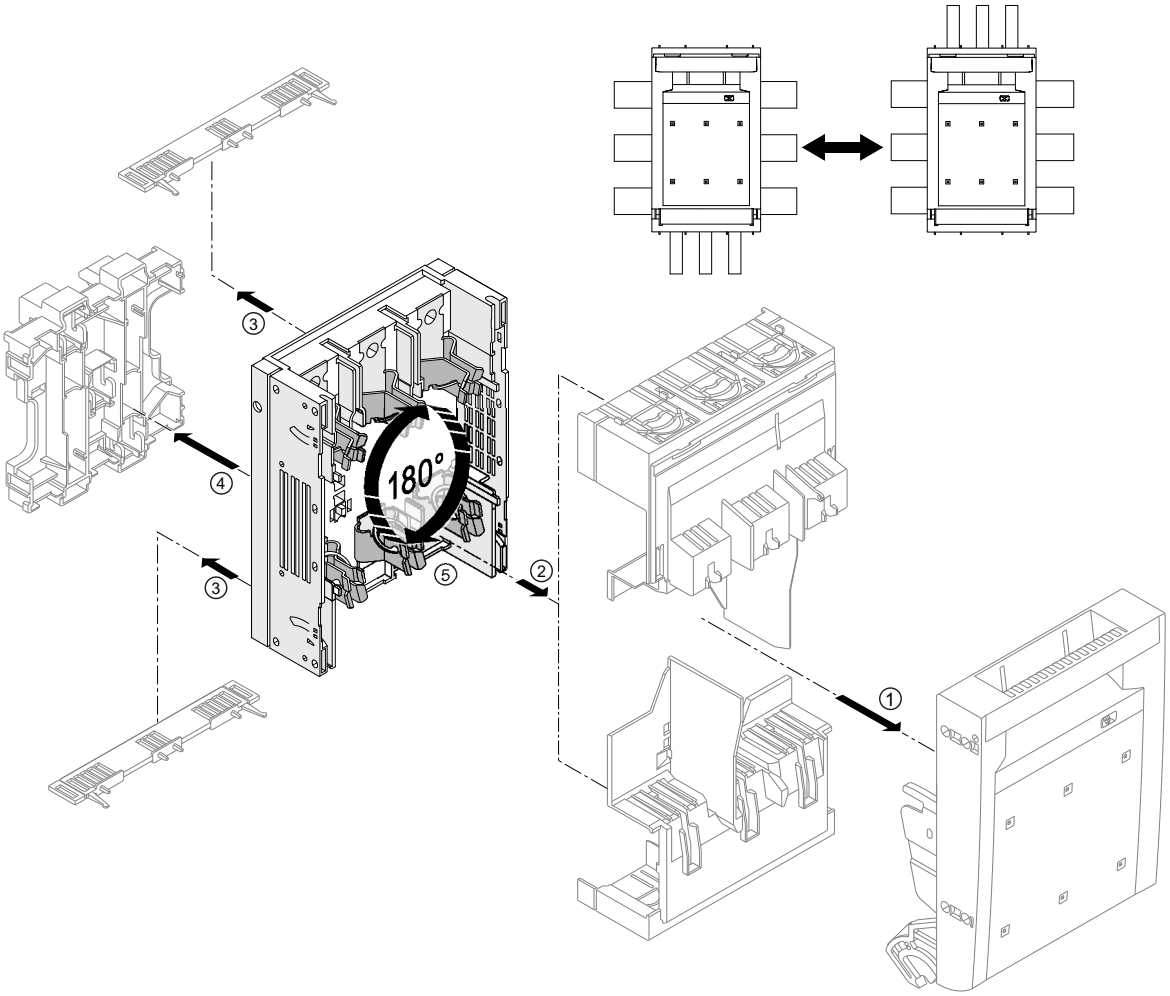
3NP1953-1BA00
3NP1963-1BA00

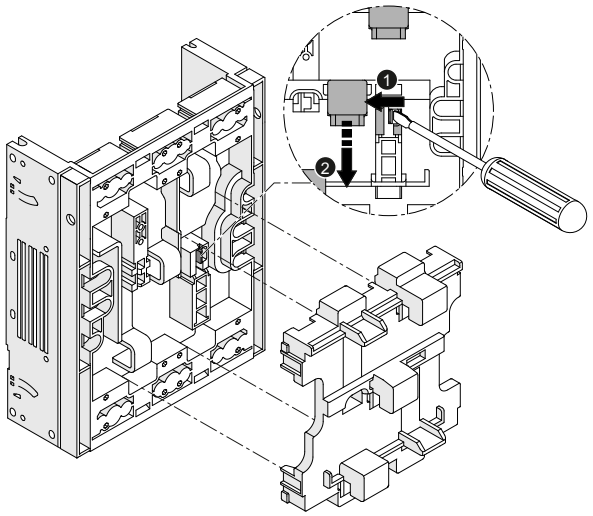


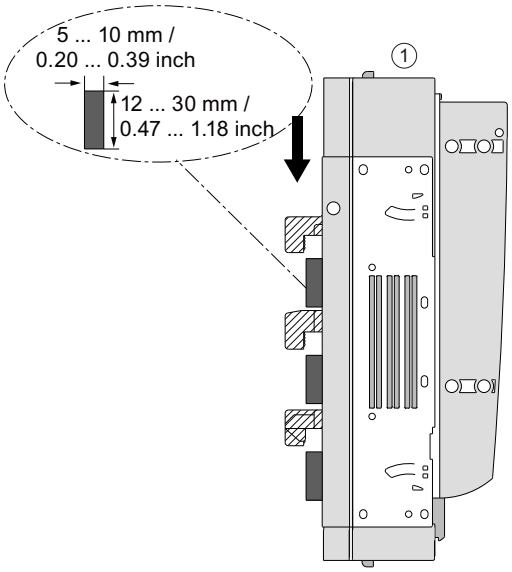
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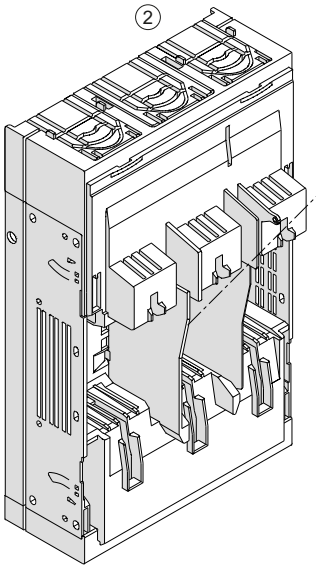


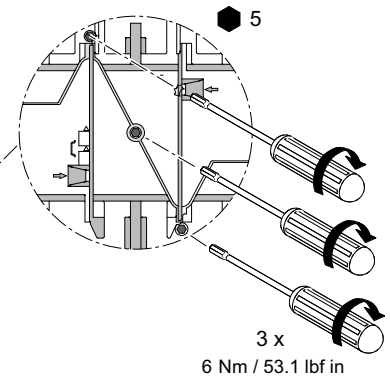
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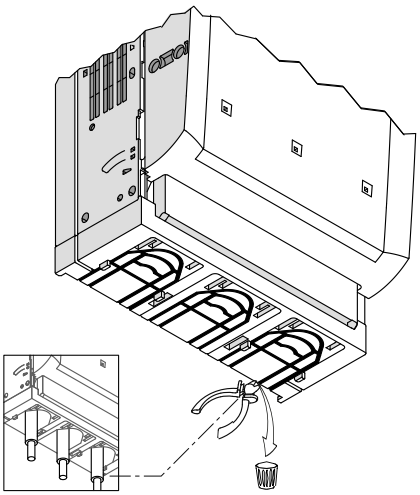

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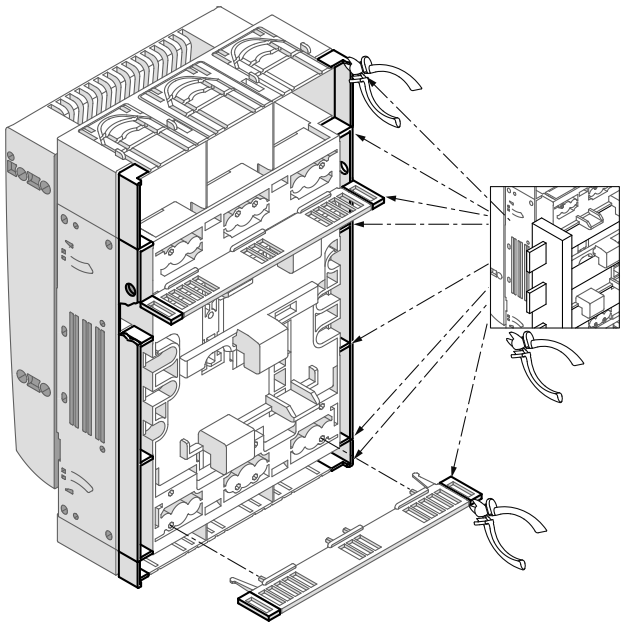

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2

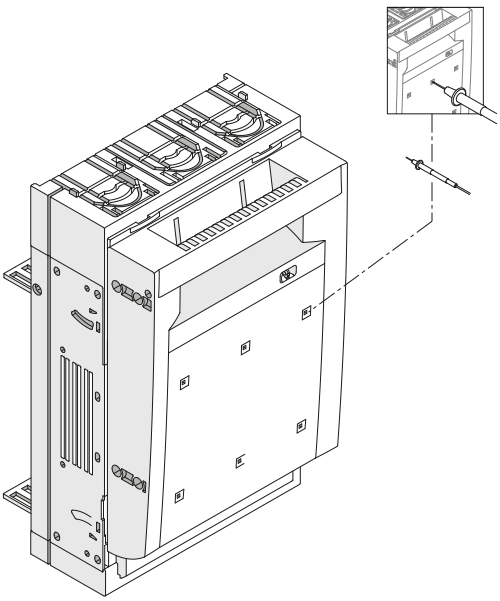

5 ... 10 mm /
0.20 ... 0.39 inch
12 ... 30 mm /
0.47 ... 1.18 inch
①

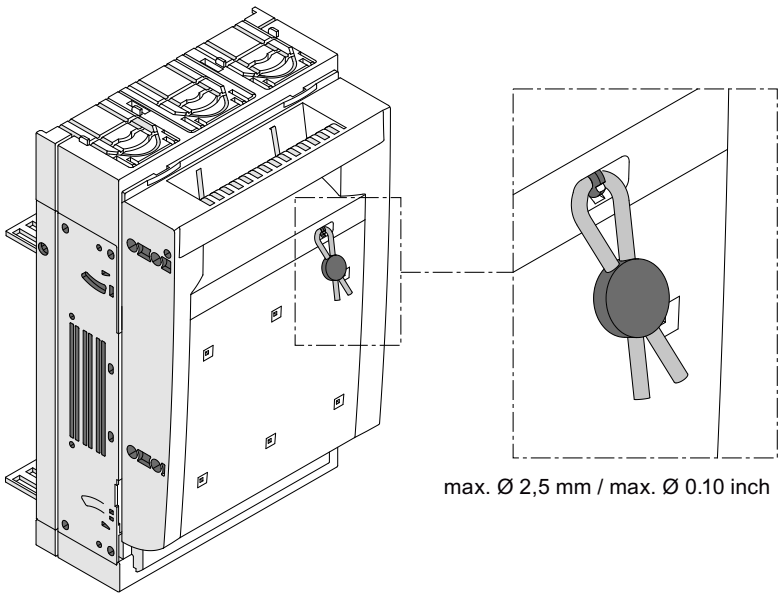

②


5
3 x
6 Nm / 53.1 lbf in









DE	Weitere Informationen finden Sie im Systemhandbuch "Sicherungslasttrennschalter 3NP1" (3ZX1012-0NP10-1AB1).
EN	Further information can be found in the system manual "Fuse switch disconnector 3NP1" (3ZX1012-0NP10-1AC1).
FR	Vous trouverez des informations supplémentaires dans le manuel système "Fusible-interrupteur-sectionneur 3NP1" (3ZX1012-0NP10-1AD1).
ES	Podrá obtener información adicional en el manual de sistema "Fuse switch disconnector 3NP1" (3ZX1012-0NP10-1AC1).
IT	Per ulteriori informazioni, consultare il manuale di sistema "Fuse switch disconnector 3NP1" (3ZX1012-0NP10-1AC1).
PT	Maiores informações você encontra no Manual de Sistema "Fuse switch disconnector 3NP1" (3ZX1012-0NP10-1AC1).
TR	Ayrıntılı bilgiyi "Fuse switch disconnector 3NP1" (3ZX1012-0NP10-1AC1) sistem kılavuzundan edinebilirsiniz.
РУ	Дополнительную информацию Вы найдете в Системном руководстве "Fuse switch disconnector 3NP1" (3ZX1012-0NP10-1AC1).
中文	更多信息请参见系统手册 "Fuse switch disconnector 3NP1" (3ZX1012-0NP10-1AC1).

Technische Änderungen vorbehalten. Zum späteren Gebrauch aufbewahren.
Subject to change without prior notice. Store for use at a later date.

Bestell-Nr./Order No.: 3ZX1012-0NP11-4CA1
© Siemens AG 2008

EU-Konformitätserklärung Nr. 2866404.CE.02
EU-Declaration of Conformity No.

Hersteller / *Manufacturer*: **PHOENIX CONTACT GmbH & Co. KG**

Anschrift / *Address*: Flachsmarktstraße 8, 32825 Blomberg, Germany

Produktbezeichnung / *Product description*: **TRIO-PS/3AC/24DC/40**

(Artikelbezeichnung, / *Article description*, Artikel-Nr. / *Article no.*) **2866404**

Das vorstehend bezeichnete Produkt stimmt mit den wesentlichen Anforderungen der nachfolgenden Richtlinie(n) und deren Änderungsrichtlinien überein / *The above mentioned product is in line with the essential requirements of the below directive(s) and their modification directive(s):*

2014/30/EU	**EMV-Richtlinie (Elektromagnetische Verträglichkeit)** **Electromagnetic Compatibility Directive (EMC)**
2014/35/EU	**Niederspannungs-Richtlinie** **Low Voltage Directive (LVD)**

Für die Beurteilung der Übereinstimmung wurden folgende einschlägige Normen herangezogen:
For evaluation of the conformity following relevant standards were consulted:

EN 60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013

EN 61000-6-3:2007+A1:2011

EN 61000-6-2:2005

EN 61000-3-2:2014

Weitere Informationen (z. B. Dokumente, Prüfberichte, Einschränkungen, etc.) zur Konformitätsbewertung:
Additional information (for example documents, test reports, restrictions etc.,) of the conformity assessment:

Zertifikate einer benannten Stelle / *Certificates by a notified body*:

Anschrift / *Address*:

Referenz / *Reference*:

Anschrift / *Address*:

Referenz / *Reference*:

Die letzten beiden Ziffern des Jahres in dem die CE-Kennzeichnung angebracht wurde: 06
The last two figures of the year in which the CE marking was applied:
(nur einzutragen, bei der Niederspannungsrichtlinie / *only to be entered on the low voltage directive*)

☐ Diese Erklärung gilt auch für die im Anhang aufgelisteten Produkte. (wenn angekreuzt)
This declaration also applies for the products listed in the annex. (if marked with a cross)

Diese Erklärung bescheinigt die Übereinstimmung mit den wesentlichen Anforderungen der genannten Richtlinie(n), enthält jedoch keine Zusicherung von Eigenschaften. Die Sicherheits- und Einbauhinweise der mitgelieferten Produktdokumentation sind zu beachten.
This declaration certifies the conformity with the essential requirements of the indicated directive(s), it does not, however, covenant any characteristics. The instructions for safety and installation of the enclosed product documentation have to be observed.

Blomberg, 2017-05-12

i. A. Werner Meyer
Werner Meyer
Business Unit Power Supplies
Manager Quality Engineering & Testing
Ansprechpartner / *contact person*

i. A.
Dr.-Ing. Mathias Emsermann
Business Unit Power Supplies
Director Research and Development
Zeichnungsberechtigter / *authorized signatory*

EU-Konformitätserklärung Nr. 2320212.CE.06
EU-Declaration of Conformity No.

Hersteller / *Manufacturer*: **PHOENIX CONTACT GMBH & CO. KG**

Anschrift / *Address*: Flachsmarktstraße 8, D-32825 Blomberg, Germany

Produktbezeichnung / *Product description*: **QUINT-UPS/24DC/24DC/ 5**

(Artikelbezeichnung, / *Article description*, Artikel-Nr. / *Article no.*) **2320212**

Der obige Hersteller erklärt in alleiniger Verantwortung, dass das/die hier bezeichnete(n) Produkt(e) mit den wesentlichen Anforderungen der nachfolgend genannten Richtlinie(n) übereinstimmt / *The above manufacturer declares in sole responsibility, that the here specified product(s) is/are in line with the essential requirements of the following directive(s):*

2011/65/EU	**Beschränkung der Verwendung bestimmter gefährlicher Stoffe** **Restriction of the use of certain hazardous substances (RoHS)**
2014/30/EU	**EMV-Richtlinie (Elektromagnetische Verträglichkeit)** **Electromagnetic Compatibility Directive (EMC)**

Für die Beurteilung der Übereinstimmung wurden folgende einschlägige Normen herangezogen:
For evaluation of the conformity following relevant standards were consulted:

EN 61000-6-2:2005 EN 61000-6-3:2007+A1:2011 EN 50581:2012

Weitere Informationen (z. B. Dokumente, Prüfberichte, Einschränkungen, etc.) zur Konformitätsbewertung:
Additional information (for example documents, test reports, restrictions etc.,) of the conformity assessment:

Zertifikate einer benannten Stelle / *Certificates by a notified body*:

Anschrift / *Address*:

Referenz / *Reference*:

Anschrift / *Address*:

Referenz / *Reference*:

Die letzten beiden Ziffern des Jahres in dem die CE-Kennzeichnung angebracht wurde:
The last two figures of the year in which the CE marking was applied:
(nur einzutragen, bei der Niederspannungsrichtlinie / *only to be entered on the low voltage directive*)

☒ Diese Erklärung gilt auch für die im Anhang aufgelisteten Produkte. (wenn angekreuzt)
This declaration also applies for the products listed in the annex. (if marked with a cross)

Diese Erklärung bescheinigt die Übereinstimmung mit den wesentlichen Anforderungen der genannten Richtlinie(n), enthält jedoch keine Zusicherung von Eigenschaften. Die Sicherheits- und Einbauhinweise der mitgelieferten Produktdokumentation sind zu beachten.
This declaration certifies the conformity with the essential requirements of the indicated directive(s), it does not, however, covenant any characteristics. The instructions for safety and installation of the enclosed product documentation have to be observed.

Blomberg, 2018-05-02

i. A. Werner Meyer
Werner Meyer
Business Unit Power Supplies
Manager Quality Engineering & Testing
Ansprechpartner / *contact person*

i. A. Dr. Emsermann
Dr.-Ing. Mathias Emsermann
Business Unit Power Supplies
Director Research and Development
Zeichnungsberechtigter / *authorized signatory*

Anhang zur EU-Konformitätserklärung Nr. 2320212.CE.06
Annex on EU Declaration of Conformity No.
vom / dated 2018-05-02

Produktbezeichnung / *Product description*: **QUINT-UPS/24DC/24DC/ 5**

(Artikelbezeichnung, / *Article description*,
Artikel-Nr. / *Article no.*) **2320212**

Die Konformität mit den wesentlichen Anforderungen der Richtlinie(n) wird auch für folgende Produkte bescheinigt:
The conformity with the essential requirements of the directive(s) is also certified by the declaration for following products.

Artikel-Nr. / *Article no.*	Artikelbezeichnung / *Article description*
2320225	QUINT-UPS/24DC/24DC/ 10
2320238	QUINT-UPS/24DC/24DC/ 20
2320241	QUINT-UPS/24DC/24DC/ 40
2320254	QUINT-UPS/ 24DC/ 24DC/ 5/1.3AH
2320267	QUINT-UPS/ 24DC/ 24DC/10/3.4AH

EU-Konformitätserklärung Nr. 2320296.CE.04
EU-Declaration of Conformity No.

Hersteller / *Manufacturer*: **PHOENIX CONTACT GMBH & CO. KG**

Anschrift / *Address*: Flachsmarktstraße 8, D-32825 Blomberg, Germany

Produktbezeichnung / *Product description*: **UPS-BAT/VRLA/24DC/ 1.3AH**

(Artikelbezeichnung, / *Article description*, Artikel-Nr. / *Article no.*) **2320296**

Der obige Hersteller erklärt in alleiniger Verantwortung, dass das/die hier bezeichnete(n) Produkt(e) mit den wesentlichen Anforderungen der nachfolgend genannten Richtlinie(n) übereinstimmt / *The above manufacturer declares in sole responsibility, that the here specified product(s) is/are in line with the essential requirements of the following directive(s):*

2011/65/EU	**Beschränkung der Verwendung bestimmter gefährlicher Stoffe Restriction of the use of certain hazardous substances (RoHS)**
2014/30/EU	**EMV-Richtlinie (Elektromagnetische Verträglichkeit) Electromagnetic Compatibility Directive (EMC)**

Für die Beurteilung der Übereinstimmung wurden folgende einschlägige Normen herangezogen:
For evaluation of the conformity following relevant standards were consulted:

EN 61000-6-3:2007+A1:2011 EN 61000-6-2:2005 EN 50581:2012

Weitere Informationen (z. B. Dokumente, Prüfberichte, Einschränkungen, etc.) zur Konformitätsbewertung:
Additional information (for example documents, test reports, restrictions etc.,) of the conformity assessment:

Zertifikate einer benannten Stelle / *Certificates by a notified body*:

Anschrift / *Address*:

Referenz / *Reference*:

Anschrift / *Address*:

Referenz / *Reference*:

Die letzten beiden Ziffern des Jahres in dem die CE-Kennzeichnung angebracht wurde:
The last two figures of the year in which the CE marking was applied:
(nur einzutragen, bei der Niederspannungsrichtlinie / *only to be entered on the low voltage directive*)

☒ Diese Erklärung gilt auch für die im Anhang aufgelisteten Produkte. (wenn angekreuzt)
This declaration also applies for the products listed in the annex. (if marked with a cross)

Diese Erklärung bescheinigt die Übereinstimmung mit den wesentlichen Anforderungen der genannten Richtlinie(n), enthält jedoch keine Zusicherung von Eigenschaften. Die Sicherheits- und Einbauhinweise der mitgelieferten Produktdokumentation sind zu beachten.
This declaration certifies the conformity with the essential requirements of the indicated directive(s), it does not, however, covenant any characteristics. The instructions for safety and installation of the enclosed product documentation have to be observed.

Blomberg, 2018-01-08

i. A. Werner Meyer
Werner Meyer
Business Unit Power Supplies
Manager Quality Engineering & Testing
Ansprechpartner / *contact person*

i. A. Hartmut Henkel
Hartmut Henkel
Business Unit Power Supplies
Head of Marketing & Sales
Zeichnungsberechtigter / *authorized signatory*

PHOENIX CONTACT

Anhang zur EU-Konformitätserklärung Nr. 2320296.CE.04
Annex on EU Declaration of Conformity No.
vom / dated 2018-01-08

Produktbezeichnung / *Product description*: **UPS-BAT/VRLA/24DC/ 1.3AH**

(Artikelbezeichnung, / *Article description*,
Artikel-Nr. / *Article no.*) **2320296**

Die Konformität mit den wesentlichen Anforderungen der Richtlinie(n) wird auch für folgende Produkte bescheinigt:
The conformity with the essential requirements of the directive(s) is also certified by the declaration for following products.

Artikel-Nr. / *Article no.*	Artikelbezeichnung / *Article description*
2320306	UPS-BAT/VRLA/24DC/ 3.4AH
2320319	UPS-BAT/VRLA/24DC/ 7.2AH
2320322	UPS-BAT/VRLA/24DC/12AH
2320335	UPS-BAT/VRLA/24DC/38AH

PHOENIX CONTACT GmbH & Co. KG
Flachsmarktstraße 8
32825 Blomberg, Germany
Telefon: +49 5235 300
Telefax: +49 5235 3-41200
Internet: http://www.phoenixcontact.com
USt-Id-Nr.: DE124613250
WEEE-Reg.-Nr.: DE50738265

CCC-Exempt Declaration

As we know, CCC certification is mandatory in China for defined products, and CNCA is the responsible committee for the definition of CCC application range. So please visit the website below for the latest bulletin (No. 45 of year 2014) of CNCA for CCC:

http://www.cnca.gov.cn/xxgk/ggxx/2014/201512/t20151230_44252.shtml

Primary-switched power supplies

Description of product, product group or product family

Product list:
See list on next page(s).

Description of product function:

Primary-switched power supplies for DIN rail mounting in industrial switch cabinets.

Reason why CCC certification is not required:

The listed power supplies are not for computers and adapters for information technology equipment (such as laptop) and they are not for audio/video products. So these above mentioned products do not belong to CCC categories and therefore are not in CCC application range.

Date of creation: 01. July 2018

PHOENIX CONTACT GmbH & Co. KG
Flachsmarktstr. 8
D-32825 Blomberg

Seal

i. V.

Michael Heinemann
Vice President, Business Unit Power Supplies

Product list:

Part-No.	Product-Description
2866268	TRIO-PS/1AC/24DC/ 2.5
2866310	TRIO-PS/1AC/24DC/ 5
2866323	TRIO-PS/1AC/24DC/10
2866381	TRIO-PS/1AC/24DC/20
2866394	TRIO-PS/3AC/24DC/20
2866404	TRIO-PS/3AC/24DC/40
2866459	TRIO-PS/3AC/24DC/10
2866462	TRIO-PS/3AC/24DC/ 5
2866475	TRIO-PS/1AC/12DC/ 5
2866488	TRIO-PS/1AC/12DC/10
2866491	TRIO-PS/1AC/48DC/ 5
2866501	TRIO-PS/1AC/48DC/10
2866530	TRIO-PS/600DC/24DC/20
2902646	TRIO-PS/1AC/5DC/10
2903144	TRIO-PS-2G/1AC/24DC/5/B+D
2903145	TRIO-PS-2G/1AC/24DC/10/B+D
2903147	TRIO-PS-2G/1AC/24DC/3/C2LPS
2903148	TRIO-PS-2G/1AC/24DC/5
2903149	TRIO-PS-2G/1AC/24DC/10
2903151	TRIO-PS-2G/1AC/24DC/20
2903153	TRIO-PS-2G/3AC/24DC/5
2903154	TRIO-PS-2G/3AC/24DC/10
2903155	TRIO-PS-2G/3AC/24DC/20
2903156	TRIO-PS-2G/3AC/24DC/40
2903157	TRIO-PS-2G/1AC/12DC/5/C2LPS
2903158	TRIO-PS-2G/1AC/12DC/10
2903159	TRIO-PS-2G/1AC/48DC/5
2903160	TRIO-PS-2G/1AC/48DC/10
2909900	TRIO-PS-2G/3AC/150DC/6

PHOENIX CONTACT GmbH & Co. KG
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32825 Blomberg, Germany
Telefon: +49 5235 300
Telefax: +49 5235 3-41200
Internet: http://www.phoenixcontact.com
USt-Id-Nr.: DE124613250
WEEE-Reg.-Nr.: DE50738265

CCC-Exempt Declaration

As we know, CCC certification is mandatory in China for defined products, and CNCA is the responsible committee for the definition of CCC application range. So please visit the website below for the latest bulletin (No. 45 of year 2014) of CNCA for CCC:

http://www.cnca.gov.cn/xxgk/ggxx/2014/201512/t20151230_44252.shtml

Energy storage devices

Description of product, product group or product family

Product list:
See list on next page(s).

Description of product function:

Energy storage device based on batteries or double layer capacitors for 12Vdc or 24Vdc.

Reason why CCC certification is not required:

For electrical and electronic products, CCC categories only apply to products that can be directly or indirectly connected to power supply over 36V (dc or ac RMS) except for telecommunication terminals, electric welding machines.

Date of creation: 18.07.2018

PHOENIX CONTACT GmbH & Co. KG
Flachsmarktstr. 8
D-32825 Blomberg

Seal

Michael Heinemann
Executive Vice President, Business Unit Power Supplies

Product list:

Part-No.	Product-Description
2320296	UPS-BAT/VRLA/24DC/1.3AH
2320306	UPS-BAT/VRLA/24DC/3.4AH
2320319	UPS-BAT/VRLA/24DC/7.2AH
2320322	UPS-BAT/VRLA/24DC/12AH
2320335	UPS-BAT/VRLA/24DC/38AH
2320351	UPS-BAT/LI-ION/24DC/120WH
2320364	STEP-BAT/LIPO/18.5DC/1.4AH
2320377	UPS-CAP/24DC/10A/10KJ
2320380	UPS-CAP/24DC/20A/20KJ
2320393	QUINT-BUFFER/24DC/24DC/40
2320416	UPS-BAT/VRLA-WTR/24DC/13AH
2320429	UPS-BAT/VRLA-WTR/24DC/26AH
2320539	QUINT4-CAP/24DC/5/4KJ
2320571	QUINT4-CAP/24DC/10/8KJ
2866213	QUINT-BUFFER/24DC/20
2866349	QUINT-BAT/24DC/ 3.4AH
2866352	QUINT-BAT/24DC/ 7.2AH
2866365	QUINT-BAT/24DC/12AH
2866417	MINI-BAT/24DC/1.3AH
2866569	MINI-BAT/12DC/2.6AH
2866572	MINI-BAT/12DC/1.6AH
2866666	MINI-BAT/24DC/0.8AH
2868936	QUINT-BAT/24DC/ 7.2AH/SO1
2868949	QUINT-BAT/24DC/12AH/SO1
2907913	QUINT4-BUFFER/24DC/20
2908232	UPS-BAT/LI-ION/24DC/924WH
2908233	UPS-BAT-KIT-VRLA 2X12V/3,4AH
2908234	UPS-BAT-KIT-VRLA 2X12V/7,2AH
2908235	UPS-BAT-KIT-VRLA 2X12V/12AH
2908237	UPS-BAT-KIT-VRLA 2X12V/38AH
2908283	QUINT4-BUFFER/24DC/40
2908368	UPS-BAT-KIT-WTR 2X12V/13AH
2908665	UPS-BAT-KIT-VRLA 2X12V/1,3AH
2909830	UPS-BAT/CTRL/24DC/05AH/120WH

ZILMET

Technologie der Druckhaltung

ZILFLEX H

Membran-Druckausdehnungsgefäße gemäß Richtlinie 97/23/EG und prEN 13831.
Einsatz in geschlossenen Heizungsanlagen nach EN 12828 (DIN 4751–2)



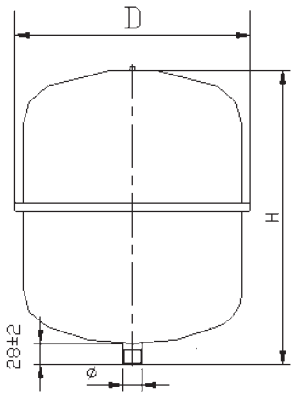


Zulassung	:	nach Druckgeräterichtlinie 97/23/EG
Baugrößen	:	wandhängend 8 bis 25 Liter stehend 35 bis 1000 Liter
Betriebsüberdruck:		8 – 50 Liter 4.0 bar 80 – 1000 Liter 6.0 bar 80 – 600 Liter 10.0 bar
Betriebstemperatur	:	-10 °C / 263 K bis +110 °C / 383 K
Belastungstemperatur der Membrane	:	+70 °C / 343 K
Oberfläche		Pulverbeschichtung in den Farben rot, weiss und Serie SILVERLINE

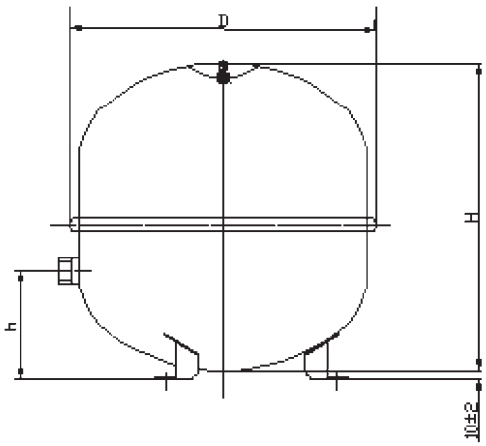
ZILMET

Membran-Druckausdehnungsgefäße

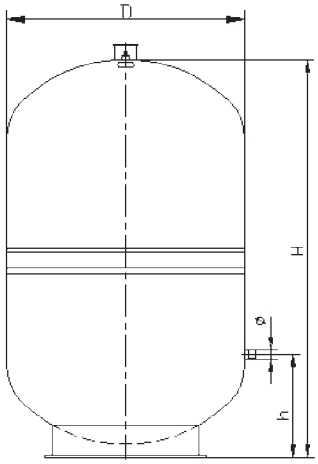
Abmessungen:



Zilflex H 8 – 25 Liter



Zilflex H 35 + 50 Liter
mit Füßen*



Zilflex H 80 – 1000 Liter
mit Standring

* auch zur Zwei-Minuten-Schnellmontage
an der Wand mit ZILMET Montagehilfe M

Typ Volumen/Liter	D Durchmesser mm	H Bauhöhe mm	h Abstand mm	Anschluss
ZILFLEX H 8	220	302		G ¾“
ZILFLEX H 12	294	281		G ¾“
ZILFLEX H 18	290	400		G ¾“
ZILFLEX H 25	325	415		G ¾“
ZILFLEX H 35	405	400	120	G ¾“
ZILFLEX H 50	405	510	155	G ¾“
ZILFLEX H 80	450	608	140	G 1“
ZILFLEX H 105	500	665	165	G 1“
ZILFLEX H 150	500	897	215	G 1“
ZILFLEX H 200	600	812	225	G 1“
ZILFLEX H 250	630	957	215	G 1“
ZILFLEX H 300	630	1105	210	G 1“
ZILFLEX H 400	630	1450	245	G 1“
ZILFLEX H 500	750	1340	300	G 1“
ZILFLEX H 600	750	1555	280	G 1“
ZILFLEX H 700	750	1755	290	G 1“
ZILFLEX H 800	750	2019	270	G 1“
ZILFLEX H 900	750	2150	290	G 1“
ZILFLEX H 1000	750	2250	290	G 1“

03/2007

SIEMENS

SITOP power supply

Selectivity modules

Manual

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SITOP select 4 x 10 A
6EP1961-2BA00

SITOP PSE200U 4 x 3 A
6EP1961-2BA11
6EP1961-2BA31
6EP1961-2BA51
6EP1961-2BA61

SITOP PSE200U 4 x 10 A
6EP1961-2BA21
6EP1961-2BA41

11.2017
C98130-A7579-A1-3-7629

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Siemens AG
Division Process Industries and Drives
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C98130-A7579-A1-3-7629
℗ 12/2017 Subject to change

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Overview

Description



Figure 1 View of devices

In conjunction with a 24 V power supply, the selectivity module is used to distribute the load current across several branches and to monitor the individual currents in these branches. Faults in the individual branches caused by overload or short-circuit are detected and selectively switched off, so that the fault does not impact the other load circuits. This means fast troubleshooting and minimized downtimes.

The key benefits of the product include:

- A maximum of 4 load branches are monitored for each module
- The response threshold can be continually set for each output using a potentiometer
- Overcurrents are reliably switched off, independent of the cable length and cable cross-section
- The 24 V supply for the other loads is maintained
- Multi-colored LED for each output for faster troubleshooting on-site
- Floating group signal contact for remote diagnostics (for -2BA00, -2BA11, -2BA21, -2BA51)
- Single-channel signal to serially indicate the state of the individual outputs (for -2BA31, -2BA41, -2BA61)

- Evaluation using free-of-charge SIMATIC S7 function blocks (S7-300/400/1200/1500) for modules with single channel signal
- It can be selected that the load branches are sequentially switched on to reduce the total inrush current
- Versions for limited output power ratings according to NEC Class 2 (maximum, 100 VA).

Ordering data

The following device options are available:

Selectivity modules	
Type	**Order number**
SITOP select 24 V DC input Number of outputs: 4 Setting range of the response threshold: 2 - 10 A with group signaling contact	6EP1961-2BA00
SITOP PSE200U 24 V DC input Number of outputs: 4 Setting range of the response threshold: 0.5 - 3 A with group signaling contact	6EP1961-2BA11
SITOP PSE200U 24 V DC input Number of outputs: 4 Setting range of the response threshold: 3 - 10 A with group signaling contact	6EP1961-2BA21
SITOP PSE200U 24 V DC input Number of outputs: 4 Setting range of the response threshold: 0.5 - 3 A with group signaling contact	6EP1961-2BA31
SITOP PSE200U 24 V DC input Number of outputs: 4 Setting range of the response threshold: 3 - 10 A with group signaling contact	6EP1961-2BA41

Selectivity modules	
Type	**Order number**
SITOP PSE200U 24 V DC input Number of outputs: 4 Setting range of the response threshold: 0.5 - 3 A with group signaling contact, NEC Class 2	6EP1961-2BA51
SITOP PSE200U 24 V DC input Number of outputs: 4 Setting range of the response threshold: 0.5 - 3 A with single-channel signal, NEC Class 2	6EP1961-2BA61

Accessories	
Type	**Order number**
Flat insertable fuse: Manufacturer, Littelfuse, series FKS, 19 mm long (for 6EP1961-2BA00)	162.6185.* (FKS-32), 166.7000.* (FKS-80)
Device name plate 20 mm × 7 mm, TI grey (for 6EP1961-2BA11, -2BA21, -2BA31, -2BA41, -2BA51, -2BA61)	3RT2900-1SB20

Validity

This manual provides information on the following products:

- Selectivity module SITOP select 10 A
  Article number: 6EP1961-2BA00
  Product State: 4
- Selectivity module SITOP PSE200U 3 A
  Article number: 6EP1961-2BA11, 6EP1961-2BA31
  Product state: 3
  changes with respect to the previous version (PS: 2):
  – temperature range extended to -25 … 60 °C
  – terminal labeling changed from "NC" to "NF"
- Selectivity module SITOP PSE200U 3 A NEC Class 2
  Article number: 6EP1961-2BA51, 6EP1961-2BA61
  Product state: 2
  changes with respect to the previous version (PS: 1):
  – temperature range extended to -25 … 60 °C
  – terminal labeling changed from "NC" to "NF"
- Selectivity module SITOP PSE200U 10 A
  Article number: 6EP1961-2BA21, 6EP1961-2BA41
  Product state: 3
  changes with respect to the previous version (PS: 2):
  – temperature range extended to -25 … 60 °C
  – terminal labeling changed from "NC" to "NF"

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Safety notes

1

1.1 General safety instructions

⚠ WARNING
Correct handling of the devices When operating electrical devices, it is inevitable that certain components will carry dangerous voltages. Therefore, failure to handle the units properly can result in death or serious physical injury as well as extensive property damage. Only appropriately qualified personnel may work on or in the vicinity of this equipment. Perfect, safe, and reliable operation of this equipment is dependent on proper transportation, storage, installation and mounting. Before installation or maintenance work can begin, the system's main switch must be switched off and measures taken to prevent it being switched on again. If this instruction is not observed, touching live parts can result in death or serious injury.

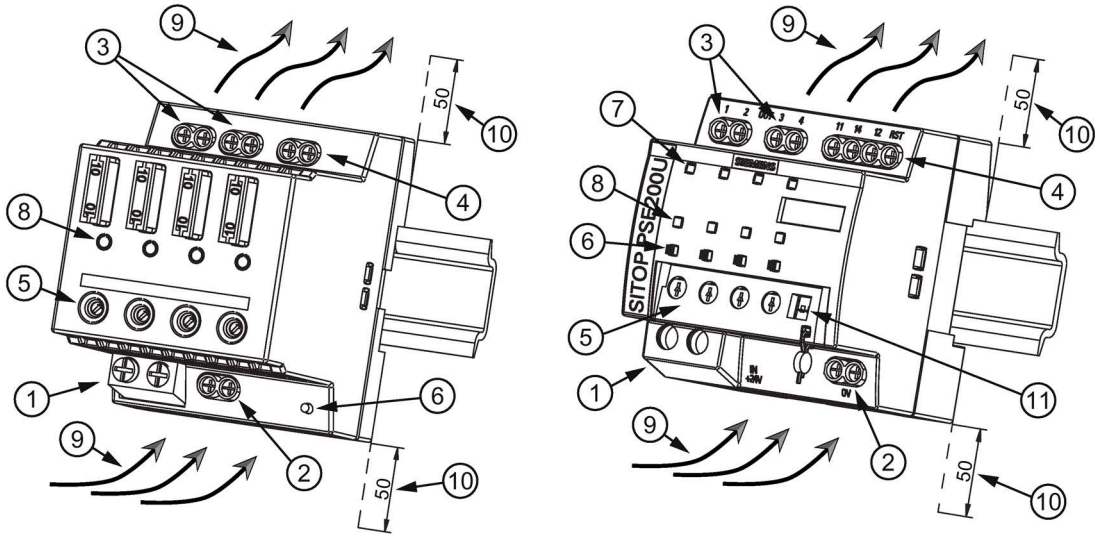
1.2 Safety instructions for hazardous zones

⚠ WARNING
OPERATE POTENTIOMETERS OR SWITCHES IN NON-HAZARDOUS AREAS ONLY!

Description, device design, dimension drawing 2

2.1 Device description

Using the selectivity module, a 24 V DC output voltage from a regulated power supply can be distributed across four load circuits. The response threshold of the output current can be individually set for each output using a potentiometer. When the set response threshold is exceeded, the output is automatically switched off according to a defined switch off characteristic, and can be switched on again after a wait time using a pushbutton or remote reset (SITOP PSE200U). The status of the output is displayed using a multi-color LED for each output. The status of the outputs can be processed via a group signaling contact or via a serial single-channel signal.



SITOP select SITOP PSE200U

① +24 V input
② 0 V connection for the internal supply
③ +24 V outputs
④ Group signal contact/status output/remote reset input
⑤ Potentiometer for each output
⑥ Button
⑦ Measuring point
⑧ Indicator light for each output
⑨ Natural convection
⑩ Clearance above/below
⑪ Selector switch for switch-on delay

Figure 2-1 Design

2.2 Connections and terminal designation

The input terminals ① can be used to establish the connection to the supply voltage. The 0 V connection ② is used to supply the internal electronics. Output terminals ③ are used to connect to the loads to be supplied (also see Chapter Installation (Page 43)).

Using the group signal contact or status output ④, the operating state of the device can be processed (function and contact rating, see Chapter Figure 2-4 Operating displays and signaling (SITOP select and SITOP PSE200U) (Page 15)).
The remote reset input ④ is used to reset outputs that have been automatically shut down (function, see Chapter Status displays and signaling (Page 15)).

Connections and terminal designations for 6EP1961-2BA00	
① + 24 V input	2 screw terminals
② 0 V connection	2 screw terminals
③ + 24 V output: 1, 2, 3, 4	One screw terminal each
④ group signal contact (13, 14)	One screw terminal each

Connections and terminal designations for 6EP1961-2BA11, 6EP1961-2BA21 and 6EP1961-2BA51	
① + 24 V input	2 screw terminals
② 0 V connection	2 screw terminals
③ + 24 V output: 1, 2, 3, 4	One screw terminal each
④ group signal contact (11, 12, 14); remote reset (RST)	One screw terminal each

Connections and terminal designations for 6EP1961-2BA31, 6EP1961-2BA41 and 6EP1961-2BA61	
① + 24 V input	2 screw terminals
② 0 V connection	2 screw terminals
③ + 24 V output: 1, 2, 3, 4	One screw terminal each
④ not assigned (NF)	2 screw terminals
④ status output (S); remote reset (RST)	One screw terminal each

	①	② + ③ + ④	⑤
	1 x 5,5 / PZ2 / PH2	0,6 x 3,5 / PZ1	0,6 x 3,5 / PZ1
	0,5 - 16 mm^2	0,2 - 6 mm^2	-
	0,5 - 16 mm^2	0,2 - 4 mm^2	-
	2,5 - 10 mm^2	0,25 - 4 mm^2	-
AWG	26 - 6	24 - 10	-
Nm	1,2 - 1,5 Nm	0,5 Nm	0,04 Nm *1)
	12 mm	8 mm	-

*1) Do not subject the end stop to higher loads

Figure 2-2 Terminal data

NOTICE

Overload of the wiring

The "0 V" connection is only used to supply the internal electronics of the selectivity module. The 0 V of the connected loads must be routed directly to the power supply using separate cables!

2.3 Potentiometer

The potentiometer ⑤ on the front of the device is used to set the response threshold of the output current. When delivered, the maximum possible response threshold is set.

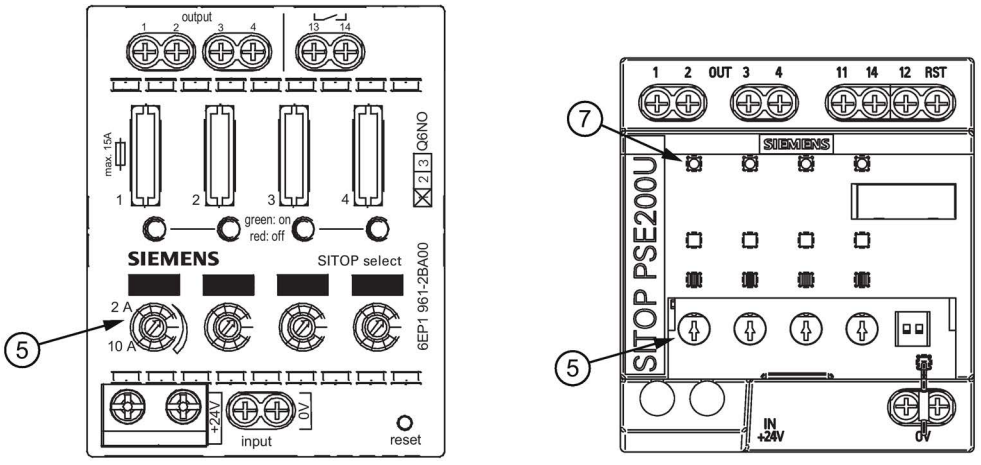


Figure 2-3 Potentiometer (SITOP select and SITOP PSE200U)

Note

It is only permissible to use an insulated screwdriver when actuating the potentiometer.

For information on actuating the potentiometer (screwdriver, torque), see Figure 2-2 Terminal data (Page 13).

Note

For SITOP PSE200U, the actual output current of a branch can be determined by measuring the voltage at measuring point "MP" ⑦ with respect to the "0 V" terminal. A measured voltage of 1 V corresponds to an output current of 1 A.

2.4 Status displays and signaling

	6EP1961-2BA00	6EP1961-2BA11 6EP1961-2BA21 6EP1961-2BA51	6EP1961-2BA31 6EP1961-2BA41 6EP1961-2BA61
Operating display ⑧	Two-color LED	Three-color LED	Three-color LED
Group signal contact (13, 14 or 11, 12, 14) ④	floating relay contact (NO contact), contact rating: 24 V/0.5 A	floating relay contact (changeover contact), contact rating: 24 V/0.1 A	-
Status output (S) ④	-	-	non-isolated 24 V DC output, max. 30 mA
Remote reset input (RST) ④	-	non-isolated 24 V DC input Signal level "High" for > 15 V	non-isolated 24 V DC input Signal level "High" for > 15 V

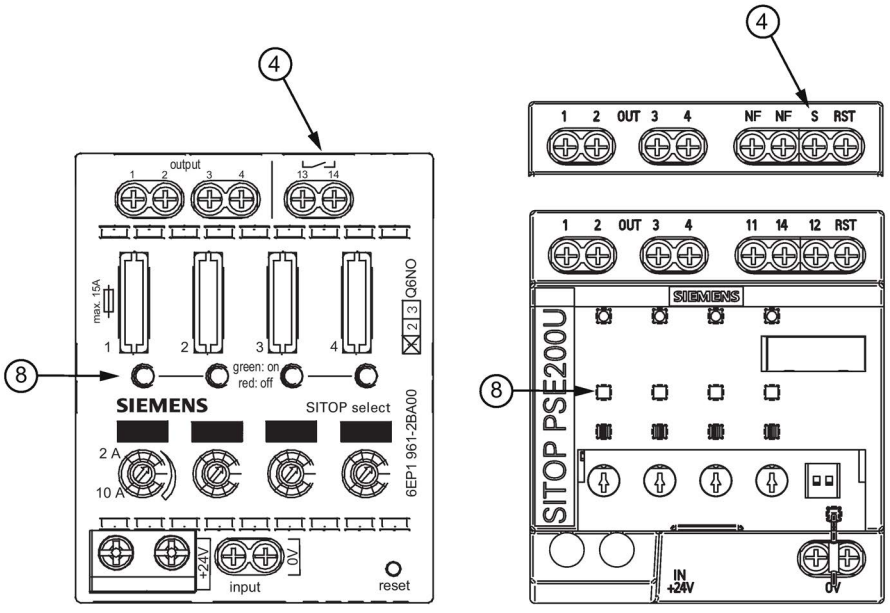


Figure 2-4 Operating displays and signaling (SITOP select and SITOP PSE200U)

The operating state of the outputs is displayed using multi-color LEDs at the front of the device. Symbols indicate the significance of each LED, which are listed in the following table.

○	LED off
●	LED is continuously lit
✷	LED flashes

SITOP select

LED ⑧ and group signaling contact ④

Signaling		6EP1961-2BA00
○	Off	All LEDs: • No supply voltage • Device powering up: After the device has powered up, the outputs are switched on, taking into consideration the switch-on delay that has been set.
●	Lights up green	Normal operation, output is switched on
●	Lights up red	Output switched off automatically to due overload
✷	Flashes red	Outputs ready to be reset after an automatic switch off by pressing the button
● ● ● ●	Light up red	All LEDs are red (after actuating the reset button for a minimum of 8 s): programming mode for the switch-on delay
✷ ✷ ✷ ✷	Flashes red	All LEDs flash red (in the programming mode): signals the programmed switch-on delay time: • all LEDs flash 1x simultaneously red, followed by a 2 s pause: 0 ms • all LEDs flash 2x simultaneously red, followed by a 2 s pause: 24 ms • all LEDs flash 3x simultaneously red, followed by a 2 s pause: 100 ms
Group signaling contact (NO contact)		Signal contact (13-14) opens (=quiescent position) when one/several outputs are switched off as a result of overload or when a fuse ruptures.

SITOP PSE200U

LED ⑧ and group signaling contact or status output ④

Signaling		6EP1961-2BA11 6EP1961-2BA21 6EP1961-2BA51	6EP1961-2BA31 6EP1961-2BA41 6EP1961-2BA61
○	Off	All LEDs: • No supply voltage • Device powering up: After the device has powered up, the outputs are switched on, taking into consideration the switch-on delay that has been set.	
		Group signal: Inactive	Status output[1*]: -
		LED, individual output: Output defective (internal fuse has ruptured)	
		Group signal: Inactive	Status output[1*]: Ci = '0'
●	Lights up green	Normal operation, output is switched on	
		Group signal: Active	Status output[1*]: Ci = '1'
✷	Flash-es green	The output current is in the overload range according to the shutdown characteristic (see Chapter SITOP PSE200U (Page 23)) -2BA11, -2BA21, -2BA31, -2BA41: overload at the output: Output current 101 - 150 % of the response threshold (for 5 s) -2BA51, -2BA61: overload at the output: Output current 101 - 110 % of the response threshold (for 5 s)	
		Group signal: Active	Status output[1*]: Ci = '1'
●	Lights up red	Output automatically shut down due to overload or external overvoltage > typ. 30 V/100 ms. The output can be switched on again after a typical wait time of 20 s. The wait time still to elapse is saved when switching off the device – and is reactivated after the device has been switched on again.	
		Group signal: Inactive	Status output[1*]: Ci = '0'
✷	Flash-es red	Output ready to be reset after an automatic switch off by actuating the button or remote reset (effective for all outputs that have been automatically switched off)	
		Group signal: Inactive	Status output[1*]: Ci = '0'
✷	Flash-es orange	Output manually switched off using the button: The state is saved when the device is switched off, and can only be reset again by pressing the up button again.	
		Group signal: Active	Status output[1*]: Ci = '0'
✷○○○ ➔➔➔➔	Red running light	Device overtemperature: The outputs can be switched-on again once the temperature is in the normal range.	
		Group signal: Inactive	Status output[1*]: Ci = '0'
Group signaling contact (changeover contact)		In the "inactive" state, 11-12 are connected and 11-14 open	-

Signaling	**6EP1961-2BA11** **6EP1961-2BA21** **6EP1961-2BA51**	**6EP1961-2BA31** **6EP1961-2BA41** **6EP1961-2BA61**
Status output	-	Serial signaling (see Figure 2-5 Status signaling (Page 18)), '1' = 24 V DC / '0' = 0 V (pull down)

1* The status of all four outputs is serially signaled using status output ④ (see Figure 2-5 Status signaling (Page 18)). A frame comprises a start bit START and four status bits Ci (i=1 … 4), which are each separated by a pause bit P. While the device powers up, or if the supply voltage is missing, nothing is signaled, the status remains continuously at '0'. For SIMATIC-S7 controllers (S7-300/400/1200/1500), a function block for evaluation is available under (http://www.siemens.com/sitop) or the direct link (https://support.industry.siemens.com/cs/us/en/view/61450284).

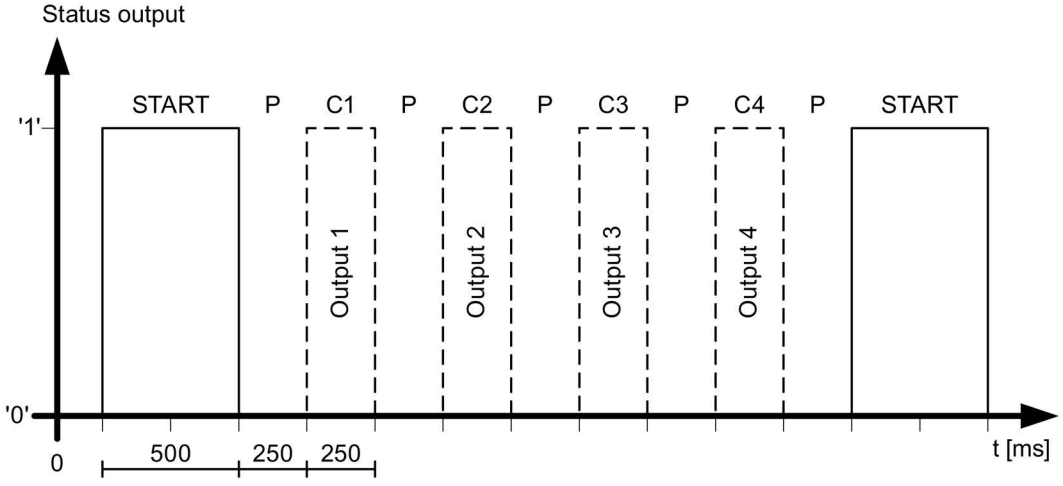


Figure 2-5 Status signaling

2.5 Buttons and selector switches

2.5.1 SITOP select

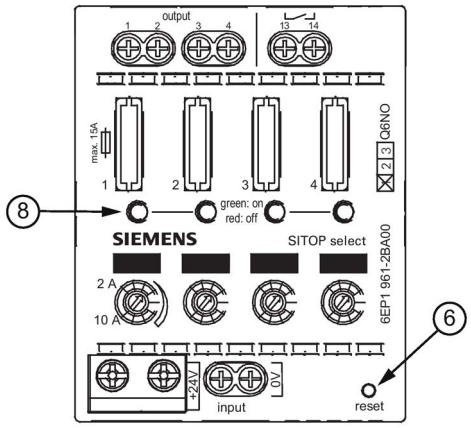


Figure 2-6 Reset button SITOP select

The reset button ⑥ for the SITOP select selectivity module has the following two functions:

1. resets all outputs automatically switched off due to an overload condition (see Chapter Electronic overload shutdown and reset (Page 21)).
2. is used to program the sequential switch-on delay (see Chapter Setting the switch-on delay time (Page 26).

Note

Switching off and switching on an output while commissioning the device

For selectivity module SITOP select, an output can be manually switched off and switched on, e.g. during commissioning, by removing and inserting the flat fuse of the corresponding output.

2.5.2 SITOP PSE200U

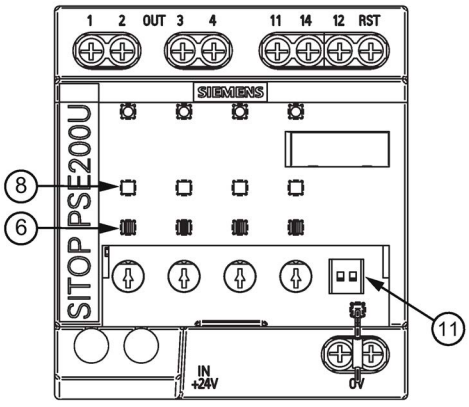


Figure 2-7 Buttons and selector switches, SITOP PSE200U

The button ⑥ for the SITOP PSE200U selectivity module has the following two functions:

1. manually switching an output off and on (see the following).
2. resetting an output automatically switched off due to an overload condition (see Chapter Electronic overload shutdown and reset (Page 21)).

The selector switch ⑪ can be used to select the delay time when switching on the individual outputs (see Chapter Setting the switch-on delay time (Page 26)).

Manually switching an output on and off

An individual output can be switched on and switched off using the button. When the device is delivered, the outputs are manually switched off.

Switching off an output:
For outputs that are switched on, LED ⑧ of the particular output is lit green. You can switch off the output by pressing the assigned button ⑥. The LED then flashes orange (output has been manually switched off).

Switching on an output:
For outputs that have been manually switched off, LED ⑧ of the particular output is lit orange. You can switch on the output by pressing the assigned button ⑥. The LED is then lit green (output is switched on).

Note

An output that has been manually switched-off can only be manually switched-on again by manually pressing the button again. It is not possible to switch on an output that has been manually switched off using the remote reset signal.

An output that has been manually switched off remains saved (latch) even when the supply voltage is no longer available, and is a manually switched off when the supply voltage returns.

2.6 Electronic overload shutdown and reset

An overload is permitted for a defined period of time for each selectivity module output. The output is electronically shut down according to the "Shutdown characteristic" diagram after the limit value has been exceeded.

2.6.1 SITOP select

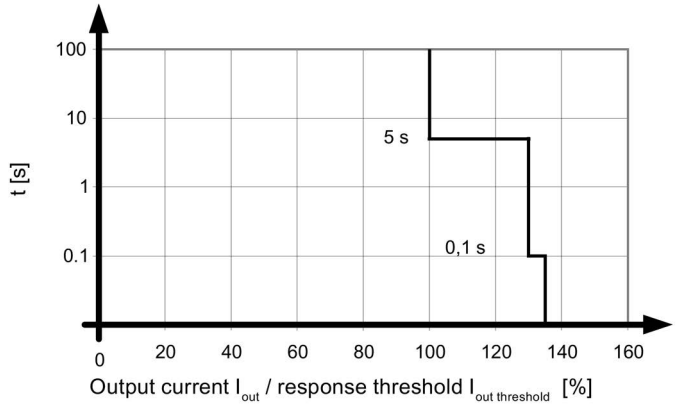


Figure 2-8 Shutdown characteristic SITOP select

- An output current is continuously permissible up to the selected current response threshold (LED of the output is lit green).
- In the range 101 - 129 % of the selected current response threshold, an overload current is permissible for 5 seconds; after this time, the output is electronically shut down (LED of the output is lit red).
- In the range > 130 % of the selected current response threshold, the current is limited to 130 %, after approx. 50 - 100 ms the output is electronically shut down (LED of the output is lit red).
- When the output current exceeds the selected current response threshold, and if the supply voltage simultaneously dips below 20 V, then the output is electronically shutdown (the LED of the output is lit red).

Reset of an electronic overload shutdown using the reset button

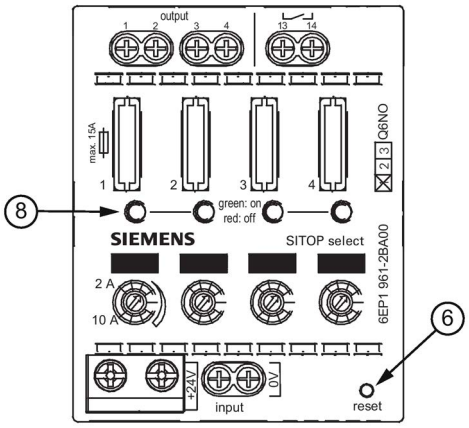


Figure 2-9 Reset button SITOP select

Using the reset button ⑥, after a delay time has elapsed, outputs that have been shut down due to an overload can be reset, i.e. the electronic shutdown can be reset.

The initial situation is an electronic shutdown of individual outputs as a result of an overload condition. This is signaled using the LED ⑧ of the particular output.

LED	Meaning/handling
Lit red	Electronic shutdown as a result of an overload; wait time until a reset is possible: approx. 20 seconds.
Flashes red	Output ready for a reset; press the button to switch-on the output again.
Lit green	The reset was carried out, the output was switched-on again.

Procedure to reset an electronic shutdown:

1. After an electronic shutdown (LED of the output is lit red), allow a wait time of 20 seconds to elapse.
2. Press the reset button ⑥
   Electronic shutdown was reset, and the output has been switched-on again (LED of the output is lit green).

Note

When pressing the button, all of the outputs shut down due to an overload, which are ready for reset (LED flashes red), are switched-in again together.

Note

If, after a reset, the cause of the overload is still present, then the output is again automatically shut down. Before carrying out a reset, remove the cause of the overload to prevent a new shutdown.

2.6.2 SITOP PSE200U

Shutdown characteristics SITOP PSE200U (with the exception of -2BA51, -2BA61) product version 1:

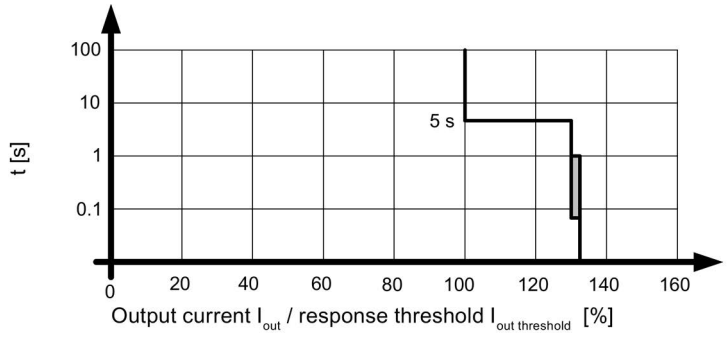


Figure 2-10 Shutdown characteristics SITOP PSE200U (product version 1)

- An output current is continuously permissible up to the selected current response threshold.
- In the range 101 - 129 % of the selected current response threshold, an overload current is permissible for 5 seconds; after this time, the output is electronically shut down.
- In the range > 130 % of the selected current response threshold, the current is limited to 130 %; typically after 100 ms the output is electronically shut down.
- When the output current exceeds the selected current response threshold, and if the supply voltage simultaneously dips below 20 V, then the output is electronically shutdown.

Shutdown characteristic SITOP PSE200U (with the exception of -2BA51, -2BA61) from product version 2 and higher:

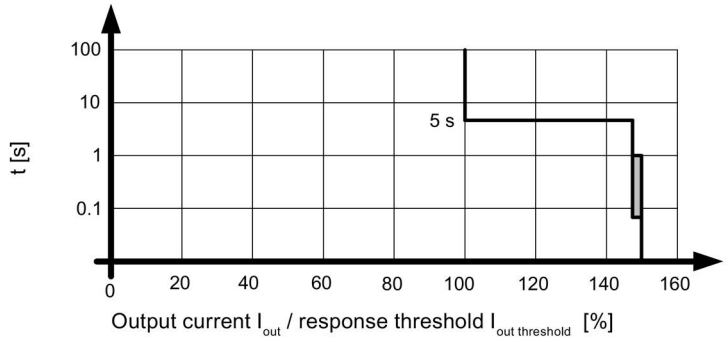


Figure 2-11 Shutdown characteristics SITOP PSE200U (from product version 2 and higher)

- An output current is continuously permissible up to the selected current response threshold (LED of the output is lit green).
- An overload current for 5 seconds is permissible in the range 101 - 149 % of the set current response threshold value (the LED of the output flashes green) - and then the output is electronically shut down (LED of the output is red).

- In the range > 150 % of the selected current response threshold, the current is limited to 150 %, typically after 100 ms, the output is electronically shut down (LED of the output is lit red).
- When the output current exceeds the selected current response threshold, and if the supply voltage simultaneously dips below 20 V, then the output is electronically shutdown (the LED of the output is lit red).

Shutdown characteristic 6EP1961-2BA51, -2BA61:

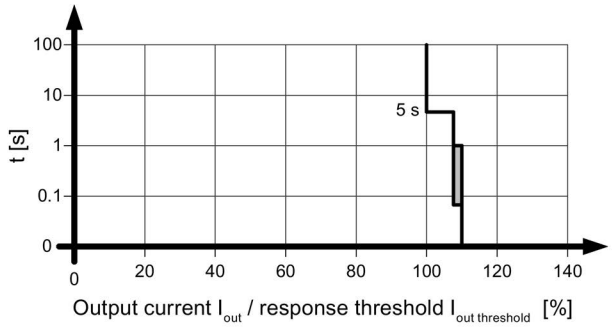


Figure 2-12 Shutdown characteristic 6EP1961-2BA51, -2BA61

- An output current is continuously permissible up to the selected current response threshold (LED of the output is lit green).
- An overload current for 5 seconds is permissible in the range 101 - 109 % of the set current response threshold value (the LED of the output flashes green) - and then the output is electronically shut down (LED of the output is red).
- In the range > 110 % of the selected current response threshold, the current is limited to 110 %, typically after 100 ms, the output is electronically shut down (LED of the output is lit red).
- When the output current exceeds the selected current response threshold, and if the supply voltage simultaneously dips below 20 V, then the output is electronically shutdown (the LED of the output is lit red).

Reset of an electronic overload shutdown using the reset button and remote reset

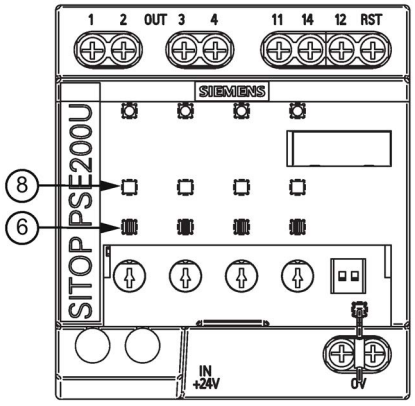


Figure 2-13 SITOP PSE200U button

An individual output can be reset using the button. This resets the electronic shutdown of the output, caused by an overload condition.

The initial situation is an electronic shutdown of individual outputs as a result of an overload condition. This is signaled using the LED ⑧ of the particular output.

LED	Meaning/handling
Lit red	Electronic shutdown as a result of an overload; wait time until a reset is possible: approx. 20 seconds.
Flashes red	Output ready for a reset; press the button to switch-on the output again.
Lit green	The reset was carried out, the output was switched-on again.

Procedure to reset an electronic shutdown:

1. After an electronic shutdown (LED of the output is lit red), allow a wait time of 20 seconds to elapse.
2. Press the reset button ⑥ of the particular output
   Electronic shutdown was reset, and the output has been switched-on again (LED of the output is lit green).

Remote reset:

Alternatively, a remote reset signal can be used. The non-isolated 24 V input (referred to the "0 V" terminal of the module) can be used at terminal "RST". A reset is executed for an input level of > 15 V.

Note

The rising edge of the remote reset signal is evaluated, i.e. for an additional remote reset signal, initially a voltage level of 13 V must be fallen below.

Using a remote reset signal at terminal "RST" all outputs that were shut down electronically due to an overload are reset at this time. Prerequisite: The output is ready to be reset, i.e. the electronic overload shutdown occurred longer than 20 s ago (LED of the output flashes red).

Note

If, after a reset, the cause of the overload is still present, then the output is again automatically shut down. Before carrying out a reset, remove the cause of the overload to prevent a new shutdown.

2.7 Setting the switch-on delay time

For specific loads, it can make sense to sequentially switch-on the outputs in order to reduce the peak inrush currents, and therefore the load on the power supply. To achieve this, the individual outputs of the selectivity module can be switched-in with a time delay between one another in a fixed sequence (output 1 ⇒ 2 ⇒ 3 ⇒ 4). The delay time set between the individual outputs is the same for all of the outputs. When supplied, the delay time is set to 0 ms (all outputs switch on simultaneously).

2.7.1 SITOP select

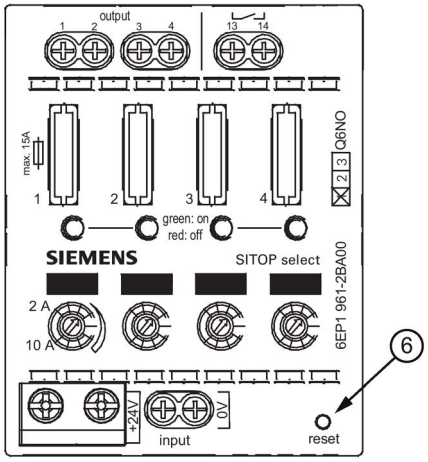


Figure 2-14 Reset button SITOP select

Programming the sequential switch-on delay

For specific loads, it can make sense to sequentially switch-on the outputs in order to reduce the peak inrush currents, and therefore the load on the power supply. To achieve this, the individual outputs of the selectivity module can be switched-in with a time delay between one another in a fixed sequence (output 1 ⇒ 2 ⇒ 3 ⇒ 4). The delay time between the individual outputs is the same for all outputs, and can be set to 0 ms, 24 ms or 100 ms. The selected setting is also kept for an unlimited time even when the power fails, and can be changed as often as required. When supplied, the delay time is set to 0 ms (all outputs switch on simultaneously).

Procedure when setting the delay time:

1. Keep the reset button ⑥ pressed for approximately 8 seconds. The selectivity module changes into the programming mode, all LEDs are lit red and the outputs are shut down.
2. Release the reset button. The LEDs signal the selected delay time using a specific flash rhythm. The meaning is as follows:

LED	Meaning
flash 1x simultaneously red, followed by a 2 s pause	Delay time of 0 ms selected
flash 2x simultaneously red, followed by a 2 s pause	Delay time of 24 ms selected
flash 3x simultaneously red, followed by a 2 s pause	Delay time of 100 ms selected

   The flashing rhythm is repeated after a pause of approx. 2 s.
3. Briefly press the reset button; this causes the actual setting to be moved forward by one stage (0 ms ⇒ 24 ms ⇒ 100 ms ⇒0 ms). Press the reset button several times until the required setting is signaled.
4. Then keep the reset button pressed for approximately 8 seconds. All LEDs light up red.
5. Release the reset button. The selectivity module saves the delay time that has been set and sequentially switches on the outputs.

The LEDs of the outputs are lit green, and the selectivity module is again in its normal operating mode.

Note

In the programming mode, if the reset button is not pressed within 30 s, then the selectivity module automatically returns to the normal operating state without saving any change made to the delay time. The setting is also not saved if, while programming, the supply voltage fails.

Note

The selectivity module outputs are shut down while programming, and are automatically switched-on again after the programming mode is either manually or automatically exited. They are also automatically switched on again after the voltage returns after a power failure!

2.7.2 SITOP PSE200U

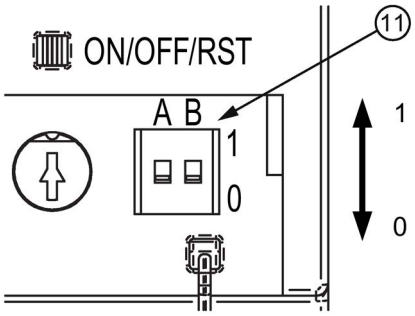


Figure 2-15 SITOP PSE200U selector switch

Setting the sequential switch-on delay

The switch-on delay is set at selector switch ⑪. When delivered, DIP switches "A" and "B" are in position "0" (no switch-on delay).

Procedure when setting the delay time:

With the selectivity module in a no-voltage condition, set DIP switches "A" and "B" to the required delay time.

	No delay, all four outputs are simultaneously switched-on (condition when delivered).
	25 ms delay between the outputs being switched on.
	100 ms delay between the outputs being switched on.
	Outputs switched on depending on the load: The next output is switched on as soon as the current of the previous output lies below the selected response threshold.

The next time that the selectivity module powers up, the outputs are sequentially switched on corresponding to the selected delay time.

2.8 Block diagram

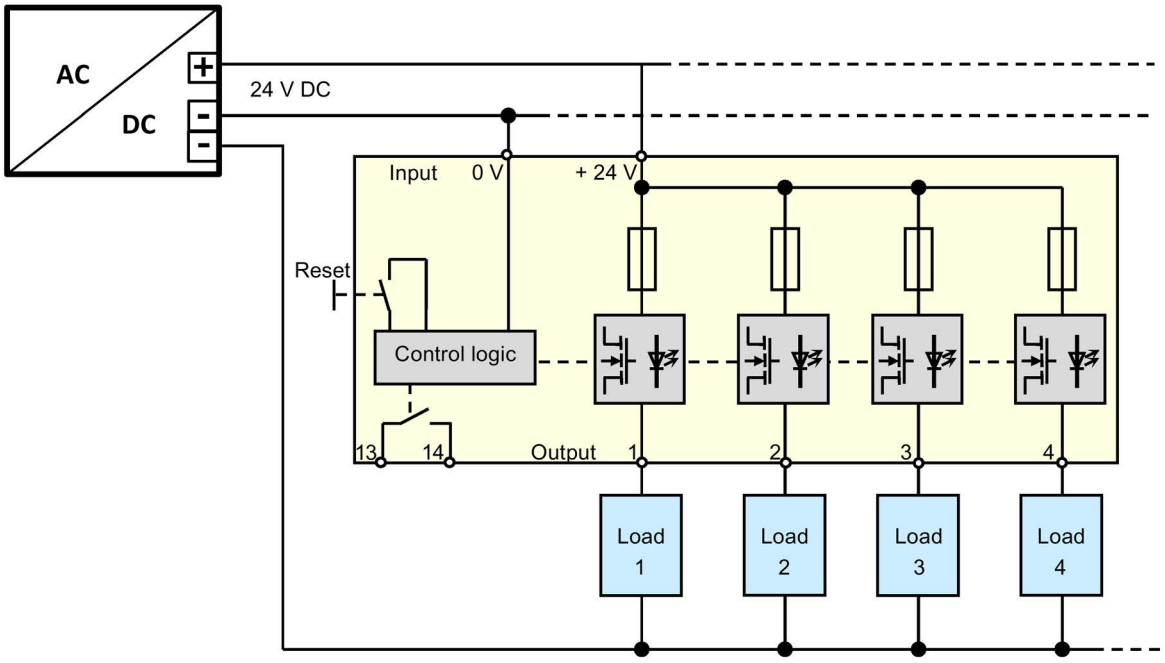


Figure 2-16 Block diagram of the 6EP1961-2BA00

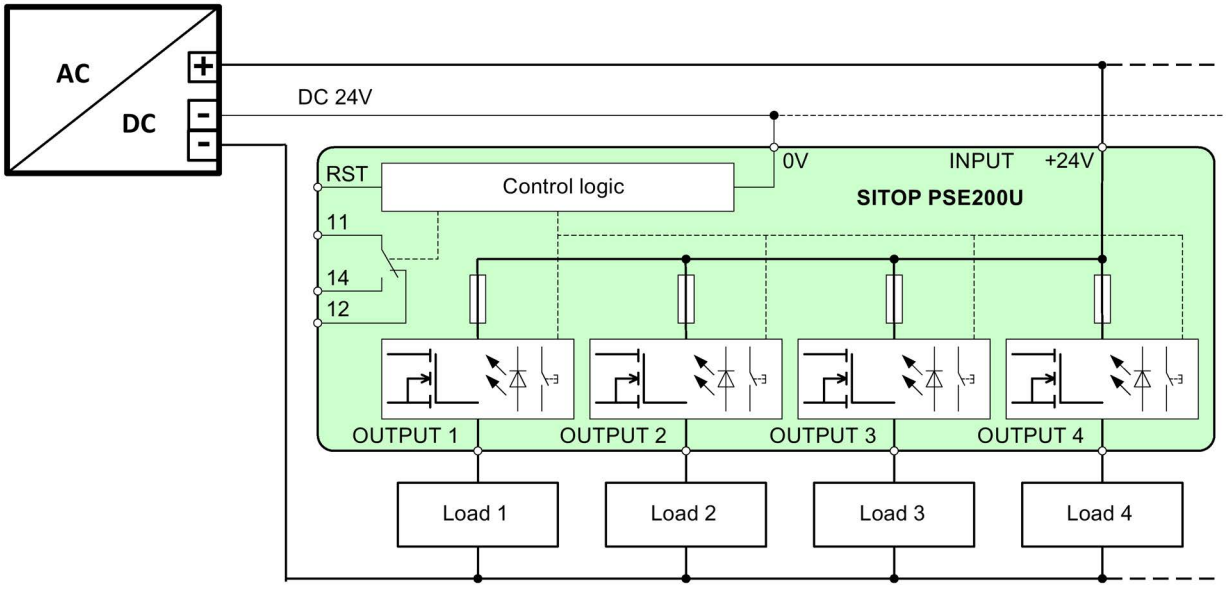


Figure 2-17 Block diagram for 6EP1961-2BA11, 6EP1961-2BA21 and 6EP1961-2BA51

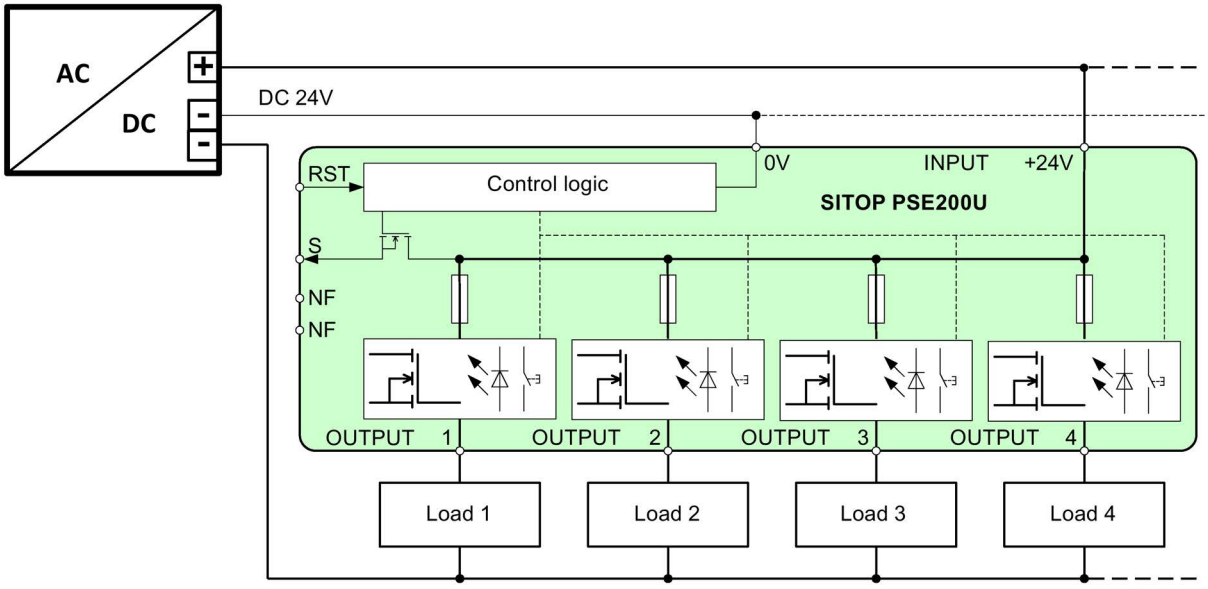


Figure 2-18 Block diagram 6EP1961-2BA31, 6EP1961-2BA41 and 6EP1961-2BA61

2.9 Dimensions and weight

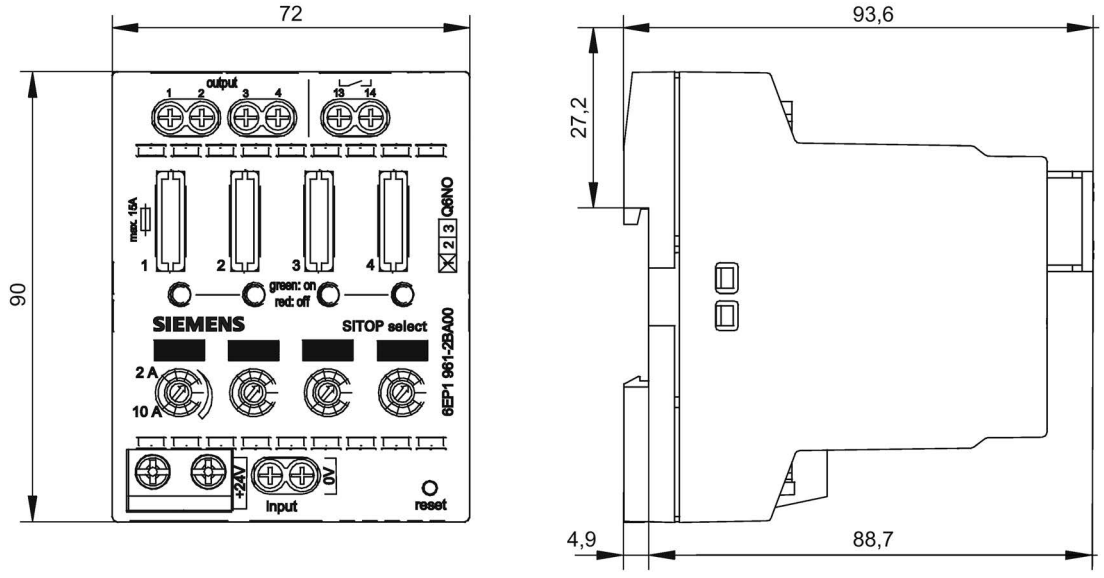


Figure 2-19 Dimension drawing 6EP1961-2BA00

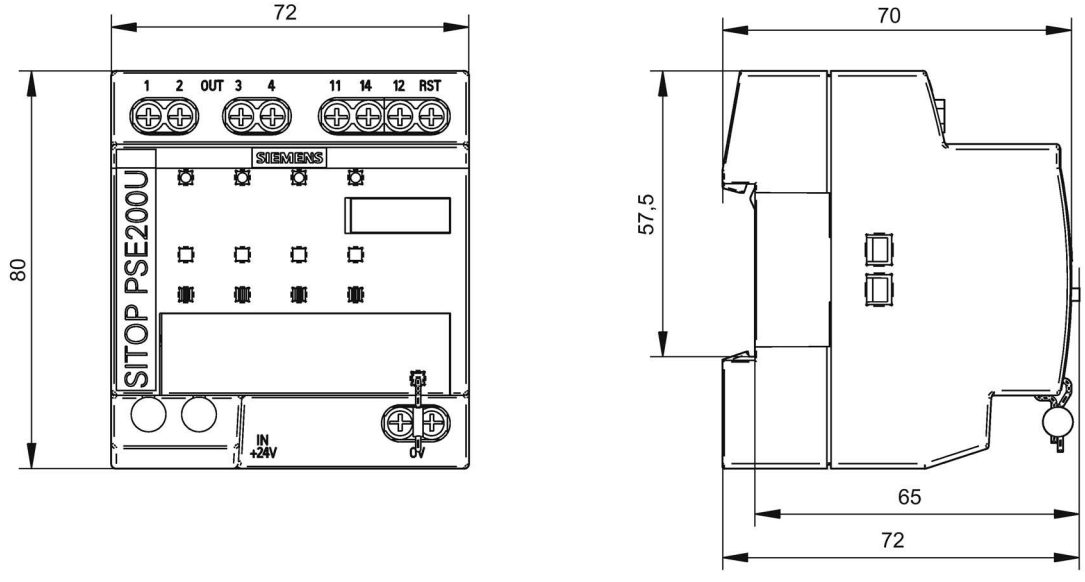


Figure 2-20 Dimension drawing 6EP1961-2BA*1

	6EP1961-2BA00	6EP1961-2BA11 6EP1961-2BA31 6EP1961-2BA21 6EP1961-2BA41 6EP1961-2BA51 6EP1961-2BA61
Dimensions (W × H × D) in mm	72 × 90 × 88.7	72 × 80 × 65
Weight	Approx. 0.4 kg	Approx. 0.2 kg

Mounting/removal

3

WARNING
Installing the device in a housing or a control cabinet The SITOP select and SITOP PSE200U selectivity modules are built-in units. They must be installed in a housing or control cabinet where only qualified personnel have access.

The device can be mounted in a control cabinet on standard mounting rails (see Chapter Mechanical system (Page 52))

Mounting

To mount the device, position it with the mounting rail guide at the upper edge of the standard mounting rail and press down to lock it into place. If it is too difficult to snap them into place, press slider ① at the same time, as described under "Removal".

Removal

To remove the device, pull slider ① using a screwdriver ② (see Figure 3-1 Mounting/removal (example): 6EP1961-2BA11) (Page 33)) and detach it at the lower edge of the standard mounting rail. Then you can remove the device from the upper edge of the standard mounting rail.

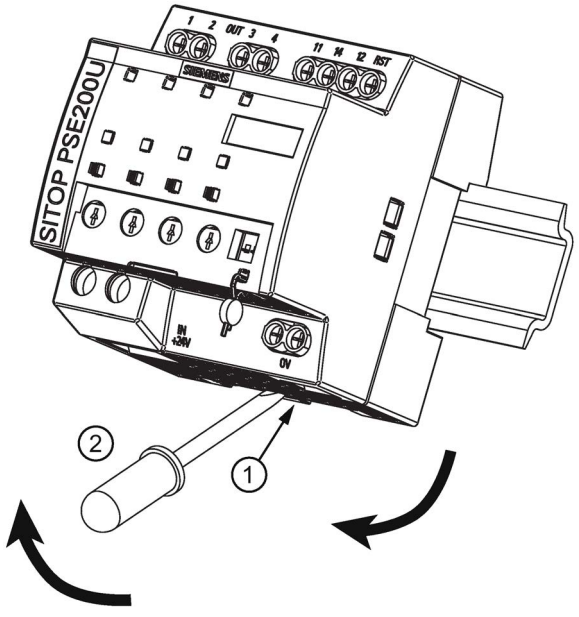


Figure 3-1 Mounting/removal (example): 6EP1961-2BA11)

WARNING

Use in hazardous zones

If the device is installed in a hazardous zone (II 3G Ex nA nC IIC T4 Gc (-2BA11, -2BA21, -2BA51) / II 3G Ex nA IIC T4 Gc (-2BA31, -2BA41, -2BA61)), then it must be installed in a distribution box with degree of protection IP54 or higher.

Mounting position, mounting clearances

4

4.1 Standard mounting position

The device is mounted on standard mounting rails. The device must be mounted vertically in such a way that the input terminals are at the bottom.

A clearance of at least 50 mm should be maintained above and below the device (maximum depth of the cable duct, 50 mm).

No space is required at the side.

Individual output current as a function of the ambient temperature and installation altitude

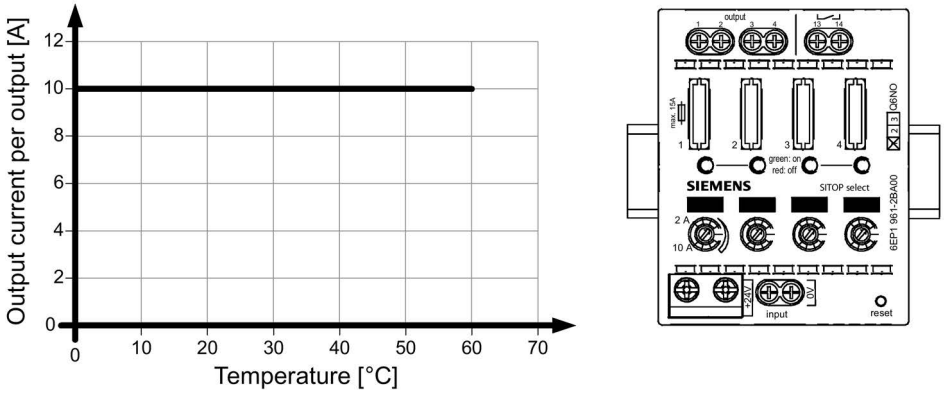


Figure 4-1 6EP1961-2BA00: Output current in the standard mounting position

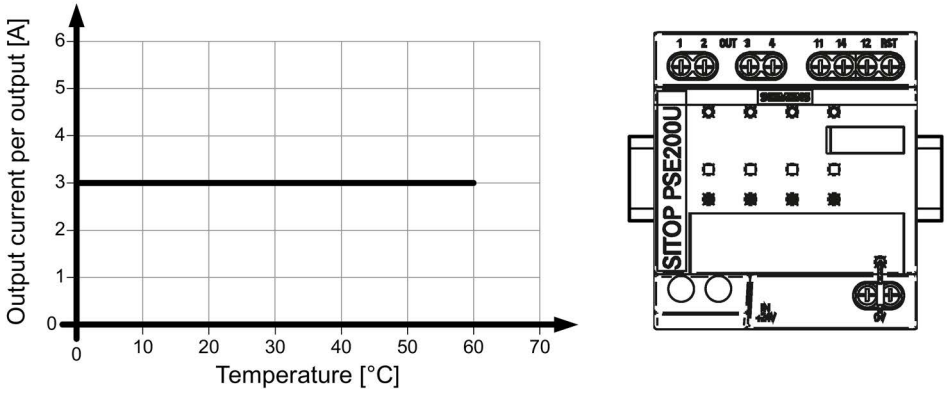


Figure 4-2 6EP1961-2BA11, 6EP1961-2BA31, 6EP1961-2BA51 and 6EP1961-2BA61 output current in the standard mounting position

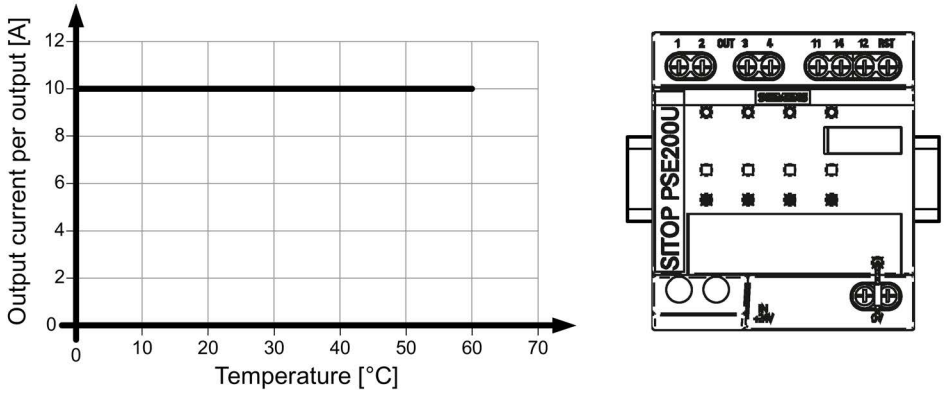


Figure 4-3 6EP1961-2BA21 and 6EP1961-2BA41: Output current in the standard mounting position

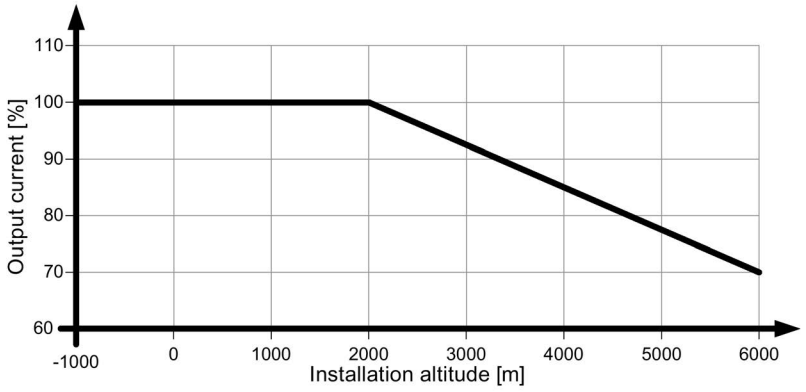


Figure 4-4 Mounting height derating

4.2 Other mounting positions

For mounting positions that deviate from the standard mounting position, derating factors (reduction of the output power or the permissible ambient temperature) must be observed in accordance with the following diagrams.

Note

In the case of mounting positions that deviate from the standard mounting position, reduced mechanical resistance of the devices against vibration and shock must be expected.

Particularly when installing on a vertically fastened standard mounting rail, additional measures may be required, e.g. to prevent the device from slipping on the standard mounting rail.

4.2.1 6EP1961-2BA00

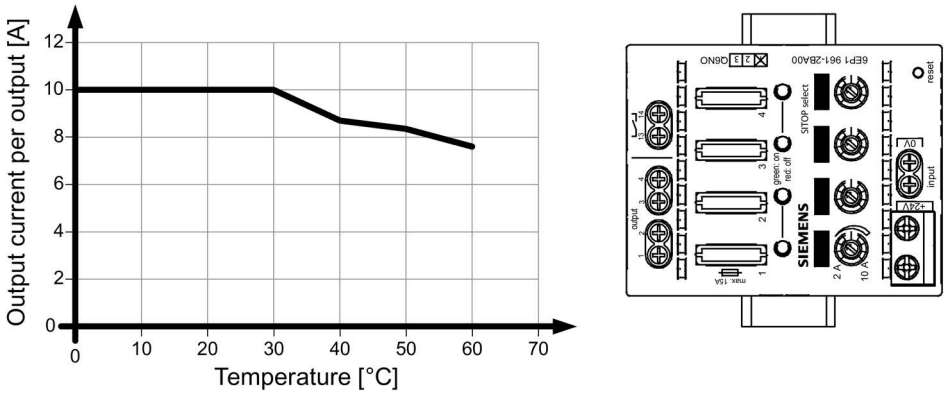


Figure 4-5 Mounting position (1)

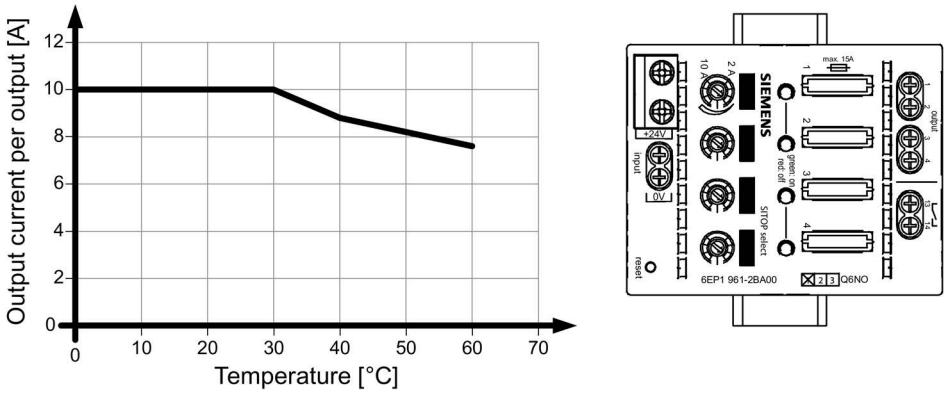


Figure 4-6 Mounting position (2)

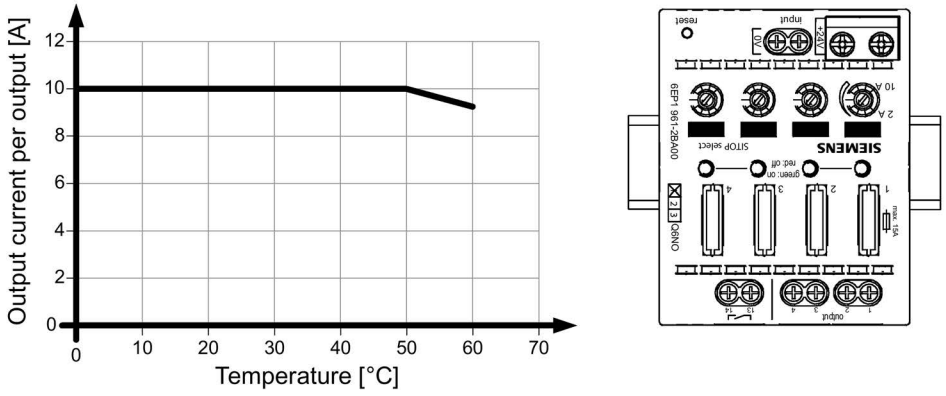


Figure 4-7 Mounting position (3)

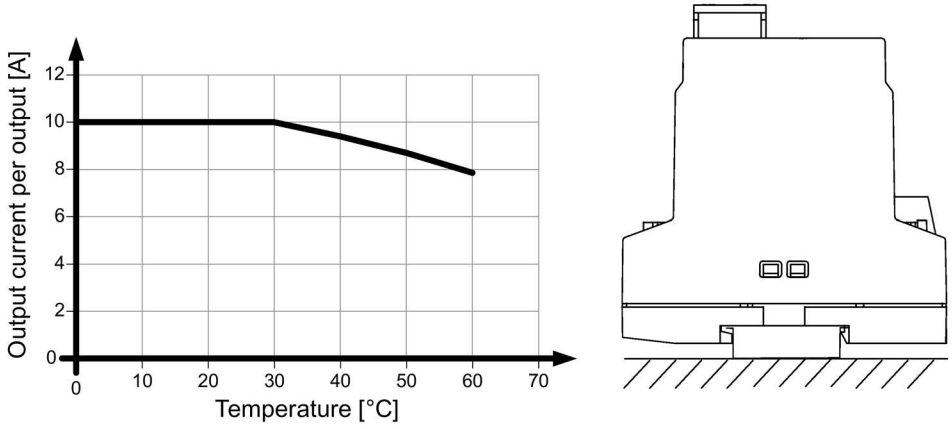


Figure 4-8 Mounting position (4)

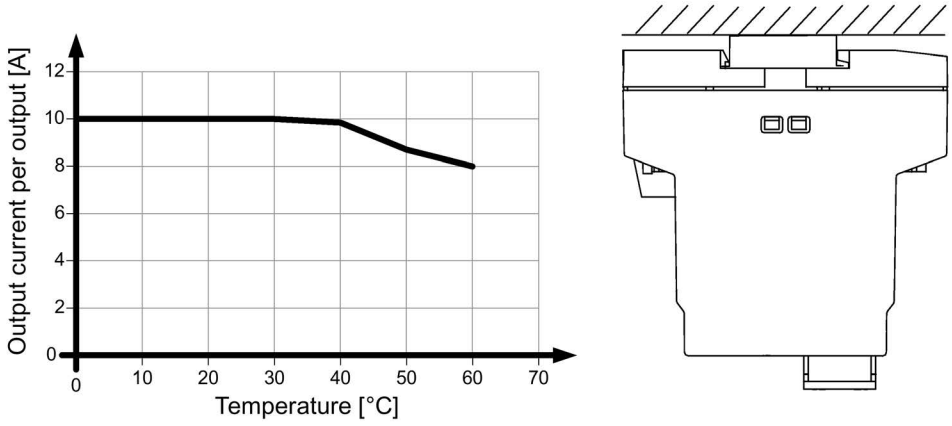


Figure 4-9 Mounting position (5)

4.2.2 6EP1961-2BA11, 6EP1961-2BA31, 6EP1961-2BA51 and 6EP1961-2BA61

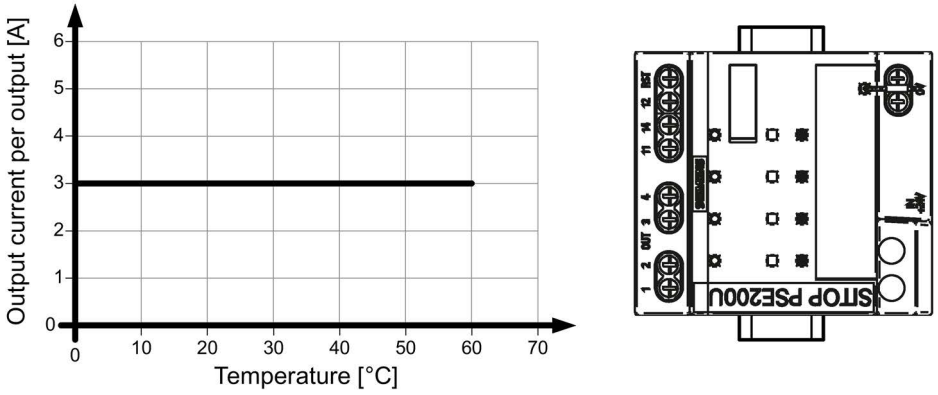


Figure 4-10 Mounting position (1)

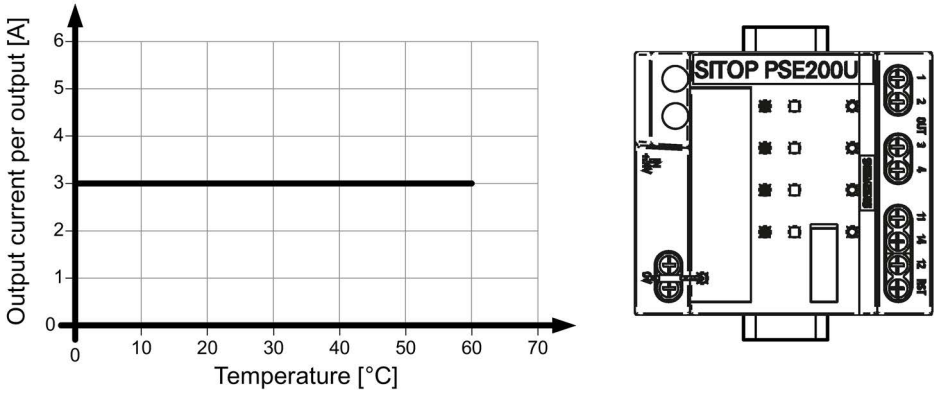


Figure 4-11 Mounting position (2)

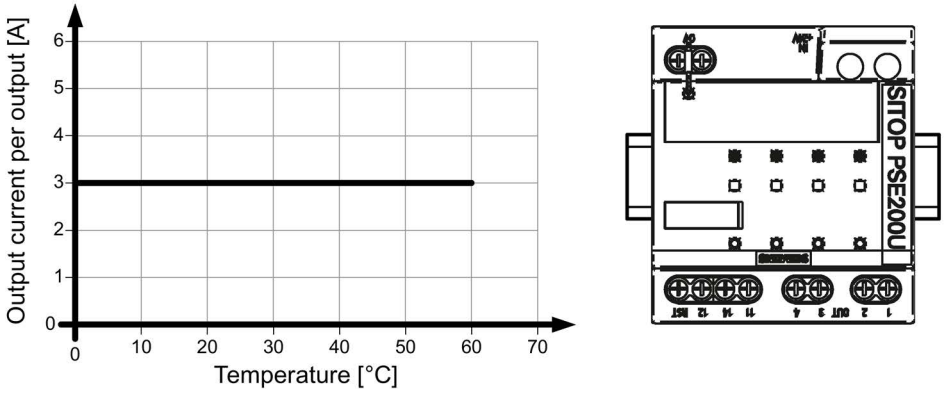


Figure 4-12 Mounting position (3)

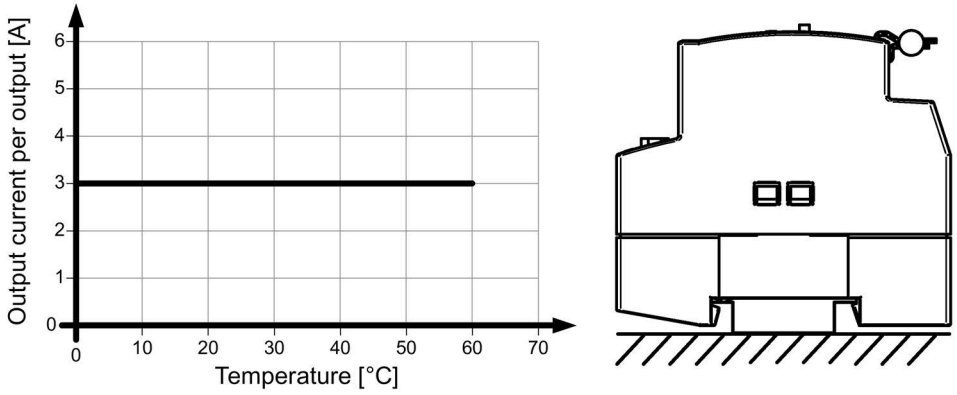


Figure 4-13 Mounting position (4)

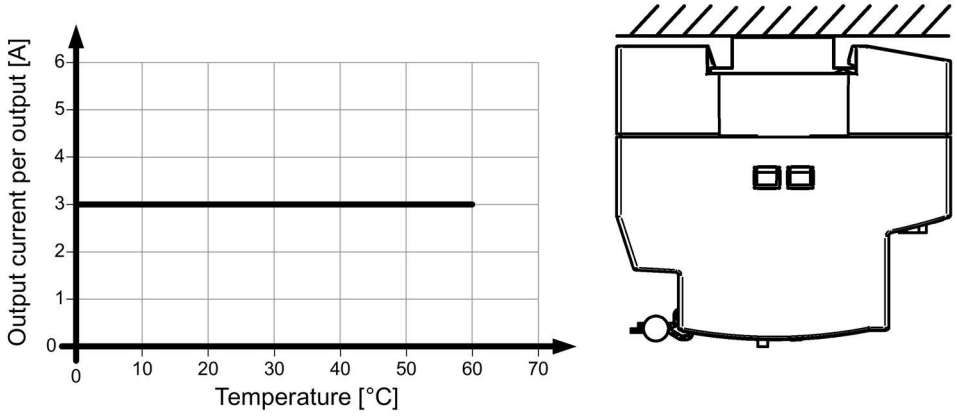


Figure 4-14 Mounting position (5)

4.2.3 6EP1961-2BA21 and 6EP1961-2BA41

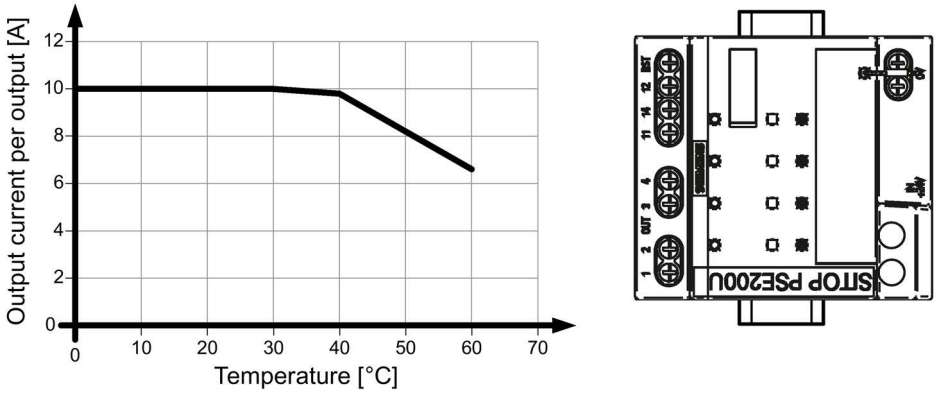


Figure 4-15 Mounting position (1)

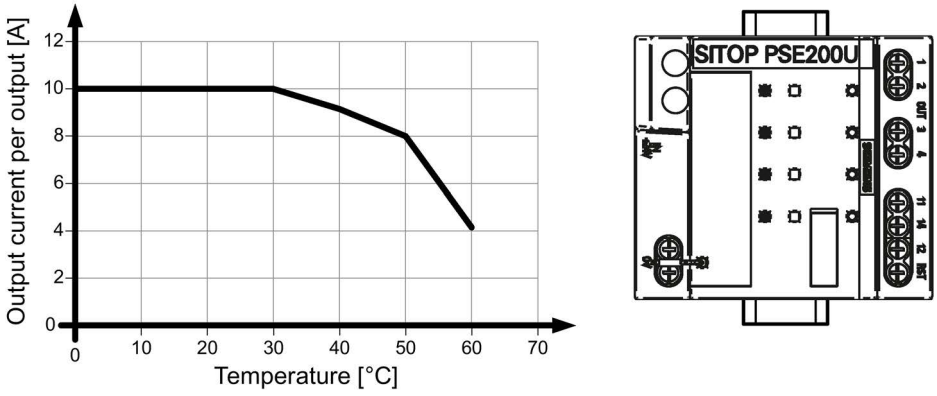


Figure 4-16 Mounting position (2)

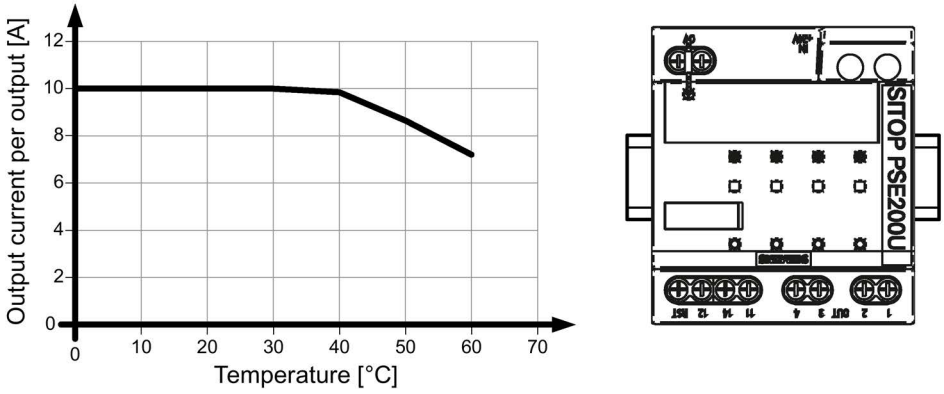


Figure 4-17 Mounting position (3)

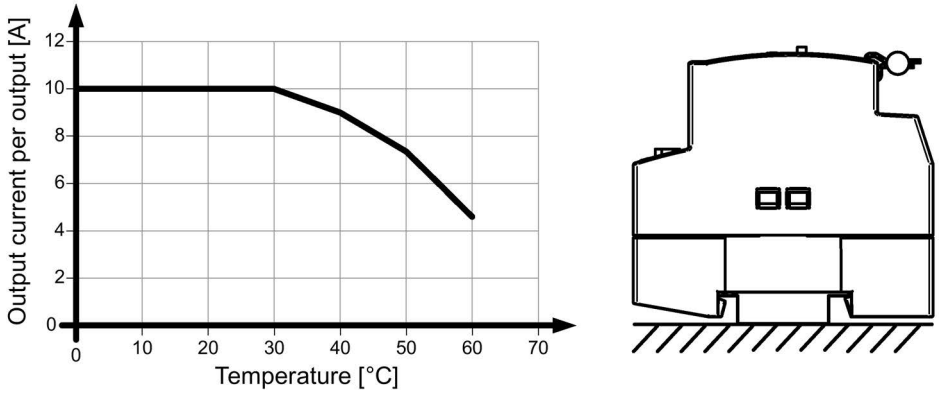


Figure 4-18 Mounting position (4)

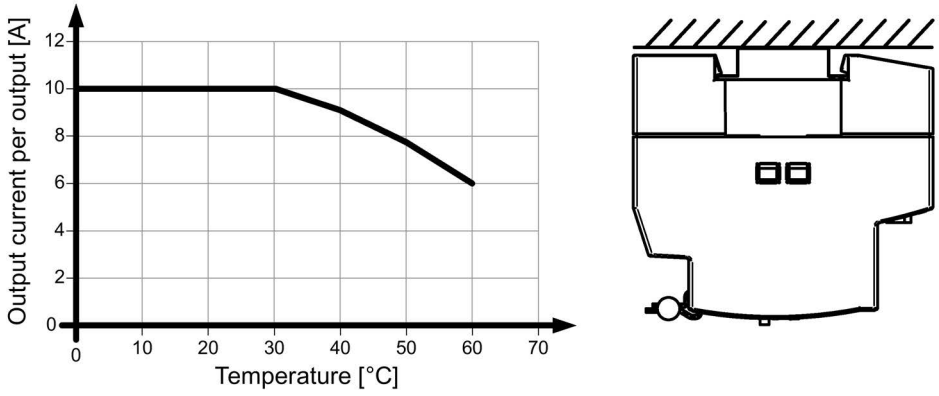


Figure 4-19 Mounting position (5)

Installation

5

WARNING

Hazard due to electric shock

Before installation or maintenance work can begin, the system's main switch must be switched off and measures taken to prevent it being switched on again. If this instruction is not observed, touching live parts can result in death or serious injury.

5.1 Input side connection

WARNING

The device is only suitable for operation with **24 V DC voltages** (safety extra low voltage). If this device is connected to line supplies with higher voltage levels this can result in death or serious injury as well as extensive material damage.

Only appropriately qualified personnel may work on or in the vicinity of this equipment. Perfect, safe, and reliable operation of this equipment is dependent on proper transportation, storage, installation and mounting.

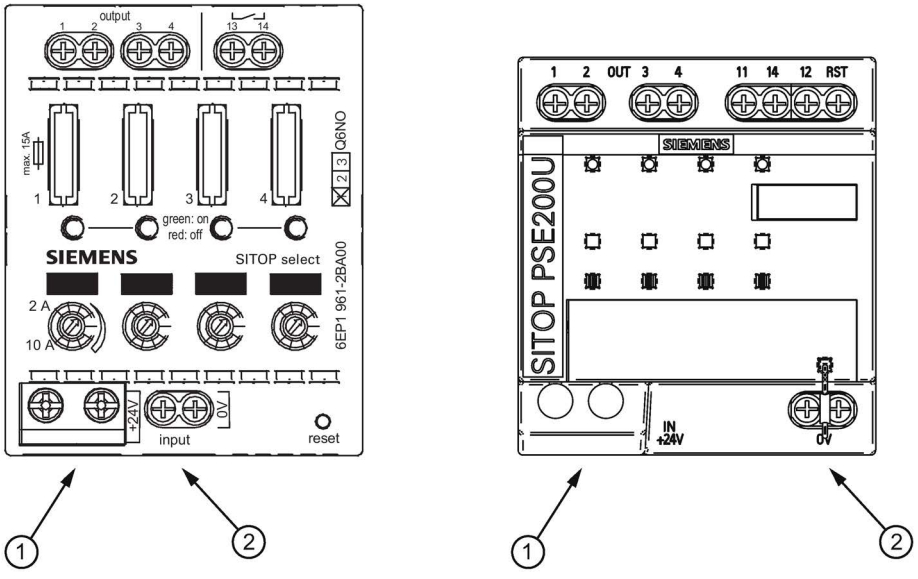


Figure 5-1 Input connection

The supply is connected via input terminal ①, designated "24 V" and the 0 V terminal ②, designated "0 V"; the "0 V" connection is not used for the load supply, but only to supply the internal electronics of the selectivity module (terminal cross-sections, see Figure 2-2 Terminal data (Page 13)).

NOTICE

Overload of the wiring

The "0 V" connection is only used to supply the internal electronics of the selectivity module. The 0 V of the connected loads must be routed directly to the power supply using separate cables!

NOTICE

Overload of the wiring

The input terminals of the selectivity module are designed for a maximum input current of 40 A. This must be taken into account when connecting several selectivity modules in parallel using "loop through". If the total current demand of all selectivity modules connected in parallel is more than 40 A, then the maximum current should be reduced to 40 A per branch by using additional feeder cables directly from the power supply to the selectivity modules connected in parallel.

5.2 Output-side connection

(see Chapter Technical data (Page 47))

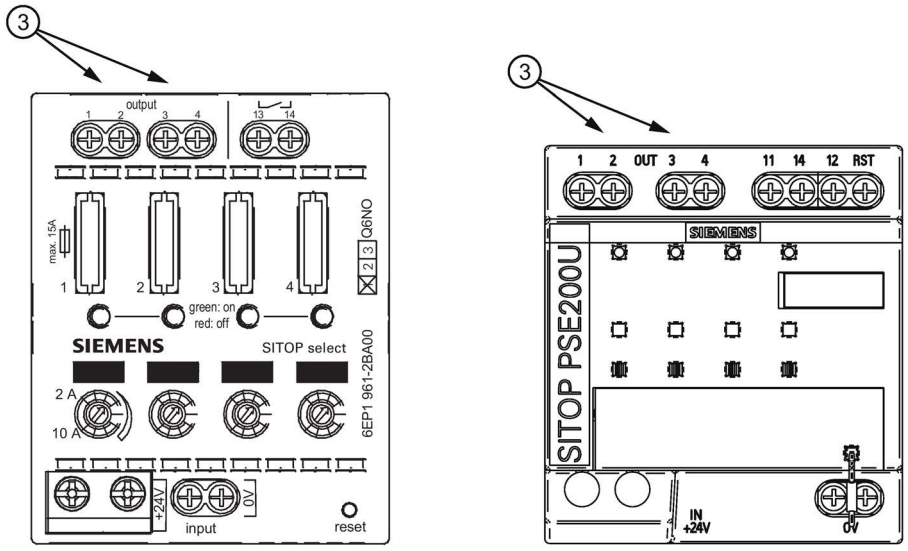


Figure 5-2 Output connection

The load to be supplied is connected through output terminals ③ labeled OUT 1, 2, 3, 4. (terminal cross-sections, see Figure Terminal data (Page 13)).

Note

The 0 V of the loads must be routed directly to the power supply using separate cables!

Technical data

6

Note

Technical data apply for a rated input voltage, rated load and 25 °C ambient temperature if nothing else is specified.

6.1 Input

	6EP1961-2BA00	6EP1961-2BA11 6EP1961-2BA31 6EP1961-2BA51 6EP1961-2BA61	6EP1961-2BA21 6EP1961-2BA41
Input	Regulated DC voltage [1*)]	Regulated DC voltage	Regulated DC voltage
Rated voltage $U_{in\ rated}$	24 V	24 V	24 V
Voltage range	22 - 30 V	22 - 30 V	22 - 30 V
Overvoltage strength	35 V; 100 ms	35 V	35 V
Input current at $U_{in\ rated}$	40 A	12 A	40 A

[1*)] SITOP select (6EP1961-2BA00) cannot be operated with the DC-UPS module 40 A (6EP1931-2FC21/-2FC42).

6.2 Output

	6EP1961-2BA00	6EP1961-2BA11 6EP1961-2BA31 6EP1961-2BA51 6EP1961-2BA61	6EP1961-2BA21 6EP1961-2BA41
Output	Regulated DC voltage	Regulated DC voltage	Regulated DC voltage
Output voltage	U_{in} - approx. 0.3 V	U_{in} - approx. 0.2 V	U_{in} - approx. 0.2 V
Total tolerance	Corresponding to the supplying input voltage	Corresponding to the supplying input voltage	Corresponding to the supplying input voltage
Number of outputs	4	4	4
Output current up to 60 °C for each output (rated value)	10 A	3 A	10 A

	6EP1961-2BA00	6EP1961-2BA11 6EP1961-2BA31 6EP1961-2BA51 6EP1961-2BA61	6EP1961-2BA21 6EP1961-2BA41
Adjustable response threshold	2 - 10 A	0.5 - 3 A	3 - 10 A
Connecting outputs in parallel	No	No	No
Switching on outputs	All outputs are simultaneously switch on after the supply voltage has ramped up, delay time of 24 ms or 100 ms can be programmed for outputs to be sequentially switched on.	All outputs are simultaneously switched-on after the supply voltage ramps up > 20 V, delay time of 25 ms, 100 ms – or "load optimized" where the outputs are sequentially switched-on, selected using the DIP switch.	

Shutdown characteristics SITOP select:

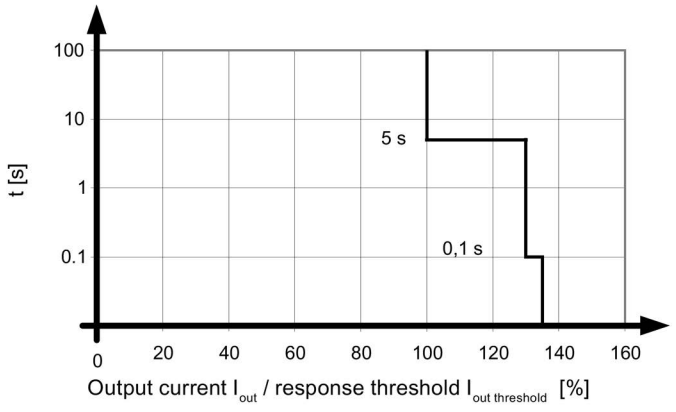


Figure 6-1 Shutdown characteristic SITOP select

- An output current is continuously permissible up to the selected current response threshold.
- In the range 101 - 129 % of the selected current response threshold, an overload current is permissible for 5 seconds; after this time, the output is electronically shut down.
- In the range > 130 % of the selected current response threshold, the current is limited to 130 %; after approximately 50 - 100 ms, the output is electronically shut down.
- When the output current exceeds the selected current response threshold, and if the supply voltage simultaneously dips below 20 V, then the output is electronically shutdown.

Shutdown characteristics SITOP PSE200U (with the exception of -2BA51, -2BA61) product version 1:

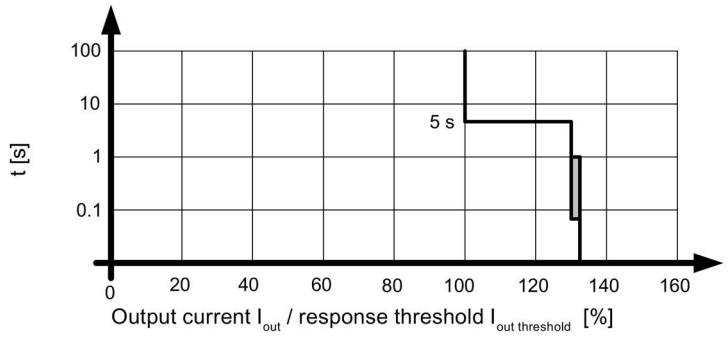


Figure 6-2 Shutdown characteristics SITOP PSE200U (product version 1)

- An output current is continuously permissible up to the selected current response threshold.
- In the range 101 - 129 % of the selected current response threshold, an overload current is permissible for 5 seconds; after this time, the output is electronically shut down.
- In the range > 130 % of the selected current response threshold, the current is limited to 130 %; typically after 100 ms the output is electronically shut down.
- When the output current exceeds the selected current response threshold, and if the supply voltage simultaneously dips below 20 V, then the output is electronically shutdown.

Shutdown characteristics SITOP PSE200U (with the exception of -2BA51, -2BA61) from product version 2 and higher:

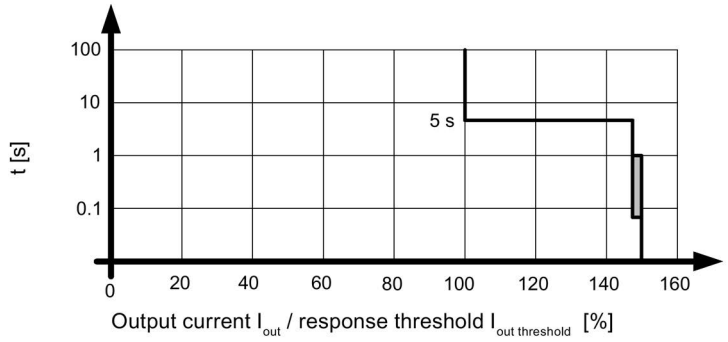


Figure 6-3 Shutdown characteristics SITOP PSE200U (from product version 2 and higher)

- An output current is continuously permissible up to the selected current response threshold.
- In the range 101 - 149 % of the selected current response threshold, an overload current is permissible for 5 seconds; after this time, the output is electronically shut down.

- In the range > 150 % of the selected current response threshold, the current is limited to 150 %; typically after 100 ms the output is electronically shut down.
- When the output current exceeds the selected current response threshold, and if the supply voltage simultaneously dips below 20 V, then the output is electronically shutdown.

Shutdown characteristic 6EP1961-2BA51, -2BA61:

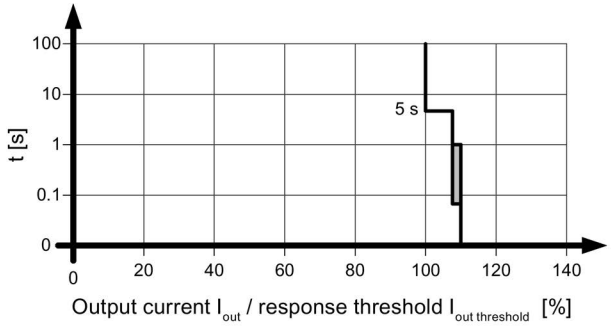


Figure 6-4 Shutdown characteristic 6EP1961-2BA51, -2BA61

- An output current is continuously permissible up to the selected current response threshold (LED of the output is lit green).
- In the range 101 - 109 % of the selected current response threshold, an overload current is permissible for 5 seconds (LED of the output flashes green), then the output is electronically shut down (LED of the output is lit red).
- In the range > 110 % of the selected current response threshold, the current is limited to 110 %, typically after 100 ms, the output is electronically shut down (LED of the output is lit red).
- When the output current exceeds the selected current response threshold, and if the supply voltage simultaneously dips below 20 V, then the output is electronically shutdown (the LED of the output is lit red).

6.3 Efficiency

	6EP1961-2BA00	6EP1961-2BA11 6EP1961-2BA31 6EP1961-2BA51 6EP1961-2BA61	6EP1961-2BA21 6EP1961-2BA41
Efficiency at $U_{out\ rated}$, $I_{out\ rated}$, approx.	97 %	97 %	99 %
Power loss at $U_{out\ rated}$, $I_{out\ rated}$, approx.	30 W	9 W	10 W

6.4 Protection and monitoring

	6EP1961-2BA00	6EP1961-2BA11 6EP1961-2BA51	6EP1961-2BA21	6EP1961-2BA31 6EP1961-2BA61	6EP1961-2BA41
Device protection	Flat fuse for each output (a 15 A fuse is inserted when the device is shipped) [1*)]	Internal fuse 5 A for each output (not accessible)	Internal fuse 15 A for each output (not accessible)	Internal fuse 5 A for each output (not accessible)	Internal fuse 15 A for each output (not accessible)
Operating display	One LED per output: Green LED for "Output switched through", red LED for "Output shutdown due to overcurrent"	One LED per output: Green LED for "Output switched through", orange LED for "Output manually switched off", red LED for "Output shutdown due to overcurrent".			
Signaling	Group signaling contact (NO contact, contact rating 0.5 A/24 V)	Group signaling contact (changeover contact, contact rating 0.1 A/24 V)		Status signal output (pulse position signal that can be evaluated using a Simatic function block)	

[1*)] Note for 6EP1961-2BA00:
When required, depending on the potentiometer setting, lower fuse values can be selected.
Setting to → fuse from
2 A → 3 A
3 A → 4 A
4 A → 5 A
6 A → 7.5 A
8 A → 10 A
10 A → 15 A

6.5 MTBF

	6EP1961-2BA00 6EP1961-2BA11 6EP1961-2BA21	6EP1961-2BA31 6EP1961-2BA41	6EP1961-2BA51 6EP1961-2BA61
Mean Time Between Failures	> 500,000 hours at 40 °C, rated load, 24 hour operation		

6.6 Mechanical system

	6EP1961-2BA00	6EP1961-2BA11 6EP1961-2BA21 6EP1961-2BA51	6EP1961-2BA31 6EP1961-2BA41 6EP1961-2BA61
Connection system	Screw connection	Screw connection	Screw connection
+24 V input	2 screw terminals for 0.5 - 16 mm²	2 screw terminals for 0.5 - 16 mm²	2 screw terminals for 0.5 - 16 mm²
0 V connection	2 screw terminals for 0.2 - 6 (4) mm² solid (finely stranded)	2 screw terminals for 0.2 - 6 (4) mm² solid (finely stranded)	2 screw terminals for 0.2 - 6 (4) mm² solid (finely stranded)
Output 1, 2, 3, 4	One screw-type terminal for each output for 0.2 - 6 (4) mm² solid (finely stranded)	One screw-type terminal for each output for 0.2 - 6 (4) mm² solid (finely stranded)	One screw-type terminal for each output for 0.2 - 6 (4) mm² solid (finely stranded)
Group signal contact	2 screw terminals for 0.2 - 6 (4) mm² solid (finely stranded)	3 screw terminals for 0.2 - 6 (4) mm² solid (finely stranded)	-
Status output	-	-	One screw terminal for 0.2 - 6 (4) mm² solid (finely stranded)
Remote reset	-	One screw terminal for 0.2 - 6 (4) mm² solid (finely stranded)	One screw terminal for 0.2 - 6 (4) mm² solid (finely stranded)
Width of the housing	72 mm	72 mm	72 mm
Height of the housing	90 mm	80 mm	80 mm
Depth of the housing	approx. 90 mm	72 mm	72 mm
Installation width	72 mm	72 mm	72 mm
Mounting height	190 mm	180 mm	180 mm
Weight, approx.	0.4 kg	0.2 kg	0.2 kg
Mounting	Can be snapped onto standard TH35-15/7,5 mounting rails (EN 60715)		

6.7 Accessories

Accessories

	6EP1961-2BA00	6EP1961-2BA11 6EP1961-2BA21 6EP1961-2BA31 6EP1961-2BA41 6EP1961-2BA51 6EP1961-2BA61
Electrical accessories	Flat insertable fuse: Manufacturer, Littelfuse, FKS series, 19 mm long	-
Mechanical accessories	-	Device name plate 20 mm x 7 mm TI grey 3RT2900-1SB20

6.8 Dimension drawing

See chapter Dimensions and weight (Page 31)

CAD data that can be downloaded from the Internet:

6EP1961-2BA00
(http://www.automation.siemens.com/bilddb/index.aspx?objKey=G_KT01_XX_00575)

6EP1961-2BA11
(http://www.automation.siemens.com/bilddb/index.aspx?objKey=G_KT01_XX_00423)

6EP1961-2BA21
(http://www.automation.siemens.com/bilddb/index.aspx?objKey=G_KT01_XX_00427)

6EP1961-2BA31
(http://www.automation.siemens.com/bilddb/index.aspx?objKey=G_KT01_XX_00742)

6EP1961-2BA41
(http://www.automation.siemens.com/bilddb/index.aspx?objKey=G_KT01_XX_00745)

6EP1961-2BA51
(http://www.automation.siemens.com/bilddb/index.aspx?objKey=G_KT01_XX_01240)

6EP1961-2BA61
(http://www.automation.siemens.com/bilddb/index.aspx?objKey=G_KT01_XX_01241)

Safety, approvals, EMC

7

7.1 Safety

	6EP1961-2BA00 6EP1961-2BA11 6EP1961-2BA21	6EP1961-2BA31 6EP1961-2BA41	6EP1961-2BA51 6EP1961-2BA61
Standard for safety	acc. to EN 60950-1 and EN 50178		
Protection class	Class III		

7.2 Approvals

	6EP1961-2BA00	6EP1961-2BA11 6EP1961-2BA21 6EP1961-2BA51	6EP1961-2BA31 6EP1961-2BA41 6EP1961-2BA61
CE marking	Yes	Yes	Yes
Degree of protection (EN 60529)	IP20	IP20	IP20
UL/cUL (CSA) approval	UL-Recognized (UL 2367) File E328600; cULus (UL 508, CSA C22.2 No. 107.1) File E197259; cURus (UL 60950, CSA C22.2 No. 60950) File E151273	UL-Recognized (UL 2367) File E328600; cULus (UL 508, CSA C22.2 No. 107.1) File E197259	
• Remark:		The combination of the listed Siemens AG power supply and solid-state overcurrent protector models 6EP1961, followed by -2BA51 or -2BA61 additionally create a limited voltage/current circuit. Devices 6EP1961-2BA51 and -2BA61 additionally fulfill the conditions for "Class 2 output" according to UL 1310 (maximum 100 VA)	
Explosion protection	ATEX (EX) II 3G Ex nA nC IIC T4 Gc cCSAus Class I, Div. 2, Group A,B,C,D, T4	ATEX (EX) II 3G Ex nA nC IIC T4 Gc cCSAus Class I, Div. 2, Group A,B,C,D, T4	ATEX (EX) II 3G Ex nA IIC T4 Gc cCSAus Class I, Div. 2, Group A,B,C,D, T4
Marine approvals	-	DNV-GL, ABS	DNV-GL, ABS

7.3 EMC

	6EP1961-2BA00 6EP1961-2BA11 6EP1961-2BA21	6EP1961-2BA31 6EP1961-2BA41	6EP1961-2BA51 6EP1961-2BA61
Emitted interference	EN 55022 Class B		
Noise immunity	EN 61000-6-2		

Environmental conditions

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	6EP1961-2BA00 6EP1961-2BA11 6EP1961-2BA21	6EP1961-2BA31 6EP1961-2BA41	6EP1961-2BA51 6EP1961-2BA61
Ambient temperature	-25 … 60 °C for natural convection		
	Tested according to: • EN 60068-2-1 cold • EN 60068-2-2 dry heat • EN 60068-2-78 humid heat, constant • EN 60068-2-14 temperature change		
Transport and storage temperature	-40 … 85 °C Tests (packed for shipping) according to: • EN 60068-2-1 cold • EN 60068-2-2 dry heat • EN 60068-2-30 humid heat, cyclic		
Humidity class	Climatic class 3K3 according to EN 60721, 5 - 95 % no condensation		
Degree of pollution	2		
Mechanical stressing in operation	• Tested according to EN 60068-2-6 vibration, test Fc:		
	3.5 mm deflection in the range 5 - 8.4 Hz 2 g acceleration in the range 8.4 - 150 Hz		
	• Tested according to EN 60068-2-27 shock, test Ea: acceleration 150 m/s², test duration 11 ms		
Damaging gases	Tested according to: • EN 60068-2-42 sulfur dioxide • EN 60068-2-43 hydrogen sulfide		
Atmospheric pressure	Operation: • 1080 - 795 hPa (-1000 - 2000 m) • For operation at altitudes of 2000 - 6000 m above sea level: output must be derated by -7.5% / 1000 m or the ambient temperature must be reduced by 5 K / 1000 m (see Figure 4-4 Mounting height derating (Page 36)) Storage: • 1080 - 660 hPa (-1000 - 3500 m)		

Environment

9

The devices are in conformance with RoHS.

As a rule, only non-silicon precipitating materials are used.

Disposal guidelines



Packaging and packaging aids can and should always be recycled. The product itself may not be disposed of as domestic refuse.

Service & Support

10

Technical support

Technical support for all IA/DT products can be accessed through the following communication channels:

- Telephone: + 49 (0) 911 895 7222
- Internet:
  Web form for support request (http://www.siemens.de/automation/support-request)

Technical documentation on the Internet

Operating instructions and manuals for SITOP are available in the Internet:
Operating instructions/manuals (http://www.siemens.com/sitop/manuals)

SITOP power supply homepage

General news about our power supplies is available in the Internet at the SITOP home page:
SITOP (http://www.siemens.com/sitop)

Information material

SITOP information can be downloaded from the Internet:
Information and download center (http://www.siemens.com/sitop-infomaterial)

CAx data

2D/3D data and circuit diagram macros can be downloaded from the Internet:
Siemens image database (http://www.siemens.com/sitop-cax)

Request all CAx data via the CAx download manager:
CAx shopping cart (http://www.siemens.com/cax)

SITOP Selection Tool

Simply and quickly select the optimum the power supply or DC-UPS:
SITOP Selection Tool (http://www.siemens.com/sitop-selection-tool)

Online catalog and ordering system

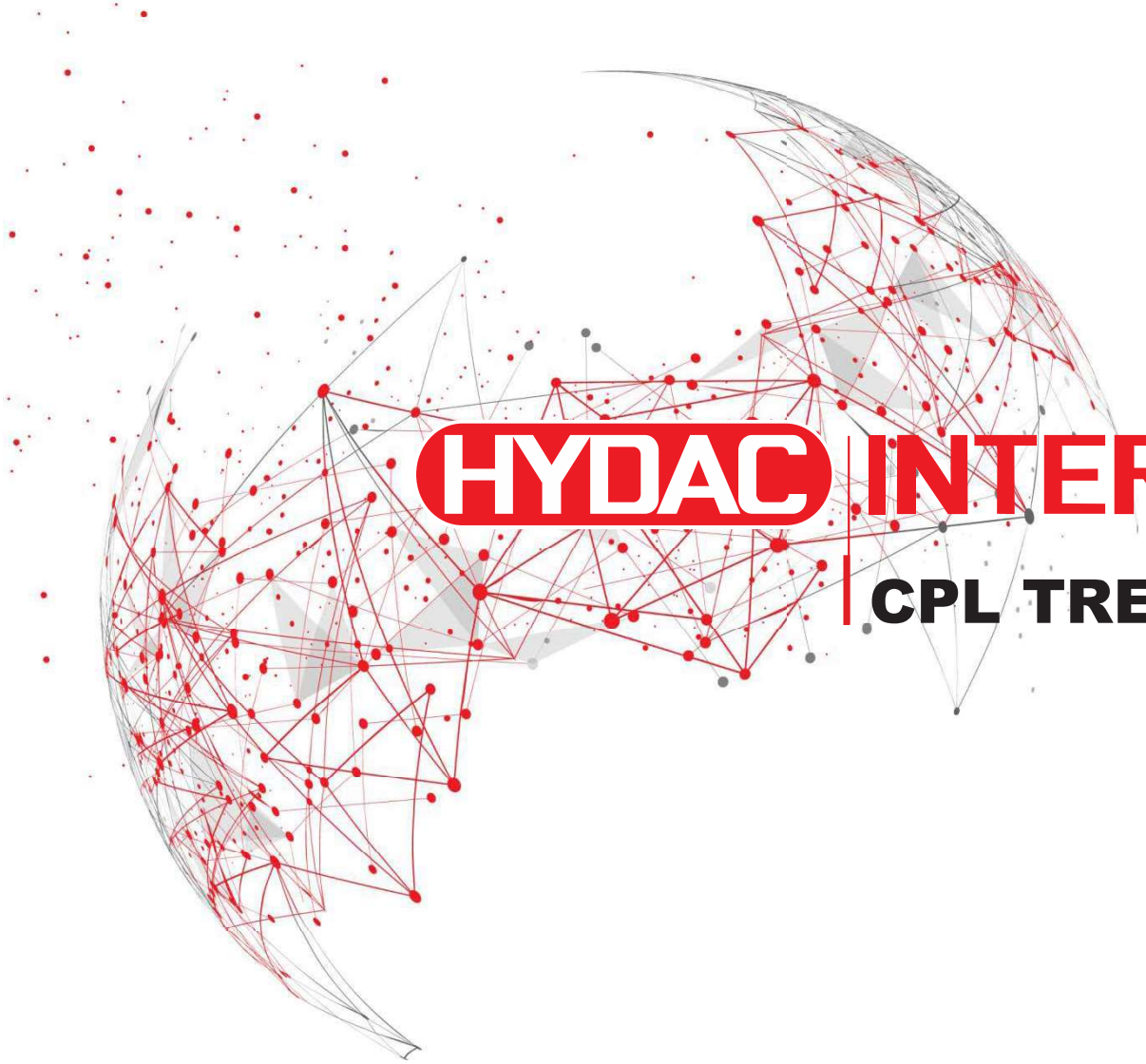
The online catalog and the online ordering system are available through the Industry Mall homepage:
Industry Mall (http://www.siemens.com/industrymall/de)

Contact persons

If you have any questions regarding the use of our products, then contact the Siemens contact person in your regional Siemens sales office.

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- On the Internet (http://www.automation.siemens.com/partner)
- Industry Mall (http://www.siemens.com/industrymall/de)



INDUSTRIAL

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CPL TREATMENTS

Rev. 00 / 01.01.2020

HYDAC COOLING GROUP

LEVELS

INDUSTRIAL

DEFINITIONS ACCORDING TO ISO 12944

C2 Atmosphere with low level of pollution, rural areas
C3 Urban and industrial atmosphere, moderate suplhur dioxide pollution, costal area with low salinity
C4 Industrial areas and costal areas with moderate salinity
C5 Marine Costal area and offshore area with hig salinity

STANDARD COOLER	CPL1	CPL2	CPLS
C2	**C3** High	**C4** High	**C5** Marine High
Test resistance not applicable	480h in salt spray	720h in salt spray	1440h in salt spray

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QUINT-UPS/ 24DC/ 24DC/40



Uninterruptible power supply

INTERFACE

Data sheet
104660_en_03

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1 Description

Uninterruptible power supplies (UPS) continue to deliver power even if the mains breaks down.

An uninterruptible solution consists of three function units:

- Power supply
- Electronic switchover unit
- Power storage device

The product described here is an electronic switchover unit. In the event of mains breakdowns or failures, it switches to battery operation without interruption so that loads continue to be consistently supplied.

As an option, you can monitor and configure the device with the free UPS-CONF software. The IFS-CONFSTICK memory stick is available for convenient transfer of parameters between more than one QUINT-UPS.

Features

- IQ technology for maximum system availability. The intelligent battery management optimizes and keeps you informed on the remaining runtime, current state of charge, service life and performance of the power storage device.
- Generous power reserve POWER BOOST
- Optimum use of the buffer time
- Preventive battery monitoring
- Fast battery charging
- Extensive signaling and parameterization
- SFB technology

Make sure you always use the latest documentation.
It can be downloaded from the product at www.phoenixcontact.net/catalog.

This data sheet is valid for all products listed on the following page:

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3 Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Uninterruptible power supply with IQ technology 24 V/40 A. Provides information regarding the charging state, remaining runtime, and service life of your rechargeable battery module at all times and thereby increases system availability.	QUINT-UPS/ 24DC/ 24DC/40	2320241	1

Accessories	Type	Order No.	Pcs. / Pkt.
Rechargeable battery module, lead AGM, VRLA technology, 24 V DC, 7.2 Ah, tool-free battery replacement, automatic detection and communication with QUINT UPS-IQ	UPS-BAT/VRLA/ 24DC/ 7.2AH	2320319	1
Rechargeable battery module, lead AGM, VRLA technology, 24 V DC, 12 Ah, tool-free battery replacement, automatic detection and communication with QUINT UPS-IQ	UPS-BAT/VRLA/ 24DC/12AH	2320322	1
Rechargeable battery module, LI-ION technology, 24 V DC, 60 Wh, for ambient temperatures of -20°C ... +60°C, automatic detection and communication with QUINT UPS-IQ	UPS-BAT/LI-ION/24DC/60WH	2320351	1
Rechargeable battery module, lead AGM, VRLA technology, 24 V DC, 38 Ah, automatic detection and communication with the QUINT UPS-IQ	UPS-BAT/VRLA/ 24DC/38AH	2320335	1
Configuration software for QUINT UPS can be downloaded free of charge.	UPS-CONF	2320403	1
Used for communication between the UPS CONF configuration software and the QUINT UPS IQ and TRIO UPS uninterruptible power supply units.	IFS-USB-DATACABLE	2320500	1
Multi-functional memory blockfor the INTERFACE systemf for easy storage and backup of the configuration.	IFS-CONFSTICK	2986122	1

4 Technical data

Input data	
Nominal input voltage	24 V DC
DC input voltage range	18 V DC ... 30 V DC
Buffer period	0.5 h ()
Current consumption mains mode Max. No load Charging process	 51.9 A 66 mA 6.9 A
Fixed connect threshold	≤ 22 V DC

Output data	
Nominal output voltage	24 V DC
Output voltage range	18 V DC ... 30 V DC
Nominal output current	40 A
Derating	60 °C ... 70 °C (2.5%/K)
Output current limit	(In mains mode according to connected upstream current limiting device) > 45 A (Battery operation)
Power dissipation (mains mode) Idle Nominal Load BOOST	 1.6 W 9.3 W 10.3 W
Power dissipation (battery operation) Idle Nominal Load BOOST	 1.4 W 20.9 W 26.5 W
Output power	960 W
Efficiency	> 98.7 %
Connection in parallel	Yes, up to 2 modules with redundancy module
Connection in series	No

Output data (mains operation)	
Nominal output voltage	24 V DC
Output voltage range	18 V DC ... 30 V DC
Output current (according to connected upstream power supply unit) Nominal output current I_N POWER BOOST I_{BOOST} SFB technology I_{SFB}	 40 A (-25 °C ... +60 °C) 45 A (-25 °C ... +40 °C) 215 A (-25 °C ... +60 °C)
Duration	12 ms (SFB technology)

Output data (battery operation)	
Nominal output voltage	24 V DC
Output voltage range	19.2 V DC ... 27.6 V DC (U_{OUT} = U_{BAT} - 0.5 V DC)
Output current Nominal output current I_N POWER BOOST I_{BOOST} SFB technology I_{SFB}	 40 A (-25 °C ... +60 °C) 45 A (-25 °C ... +40 °C) 215 A (-25 °C ... +60 °C)
Duration	15 ms (SFB technology)

Power storage device	
Nominal voltage U_N	24 V DC
End-of-charge voltage	24 V DC ... 29 V DC (temperature compensated)
Temperature compensation	42 mV/K (preset)
Nominal capacity range	7 Ah ... 200 Ah
Charge current	0.2 A ... 5 A
Battery presence check (time interval)	1 min

Power In OK	
Status display	LED / Static to / green

Alarm	
Inverting with the UPS-CONF configuration and management software	
Switching output	Relay
Maximum switching voltage	≤ 30 V AC/DC
Maximum switching current	≤ 100 mA
Status display	LED / Static to / red

Battery charge	
Signal options are adjustable with the UPS-CONF configuration and management software	
Switching output	Relay
Maximum switching voltage	≤ 30 V AC/DC
Maximum switching current	≤ 100 mA
Status display	LED bar graph / dynamic / green

Battery mode	
Signal options are adjustable with the UPS-CONF configuration and management software	
Switching output	Relay
Maximum switching voltage	≤ 30 V AC/DC
Maximum switching current	≤ 100 mA
Status display	LED / Static to / yellow

General data	
MTBF	> 500000 h
Mounting position	horizontal DIN rail NS 35, EN 60715
Housing material	Steel sheet, zinc-plated
Dimensions W / H / D	47 mm / 130 mm / 125 mm
Dimensions W / H / D (90° turned)	122 mm / 130 mm / 50 mm
Weight	0.7 kg

Security	
Degree of protection	IP20
Protection class	III

Connection data

Connection method	Screw connection
Conductor cross section, solid	0.5 mm² ... 16 mm²
Conductor cross section, stranded	0.5 mm² ... 16 mm²
Conductor cross section AWG/kcmil	8 ... 6
Stripping length	10 mm
Screw thread	M4
Tightening torque	1.2 Nm ... 1.5 Nm

Ambient conditions

Ambient temperature (operation)	-25 °C ... 70 °C
Ambient temperature (storage/transport)	-40 °C ... 85 °C
Max. permissible relative humidity (operation)	≤ 95 % (25°C, no condensation)
Vibration (operation)	< 15 Hz, amplitude ±2.5 mm in acc. with IEC 60068-2-6 15 Hz ... 150 Hz, 2.3 g t_v = 90 min.
Shock	30g in all directions in acc. with IEC 60068-2-27
Climatic class	3K3 (in acc. with EN 60721)

Standards

Electrical safety (of information technology equipment)	EN 60950-1/VDE 0805 (SELV) EN 61558-2-17
Electronic equipment for use in electrical power installations	EN 50178/VDE 0160 (PELV)

Approvals

UL approvals	UL/C-UL Recognized UL 60950 UL Listed UL 508

Conformance with EMC Directive 2004/108/EC		
Noise immunity according to EN 61000-6-2		
	EN 61000-6-2 requirement	**Tested**
Electrostatic discharge EN 61000-4-2		
Housing contact discharge	4 kV (Test intensity 2)	8 kV (Test intensity 4)
Housing air discharge	8 kV (Test intensity 3)	15 kV (Test intensity 4)
Comments	Criterion B	Criterion A
Electromagnetic HF field EN 61000-4-3		
Frequency range	80 MHz ... 1 GHz	80 MHz ... 1 GHz
Test field strength	10 V/m	20 V/m
Frequency range	1.4 GHz ... 2 GHz	1 GHz ... 3 GHz
Test field strength	3 V/m (Criterion A)	10 V/m (Test intensity X / 3)
Fast transients (burst) EN 61000-4-4		
Input	2 kV (Test intensity 3 - asymmetrical)	2 kV (Test intensity 3 - asymmetrical)
Output	2 kV (Test intensity 3 - asymmetrical)	2 kV (Test intensity 3 - asymmetrical)
Signal	1 kV (Test intensity 3 - asymmetrical)	2 kV (Test intensity 4 - asymmetrical)
Comments	Criterion B	Criterion A
Surge current loads (surge) EN 61000-4-5		
Input/Output	+/- 0.5 kV (Asymmetrical) 0.5 kV (symmetrical)	1 kV (symmetrical) 2 kV (Asymmetrical)
Signal	+/- 1 kV (Asymmetrical)	1 kV (Asymmetrical)
Comments	Criterion B	Criterion A
Conducted interference EN 61000-4-6		
Input/Output/Signal	asymmetrical	asymmetrical
Frequency range	0.15 MHz ... 80 MHz	0.15 MHz ... 80 MHz
Voltage	10 V (Test intensity 3)	10 V (Test intensity 3)
Comments	Criterion A	Criterion A

Emitted interference in acc. with EN 61000-6-3	
Radio interference voltage in acc. with EN 55011	EN 55011 (EN 55022) Class B, area of application: Industry and residential
Emitted radio interference in acc. with EN 55011	EN 55011 (EN 55022) Class B, area of application: Industry and residential

5 Safety regulations and installation notes



EXPLOSION HAZARD

Only remove equipment when it is disconnected and not in the potentially explosive area!

DANGER

Never carry out work on live parts!
The housing can become very hot, depending on the ambient temperature and load!



CAUTION:

Before startup please ensure:

The connection must be carried out by a competent person and protection against electric shock guaranteed.

It must be possible to switch off power to device according to EN 60950.

All feed lines are sufficiently protected and dimensioned!

All output lines are dimensioned according to the maximum output current of the device or separately protected!

Sufficient convection must be guaranteed.

Observe mechanical and thermal limits.



ATTENTION: Danger if used improperly

Uninterruptible power supplies are installable devices. Installation and startup may only be carried out by qualified personnel. The relevant country-specific regulations must be observed.



CAUTION: Risk of injury

Cover termination area after installation in order to avoid accidental contact with live parts (e. g., installation in control cabinet).



Do not dispose of used batteries in the household waste! Dispose of these according to the currently valid national regulations.



They can also be returned to Phoenix Contact or the manufacturer.



CAUTION: Risk of injury

Use the device with the UPS-BAT.... recommended in the table of accessories. When using power storage devices other than UPS-BAT..., make sure that the corresponding parameters for the charging characteristics are adjusted and adhered to.

Phoenix Contact accepts no liability or responsibility for possible for any consequential damage.

6 Structure

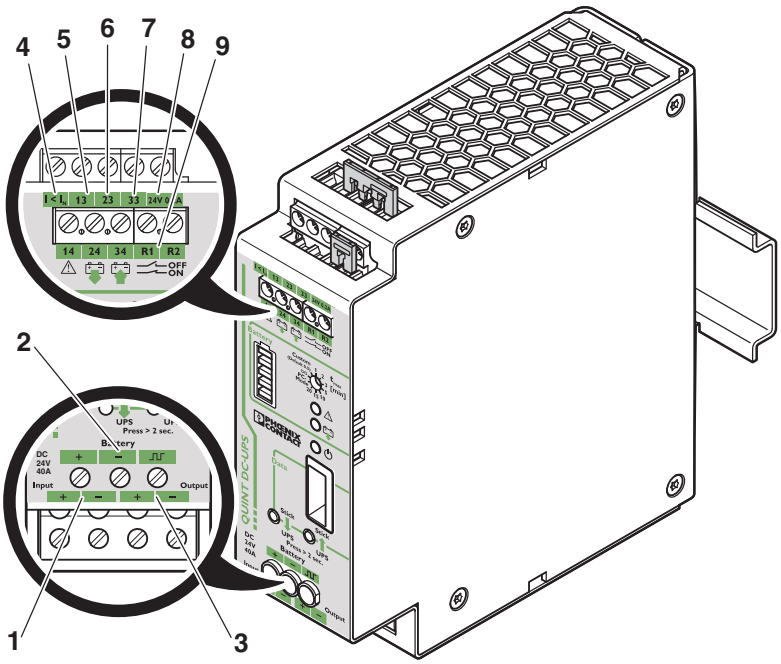


Figure 1 Connection terminal blocks

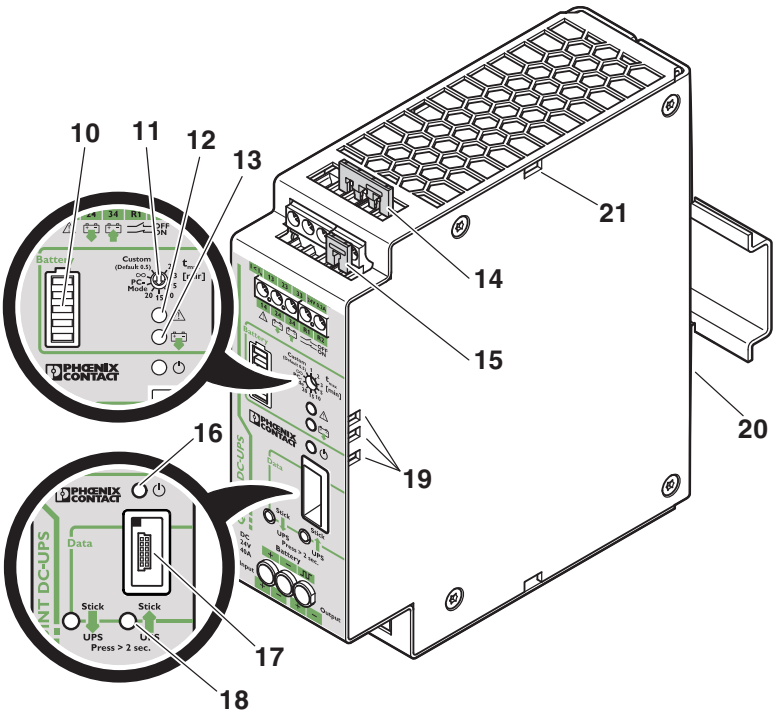


Figure 2 Function elements

Connections / Operating elements

1 DC input, 18 V DC ... 30 V DC

2 Power storage device connection, 24 V DC (+, -, communication between UPS and power storage device)

3 DC output, 24 V DC, buffered

17 Data port for data linking to the PC or the use of a memory block

18 Button for use of the memory block

Mains mode, charging

16 Green LED: Power In OK, mains mode

10 Bar graph for displaying the current charging state of the power storage device

7 Floating relay contact 33/34: battery charge

4 $I < I_N$, fast battery charging

Battery operation, discharging

13 Yellow LED: battery mode

6 Floating relay contact 23/24: battery mode

11 Buffer time setting: unlimited ≤ , 1 ... 20 mins., customized (customized default: 0.5), PC mode

9 Remote control (R1, R2)

15 Remote control plug-in bridge, pre-installed

General

12 Red LED: alarm

5 Floating contact 13/14: alarm

8 24 V DC supply voltage, maximum current limit 0.2 A for the signal contacts 13, 23, 33

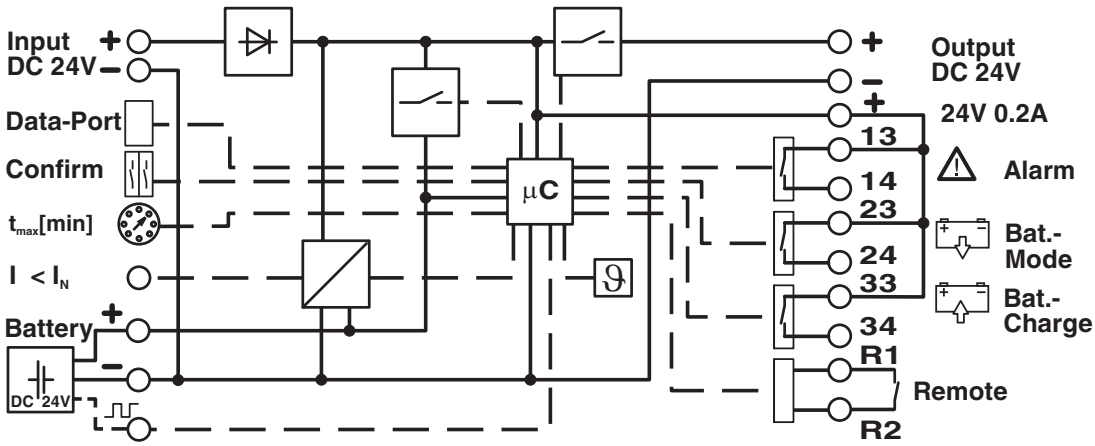
14 Plug-in bridge for signal contact supply voltages, pre-installed

19 LED windows for flat mounting position

21 Accommodation for cable binders

20 Universal snap-on foot for EN DIN rails

7 Basic circuit diagram



Element	Meaning
µC	Microprocessor
	Decoupling
	Charging unit
	Switch
ϑ	Temperature sensor
	Selector switch

8 Installation

8.1 Convection

The device supplies the specified values in the case of sufficient convection cooling and when mounted on a horizontal DIN rail.

To enable sufficient convection, we recommend a minimum vertical gap to other modules of 5 cm.
A lateral gap of 5 mm is recommendable.

The module can be snapped onto all DIN rails according to EN 60715 and must be mounted horizontally (connecting terminal blocks on top and bottom).

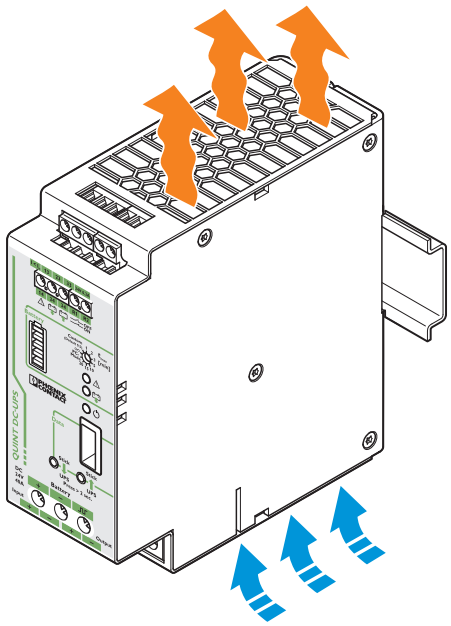


Figure 3 Convection

8.2 Mounting position

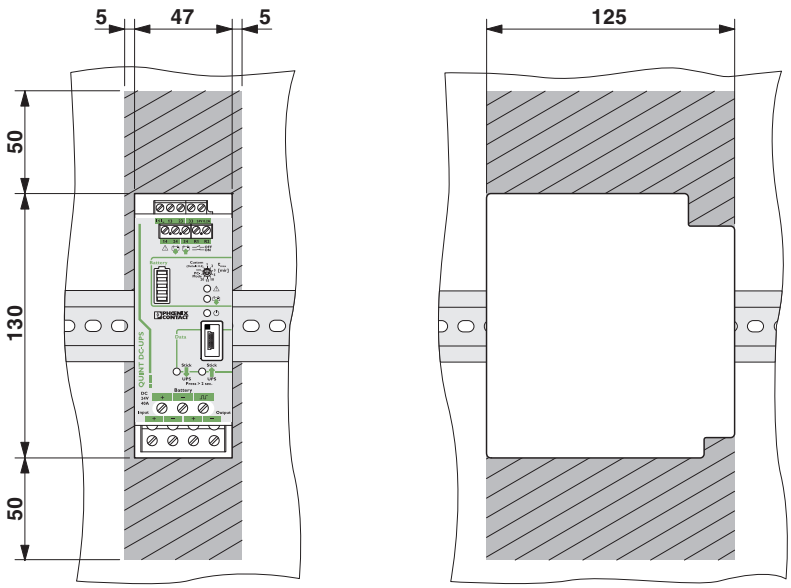


Figure 4 Installation dimensions

Installation depth 125 mm

8.3 Mounting on a DIN rail

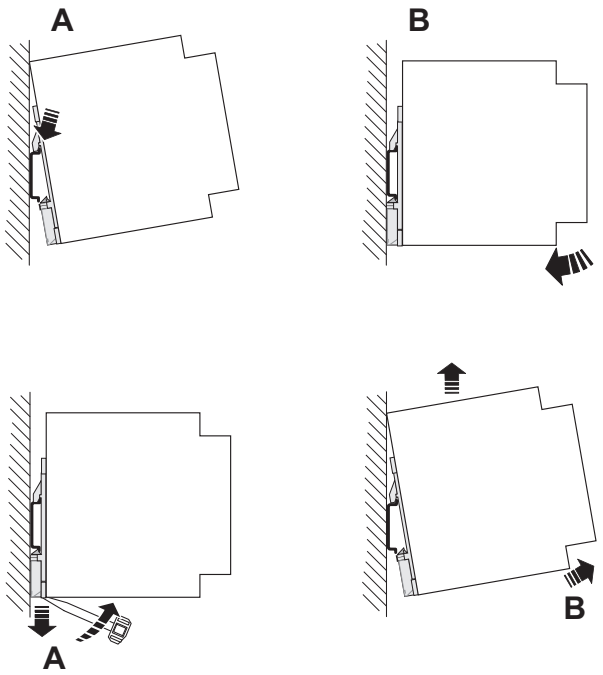


Figure 5 Mounting and removing

Slim-style installation

Assembly:

Position the module with the DIN rail guide on the upper edge of the DIN rail, and snap it in with a downward motion.

Removing:

Pull the snap lever open with the aid of a screwdriver and slide the module out at the lower edge of the DIN rail.

Mounting position rotated 90°

Low-profile installation can be achieved by mounting the device at right-angles to the DIN rail. Mount the DIN rail adapter (UTA 107) as described in the figure. No additional mounting material is required. Fixing screws: Torx T10 (torque 0.8 Nm ... 0.9 Nm).

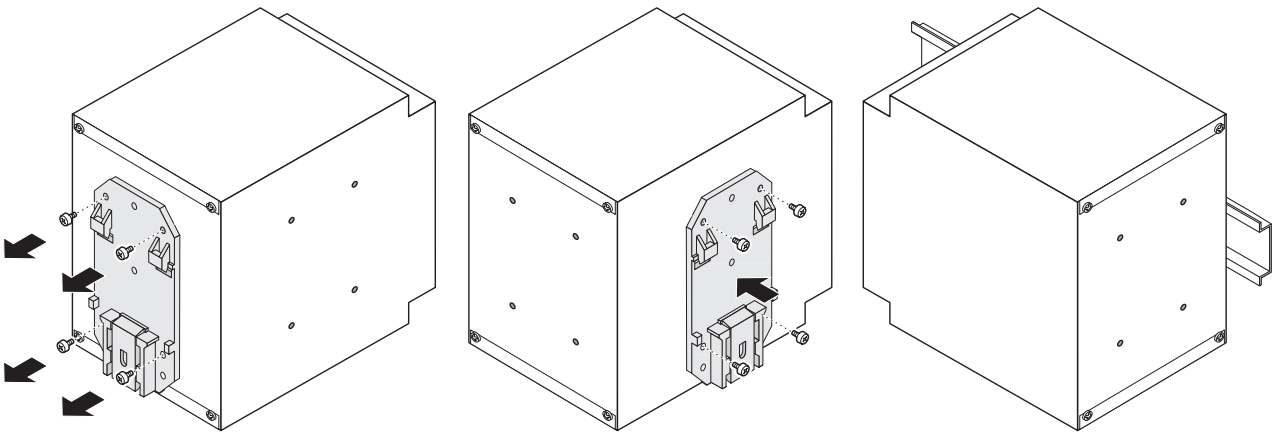


Figure 6 Mounting position rotated 90°

8.4 Connection terminal blocks

Use a screwdriver with a suitable blade width for wiring. For a reliable and touch-proof connection, use a suitable cable cross section and insulate the cable ends according to the above-mentioned specifications.

Terminal block	Solid conductor [mm^2]	stranded conductor [mm^2]	AWG	Stripping length [mm]	Torque [Nm]	Torque [lb in]
DC input: +/-	0.5 ... 16	0.5 ... 16	8 ... 6	10	1.2 ... 1.5	15
DC output: +/-	0.5 ... 16	0.5 ... 16	8 ... 6	10	1.2 ... 1.5	15
Battery: +/-/signal	0.5 ... 16	0.5 ... 16	20 ... 6	10	1.2 ... 1.5	15
Signals: R1, R2/I<I_N	0.2 ... 4	0.2 ... 2.5	24 ... 12	8	0.5 ... 0.6	5 ... 7

508:

Copper cable; operating temperature > 75°C (ambient temperature < 55°C) and > 90°C (ambient temperature < 75°C).

60950:

Use ferrules for flexible cables.

8.5 Installation of individual components

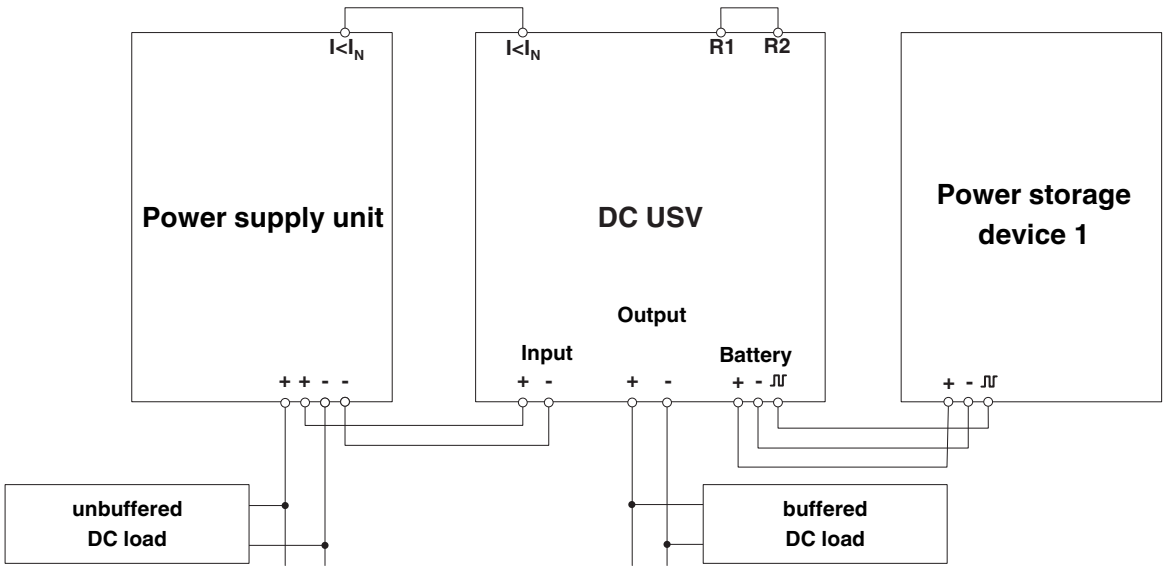


Figure 7 Schematic design

The image is a schematic representation of the design and does not contain all parts.

Observe the installation instructions.

Power supply unit

Use current-limited source (e. g., QUINT POWER power supply) or a suitable fuse. If loads must **not** be supplied in the event of a mains breakdown or failure, they must be connected directly to the output of the power supply as unbuffered DC load.

DC UPS

- Input: the input is supplied with 18 … 30 V DC.
- Output: in the event of mains interruption or failure, the connected DC load is supplied with voltage without interruption.
- Battery: the required power is made available by the power storage device. The signal cable is used for communication between the UPS and power storage device.
- Signal $I<I_N$: when connected to the $I<I_N$ output of the QUINT POWER power supply unit, the power supply unit is charged with the maximum charging current as quickly as possible (fast battery charging). Supply of the buffered DC load always has priority. This function is available when the power supply unit makes a static power reserve available with corresponding signal contact e. g., QUINT POWER with POWER BOOST and preventive function monitoring. Without this, charging is performed at reduced current.
- Signal R1, R2: remote control

Power storage device

Depending on the desired buffering time, select the power storage device listed under accessories.

VRLA power storage devices are temperature dependent. If possible and to ensure optimum function, install at a cool location e. g., at the bottom of the control cabinet.

9 Connection and protection

9.1 Input and protection of the primary side

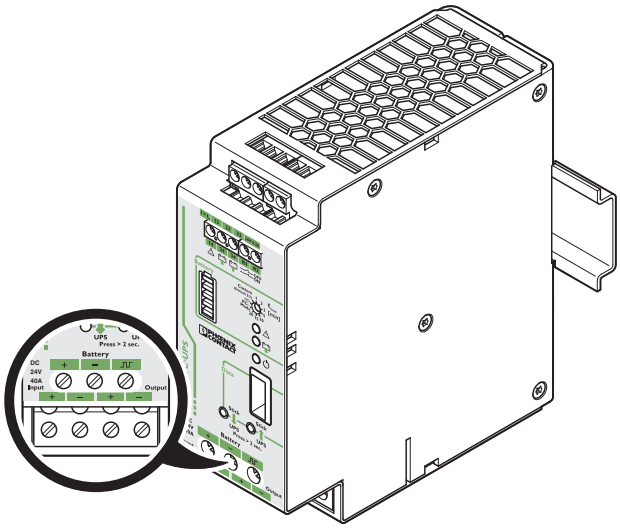


Figure 8 Input

Connection of the input is made via connection terminal blocks "Input +/-" (input reverse polarity protection).

The maximum current for each input is 53 A.

Therefore use a current-limited source (e. g., QUINT POWER) or a suitable fuse.

Installation of the device must correspond to EN 60950 regulations.

All cables must have large cross sections in order to keep voltage drops as small as possible.

9.2 Output and protection on the secondary side

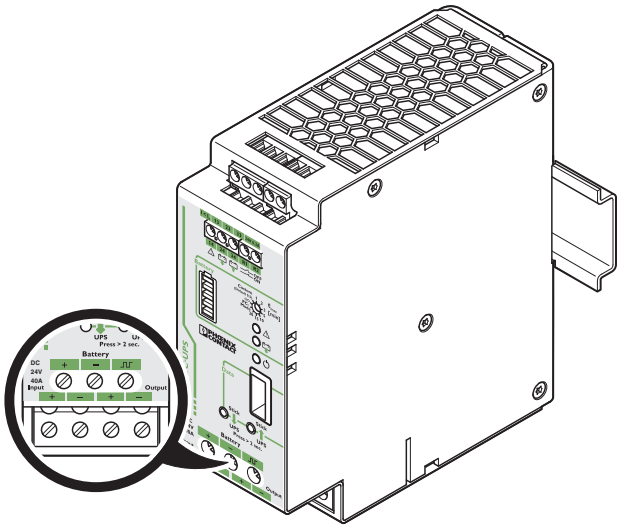


Figure 9 Output

Connection of the output takes place via the connection terminal block "Output +/-".

The device is electronically short-circuit-proof and idle-proof. In the event of a malfunction, the output voltage is limited to a maximum of 35 V DC. It must be ensured that all output cables are dimensioned or separately protected according to the maximum output current. All cables must have large cross sections in order to keep voltage drops as small as possible.

9.3 Power storage device

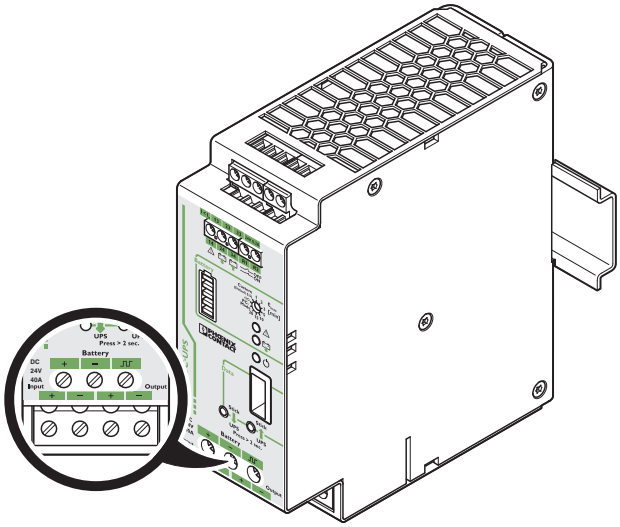


Figure 10 Output, battery

Connection of the power storage device takes place via the connection terminal block "Battery +/-". To make use of intelligent IQ technology, you must also install a cable for the communication between the UPS and power storage device.

You will find a clearly arranged selection table for suitable power storage devices next to the product at www.phoenixcontact.net/catalog.

9.4 SFB technology

SFB (Selective Fuse Breaking) technology reliably switches off faulty current paths in the event of a short circuit. It supplies six times the nominal current for 12 ms in mains mode and for 15 ms in battery mode. SFB technology therefore safely triggers standard circuit breakers. Faults are located reliably and important system parts remain in operation.

9.5 Power reserves

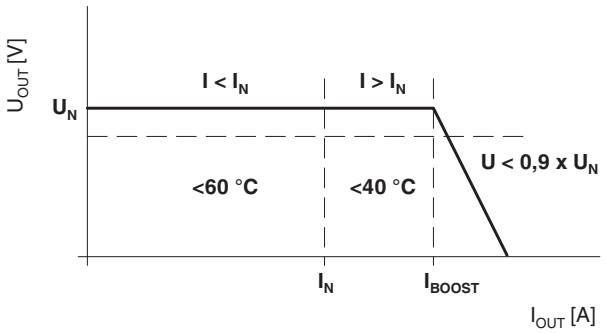


Figure 11 Output characteristic curve

Both the POWER BOOST static power reserve and the SFB (Selective Fuse Breaking) technology dynamic power reserve are available in mains and battery mode if a QUINT POWER power supply unit from Phoenix Contact is connected upstream.

In mains mode, the power reserve is forwarded to the buffered DC load via the UPS.

In battery mode, the power storage device supplies sufficient power to ensure the same behavior as a QUINT POWER power supply unit with SFB technology.

9.6 Temperature response

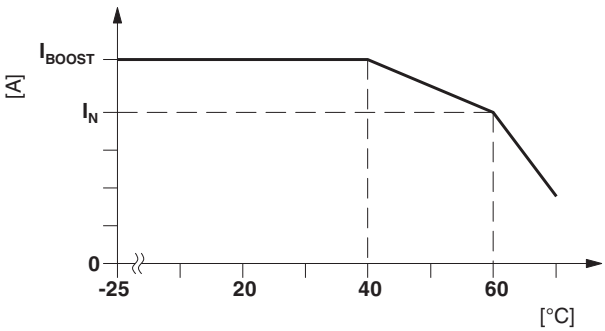


Figure 12 Derating diagram

At an ambient operating temperature of up to +40 °C, the UPS makes the I_{BOOST} continuous output current available. The device can supply the I_N nominal output current up to ambient temperatures of +60 °C. In the case of ambient temperatures above +60 °C, The output power must be decreased by 2.5 % per Kelvin temperature increase.

10 Signaling

Three LED indicators, an LED bar graph and three floating relay contacts are available for function monitoring.

In addition, you can use the UPS-CONF configuration and management software.

The software and the associated user manual are available free of charge at www.phoenixcontact.net/catalog.

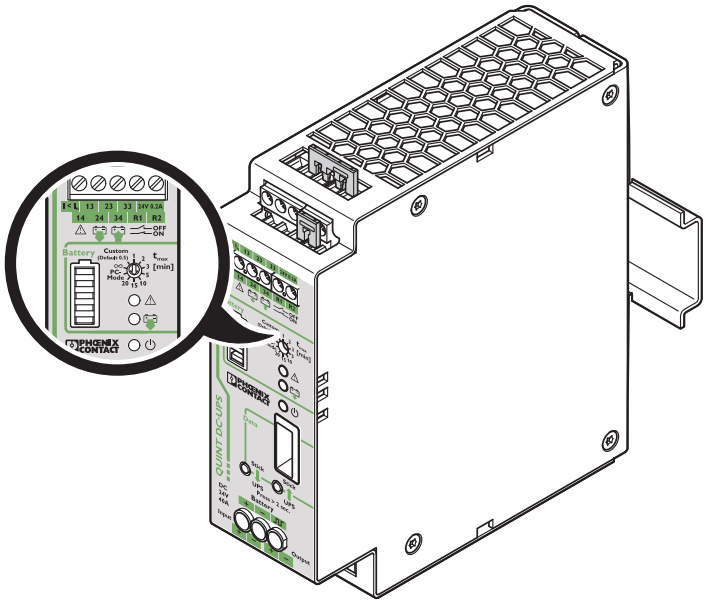


Figure 13 Display elements

State	LED	Switching output	Signal, default
Power In OK, mains mode	Green	-	-
Alarm	Red	13/14	Active low
Battery mode	Yellow	23/24	Active high
Battery charge	Bar graph	33/34	Active high

Alarms, warnings and/or operating states can be individually assigned to the battery mode and battery charge switching outputs via the UPS-CONF configuration and management software. Warnings are not indicated by the LED indicators.

ATTENTION:

LED indicator states are also simultaneously signaled via the switching outputs in the default settings. If an individual assignment of the switching outputs takes place, signal states deviating from the LED indicators are possible. Make sure that only sensible combinations are signaled.

10.1 LED and bar graph test

An LED test is performed automatically during startup of the device. The LEDs indicate the following error states:

1. All LEDs and the bar graph light up.
2. The LEDs light up, the bar graph does not light up, the lower bar changes its color from green to red.
3. All LEDs and the bar graph are off.
4. The LEDs and the bar graph light up according to their current status.

10.2 LED indicator

State	Green LED	Red LED	Yellow LED	Description
1	OFF	OFF	Lit	Battery mode, bar graph displays current charging state
2	OFF	Lit	Lit	Battery mode, power storage device is almost empty, lower bar graph LED is red
3	Lit	OFF	OFF	Mains mode, bar graph displays current charging state
4	Lit	Lit	OFF	Mains mode, alarm in the event of battery problem: lower bar graph LED flashes red

Green LED (mains mode), yellow LED (battery mode)

Either the green or the yellow LED lights up.

Green LED lights up, yellow LED is off: the load connected to the UPS is supplied from the mains.

Green LED off, yellow LED lights up: mains is not available. The load connected to the UPS is supplied by the power storage device.

Red LED, alarm in mains mode

Red LED lights up, the lower bar graph LED flashes red: there is a problem with the power storage device.

When using the UPS-BAT... power storage device and a connected communication cable, the current life expectancy (SOH, State of Health) is determined via the IQ technology. An alarm is signaled in the following cases:

– The adjustable threshold "remaining life expectancy" is reached.
– Different types of battery technology were connected that cannot be charged simultaneously, e. g. VRLA and LI-ION.
– The presence check is negative.
– The quality check is negative.

When using power storage devices other than UPS-BAT..., an alarm is signaled if it is not present or if the quality of the power storage device is no longer sufficient for supplying the load in the event of a mains failure.

If the lower bar graph LED does not flash, the alarm indicates overload or service mode.

Red LED, alarm in battery mode

Red LED lights up: the power storage device is almost completely discharged.

When using the recommended UPS-BAT power storage device and connected communication cable, the current charging state (SOC, State of Charge)., is displayed via the IQ technology. The preset alarm signaling threshold is 10%. The lower bar graph LED lights up red.

As an option, a time can be set via the UPS-CONF software, for example, 10 mins. In this case, the UPS signals an alarm when the power storage device is able to supply the connected load for a further 10 minutes.

When using power storage devices other than the UPS-BAT..., the alarm indicates battery voltage too low (default: 20.4 V).



ATTENTION:

Signaling of all states is determined by calculated, individual or preset thresholds and operating states. The detection that is the base of signaling takes place with high accuracy. However, detection is subject to the respective ambient conditions in each case. In particular power storage devices can contribute to further deviations, irrespective of the storage technology.

10.3 Bar graph-display when the communication cable is installed

The current charging state and the remaining runtime of the power storage device is determined during startup of the UPS. The LED light lights up from bottom to top during this (charging the battery in mains mode) or from top to bottom (discharging the battery in battery mode).

When the power storage device is fully charged and the charging state is determined, this is displayed by the bar graph. Depending on the charging state and the size of the power storage device, this can range from a few minutes to hours.

Each LED corresponds to 20% of the total capacity. The lowest LED is divided into two parts: red for 0-10%, green for 11-20%.

The current capacity level is indicated by flashing during charging.

10.4 Bar graph display without communication cable

If no communication cable is installed between the UPS and the power storage device, the LEDs indicate the following states during startup of the UPS in mains mode.

The upper 4 LEDs are off.

The lower LED can indicate the following states.

– Flashing: power storage device is being charged
– Off: power storage device is not being charged
– Red: battery problem

11 Function

In mains mode (DC input voltage present), the output voltage corresponds to the applied input voltage. In the event of a failure of the voltage supply, switching to battery mode takes place without interruption. The output voltage is not directly dependent on the battery voltage.

11.1 IQ technology

Intelligent Battery Management

- SOC (State of Charge): current charging state and remaining runtime of the power storage device is always available.
- SOH (State of Health): displays the remaining life expectancy of the power storage device and warns of failures at an early stage.
- SOF (State of Function): determines the current performance of the power storage device.

Intelligent Battery Control

Intelligent Battery Control – automatically detects the connected battery type via the connected communication cable and maximizes the remaining service life of the power storage device via an optimally adapted charging characteristic.

Intelligent Charging

The device adapts the charging current and thereby ensures the fastest possible recharging and maximum availability

Intelligent Communication

The data port is used for communication between the UPS and PC, e. g., for configuring the UPS.

11.2 SOC application example

Task: an industrial PC must be continuously supplied with 24 V DC.

Previous solution: the UPS is buffered with 3.4 Ah and supplies 24 V DC / 5 A for 20 under optimum conditions Minutes

Problem: can the power storage device actually bridge this time? Charging state, performance and remaining runtime of the battery are unknown.

Solution with IQ technology:
The intelligent UPS determines all relevant battery states. This ensures the transparency required to guarantee the stability of the supply and optimum use of the battery at all times.

The intelligent battery management detects the current charging state of the connected battery and uses this to calculate the remaining runtime.

The QUINT UPS-IQ also signals whether the buffer time is actually 20 minutes. As soon as an adjustable threshold value is reached, the floating relay contact or the software generates a warning message or the PC is shut down. The industrial PC works for as long as possible and is shut down only if absolutely necessary.

11.3 SOH/SOF application example

Task: electrical loads in remote systems widely separated from each other must be continuously supplied with 24 V DC.

Previous solution: The user invests in a new battery every two years assuming that the system is reliably protected by this.

Problem: is the power storage device really 100% available for two years? Hs the battery aged more quickly as a result of higher ambient temperatures and cannot deliver sufficient performance?

Solution with IQ technology:
The remaining life expectancy of the battery is known. This allows servicing to be planned. If the battery is replaced at the ideal time, costs are also avoided that would occur by replacing the battery too early or after failure. It is particularly important for applications that are widely separated from each other to ascertain whether the battery works reliably for another two years or only two months. For example, replacing power storage devices in offshore wind power plants is associated with high costs. Indication of the current life expectancy of the battery saves unnecessary labor and material costs.

11.4 Charging characteristic

When the recommended UPS-BAT… power storage device is used, the intelligent battery management of the UPS adapts itself to the respective connected storage technology such as Lithium or lead (VRLA – Valve Regulated Lead Acid) batteries. Additional settings of charging parameters are not necessary due to automatic detection.

The UPS is equipped with an integrated charging unit. Charging is performed according to the current battery state. By measuring the current temperature at the battery, temperature-compensated charging takes place. The intelligent battery management ensures fast availability and maximum service life of the power storage device. Depending on the performance class of the UPS, the integrated charging unit can have the following maximum charging current.

UPS	Max. charging current
5 A	1.36 A
10 A	2.88 A
20 A	5 A
40 A	5 A

The recharging time results from the maximum available charging current and the total capacity of the storage device type connected.

Charge control depends on the IUoU charging characteristic. This is a 3-stage charging process that is represented as follows.

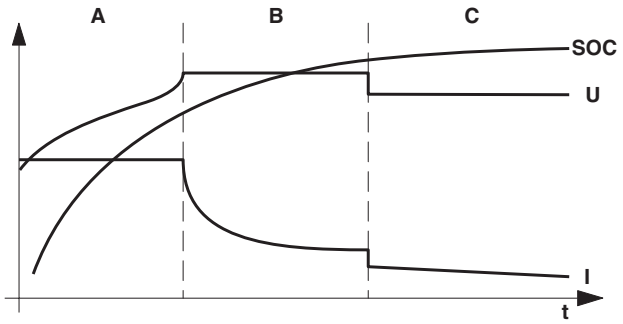


Figure 14 Charging curve

Stage	Name	Description
A	Main charge	Constant current charging phase (CC), initial charging current
B	Compensation charging	Constant voltage charging phase (CV), compensation trickle charge voltage
C	Trickle charging	Constant voltage charging phase (CV), trickle charging final voltage

If the communication cable between the UPS and the power storage device is interrupted, the temperature detected in the UPS module is used temporarily to ensure temperature compensation.

Temperature recording only takes place in the UPS module when using power storage devices other than the UPS-BAT…. In addition, adjustment and adherence to the charging parameters is necessary.

11.5 Fast battery charging, intelligent charging (contact $I < I_N$)

The adaptive current management of the charging unit charges the power storage device considerably faster when the $I<I_N$ input of the UPS is connected to the corresponding output of the power supply. This ensures shorter recharging times and the power storage device is available with full capacity much more quickly.

At the same time, the module supplies sufficient power for buffered DC loads. As long as the upstream connected power supply unit has sufficient power reserves, charging continues with high current. If the load requires a higher current, this is supplied at the highest priority. In this case the power storage device is charged more slowly.

The fast battery charging function is only available when the power supply unit makes a static power reserve available with corresponding signal contact, e. g., QUINT POWER with POWER BOOST and preventive function monitoring.

11.6 Setting the buffer time

You can set the time for exiting battery mode via the selection switch on the front of the device.

t_{max} [min] setting	Meaning
1, 2, 3, 5, 10, 15, 20	The UPS switches off after the set buffer time.
Custom (default 0.5)	The UPS switches off after the individual buffer time set via UPS-CONF.
≤ (unlimited, delivery state)	Buffering with the total stored power. A warning is generated as soon as the power storage device only has 10 % charge (default).
PC mode	In PC mode, it is possible to continue working with a PC after a mains failure, perform a controlled shutdown and restart automatically.

11.7 PC mode

In "PC mode", the UPS function follows a chronological sequence that can be parameterized via the software and individually optimized for the relevant application.

In the event of a mains failure, PC can continue to work, perform a controlled shutdown and restart automatically.



It is required that the following is installed:

IFS-USB-DATACABLE data cable (Order No. 2320500)

UPS-CONF software (Order No. 2320403, available free of charge at www.phoenixcontact.net/catalog)

Communication cable between the UPS and the power storage device

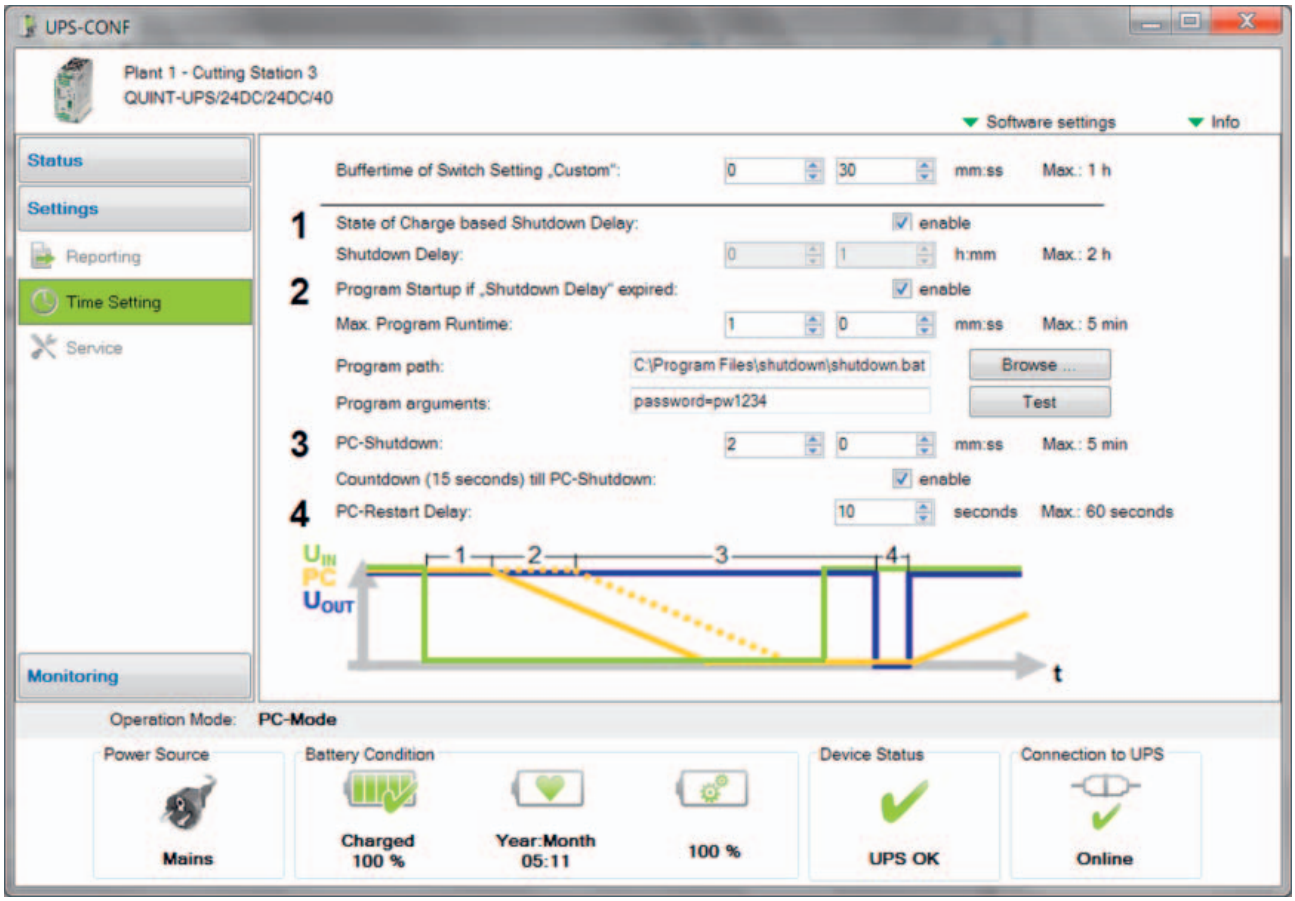


Figure 15 PC mode

1: Delay time

Delay time is calculated automatically from the current remaining battery life minus the time required by the PC to shut Delay time is calculated automatically from the current remaining battery life minus the time required by the PC / IPC to shut-down. Alternatively, a fixed delay time may be chosen.

Example: setting is 10 mins. and if mains power has not returned within 10 minutes, a corresponding alarm is signaled.

2: Program start

After the delay time has expired, it is possible to start a program.

Example: the software starts and begins successive back up of system data.

In the "PC-Mode" setting, on the selection switch of the UPS, the UPS function follows a chronological sequence that can be parameterized via the software and individually optimized for the relevant application

Menu: Settings > Time setting

3: PC shut-down

The time required for shutdown of the PC is set here.

4: PC idle time

The output voltage is interrupted during the reset time and the PC automatically restarted only if the PC is shut down and the mains returned in the mean time

11.8 Remote control (contact R1, R2)

The module can be switched on and off via a signal to contacts R1 / R2. Shutdown can take place in mains mode or while battery mode is active

Remote shutdown is deactivated

UPS in function (delivery state)

– The "R1" and "R2" terminal points are short circuited (delivery with plug-in bridge) OR 24 V DC is present at terminal point "R2".
– In the event of a voltage supply failure, the UPS switches over to battery mode.

Remote shutdown is activated

– The "R1" and "R2" terminal points are not short circuited AND O V is present at terminal point "R2".
– In the event of a voltage supply failure, the UPS does not switch over to battery mode and the device shuts down.

12 Interfaces

Optionally, you can the data port interface.

12.1 IFS-USB-DATACABLE

The module is connected via the data port to the USB port of the PC using the IFS-USB-DATACABLE.

The data cable between the PC and the UPS is necessary for parameterization and monitoring. It contains the interface electronics and electrical isolation.

12.2 IFS-CONFSTICK

The IFS-CONFSTICK is a multi-functional memory block for easy storage and backup of configuration and parameter data. You can copy the parameterization of one UPS to another UPS of the same type using the IFS-CONFSTICK.

Transferring UPS parameters to the IFS-CONFSTICK

1. Press the "UPS -> Stick" button and hold for at least 2 seconds.
2. Insert the IFS-CONFSTICK carefully into the "Data Port" of the UPS while observing the plug-in direction.
3. Parameter transfer is started and indicated by cyclic control of the three LED indicators. Light-up sequence: green/yellow/red

– Error-free transfer: green LED indicator on
– Transfer error: red LED indicator on

Transferring IFS-CONFSTICK parameters to the UPS

1. Press the "Stick -> UPS" button and hold for at least 2 seconds.
2. Insert the IFS-CONFSTICK carefully into the "Data Port" of the UPS while observing the plug-in direction.
3. Parameter transfer is started and indicated by cyclic control of the three LED indicators. Light-up sequence: green/yellow/red

– Error-free transfer: green LED indicator on
– Transfer error: red LED indicator on

13 Servicing

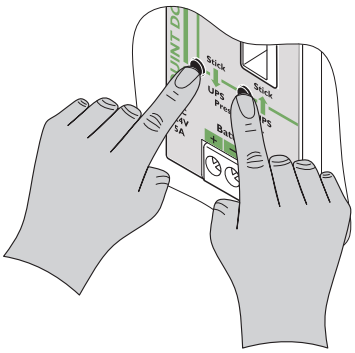
To switch to service mode, the following options are available:

– Button on the front of the UPS
– UPS-CONF software
– Service stick

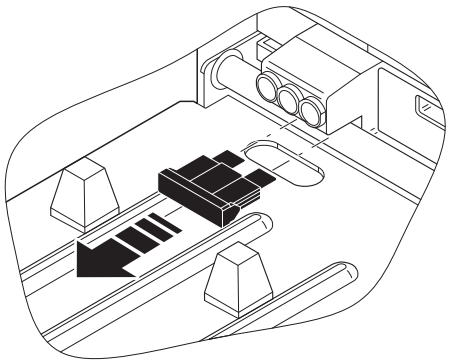
Details can be found in the UPS-CONF user manual at www.phoenixcontact.net/catalog.

Replacing the battery

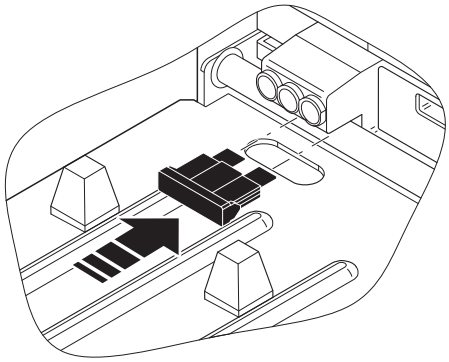
- Press and hold down both buttons on the front of the UPS longer than 6 s to switch to service mode.
  The red LED lights up.



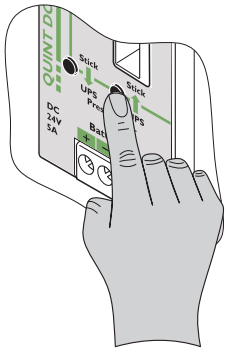
- Remove the fuses.



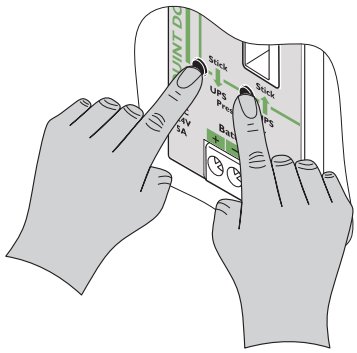
- Remove the cabling of the battery blocks.
- Remove the batteries.
- Install new batteries.
- Connect the cabling of the battery blocks.
- Insert the fuses.



- Press and hold down both buttons on the front of the UPS for longer than 6 s to register the batteries.
  The bar graph flashes.



- Press and hold down both buttons on the front of the UPS for longer than 6 s to exit the service mode.
  The red LED extinguishes.



An exact description of the replacement procedure for all power storage devices can be found in the corresponding data sheet at www.phoenixcontact.net/catalog.

14 Application examples

14.1 Parallel connection of the power storage devices

To increase the buffer time, a maximum of 15 power storage devices can be switched in parallel. It is recommended to keep the number as low as possible and use power storage devices with a higher capacity of necessary. For parallel operation, only use power storage devices with the same batch number .

After discharging of the power storage device, the recharging time depends on the maximum charging current that the UPS can make available.

Use a suitable fuse. Flat-type fuse inserts with the same nominal values from the battery used are recommended.

If possible, install at a cool location e. g., at the bottom of the control cabinet to ensure optimum function. For this, the following cabling design is advantageous.

Value	Description
l_1	Cable distance to the power storage device, to the node in the case of parallel connection, including fuse terminal block
mm^2	Conductor cross section to the power storage device
l_2	Cable distance between the power storage device and node

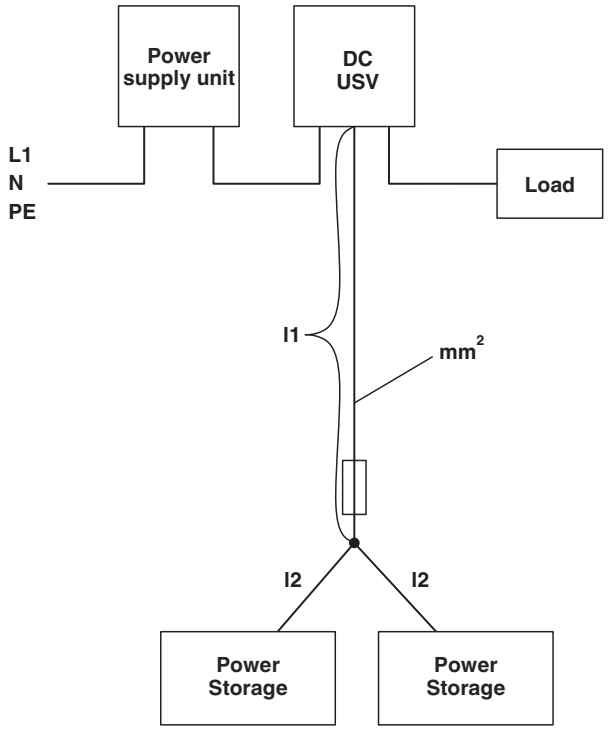


Figure 16 Parallel connection of the power storage devices in the control cabinet

14.2 Parallel connection for redundancy

Redundant circuits are suitable for supplying systems, which place particularly high demands on operational safety.

In order to set up a redundant power supply solution, two UPS systems of the same type (consisting of a power supply unit, DC-PS, redundant 1 .... n) are connected in parallel and decoupled. No further adjustments to the default setting are necessary.

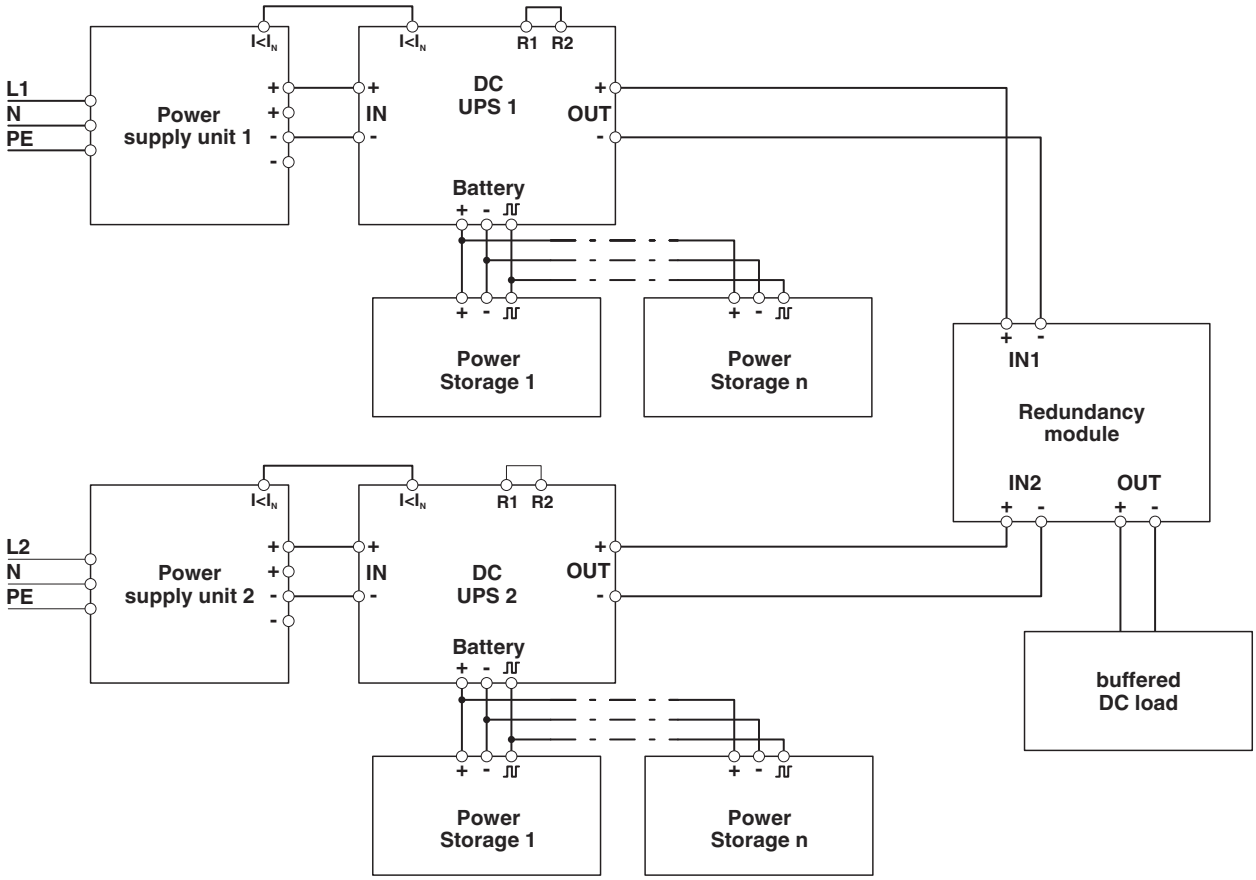


Figure 17 Parallel connection for redundancy

If a fault occurs in the first UPS system, the second UPS system automatically takes over the entire supply without interruption and vice versa. For this purpose, the UPS systems to be connected in parallel are dimensioned so that the total current requirements of all loads can be fully met by one UPS system.

TRIO-PS/3AC/24DC/40

Primary switched power supply, 3-phase, output current: 40 A



INTERFACE

Data Sheet
102782_01_en

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Description

TRIO POWER is the rail mountable 24 V power supply unit with basic functions. With an output voltage of 24 V DC and 1-phase and 3-phase versions with 60 W or 960 W, it is particularly suited for use in series production in mechanical engineering. The wide-range input and international certification package allows worldwide implementation.
The high MTBF of 500,000 h stands for high supply reliability. The devices can be connected in parallel to increase the capacity and redundancy.
The clear LED signaling and the device connection with double terminal block for plus and minus for fast potential distribution are further advantages of this device series. A third terminal block for minus simplifies the grounding on the secondary side. All power supply units are idle proof and short circuit proof and provide a regulated and settable output voltage of 22.5 V DC to 29.5 V DC with output currents of 2.5 A, 5 A, 10 A, 20 A or 40 A.

- Reliable power supply unit even at high ambient temperatures
- No load and short circuiting resistance
- High dielectric strength
- Can be used worldwide in all industrial sectors due to a wide-range input and an international approval package

DANGER OF EXPLOSION!
Remove an item only when it is not connected to power or if it is located in the non-explosive area.

DANGER
Components with dangerously high voltage and high stored energy are located in the device!
Never carry out work on live parts!
Depending on the ambient temperature and the load, the housing can become very hot!

Make sure you always use the the latest documentation.
It can be downloaded at www.download.phoenixcontact.com.

A conversion table is available on the Internet at
www.download.phoenixcontact.com/general/7000_en_00.pdf.

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Order data

Description	Type	Order No.	Pcs./Pkt.
Primary switched power supply, 3-phase, output current: 40 A	TRIO-PS/3AC/24DC/40	2866404	1

Accessories	Type	Order No.	Pcs./Pkt.
Universal wall adapter	UWA 182/52	2938235	1

Technical data

Input data	
Input nominal voltage range	2x / 3x 400 V AC ... 500 V AC
AC input voltage range	320 V AC ... 575 V AC (for 3-phase operation) 2x 360 V AC ... 575 V AC (for 2-phase operation)
AC frequency range	45 Hz ... 65 Hz
Current consumption	3x 2 A (400 V AC) 3x 1.6 A (480 V AC)
Inrush current limitation	< 20 A
I^2t	1.3 A^2s
Power failure bypass	> 16 ms (400 V AC) > 20 ms (480 V AC)
Typical response time	< 1 s
Power factor (cos phi)	0.76
Protective circuitry	Transient surge protection Varistor
Recommended backup fuse for mains protection	3x 10 A (characteristic B) 3x 16 A (characteristic B)
Required backup fuse (device and line protection)	(externally via 3 10 A or 16 A circuit breakers, characteristic B)
Discharge current to PE	< 3.5 mA

Output data	
Nominal output voltage	24 V DC ±1%
Setting range of the output voltage	22.5 V DC ... 29.5 V DC
Output current	40 A (-25 °C ... 55 °C)
Derating	Above +55°C: 2.5% per Kelvin
Current limitation	Approx. 48 A
Max. capacitive load	Unlimited
Control deviation	< 1 % (change in load, static 10% ... 90%) < 2 % (change in load, dynamic 10% ... 90%) < 0.1 % (change in input voltage ±10%)
Power loss nominal load max.	87 W
Maximum power dissipation idling	11 W
Efficiency	> 91.5 %
Ascent time	< 2 ms (U_{OUT} (10% ... 90%))
Residual ripple	< 20 mV_{PP}
Peak switching voltages	< 40 mV_{PP}
Connection in parallel	Yes, for redundancy and increased capacity
Connection in series	No
Surge protection against internal surge voltages	Yes, < 35 V DC
Resistance to reverse feed	35 V DC

Signal output DC OK active	
Status display	"DC OK" LED green / U_{OUT} > 21.5 V: LED lights up

General data	
Insulation voltage input/output	4 kV AC (Type test) 2 kV AC (routine test)
Insulation voltage input / PE	2 kV AC (type test) 2 kV AC (routine test)
Insulation voltage output / PE	500 V DC (routine test)
Degree of protection	IP20
Class of protection	I, with PE connection
MTBF	> 500 000 h in acc. with IEC 61709 (SN 29500)
Housing version	Steel sheet, zinc-plated
Side element version	Aluminum
Dimensions W / H / D (state of delivery)	139 mm / 130 mm / 190 mm
Weight	3.2 kg

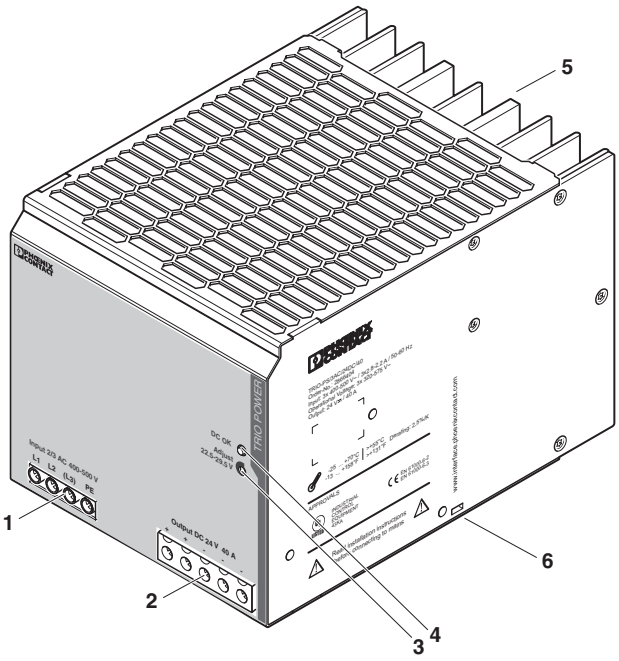
Ambient conditions	
Ambient temperature (operation)	-25 °C ... 70 °C (> 55° C derating)
Ambient temperature (storage/transport)	-40 °C ... 85 °C
Max. permissible relative humidity (operation)	95 % (at 25°C, no condensation)
Vibration (operation)	< 15 Hz, amplitude ±2.5 mm in acc. with IEC 60068-2-6 15 Hz ... 150 Hz, 2.3g, 90 min.
Shock	15g in all directions in acc. with IEC 60068-2-27
Pollution degree in acc. with EN 50178	2
Climatic class	3K3 (in acc. with EN 60721)

Standards	
Electrical Equipment for Machinery	EN 60204
Safety transformers for power supply units	EN 61558-2-17
Electrical safety (of information technology equipment)	EN 60950/VDE 0805 (SELV) EN 61558-2-17
Electronic equipment for use in electrical power installations	EN 50178/VDE 0160 (PELV)
SELV	EN 60950 (SELV) EN 60204 (PELV)
Safe isolation	DIN VDE 0100-410 DIN VDE 0106-1010
Protection against electric shock	DIN 57100-410
Protection against electric shock, basic requirements for safe isolation in electrical equipment	DIN VDE 0106-101
Limitation of mains harmonic currents	EN 61000-3-2

Approvals	
UL rating	UL Listed UL 508 UL/C-UL Recognized UL 60950

Conformance with EMC directive 89/336/EEC		
Immunity to interference in acc. with EN 61000-6-2		
Discharge of static electricity		
	Housing	Level 3
	Contact discharge	6 kV
	Discharge in air	8 kV
	Comments	Criterion B
Electromagnetic HF field		
	Housing	Level 3
	Frequency range	80 MHz ... 3 GHz
	Field intensity	10 V/m
	Comments	Criterion A
Fast transients (burst)		
	Input	4 kV (level 4 - asymmetrical: conductor to ground)
	Output	2 kV (level 3 - asymmetrical: conductor to ground)
	Comments	Criterion A
Surge current loads (Surge)		
	Input/Output	4 kV (level 4 - asymmetrical: conductor to ground) 2 kV (level 4 - symmetrical: conductor to conductor)
	Comments	Criterion A
Conducted interference		
	Input/output	Level 3 - asymmetrical
	Frequency range	0.1 MHz ... 80 MHz
	Voltage	10 V
	Comments	Criterion A
Voltage dips		
	Input	(mains buffering > 10 ms)
	Comments	Criterion B
Emitted interference in acc. with EN 61000-6-3		
Radio interference voltage in acc. with EN 55011		EN 55011 (EN 55022) Class B, area of application: Industry and residential
Emitted radio interference in acc. with EN 55011		EN 55011 (EN 55022) Class B, area of application: Industry and residential

Structure



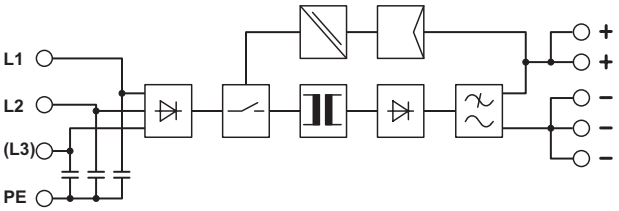
1 AC input
2 DC output
3 Potentiometer 22.5 V DC ... 29.5 V DC
4 "DC OK" LED
5 DIN rail adapter
6 Take-up for cable binders

	[mm²]		AWG	[Nm]
	solid	stranded		Torque
Input	0.2 - 6	0.2 - 4	22 - 10	0.5 - 0.6
Output	0.5 - 16	0.5 - 10	8 - 6	1.2 - 1.5

Input data	
Input nominal voltage range	2x / 3x 400 V AC ... 500 V AC
AC input voltage range	320 V AC ... 575 V AC (for 3-phase operation) 2x 360 V AC ... 575 V AC (for 2-phase operation)
AC frequency range	45 Hz ... 65 Hz
Recommended backup fuse for mains protection	3x 10 A (characteristic B) 3x 16 A (characteristic B)
Required backup fuse (device and line protection)	(externally via 3 10 A or 16 A circuit breakers, characteristic B)
Type of connection	Screw connection
Stripping length	8 mm

Output data	
Nominal output voltage	24 V DC ±1%
Setting range of the output voltage	22.5 V DC ... 29.5 V DC
Output current	40 A (-25 °C ... 55 °C)
Type of connection	Screw connection
Stripping length	10 mm

Block diagram



Safety and warning notes

The power supply units are built-in devices. The device may only be installed and put into operation by qualified personnel. The corresponding national regulations must be observed.

DANGER OF EXPLOSION!
Remove an item only when it is not connected to power or if it is located in the non-explosive area.

DANGER
Components with dangerously high voltage and high stored energy are located in the device!
Never carry out work on live parts!
Depending on the ambient temperature and the load, the housing can become very hot!

Before startup please ensure:

The mains connection has been carried out by a competent person and protection against electric shock is guaranteed!

The device can be disconnected outside the power supply unit in accordance with the regulations as in EN 60950 (e.g. through primary side line protection)!

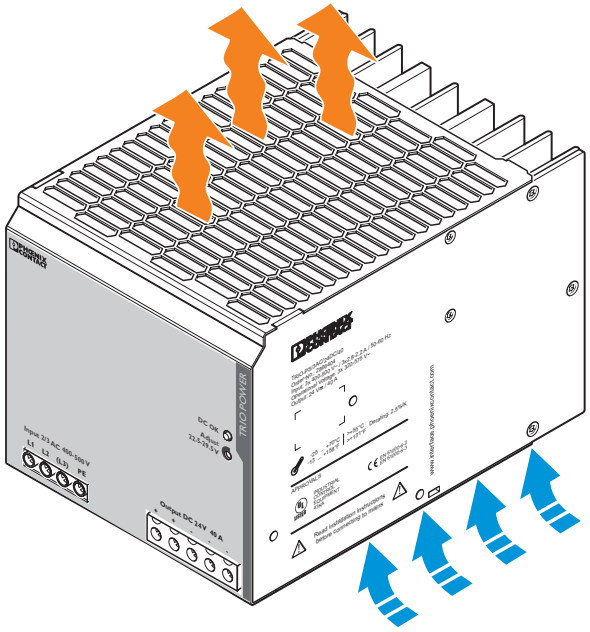
The ground conductor is connected!

All feed lines are sufficiently protected and dimensioned!

All output lines are dimensioned according to the maximum output current of the device or separately protected!

Sufficient convection is guaranteed!

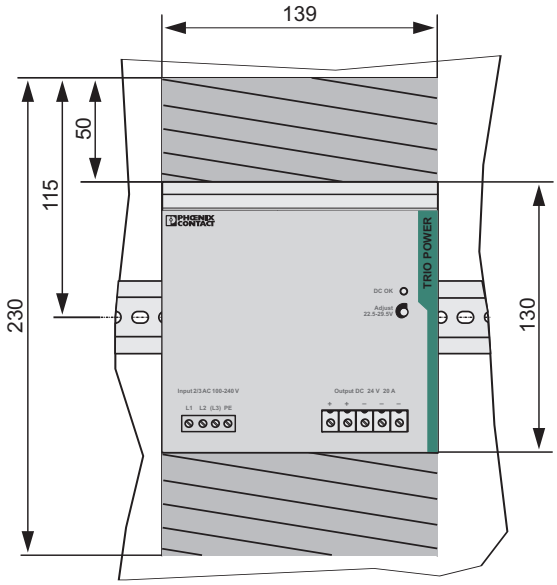
Installation



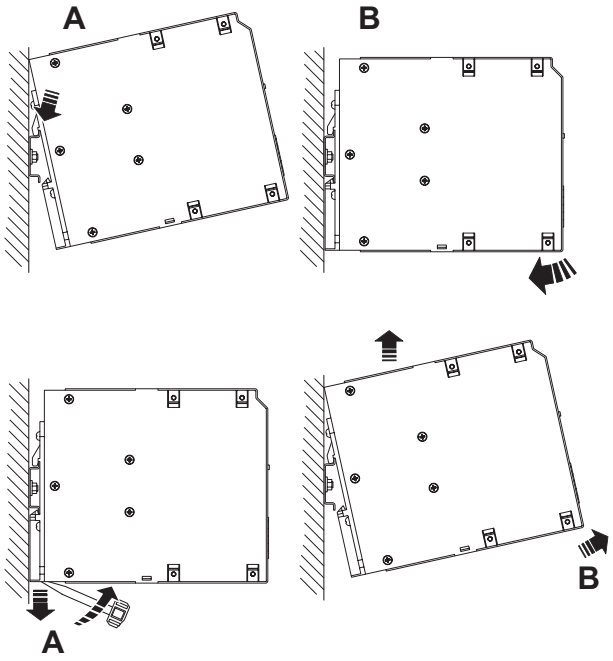
In order to guarantee sufficient convection, we recommend observing the following minimum distance to other modules: 5 cm in a vertical direction and 0 cm in a horizontal direction.

The power supply unit can be snapped onto all DIN rails in acc. with EN 60715. They must be mounted horizontally (connecting terminal blocks bottom).

Installation position



Mounting position: Installation depth 190 mm (+ DIN rail)



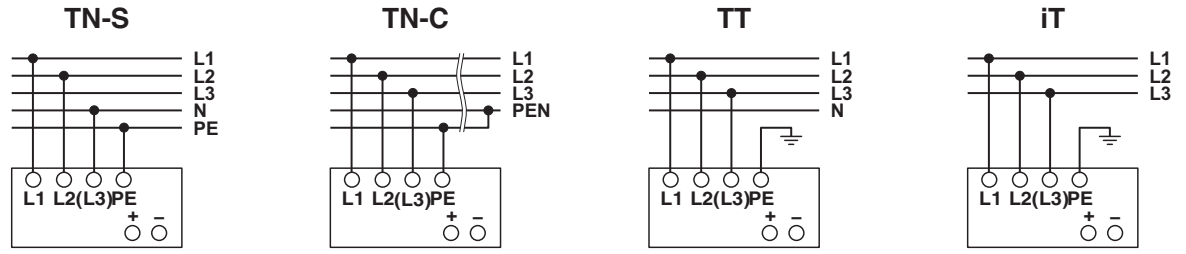
Assembly

Position the module with the DIN rail guide on the upper edge of the DIN rail, and snap it in with a downward motion.

Removing

Pull the snap lever open with the aid of a screwdriver and slide the module out at the lower edge of the DIN rail.

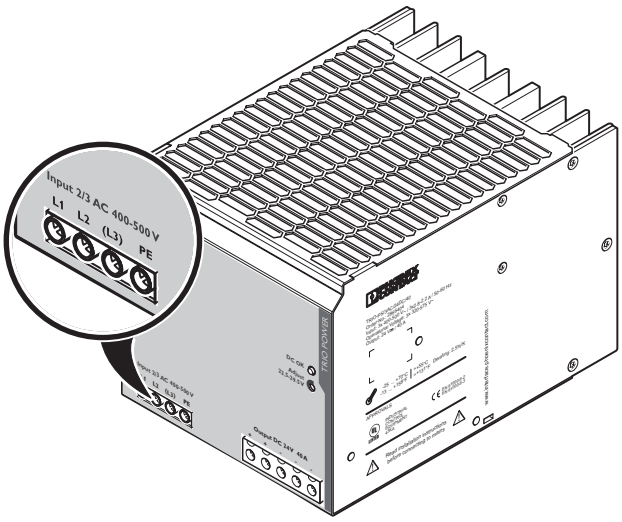
Connection to various network forms



The connection for 2x/3x 400 V AC ... 500 V AC is made using the L1, L2, L3 and PE screw connections.
The device can be connected to 2/3-phase AC networks with nominal voltages 2x/3x 400 V AC ... 500 V AC.
In the event of a phase failure, unrestricted operation is possible with nominal capacity.

In order to comply with the UL certification, use copper cables that are designed for operating temperatures of > 75°C.
In order to comply with EN 60950/UL 60950, flexible cables require ferrules. To safely connect a device, the ferrules should have a length of at least 10 mm (AC input) or 12 mm (DC output). To achieve a reliable and shock-proof connection, strip the connecting ends according to section "Structure".

Input



Protection of the primary side

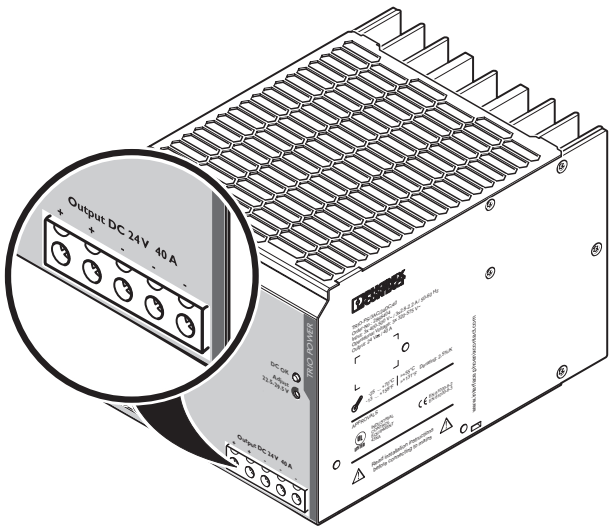
The device must be installed in acc. with the regulations as in EN 60950. It must be possible to disconnect the device using a suitable isolating facility outside the power supply. Primary circuit mains protection, for example, is suitable for this purpose.

Required backup fuse (device and line protection)

Three external thermo-magnetic fuses are necessary as device protection: 3 x 10 A or 16 A power circuit breaker, characteristic B (or identical function).

If an external fuse is triggered, there is most probably a malfunction in the device. In this case, the device must be inspected in the factory!

Output



Make sure that all output lines are dimensioned according to the maximum output current or are separately protected. The cables on the secondary side must have sufficiently large cross sections in order to keep the voltage drops on the lines as low as possible.

You can fasten the connection cables to the housing using cable binders.
Ensure that the cable binders and the connection cables are designed for the surface temperatures that occur in operation.
Make sure that the insulation of the connection cables is not damaged when tightening the cable binders.

The connection is made using the "+" and "-" screw connections on the screw connection of the DC output. At the time of delivery, the output voltage is 24 V DC. The output voltage can be set on the potentiometer.

Protection of the secondary side

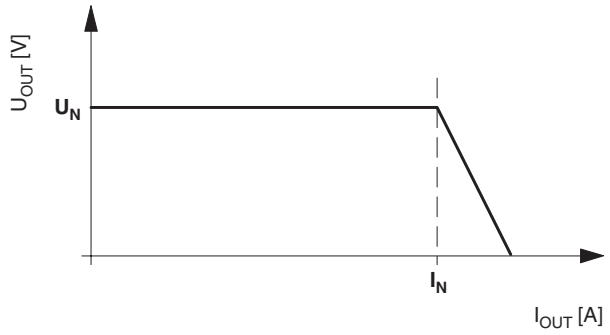
The device is electronically protected against short circuit and idling. In the event of a malfunction, the output voltage is limited to 35 V DC.

Signaling

The "DC OK" LED enables evaluation of the function of the power supply directly on site.

	State 1	State 2
"DC OK" LED	ON	OFF
Cause	Output voltage > 21.5 V	Output voltage < 21.5 V or no voltage at the output
Meaning	Output voltage and output current OK	TRIO POWER is in operation, but there is a fault on the side of the consumer; the current consumption is greater than I_N or the output is short circuited. TRIO POWER is out of operation because there is no mains voltage, the fuse on the primary side has been triggered, or the device is faulty.

Function



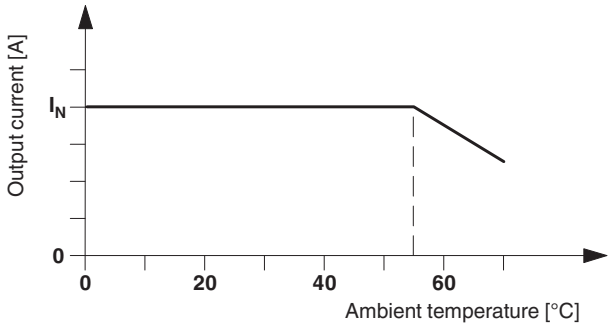
Output characteristic curve

The device functions following the U/I characteristic curve. Under load, the working point follows this curve. The output current is limited in the event of a short circuit or overload. Thereby, the device does not switch off, but rather supplies a continuous output current.
The secondary voltage is reduced until the short circuit or overload on the secondary side has been remedied. The U/I characteristic curve ensures that both heavily capacitive loads and loads with DC/DC converters in the primary circuit can be supplied. Downstream fuses are triggered. Selectivity in the design of your system is guaranteed at all times.

U_N = 24 V

I_N = 40 A

P_N = 960 W

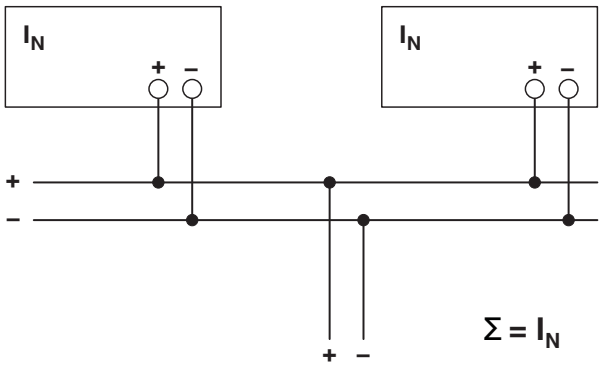


Thermal behavior

With an ambient temperature of up to +55°C, the device supplies the continuous output current of I_N. In the case of ambient temperatures above +55°C, the output current must be reduced by 2.5% per Kelvin increase in temperature. The device does not switch off at ambient temperatures of +70°C or thermal overload. The output capacity is reduced as far as necessary to provide device protection. After it has cooled down, the output capacity is increased again.

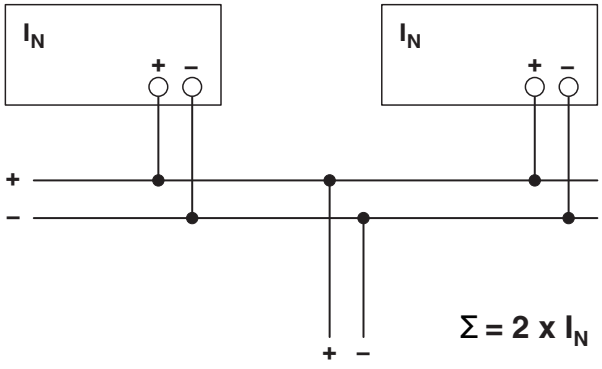
Parallel operation

Devices of the same type can be connected in parallel to enable both redundancy and an increase in efficiency. No other alignment is necessary when in the state of delivery.
If the output voltage is adjusted, a uniform distribution of power is guaranteed by setting all parallel operated power supply units to exactly the same output voltage.
To ensure symmetrical distribution of power, we recommend designing all cable connections from the power supply unit to a busbar of the same length and with the same conductor cross section. The system makes it advisable to install a protective circuit at the output of each device when more than two power supply units are connected in parallel (e.g. decoupling diode or DC fuse). This prevents high reverse feed currents in the event of a secondary device fault.



Redundant operation

Redundant circuits are suitable for the supply of systems which make especially high requirements on the operational safety. If a fault occurs in the primary circuit of the first power supply unit, the second device automatically takes over the entire power supply, without interruption, and vice versa. For this reason, the power supply units to be connected in parallel are dimensioned in such a way that the total current requirement of all consumers can be completely covered by one power supply unit. 100% redundancy makes external decoupling diodes necessary (QUINT-DIODE/40, Order No. 2938963)!



Increased performance

For n parallel connected devices, the output current can be increased to n x I_N. Parallel connection to increase efficiency is used for the expansion of existing systems. It is advisable to use parallel connection if the power supply unit does not cover the current requirement of the most powerful consumer. Otherwise the consumers should be spread among individual devices independent of one another. A maximum of five devices can be connected in parallel!

Updated: 13.06.2022

EC - Declaration of Conformity

We hereby declare that the following specified equipment complies with the Marine Equipment Directive 2014/90/EU. This declaration of comformity is issued under the sole responsibility of the manufacturer.

Equipment Description	Stone wool insulation slabs
Type	PAROC Marine Fire Slab 100
Manufactured By	Paroc Group Oy
Address	Energiakuja 3, P.O. Box 240
	FI-00181 Helsinki, Finland

This equipment has been tested to verify compliance with the following Regulations and Testing Standards:
IMO 2010 FTP Code (IMO Resolution MSC.307(88) Annex 1 Part 1: Non-combustibility test (test procedure ISO 1182:2002)

The notified body Eurofins Expert Services Ltd. (0809) performed and issued the certificates:
Type-Examination (Module B) certificate No. EUFI29-20002521-MED
Surveillance certificate (Module D) No. EUFI29-20002251-MED



Dmitriy Bolotov, Product Data and Project Manager

Head Office: PAROC GROUP, P.O. Box 240 (Energiakuja 3), FI-00181 Helsinki Finland, Tel. +358 46 876 8000, www.paroc.com

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Updated: 13.06.2022

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IMO 2010 FTP Code (IMO Resolution MSC.307(88) Annex 1 Part 1: Non-combustibility test (test procedure ISO 1182:2002)

The notified body Eurofins Expert Services Ltd. (0809) performed and issued the certificates:
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SIMULATION MODEL OF FREQCON INVERTERS IN DIGSILENT POWERFACTORY

MODEL DESCRIPTION

DIgSILENT PowerFactory Modell: Freqcon_VDE_4110_4120_4130_rel_enc_v4.pfd

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Revision history:

Document

Version	Date	Description
1	09.08.2021	First version
2	12.08.2021	Family members added
3	15.10.2021	Parameter tables updated, plausibility tests
4	26.11.2021	Correction of limited voltage support and FRT detection, extended protection

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4	26.11.2021	Correction of limited voltage support and FRT detection, extended protection, updated parameter description

26. November 2021

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1 INTRODUCTION

This document describes the simulation model of the Freqcon 1 MW inverter (MSC-1000-620-X) in DIgSILENT PowerFactory and provides usage instructions. Besides of the model of the 1 MW inverter, which was validated with measurement data, there are also templates of the inverter family included in the PowerFactory file. The model was developed for validation according to the German grid code VDE 4110, 4120 and 4130 and FGW Technical Guidelines TG 4.

The model is suited for basic load flow simulations, dynamic fault ride through (FRT) simulations for symmetric and asymmetric faults as well as active and reactive power steps and P(f) active power control.

The model was created with DIgSILENT PowerFactory 2021 and can be run with any equal or newer version of PowerFactory. Chapter 2 provides a description of the model components and their most important parameters.

The power generation of the prime mover unit is not modelled; instead, the model assumes a source with constant power output as its input unless something else is connected by the user. Changes in primary power, if needed for the simulation, can therefore simply be integrated as variable power input into the converter model or can be simulated via parameter events.

Chapter 3 documents basic model usage and in chapter 4 all conducted test simulations are described.

2 MODEL

2.1 SIMULATION SETTINGS

The dynamic model is a three-phase RMS-Model that was created in DIgSILENT PowerFactory 2021. The simulation step size must be set to 1.0 millisecond to guarantee proper simulation results.

The used solver options are shown in Figure 2.1 to Figure 2.3.

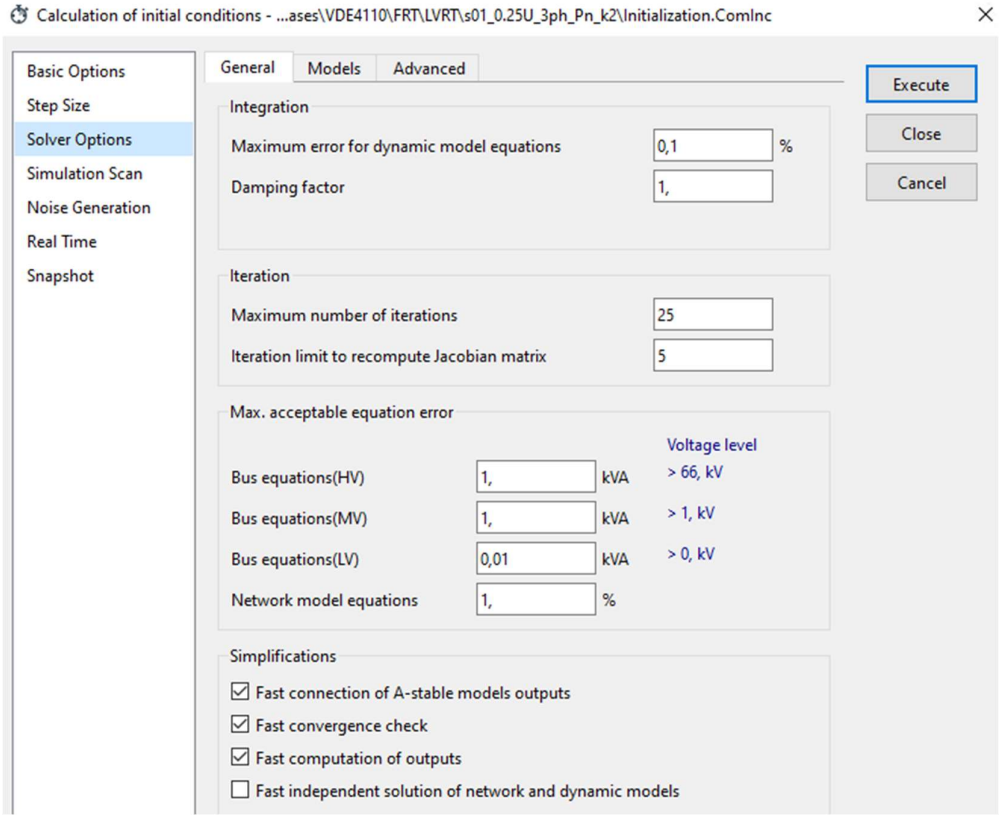


Figure 2.1: General Solver Options

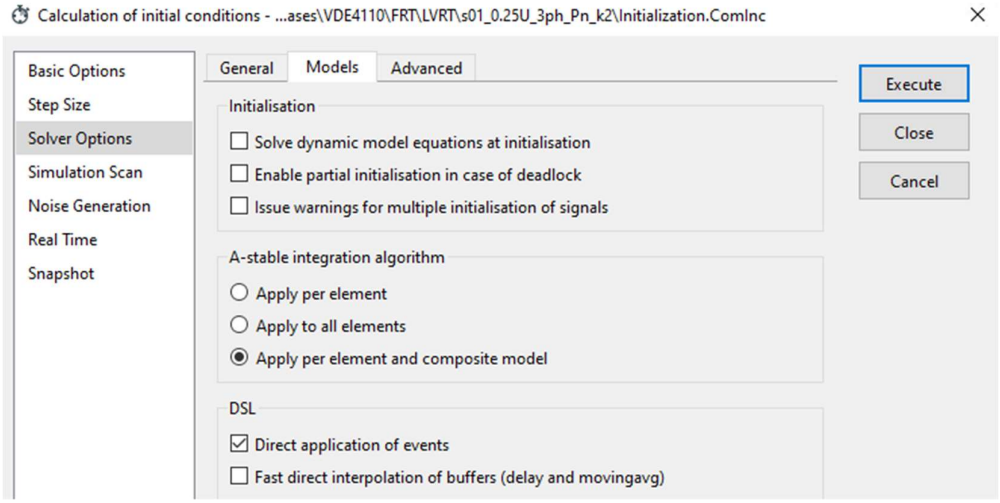


Figure 2.2: Model solver options

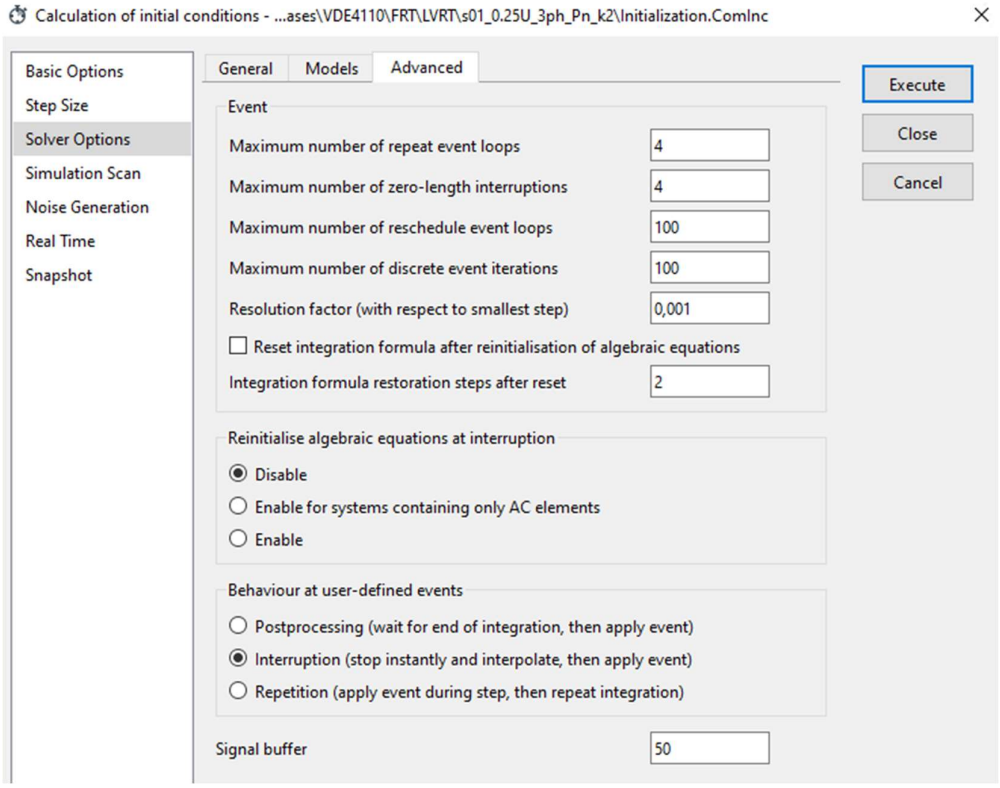


Figure 2.3: Advanced solver options

2.2 GRID MODEL

The grid model represents the real test setup that was used for the FRT measurements in a simplified way. In the measurements, the “device under test” (DUT) was connected to a grid simulator. This grid simulator is replicated as an ideal voltage source in the simulation model. The voltage level is 620 V. The inverter is implemented with the element “static generator”. Its controls are implemented in a DSL model, which is connected to the static generator (see chapter 2.3).

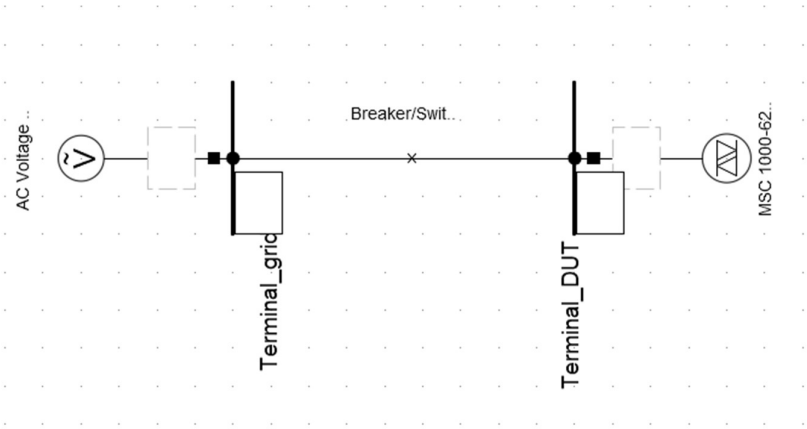


Figure 2.4: Grid model

2.3 MODEL STRUCTURE

The composite model connects the components of the converter control system including its inputs and outputs. Figure 2.5 depicts the structure.

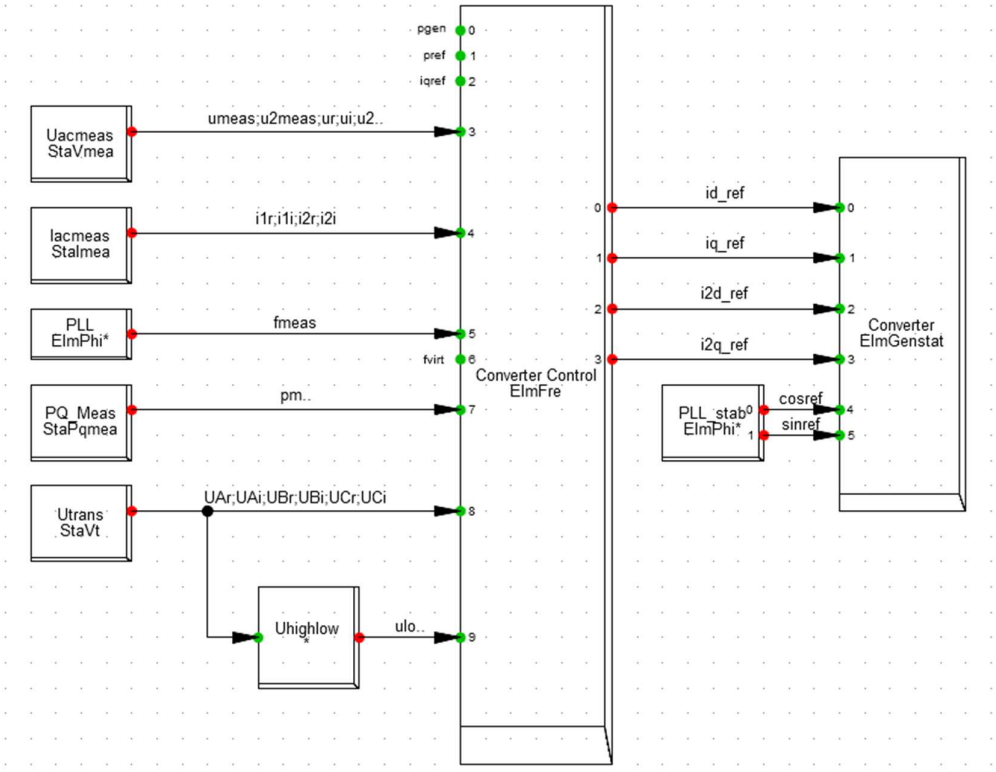


Figure 2.5: Composite Model Structure (Block Diagram) of the Converter Unit Model

The measurement data are taken directly from the generator terminals and are provided to the control model via the measurement slots **PQ_Meas** (active and reactive power), **Iacmeas** (current), and **Uacmeas** (voltage). **Utrans** serves to provide the phase-neutral voltages as separate signals. From this, the **Uhighlow** block determines the lowest and highest phase voltages, which are used for FRT detection. The control system **Converter Control** contains the actual controller code functionality. The **Converter** slot connects the control system output signals to the generic generator model (Static Generator) with appropriate parameters. **PLL** and **PLL_stab** provide additional signals for frequency and voltage reference phase angle.

2.4 CONVERTER CONTROL

The converter control model contains the following functions:

- Active power control as DC circuit voltage control
- Active power reduction adaption at over- and underfrequency

- Reactive power and reactive current control
- Current limitation with prioritization of active or reactive current during faults.

A list of parameters of the controls and their settings of the MSC-1000-620-X is given in Table 2.1. The parameters of the whole MSC inverter family are given in the attached Excel file "Parameters_Freqcon_MSC_Family.xlsx". There are several possible settings and control modes, so the model can represent the required FRT behavior of different grid codes. The parameters corresponding to VDE 4110 are set in the model. Especially the parameter *FlagQctrl* has to be set to 3 and the parameter *PpriorityFRT* to 0 (see also section 3).

The parameters *Kq* and *Kq2* are the K-factors that determines the additional reactive current during FRT depending on the depth of the voltage dip. It can be set according to user preferences.

The model does not include any primary power conversion. However, varying input power can be considered by applying events or connecting external signals to the input *pgen*.

Table 2.1: Parameter list for converter control system of MSC-1000-620-X (1000 kW, 620V)

Name	Value	Unit	Description
Tmean	60.00000	[s]	Mean filter time window for system reference voltage (TAB HS)
KtrigL	0.05000000	[pu]	Trigger level for LVRT calculation of TAB HS
KtrigH	0.05000000	[pu]	Trigger level for HVRT calculation of TAB HS
Tclear	0.5000000	[s]	Time after FRT until inverter returns to normal mode (VDE4110/4120)
Tfrtmax	130.0000	[s]	Maximum time of FRT support (TAB HS, VDE4110/4120)
FlagQctrl	3.000000	[0/1/2/3]	0 = SDLWindV, 1 = TC2007, 2 = TAB HS, 3 = VDE4110/4120
udip	0.9000000	[p.u.]	LVRT detection threshold (TAB HS, VDE4110/4120)
uswell	1.100000	[p.u.]	HVRT detection threshold (TAB HS, VDE4110/4120)
deltaudyn	0.05000000	[p.u.]	Limit for dynamic voltage steps that activate FRT mode (VDE4410/4120). Set very high (e.g. 1), if not used.
db	0.1000000	[pu]	Voltage deadband (SDLWindV, TC2007)
Qdisable	0.00000000	[bool]	disable reactive power prefault demand during fault (TAB HS)
Kq	2.000000	[pu/pu]	Reactive current/voltage delta ratio for positive sequence
Flaglim	0.00000000	[0/1]	Limited dynamic voltage support flag (TAB HS, VDE4110/4120)
udiplim	0.7000000	[p.u.]	Voltage threshold below which limited dynamic voltage support is activated (VDE4110/4120)
Kq2	2.000000	[pu/pu]	Reactive current/voltage delta ratio for negative sequence
Ffreezelimlow	49.50000	[Hz]	No increase of charging current or deacrease of discharging current below this value
Ffreezelimup	50.50000	[Hz]	No decrease of charging current below this value
Fnom	50.00000	[Hz]	Nominal frequency
Vnom	400.0000	[V]	Nominal Voltage (L-L)
dUasym	35.00000	[V]	Voltage Asymmetry Threshold
dtasym	0.01000000	[s]	Asymmetry Detection Time
ir	1.000000	[pu]	Rated current
uLimPsym	0.00000000	[pu]	voltage threshold for iPmaxsym
uLimPasym	0.00000000	[pu]	voltage threshold for iPmaxasym

iPmaxsym	0.3000000	[pu]	sym dip active current limit
iPmaxasym	0.3000000	[pu]	asym dip active current limit
Pdisable	0.00000000	[0/1]	0: ref. value according Pcontrol, 1: disable active power during fault (TAB HS or VDE4110/4120)
Pcontrol	0.00000000	[0/1]	0=const. Ip, 1=const. P
iratio	1.000000	[-]	Ratio between 1 p.u. for the inverter and 1 p.u. for the control system
PpriorityFRT	0.00000000	[0/1]	0=reactive current, 1=active current prioritized during FRT
lim_mode	0.00000000	[0/1]	0 = fixed current limit, 1 = dynamic current limit
imax2t_dyn	1.395000	[pu^2*t]	Maximal value of integral for dynamic maximum converter limit
imax_short	2.000000	[pu]	Maximal inverter current. Can be sustained for short time when lim_mode is 1.
t_cooldown	200.0000	[s]	Time until the full overload capability is available again after imax2t_dyn was reached
t_block	100.0000	[s]	Time until imax_short is available again, after imax2t_dyn was reached
Tposneg	0.01000000	[s]	Time constant for voltage angle calculation
dbof	0.2000000	[Hz]	Deadband to nominal frequency until active power is decreased (positive value)
dbuf	0.2000000	[Hz]	Deadband to nominal frequency until active power is increased (negative value)
slope	0.02000000	[pu/pu]	Droop for active power reduction with overfrequency
reset_lim	0.02000000	[Hz]	Deviation to nominal frequency, where lfs mode is deactivated
t	0.00000000	[s]	Time after reset_lim is reached, when lfs mode is deactivated
dragind	0.00000000	[0/1]	Should the active power stay at the lowest (highest) reach value during overfrequency (underfrequency), like a drag indicator?
fmode	0.00000000	[0/1]	Frequency measurement from grid (0) or external signal (1)?
Tffilt	0.02000000	[s]	Filter time constant for frequency measurement
Ki_pre	0.1000000	[-]	Integrator constant for q references
Tqref	4.000000	[s]	5 tau - time constant of first order delay for q references
offset	1.050000	[p.u.]	Factor to emulate the effect of filter reactances, when giving setpoint steps
Tqref2	1.000000	[s]	Additional Time Constant for Q-references (do not change)
Ki1	0.1000000	[-]	Integrator constant for p references
pgradient_post	0.00170000	[%Pn/s]	Active power gradient after LFSM operation
diqmin	-1.000000	[p.u.]	Limit for additional iq refernce during FRT
qref_min	-1.000000	[p.u.]	Minimal value for q references
y_min	-1.070000	[p.u.]	Minimal value for p references
diqmax	1.000000	[p.u.]	Limit for additional iq refernce during FRT
qref_rate	10.00000	[pu/s]	Reactive power reference rate
iq_up	100.0000	[pu/s]	Reactive current release rate
iqlim	1.200000	[pu]	Maximum reactive current during normal mode
pgradient	0.6600000	[%Pn/s]	Slope for active power reference values
imax_fix	1.200000	[pu]	Static maximum converter current during normal mode. Is applied, after the maximal time of imax_short is reached or if lim_mode is 0.
imax_fix_FRT	1.070000	[pu]	Static maximum converter current during FRT. Is applied, after the maximal time of imax_short is reached or if lim_mode is 0.
iqlim_FRT	1.070000	[pu]	Maximum reactive current during FRT
pgradient_lfsm	0.7200000	[%Pn/s]	Active power gradient during LFSM operation
qref_max	1.000000	[p.u.]	Maximal value for q references
qref_maxrate	2.000000	[p.u./s]	Maximum rate of change for Q references
y_max	1.070000	[p.u.]	Maximal value for p references

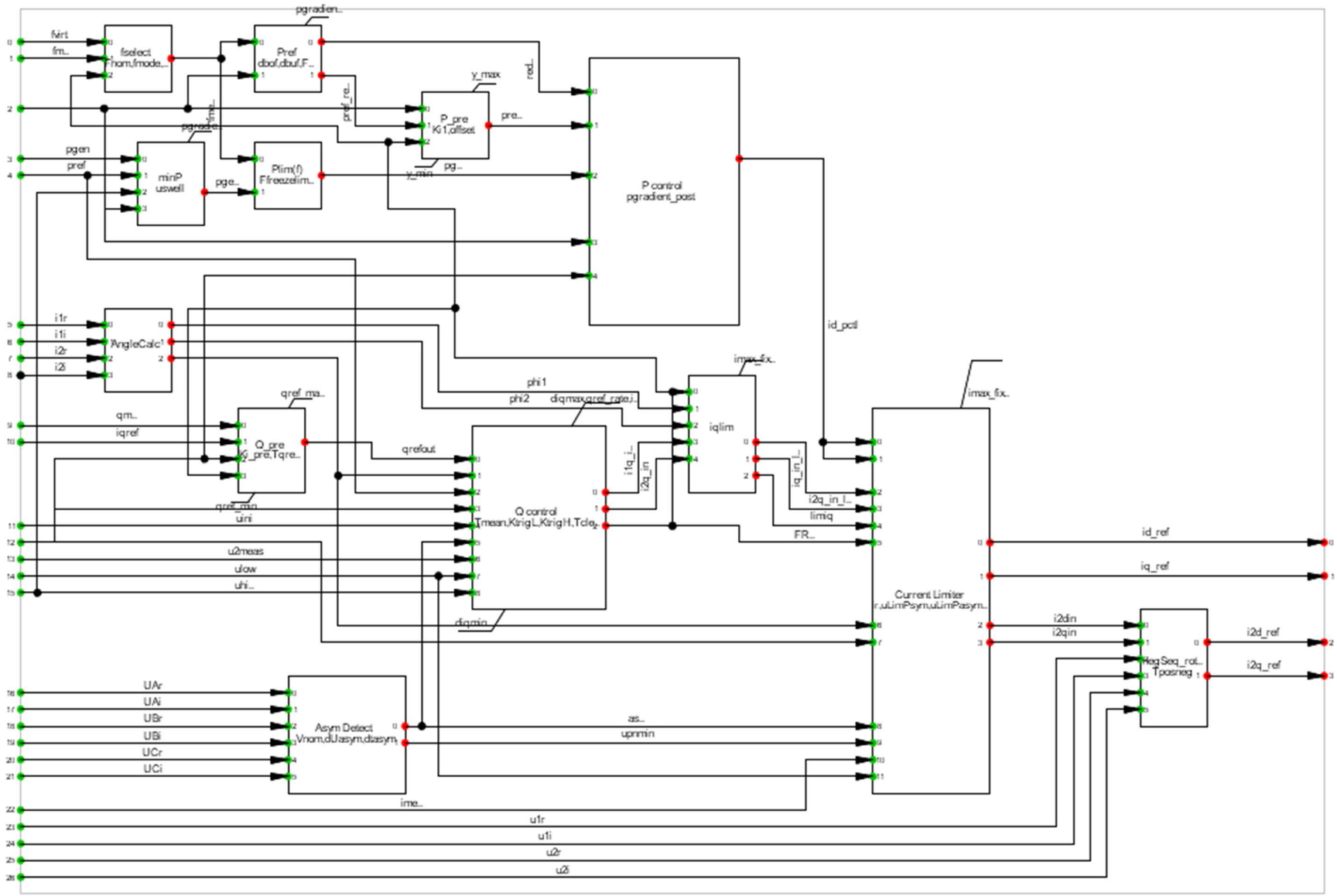

pgradien...
fvirt
fm...
fselect
fnom,fmode,...
Pref
dbof,dbuf,F...
y_max
red...
pref_re...
P_pre
Ki1,offset
pre...
pgen
pref
minP
uswell
pge...
Plim(f)
Ffreezelim...
y_min
pg...
P control
pgradient_past
id_pctl
imax_fix...
i1r
i1i
i2r
i2i
AngleCalc1
phi1
phi2
diqmax,qref_rate,i...
iqlim
qref_ma...
qm...
iqref
Q_pre
Ki_pre,Tqre...
qrefout
i1q_i...
i2q_in
iq_in_l...
i2q_in_l...
limiq
FR...
qref_min
uini
Q control
Tmean,KtrigL,KtrigH,Tcle...
u2meas
ulow
uhi...
diqmin
Current Limiter
r,uLimPsym,uLimPasym...
id_ref
iq_ref
i2din
i2qin
Neg Seq_rot...
Tpasneg
i2d_ref
i2q_ref
UAr
UAi
UBr
UBi
UCr
UCi
Asym Detect
Vnom,dUasym,diasym...
as...
upmin
ime...
u1r
u1i
u2r
u2i

Figure 2.6: Controller model

2.5 GENERATOR (CONVERTER)

The static generator model provided by PowerFactory is used to represent the inverter and is fitted with parameter settings according to the converter rating. The rated power is set to 1 MVA in the “Basic Data” section, with rated power factor 1.0.

The actual generator power should be set by the user according to their specific simulation cases. Both active and reactive power can be set in the “Load Flow” section of the generator dialog. The “Input Mode” can be set as desired. The local controller setting is typically “const. Q”, and the voltage in the load flow is determined based on the setting in the external grid.

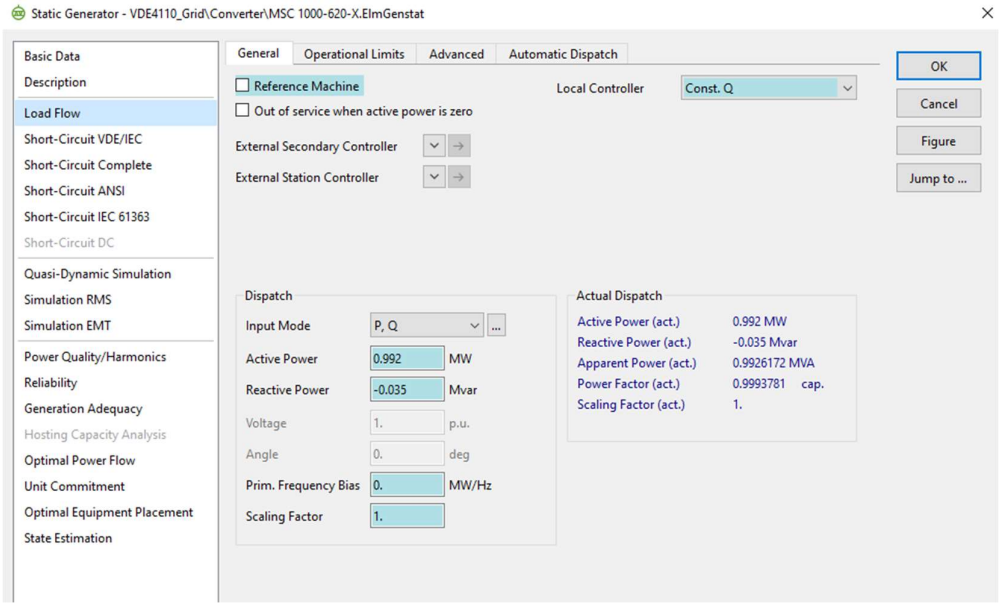


Figure 2.7: load flow settings in the dialog of the static generator

2.6 MEASUREMENT DEVICES

All measurement devices in the model are set to use the rating of the connected element. The power measurement is generator oriented.

2.7 PROTECTION

There are generator protection devices (high and low voltage, high and low frequency) implemented in this model (Figure 2.8). They are parametrized according the default settings given in Table 15 of the document “Produktbeschreibung Multi Source Converter 250 A 1500 A”. However during the measurements the protection was deactivated, hence it is also deactivated in the model.

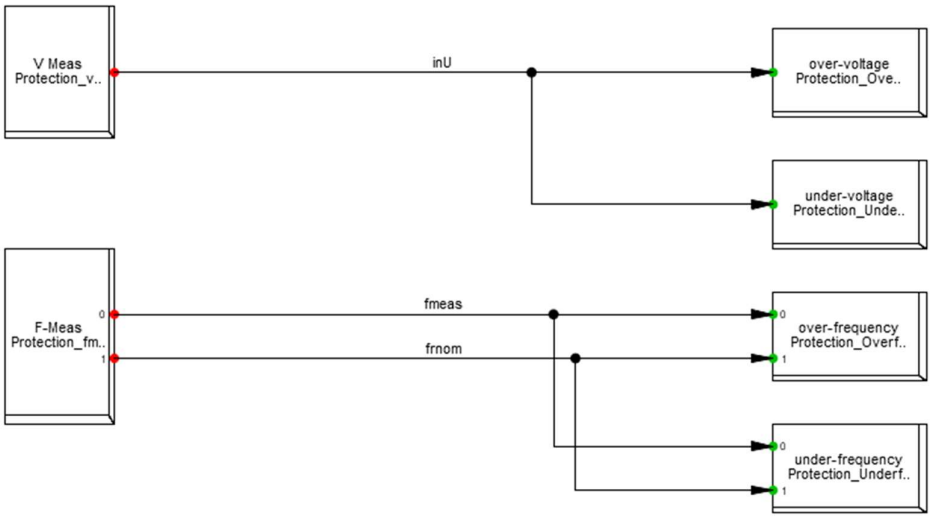


Figure 2.8: Protection frame

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3 MODEL USAGE

3.1 PARAMETER MODIFICATION

After insertion of a model instance into the model from the template, parameter changes can be made directly in that model instance. The structure of the model instance is identical to the composite model structure shown in Chapter 2.

Figure 3.1 shows all relevant model instances in the PowerFactory project tree. The control system model is marked with the "DSL" icon. Its settings (those shown in section 2.4) can be adapted after selecting "Edit" in its context menu.

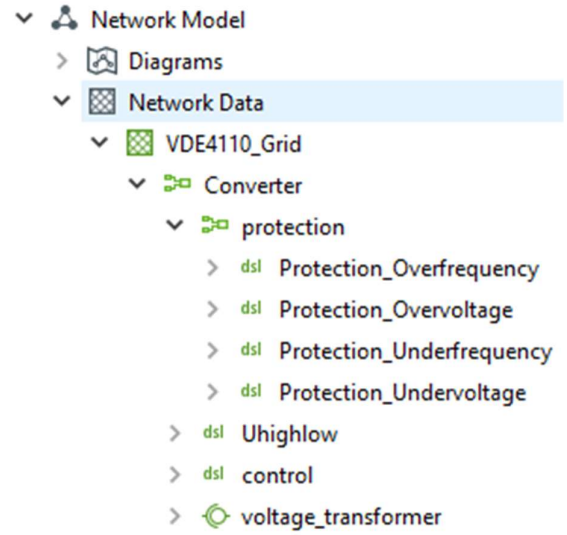


Figure 3.1: Model instances in PowerFactory

In the template, all parameters are set according the specifications of VDE 4110 and no parameters need to be adjusted. If different FRT settings shall be used, mainly the following parameters are relevant:

FlagQctrl	(LVRT reactive current contribution profile selection, 3 = VDE 4110)
Kq, Kq2	(factors for reactive current contribution proportional to voltage dip depth)
udip	(Voltage dip recognition thresholds)
uswell	(Voltage swell recognition threshold)
db	(deadband)
KtrigL	(LVRT-recognition for German TAB HS mode)
KtrigH	(HVRT-recognition for German TAB HS mode)
Pdisable	(Active power generation during fault)
Qdisable	(Indication of whether pre-fault reactive power should be considered)

Pcontrol (constant active current or constant active power during fault)

PpriorityFRT (prioritize active or reactive current during FRT)

lim_mode (allow for short over current during fault)

Flaglim (limited dynamic voltage support)

In the study cases that are already defined in the model, all measured FRT tests are replicated. The default k-factor *Kq* is 2, but in some of the tests *Kq* was different. In these tests, variations have been activated. In the variation **k4**, *Kq* was set to 4. The study cases that are conducted with limited dynamic voltage support according to TR 3 are executed with the variation **Eingeschränkte Spannungsstützung**, in which Flaglim is set to 1.

3.2 EXECUTING FRT SIMULATIONS

The faults in the FRT study cases are triggered by the **FRT** Element, that gives setpoints to the voltage source. The voltage level, angles and start and end point of the FRT is given with parameters for this element. Example parameters are shown in Table 3.1. If different FRTs should be simulated, these parameters have to be changed. If the parameters should only be changed in one study case, this can be done by applying a variation or changing the parameters by events at the beginning of the simulation. In the study cases in the model, there are events at the beginning of each case, which set the parameters of the **FRT** element.

If no FRT is simulated, the **FRT** element should be deactivated or its parameters should be set in such way, that no FRT is executed during the considered study case.

Table 3.1: Example parameters of the FRT element

Name	Value
U1fault	0.4609000
U2fault	0.8913000
U3fault	0.8913000
U2phifault	-109.1000
U3phifault	108.9000
Tfault	1.000000
Tclear	2.642000
Ur	0.4000000

3.3 APPLICATION OF SETPOINT STEPS

Setpoint steps for active power are done with the signal *pref* of the block **control**, e.g. by applying parameter events. The setpoints are given in p.u. rated to the nominal inverter power (1000 kW). There is also an input *pgen*, which represents the available primary power. The inverter will adjust the output power to the minimum of *pgen* and *pref*. During initialization, *pref* is set to the power obtained from the load flow, while *pgen* is set to

1p.u. When applying setpoint steps to *pref* the rate of change is limited to the ramp rate given with the parameter *pgradient*. Changes in *pgen* are applied immediately.

For P(f) behavior, the frequency is either measured in the grid or given by an external signal *fvirt* in the block **control**. Which of these two inputs should be chosen is set with the parameter *fmode*. Frequency changes for *fvirt* have to be given in Hz.

Like in the real inverter, setpoints for reactive power are given as current setpoints with the signal *iqref* of the block **control**, e.g. by applying parameter events. The setpoints are given in p.u. rated to the nominal inverter current. If the inverter is operated at (or near) to nominal voltage, the reference value for the reactive current in p.u. is the same (or approximately the same) as the reference value for reactive power in p.u. The setpoint is adjusted with PT1 behavior with the time constant *Tqref*. *Tqref* is equal to 5 tau.

3.4 TRANSFERRING THE MODEL TO OTHER PROJECTS

To transfer one or more of the included templates into a different PowerFactory project, first “pack” the template in the delivered model, then copy it to the Library\Templates folder in your own project:

The “packing” will copy all used block definitions and asset characteristics into the template so there is no need to take care of copying any complex set of library objects. Navigate to the Library\Templates\ folder in the project library, select the desired template and click “Edit” from the context menu, then click the “Pack” button.

After copying the template into the desired project, the “General template” icon can be used in the power system asset symbol bar to insert instances of the template into the grid diagram. The template can then be connected as needed within the project.

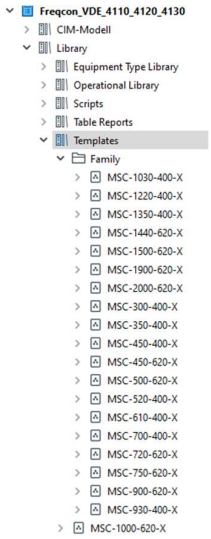


Figure 3.2: Overview of all templates in the model

3.5 DELETING THE MODEL

If only the control system of the converter is to be deleted, simply delete the “control” DSL object from the mode instance. The “Converter” composite model can also be deleted, but remember to move the static generator out of it before if it is to be retained!

3.6 DEACTIVATING THE MODEL

Right click on the “Converter” composite model and select “Edit” from the context menu. Then select “Out of service”. The static generator will be deactivated as well.

4 SIMULATED STUDY CASES

4.1 FRT TESTS

The FRT-tests listed in Table 4.1 have been conducted with the model. Each of the tests is set up as a separate study case and was compared to the first of the two measurements. It is mentioned in the comment column in Table 4.1, when variations had to be activated, because the controller settings have been different in the corresponding cases. The variations **k0** and **k4** implement a different K-factor **Kq**. It Is also indicated, at which tests the measurement results of the second measurement ("Nachmessung") have been used.

Table 4.1: Simulated FRT-Tests

Test name	Voltage [p.u.]	3-/ 2-phases	Full load or Partial load	K-Factor	Comment
FRT_0.1-T1	0	3ph	Full load	2	Behavior during fault not correctly replicated
FRT_0.2-T1			Partial load	2	
FRT_0.3-T1		2ph	Full load	2	Measurement results of "Nachmessung" have been used for comparison.
FRT_0.4-T1			Partial load	2	
FRT_25.1-T1	0.25	3ph	Full load	2	
FRT_25.2-T1			Partial load	2	
FRT_25.4-T1		2ph	Full load	2	Measurement results of "Nachmessung" have been used for comparison.
FRT_25.5-T1			Partial load	2	
FRT_50.1-T1	0.5	3ph	Full load	2	
FRT_50.2-T1			Partial load	2	
FRT_50.3-T1		2ph	Full load	2	
FRT_50.4-T1			Partial load	2	
FRT_50.5-T1		3ph	Full load	0	Variation "Eingeschränkte Spannungsstützung" activated
FRT_50.6-T1		2ph	Full load	0	Variation "Eingeschränkte Spannungsstützung" activated
FRT_75.1-T1	0.75	3ph	Full load	2	
FRT_75.2-T1			Partial load	2	
FRT_75.3-T1			Partial load, inductive	2	Measurement results of "Nachmessung" have been used for comparison.
FRT_75.4-T1			Partial load, capacitive	2	
FRT_75.5-T1			Partial load	4	Variation "k4" activated
FRT_75.6-T1		2ph	Full load	2	
FRT_75.7-T1			Partial load	2	
FRT_75.8-T1			Partial load	4	Variation "k4" activated
FRT_80.1-T1	0.8	3ph	Full load	2	Variation "Eingeschränkte Spannungsstützung" activated

Test name	Voltage [p.u.]	3-/ 2-phases	Full load or Partial load	K-Factor	Comment
FRT_80.2-T1		2ph	Full load	2	Variation "Eingeschränkte Spannungsstützung" activated
FRT_85.1-T1	0.85	3ph	Partial load	2	
FRT_115.1-T1	1.15	3ph	Partial load	2	
FRT_115.2-T1		2ph	Partial load	2	
FRT_125.1-T1	1.25	3ph	Full load	2	
FRT_125.2-T1			Partial load	2	
FRT_125.3-T1		2ph	Full load	2	
FRT_125.4-T1			Partial load	2	
FRT_135.1-T1	1.35	3ph	Full load	2	
FRT_135.2-T1			Partial load	2	
FRT_135.3-T1		2ph	Full load	2	
FRT_135.4-T1			Partial load	2	

4.2 SETPOINT STEPS

The setpoint steps listed in Table 4.2 have been simulated. In some of these test cases, different parameter settings of the control have been applied. Those different settings are stored in the variations that are active in these tests.

Table 4.2: Simulated setpoint steps

Test name	Comment
P(f)_Unterfrequenz	The frequency changes in the measurement are no steps, but continuous changes. However, in the simulation frequency changes stepwise. To approach the continuous change, the last frequency change was separated into two steps.
P(f)_Überfrequenz	
P_max_grad	
P_min_grad	Variation "P_min_grad" active
P_steps	Variation "P_steps" active
Q_4s_Genauigkeit	
Q_4s_Zeit	
Q_60s_Genauigkeit	Variation "Tqref_60" active
Q_60s_Zeit	Variation "Tqref_60" active

4.3 PLAUSIBILITY TESTS

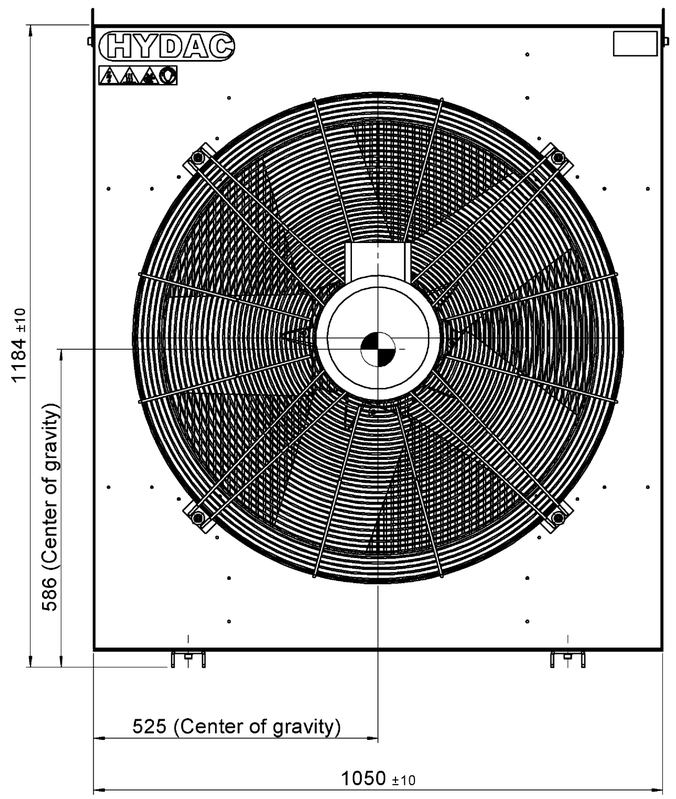
There are also two study cases for the plausibility tests of the unit and the plant in the model. These tests are described in the separate document "Dokumentation_Plausibilitätstests_Freqcon.docx".

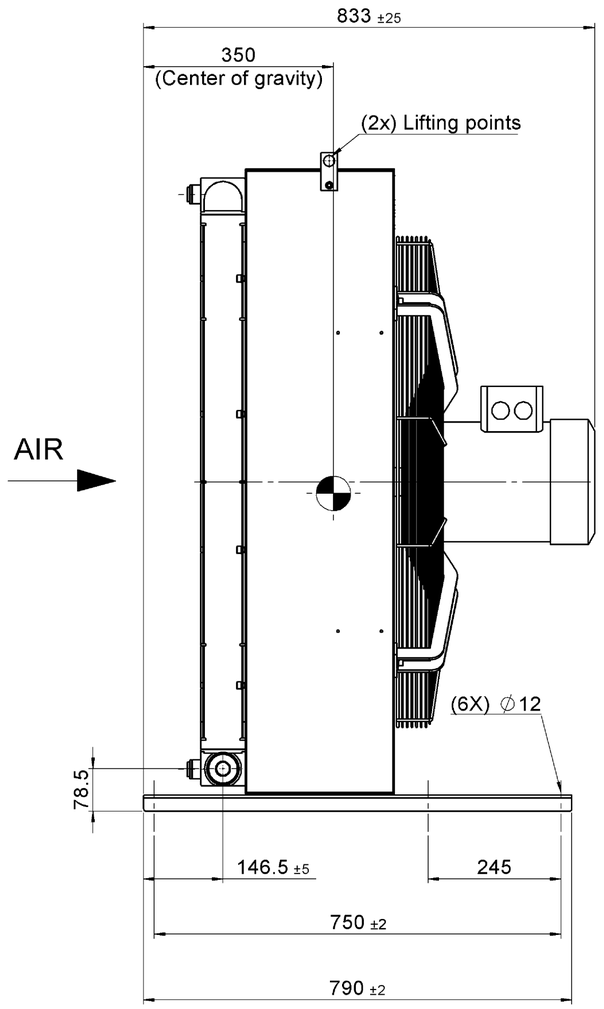
energynautics

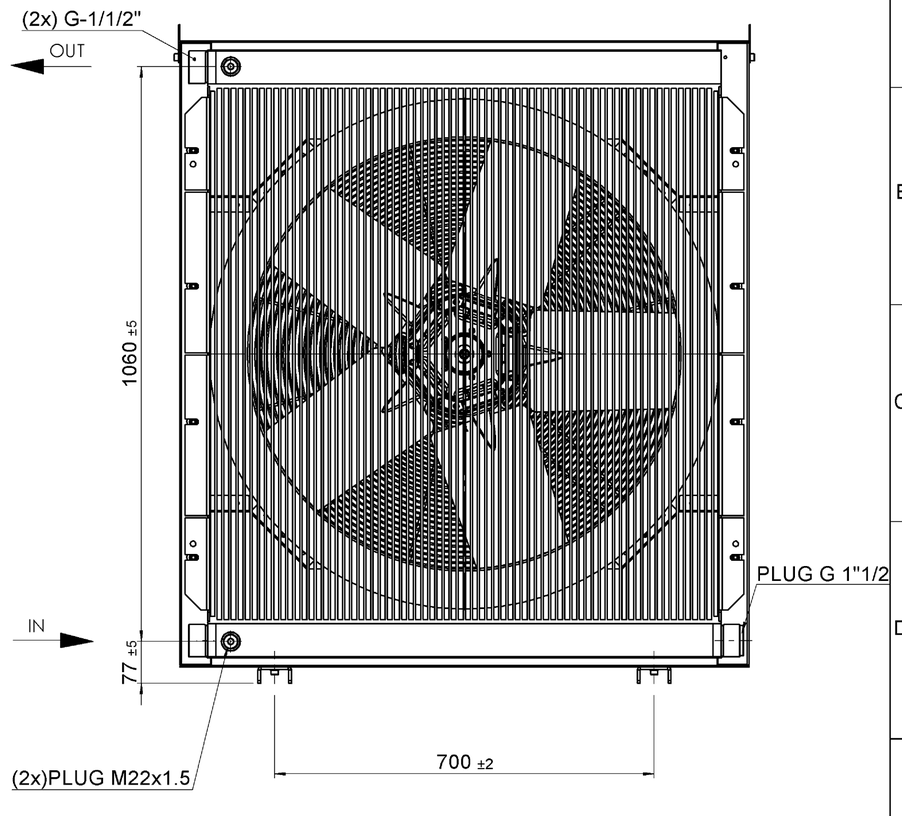
solutions for a sustainable development

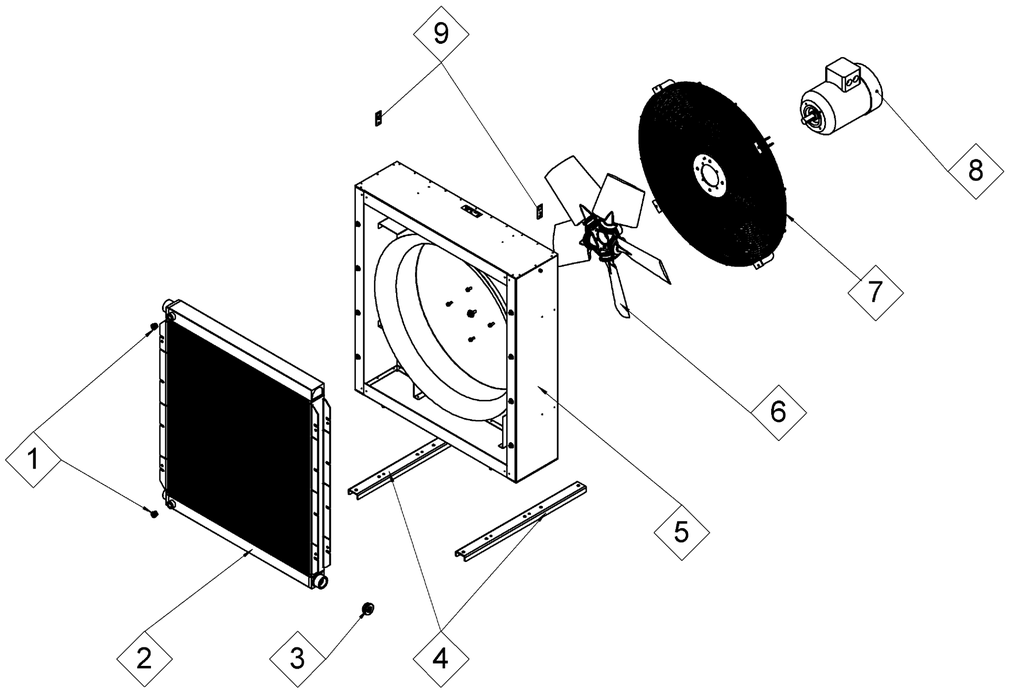
Vertraulich / confidential

IND.	Nr.	Description	Area









NOTE:
FILLING VOLUME RADIATOR: 17.3 LITERS

QTY	POS	DESCRIPTION	SAP PART NUMBER
2	9	SUPPORT-CRANE EL/SC RAL 9002 MAR3L	3882327
1	8	E-Mot.IMB14 BG112M- 4,00KW-1500U *	6215465
1	7	GRN 792/B117/E/IMB14/130/940/4*	3731359
1	6	FAN 792/5-5LP/29/PPG/6WR/28/8/EXT40/B*	3889290
1	5	RRX AC-LN11/1.0/FR/1/S1/CPS/GP	4291914
2	4	RSX AC-LN11/1.0/BT/1/S1/CPS/GP	4292032
1	3	Verschl.Shr. VSTI G1 1/2-ED-71 /NBR *	629939
1	2	RADIATOR OK-EL11/3.0 (alt.)	3510678
2	1	Verschl.Shr. VSTI M22x1,5-ED-71-NBR *	639680

HYDAC ADA Version

Spigoli Corners ISO13715

COLOR/Colore RAL 9002

Qualità delle superfici Surface quality ISO 1302

Tolleranze generali / General tolerances ISO 2768 - m SIZE ISO 14405 (E)

Toll. geometriche / classe di tolleranza Geometrical tolerances / Tolerance class (H)

Quote lineari / linear dimensions (mm)

Da /over	0,5	3	6	30	120	400	1000
A /to	3	6	30	120	400	1000	2000
	±0,1	±0,1	±0,2	±0,3	±0,5	±0,8	±1,2

Ord.-/Svilupp.-No prog. Ord.-Devel.-Project-No

1:8 Scale

Materiale / Material

Massa / Mass 170,000 KG

Grandezza dimensione / Finished size

No. No Indice Indice	contr. il Chkd. on modif. il Modif. on	controllato da Chkd. by modificato da Modif. by	Nr. modifica Notice of change No	Vers./Part 000	Data / Date	Nome / Name
				Dis./ Drawn	16.10.2017	BALLAE
				Appr./ Chkd.	17.10.17	ZEOLLAG

HYDAC

foglio di Sheet of 1 / 1

Formato/Size A2

SW-Vers.

Descrizione/ Description

AC-LN11S/1.3/F/B/1/CPLS*

Dis. Nr. Draw.-No **04292202**

Codice Businnes / Old Mat No.

Doc. Nr. / Old Doc No.

Sostituito con / Exchange for

Rimpiazzato da / Replaced by

V8

Protetto dalla normativa ISO16016 / Observing of protection notice ISO 16016

HYDAC INTERNATIONAL



Air Cooler Industry

AC-LN / ACA-LN / ACAF-LN 2-14
Corrosion Protection Levels (CPL)

General

The AC-LN series is also available to work in aggressive environments with high corrosive potential. The design is a result of our research and developments during years of experience.

The protection levels are verified in neutral salt spray tests following EN ISO 9227.

Quality and performance are guaranteed in every condition.

Product Features

Protection Level	Standard	Medium	High
System code	–	CPL1	CPL2
Ambient	C2-H*	C3-H*	C4-H*
Description	Atmosphere with low level of pollution. Places where condensation may occur.	Atmospheres with moderate pollution and humidity. Coastal areas with low salinity.	Industrial areas and coastal areas with moderate salinity.

* Following EN ISO 12944

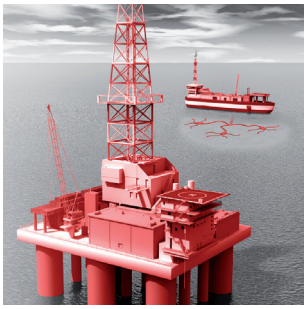
C5-H or configurations according to other standards can be supplied on request. ATEX certification is available on request.

For all other standard air cooler series, corrosion protection levels on request.

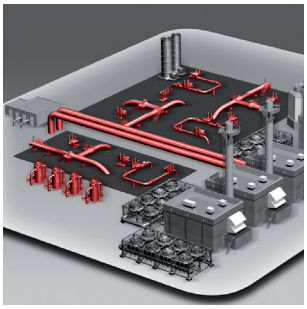
Application Field

For all industrial applications, indoor and outdoor applications in an aggressive environment where a high level of corrosion protection is requested. e.g.

- cranes
- harbour
- marine platforms
- ships
- chemical plants
- agricultural sites







Model Type

AC-LN10L - ..... - CPL2

Corrosion Protection Level
n/a = Standard
CPL1 = Medium protection level
CPL2 = High protection level
CPLS = Special protection level

For CPLS version refer to the technical department.

Note

The information in this brochure relates to the operating conditions.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC INTERNATIONAL

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Fax: +41 91 9355-701

E-mail: info@hydac.ch
Internet: www.hydac.com



SIMOTION P320-4 PC-based Motion Control

Powerful – maintenance-free – can be flexibly configured

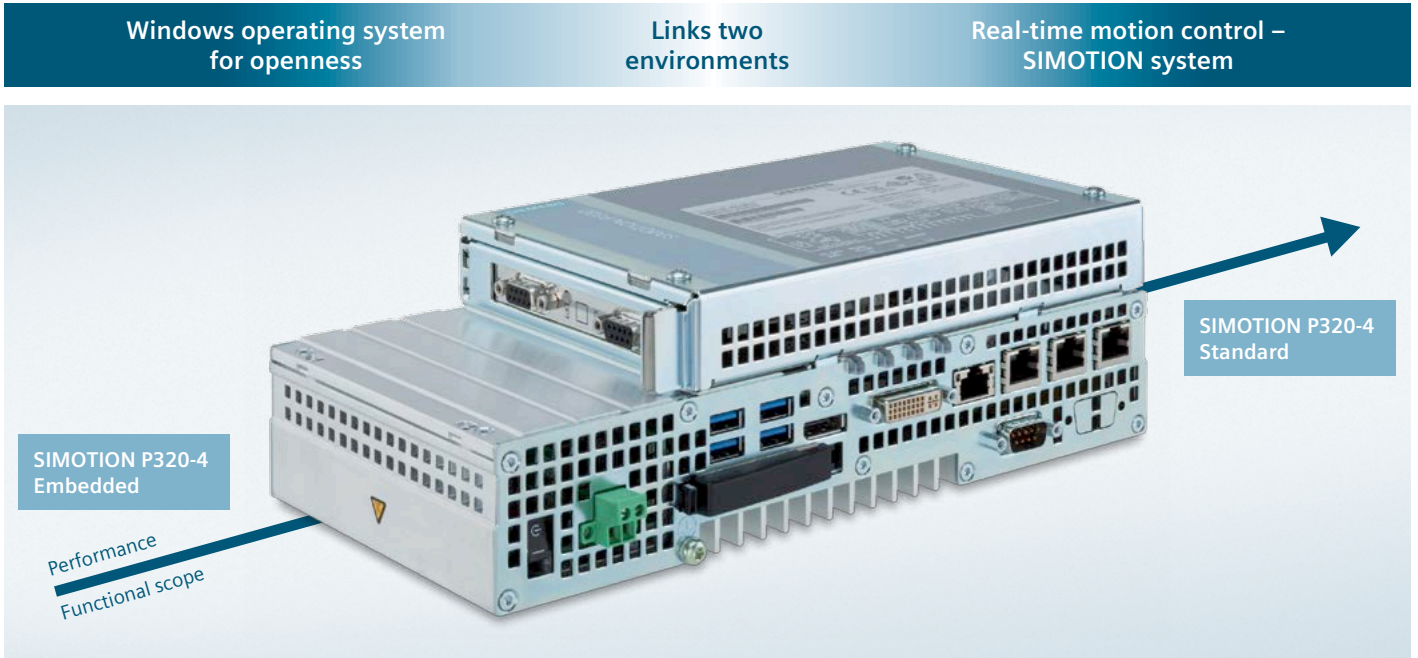
siemens.com/simotion

Fullest motion control functionality compact in an embedded industry PC: SIMOTION P320-4

SIMOTION P320-4 is a powerful, ultracompact and maintenance-free embedded industry PC, which has proven itself even under tough application conditions. The P320-4 combines the ruggedness of a PLC with the full motion control functionality of SIMOTION.

Your benefits

- PC-based solution for all production plants – new and retrofit projects (installation compatibility)
- High performance that can be selected to address your specific application
- Integrated motion control technology package (SIMOTION runtime)
- Integrated PC monitoring functions (watchdog, temperature, ...)
- Flexibility through individual mounting and installation options
- Simplified commissioning and troubleshooting using comprehensive test and diagnostic functions
- Operating control and monitoring functions can be simply integrated
- Visualization using scalable standard SIMATIC panels
- One engineering system for parameterizing and programming (SIMOTION SCOUT)



Can be universally used:


Packaging


Printing


Plastics


Textiles


Wood


Glass


Metal forming


Renewable energy


Handling

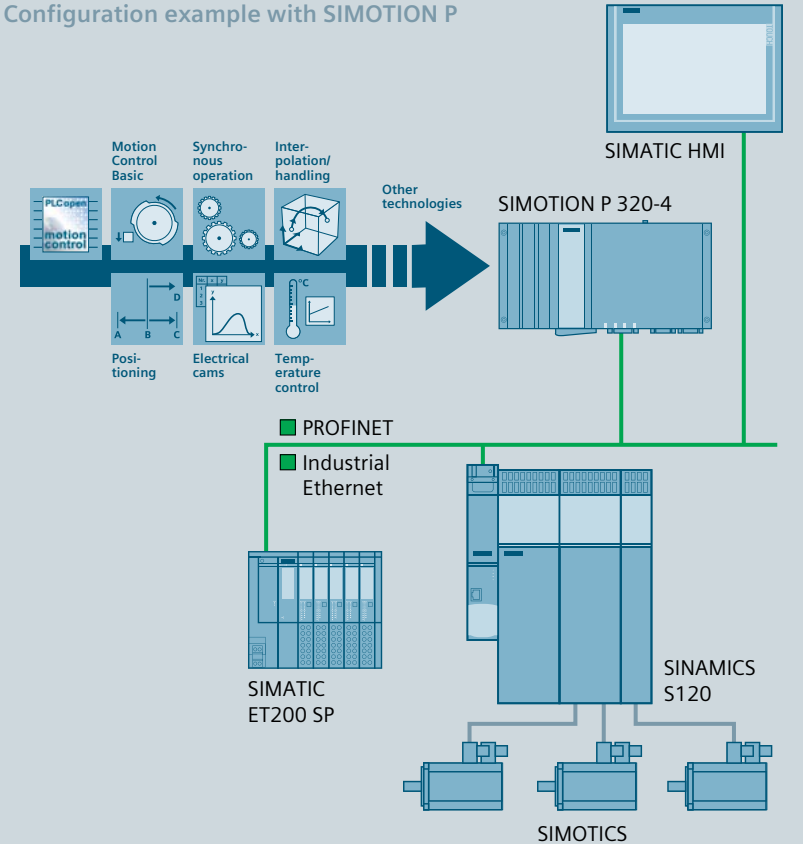

Converting

SIMOTION P320-4 – PC-based motion control

Technical data

Mechanical design/mounting position	• Mounting rail • Wall/panel mounting • Book-type mounting, front • Mounting position: horizontal (preferred position) and vertical
Processor	• P320-4 embedded: Intel Core i3-3217UE; 2x1.6 GHz, 3M cache • P320-4 standard: Intel Core i7-3517UE; 2x1.7 GHz, 4M cache
Power supply	• 24 V DC; 19.2 ... 28.8 V DC • Isolated
Main memory	• 4 Gbyte DDR3-SDRAM
CFast	• Can be exchanged (accessible): 4 Gbyte
SSD (only P320-4 **standard** internal)	• Internal (not accessible): 80 Gbyte
CFast (only P320-4 **embedded** internal)	• Internal (not accessible): 4 - 8 Gbyte
Application conditions	• No fan
Operating system	• P320-4 Embedded: Windows Embedded Standard 7 • P320-4 Standard: Windows 7 Ultimate
Start of delivery	• SIMOTION SCOUT Version V4.4
Graphics	• Integrated Intel HD 2000 or HD 4000 • Resolution DVI: 640*480 pixels up to max. 1920*1200 pixels for 32-bit colors • Resolution display port (>1920*1200 pixels for 32-bit colors) • Graphic memory is taken from the main memory • Dual-head operation to simultaneously connect two monitors (DVI-I and display port) with two different screen contents
Power supply	• 24 V DC; 19.2 ... 28.8 V DC • Isolated
Application conditions	• No fan
PC interfaces	• 4 x USB 3.0 interfaces • 1 x COM (RS232) • 1 x Ethernet Gbit • 1 x display port (connection ext. monitor, display) • 1 x DVI
PROFINET	• PROFINET on board (3 ports)
PROFIBUS (optional)	• IsoProfibus board, pluggable

Configuration example with SIMOTION P



Siemens AG
Digital Factory
Motion Control
P.O. Box 3180
91050 ERLANGEN
GERMANY

Subject to change without prior notice
Article No.: E20001-A500-P650-X-7600
Dispo 06372
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Printed in Germany
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The information provided in this brochure contains merely general descriptions or characteristics of performance which in actual case of use do not always apply as described or which may change as a result of further development of the products. An obligation to provide the respective characteristics shall only exist if expressly agreed in the terms of contract.

All product designations may be trademarks or product names of Siemens AG or supplier companies whose use by third parties for their own purposes could violate the rights of the owners.

For the secure operation of Siemens products and solutions, it is necessary to take suitable preventive action (e.g. cell protection concept) and integrate each component into a holistic, state-of-the-art industrial security concept. Third-party products that may be in use should also be considered.
For more information about industrial security, visit **http://www.siemens.com/industrialsecurity.**

Material Safety Data Sheet

Section 1 – IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Product Name: Li-ion Battery

Battery type: Li-ion Battery

Model	Voltage	Capacity（Ah）			Energy（Wh）
		Typical	Min	MAX	
LF280K	3.2V	280	/	/	896

Product Use: Energy Storage System

MSDS Date of Preparation: April 6th, 2021 ； Updated：/

Company Identification:

Name： EVE POWER Co., Ltd.

Address: No.68, Jingnan Avenue, Jingmen Hi-teck Zone, 448000 Jingmen City, Hubei Province

Post Code: 448000

Tel: +86-724-6079630

Fax:+86-724-6079688

Section 2 - Hazards Identification

- **Health Hazards (Acute and Chronic)**

These chemicals are contained in a sealed Al foil. Risk of exposure occurs only if the battery is mechanically or electrically abused. Contact of electrolyte with skin and eyes should be avoided.

- **Sign/Symptoms of Exposure**

A shorted battery can cause thermal and chemical burns upon contact with the skin. Maybe a reproductive hazard.

These products are classified as Articles under REACH and are not subject to the requirements for Information in the Supply Chain (Safety Data Sheets and Labels). While batteries may release hazardous substances if damaged, this is not an intended release as defined under REACH. Batteries are not classified as hazardous under the CLP.

The following information is provided to assist in the safe use of our products.

CAUTION: Battery can explode or leak if heated, disassembled, shorted, recharged, exposed to fire or high temperature or inserted incorrectly. Keep in original package until ready to use. Do not carry batteries

loose in your pocket or purse. Keep batteries away from children. If swallowed, consult a physician at once.

Under certain misuse conditions and by abusively opening the battery, exposed lithium can react with water or moisture in the air causing potential thermal burns or fire.

Section 3 – Composition/Information on Ingredient

Material or ingredient	Chemical Formula	CAS No.	Wt %

Lithium iron phosphate	$LiFePO_4$	/	37.0
Phosphate(1-),hexafluoro,lithium	$LiPF_6$	(CAS-No.)21324-40-3 (EC-No.)244-334-7	3.2
Graphite	C	(CAS-No.)7782-42-5 (EC-No.)231-955-3	19.1
Aluminum	Al	(CAS-No.)7429-90-5 (EC-No.)231-072-3 (EC Index-No.)013-002-00-1	4.6
Copper	Cu	(CAS-No.)7440-50-8 (EC-No.)231-159-6	7.5
Polypropylene	PP	(CAS-No.) 9003-07-0 (EC-No.)618-352-4	4.8

Section 4 - First Aid Measures

- **General Advice**

  The chemicals in this product are contained in a sealed package. Exposure to the contents will not occur unless the battery leaks, is exposed to high temperatures or is mechanically, physically, or electrically abused.

- **Eye**

  Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

- **Skin**

  Remove contaminated clothes and rinse skin with plenty of water or shower for 15 minutes. Get medical aid.

- **Inhalation**

  Remove from exposure and move to fresh air immediately. Use oxygen if available.

- **Ingestion**

  Give at least 2 glasses of milk or water. Induce vomiting unless patient is unconscious. Call a physician.

- **Note to Physician**

  Published reports recommend removal from the esophagus be done endoscopically (under direct visualization). Batteries beyond the esophagus need not be retrieved unless there are signs of injury to the GI tract or a large diameter battery fails to pass the pylorus. If asymptomatic, follow up x rays are necessary only to confirm the passage of larger batteries. Confirmation by stool inspection is preferable under most circumstances. Potential leakage of less than 50 milligrams of dimethoxyethane and propylene carbonate. Dimethoxyethane rapidly evaporates. Do not give ipecac.

Section 5 - Fire Fighting Measures

- **Fire and Explosion Hazards**: Batteries may burst and release hazardous decomposition products when exposed to a fire situation.
- **Extinguishing Media**

  CO_2.

- **Special Fire-Fighting Procedures**

  Self-contained breathing apparatus.
- **Unusual Fire and Explosion Hazards**

  Cell may vent when subjected to excessive heat-exposing battery contents.
- **Hazardous Combustion Products**

  Carbon monoxide, carbon dioxide, lithium oxide fumes.

Section 6 - Accidental Release Measures

- **Steps to be Taken in case Material is Released or Spilled**

  If the battery material is released, remove personnel from area until fumes dissipate. Provide maximum ventilation to clear out hazardous gases. Wipe it up with a cloth, and dispose of it in a plastic bag and put into a steel can. The preferred response is to leave the area and allow the battery to cool and vapors to dissipate. Provide maximum ventilation. Avoid skin and eye contact or inhalation of vapors. Remove spilled liquid with absorbent and incinerate.
- **Waste Disposal Method**

  It is recommended to discharge the battery to the end, handing in the abandoned batteries to related department unified, dispose of the batteries in accordance with approved local, state, and federal requirements. Consult state environmental protection agency and/or federal EPA.

Section 7 - Handling and Storage

The battery should not be opened, destroyed or incinerate, since they may leak or rupture and release to the environment the ingredients that they contain in the hermetically sealed container.

Do not short circuit terminals, or over charge the battery, forced over-discharge, throw to fire. Do not crush or puncture the battery, or immerse in liquids.

- **Precautions to be taken in Handling and Storing**

  Avoid mechanical or electrical abuse. Storage preferably in cool, dry and ventilated area, which is subject to little temperature change. Storage at high temperatures should be avoided.

  Do not place the battery near heating equipment, nor expose to direct sunlight for long periods.
- **Other Precautions**

  The battery may explode or cause burns, if disassembled, crushed or exposed to fire or high temperatures.

  Do not short or install with incorrect polarity.
- **Storage**

  Store batteries in a dry place at normal room temperature.

Section 8 - Exposure Controls, Personal Protection

- **Exposure Limits**: No exposure to the battery components should occur during normal use.
- **Ventilation:** Not necessary under conditions of normal use.
- **Respiratory Protection**

  In case of battery venting, provide as much ventilation as possible. Avoid confined areas with venting cell cores. Respiratory Protection is not necessary under conditions of normal use.
- **Skin Protection:** None required for normal use. Use butyl rubber gloves when handling leaking

batteries..

- **Eye Protection:** None required for normal use. Wear safety goggles when handling leaking batteries.
- **Protective Gloves**

  Not need
- **Other Protective Clothing or Equipment**

  Not necessary under conditions of normal use.

  Personal Protection is recommended for venting battery: Respiratory protection, Protective gloves, protective clothing and safety glass with side shields.

Section 9 - Physical and Chemical Properties

Appearance and Odor: prismatic cell, no odor.

Water Solubility: Insoluble

Flash Point: Not Applicable

Section 10 - Stability and Reactivity

- **Stability**

  Stable
- **Conditions to Avoid**

  Heating, mechanical abuse and electrical abuse.
- **Hazardous Decomposition Products**

  N/A.
- **Hazardous Polymerization**

  N/A.

Section 11 - Toxicological Information

- **Potential Health Effects**: The chemicals in this product are contained in a sealed package. Exposure to the contents will not occur unless the battery leaks, is exposed to high temperatures or is mechanically, physically, or electrically abused.
- **Eye Contact**: Contact with battery contents may cause irritation.
- **Skin Contact**: Contact with battery contents may cause irritation.
- **Inhalation**: Inhalation of vapors or fumes released due to heat or a large number of leaking batteries may cause respiratory and eye irritation.
- **Ingestion**: Seek immediate medical advice. Batteries lodged in the esophagus should be removed immediately since leakage, caustic burns and perforation package occur as soon as two hours after ingestion. Irritation to the internal/external mouth areas, may occur following exposure to a leaking battery.

Section 12 - Ecological Information

When promptly used or disposed the battery does not present environmental hazard. When disposed, keep away from water, rain and snow.

Section 13 - Disposal Considerations

- **APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION**

  If batteries are still fully charged or only partially discharged, they can be considered a reactive hazardous waste because of significant amount of not reaction or unconsumed lithium remaining in the spent battery. The battery must be neutralized through an approved secondary treatment facility prior to disposal as a hazardous waste. Recycling of battery can be done in authorized facility, through licensed waste carrier.

  lithium ion cell batteries are labeled in compliance with the EU Battery Directive 2006/66/EC.

Section 14 - Transport Information

Emergency Phone Number:

CHEMTREC 24 Hour Emergency Response Hotline （+86-752-2606966）

Persons who prepare or offer lithium batteries for transport are required by regulation to be trained and certified.

The information provided below is for informational purposes only.

Lithium Ion Batteries
UN No.：UN3480
EmS No.:F-A,S-I
Marine pollutant:No
Proper shipping name:Lithium ion battery（Including lithium ion ploymer batteries）
Hazard classification: The goods shall be complied with the requirements of section IA of Packing Instructions 965 of 61 th DGR Manual of IATA（2020）Edition and special provision 188 of IMDG CODE（Amdt.39-18）Edition,including the passing of the UN38.3 test.

The products meet all the requirements of the IATA DGR 61th edition, under special provisions including UN 38.3 test . If the package exceeds the table 965 - the - standard, so it belongs to the ninth category of dangerous goods. Only cargo transport. According to the packing instructions 965 Part IA IATA 61th version of the DGR requirements.

Lithium ion cells and batteries must be offered for transport at a state of charge (SoC) not exceeding 30% of their rated design capacity from 1 April 2016.

Shipping packages containing rechargeable lithium batteries must be labeled, regardless of size or number of batteries, with a lithium battery handling label.

More information concerning shipping, testing, marking and packaging can be obtained from Label master at http://www.labelmaster.com.

Separate battery when shipping to prevent short-circuiting. They should be packed in strong packaging for support during transport. Take in a cargo of them without falling, dropping, and breakage. Prevent

collapse of cargo piles and wet by rain.

Section 15 - Regulatory Information

- **Law Information**

  《Dangerous Goods Regulation》

  《Recommendations on the Transport of Dangerous Goods Model Regulations》

  《International Maritime Dangerous Goods》

  《Technical Instructions for the Safe Transport of Dangerous Goods》

  《Classification and code of dangerous goods》

  《Occupational Safety and Health Act》(OSHA)

  《Toxic Substances Control Act》(TSCA)

  《Consumer Product Safety Act》(CPSA)

  《Federal Environmental Pollution Control Act》(FEPCA)

  《The Oil Pollution Act》(OPA)

  《Superfund Amendments and Reauthorization Act Title III (302/311/312/313)》(SARA)

  《Resource Conservation and Recovery Act》(RCRA)

  《Safety Drinking Water Act》(CWA)

  《California Proposition 65》

  《Code of Federal Regulations》(CFR)

EU BATTERY DIRECTIVE: These batteries comply with the Directive substance limits and labeling requirements.

EU REACH REGISTRATION: These products are manufactured articles and not subject to REACH registration requirements.

EU Labeling: lithium ion cell batteries are labeled in compliance with the EU Battery Directive 2006/66/EC.

Section 16 – Other Information

EVE Hazard Rating: Health: 0 Fire: 0 Reactivity: 0

==========

Data supplied is for use only in connection with occupational safety and health.

DISCLAIMER: This MSDS is intended to provide a brief summary of our knowledge and guidance regarding the use of this material. The information contained here has been compiled from sources considered by EVE to be dependable and is accurate to the best of the Company's knowledge. It is not meant to be an all inclusive document on worldwide hazard communication regulations.

EVE Power Co., Ltd
Product Specification

File No	:	LF280K-72174
Version	:	B
Effective Date	:	Mar 23, 2021

Product name	:	LFP Power Battery
Model name	:	LF280K
Specification	:	3.2V 280Ah
Draft	:	
Checked	:	
Approved	:	
Customer Approved	:	

Mail : sales@evebattery.com

Address : No .68 Jingnan Avenue, Jiaodao District, Jingmen High-tech Zone, Jingmen City, Hubei Province.

History of specification

Date	Contents	Remarks
2020-09-23	First issue	Rf
2021-01-16	First issue	A
2021-03-23	Name change	B

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3. General Technical Parameter 1

4. Test conditions 2

5. Main Performance 3

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1. Scope

This specification is applied to Rechargeable LFP Power Battery with aluminum shell (3.2V 280Ah) manufactured by EVE Energy Co., Ltd., in which the description and model, main performance, test conditions and precautions of the product are included.

The product can be applied for Vehicle power supply, Storage system, etc.

2. Description and Model

2.1 Description：LFP Li-ion Power Battery with aluminum shell.

2.2 Model：LF280K

3. General Technical Parameter

#	Item		Parameter	Remark
1	Nominal Capacity		280.0 Ah	(25±2)℃，Standard charge and discharge
2	Typical Voltage		3.2 V	
3	AC Impedance Resistance(1KHz)		≤0.25 mΩ	
4	Standard charge and discharge	Charge / discharge current	0.5 C/0.5 C	
		Cut off voltage of charge / discharge	3.65 V/2.5 V	
5	Maximum charge / discharge current	Continuous charge / discharge	1 C/1 C	According to continuous / pulse charge and discharge ammeters
		Pulse charge / discharge (30s)	2 C/2 C	
6	Recommended scope of SOC		10%～90%	N.A.
7	Charging Temperature		0 ℃～55 ℃	According to continuous / pulse charge and discharge ammeters
8	Discharging Temperature		-20 ℃～55 ℃	

#	Item		Parameter	Remark
9	Storage temperature	Short term (within 1 month)	-20℃～45℃	N.A.
		Long term (within 1 year)	0℃～35℃	
10	Storage humidity range		＜90%	
11	Self-discharge rate per month		≤3%/month	Temperature：(25±2)℃, Storage scope of SOC：30%~50%SOC
12	Dimension	Width	173.7 ±0.5 mm	Refer to Appendix I
13		Thickness (under 300±20 kgf , 30%～40% SOC)	72.0 ±1.0 mm	
		Average thickness (200 pcs, under 300±20 kgf , 30%～40% SOC)	72.0 ±0.5 mm	
14		High（total）	207.5 ±0.5 mm	
15		High（subject）	204.6 ±0.5 mm	
16		Tabs Distance	123.0±0.3 mm	
17	Battery weight		5.42±0.3 kg	

4. Test conditions

4.1 Test environment conditions

Temperature：25±2℃

Relative humidity (RH)： 15%~85%

Atmospheric condition：86KPa~106KPa

4.2 Standard Charge

The standard charge means charging the cell with charge current 0.5C(A) and constant voltage 3.65V at (25±2)℃, 0.05C cutoff.

4.3 Standard Discharge

The standard discharge means discharging the cell with discharge current 0.5C(A) and cutoff voltage 2.5V at (25±2) ℃.

4.4 Pole and Busbar welding requirements

No.	Item	Parameter	Remark
1	Penetration	≤ 2.5mm	
2	Pulling force	60-100kgf	
3	Temperature of pole plastic part	≤ 150℃	Related to power and time
4	The pressure on the pole	≤ 700N	

5. Main Performance

5.1 Electrical performance

No.	Item	Requirements	Measuring Procedure
1	Rate discharge performance at 25℃	Discharge capacity/nominal capacity×100％ A）0.5C (A) ≥100％ B）1.0C (A) ≥98％	After standard charge and 1h rest, discharge to 2.5V cutoff with the current of 0.5 C (A), 1.0C (A), respectively. If the discharge capacity fails to meet the technical requirements, this test is allowed to be repeated three times
2	Discharge performance at different temperature	Discharge capacity/nominal capacity×100％ A)55℃≥95%（Cutoff 2.5V） B)-20℃≥70%（Cutoff 2.0V）	Measure the initial capacity and state of the battery：A) after standard charge and 5h rest at 55℃, discharge to 2.5V cutoff with the current of 0.5C(A)；B) after standard charge at 25±2℃ and 24h rest at -20℃±2℃, discharge to 2.0V cutoff with the current of 0.5C(A).
3	The capacity retention and recovery at 25℃	Capacity Retention ≥ nominal capacity×95％ Capacity Recovery ≥ nominal capacity×97％	Measure the initial capacity and state of the battery, after standard charge and stored for 28 days, discharge to 2.5V cutoff with the current of 0.5C (A), calculate the remaining capacity, the retention can be expressed as a percentage of nominal capacity. After standard charged and 30mins rest, calculate the discharging capacity (Ah), the recovery can be expressed as a percentage of nominal capacity. The recovery is measured with discharge current 0.5C (A) with 2.5V cut-off at (25±2) ℃.
4	cycle life at 25℃	≥6000 cycle @0.5C/0.5C	Under the 300kgf clamp, after standard charged and 30mins rest, discharge to 2.5V cutoff with the current of 0.5C(A) at (25±2) ℃, and then start the next cycle，end with the capacity decreasing to 80% of the

			initial capacity. The number of cycles is defined as the cycle life of the battery.
5	cycle life at 45℃	≥2500 cycle @0.5C/0.5C	Under the 300kgf clamp, after standard charged and 30mins rest, discharge to 2.5V cutoff with the current of 0.5C(A) at (45±2) ℃, and then start the next cycle，end with the capacity decreasing to 80% of the initial capacity. The number of cycles is defined as the cycle life of the battery.
6	End of life managem ent	capacity/nominal capacity ＜70%	During the use of the battery, the battery s hall be stopped when the end of life regul ations are exceeded.

5.2 Safety performance

No.	Item	Requirements	Measuring Procedure
1	Over Discharge	No fire、No explosion	Reference: GB/T 36276-2018《Lithium ion battery for electrical energy storage》
2	Over Charging	No fire、No explosion	
3	Short-Circuit Test	No fire、No explosion	
4	Drop Test	No fire、No explosion	
5	Heating	No fire、No explosion	
6	Extrusion Test	No fire、No explosion	
7	Low pressure test	No fire、No explosion、No leakage	
8	Thermal runaway	No fire、No explosion	

6. Transportation

Battery for shipping should be packed in boxes with the State of charge (30%~50%SOC). The Violent vibration, impact extrusion, sun and rain should be prevented during shipping.

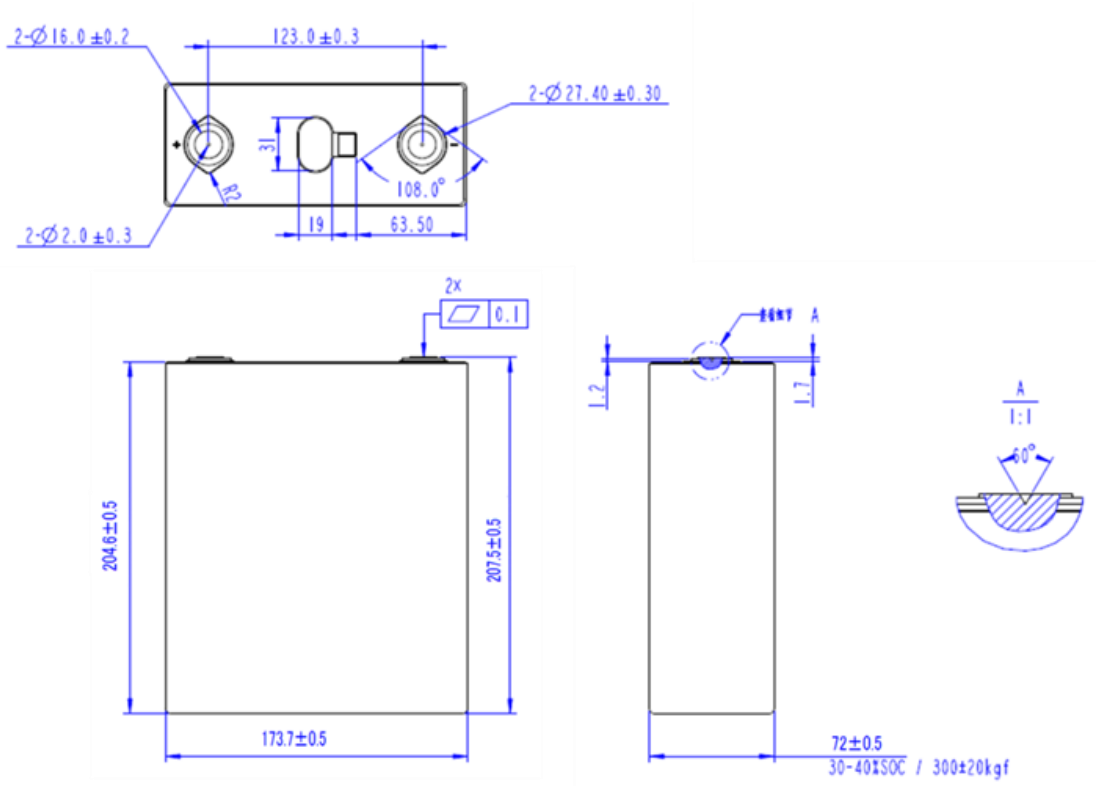
7. Storage

Batteries should be stored (more than 1 month) indoor with a dry and clean environment at 0 ℃~35 ℃. Avoiding contact with corrosive substances and staying away from fire and heat source. The battery should be charged and discharged every 6 months. The SOC for storage is between 30% ~ 50%.

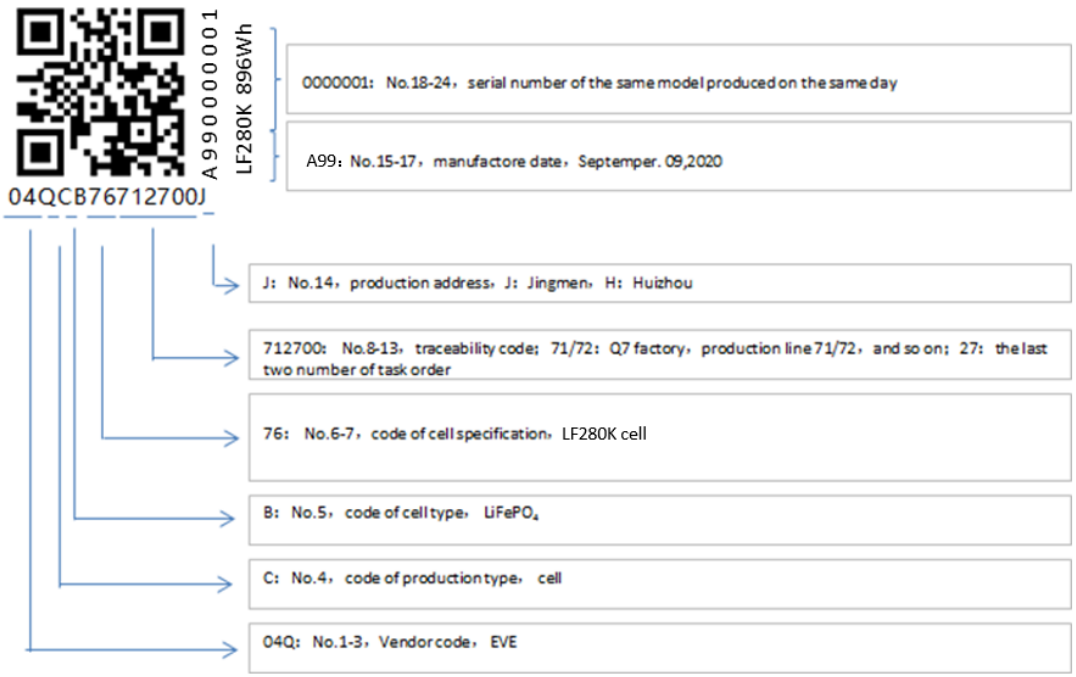
8. Points for attention

1. When the battery is charged and discharged, the conditions for monitoring and protecting the battery voltage, current and temperature shall be ensured.
2. Please keep the battery away from the heat source, fire source and other corrosive environments such as heating, strong acid and strong alkali.
3. Do not short circuit the battery or install it with incorrect polarity at any time，otherwise it can cause serious damage to the battery and cause danger.
4. Do not mix batteries of different models or manufacturers.
5. Do not use external force to make the battery fall, impact or puncture. Do not disassemble the battery or change the external structure.
6. When the battery is not used for a long time, please keep the battery in the state of 30%-50% SOC, and avoid the environment of strong direct sunlight or high temperature and humidity.
7. When operating the battery, it is necessary to wear rubber gloves and other protective devices.
8. In case of leakage, smoke or damage of battery, please stop using immediately and contact our company for handling.

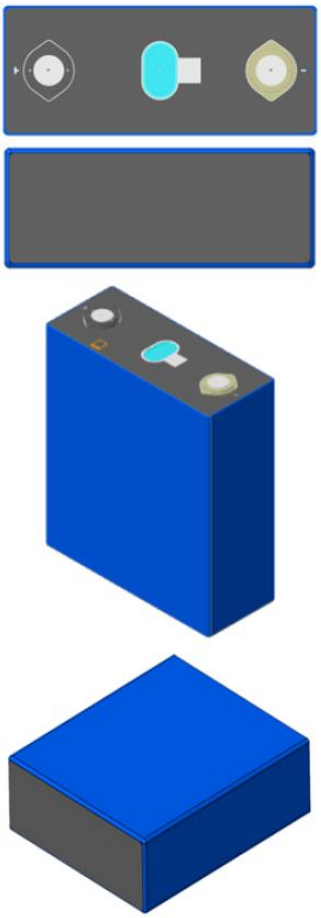
Appendix Ⅰ： Two-dimensional graphs of Battery：



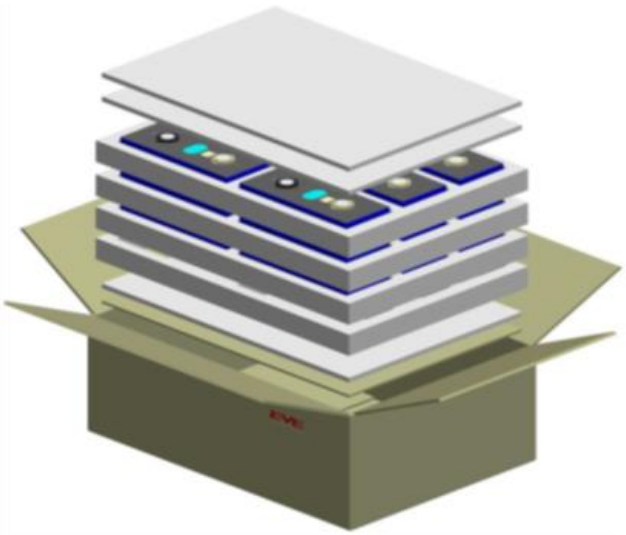
Appendix Ⅱ：Battery coding rules：



Appendix Ⅲ：photos of battery appearance：



Appendix IV: battery packaging drawing



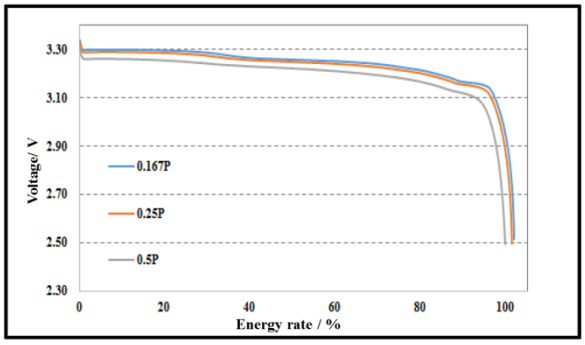
Length*width*height 426*302*245mm



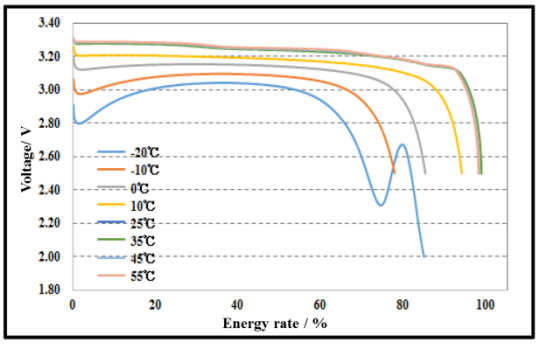
Length*width*height 1300*1100*1140mm

Appendix V: electric performance curve：

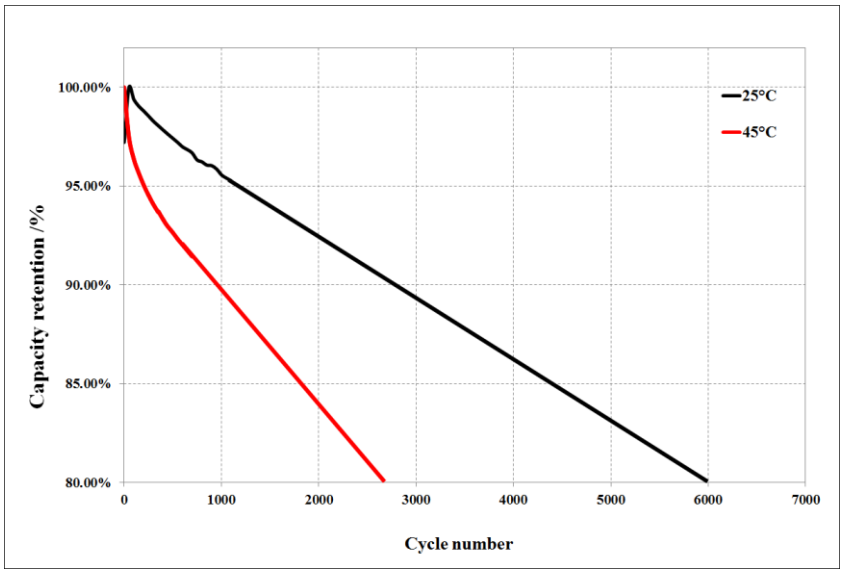
1、Rate discharge curve at 25℃



2、Discharge curve at different temperatures(0.5P)



3. Cycle curve (charge/discharge:0.5C/0.5C, 3.65V-2.5V)



SIEMENS

Sicherungsüberwachung MFM / EFM 10 / EFM 20 / EFM 25
Fuse Monitoring MFM / EFM 10 / EFM 20 / EFM 25
Dispositif de contrôle des fusibles MFM / EFM 10 / EFM 20 / EFM 25
Control de fusibles MFM / EFM 10 / EFM 20 / EFM 25
Controllo fusibili MFM / EFM 10 / EFM 20 / EFM 25
Supervisão de fusíveis MFM / EFM 10 / EFM 20 / EFM 25
Sigorta kontrolü MFM / EFM 10 / EFM 20 / EFM 25
Устройство контроля предохранителей MFM / EFM 10 / EFM 20 / EFM 25
保险器监控装置 MFM / EFM 10 / EFM 20 / EFM 25

3NP11_3-___1 / 3NP19_3-1GB10
3NP11_3-___2 / 3NP19_3-1GB20
3NP11_3-___3 / 3NP19_3-1GB30
3NP11_3-___5 / 3NP19_3-1GB50

Betriebsanleitung | **Operating Instructions** | **Instructions de service** | **Instructivo** | **Istruzioni operative**
Instruções de Serviço | **İşletme kılavuzu** | **Руководство по эксплуатации** | **使用说明**

	Deutsch	English	Français
	Vor der Installation, dem Betrieb oder der Wartung des Geräts muss diese Anleitung gelesen und verstanden werden.	Read and understand these instructions before installing, operating, or maintaining the equipment.	Ne pas installer, utiliser ou intervenir sur cet équipement avant d'avoir lu et assimilé les présentes instructions et notamment les conseils de sécurité et mises en garde qui y figurent.
	⚠ GEFAHR	**⚠ DANGER**	**⚠ DANGER**
	Gefährliche Spannung. **Lebensgefahr oder schwere Verletzungsgefahr.** Vor Beginn der Arbeiten Anlage und Gerät spannungsfrei schalten.	**Hazardous voltage.** **Will cause death or serious injury.** Turn off and lock out all power supplying this device before working on this device.	**Tension électrique.** **Danger de mort ou risque de blessures graves.** Mettre hors tension avant d'intervenir sur l'appareil.
	VORSICHT	**CAUTION**	**PRUDENCE**
	Eine sichere Gerätefunktion ist nur mit zertifizierten Komponenten gewährleistet!	Reliable functioning of the equipment is only ensured with certified components.	La sécurité de fonctionnement de l'appareil n'est garantie qu'avec des composants certifiés.

	Español	Italiano	Português
	Leer y comprender este instructivo antes de la instalación, operación o mantenimiento del equipo.	Leggere con attenzione queste istruzioni prima di installare, utilizzare o eseguire manutenzione su questa apparecchiatura.	Ler e compreender estas instruções antes da instalação, operação ou manutenção do equipamento.
	⚠ PELIGRO	**⚠ PERICOLO**	**⚠ PERIGO**
	Tensión peligrosa. **Puede causar la muerte o lesiones graves.** Desconectar la alimentación eléctrica antes de trabajar en el equipo.	**Tensione pericolosa.** **Può provocare morte o lesioni gravi.** Scollegare l'alimentazione prima di eseguire interventi sull'apparecchiatura.	**Tensão perigosa.** **Perigo de morte ou ferimentos graves.** Desligue a alimentação elétrica e proteja contra o religamento, antes de iniciar o trabalho no equipamento.
	PRECAUCIÓN	**CAUTELA**	**CUIDADO**
	El funcionamiento seguro del aparato sólo está garantizado con componentes certificados.	Il funzionamento sicuro dell'apparecchiatura è garantito soltanto con componenti certificati.	O funcionamento seguro do aparelho apenas pode ser garantido se forem utilizados os componentes certificados.

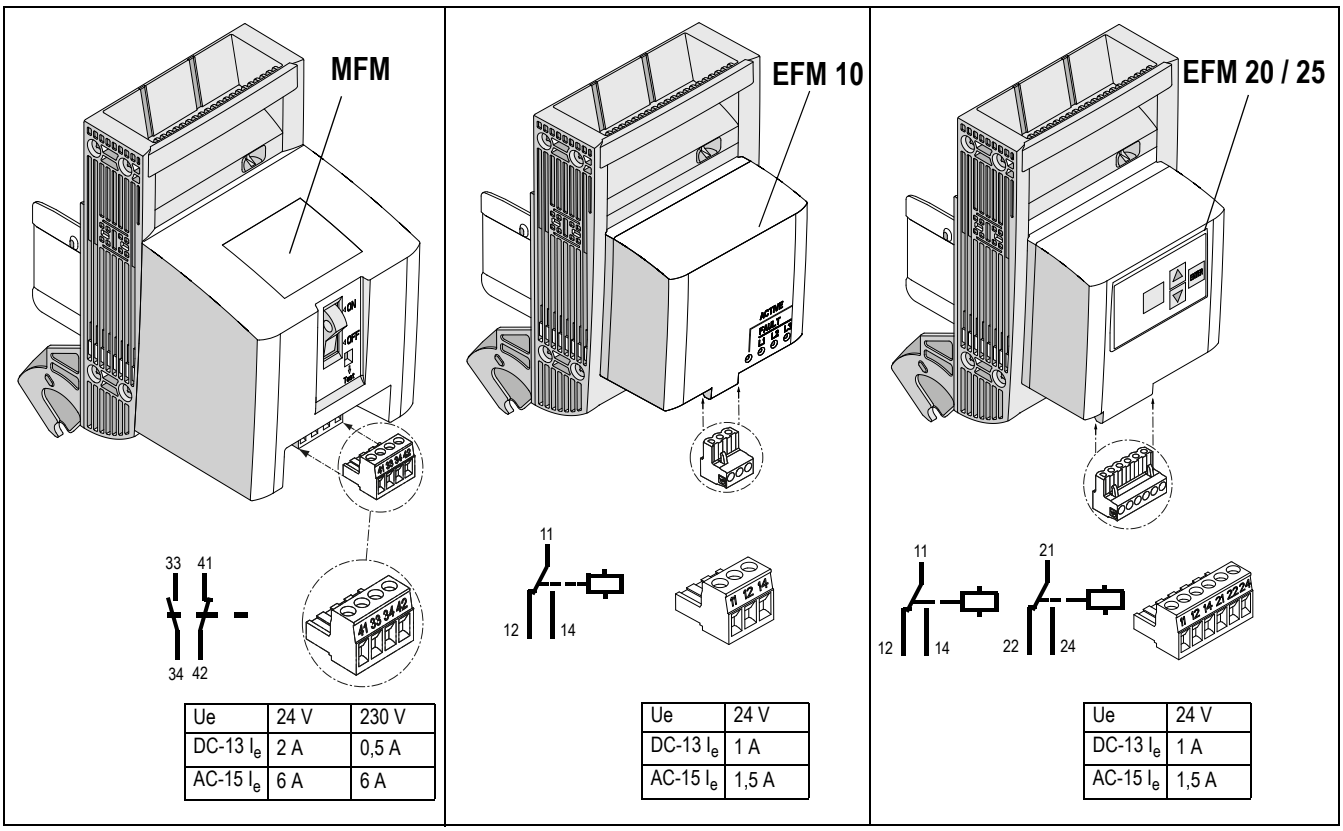
	Türkçe	Русский	中文
	Cihazın kurulumundan, çalıştırılmasından veya bakıma tabi tutulmasından önce, bu kılavuz okunmuş ve anlanmış olması gerekmektedir.	Перед установкой, вводом в эксплуатацию или обслуживанием устройства необходимо прочесть и понять данное руководство.	安装、使用和维修本设备前必须先阅读并理解本说明。
	⚠ TEHLİKE	**⚠ ОПАСНО**	**⚠ 危险**
	Tehlikeli gerilim. **Ölüm tehlikesi veya ağır yaralanma tehlikesi.** Çalışmalara başlamadan önce, sistemin ve cihazın gerilim beslemesini kapatınız.	**Опасное напряжение.** **Опасность для жизни или возможность тяжелых травм.** Перед началом работ отключить подачу питания к установке и к устройству.	**危险电压。** **可能导致生命危险或重伤危险。** 操作设备时必须确保切断电源。
	DİKKAT	**ОСТОРОЖНО**	**小心**
	Cihazın güvenli çalışması ancak sertifikalı bileşenler kullanılması halinde garanti edilebilir.	Безопасность работы устройства гарантировано только при использовании сертифицированных компонентов.	只有使用经过认证的部件才能保证设备的正常运转！

Technical Support: Internet: https://www.siemens.de/lowvoltage/technical-support

UL4248		
3NP112	600 V	160 A
3NP113	600 V	160 A
3NP114	600 V	250 A
3NP115	600 V	400 A
3NP1163-1__1_	600 V	630 A
3NP1163-1__2_	600 V	420 A

UL-File			
E171267	Vol 2	Sec 2	Fuseholders
E337672	Vol 1	Sec 1	Fuseholder Accessories

DE	**Sicherungsüberwachung MFM / Standard EFM 10 / High-End EFM 20 / 25**
EN	**Fuse Monitoring MFM / Standard EFM 10 / High-End EFM 20 / 25**
FR	**Dispositif de contrôle des fusibles MFM / Standard EFM 10 / High-End EFM 20 / 25**
ES	**Control de fusibles MFM / Standard EFM 10 / High-End EFM 20 / 25**
IT	**Controllo fusibili MFM /Standard EFM 10 / High-End EFM 20 / 25**
PT	**Supervisão de fusíveis MFM / Standard EFM 10 / High-End EFM 20 / 25**
TR	**Sigorta kontrolü MFM /Standard EFM 10 / High-End EFM 20 / 25**
РУ	**Устройство контроля предохранителей MFM / стандарт EFM 10/ High-End EFM 20 / 25**
中文	**保险器监控装置 MFM / 标准 EFM 10 / 高端 EFM 20 / 25**



Ue	24 V	230 V
DC-13 I_e	2 A	0,5 A
AC-15 I_e	6 A	6 A

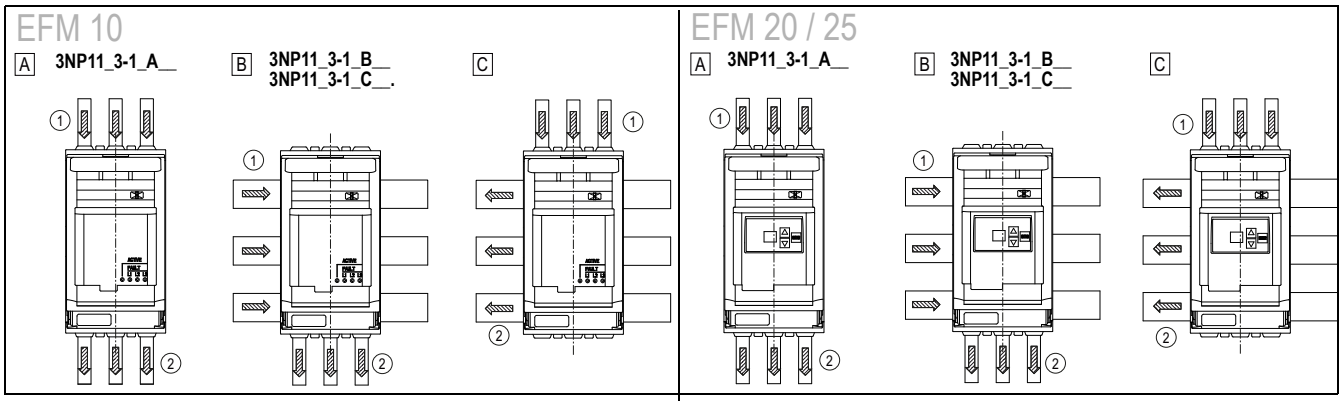
Ue	24 V
DC-13 I_e	1 A
AC-15 I_e	1,5 A

Ue	24 V
DC-13 I_e	1 A
AC-15 I_e	1,5 A

					~ / ±
3NP11_3 -____1	3NP19_3-1GB10	3,0 x 0,5 mm / 0.12 .x 0.02 inch	0,5 ... 1,2 Nm / 4.4 ... 10.6 lbf in	0,2 ... 2,5 mm^2 / 20 AWG ... 14 AWG	AC / DC
3NP11_3 - ____2	3NP19_3-1GB20	3,0 x 0,5 mm / 0.12 .x 0.02 inch	0,5 ... 1,2 Nm / 4.4 ... 10.6 lbf in	0,2 ... 2,5 mm^2 / 20 AWG ... 14 AWG	AC
3NP11_3 - ____3	3NP19_3-1GB30	3,0 x 0,5 mm / 0.12 .x 0.02 inch	0,5 ... 1,2 Nm / 4.4 ... 10.6 lbf in	0,2 ... 2,5 mm^2 / 20 AWG ... 14 AWG	AC
3NP11_3 - ____5	3NP19_3-1GB50	3,0 x 0,5 mm / 0.12 .x 0.02 inch	0,5 ... 1,2 Nm / 4.4 ... 10.6 lbf in	0,2 ... 2,5 mm^2 / 20 AWG ... 14 AWG	DC

DE	**Einbau und Anschluss**	**EN**	**Installation and Connection**	**FR**	**Installation et raccordement**
ES	**Montaje y conexión**	**IT**	**Montaggio e collegamento**	**PT**	**Instalação e conexão**
TR	**Montaj ve bağlantı**	**РУ**	**Монтаж и подключение**	**中文**	**安装和连接**

DE	**Korrekte Einspeisungsformen**	**EN**	**Correct Infeed Forms**	**FR**	**Formes d'alimentation correctes**
ES	**Formas correctas de alimentación**	**IT**	**Forme di alimentazione corrette**	**PT**	**Formas corretas de alimentação**
TR	**Doğru besleme tarzları**	**РУ**	**Правильные виды питания**	**中文**	**正确的供电形式**



DE	(1) Einspeisung	(2) Abgang	**EN**	(1) Infeed	(2) Outgoing feeder	**FR**	(1) Alimentation	(2) Départ
ES	(1) Alimentación	(2) Derivación	**IT**	(1) Alimentazione	(2) Uscita	**PT**	(1) Alimentação	(2) Saída
TR	(1) Besleme	(2) Çıkış	**РУ**	(1) питание	(2) выход	**中文**	(1) 供电	(2) 输出

DE	**ACHTUNG**	Falls bei spannungsführender Einspeisung eine andere Anschlussform der elektronischen Sicherungsüberwachung EFM als die oben genannte gewählt wurde und mehr als eine Sicherung defekt ist, leuchtet bei EFM 10 die grüne LED oder EFM 20 / 25 die Anzeige nicht. Die Eigenversorgung der elektronischen Sicherungsüberwachung EFM ist in diesem Fall nicht gewährleistet. Tauschen Sie die defekten Sicherungen aus.
EN	**ATTENTION**	If the green LED on EFM 10 or the display on EFM 20 / 25 does not light up although the electronic fuse monitoring device is correctly connected and the infeed is live, no signal or an incorrect signal is transmitted. Replace the electronic fuse monitoring device straight away.
FR	**ATTENTION**	Si la LED verte de l'EFM 10 ou l'affichage de l'EFM 20 / 25 ne sont pas allumés alors que l'alimentation fournit la tension et que la surveillance électonique de fusible est correctement raccordée, aucun signal ou un signal erronné sont émis. Remplacer immédiatement la surveillance électronique de fusible
ES	**ATENCIÓN**	Si estando presente la tensión de alimentación a la entrada y correctamente conectado el dispositivo electrónico de control de fusibles no lucen el LED verde en el EFM 10 o el display en el EFM 20 / 25, entonces no se envía señal o ésta es incorrecta. Sustituya inmediatamente el dispositivo electrónico de control de fusibles.
IT	**ATTENZIONE**	Se nonostante l'alimentazione di tensione presente e il collegamento corretto del controllo elettronico dei fusibili, il LED verde su EFM 10 o il display su EFM 20 / 25 non si accendono, non si ha l'invio di alcun segnale o si ha l'invio di un segnale errato. Sostituire immediatamente il controllo elettronico dei fusibili.
PT	**ATENÇÃO**	Se numa alimentação condutora de tensão e conexão correta da supervisão eletrônica de fusíveis o LED verde na EFM 10 ou o display na EFM 20 / 25 não acender, não é enviado qualquer sinal ou é enviado um sinal errado. É imprescindível a substituição imediata da supervisão eletrônica de fusíveis
TR	**DIKKAT**	Gerilim ileten besleme ve elektronik sigorta denetiminin doğru şekilde bağlanması durumunda EFM 10'da yeşil LED veya EFM 20 / 25'de gösterge yanmazsa, sinyal gönderilmemektedir ya da yanlış sinyal gönderilmektedir. Zaman kaybetmeden elektronik sigorta denetimini değiştirin
РУ	**ВНИМАНИЕ**	В случае если при подаче напряжения и правильном подключении устройства электронного контроля предохранителей на EFM 10 не горит зеленый светодиод или на EFM 20 / 25 индикатор, то не передается сигнал или передается неправильный сигнал. Немедленно замените устройство электронного контроля предохранителей
中文	**注意**	如果电子熔断器监视设备正确连接且馈电线路带电，但 EFM 10 上的绿色 LED 或 EFM 20 / 25 上的指示灯没有点亮，则不会传送信号或可能传送错误信号。 请立即更换该电子熔断器监视设备。

DE	**VORSICHT**	Falls bei spannungsführender Einspeisung und korrektem Anschluss der elektronischen Sicherungsüberwachung bei EFM 10 die grüne LED oder EFM 20 / 25 die Anzeige nicht leuchtet, wird kein Signal oder ein falsches Signal gesendet. Tauschen Sie unverzüglich die elektronische Sicherungsüberwachung aus.
EN	**CAUTION**	The green LED on EFM 10 or the display on EFM 20 / 25 does not light up if the electronic fuse monitoring device EFM is connected in a way other than that described above when the infeed is live and more than one fuse is faulty. In this case, the internal power supply of the electronic fuse monitoring device EFM can no longer be guaranteed. Replace the defective fuses.
FR	**PRUDENCE**	Lorsque la tenison d'alimentation est délivrée correctement et qu'une autre type de raccordement de la surveillance élecronique de fusible a été choisi, la LED verte de l'EFM 10 s'allume et l'affichage de l'EFM 20 / 25 n'est pas allumé lorsque plus d'un fusible est défectueux. L'alimentation interne de la surveillance électronique de fsible EFM n'est alors pas assurée. Remplacer les fusibles défectueux.
ES	**PRECAUCIÓN**	Si estando presente la tensión de alimentación a la entrada y la forma de conexión del dispositivo electrónico de control de fusibles EFM difiere de la arriba mencionada y está defectuoso más de un fusible, entonces no luce el LED verde en el EFM 10 o en el EFM 20 / 25 el display. En tal caso no está garantizada la alimentación correcta del dispositivo electrónico de control de fusibles EFM. Sustituya los fusibles defectuosos.
IT	**CAUTELA**	Se con alimentazione di tensione presente è stato scelto un tipo di collegamento del controllo elettronico dei fusibili EFM diverso da quello sopra citato e più di un fusibile è guasto, il LED verde su EFM 10 o il display su EFM 20 / 25 non si accendono. In questo caso l'autoalimentazione del controllo elettronico dei fusibili EFM non è assicurata. Sostituire i fusibili guasti.
PT	**CUIDADO**	Se numa alimentação condutora de tensão foi escolhida uma outra forma de conexão da supervisão eletrônica de fusíveis EFM do que a acima mencionada, e se mais de um fusível estiverem defeituosos, o LED verde na EFM 10 ou o display na EFM 20 / 25 não acenderá. Neste caso, não está assegurada a alimentação própria da supervisão eletrônica de fusíveis EFM. Substitua os fusíveis defeituosos.
TR	**DIKKAT**	Gerilim ileten beslemede EFM elektronik sigorta denetiminin yukarıda belirtilenden farklı bir bağlantı şekli seçilmişse ve birden çok sigorta arızalıysa, EFM 10'da yeşil LED ve EFM 20 / 25'de gösterge yanmaz. Bu durumda, EFM elektronik sigorta denetiminin giriş beslemesi sağlanmamaktadır. Arızalı sigortaları değiştirin.
РУ	**ОСТО-РОЖНО**	В случае если при подаче напряжения выбран иной вид подключения электронного контроля предохранителей EFM, отличный от указанного выше, и при дефекте более одного предохранителя зеленый светодиод EFM 10 или индикатор EFM 20 / 25 не горят. В данном случае не обеспечивается автономное питание устройства электронного контроля предохранителей EFM. Замените дефектные предохранители.
中文	小心	如果电子熔断器监视设备 EFM 不是按照上述方式进行连接，则当馈电线路带电且多个熔断器故障时，EFM 10 上的绿色 LED 或 EFM 20 / 25 上的指示灯不会点亮。在这种情况下，无法再保证该电子熔断器监视设备 EFM 的内部供电。 请更换有故障的熔断器。

DE	Weitere Informationen finden Sie im Systemhandbuch "Sicherungslasttrennschalter 3NP1" (3ZX1012-0NP10-1AB1).
EN	Further information can be found in the system manual "Fuse switch disconnector 3NP1" (3ZX1012-0NP10-1AC1).
FR	Vous trouverez des informations supplémentaires dans le manuel système "Fusible-interrupteur-sectionneur 3NP1" (3ZX1012-0NP10-1AD1).
ES	Podrá obtener información adicional en el manual de sistema "Fuse switch disconnector 3NP1" (3ZX1012-0NP10-1AC1).
IT	Per ulteriori informazioni, consultare il manuale di sistema "Fuse switch disconnector 3NP1" (3ZX1012-0NP10-1AC1).
PT	Maiores informações você encontra no Manual de Sistema "Fuse switch disconnector 3NP1" (3ZX1012-0NP10-1AC1).
TR	Ayrıntılı bilgiyi "Fuse switch disconnector 3NP1" (3ZX1012-0NP10-1AC1) sistem kılavuzundan edinebilirsiniz.
РУ	Дополнительную информацию Вы найдете в Системном руководстве "Fuse switch disconnector 3NP1" (3ZX1012-0NP10-1AC1).
中文	更多信息请参见系统手册 "Fuse switch disconnector 3NP1" (3ZX1012-0NP10-1AC1).

Technische Änderungen vorbehalten. Zum späteren Gebrauch aufbewahren.
Subject to change without prior notice. Store for use at a later date.
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	MSC 1000-62	SC-750-62	SC-500-62	C-1500-62	C-2000-62	SC-450-62	SC-720-62	SC-900-62	C-1440-62
Inverter	MSC 1000·	MSC 750-€	MSC 500-€	MSC 1500·	MSC 2000·	MSC 450-€	MSC 720-€	MSC 900-€	MSC 1440·
App.Pow.	1,001	0,751	0,5	1,501	2,002	0,45	0,72	0,9	1,44

C-1900-62	SC-350-40	SC-520-40	SC-700-40	C-1030-40	C-1350-40	SC-300-40	SC-450-40	SC-610-40	SC-930-40
MSC 1900	MSC 350-4	MSC 520-4	MSC 700-4	MSC 1030	MSC 1350	MSC 300-4	MSC 450-4	MSC 610-4	MSC 930-4
1,9	0,35	0,52	0,7	1,03	1,35	0,3	0,45	0,61	0,93

SC-1220-400-X

MSC 1220-400-X

1,221

	MSC 1000-62	SC-750-62	SC-500-62	C-1500-62	C-2000-62	SC-450-62	SC-720-62	SC-900-62	C-1440-62
Unom	620	620	620	620	620	620	620	620	620

C-1900-62	SC-350-400	SC-520-400	SC-700-400	C-1030-40	C-1350-40	SC-300-400	SC-450-400	SC-610-400	SC-930-400
620	400	400	400	400	400	400	400	400	400

C-1220-400-X

400

	MSC 1000-62	SC-750-62	SC-500-62	C-1500-62	C-2000-62	SC-450-62	SC-720-62	SC-900-62	C-1440-62
Tmean	60	60	60	60	60	60	60	60	60
KtrigL	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05
KtrigH	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05
Tclear	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5
Tfrtmax	130	130	130	130	130	130	130	130	130
FlagQctrl	3	3	3	3	3	3	3	3	3
udip	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9
uswell	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1
deltaudyn	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05
db	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Qdisable	0	0	0	0	0	0	0	0	0
Kq	2	2	2	2	2	2	2	2	2
Flaglim	0	0	0	0	0	0	0	0	0
udiplim	0,7	0,7	0,7	0,7	0,7	0,7	0,7	0,7	0,7
Kq2	2	2	2	2	2	2	2	2	2
freezelimlo	49,5	49,5	49,5	49,5	49,5	49,5	49,5	49,5	49,5
freezelimu	50,5	50,5	50,5	50,5	50,5	50,5	50,5	50,5	50,5
Fnom	50	50	50	50	50	50	50	50	50
Vnom	620	620	620	620	620	620	620	620	620
dUasym	35	35	35	35	35	35	35	35	35
dtasym	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
ir	1	1	1	1	1	1	1	1	1
uLimPsym	0	0	0	0	0	0	0	0	0
uLimPasym	0	0	0	0	0	0	0	0	0
iPmaxsym	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3
iPmaxasym	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3
Pdisable	0	0	0	0	0	0	0	0	0
Pcontrol	0	0	0	0	0	0	0	0	0
iratio	1	1	1	1	1	1	1	1	1
priorityFR	0	0	0	0	0	0	0	0	0
lim_mode	0	0	0	0	0	0	0	0	0
max2t_dyn	1,395	1,395	1,395	1,395	1,395	1,395	1,395	1,395	1,395
imax_short	2	2	2	2	2	2	2	2	2
t_cooldown	200	200	200	200	200	200	200	200	200
t_block	100	100	100	100	100	100	100	100	100
Tposneg	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
dbof	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2
dbuf	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2
slope	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02
reset_lim	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02
t	0	0	0	0	0	0	0	0	0
dragind	0	0	0	0	0	0	0	0	0
fmode	0	0	0	0	0	0	0	0	0
Tffilt	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02
Ki_pre	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Tqref	4	4	4	4	4	4	4	4	4
offset	1,05	1,05	1,05	1,05	1,05	1,05	1,05	1,05	1,05
Tqref2	1	1	1	1	1	1	1	1	1
Ki1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1

radient_pc	0,0017	0,0017	0,0017	0,0017	0,0017	0,0017	0,0017	0,0017	0,0017
diqmin	-1	-1	-1	-1	-1	-1	-1	-1	-1
qref_min	-1	-1	-1	-1	-1	-1	-1	-1	-1
y_min	-1,1	-1,127	-1,127	-1,127	-1,127	-1,124	-1,055	-1,125	-1,055
diqmax	1	1	1	1	1	1	1	1	1
qref_rate	10	10	10	10	10	10	10	10	10
iq_up	100	100	100	100	100	100	100	100	100
iqlim	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2
pgradient	0,66	0,66	0,66	0,66	0,66	0,66	0,66	0,66	0,66
imax_fix	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2
nax_fix_FR	1,1	1,127	1,127	1,127	1,127	1,124	1,055	1,125	1,055
iqlim_FRT	1,1	1,127	1,127	1,127	1,127	1,124	1,055	1,125	1,055
radient_lfs	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72
qref_max	1	1	1	1	1	1	1	1	1
ref_maxrat	2	2	2	2	2	2	2	2	2
y_max	1,1	1,127	1,127	1,127	1,127	1,124	1,055	1,125	1,055

C-1900-62	SC-350-40	SC-520-40	SC-700-40	C-1030-40	C-1350-40	SC-300-40	SC-450-40	SC-610-40	SC-930-40
60	60	60	60	60	60	60	60	60	60
0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05
0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05
0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5
130	130	130	130	130	130	130	130	130	130
3	3	3	3	3	3	3	3	3	3
0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9
1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1
0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05
0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
0	0	0	0	0	0	0	0	0	0
2	2	2	2	2	2	2	2	2	2
0	0	0	0	0	0	0	0	0	0
0,7	0,7	0,7	0,7	0,7	0,7	0,7	0,7	0,7	0,7
2	2	2	2	2	2	2	2	2	2
49,5	49,5	49,5	49,5	49,5	49,5	49,5	49,5	49,5	49,5
50,5	50,5	50,5	50,5	50,5	50,5	50,5	50,5	50,5	50,5
50	50	50	50	50	50	50	50	50	50
620	400	400	400	400	400	400	400	400	400
35	35	35	35	35	35	35	35	35	35
0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
1	1	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3
0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
1,395	1,395	1,395	1,395	1,395	1,395	1,395	1,395	1,395	1,395
2	2	2	2	2	2	2	2	2	2
200	200	200	200	200	200	200	200	200	200
100	100	100	100	100	100	100	100	100	100
0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2
0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2
0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02
0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02
0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
4	4	4	4	4	4	4	4	4	4
1,05	1,05	1,05	1,05	1,05	1,05	1,05	1,05	1,05	1,05
1	1	1	1	1	1	1	1	1	1
0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1

0,0017	0,0017	0,0017	0,0017	0,0017	0,0017	0,0017	0,0017	0,0017	0,0017
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
-1,066	-1,04	-1,05	-1,04	-1,06	-1,078	-1,088	-1,088	-1,071	-1,053
1	1	1	1	1	1	1	1	1	1
10	10	10	10	10	10	10	10	10	10
100	100	100	100	100	100	100	100	100	100
1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2
0,66	0,66	0,66	0,66	0,66	0,66	0,66	0,66	0,66	0,66
1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2
1,066	1,04	1,05	1,04	1,06	1,078	1,088	1,088	1,071	1,053
1,066	1,04	1,05	1,04	1,06	1,078	1,088	1,088	1,071	1,053
0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72
1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2
1,066	1,04	1,05	1,04	1,06	1,078	1,088	1,088	1,071	1,053

C-1220-400-X
60
0,05
0,05
0,5
130
3
0,9
1,1
0,05
0,1
0
2
0
0,7
2
49,5
50,5
50
400
35
0,01
1
0
0
0,3
0,3
0
0
1
0
0
1,395
2
200
100
0,01
0,2
0,2
0,02
0,02
0
0
0
0,02
0,1
4
1,05
1
0,1

0,0017
-1
-1
-1,07
1
10
100
1,2
0,66
1,2
1,07
1,07
0,72
1
2
1,07

	MSC 1000-62	SC-750-62	SC-500-62	C-1500-62	C-2000-62	SC-450-62	SC-720-62	SC-900-62	C-1440-62
ulimY	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1
tlimY	1	1	1	1	1	1	1	1	1
Ta	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
ulimYY	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2
tlimYY	0,16	0,16	0,16	0,16	0,16	0,16	0,16	0,16	0,16

C-1900-62	SC-350-40(	SC-520-40(	SC-700-40(	C-1030-40	C-1350-40	SC-300-40(	SC-450-40(	SC-610-40(	SC-930-40(
1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1
1	1	1	1	1	1	1	1	1	1
0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2
0,16	0,16	0,16	0,16	0,16	0,16	0,16	0,16	0,16	0,16

SC-1220-400-X
1,1
1
0,01
1,2
0,16

	MSC 1000-62	SC-750-62	SC-500-62	C-1500-62	C-2000-62	SC-450-62	SC-720-62	SC-900-62	C-1440-62
Ta	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
ulimYY	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5
tlimYY	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5
ulimYYY	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
tlimYYY	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4
ulimY	0,87	0,87	0,87	0,87	0,87	0,87	0,87	0,87	0,87
tlimY	2	2	2	2	2	2	2	2	2

SC-1900-62	SC-350-40(	SC-520-40(	SC-700-40(	C-1030-40	C-1350-40	SC-300-40(	SC-450-40(	SC-610-40(	SC-930-40(
0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5
1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5
0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4
0,87	0,87	0,87	0,87	0,87	0,87	0,87	0,87	0,87	0,87
2	2	2	2	2	2	2	2	2	2

SC-1220-400-X
0,01
0,5
1,5
0,1
0,4
0,87
2

	MSC 1000-62	SC-750-62	SC-500-62	C-1500-62	C-2000-62	SC-450-62	SC-720-62	SC-900-62	C-1440-62
Ta	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
flimY	47,5	47,5	47,5	47,5	47,5	47,5	47,5	47,5	47,5
tlimY	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3
flimYY	0	0	0	0	0	0	0	0	0
tlimYY	0	0	0	0	0	0	0	0	0

C-1900-62	SC-350-40(	SC-520-40(	SC-700-40(	C-1030-40	C-1350-40	SC-300-40(	SC-450-40(	SC-610-40(	SC-930-40(
0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
47,5	47,5	47,5	47,5	47,5	47,5	47,5	47,5	47,5	47,5
0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0

SC-1220-400-X
0,01
47,5
0,3
0
0

	MSC 1000-62	SC-750-62C	SC-500-62C	C-1500-62	C-2000-62	SC-450-62C	SC-720-62C	SC-900-62C	C-1440-62
Ta	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
flimY	51,5	51,5	51,5	51,5	51,5	51,5	51,5	51,5	51,5
tlimY	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3
flimYY	52,5	52,5	52,5	52,5	52,5	52,5	52,5	52,5	52,5
tlimYY	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1

C-1900-62	SC-350-40(	SC-520-40(	SC-700-40(	C-1030-40	C-1350-40	SC-300-40(	SC-450-40(	SC-610-40(	SC-930-40(
0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
51,5	51,5	51,5	51,5	51,5	51,5	51,5	51,5	51,5	51,5
0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3
52,5	52,5	52,5	52,5	52,5	52,5	52,5	52,5	52,5	52,5
0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1

SC-1220-400-X
0,01
51,5
0,3
52,5
0,1

PRODUCT DATASHEET



PAROC Marine Fire Slab 100

Stone wool fire slab. Also possible to use with facings AluCoat, G1, G2, G3, G4, G7, N3 and N5. See "Facings".

Fire protection on ships.

PAROC stone wool products are capable of withstanding high temperatures. The binder starts to evaporate when its temperature exceeds approximately 200°C. The insulating properties remain unchanged, but the compressive stress weakens. The softening temperature of stone wool products is over 1000°C.

Type-Examination (Module B) certificate No. EUFI29-20002521-MED

Nominal Density 100 kg/m³

Package Type Plastic packs on pallet

DIMENSIONS	
WIDTH X LENGTH	**THICKNESS**
600 x 1200 mm	25 - 100 mm
According to EN 822	According to EN 823
Other Dimensions: Other dimensions available on request.	

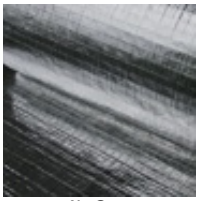
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Properties

PROPERTY	VALUE	ACCORDING TO
FIRE PROPERTIES		
Fire Classification (IMO)	Non-combustible	IMO 2010 FTP Code Annex 1 Part 1
THERMAL PROPERTIES		
Thermal Conductivity in 10 °C, λ_{10}	0,035 W/mK	EN 12667
MOISTURE PROPERTIES		
Water Absorption Short Term WS, (W_p)	≤ 1 kg/m²	EN 1609

Appearance

FACINGS	

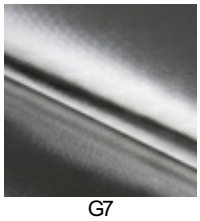

AluCoat


G1

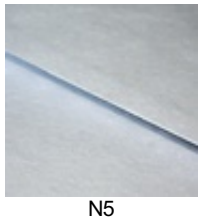

G2


G3


G4


G7


N3


N5

Head Office: PAROC GROUP, P.O. Box 240 (Energiakuja 3), FI-00181 Helsinki Finland, Tel. +358 46 876 8000, www.paroc.com

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PRODUCT DATASHEET



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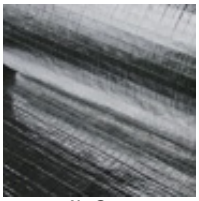
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Appearance

FACINGS	

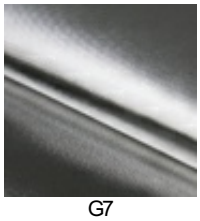

AluCoat


G1

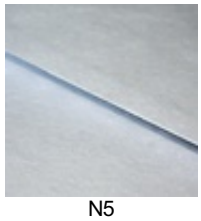

G2


G3


G4


G7


N3


N5

Head Office: PAROC GROUP, P.O. Box 240 (Energiakuja 3), FI-00181 Helsinki Finland, Tel. +358 46 876 8000, www.paroc.com

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Air Conditioning

Product Information

PCA-M R32 Standard Inverter
Ceiling Suspended System
Standard Inverter Heat Pump (Single Phase)

Making a World of Difference

Mr.SLIM



The **PCA-M Standard Inverter** range is a ceiling suspended system that blends a host of outstanding features with a sophisticated streamlined design. Offering advanced control options and quiet operation, this range provides extreme flexibility and ease of installation whilst being cost effective..

Key Features

- Flush to wall installation for concealment of service connections
- High / Low ceiling height modes
- Improved airflow control, including automatic air speed adjustment for greater comfort
- Replace Technology available
- New single fan chassis on 12.5 and 14kW models

MITSUBISHI ELECTRIC

Cooling | Heating | Ventilation | Controls

R32

Air Conditioning

Product Information

PCA-M R32 Standard Inverter Ceiling Suspended System

Standard Inverter Heat Pump (Single Phase)

Making a World of Difference







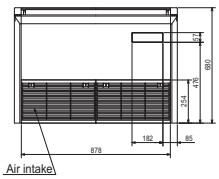

PCA-M - INDOOR UNITS		PCA-M50KA	PCA-M60KA	PCA-M71KA	PCA-M100KA	PCA-M125KA	PCA-M140KA
CAPACITY (kW)	Heating (nominal)	6.0 (1.5-7.2)	7.0 (1.6-8.0)	8.0 (2.0-10.2)	11.2 (2.8-12.5)	13.5 (4.1-15.0)	15.0 (4.2-15.8)
	Cooling (nominal)	5.0 (1.5-5.6)	6.1 (1.6-6.3)	7.1 (2.2-8.1)	9.5 (4.0-10.6)	12.1 (5.7-13.0)	13.4 (5.7-14.1)
	Heating (UK)	5.10 (1.28-6.12)	5.95 (1.36-6.80)	6.80 (1.70-8.67)	9.63 (2.41-10.75)	11.61 (3.53-12.90)	12.90 (3.61-13.59)
	Cooling (UK)	4.60 (1.38-5.15)	5.61 (1.47-5.80)	6.53 (1.56-7.45)	8.65 (3.64-9.65)	11.01 (5.19-11.83)	12.19 (5.19-12.83)
SHF (nominal)		0.79	0.81	0.76	0.77	0.72	0.72
COP / EER (nominal)		3.71 / 3.30	4.00 / 3.70	3.61 / 3.60	3.41 / 3.23	3.41 / 3.01	3.50 / 2.50
SCOP (ηsh) / SEER (ηsc) (BS EN14825)		4.10 / 6.00	4.10 / 6.40	4.10 / 6.50	4.10 / 6.00	4.1 (162.7%) / 5.2 (213%)	4.0 (158.7%) / 5.1 (208%)
ErP ENERGY EFFICIENCY CLASS	Heating/Cooling	A+ / A+	A+ / A++	A+ / A++	A+ / A+	A+ / A	A+ / A
AIRFLOW (l/s)	Lo-Mi1-Mi2-Hi	167-183-217-250	250-267-283-317	267-283-300-333	367-400-433-467	383-417-450-483	400-433-483-533
PIPE SIZE mm (in)	Gas/Liquid	12.7 (1/2") / 6.35 (1/4")	15.88 (5/8") / 6.35 (1/4")	15.88 (5/8") / 9.52 (3/8")	15.88 (5/8") / 9.52 (3/8")	15.88 (5/8") / 9.52 (3/8")	15.88 (5/8") / 9.52 (3/8")
SOUND PRESSURE LEVEL (dBA)	Lo-Mi1-Mi2-Hi	32-34-37-40	33-35-37-40	35-37-39-41	37-39-41-43	39-41-43-45	41-43-45-48
SOUND POWER LEVEL (dBA)		60	60	62	63	65	68
DIMENSIONS (mm)	Width x Depth x Height	960 x 680 x 230	1280 x 680 x 230	1280 x 680 x 230	1600 x 680 x 230	1600 x 680 x 230	1600 x 680 x 230
WEIGHT (kg)		26	32	32	37	38	40
ELECTRICAL SUPPLY		Fed by Outdoor Unit	Fed by Outdoor Unit	Fed by Outdoor Unit	Fed by Outdoor Unit	Fed by Outdoor Unit	Fed by Outdoor Unit
FUSE RATING (BS88) - HRC (A)		6	6	6	6	6	6
INTERCONNECTING CABLE No. Cores		4	4	4	4	4	4
WIRED REMOTE CONTROLLER REFERENCE		PAR-40MAA	PAR-40MAA	PAR-40MAA	PAR-40MAA	PAR-40MAA	PAR-40MAA
WIRELESS REMOTE CONTROLLER REFERENCE		PAR-SL94B	PAR-SL94B	PAR-SL94B	PAR-SL94B	PAR-SL94B	PAR-SL94B

SUZ-M / PUZ-M - OUTDOOR UNITS		SUZ-M50VA	SUZ-M60VA	SUZ-M71VA	PUZ-M100VKA	PUZ-M125VKA	PUZ-M140VKA
SOUND PRESSURE LEVEL (dBA)	Heating/Cooling	48 / 49	49 / 51	49 / 51	51 / 54	54 / 56	55 / 57
SOUND POWER LEVEL (dBA	Cooling	64	65	66	70	72	73
WEIGHT (kg)		41	54	55	76	84	84
DIMENSIONS (mm)	Width x Depth x Height	800 x 285 x 714	840 x 330 x 880	840 x 330 x 880	1050 x 330 x 981	1050 x 330 x 981	1050 x 330 x 981
ELECTRICAL SUPPLY		220-240v, 50Hz	220-240v, 50Hz	220-240v, 50Hz	220-240v, 50Hz	220-240v, 50Hz	220-240v, 50Hz
PHASE		Single	Single	Single	Single	Single	Single
SYSTEM POWER INPUT (kW)	Heating/Cooling (nominal)	1.61 / 1.51	1.75 / 1.64	2.21 / 1.97	3.28 / 2.94	3.95 / 4.01	4.28 / 5.36
	Heating/Cooling (UK)	1.37 / 1.30	1.49 / 1.41	1.88 / 1.69	2.95 / 2.44	3.56 / 3.33	3.85 / 4.45
STARTING CURRENT (A)		8.0	9.3	9.5	14.2	17.3	23.2
SYSTEM RUNNING CURRENT (A)	Heating/Cooling [MAX]	8.0 / 7.1 [13.5]	9.3 / 8.4 [14.8]	9.5 / 9.1 [14.8]	14.2 / 12.6 [20.0]	17.0 / 17.3 [26.5]	18.4 / 23.2 [30.0]
FUSE RATING (BS88) - HRC (A)		20	20	20	32	32	40
MAINS CABLE No. Cores		3	3	3	3	3	3
MAX PIPE LENGTH (m)		30	30	30	55	65	65
MAX HEIGHT DIFFERENCE (m)		30	30	30	30	30	30
CHARGE REFRIGERANT (KG) / CO_2 EQUIVALENT (T)	R32 (GWP 675)	1.20 / 0.81 (7m)	1.25 / 0.84 (7m)	1.45 / 0.98 (7m)	3.10 / 2.09 (30m)	3.60 / 2.43 (30m)	3.60 / 2.43 (30m)
MAX ADDITIONAL REFRIGERANT (KG) / CO_2EQUIVALENT (T)	R32 (GWP 675)	1.66 / 1.12	1.71 / 1.15	2.37 / 1.80	4.10 / 2.77	5.00 / 3.38	5.00 / 3.38

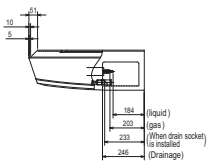
Note: Duty/standby not available on SUZ-M50/60/71VA.

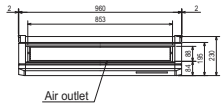
Product Dimensions PCA-M50KA

Upper View



Side View

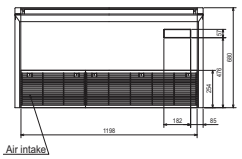




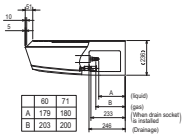
Front View

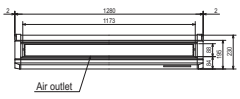
Product Dimensions PCA-M60/71KA

Upper View



Side View

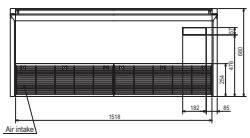




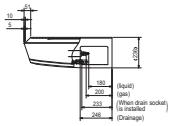
Front View

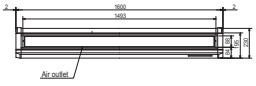
Product Dimensions PCA-M100/125/140KA

Upper View



Side View





Front View

MITSUBISHI ELECTRIC
Changes for the Better

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email: air.conditioning@meuk.mee.com
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Note: The fuse rating is for guidance only. Please refer to the relevant databook for detailed specification. It is the responsibility of a qualified electrician/electrical engineer to select the correct cable size and fuse rating based on current regulation and site specific conditions. Mitsubishi Electric's air conditioning equipment and heat pump systems contain a fluorinated greenhouse gas, R410A (GWP:2088), R32 (GWP:675), R407C (GWP:1774) or R134a (GWP:1430). *These GWP values are based on Regulation (EU) No 517/2014 from IPCC 4th edition. In case of Regulation (EU) No.626/2011 from IPCC 3rd edition, these are as follows. R410A (GWP:1975), R32 (GWP: 550), R407C (GWP:1650) or R134a (GWP:1300).

Effective as of January 2019

Air Conditioning | Product Information

MITSUBISHI ELECTRIC

PKA-M R32

Wall Mounted System

Power Inverter Heat Pump

Mr.SLIM™

The **PKA-M Power Inverter** range is a wall mounted system that blends a host of outstanding features with a sophisticated, streamlined design. Offering high seasonal efficiency, advanced control options and extended pipe runs, this range is extremely flexible.

R32

POWER INVERTER

Key Features & Benefits:

- Improved airflow control, including adjustable louvres for uniform air distribution
- Internal pipe connection to wall mounted unit for easy and neat installation
- CN22 connector as standard for connection to PAR-40MAA hard wired controller
- Full heating capacity down to -3°C
- 100m pipe run (Size 100)
- Replace Technology available



Air Conditioning | Product Information

PKA-M R32
Wall Mounted System
Power Inverter Heat Pump



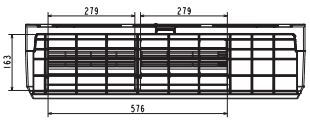
PKA-M INDOOR UNITS		PKA-M35LA	PKA-M50LA	PKA-M60KA	PKA-M71KA	PKA-M100KA	PKA-M100KA
CAPACITY (kW)	Heating (nominal)	4.1 (1.6-5.2)	5.0 (2.5-7.3)	7.0 (2.8-8.2)	8.0 (3.5-10.2)	11.2 (4.5-14.0)	11.2 (4.5-14.0)
	Cooling (nominal)	3.6 (1.6-4.5)	4.6 (2.3-5.6)	6.1 (2.7-6.7)	7.1 (3.3-8.1)	9.5 (4.9-11.4)	9.5 (4.9-11.4)
	Heating (UK)	3.5 (1.35-4.4)	4.25 (2.15-6.2)	5.95 (2.4-6.95)	6.8 (3.0-8.65)	9.5 (3.85-11.9)	9.5 (3.85-11.9)
	Cooling (UK)	3.3 (1.45-4.15)	4.23 (2.1-5.15)	5.5 (2.5-6.15)	6.55 (3.05-7.45)	9.2 (4.5-10.5)	9.2 (4.5-10.5)
SHF (nominal)		0.74	0.66	0.86	0.78	0.73	0.73
COP / EER (nominal)		3.94 / 4.20	3.72 / 3.71	4.04 / 3.91	3.78 / 3.81	3.61 / 3.95	3.61 / 3.95
SCOP (ηsh) / SEER ηsc) (BS EN14825)		4.0 / 6.5	4.3 / 6.6	4.2 / 6.8	4.3 / 6.8	4.4/ 6.5	4.4 / 6.4
ErP ENERGY EFFICIENCY CLASS	Heating/Cooling	A+ / A++	A+ / A++	A+ / A++	A+ / A++	A+ / A++	A+ / A++
AIRFLOW (l/s)	Lo-Mi2-Mi1-Hi	125-137-153-182	125-137-153-182	300-333-367	300-333-367	333-383-433	333-383-433
PIPE SIZE mm (in)	Gas	12.7 (1/2")	12.7 (1/2")	15.88 (5/8")	15.88 (5/8")	15.88 (5/8")	15.88 (5/8")
	Liquid	6.35 (1/4")	6.35 (1/4")	9.52 (3/8")	9.52 (3/8")	9.52 (3/8")	9.52 (3/8")
SOUND PRESSURE LEVEL (dBA)	Lo-Mi2-Mi1-Hi	34-37-40-43	34-37-40-43	39-42-45	39-42-45	41-45-49	41-45-49
SOUND POWER LEVEL (dBA)		60	60	64	64	65	65
DIMENSIONS (mm)	Width x Depth x Height	898 x 237 x 299	898 x 237 x 299	1170 x 295 x 365	1170 x 295 x 365	1170 x 295 x 365	1170 x 295 x 365
WEIGHT (kg)		12.6	12.6	21	21	21	21
ELECTRICAL SUPPLY		Fed by Outdoor Unit	Fed by Outdoor Unit	Fed by Outdoor Unit	Fed by Outdoor Unit	Fed by Outdoor Unit	Fed by Outdoor Unit
FUSE RATING (BS88) - HRC (A)		6	6	6	6	6	6
INTERCONNECTING CABLE No. CORES		4	4	4	4	4	4
WIRED REMOTE CONTROLLER REFERENCE		PAR-40MAA	PAR-40MAA	PAR-40MAA	PAR-40MAA	PAR-40MAA	PAR-40MAA
WIRELESS REMOTE CONTROLLER REFERENCE		PAR-FL32MA	PAR-FL32MA	PAR-FL32MA	PAR-FL32MA	PAR-FL32MA	PAR-FL32MA

PUZ-ZM OUTDOOR UNITS		PUZ-ZM35VKA	PUZ-ZM50VKA	PUZ-ZM60VHA	PUZ-ZM71VHAR1	PUZ-ZM100VKAR1	PUZ-ZM100YKAR1 ③
SOUND PRESSURE LEVEL (dBA)	Heating/Cooling	46 / 44	46 / 44	49 / 47	49 / 47	51 / 49	51 / 49
SOUND POWER LEVEL (dBA)	Cooling	65	65	67	67	69	69
WEIGHT (kg)		46	46	70	70	116	123
DIMENSIONS (mm)	Width x Depth x Height	809 x 300 x 630	809 x 300 x 630	950 x 330 + 25 x 943	950 x 330 + 25 x 943	1050 x 330 + 40 x 1338	1050 x 330 + 40 x 1338
ELECTRICAL SUPPLY		220-240v, 50Hz	220-240v, 50Hz	220-240v, 50Hz	220-240v, 50Hz	220-240v, 50Hz	380-415v, 50Hz
PHASE		Single	Single	Single	Single	Single	Three
SYSTEM POWER INPUT (kW)	Heating/Cooling (nominal)	1.040 / 0.869	1.347 / 1.239	1.732 / 1.560	2.116 / 1.863	3.102 / 2.405	3.102 / 2.405
	Heating/Cooling (UK)	0.81 / 0.84	1.12 / 1.12	1.25 / 1.65	1.54 / 1.92	2.47 / 2.06	2.47 / 2.06
STARTING CURRENT (A)		5.0	5.0	6.0	6.0	13.0	6.0
SYSTEM RUNNING CURRENT (A)	Heating/Cooling [MAX]	4.97 / 4.31 [13.4]	5.98 / 5.57 [13.4]	7.41 / 6.65 [19.4]	9.10 / 7.96 [19.4]	13.46 / 10.45 [27.1]	4.49 / 5.45 [8.6]
FUSE RATING (BS88) - HRC (A)		16	16	25	25	32	16
MAINS CABLE No. CORES		3	3	3	3	3	5
MAX PIPE LENGTH (m)		50	50	55	55	100	100
MAX HEIGHT DIFFERENCE (m)		30	30	30	30	30	30
CHARGE REFRIGERANT (kg) / CO_2 EQUIVALENT (t) - R32 (GWP 675) - 30m		2.0 / 1.35	2.00 / 1.35	2.80 / 1.89	2.80 / 1.89	4.00 / 2.70	4.00 / 2.70
MAX ADDITIONAL REFRIGERANT (kg) / CO_2 EQUIVALENT (t) - R32 (GWP 675)		0.30 / 0.20	0.30 / 0.20	0.80 / 0.54	0.80 / 0.54	2.80 / 1.89	2.80 / 1.89

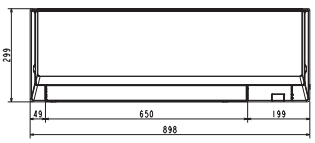
③ Three Phase

PKA-M35/50LA DIMENSIONS

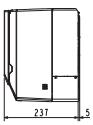
UPPER VIEW



FRONT VIEW

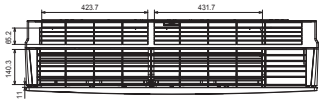


SIDE VIEW

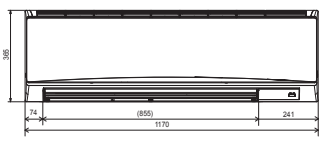


PKA-M60/71/100KA DIMENSIONS

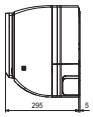
UPPER VIEW



FRONT VIEW



SIDE VIEW



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Changes for the Better

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Note: The fuse rating is for guidance only. Please refer to the relevant databook for detailed specification. It is the responsibility of a qualified electrician/electrical engineer to select the correct cable size and fuse rating based on current regulation and site specific conditions. Mitsubishi Electric's air conditioning equipment and heat pump systems contain a fluorinated greenhouse gas, R410A (GWP:2088), R32 (GWP:675), R407C (GWP:1774), R134a (GWP:1430), R513A (GWP:631), R454B (GWP:466), R1234ze (GWP:7) or R1234yf (GWP:4). *These GWP values are based on Regulation (EU) No 517/2014 from IPCC 4th edition. In case of Regulation (EU) No.626/2011 from IPCC 3rd edition, these are as follows. R410A (GWP:1975), R32 (GWP:550), R407C (GWP:1650) or R134a (GWP:1300).

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Performance diagrams – Climate control



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Performance diagrams

Cooling with ambient air

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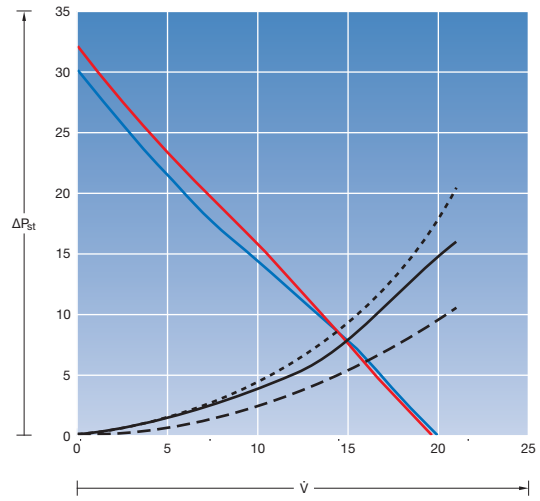
Enclosure heaters

Enclosure heaters without fan
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TopTherm fan-and-filter units and EMC TopTherm fan-and-filter units

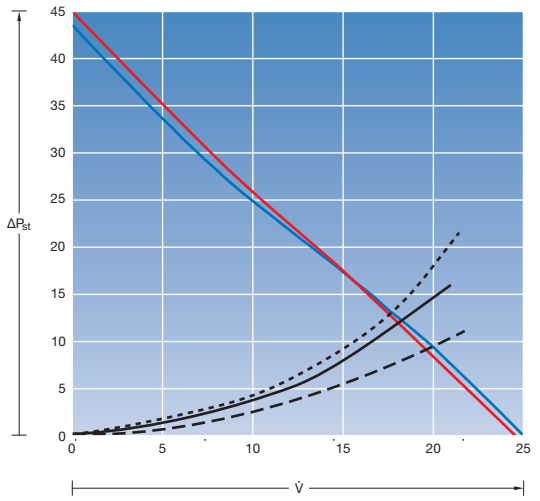
Air throughput 20/25 m³/h

50 Hz
SK 3237.100, .110, .124, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter

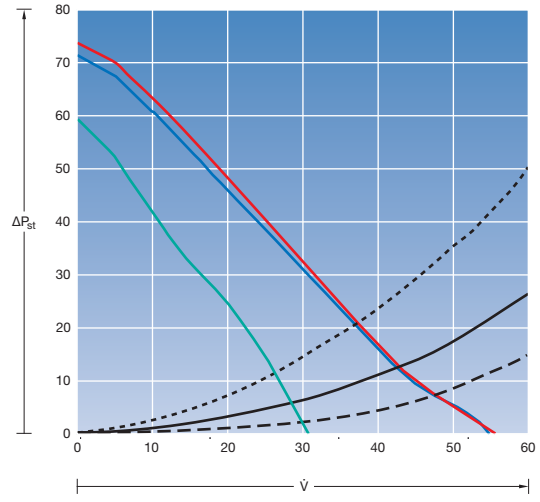
60 Hz
SK 3237.100, .110, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter

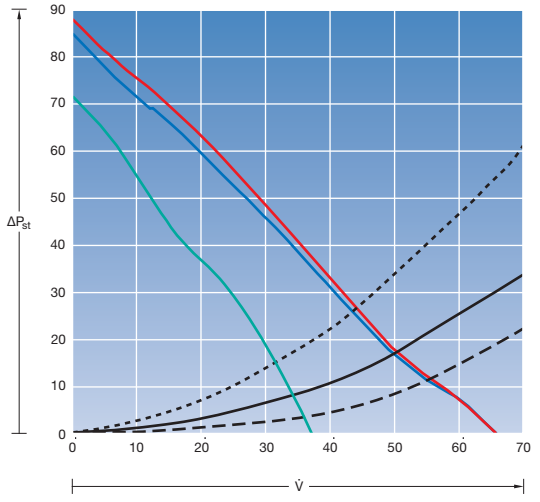
Air throughput 55/66 m³/h

50 Hz
SK 3238.100, .110, .124, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter

60 Hz
SK 3238.100, .110, .600

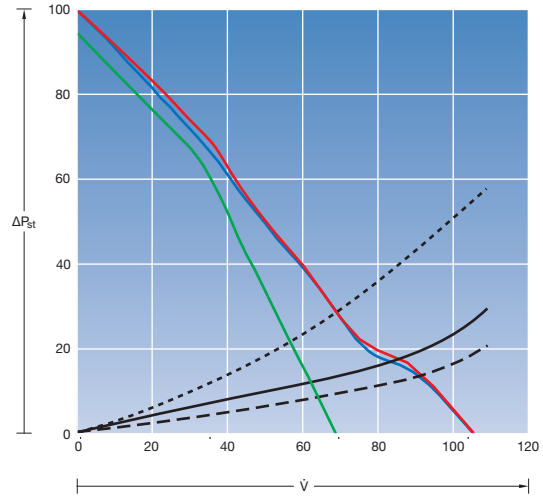


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter

TopTherm fan-and-filter units and EMC TopTherm fan-and-filter units

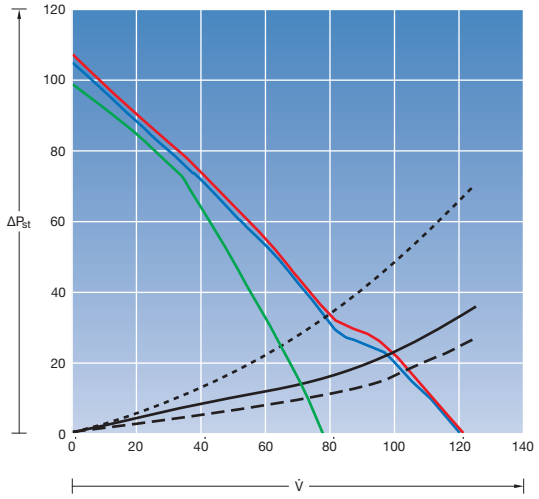
Air throughput 105/120 m³/h

50 Hz
SK 3239.100, .110, .124, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter

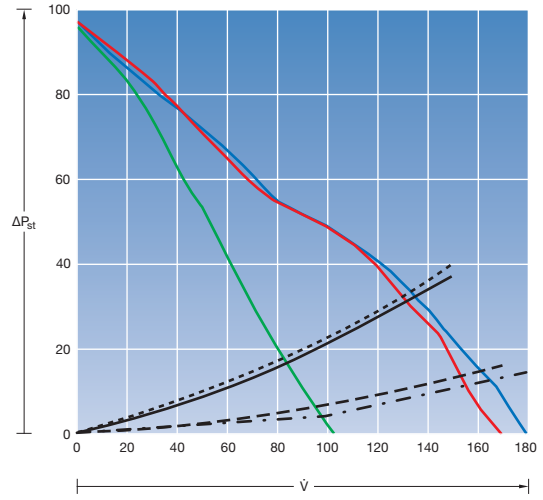
60 Hz
SK 3239.100, .110, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter

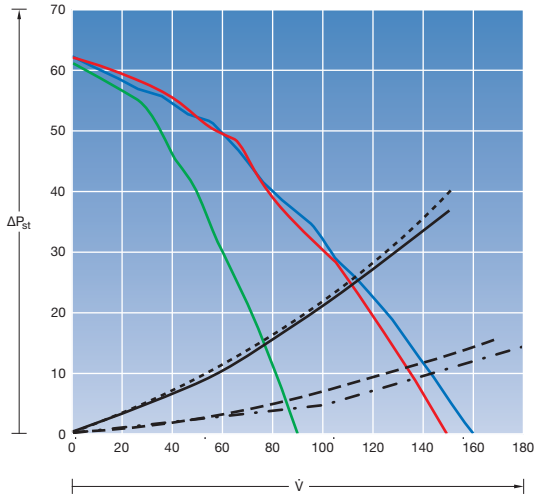
Air throughput 180/160 m³/h

50 Hz
SK 3240.100, .110, .124, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

60 Hz
SK 3240.100, .110, .600

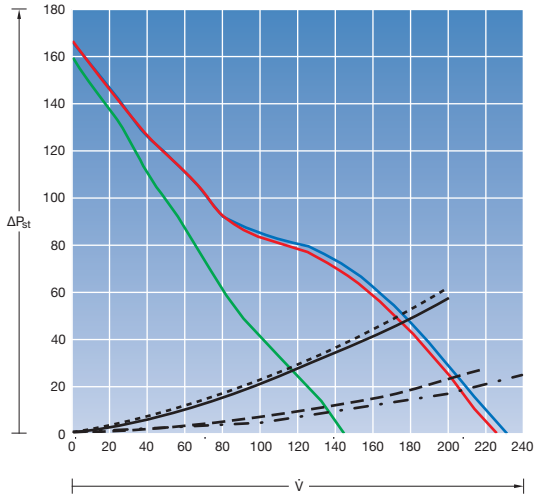


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

TopTherm fan-and-filter units and EMC TopTherm fan-and-filter units

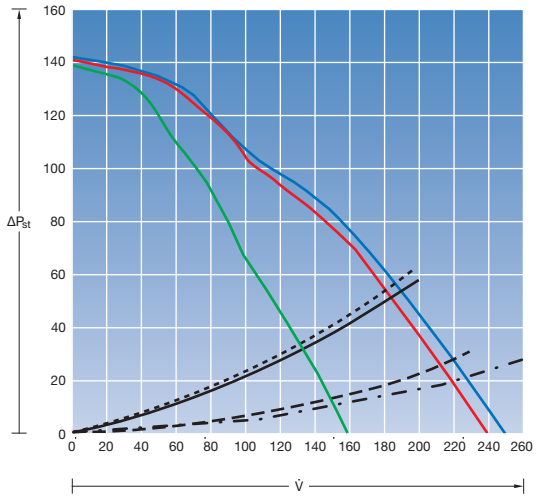
Air throughput 230/250 m³/h

50 Hz
SK 3241.100, .110, .124, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

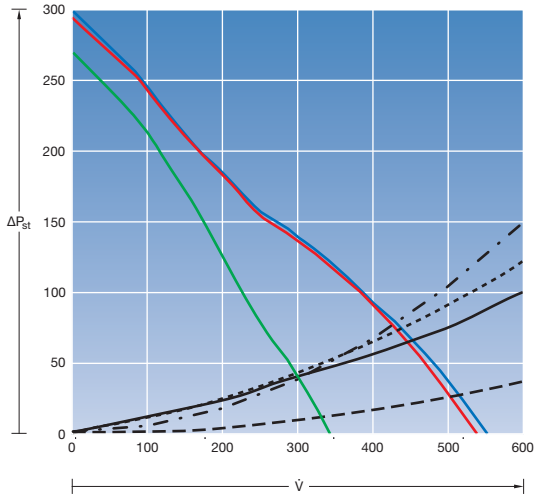
60 Hz
SK 3241.100, .110, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

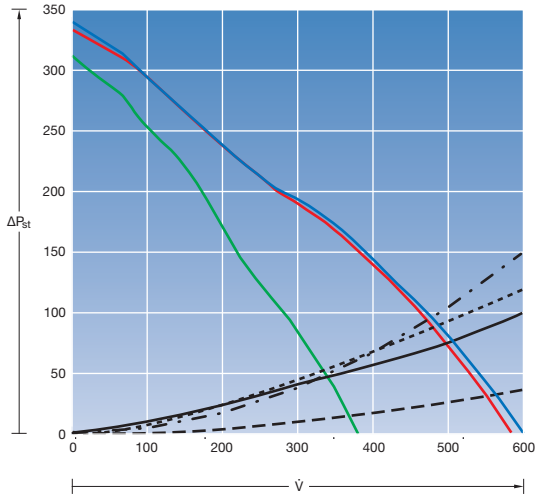
Air throughput 550/600 m³/h

50 Hz
SK 3243.100, .110, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

60 Hz
SK 3243.100, .110, .600

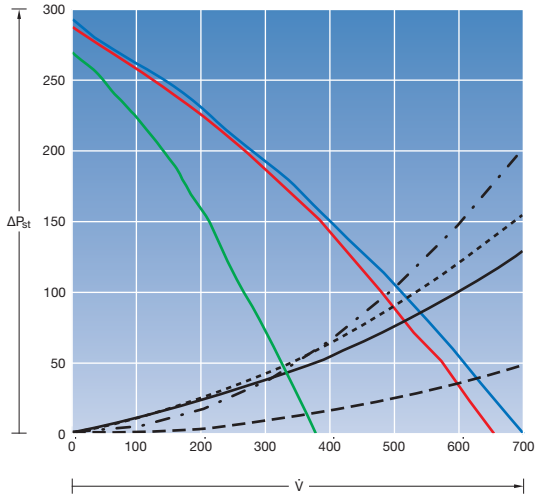


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

TopTherm fan-and-filter units and EMC TopTherm fan-and-filter units

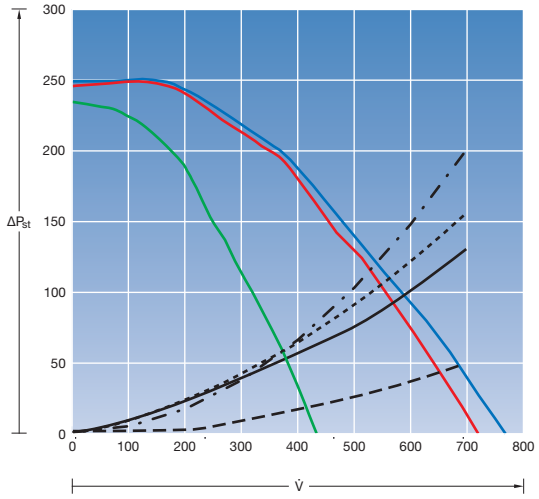
Air throughput 700/770 m³/h

50 Hz
SK 3244.100, .110, .140, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

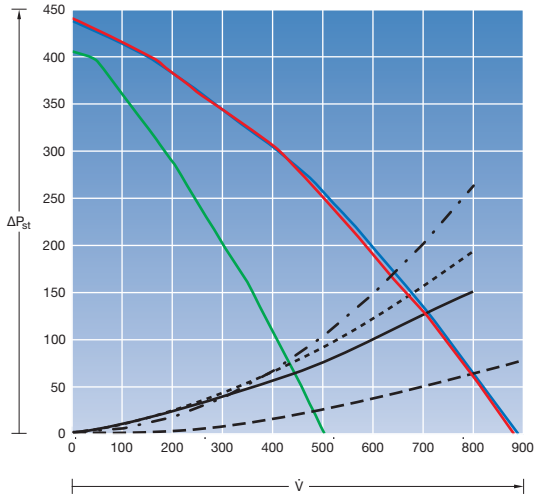
60 Hz
SK 3244.100, .110, .140, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

Air throughput 900 m³/h

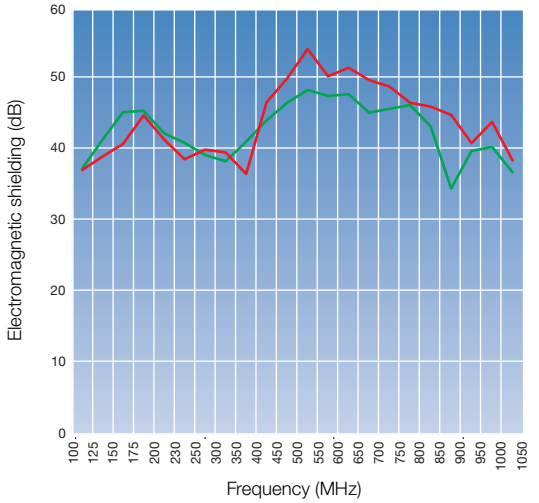
50/60 Hz
SK 3245.600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

Shielding/attenuation diagram
Testing to EN 61587-3: 2006 – Electromagnetic shielding performance tests for cabinets, racks and sub-racks

TopTherm EMC fan-and-filter units/outlet filters
SK 3237.XXX – SK 3245.XXX

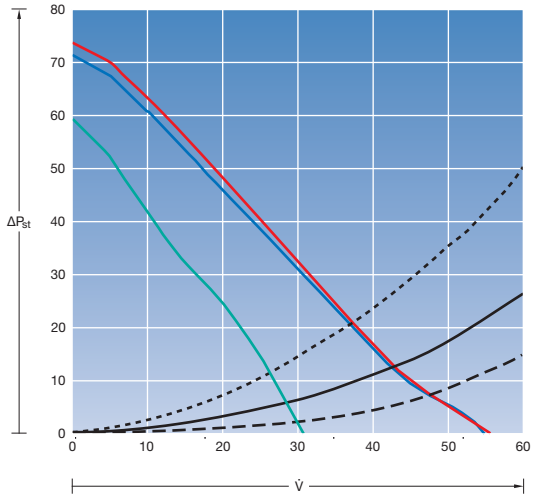


= vertical attenuation
= horizontal attenuation

TopTherm fan-and-filter units with EC technology

Air throughput 55 m³/h

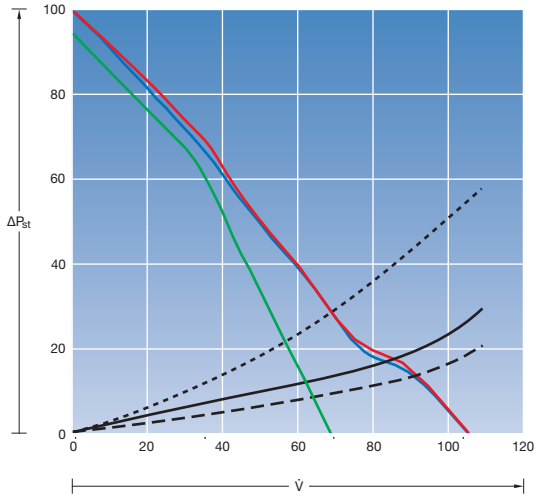
50/60 Hz
SK 3238.500



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter

Air throughput 105 m³/h

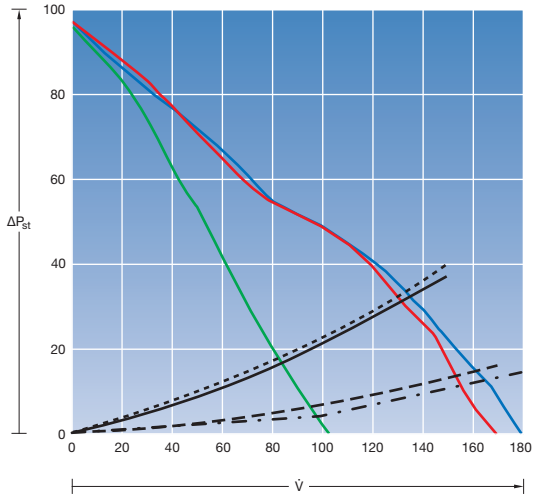
50/60 Hz
SK 3239.500



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter

Air throughput 180 m³/h

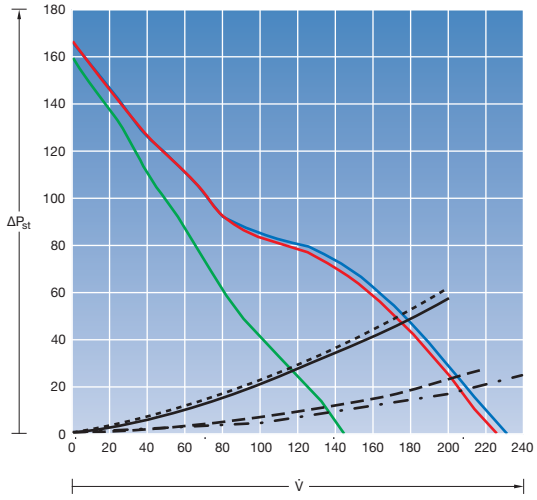
50/60 Hz
SK 3240.500



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

Air throughput 230 m³/h

50/60 Hz
SK 3241.500

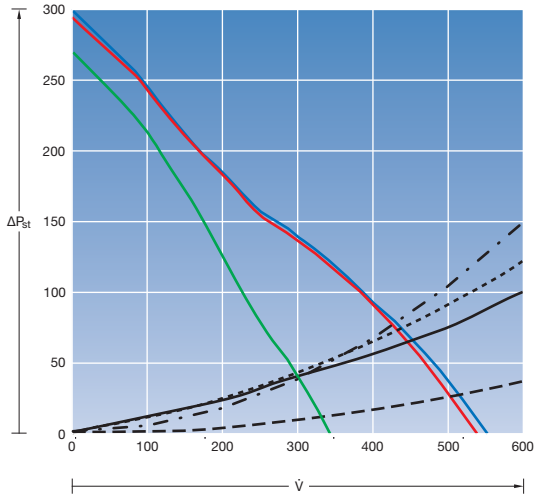


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

TopTherm fan-and-filter units with EC technology

Air throughput 550 m³/h

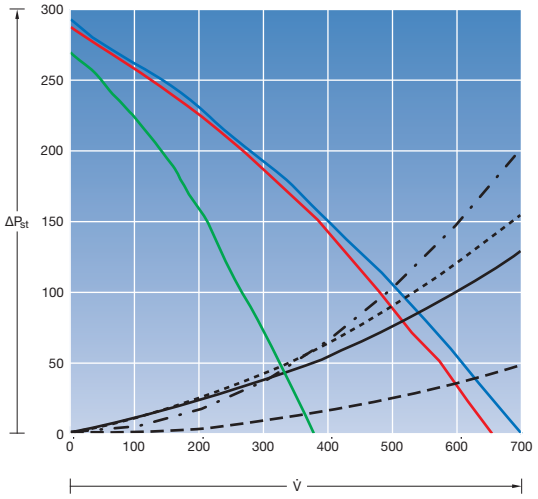
50/60 Hz
SK 3243.500



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

Air throughput 700 m³/h

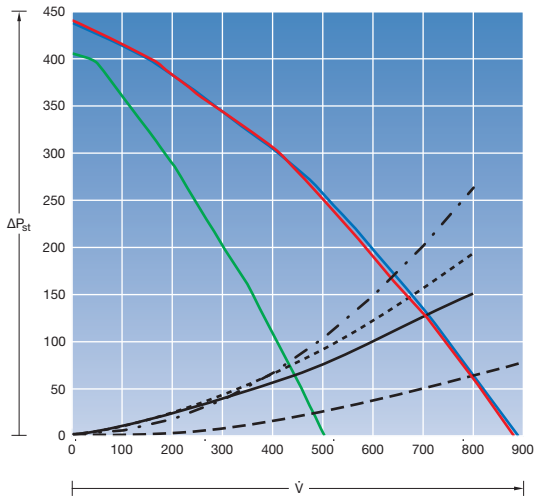
50/60 Hz
SK 3244.500



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

Air throughput 900 m³/h

50/60 Hz
SK 3245.500, .510



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

Roof-mounted fans

Using the base/plinth:

If the vented base/plinth is used as an air inlet instead of the outlet filter 3243.200, the resistance curves as indicated in the performance diagrams will apply as follows:

----- 1 x vented base/plinth with filter

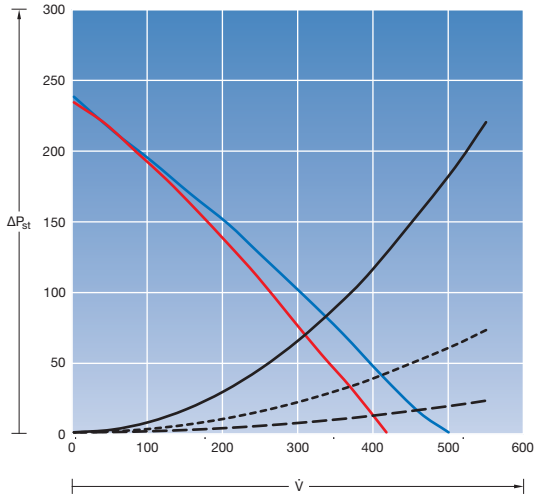
– – – 2 x vented base/plinth with filter

– – – 1 x vented base/plinth without filter

Roof-mounted fans

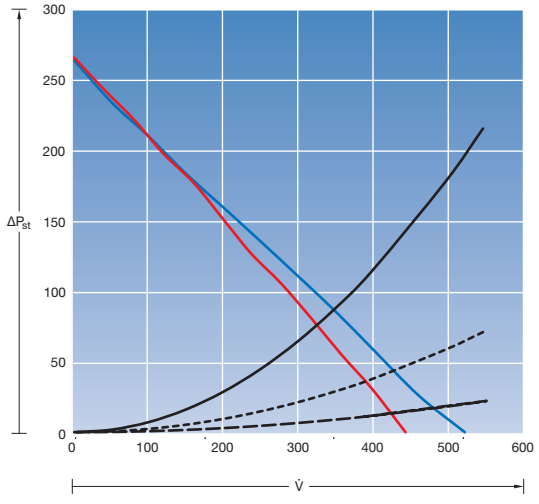
Air throughput 500/525 m³/h

50 Hz
SK 3139.100/.110



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= without filter mat (IP 22)
= with filter mat (IP 55)
= 1 x outlet filter 3243.200 with standard and fine filter (IP 55)
----- = 1 x outlet filter 3243.200 with standard filter (IP 54) or 2 x outlet filter 3243.200 with standard and fine filter (IP 55)
– – – = 2 x outlet filter 3243.200 with standard filter (IP 54)

60 Hz
SK 3139.100/.110

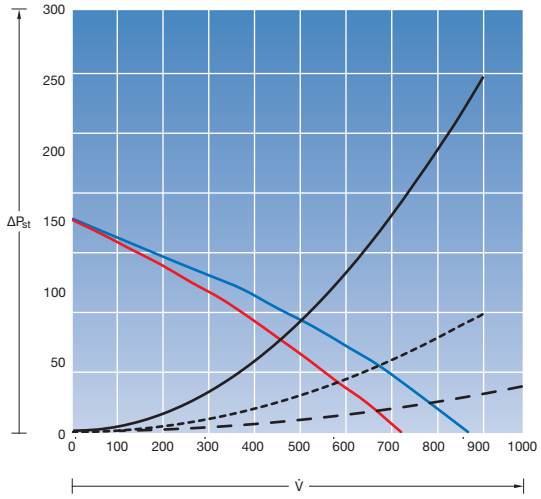


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= without filter mat (IP 22)
= with filter mat (IP 55)
= 1 x outlet filter 3243.200 with standard and fine filter (IP 55)
----- = 1 x outlet filter 3243.200 with standard filter (IP 54) or 2 x outlet filter 3243.200 with standard and fine filter (IP 55)
– – – = 2 x outlet filter 3243.200 with standard filter (IP 54)

Roof-mounted fans

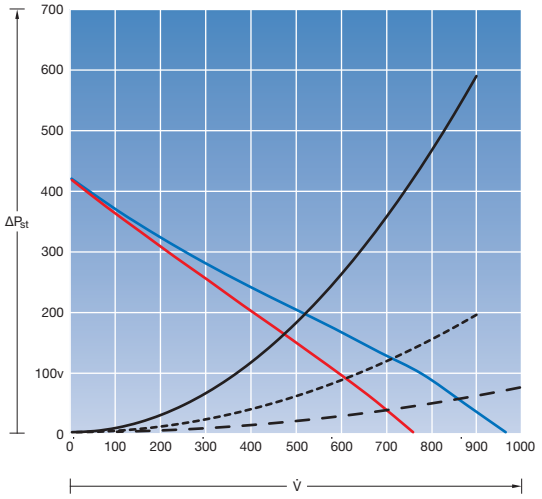
Air throughput 873/965 m³/h

50 Hz
SK 3140.100/.110



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
— = without filter mat (IP 22)
— = with filter mat (IP 55)
— = 1 x outlet filter 3243.200 with standard and fine filter (IP 55)
- - - = 1 x outlet filter 3243.200 with standard filter (IP 54) or 2 x outlet filter 3243.200 with standard and fine filter (IP 55)
- - - = 2 x outlet filter 3243.200 with standard filter (IP 54)

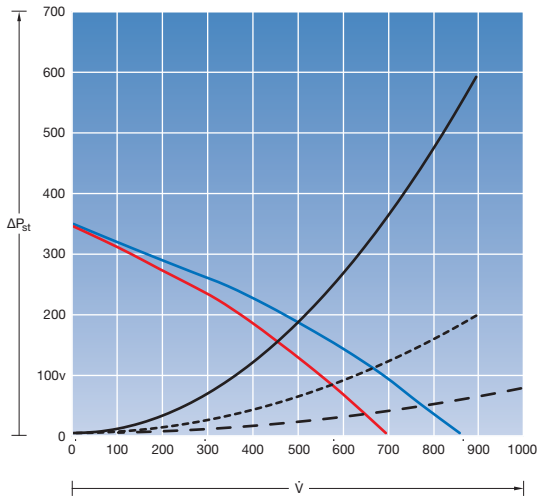
60 Hz
SK 3140.100/.110



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
— = without filter mat (IP 22)
— = with filter mat (IP 55)
— = 1 x outlet filter 3243.200 with standard and fine filter (IP 55)
- - - = 1 x outlet filter 3243.200 with standard filter (IP 54) or 2 x outlet filter 3243.200 with standard and fine filter (IP 55)
- - - = 2 x outlet filter 3243.200 with standard filter (IP 54)

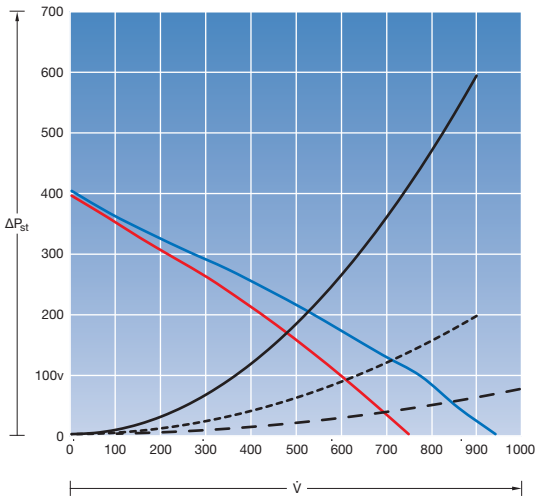
Air throughput 863/942 m³/h

400 V, 50 Hz
SK 3140.140



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
— = without filter mat (IP 22)
— = with filter mat (IP 55)
— = 1 x outlet filter 3243.200 with standard and fine filter (IP 55)
- - - = 1 x outlet filter 3243.200 with standard filter (IP 54) or 2 x outlet filter 3243.200 with standard and fine filter (IP 55)
- - - = 2 x outlet filter 3243.200 with standard filter (IP 54)

400 V, 60 Hz
SK 3140.140

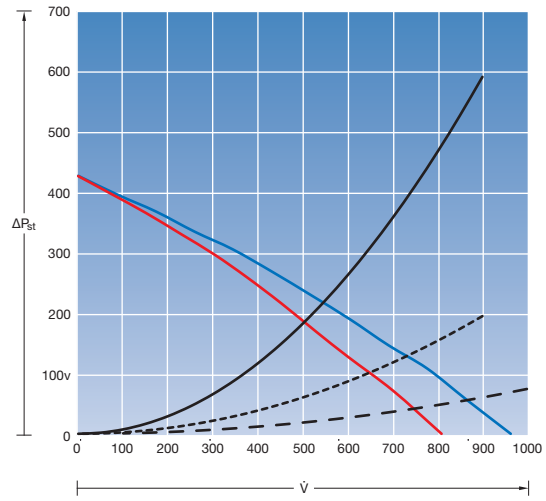


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
— = without filter mat (IP 22)
— = with filter mat (IP 55)
— = 1 x outlet filter 3243.200 with standard and fine filter (IP 55)
- - - = 1 x outlet filter 3243.200 with standard filter (IP 54) or 2 x outlet filter 3243.200 with standard and fine filter (IP 55)
- - - = 2 x outlet filter 3243.200 with standard filter (IP 54)

Roof-mounted fans

Air throughput 963 m³/h

460 V, 60 Hz
SK 3140.140

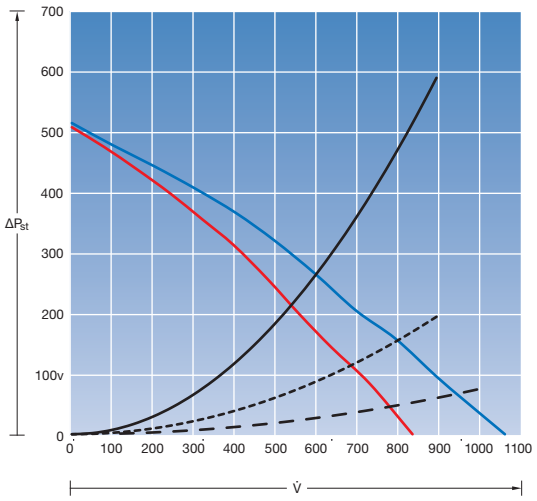


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= without filter mat (IP 22)
= with filter mat (IP 55)
= 1 x outlet filter 3243.200 with standard and fine filter (IP 55)
= 1 x outlet filter 3243.200 with standard filter (IP 54) or 2 x outlet filter 3243.200 with standard and fine filter (IP 55)
= 2 x outlet filter 3243.200 with standard filter (IP 54)

Roof-mounted fans with EC technology

Air throughput 1069 m³/h

50/60 Hz
SK 3140.500/.510

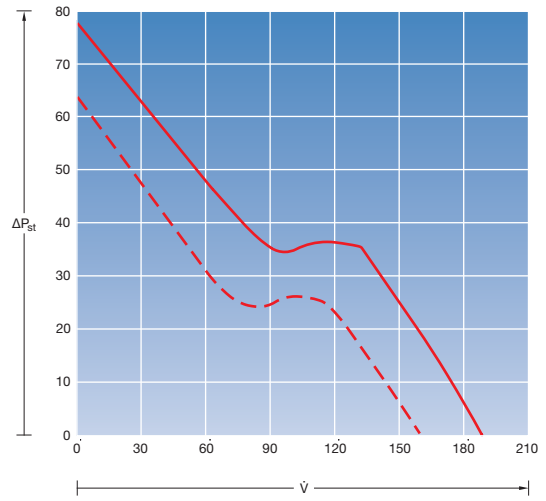


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= without filter mat (IP 22)
= with filter mat (IP 55)
= 1 x outlet filter 3243.200 with standard and fine filter (IP 55)
= 1 x outlet filter 3243.200 with standard filter (IP 54) or 2 x outlet filter 3243.200 with standard and fine filter (IP 55)
= 2 x outlet filter 3243.200 with standard filter (IP 54)

Rack-mounted fans for 482.6 mm (19˝)

Air throughput 320/480 m³/h

50/60 Hz
SK 3340.230, 3341.024, .115, .230, 3342.024, .230, .500, 3350.115, .230, 3351.230, 3352.230, .500

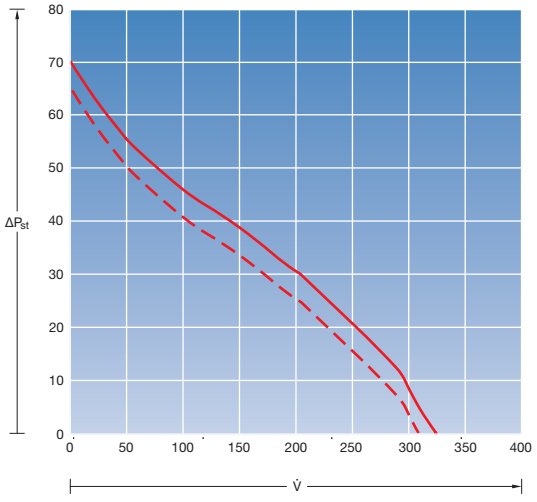


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= 50 Hz
= 60 Hz

Tangential fans for 482.6 mm (19˝)

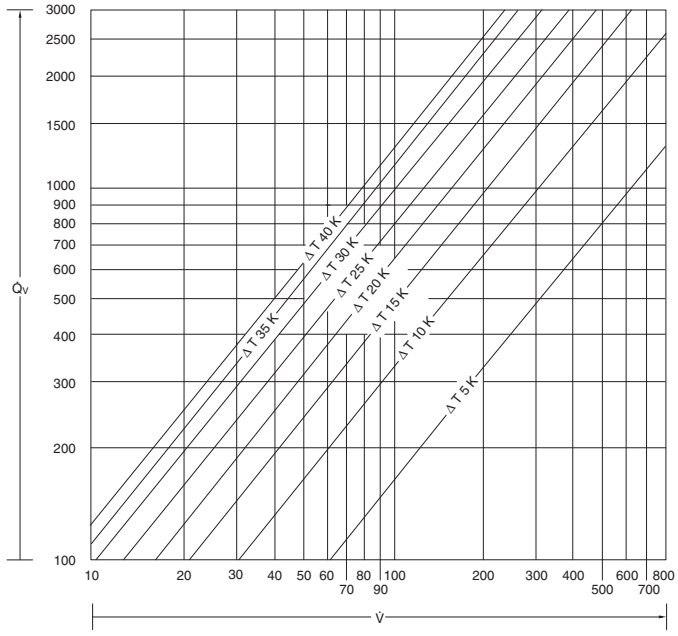
Air throughput 320 m³/h

50/60 Hz
SK 3144.000, 3145.000



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= 50 Hz
= 60 Hz

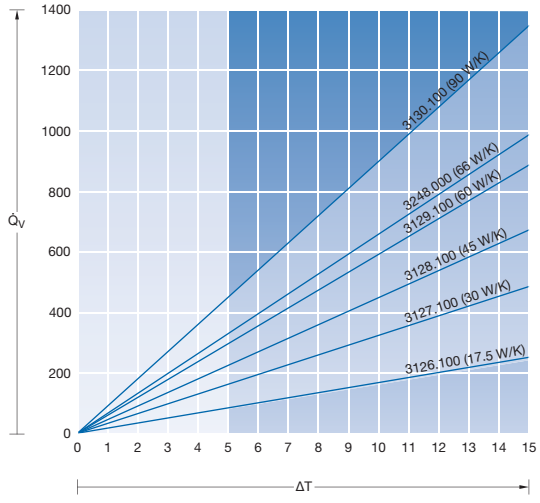
Selection diagram
for fans



$\dot{V}$ = Volumetric flow (m^3/h)
$\dot{Q}_V$ = Heat loss (W)

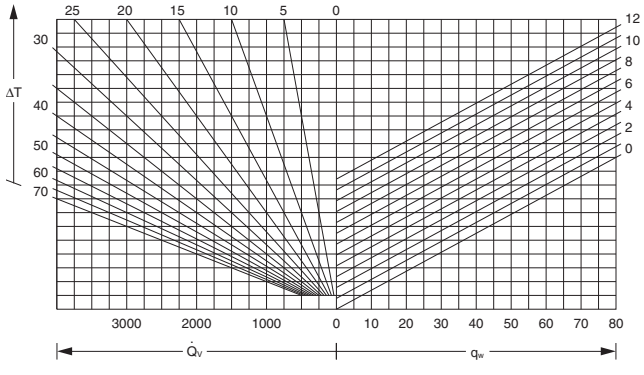
TopTherm air/air heat exchangers
Specific thermal output 17.5 – 90 W/K, wall-mounted with controller

50/60 Hz
SK 3126.100, 3127.100, 3128.100, 3129.100, 3130.100, 3248.000



$\dot{Q}_V$ = Heat loss (W)
ΔT = Temperature difference (K)

Selection diagram
for air/air heat exchangers

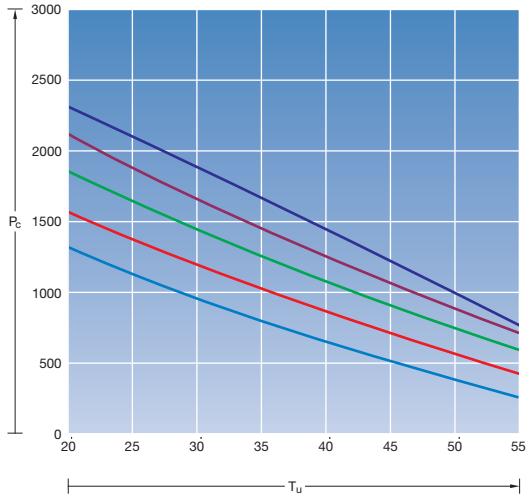


ΔT	=	Temperature difference (K)
$\dot{Q}_V$	=	Heat loss (W)
q_W	=	Specific thermal output (W/K)
A	=	Enclosure surface area to IEC 890 (m^2)
k	=	Heat transfer coefficient (W/m^2 K) for sheet steel k = 5.5 W/m^2 K

VX25 Blue e+ integration solution

Output class 1300 W (110 – 240 V, 1 ~, 50 – 60 Hz / 380 – 480 V, 3 ~, 50 – 60 Hz)

1.30 kW
SK 3185.030



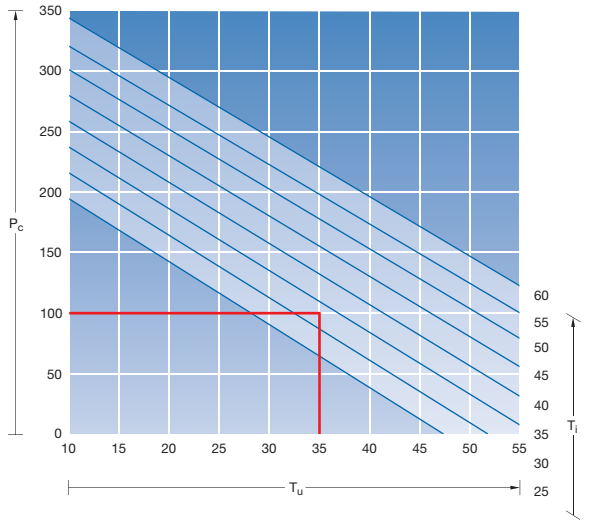
Enclosure internal temperature T_i
- 45 °C
- 40 °C
- 35 °C
- 30 °C
- 25 °C

P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

Thermoelectric coolers

Cooling output

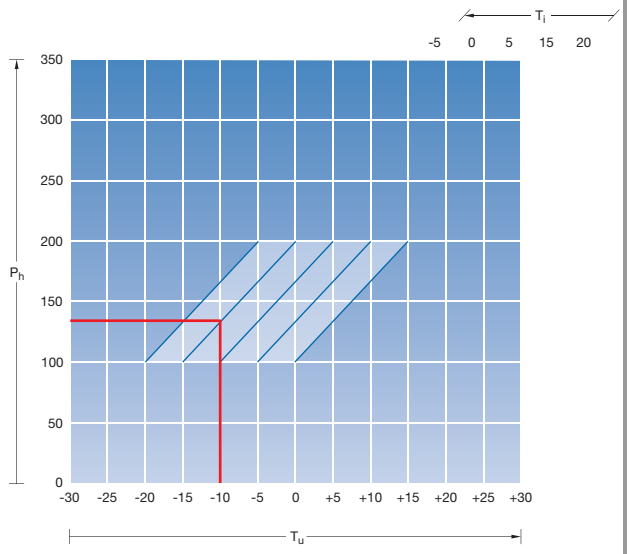
50/60 Hz
SK 3201.200, .300



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Heating output

50/60 Hz
SK 3201.200, .300

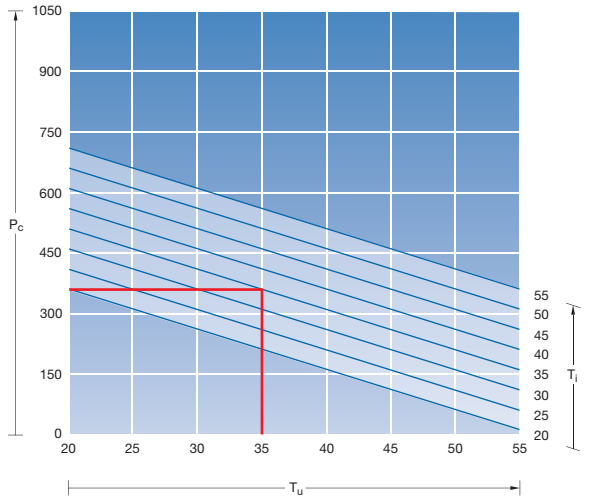


T_u = Ambient temperature (°C)
P_h = Heating output (W)
T_i = Enclosure internal temperature (°C)

TopTherm wall-mounted cooling units

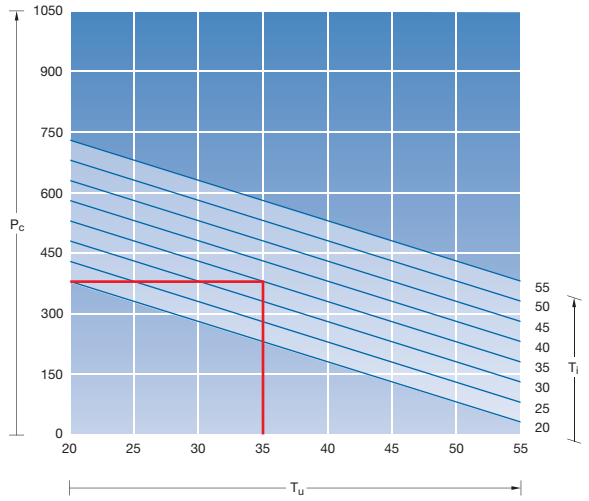
Output class 300 W (115/230 V, 1~)

50 Hz
SK 3302.300, .310, .100, .110, .200



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3302.300, .310, .100, .110, .200

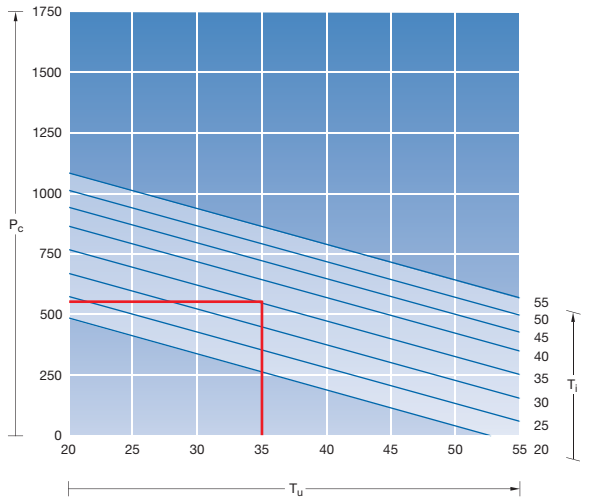


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm wall-mounted cooling units Blue e

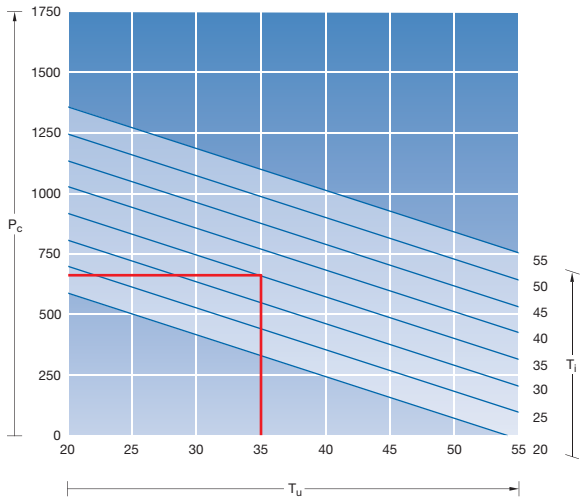
Output class 500 W (115/230 V, 1~)

50 Hz
SK 3303.500, .510, .600, .504, .514



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

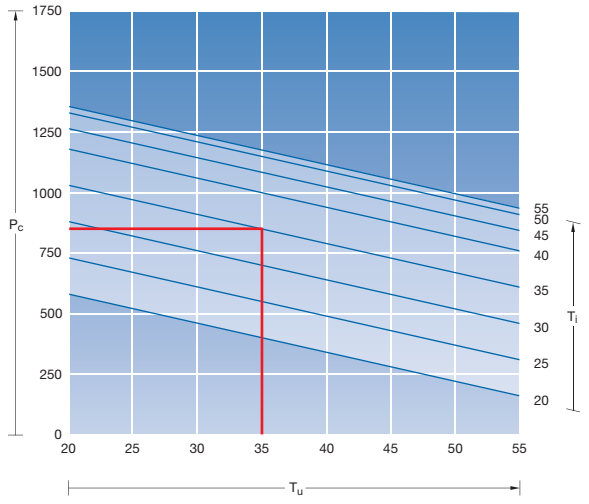
60 Hz
SK 3303.500, .510, .600, .504, .514



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

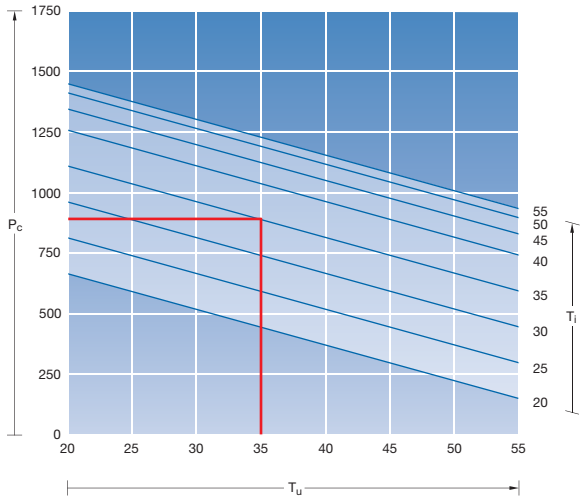
Output class 750 W (115/230 V, 1~, 400 V, 2~)

50 Hz
SK 3361.500, .510, .540, .600



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3361.500, .510, .540, .600

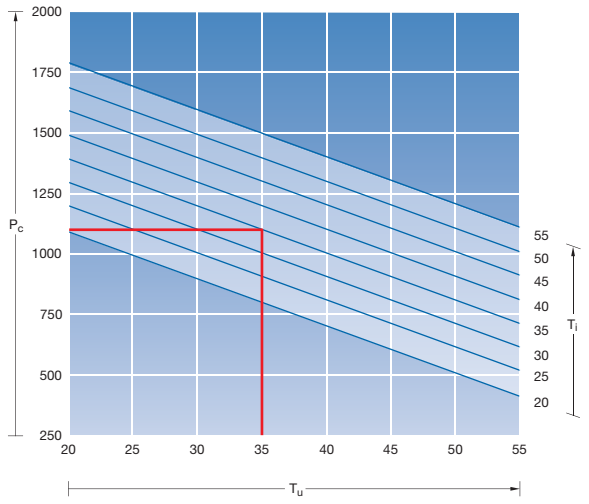


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm wall-mounted cooling units Blue e

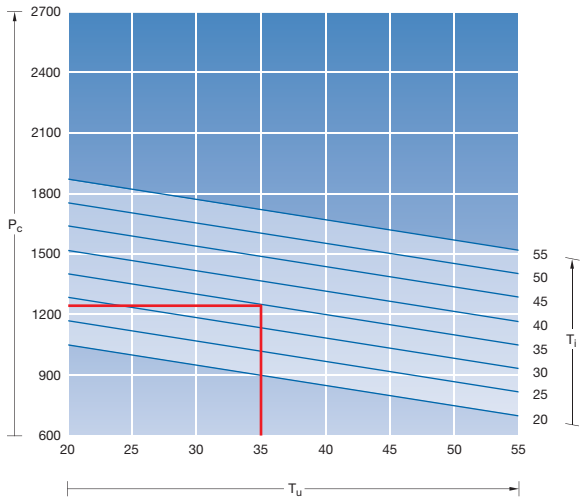
Output class 1000 W (115/230 V, 1~)

50 Hz
SK 3304.500, .510, .600, .504



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

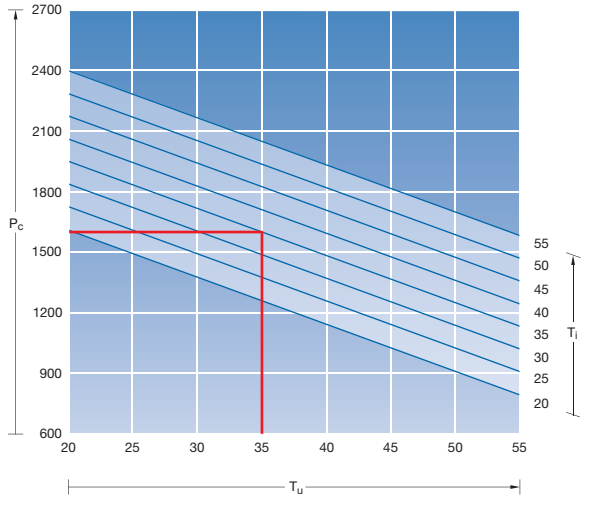
60 Hz
SK 3304.500, .510, .600, .504



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

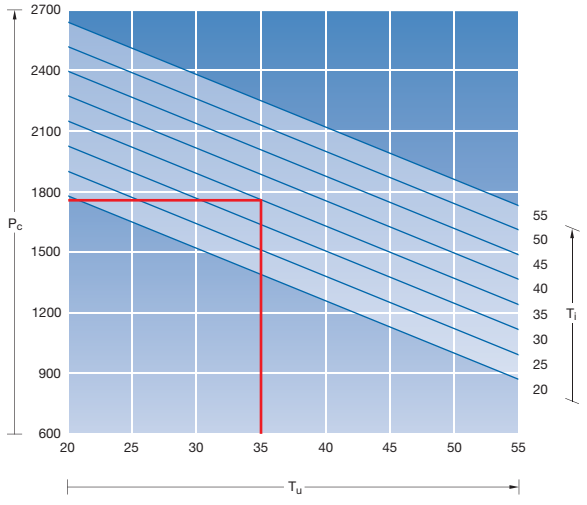
Output class 1500 W (115/230 V, 1~)

50 Hz
SK 3305.500, .510, .600, .504



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3305.500, .510, .600, .504

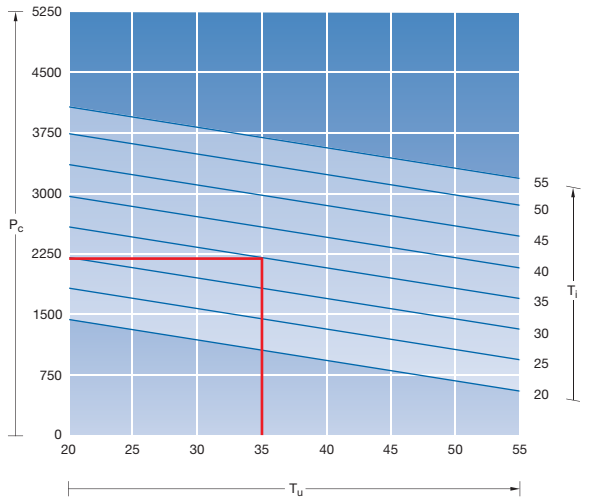


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm wall-mounted cooling units Blue e

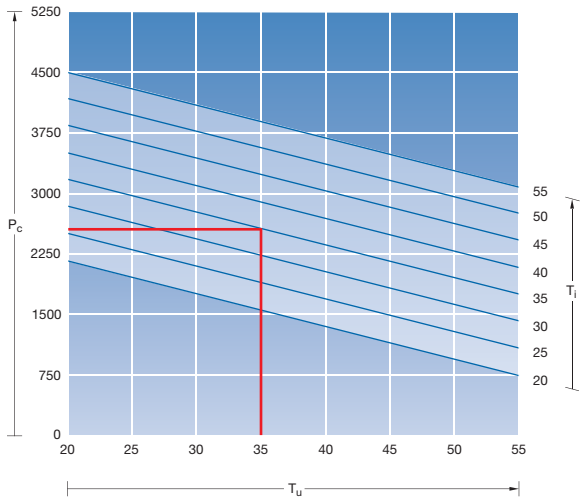
Output class 2000 W (115/230 V, 1~)

50 Hz
SK 3328.500, .510, .600, .504



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

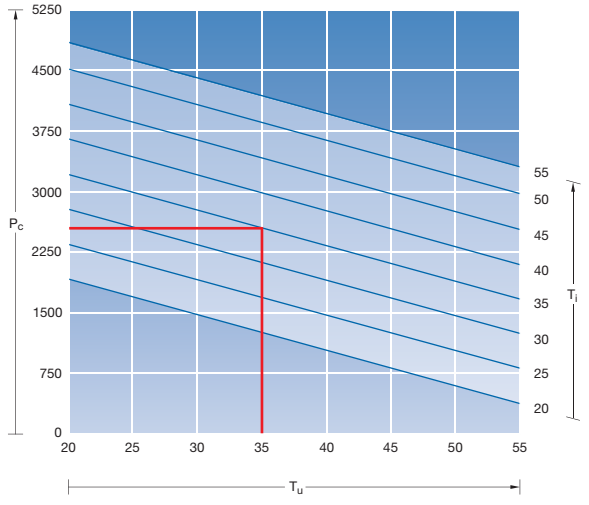
60 Hz
SK 3328.500, .510, .600, .504



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

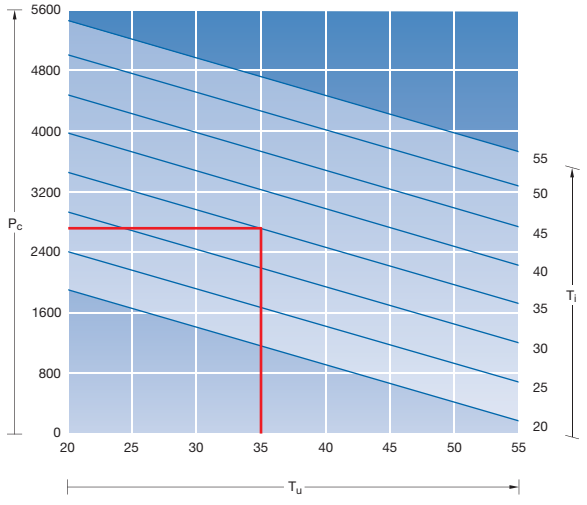
Output class 2500 W (115/230 V, 1~)

50 Hz
SK 3329.500, .510, .600, .504



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3329.500, .510, .600, .504

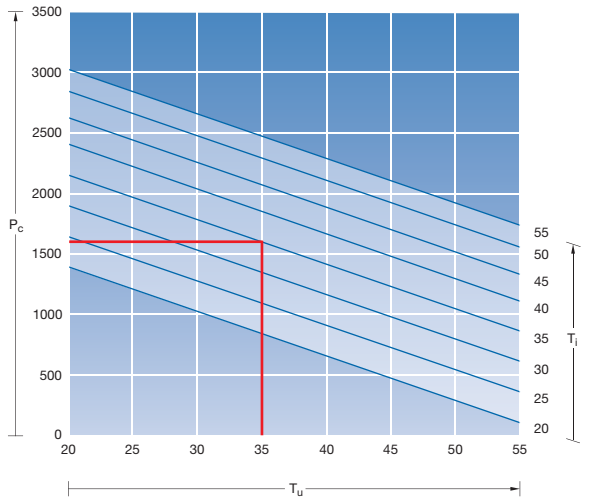


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm wall-mounted cooling units Blue e, slimline

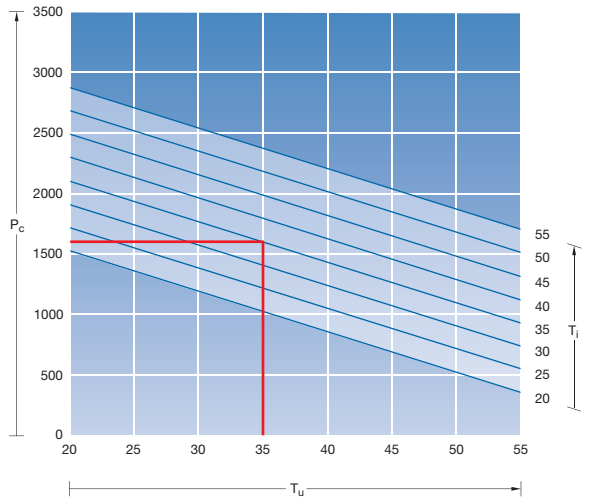
Output class 1500 W (230 V, 1~)

50 Hz
SK 3366.500



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

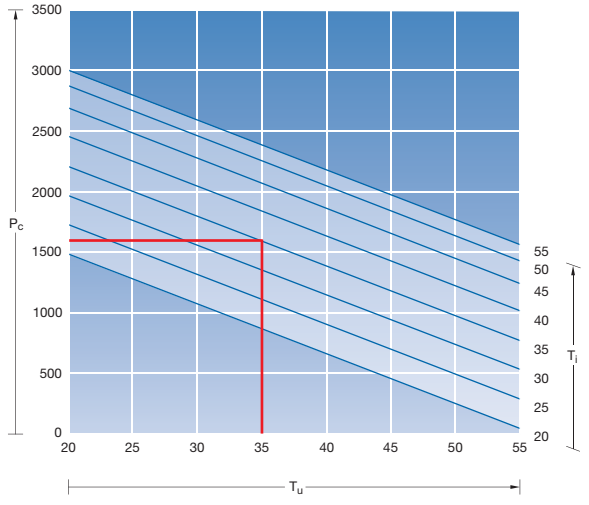
60 Hz
SK 3366.500



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

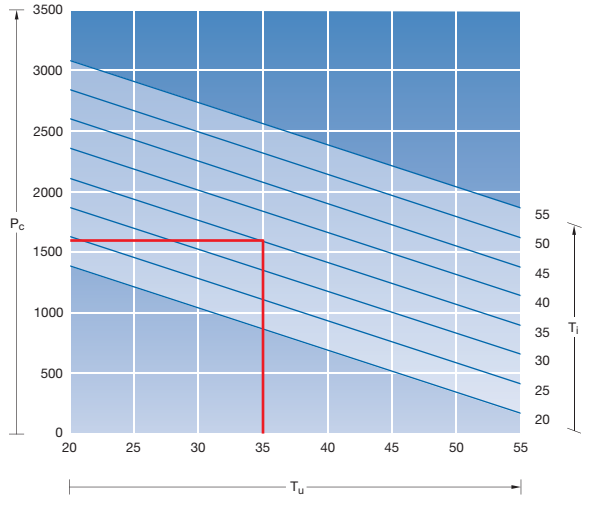
Output class 1500 W (400/460 V, 3~)

50 Hz
SK 3366.540



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3366.540

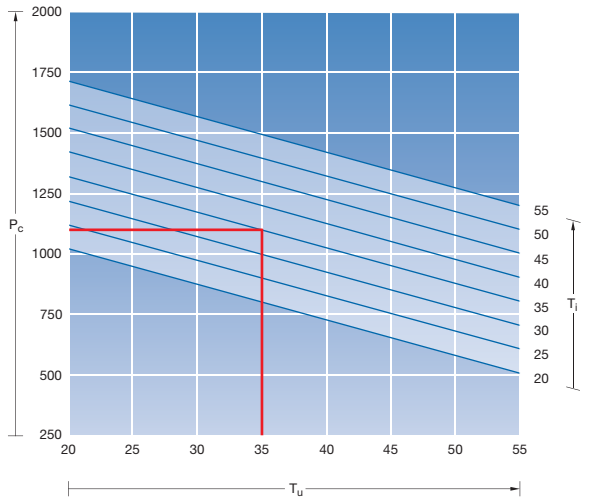


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm wall-mounted cooling units Blue e

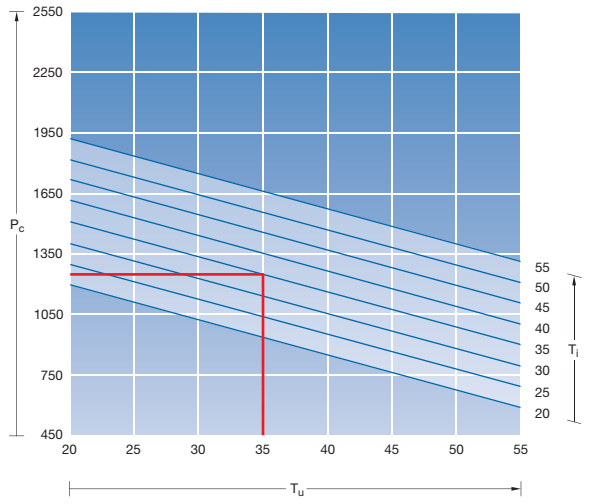
Output class 1000 W (400/460 V, 3~)

50 Hz
SK 3304.540, .640, .544



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

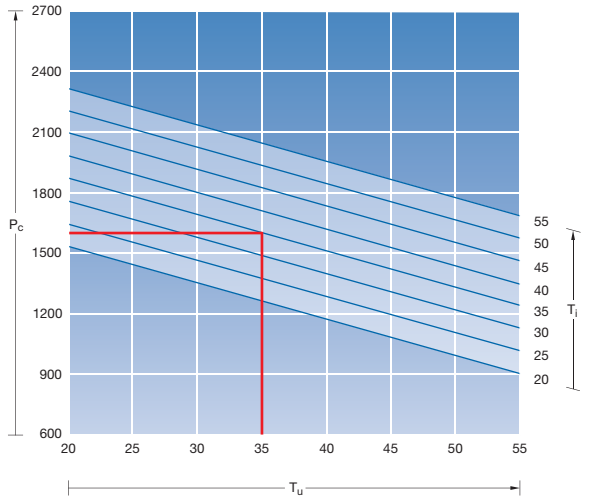
60 Hz
SK 3304.540, .640, .544



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

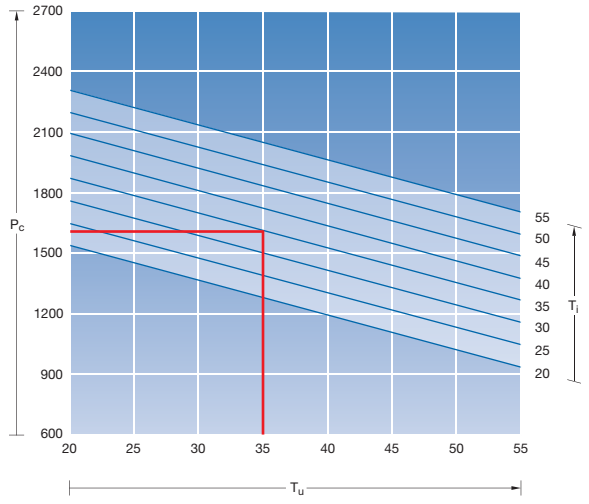
Output class 1500 W (400/460 V, 3~)

50 Hz
SK 3305.540, .640, .544



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3305.540, .640, .544

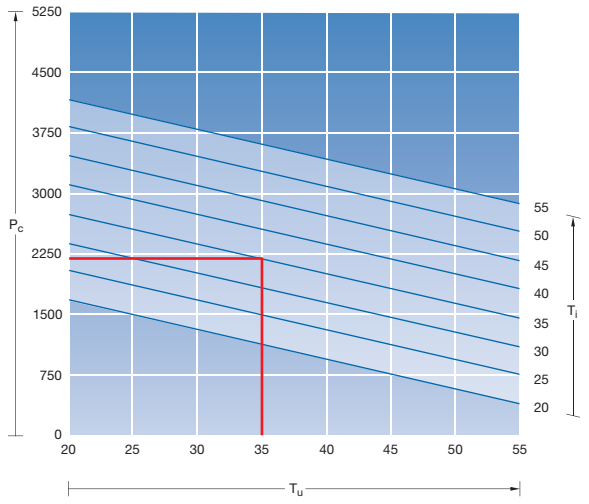


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm wall-mounted cooling units Blue e

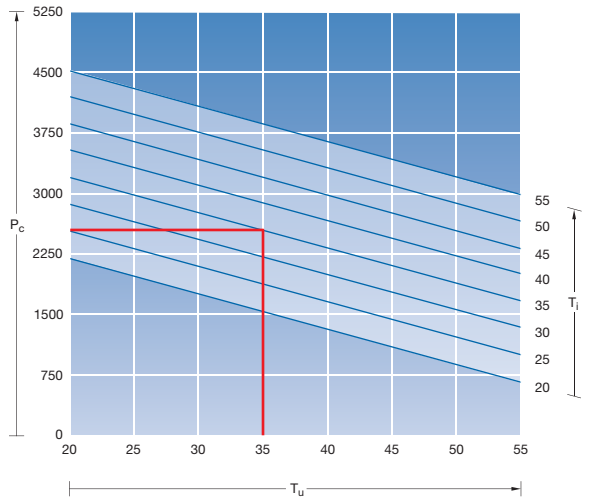
Output class 2000 W (400/460 V, 3~)

50 Hz
SK 3328.540, .640, .544



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

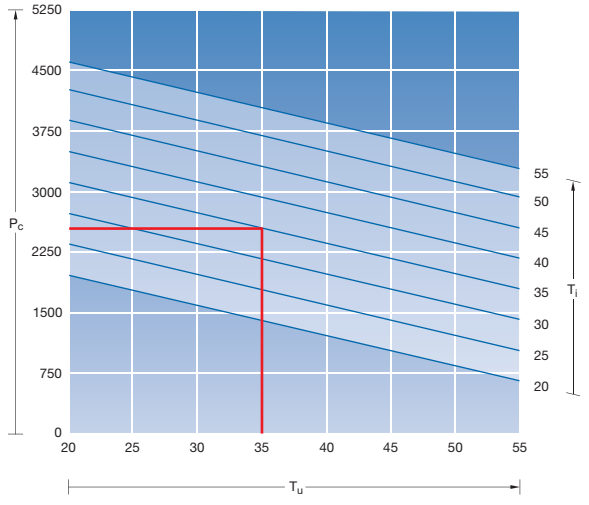
60 Hz
SK 3328.540, .640, .544



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

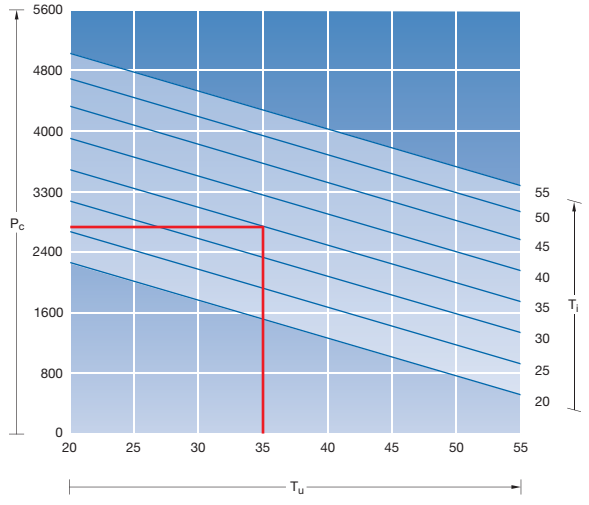
Output class 2500 W (400/460 V, 3~)

50 Hz
SK 3329.540, .640, .544



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3329.540, .640, .544

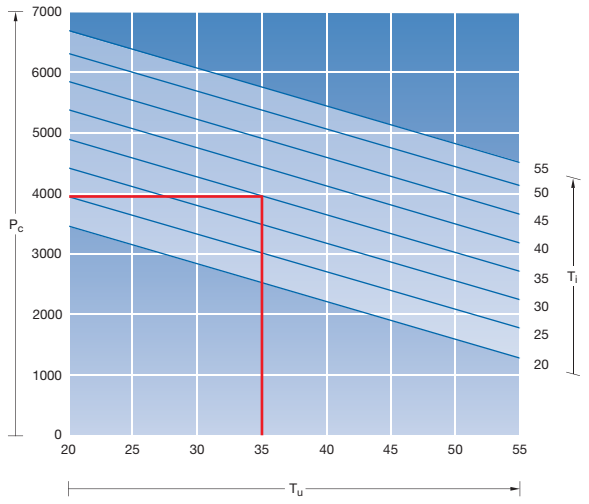


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm wall-mounted cooling units Blue e

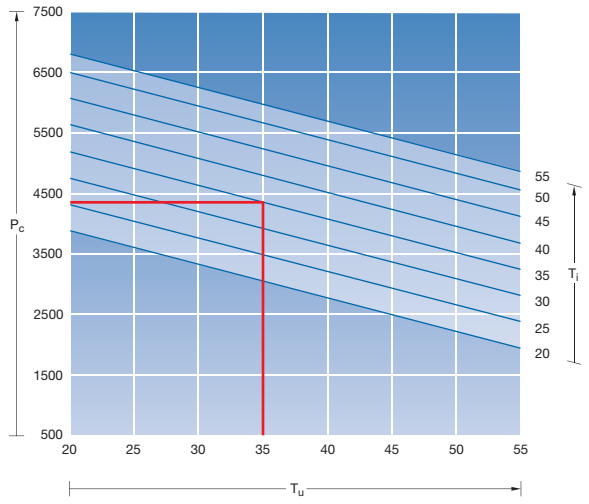
Output class 4000 W (400/460 V, 3~)

50 Hz
SK 3332.540, .640



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3332.540, .640

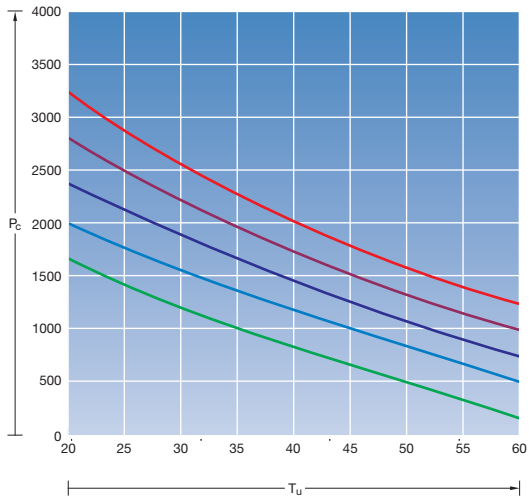


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Wall-mounted cooling units Blue e+

Output class 1600/2000 W (110 – 240 V, 1~, 50 – 60 Hz / 380 – 480 V, 3~, 50 – 60 Hz)

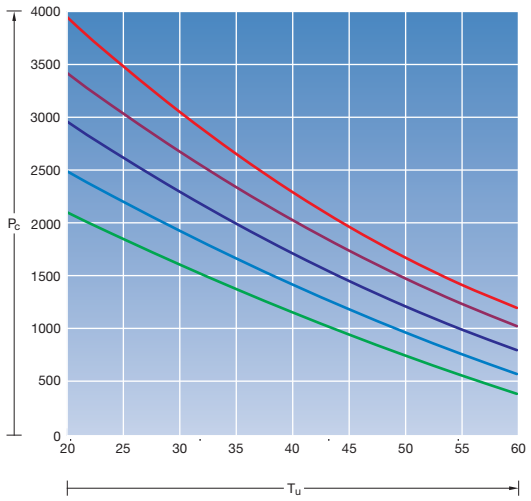
1.6 kW
SK 3185.530, .830



Enclosure internal temperature T_i
- 45 °C
- 40 °C
- 35 °C
- 30 °C
- 25 °C

P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

2 kW
SK 3186.630, .930

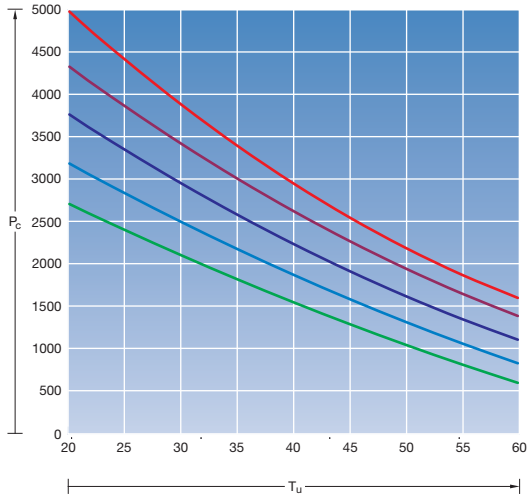


Enclosure internal temperature T_i
- 45 °C
- 40 °C
- 35 °C
- 30 °C
- 25 °C

P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

Output class 2600/4200 W (110 – 240 V, 1~, 50 – 60 Hz / 380 – 480 V, 3~, 50 – 60 Hz)

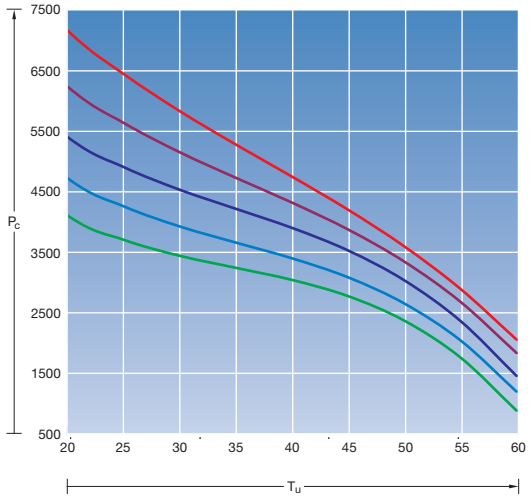
2.6 kW
SK 3187.630, .930



Enclosure internal temperature T_i
- 45 °C
- 40 °C
- 35 °C
- 30 °C
- 25 °C

P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

4.2 kW
SK 3188.640, .940



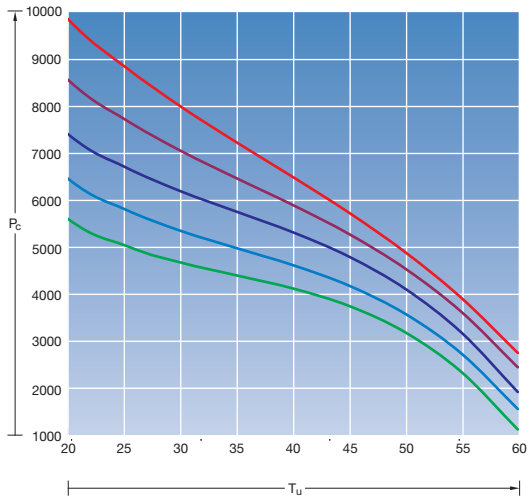
Enclosure internal temperature T_i
- 45 °C
- 40 °C
- 35 °C
- 30 °C
- 25 °C

P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

Wall-mounted cooling units Blue e+

Output class 5800 W (380 – 480 V, 3~, 50 – 60 Hz)

5.8 kW
SK 3189.640, .940



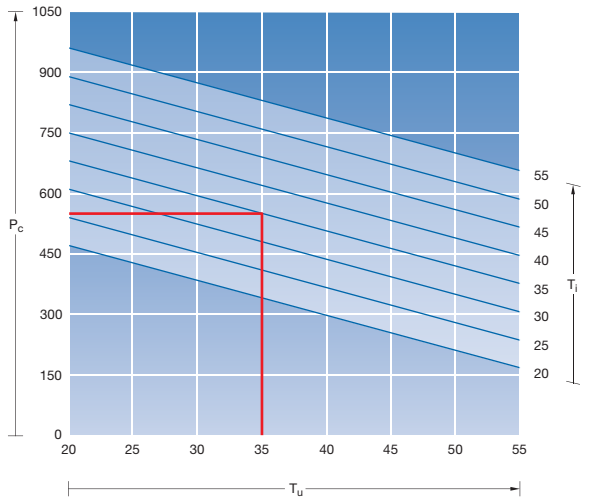
Enclosure internal temperature T_i
- 45 °C
- 40 °C
- 35 °C
- 30 °C
- 25 °C

P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

TopTherm roof-mounted cooling units Blue e

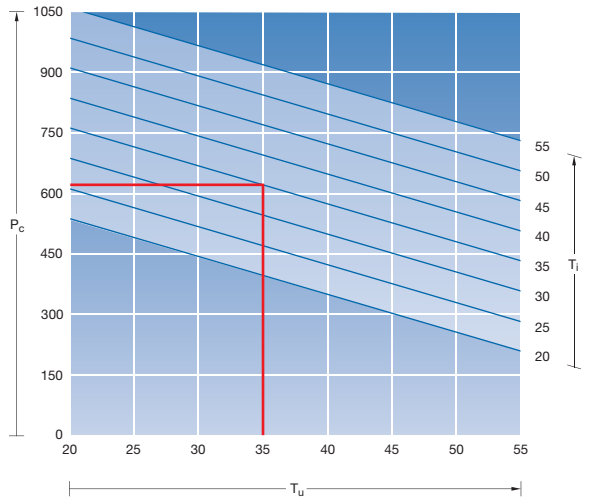
Output class 500 W (115/230 V, 1~)

50 Hz
SK 3382.500, .510, .600



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

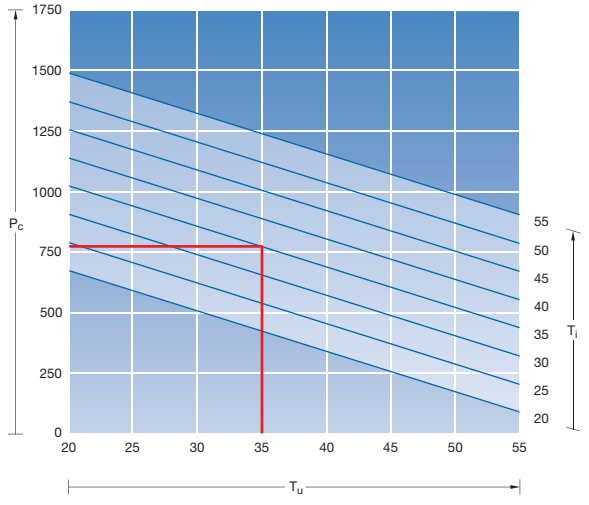
60 Hz
SK 3382.500, .510, .600



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

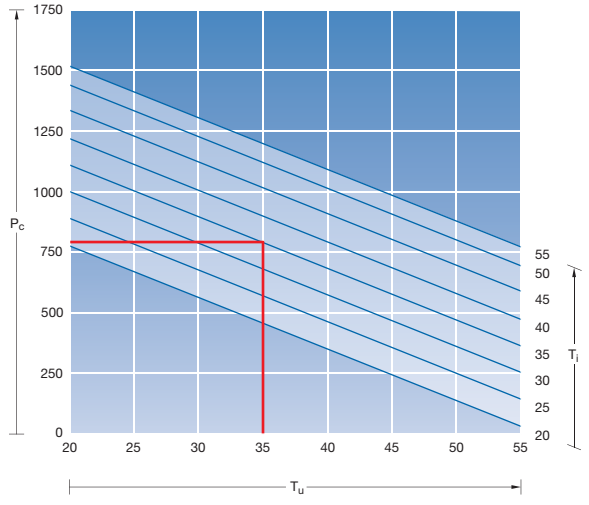
Output class 750 W (115/230 V, 1~, 400 V, 2~)

50 Hz
SK 3359.500, .510, .540, .600



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3359.500, .510, .540, .600

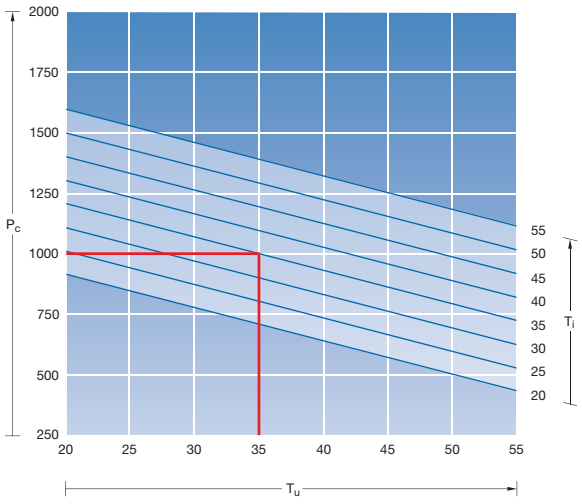


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm roof-mounted cooling units Blue e

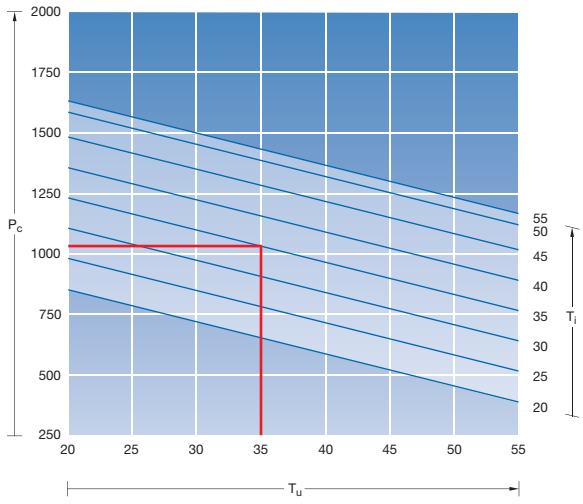
Output class 1000 W (115/230 V, 1~, 400 V, 2~)

50 Hz
3383.500, .510, .540, .600



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

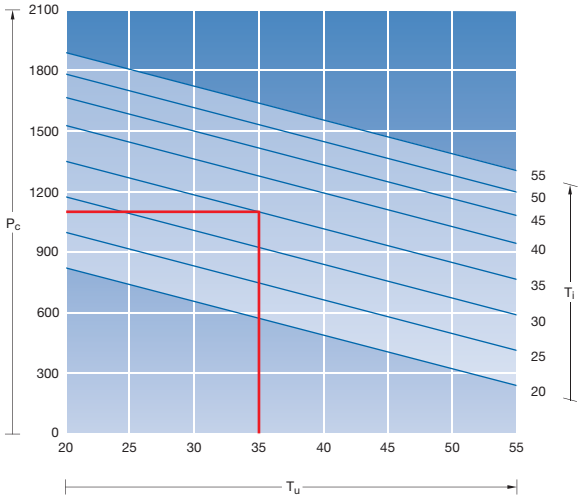
60 Hz
3383.500, .510, .540, .600



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

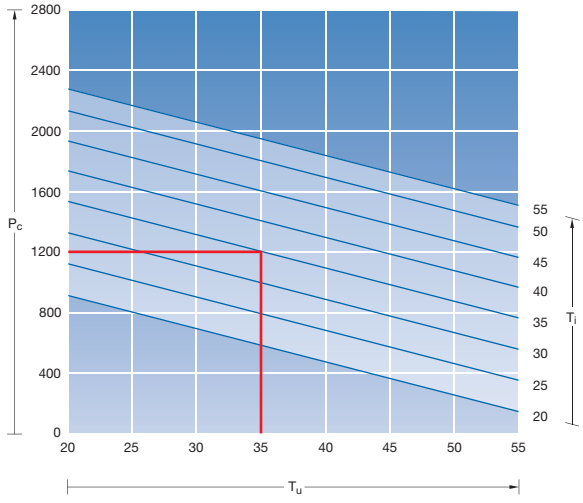
Output class 1100 W (115/230 V, 1~)

50 Hz
SK 3273.500, .515



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3273.500, .515

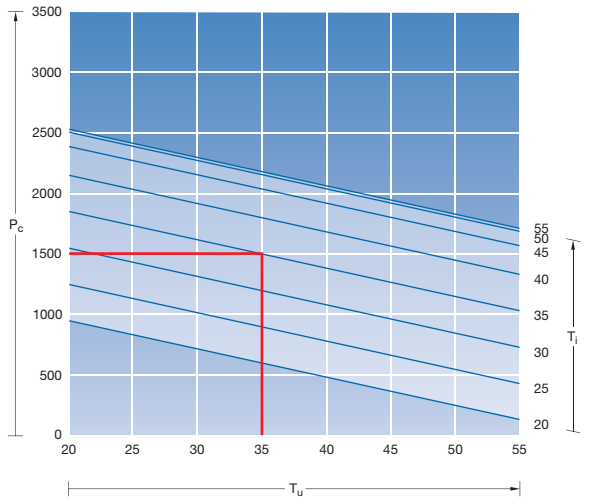


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm roof-mounted cooling units Blue e

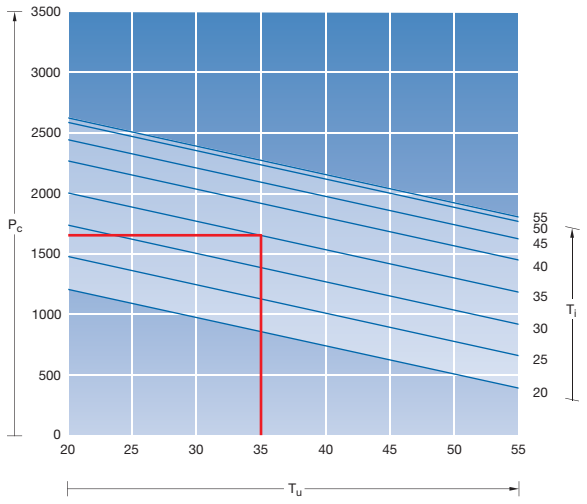
Output class 1500 W (115/230 V, 1~, 400 V, 2~)

50 Hz
3384.500, .510, .540, .600



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

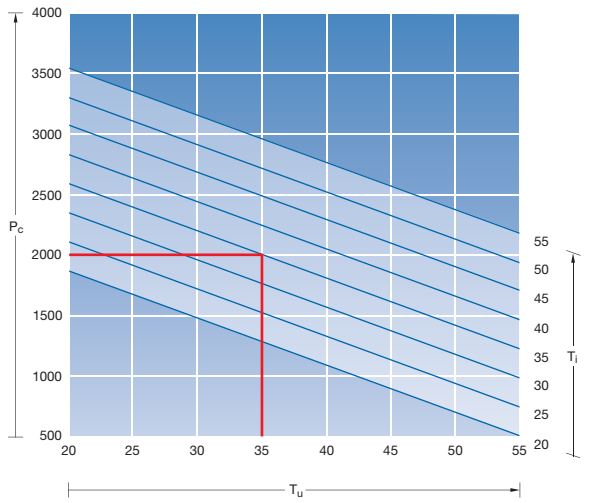
60 Hz
3384.500, .510, .540, .600



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

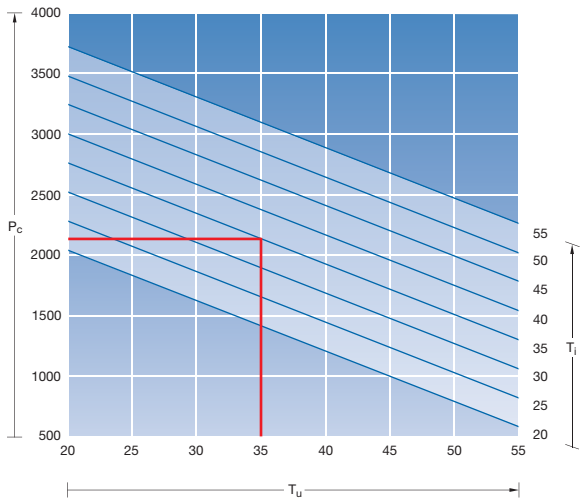
Output class 2000 W (115/230 V, 1~, 400 V, 2~)

50 Hz
SK 3385.500, .510, .540, .600, .640



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3385.500, .510, .540, .600, .640

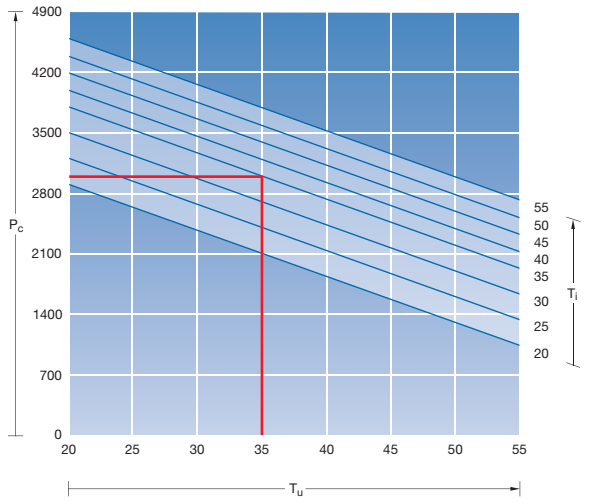


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm roof-mounted cooling units Blue e

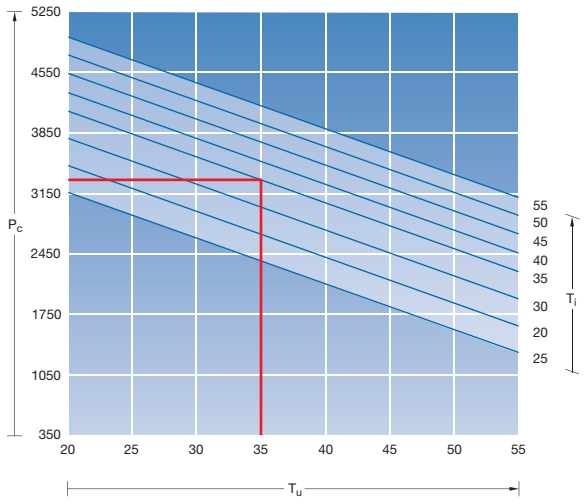
Output class 3000 W (400/460 V, 3~)

50 Hz
3386.540, .640



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

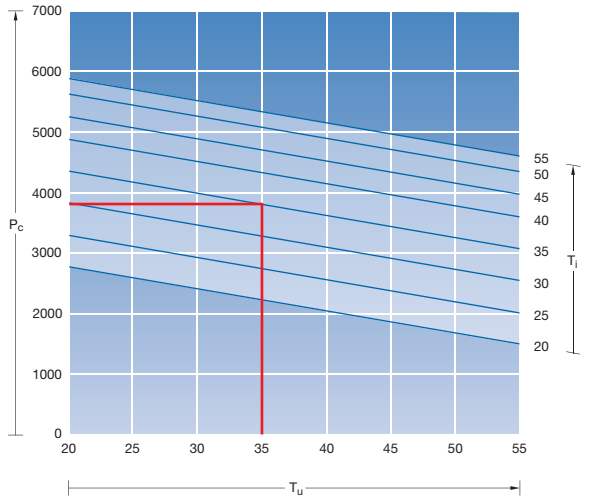
60 Hz
3386.540, .640



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

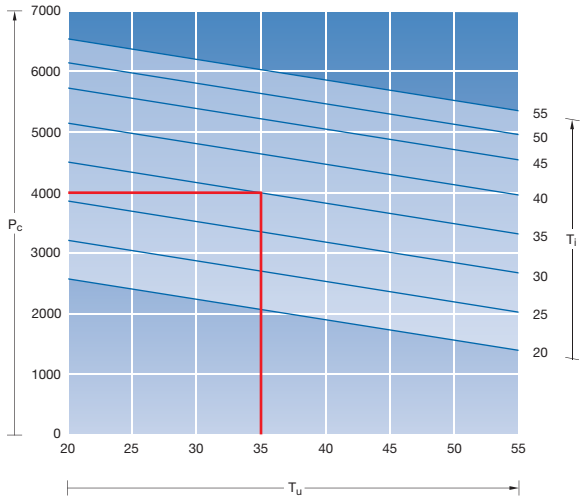
Output class 4000 W (400/460 V, 3~)

50 Hz
3387.540, .640



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
3387.540, .640

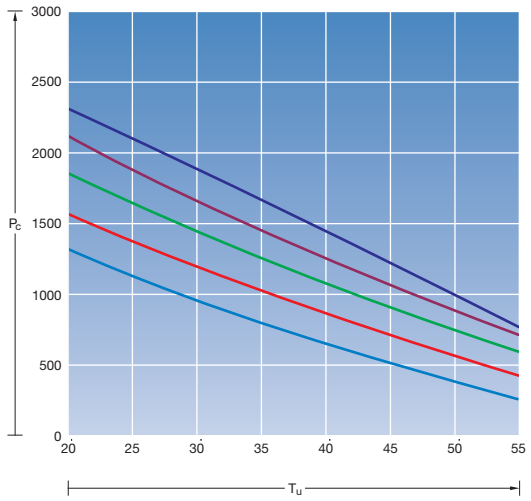


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Roof-mounted cooling unit Blue e+

Output class 1300 W (110 – 240 V, 1 ~, 50 – 60 Hz / 380 – 480 V, 3 ~, 50 – 60 Hz)

1.30 kW
SK 3185.730



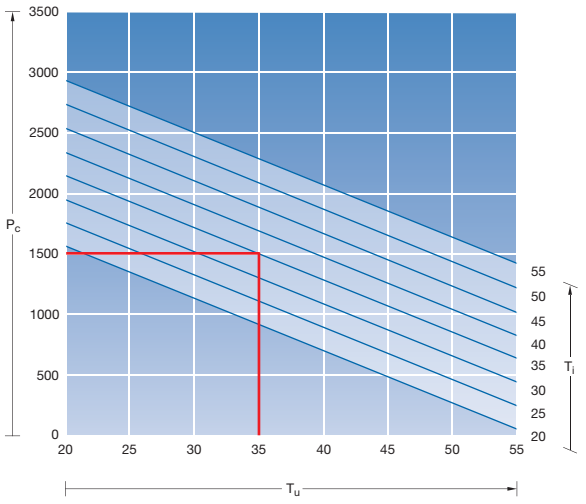
Enclosure internal temperature T_i
- 45 °C
- 40 °C
- 35 °C
- 30 °C
- 25 °C

P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

Modular climate control concept – Cooling module Blue e

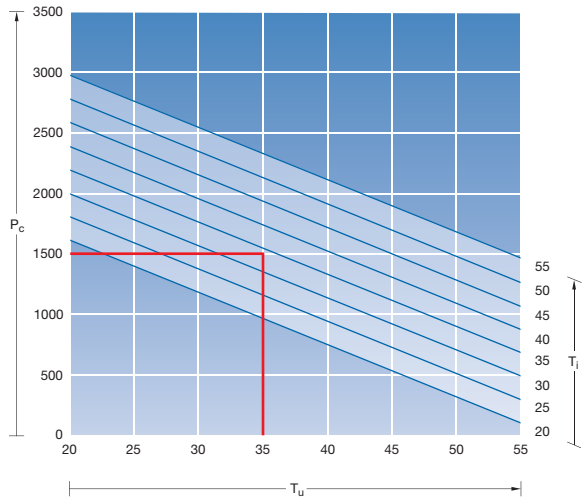
Output class 1500 W (230 V, 1~)

50 Hz
SK 3307.700



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

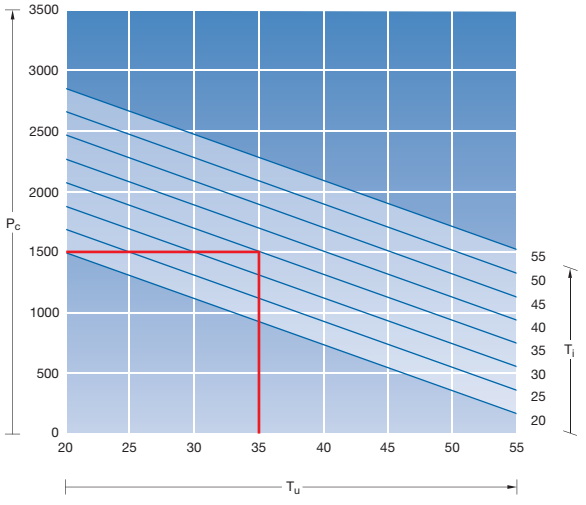
60 Hz
SK 3307.700



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

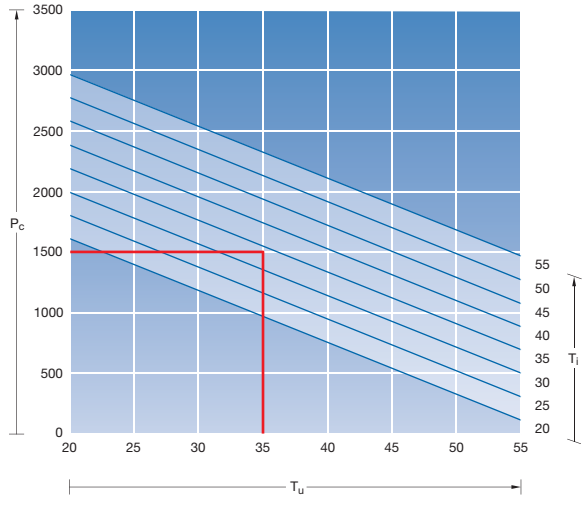
Output class 1500 W (400/460 V, 3~)

50 Hz
SK 3307.740



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3307.740

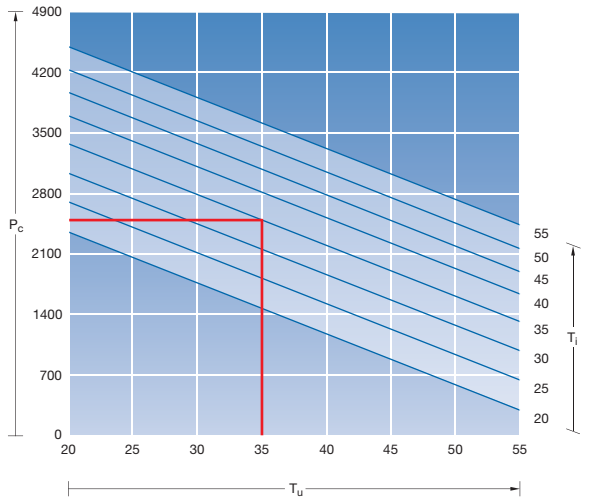


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Modular climate control concept – Cooling module Blue e

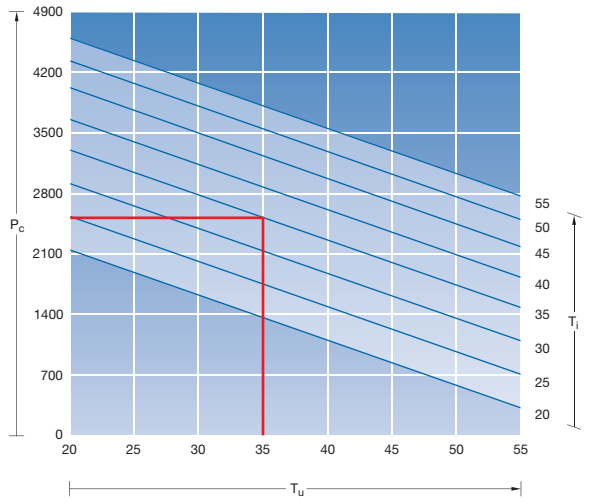
Output class 2500 W (230 V, 1~)

50 Hz
SK 3310.700



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

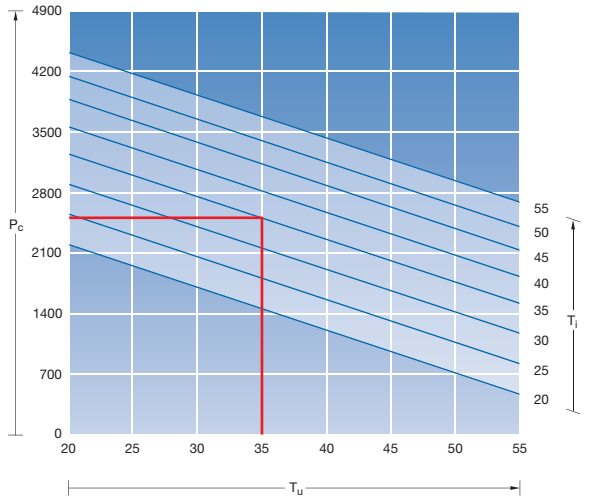
60 Hz
SK 3310.700



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

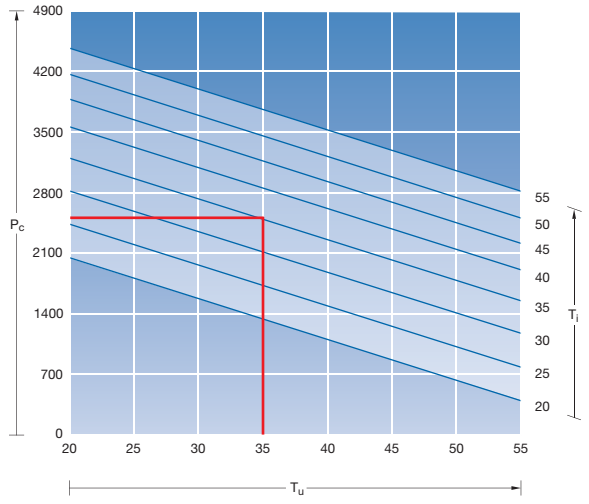
Output class 2500 W (400/460 V, 3~)

50 Hz
SK 3310.740



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3310.740

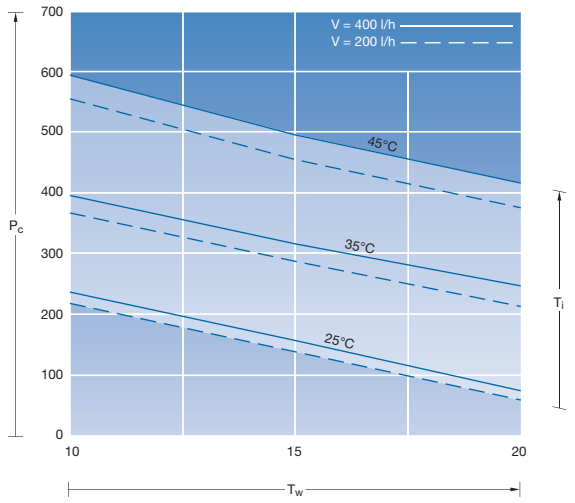


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Wall-mounted air/water heat exchangers

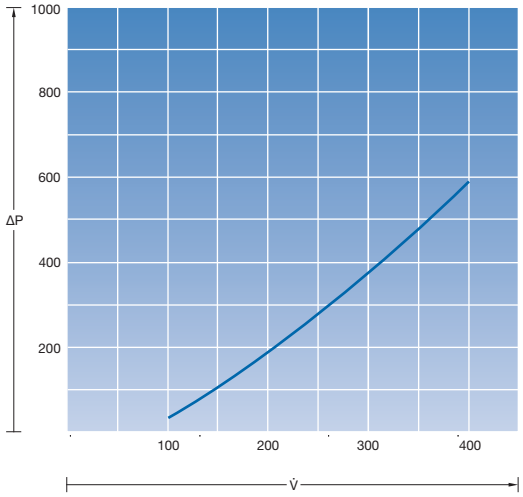
Output class 300 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50/60 Hz
SK 3212.024, .115, .230



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

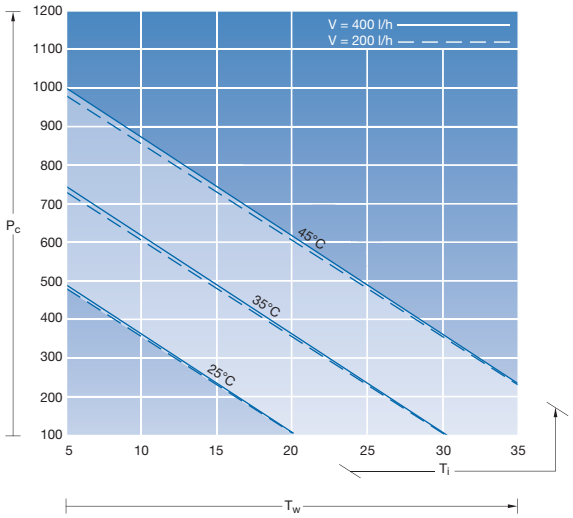
Water resistance diagram
SK 3212.024, .115, .230



$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

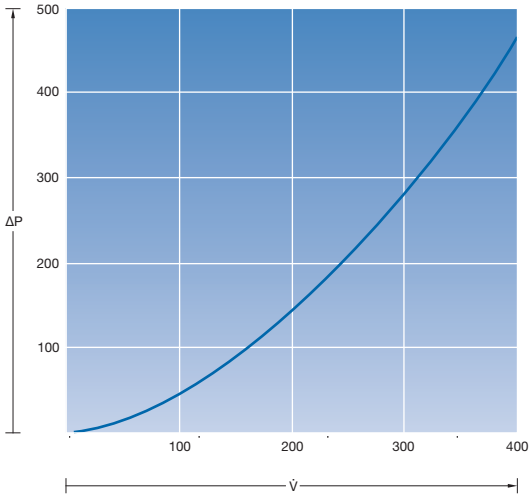
Output class 600 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50/60 Hz
SK 3214.100



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3214.100

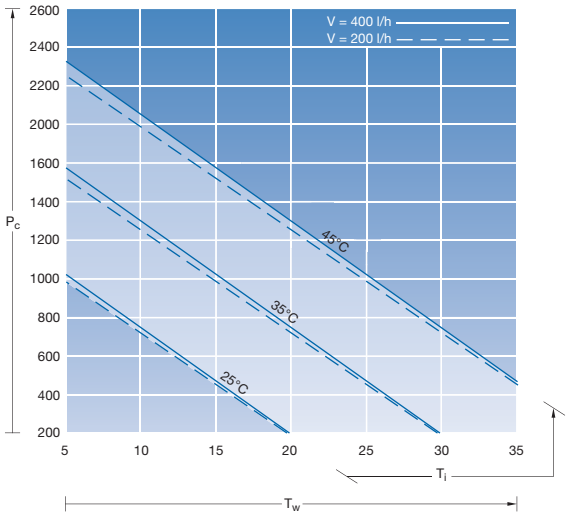


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

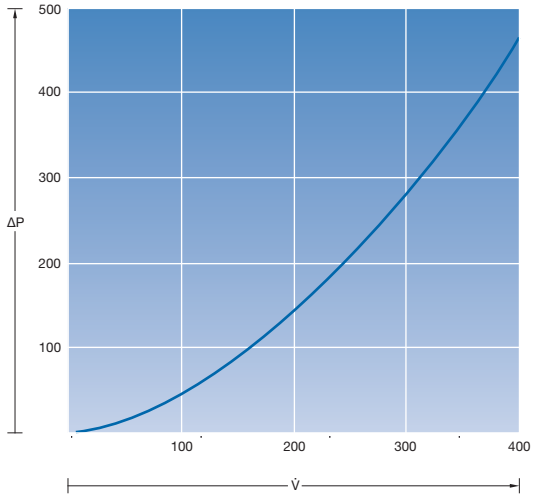
Output class 1250 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50/60 Hz
SK 3215.100



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

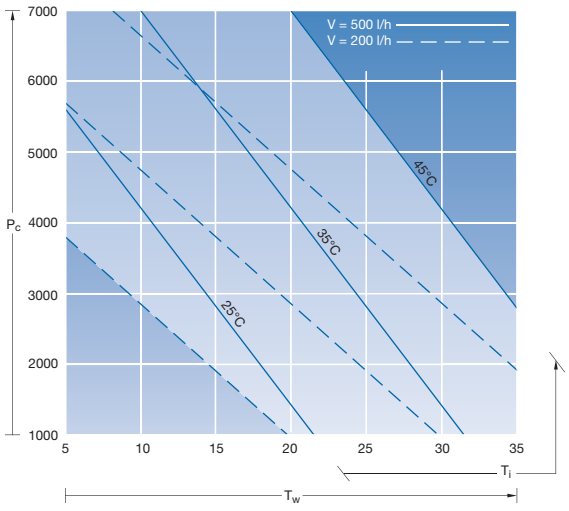
Water resistance diagram
SK 3215.100



$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

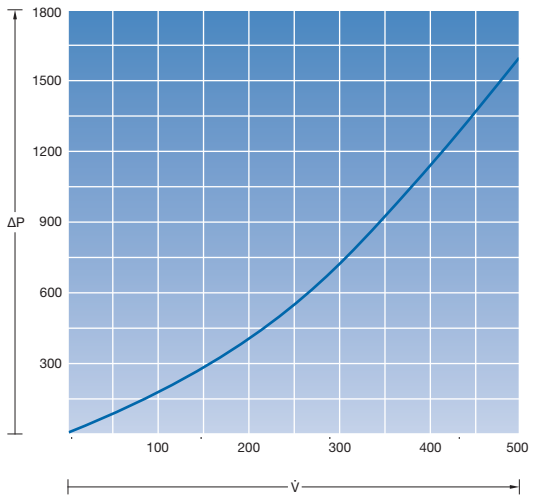
Output class 7000 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50/60 Hz
SK 3216.480



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3216.480

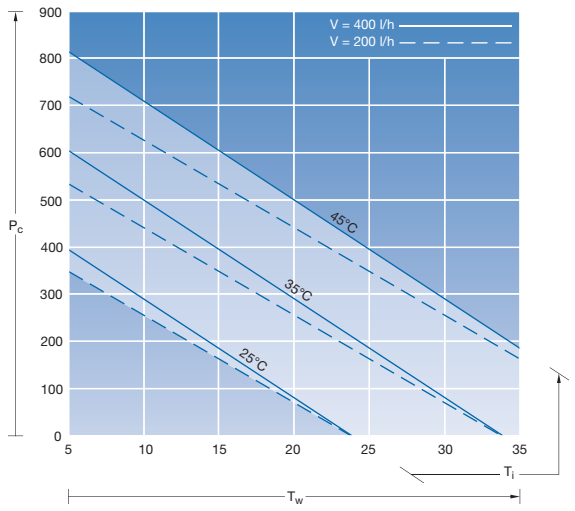


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

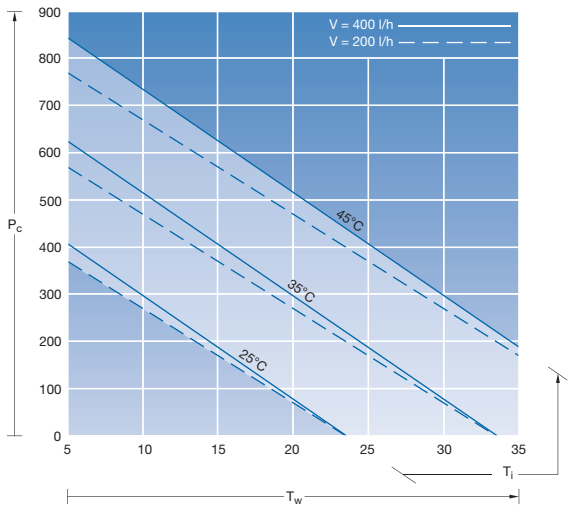
Output class 500 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz
SK 3363.100, .500



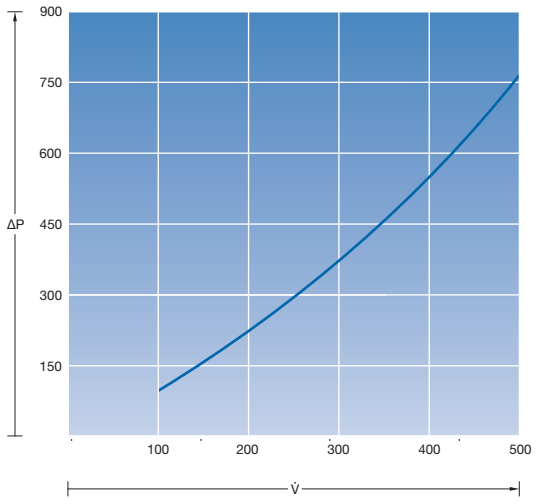
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3363.100, .500



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3363.100, .500

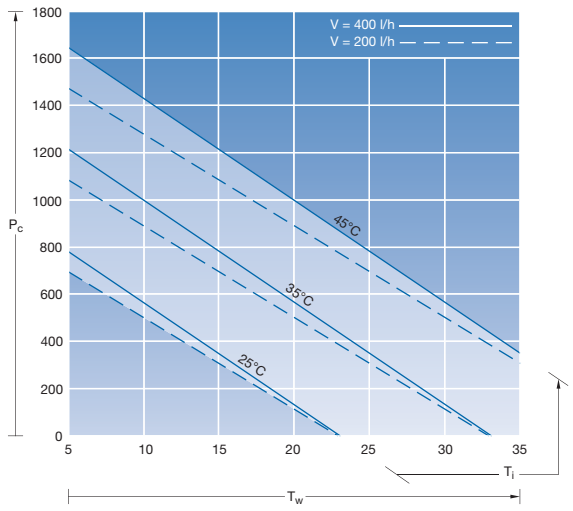


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

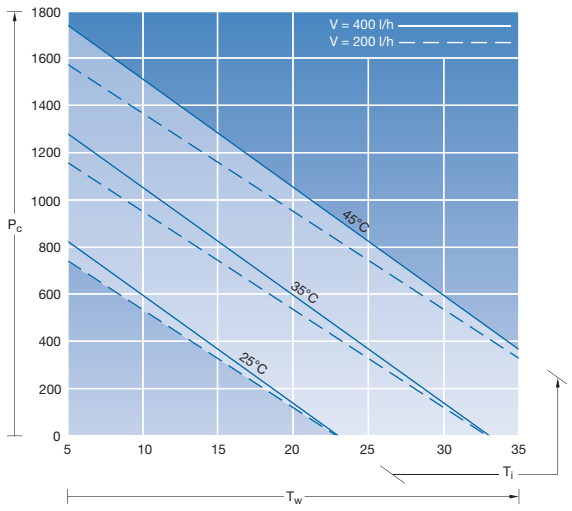
Output class 1000 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz
SK 3364.100, .500



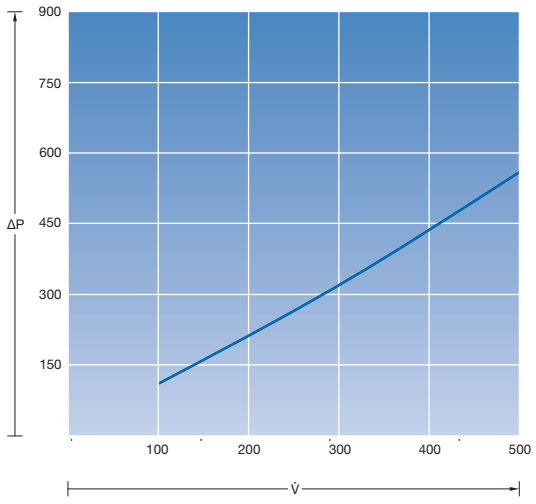
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3364.100, .500



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3364.100, .500

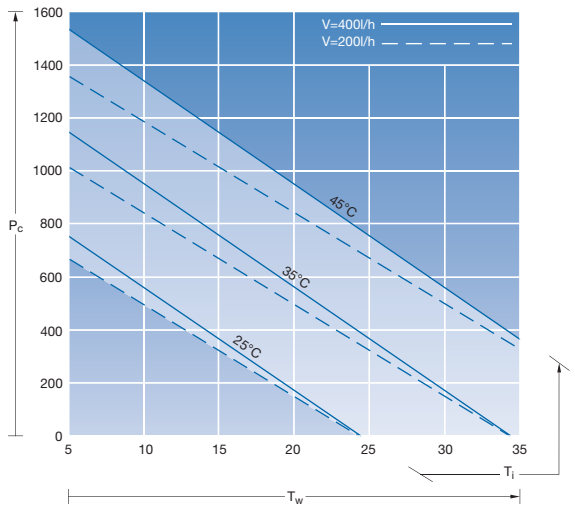


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

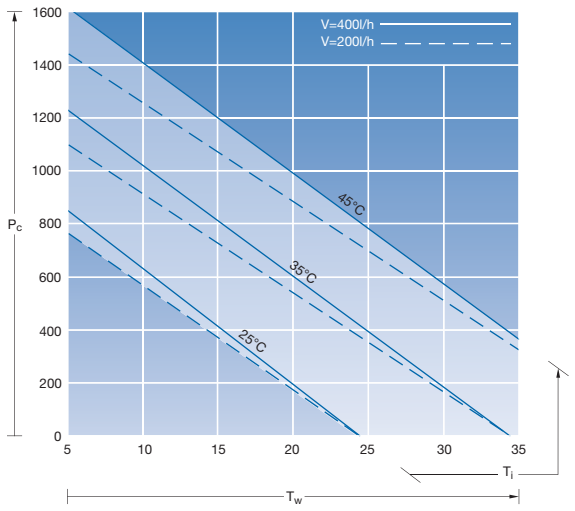
Output class 1000 W
Water-carrying parts: Stainless steel (1.4571)

50 Hz
SK 3364.504



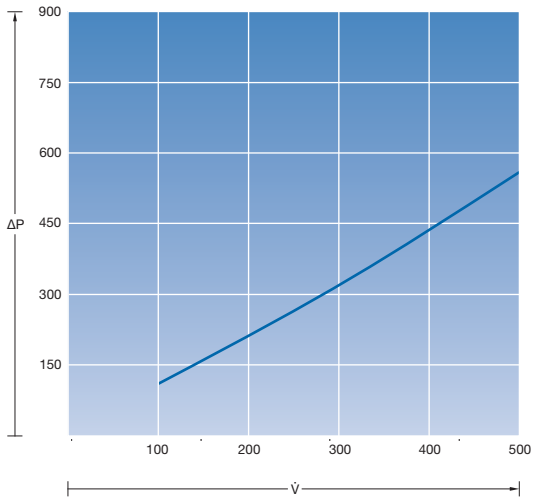
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3364.504



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3364.504

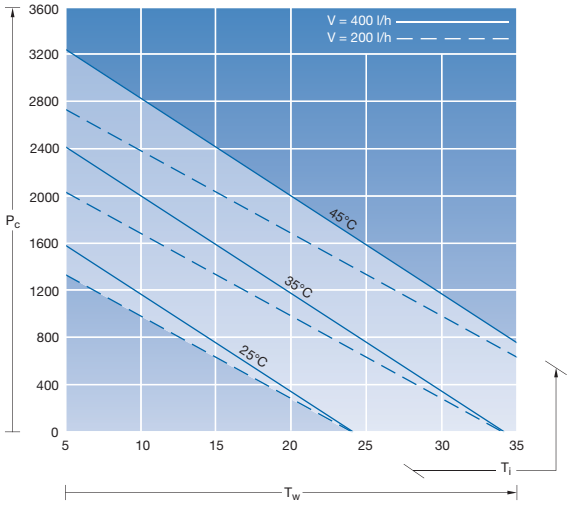


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

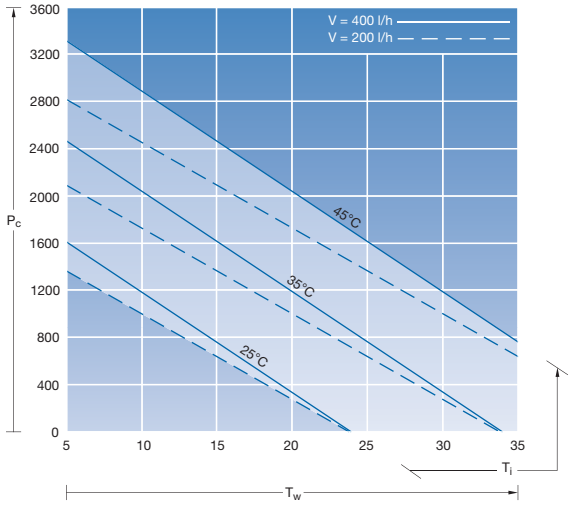
Output class 2000 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz
SK 3373.100, .500



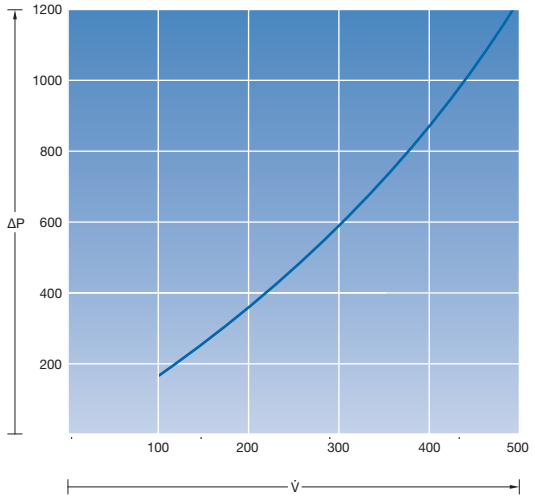
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3373.100, .500



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3373.100, .500

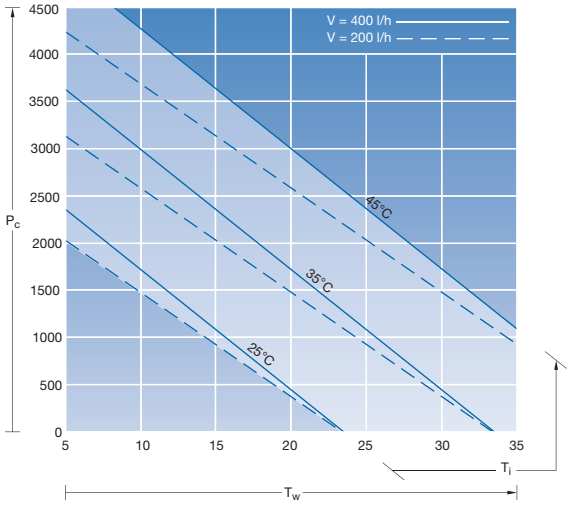


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

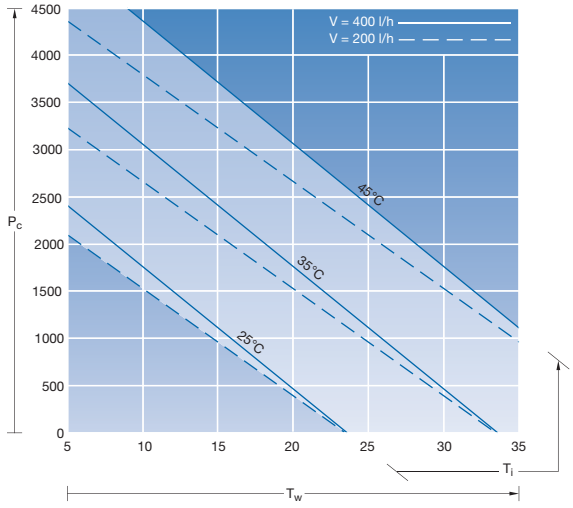
Output class 3000 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz
SK 3374.100, .500



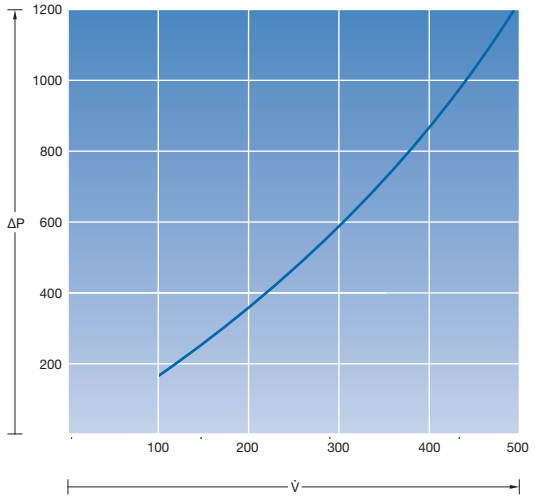
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3374.100, .500



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3374.100, .500

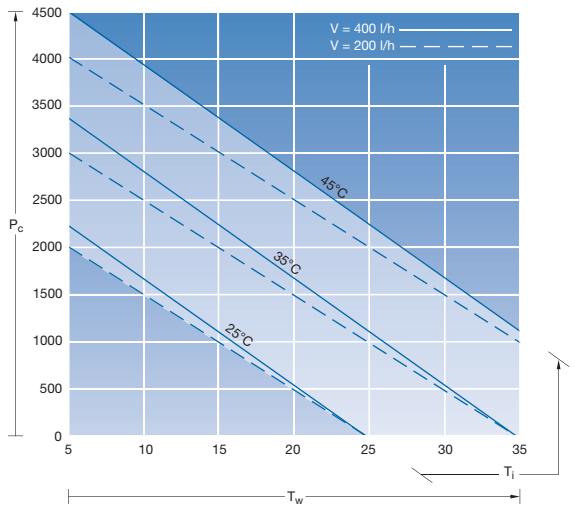


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

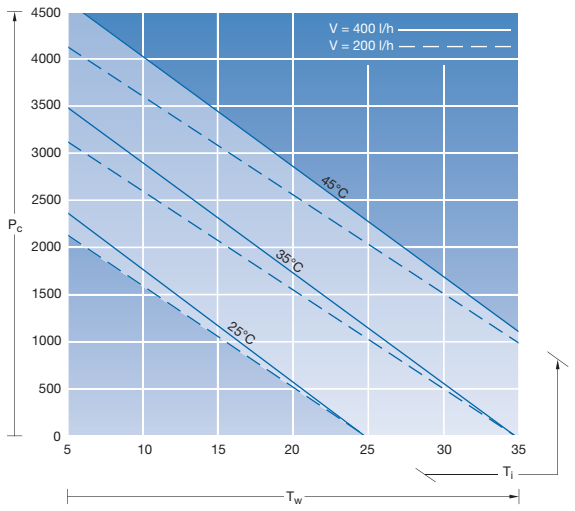
Output class 2500 W
Water-carrying parts: Stainless steel (1.4571)

50 Hz
SK 3374.504



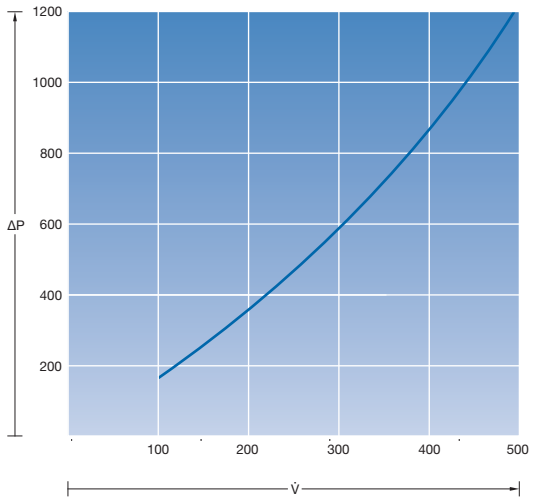
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3374.504



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3374.504

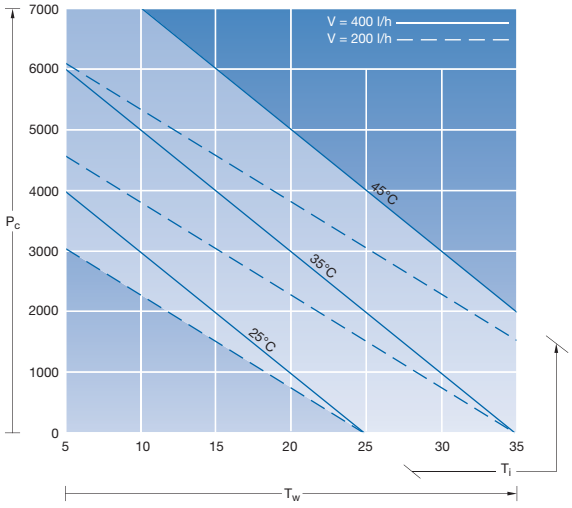


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

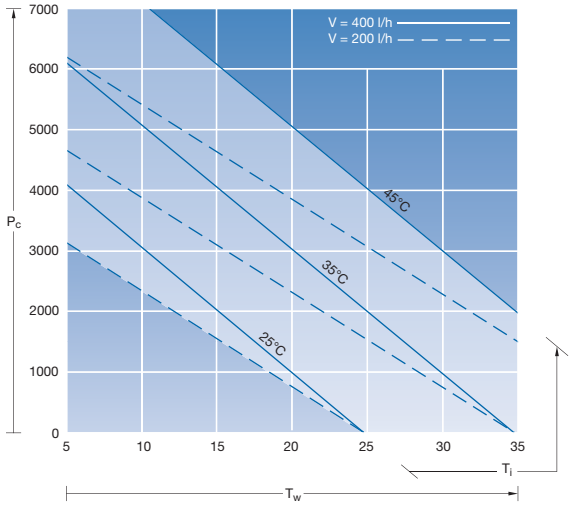
Output class 5000 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz
SK 3375.100, .500



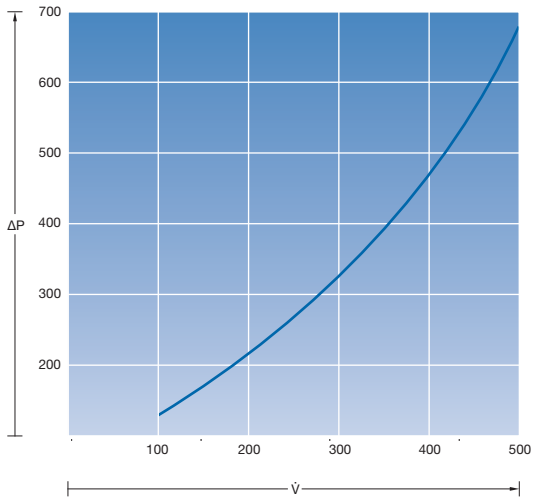
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3375.100, .500



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3375.100, .500

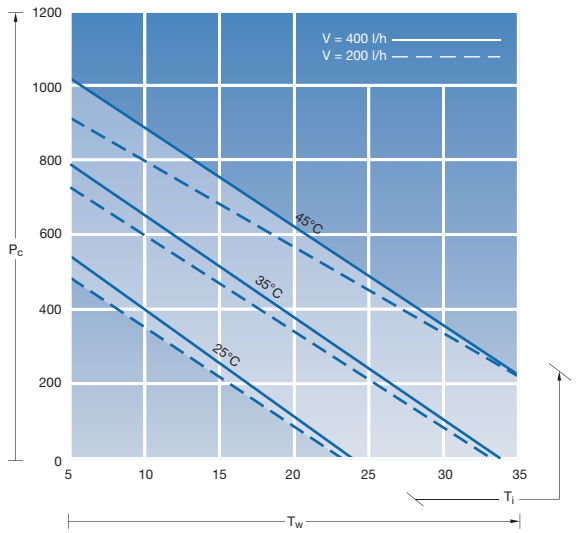


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers HD

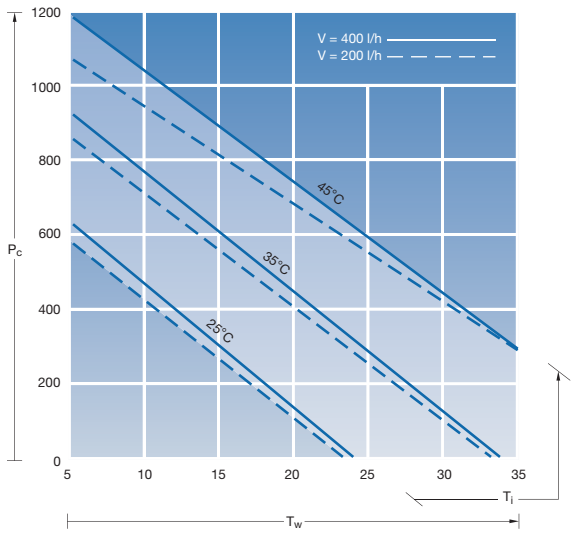
Output class 600/1200 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz
SK 3214.700



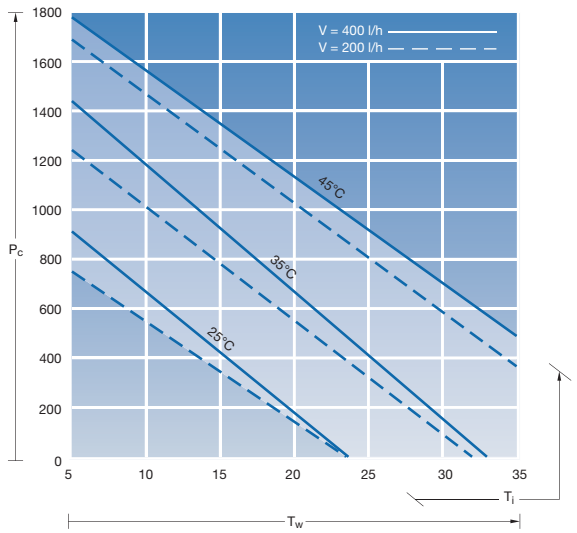
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3274.600



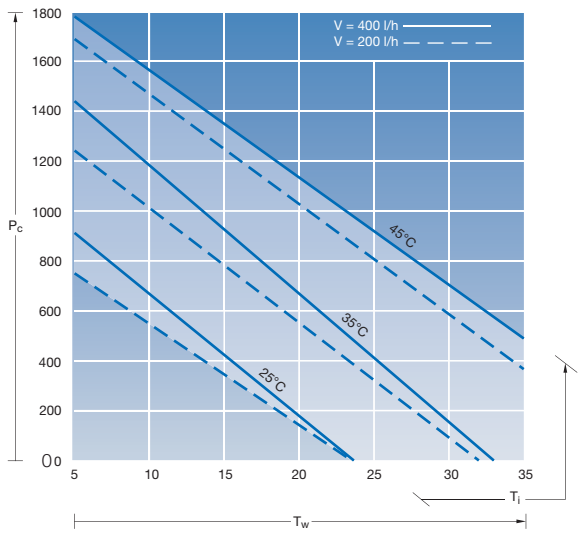
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

50 Hz
SK 3217.500



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3217.600

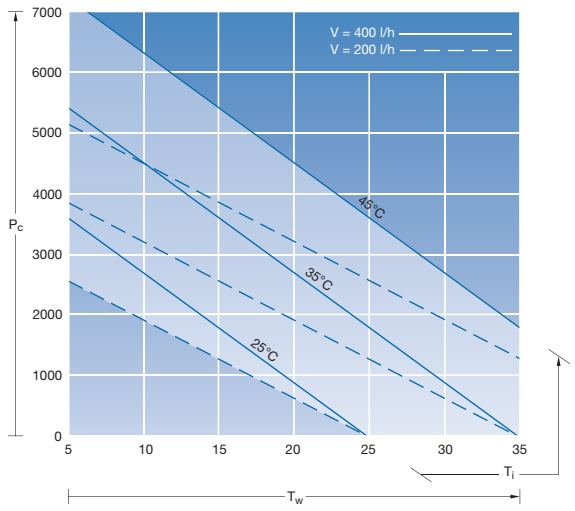


T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Wall-mounted air/water heat exchangers

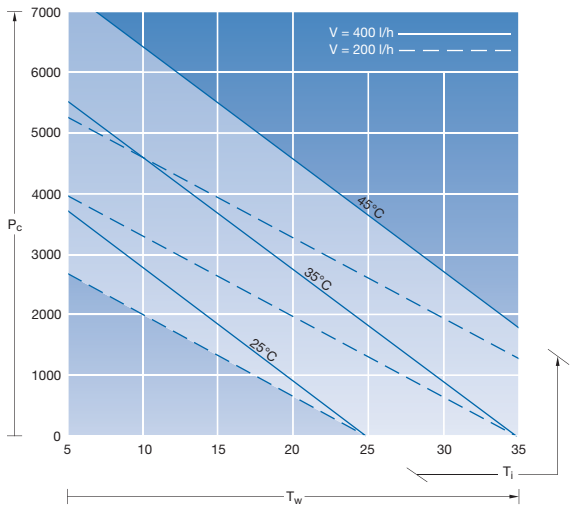
Output class 4000 W
Water-carrying parts: Stainless steel (1.4571)

50 Hz
SK 3375.504



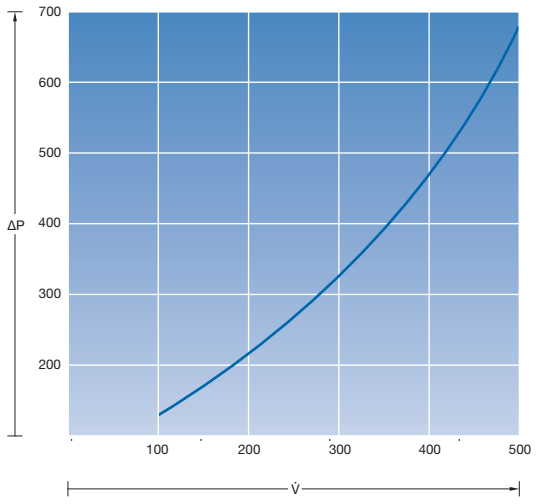
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3375.504



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3375.504

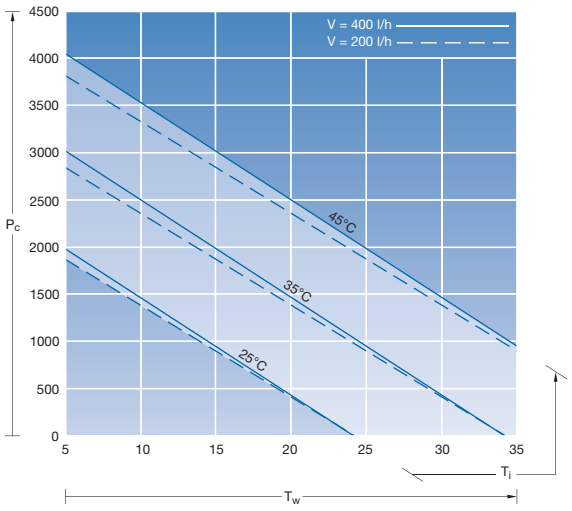


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Roof-mounted air/water heat exchangers

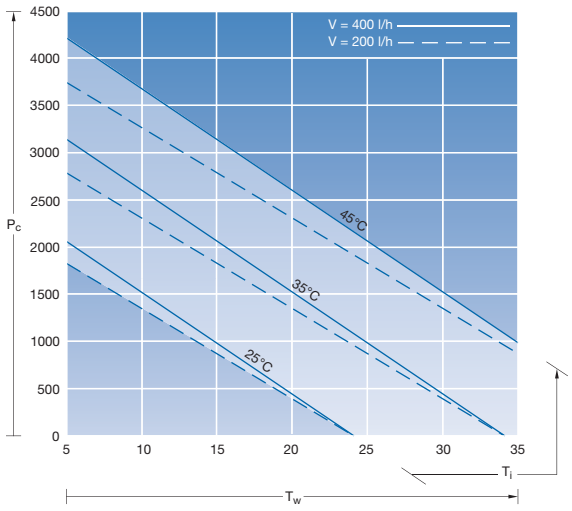
Output class 2500 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz
SK 3209.100, .500



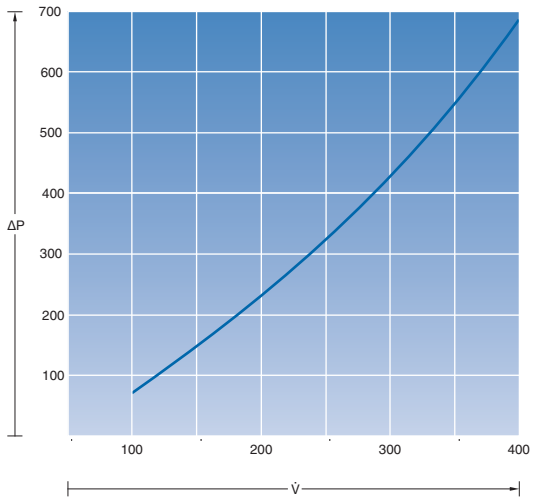
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3209.100, .500



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3209.100, .500

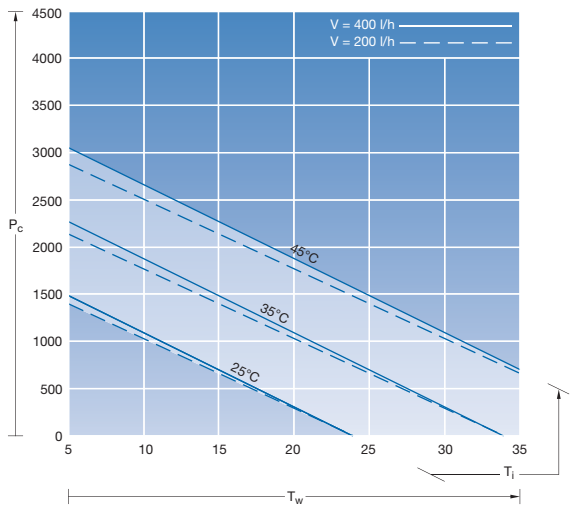


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Roof-mounted air/water heat exchangers

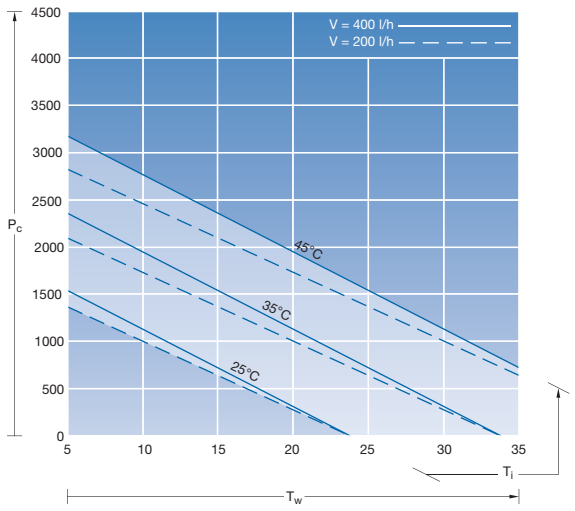
Output class 1875 W
Water-carrying parts: Stainless steel (1.4571)

50 Hz
SK 3209.504



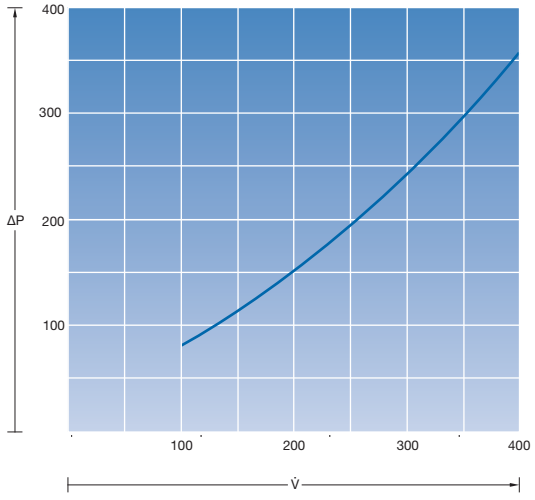
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3209.504



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3209.504

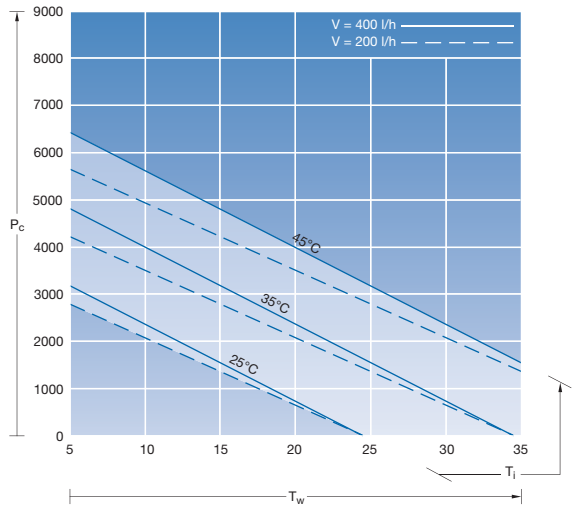


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Roof-mounted air/water heat exchangers

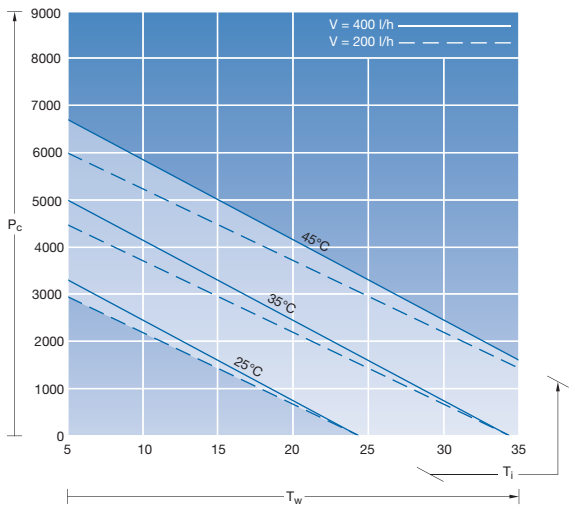
Output class 4000 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz
SK 3210.100, .500



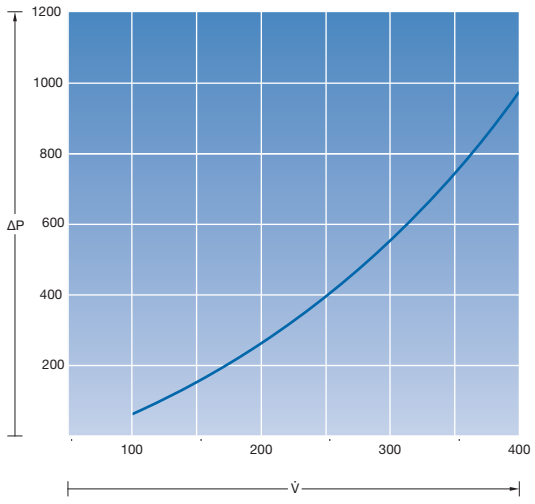
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3210.100, .500



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3210.100, .500

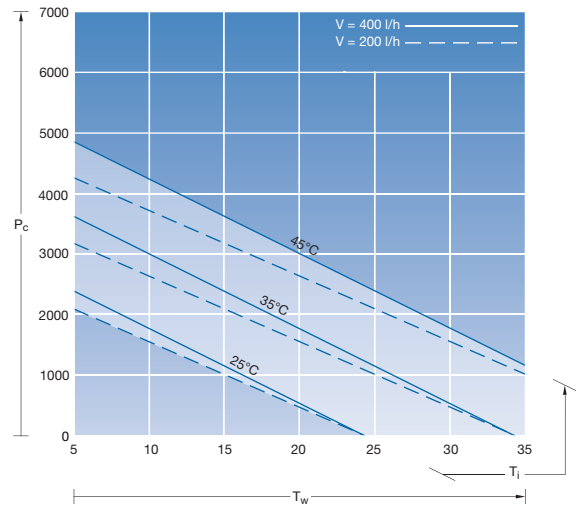


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Roof-mounted air/water heat exchangers

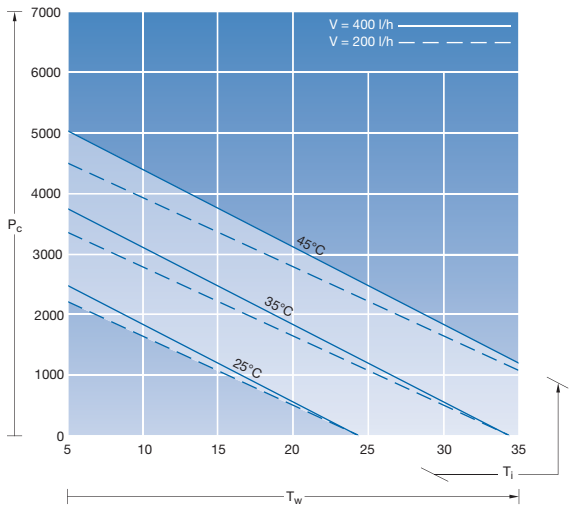
Output class 3000 W
Water-carrying parts: Stainless steel (1.4571)

50 Hz
SK 3210.504



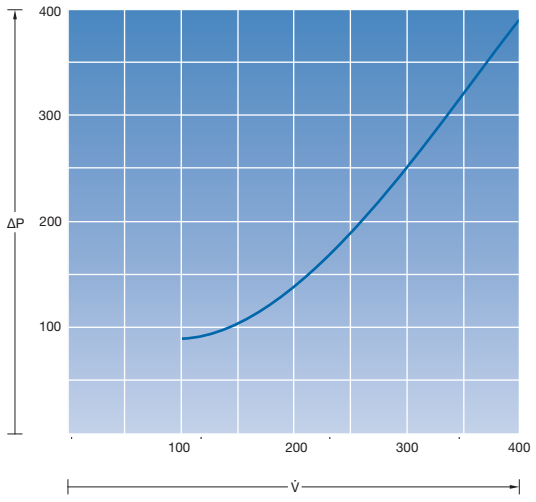
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3210.504



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3210.504

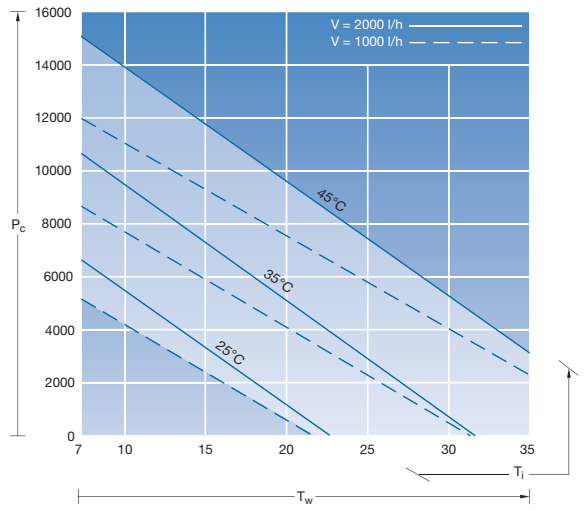


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Liquid Cooling Package

Output class 10 kW, LCP Rack Industry
Water-carrying parts: Copper/brass (Cu/CuZn)

50/60 Hz
SK 3378.200, .280

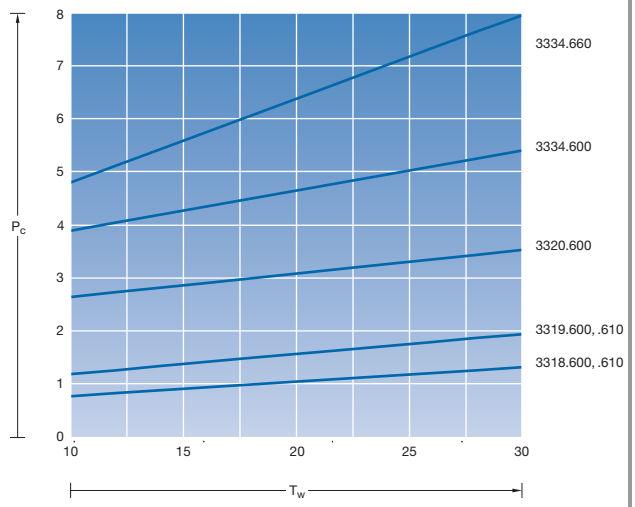


T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm chillers

Output class 1 – 6 kW

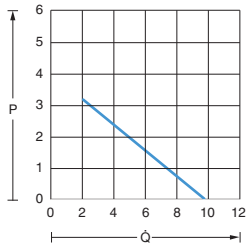
50 Hz at T_u = 32 °C
SK 3318.600, .610, 3319.600, .610, 3320.600, 3334.600, .660



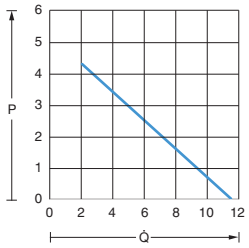
T_w = Water inlet temperature (°C)
T_u = Ambient temperature (°C)
P_c = Total cooling output (kW)

Characteristic curves of pump
SK 3318.600/SK 3318.610/SK 3319.600/SK 3319.610

50 Hz

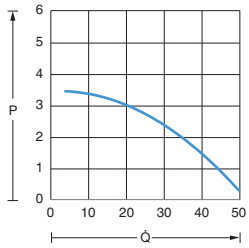


60 Hz

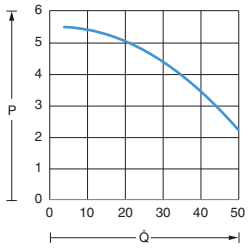


SK 3320.600/SK 3334.600/SK 3334.660

50 Hz



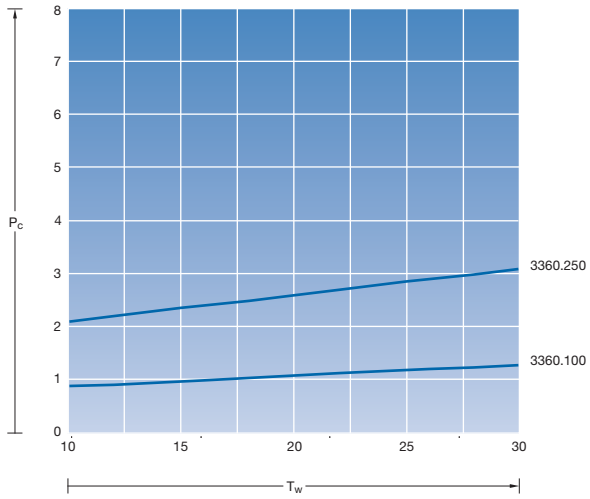
60 Hz



P = External static pressure [bar]
Q̇ = Delivery flow Q [l/min]

Output class 1 – 2.5 kW, wall-mounted

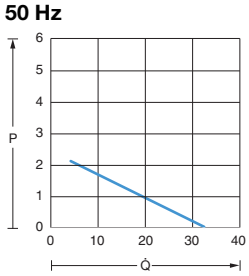
50 Hz at T_u = 32 °C
SK 3360.100, .250



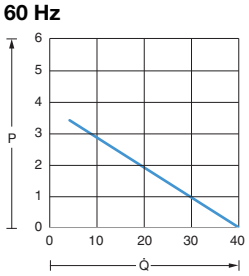
T_w = Water inlet temperature (°C)
T_u = Ambient temperature (°C)
P_c = Total cooling output (kW)

Characteristic curves of pump
SK 3360.100/SK 3360.250

50 Hz



60 Hz

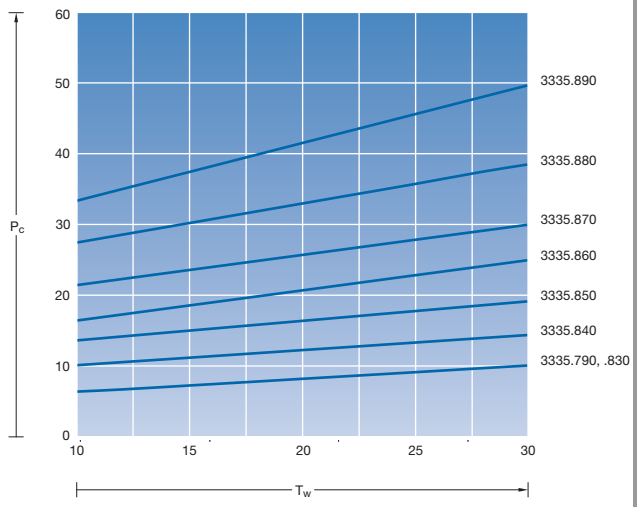


P = External static pressure [bar]
Q̇ = Delivery flow Q [l/min]

TopTherm chillers

Output class 8 – 40 kW

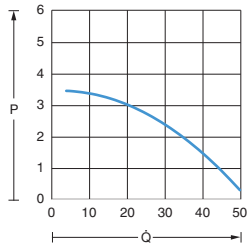
50 Hz at T_u = 32 °C
SK 3335.790, .830, .840, .850, .860, .870, .880, .890



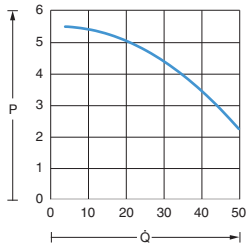
T_w = Water inlet temperature (°C)
T_u = Ambient temperature (°C)
P_c = Total cooling output (kW)

Characteristic curves of pump
SK 3335.790/SK 3335.830

50 Hz

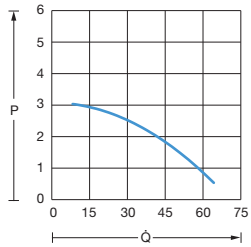


60 Hz

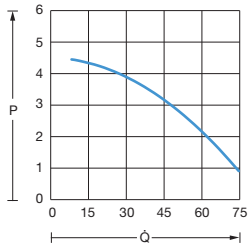


SK 3335.840

50 Hz

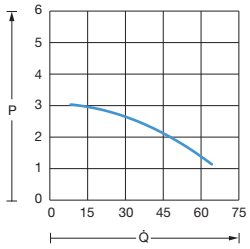


60 Hz

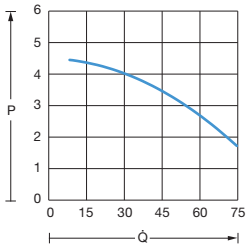


Characteristic curves of pump
SK 3335.850

50 Hz

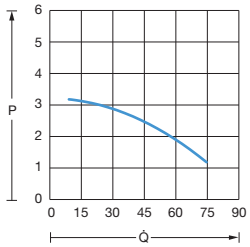


60 Hz

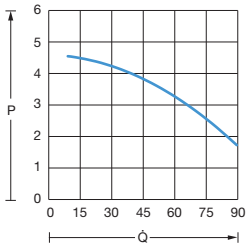


SK 3335.860

50 Hz

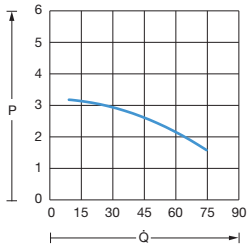


60 Hz

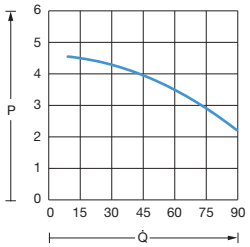


SK 3335.870

50 Hz

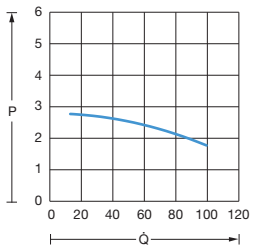


60 Hz

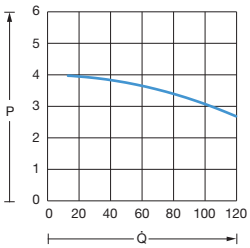


SK 3335.880

50 Hz

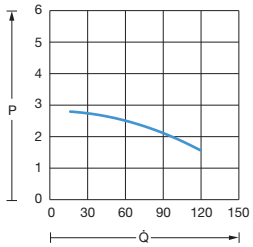


60 Hz

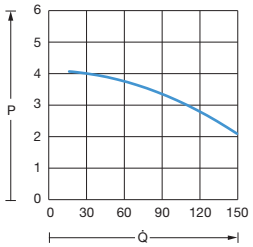


SK 3335.890

50 Hz



60 Hz

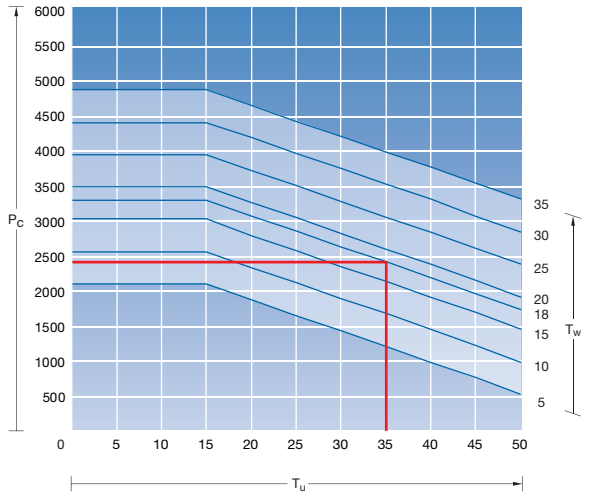


P = External static pressure [bar]
Q̇ = Delivery flow Q [l/min]

Blue e+ chillers

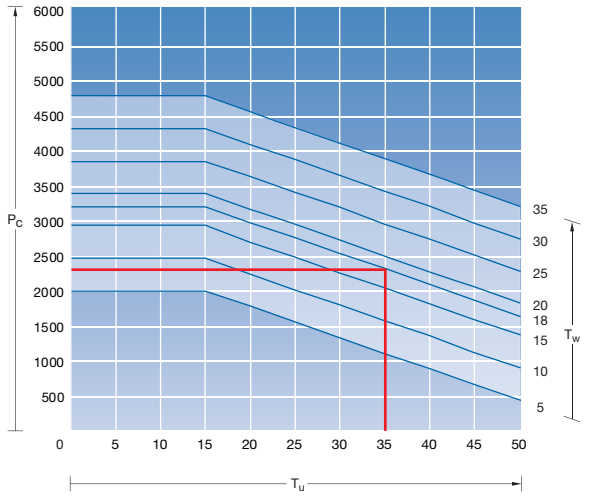
Output class 2.5 kW

50 Hz
SK 3320.200



T_w = Water inlet temperature [°C]
P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

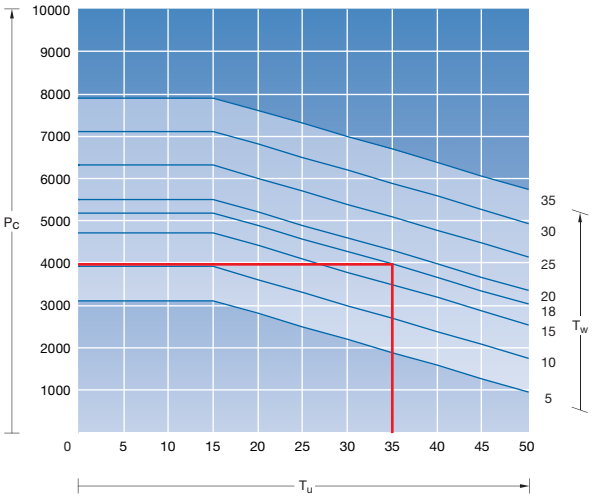
60 Hz
SK 3320.200



T_w = Water inlet temperature [°C]
P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

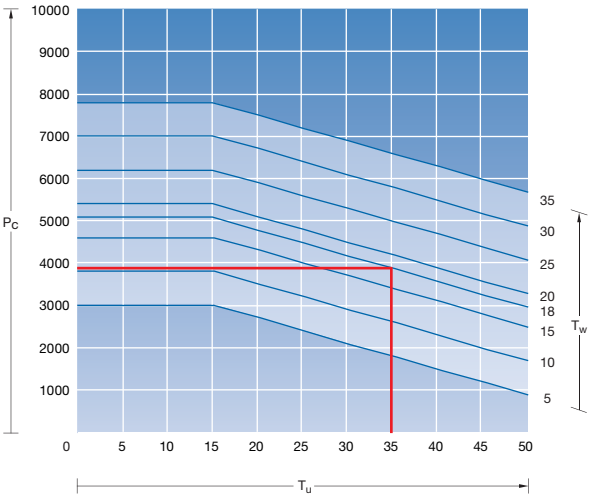
Output class 4.0 kW

50 Hz
SK 3334.300



T_w = Water inlet temperature [°C]
P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

60 Hz
SK 3334.300

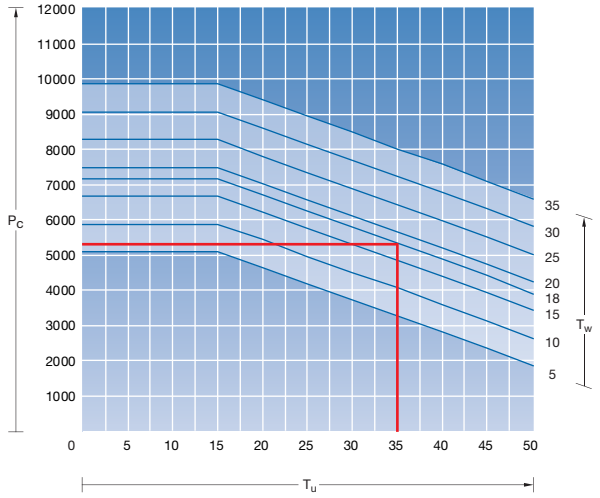


T_w = Water inlet temperature [°C]
P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

Blue e+ chillers

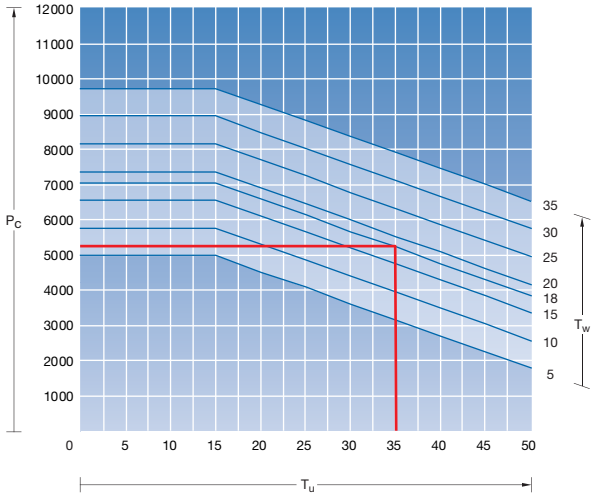
Output class 5.5 kW

50 Hz
SK 3334.400



T_w = Water inlet temperature [°C]
P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

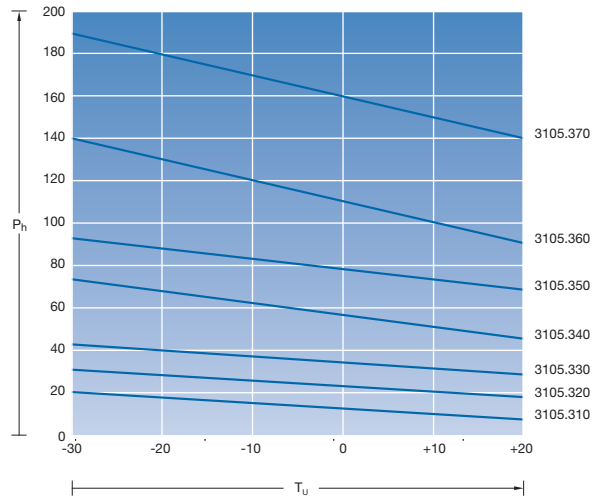
60 Hz
SK 3334.400



T_w = Water inlet temperature [°C]
P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

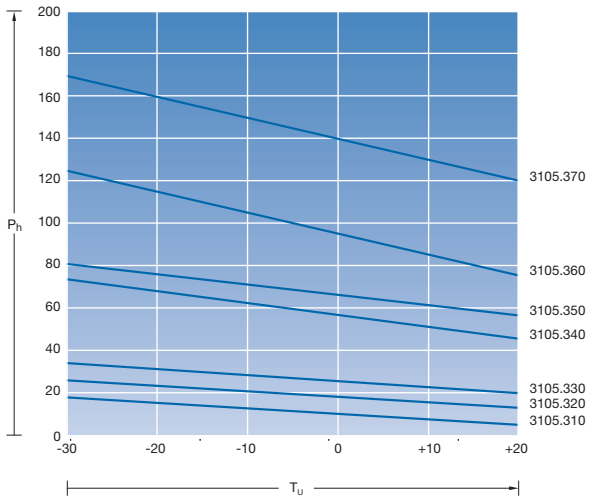
Enclosure heaters without fan

Heating output 230 V



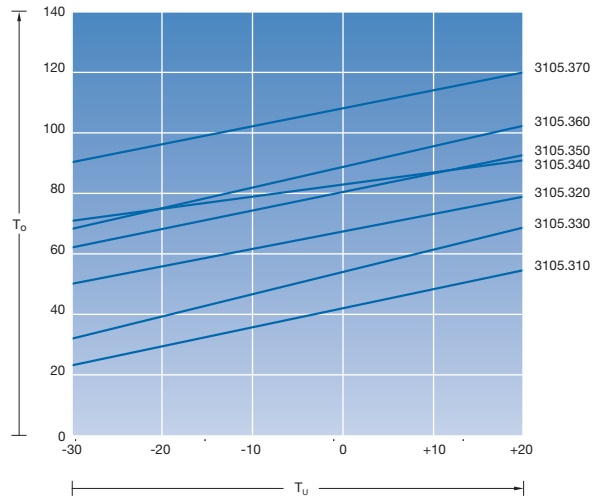
T_u = Ambient temperature (°C)
P_h = Heating output (W)

Heating output 110 V



T_u = Ambient temperature (°C)
P_h = Heating output (W)

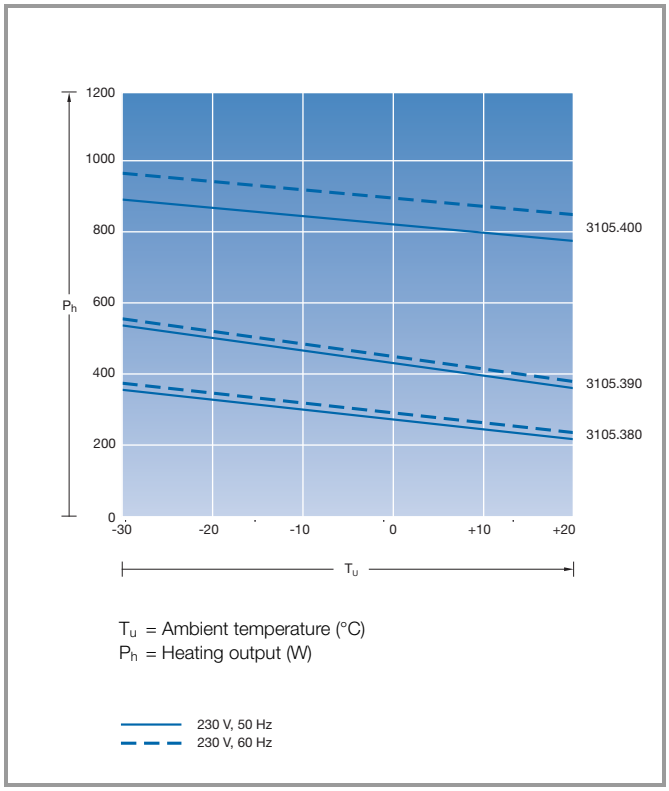
Maximum surface temperature



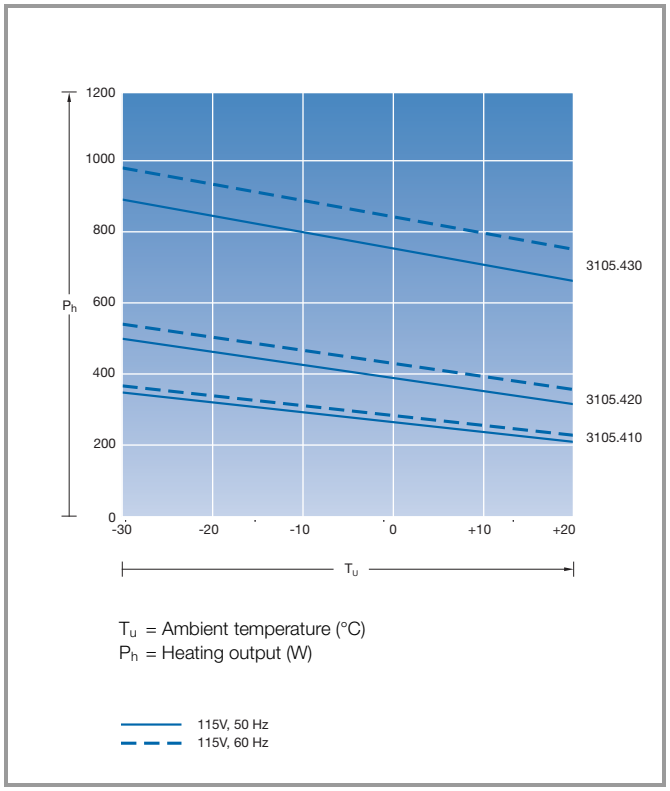
T_u = Ambient temperature (°C)
T_o = Surface temperature (°C)

Enclosure heaters with fan

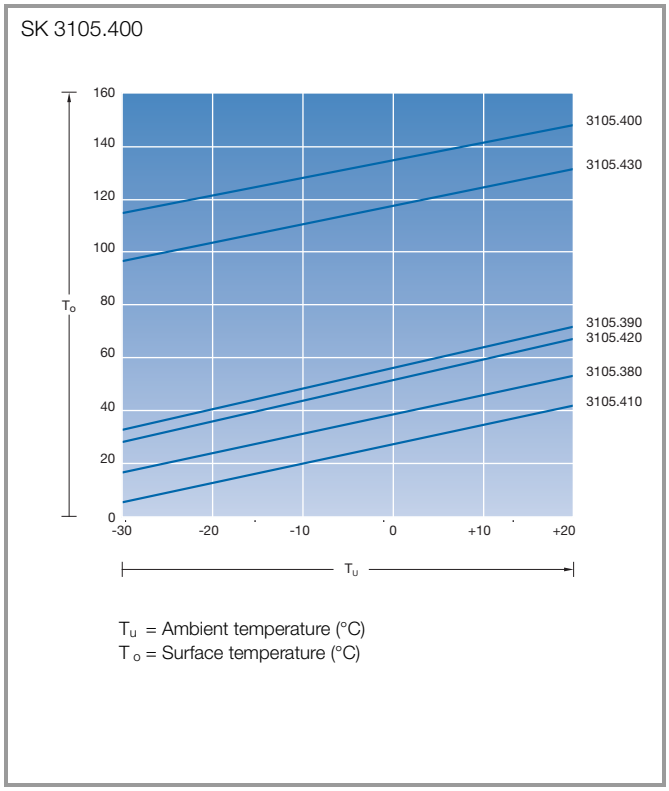
Heating output 230 V, 50/60 Hz



Heating output 115 V, 50/60 Hz



Maximum surface temperature



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Performance diagrams – Climate control



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Performance diagrams

Cooling with ambient air

TopTherm fan-and-filter units and EMC TopTherm fan-and-filter units
Air throughput 20/25 – 900 m^3/h ..... 4 – 7
TopTherm fan-and-filter units, with EC technology
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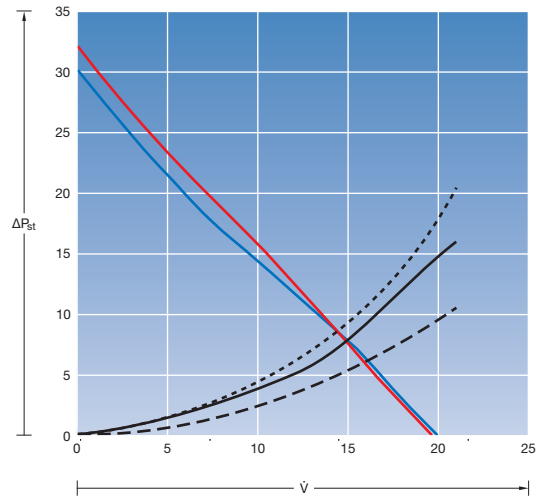
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TopTherm fan-and-filter units and EMC TopTherm fan-and-filter units

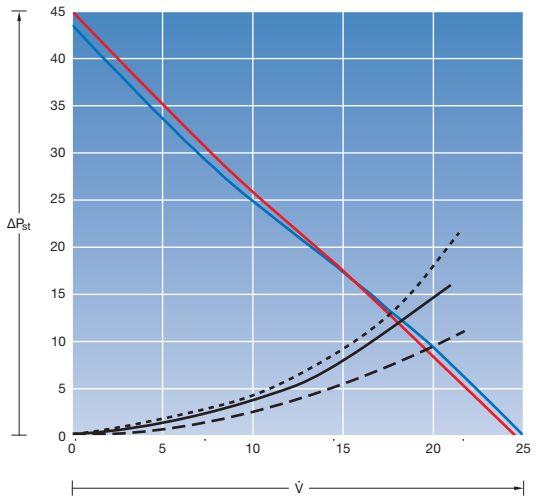
Air throughput 20/25 m³/h

50 Hz
SK 3237.100, .110, .124, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter

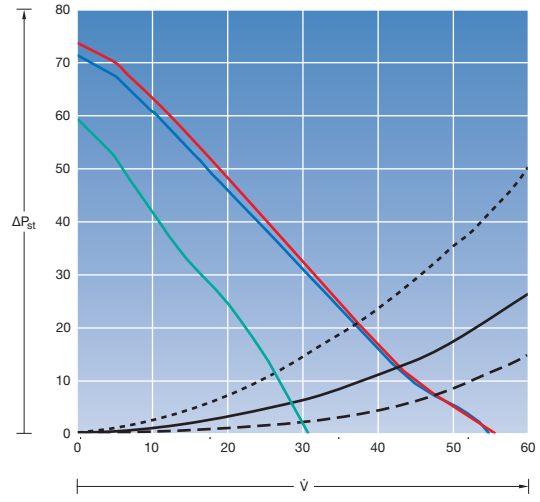
60 Hz
SK 3237.100, .110, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter

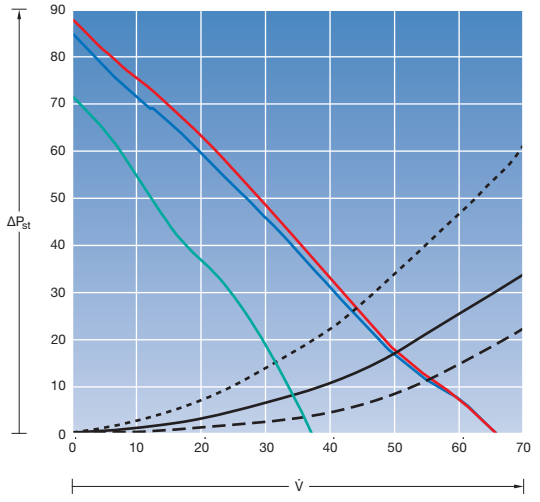
Air throughput 55/66 m³/h

50 Hz
SK 3238.100, .110, .124, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter

60 Hz
SK 3238.100, .110, .600

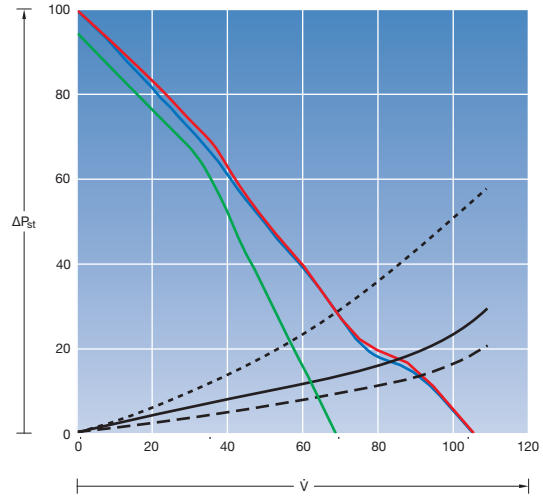


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter

TopTherm fan-and-filter units and EMC TopTherm fan-and-filter units

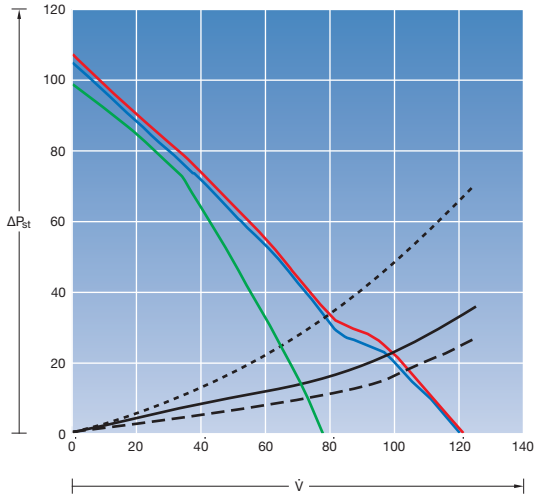
Air throughput 105/120 m³/h

50 Hz
SK 3239.100, .110, .124, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter

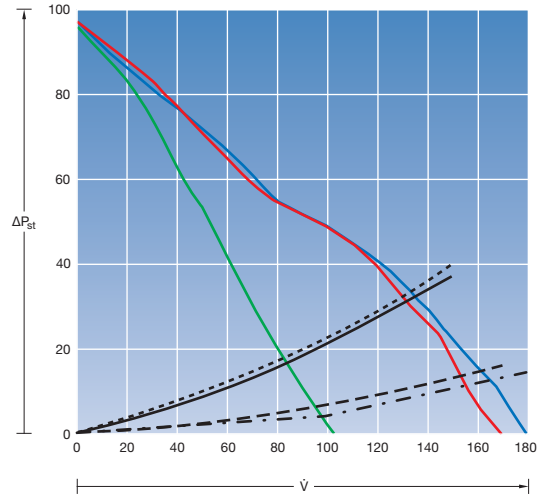
60 Hz
SK 3239.100, .110, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter

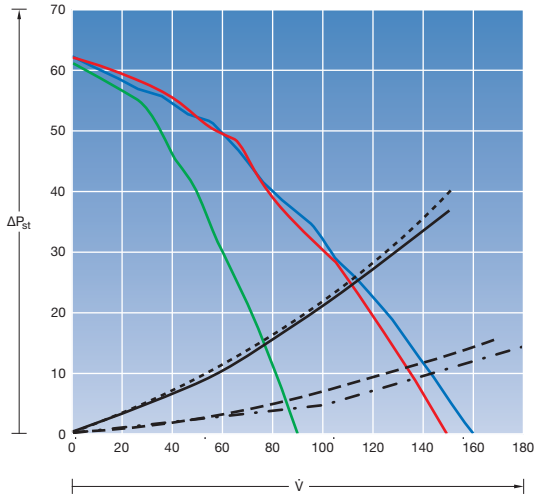
Air throughput 180/160 m³/h

50 Hz
SK 3240.100, .110, .124, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

60 Hz
SK 3240.100, .110, .600

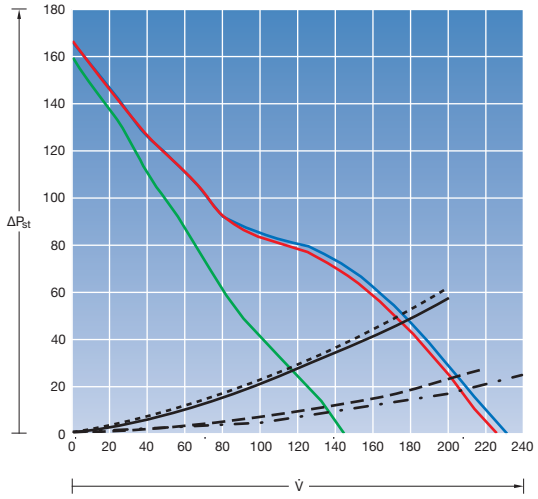


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

TopTherm fan-and-filter units and EMC TopTherm fan-and-filter units

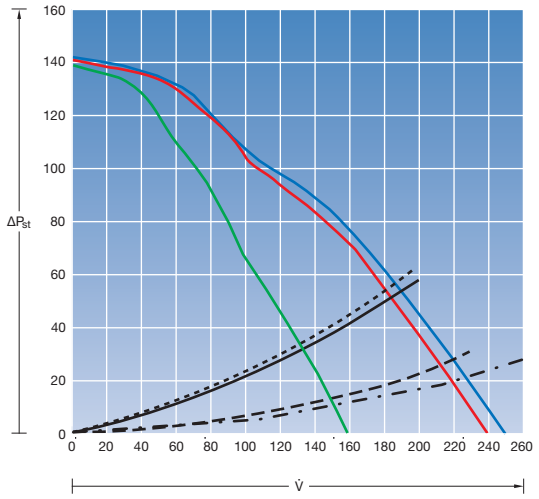
Air throughput 230/250 m³/h

50 Hz
SK 3241.100, .110, .124, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

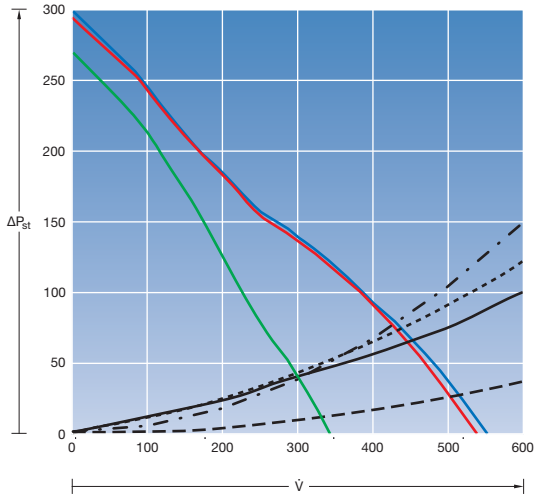
60 Hz
SK 3241.100, .110, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

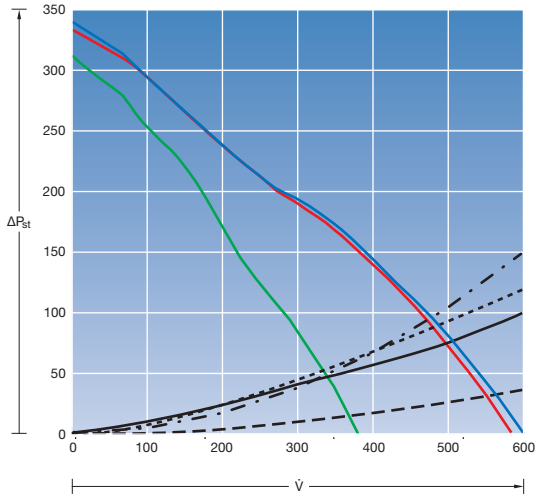
Air throughput 550/600 m³/h

50 Hz
SK 3243.100, .110, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

60 Hz
SK 3243.100, .110, .600

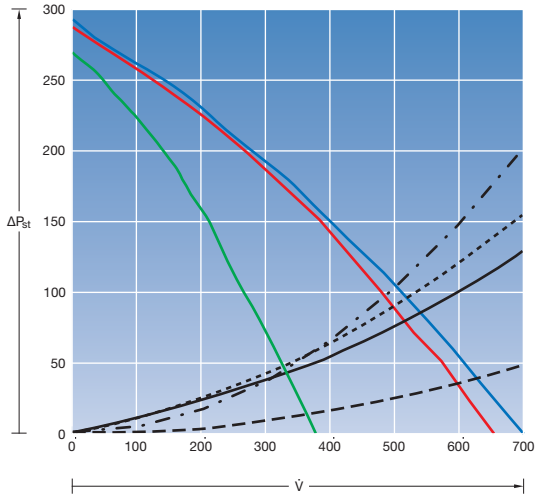


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

TopTherm fan-and-filter units and EMC TopTherm fan-and-filter units

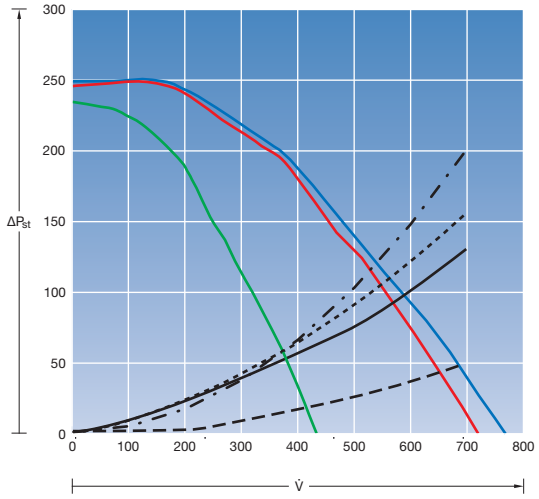
Air throughput 700/770 m³/h

50 Hz
SK 3244.100, .110, .140, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

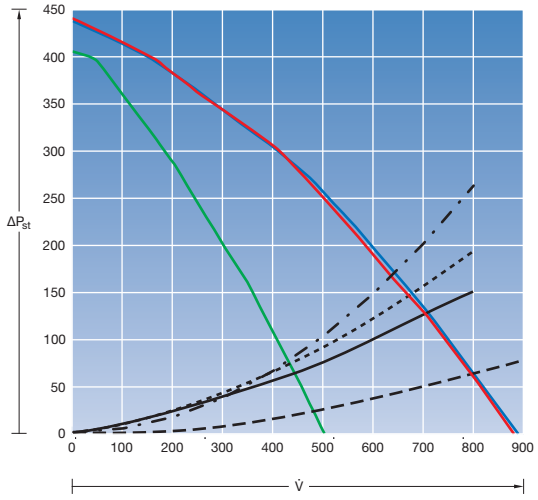
60 Hz
SK 3244.100, .110, .140, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

Air throughput 900 m³/h

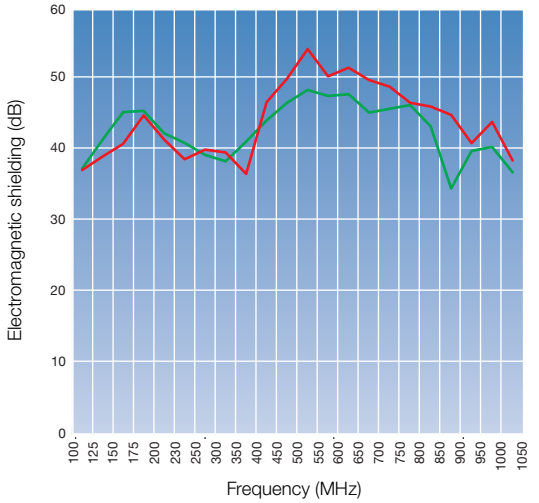
50/60 Hz
SK 3245.600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

Shielding/attenuation diagram
Testing to EN 61587-3: 2006 – Electromagnetic shielding performance tests for cabinets, racks and sub-racks

TopTherm EMC fan-and-filter units/outlet filters
SK 3237.XXX – SK 3245.XXX

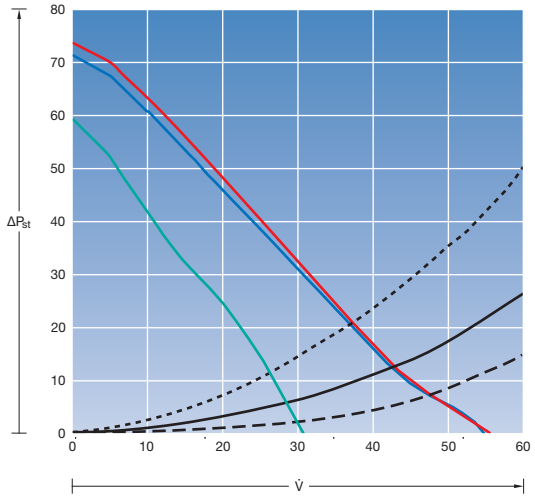


= vertical attenuation
= horizontal attenuation

TopTherm fan-and-filter units with EC technology

Air throughput 55 m³/h

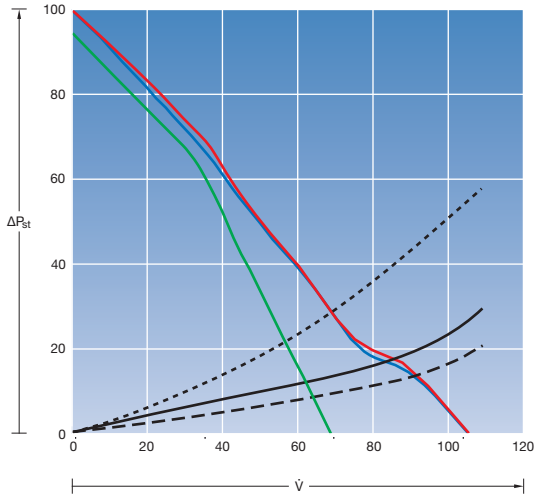
50/60 Hz
SK 3238.500



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter

Air throughput 105 m³/h

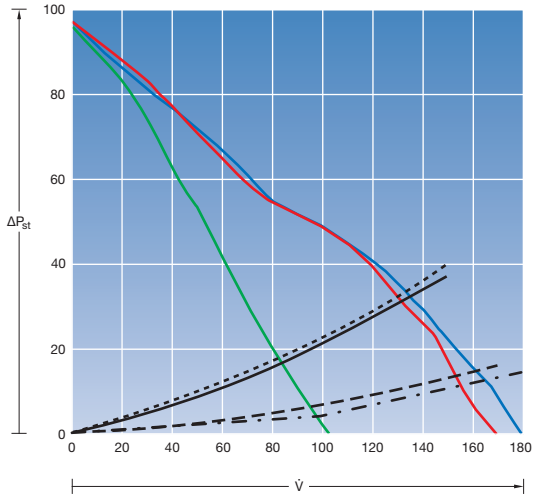
50/60 Hz
SK 3239.500



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter

Air throughput 180 m³/h

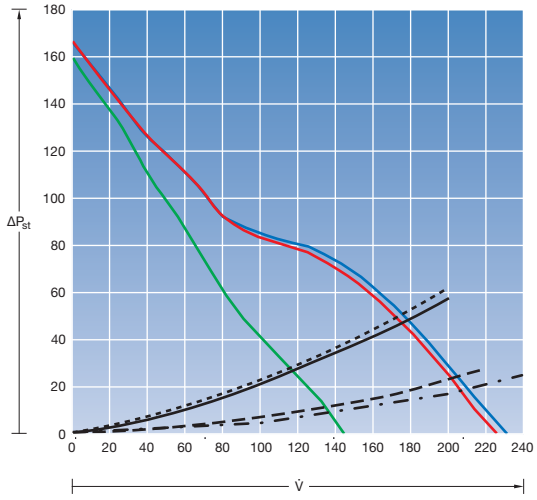
50/60 Hz
SK 3240.500



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

Air throughput 230 m³/h

50/60 Hz
SK 3241.500

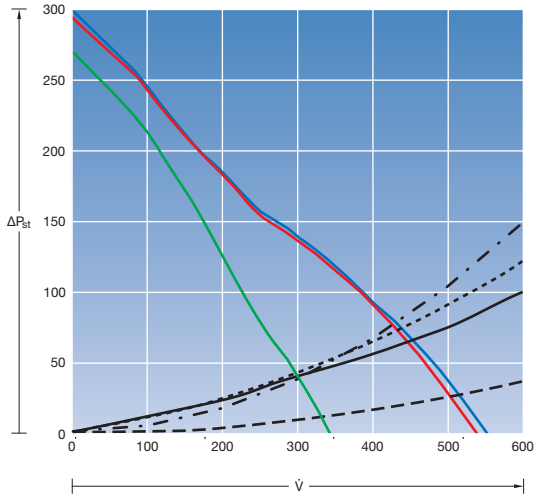


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

TopTherm fan-and-filter units with EC technology

Air throughput 550 m³/h

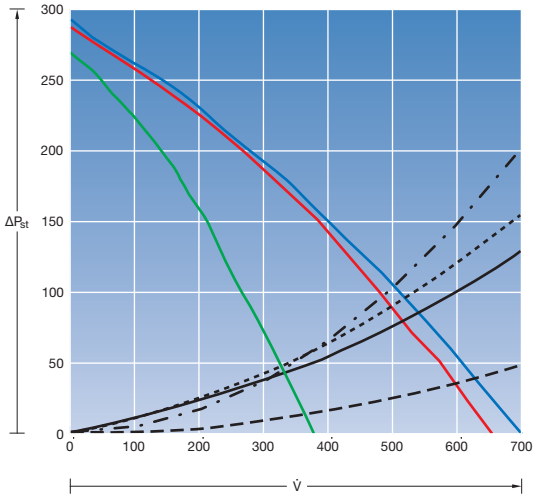
50/60 Hz
SK 3243.500



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

Air throughput 700 m³/h

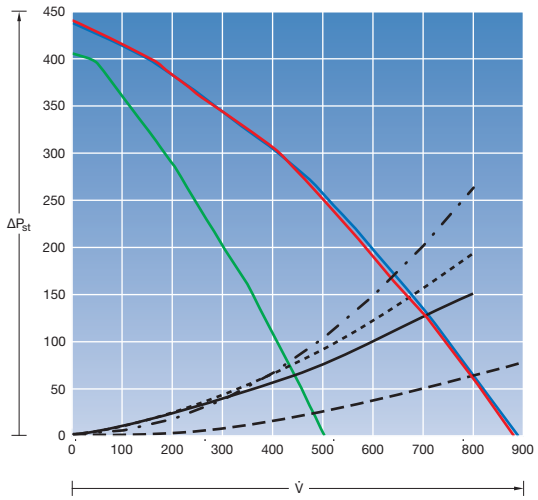
50/60 Hz
SK 3244.500



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

Air throughput 900 m³/h

50/60 Hz
SK 3245.500, .510



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

Roof-mounted fans

Using the base/plinth:

If the vented base/plinth is used as an air inlet instead of the outlet filter 3243.200, the resistance curves as indicated in the performance diagrams will apply as follows:

----- 1 x vented base/plinth with filter

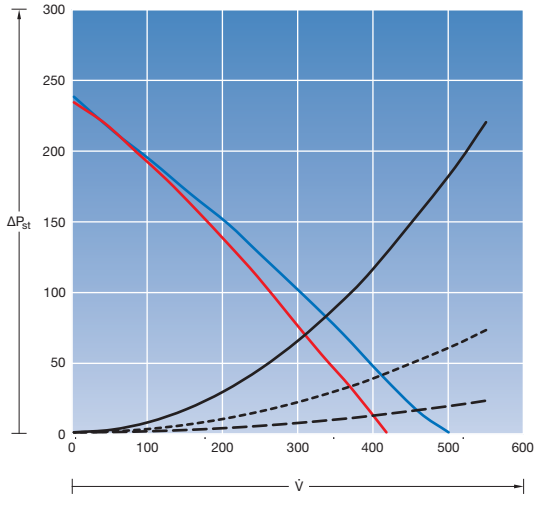
– – – 2 x vented base/plinth with filter

– – – 1 x vented base/plinth without filter

Roof-mounted fans

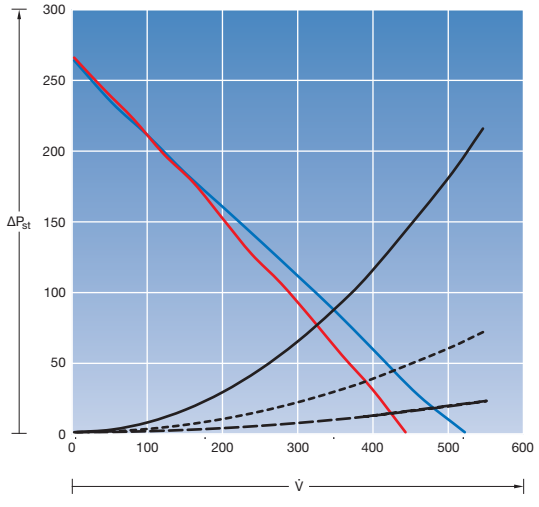
Air throughput 500/525 m³/h

50 Hz
SK 3139.100/.110



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= without filter mat (IP 22)
= with filter mat (IP 55)
= 1 x outlet filter 3243.200 with standard and fine filter (IP 55)
----- = 1 x outlet filter 3243.200 with standard filter (IP 54) or 2 x outlet filter 3243.200 with standard and fine filter (IP 55)
– – – = 2 x outlet filter 3243.200 with standard filter (IP 54)

60 Hz
SK 3139.100/.110

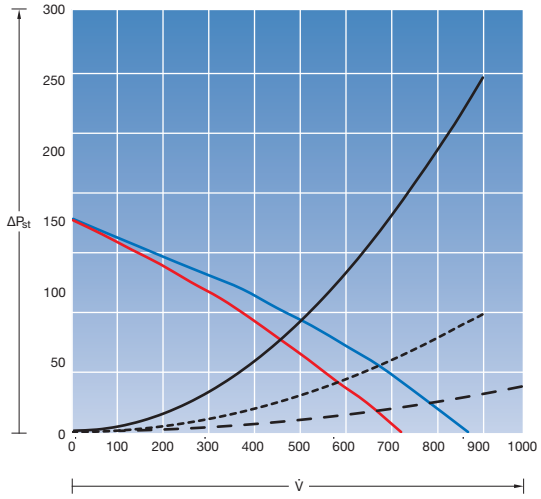


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= without filter mat (IP 22)
= with filter mat (IP 55)
= 1 x outlet filter 3243.200 with standard and fine filter (IP 55)
----- = 1 x outlet filter 3243.200 with standard filter (IP 54) or 2 x outlet filter 3243.200 with standard and fine filter (IP 55)
– – – = 2 x outlet filter 3243.200 with standard filter (IP 54)

Roof-mounted fans

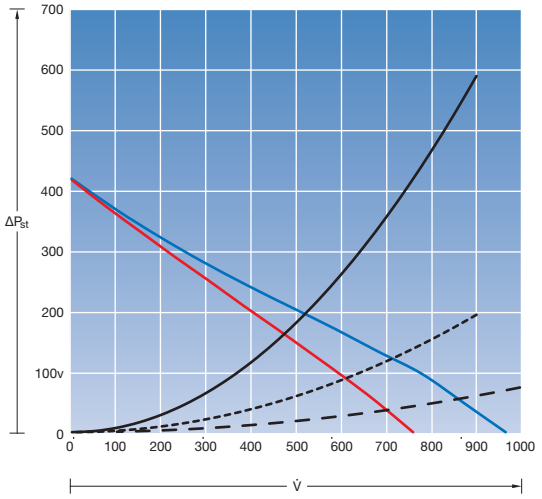
Air throughput 873/965 m³/h

50 Hz
SK 3140.100/.110



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
— = without filter mat (IP 22)
— = with filter mat (IP 55)
— = 1 x outlet filter 3243.200 with standard and fine filter (IP 55)
- - - = 1 x outlet filter 3243.200 with standard filter (IP 54) or 2 x outlet filter 3243.200 with standard and fine filter (IP 55)
- - - = 2 x outlet filter 3243.200 with standard filter (IP 54)

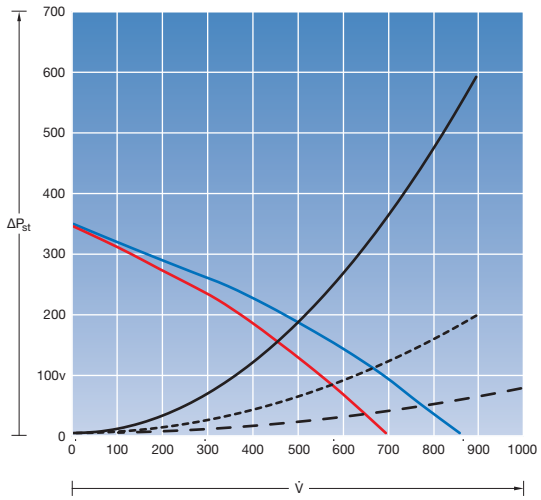
60 Hz
SK 3140.100/.110



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
— = without filter mat (IP 22)
— = with filter mat (IP 55)
— = 1 x outlet filter 3243.200 with standard and fine filter (IP 55)
- - - = 1 x outlet filter 3243.200 with standard filter (IP 54) or 2 x outlet filter 3243.200 with standard and fine filter (IP 55)
- - - = 2 x outlet filter 3243.200 with standard filter (IP 54)

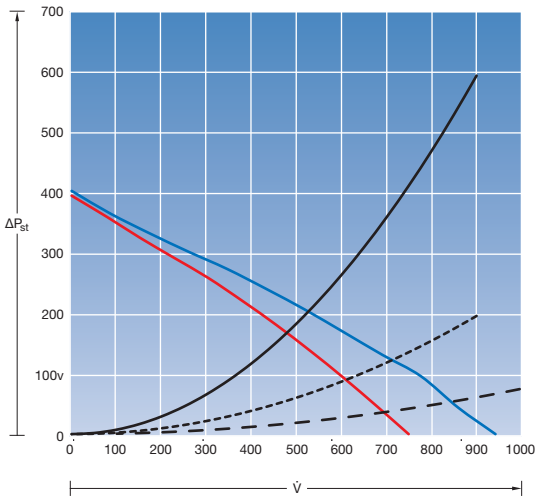
Air throughput 863/942 m³/h

400 V, 50 Hz
SK 3140.140



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
— = without filter mat (IP 22)
— = with filter mat (IP 55)
— = 1 x outlet filter 3243.200 with standard and fine filter (IP 55)
- - - = 1 x outlet filter 3243.200 with standard filter (IP 54) or 2 x outlet filter 3243.200 with standard and fine filter (IP 55)
- - - = 2 x outlet filter 3243.200 with standard filter (IP 54)

400 V, 60 Hz
SK 3140.140

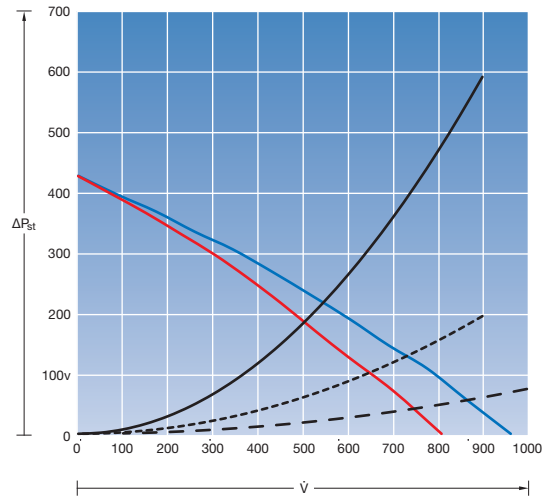


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
— = without filter mat (IP 22)
— = with filter mat (IP 55)
— = 1 x outlet filter 3243.200 with standard and fine filter (IP 55)
- - - = 1 x outlet filter 3243.200 with standard filter (IP 54) or 2 x outlet filter 3243.200 with standard and fine filter (IP 55)
- - - = 2 x outlet filter 3243.200 with standard filter (IP 54)

Roof-mounted fans

Air throughput 963 m³/h

460 V, 60 Hz
SK 3140.140

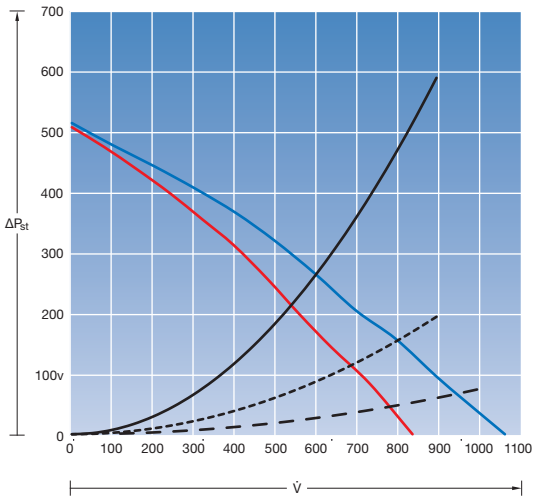


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= without filter mat (IP 22)
= with filter mat (IP 55)
= 1 x outlet filter 3243.200 with standard and fine filter (IP 55)
= 1 x outlet filter 3243.200 with standard filter (IP 54) or 2 x outlet filter 3243.200 with standard and fine filter (IP 55)
= 2 x outlet filter 3243.200 with standard filter (IP 54)

Roof-mounted fans with EC technology

Air throughput 1069 m³/h

50/60 Hz
SK 3140.500/.510

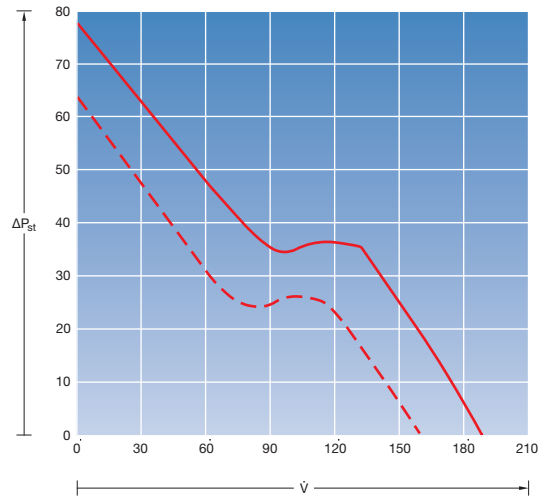


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= without filter mat (IP 22)
= with filter mat (IP 55)
= 1 x outlet filter 3243.200 with standard and fine filter (IP 55)
= 1 x outlet filter 3243.200 with standard filter (IP 54) or 2 x outlet filter 3243.200 with standard and fine filter (IP 55)
= 2 x outlet filter 3243.200 with standard filter (IP 54)

Rack-mounted fans for 482.6 mm (19˝)

Air throughput 320/480 m³/h

50/60 Hz
SK 3340.230, 3341.024, .115, .230, 3342.024, .230, .500, 3350.115, .230, 3351.230, 3352.230, .500

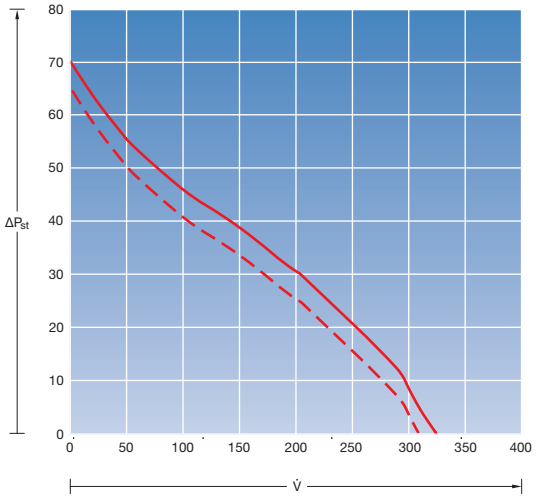


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= 50 Hz
= 60 Hz

Tangential fans for 482.6 mm (19˝)

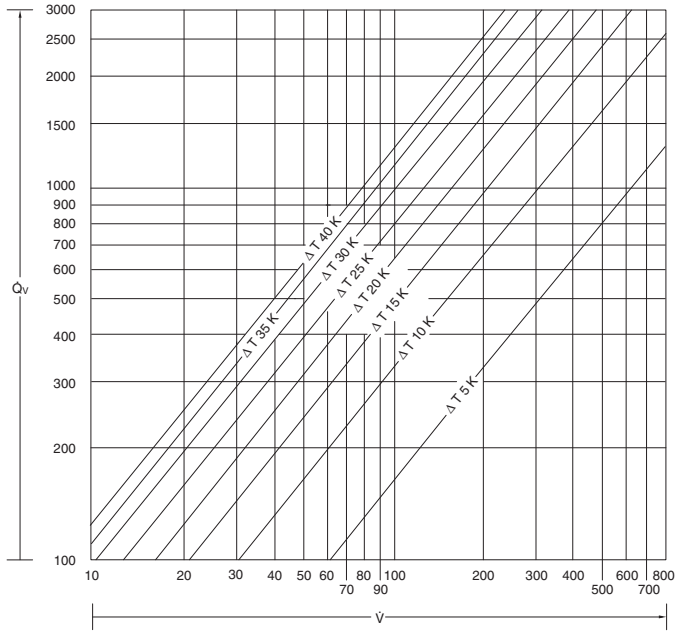
Air throughput 320 m³/h

50/60 Hz
SK 3144.000, 3145.000



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= 50 Hz
= 60 Hz

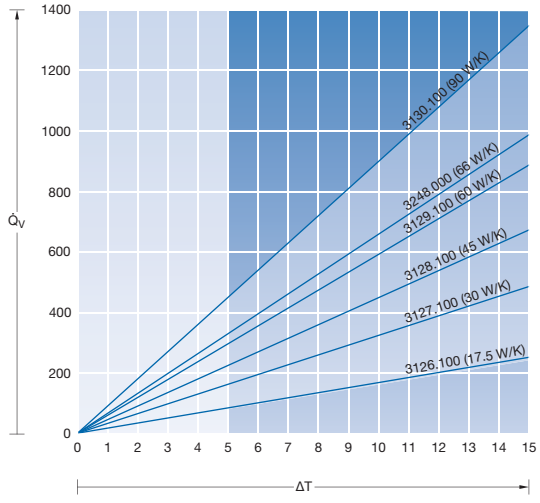
Selection diagram
for fans



$\dot{V}$ = Volumetric flow (m^3/h)
$\dot{Q}_V$ = Heat loss (W)

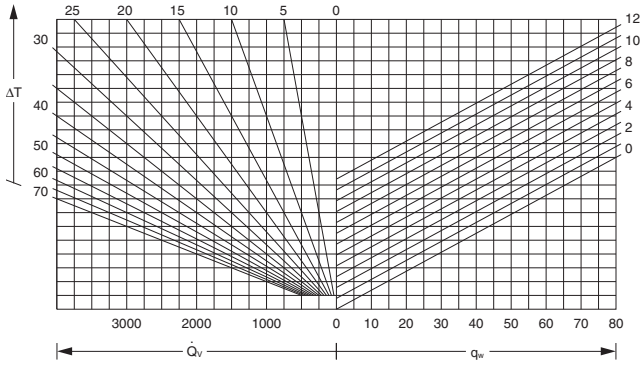
TopTherm air/air heat exchangers
Specific thermal output 17.5 – 90 W/K, wall-mounted with controller

50/60 Hz
SK 3126.100, 3127.100, 3128.100, 3129.100, 3130.100, 3248.000



$\dot{Q}_V$ = Heat loss (W)
ΔT = Temperature difference (K)

Selection diagram
for air/air heat exchangers

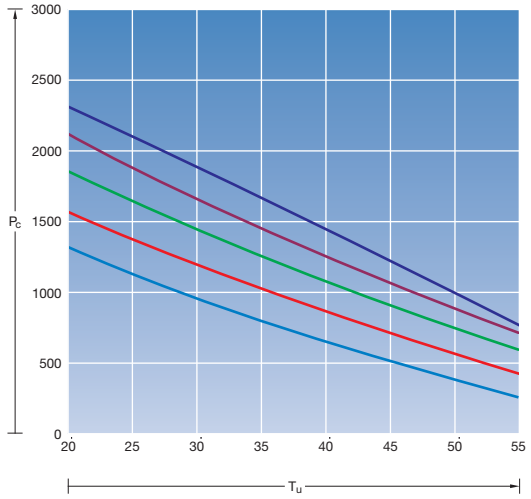


ΔT	=	Temperature difference (K)
$\dot{Q}_V$	=	Heat loss (W)
q_W	=	Specific thermal output (W/K)
A	=	Enclosure surface area to IEC 890 (m^2)
k	=	Heat transfer coefficient (W/m^2 K) for sheet steel k = 5.5 W/m^2 K

VX25 Blue e+ integration solution

Output class 1300 W (110 – 240 V, 1 ~, 50 – 60 Hz / 380 – 480 V, 3 ~, 50 – 60 Hz)

1.30 kW
SK 3185.030



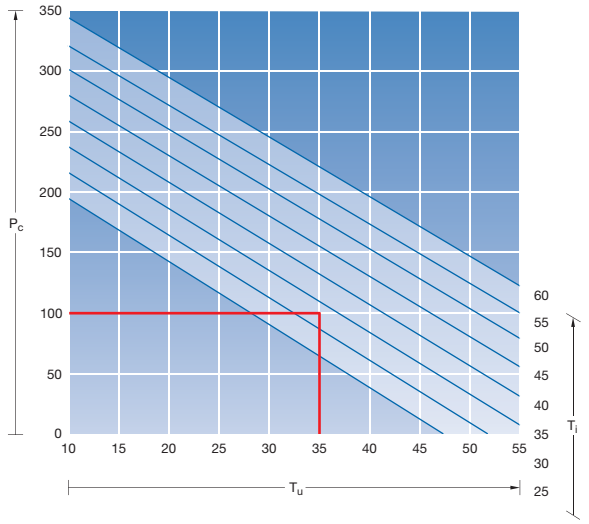
Enclosure internal temperature T_i
- 45 °C
- 40 °C
- 35 °C
- 30 °C
- 25 °C

P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

Thermoelectric coolers

Cooling output

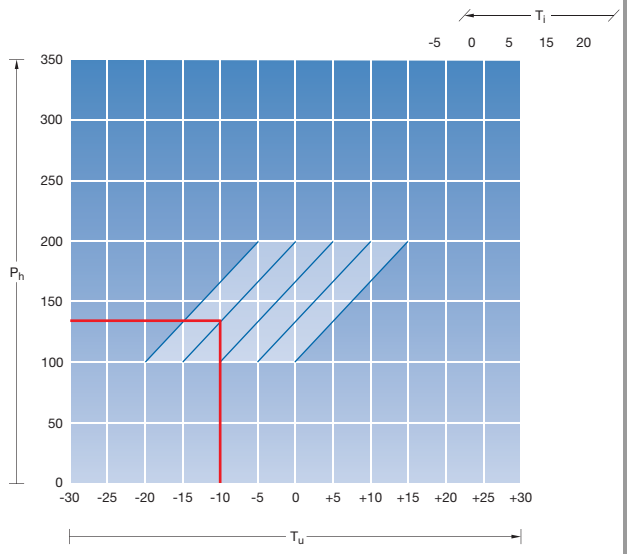
50/60 Hz
SK 3201.200, .300



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Heating output

50/60 Hz
SK 3201.200, .300

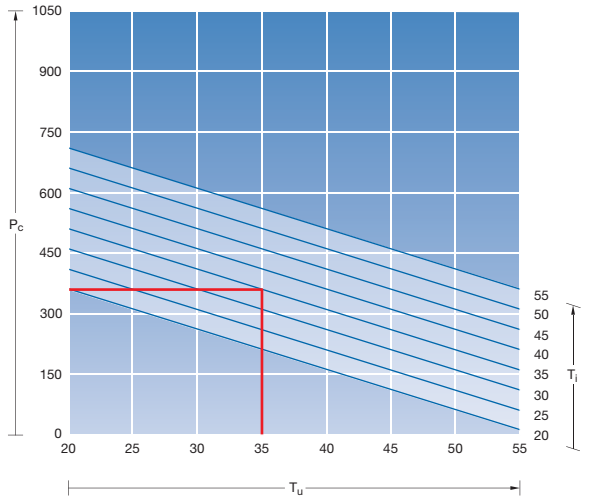


T_u = Ambient temperature (°C)
P_h = Heating output (W)
T_i = Enclosure internal temperature (°C)

TopTherm wall-mounted cooling units

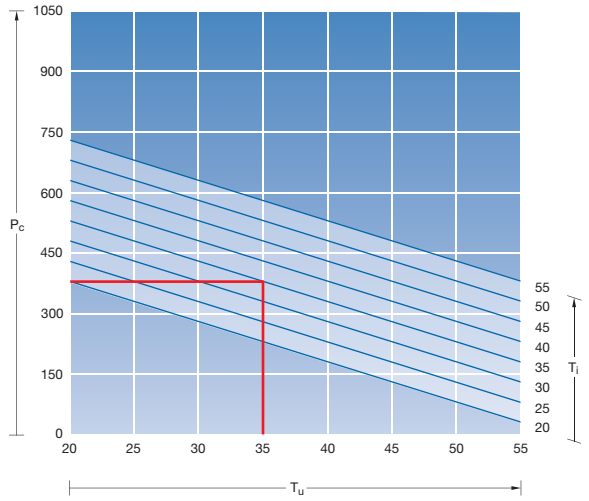
Output class 300 W (115/230 V, 1~)

50 Hz
SK 3302.300, .310, .100, .110, .200



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3302.300, .310, .100, .110, .200

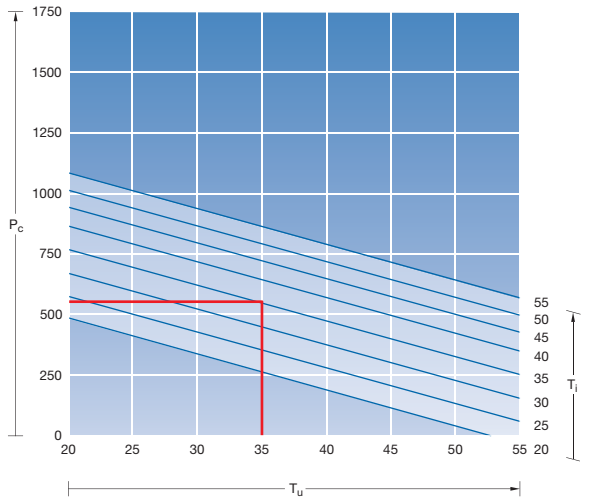


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm wall-mounted cooling units Blue e

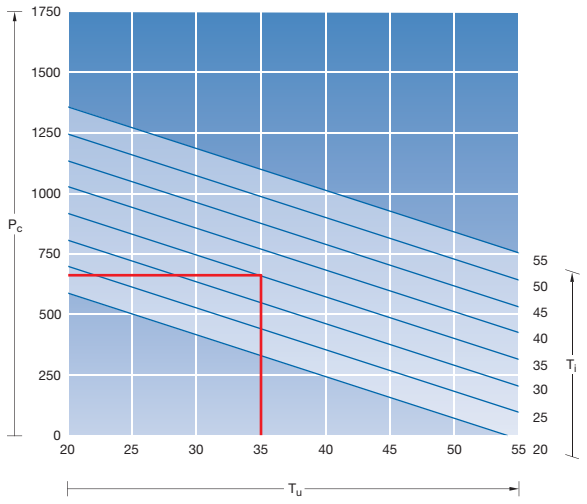
Output class 500 W (115/230 V, 1~)

50 Hz
SK 3303.500, .510, .600, .504, .514



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

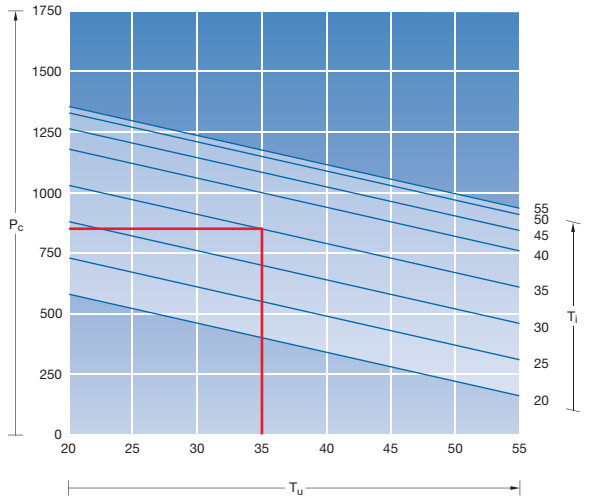
60 Hz
SK 3303.500, .510, .600, .504, .514



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

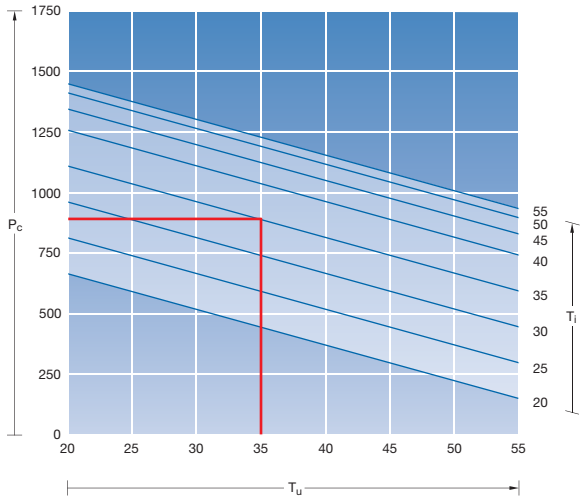
Output class 750 W (115/230 V, 1~, 400 V, 2~)

50 Hz
SK 3361.500, .510, .540, .600



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3361.500, .510, .540, .600

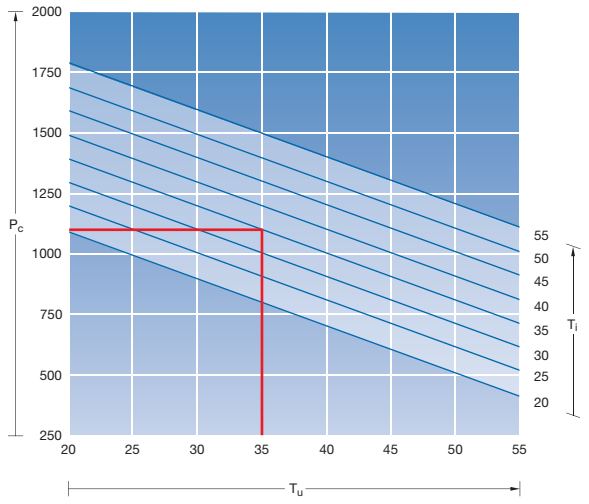


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm wall-mounted cooling units Blue e

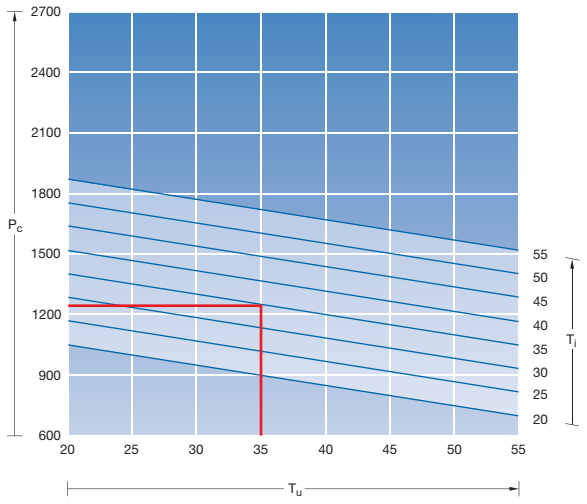
Output class 1000 W (115/230 V, 1~)

50 Hz
SK 3304.500, .510, .600, .504



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

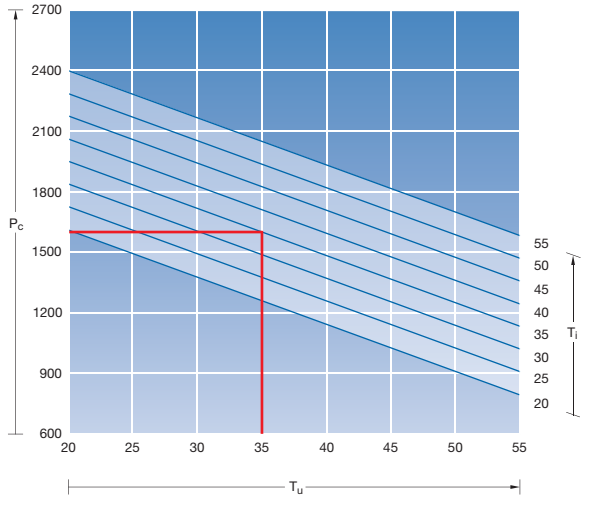
60 Hz
SK 3304.500, .510, .600, .504



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

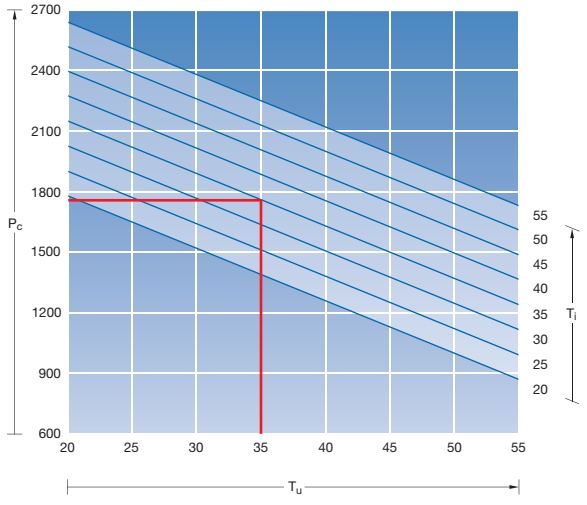
Output class 1500 W (115/230 V, 1~)

50 Hz
SK 3305.500, .510, .600, .504



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3305.500, .510, .600, .504

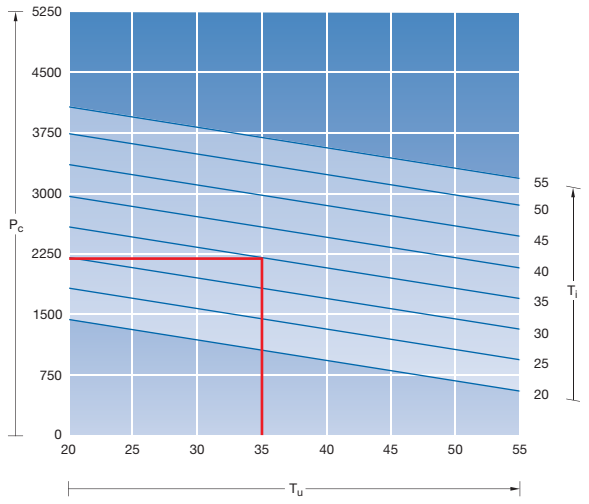


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm wall-mounted cooling units Blue e

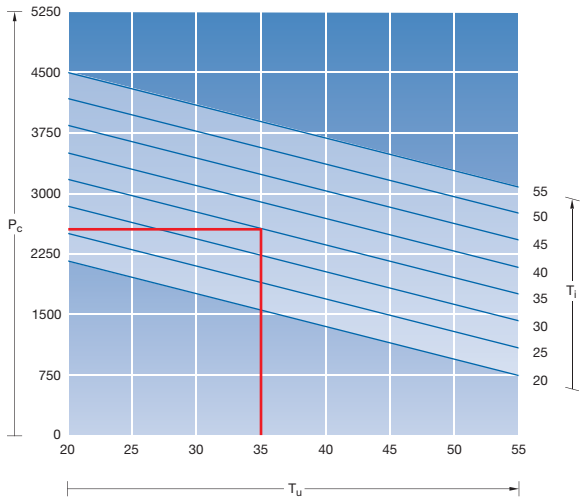
Output class 2000 W (115/230 V, 1~)

50 Hz
SK 3328.500, .510, .600, .504



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

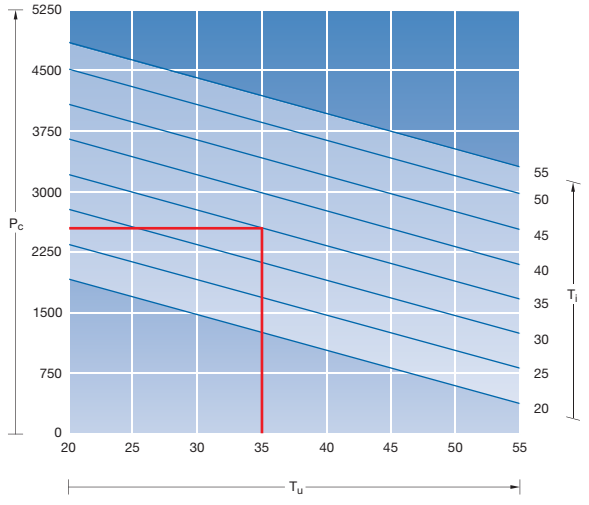
60 Hz
SK 3328.500, .510, .600, .504



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

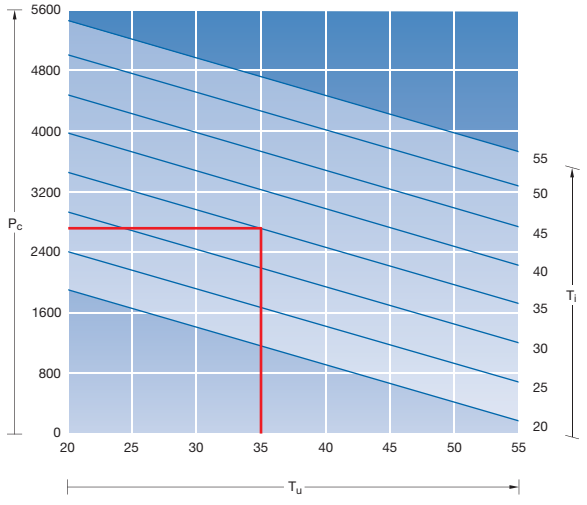
Output class 2500 W (115/230 V, 1~)

50 Hz
SK 3329.500, .510, .600, .504



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3329.500, .510, .600, .504

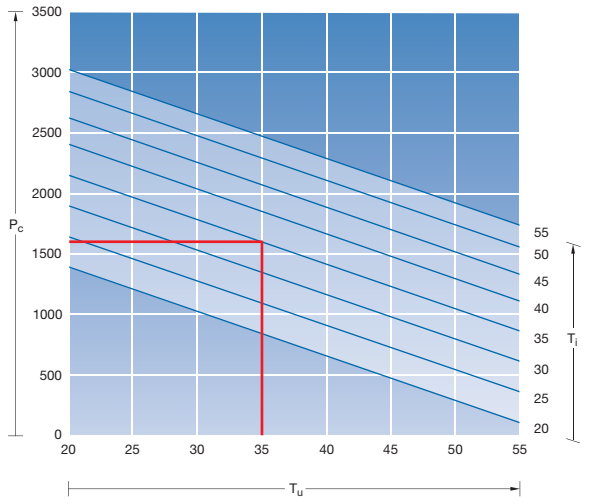


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm wall-mounted cooling units Blue e, slimline

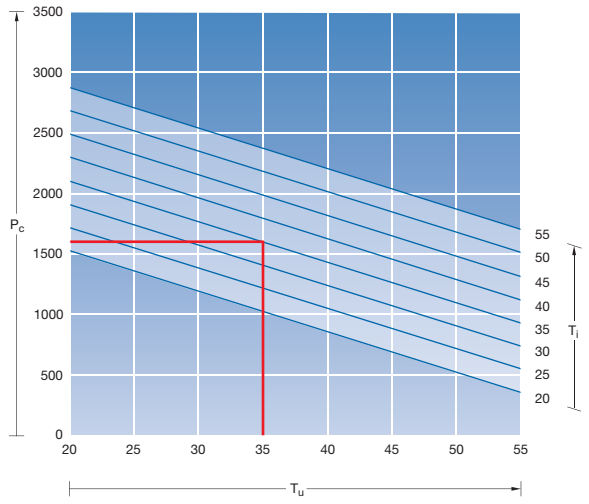
Output class 1500 W (230 V, 1~)

50 Hz
SK 3366.500



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

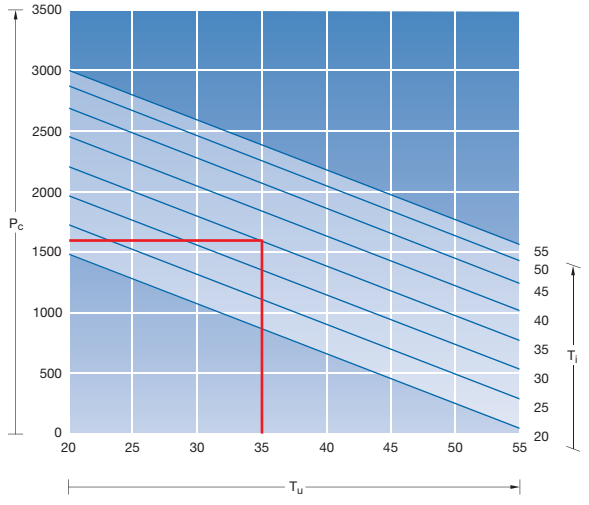
60 Hz
SK 3366.500



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

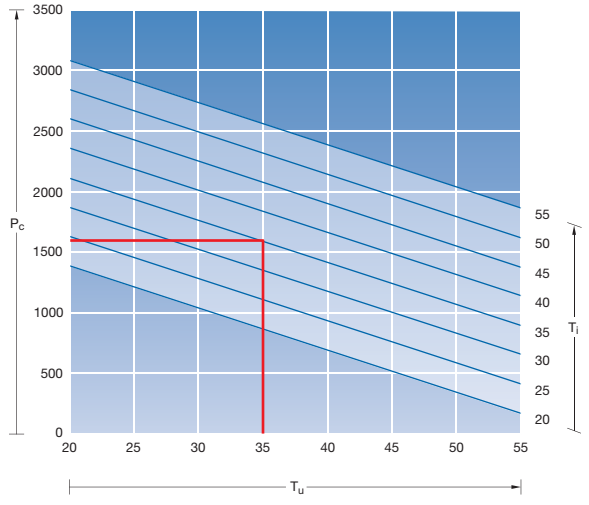
Output class 1500 W (400/460 V, 3~)

50 Hz
SK 3366.540



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3366.540

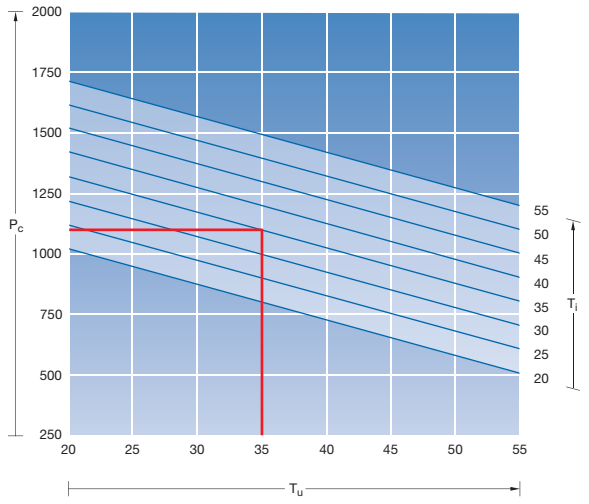


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm wall-mounted cooling units Blue e

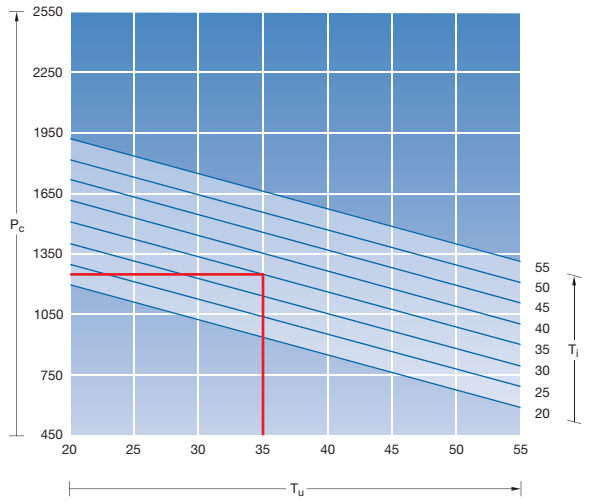
Output class 1000 W (400/460 V, 3~)

50 Hz
SK 3304.540, .640, .544



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

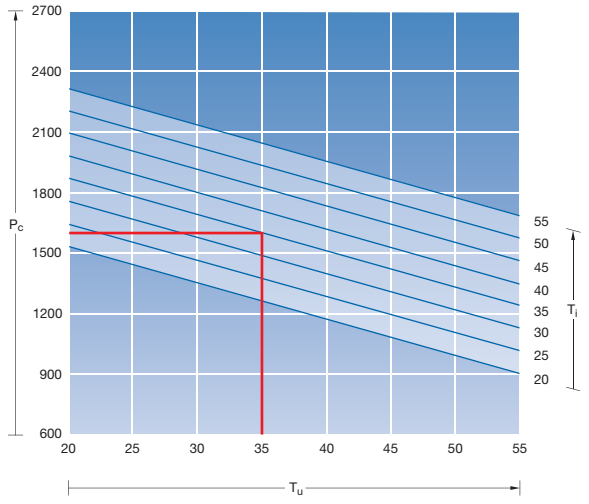
60 Hz
SK 3304.540, .640, .544



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

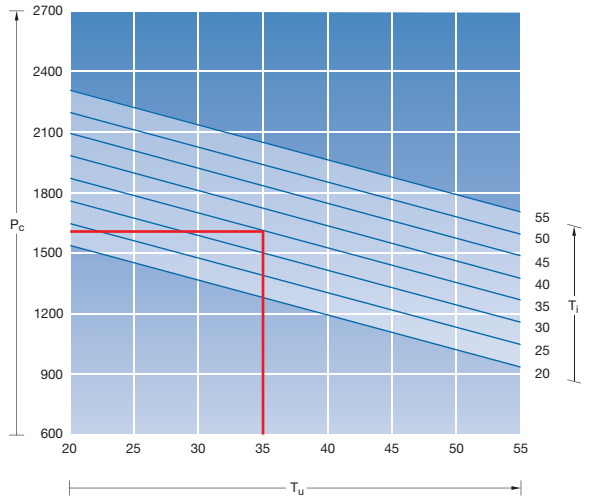
Output class 1500 W (400/460 V, 3~)

50 Hz
SK 3305.540, .640, .544



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3305.540, .640, .544

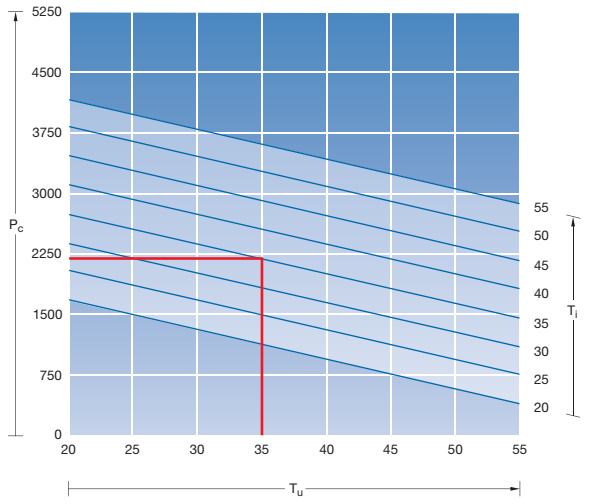


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm wall-mounted cooling units Blue e

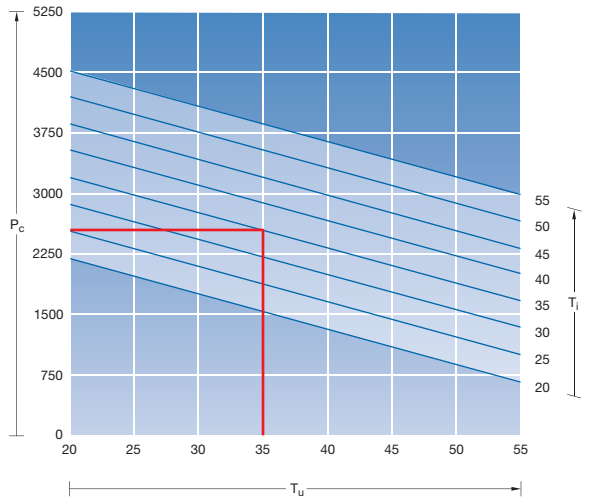
Output class 2000 W (400/460 V, 3~)

50 Hz
SK 3328.540, .640, .544



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

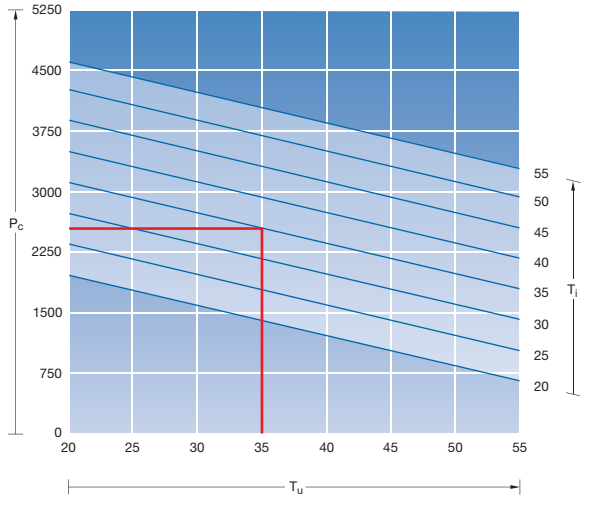
60 Hz
SK 3328.540, .640, .544



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

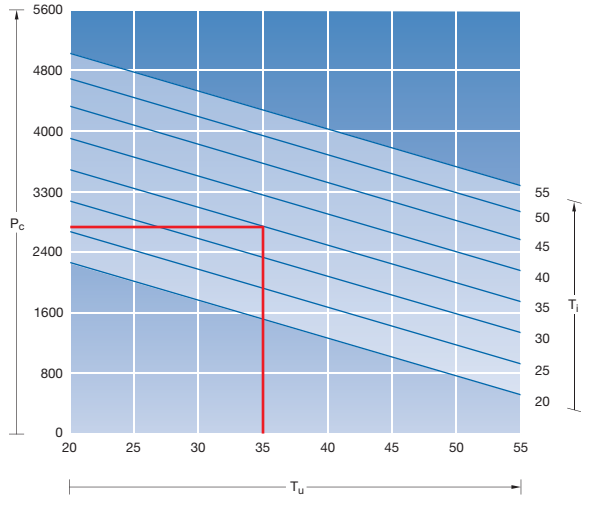
Output class 2500 W (400/460 V, 3~)

50 Hz
SK 3329.540, .640, .544



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3329.540, .640, .544

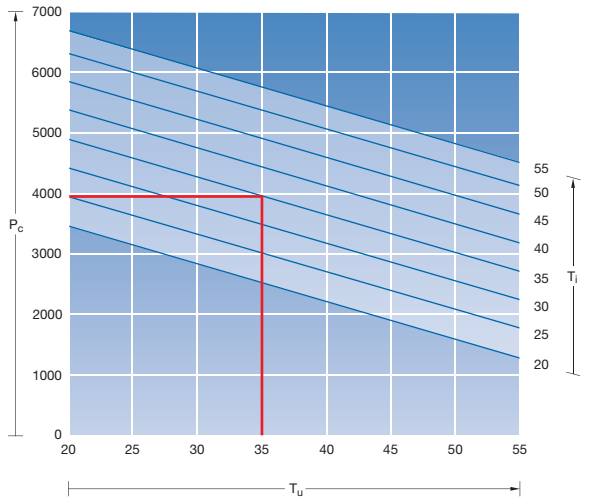


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm wall-mounted cooling units Blue e

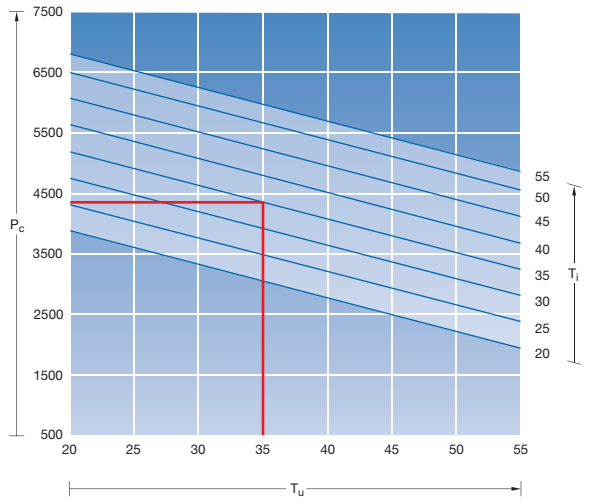
Output class 4000 W (400/460 V, 3~)

50 Hz
SK 3332.540, .640



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3332.540, .640

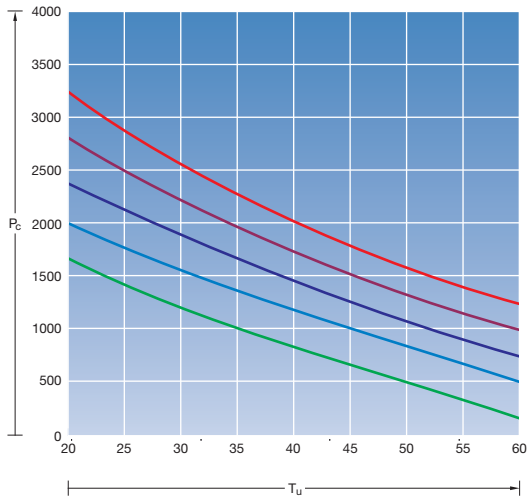


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Wall-mounted cooling units Blue e+

Output class 1600/2000 W (110 – 240 V, 1~, 50 – 60 Hz / 380 – 480 V, 3~, 50 – 60 Hz)

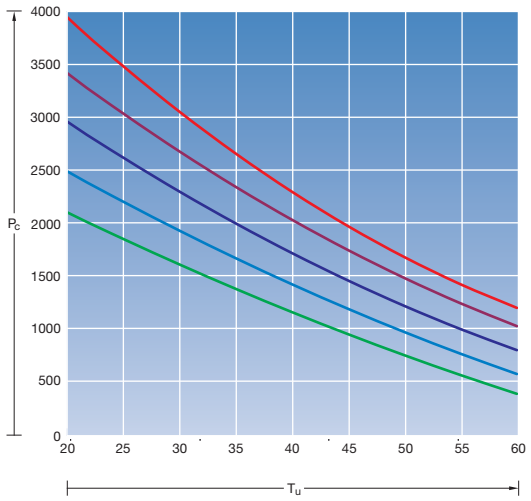
1.6 kW
SK 3185.530, .830



Enclosure internal temperature T_i
- 45 °C
- 40 °C
- 35 °C
- 30 °C
- 25 °C

P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

2 kW
SK 3186.630, .930

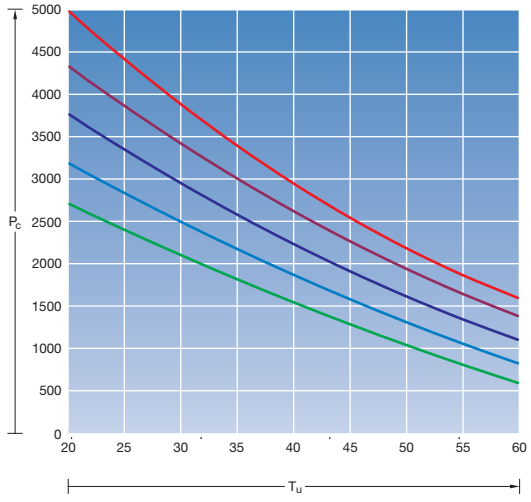


Enclosure internal temperature T_i
- 45 °C
- 40 °C
- 35 °C
- 30 °C
- 25 °C

P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

Output class 2600/4200 W (110 – 240 V, 1~, 50 – 60 Hz / 380 – 480 V, 3~, 50 – 60 Hz)

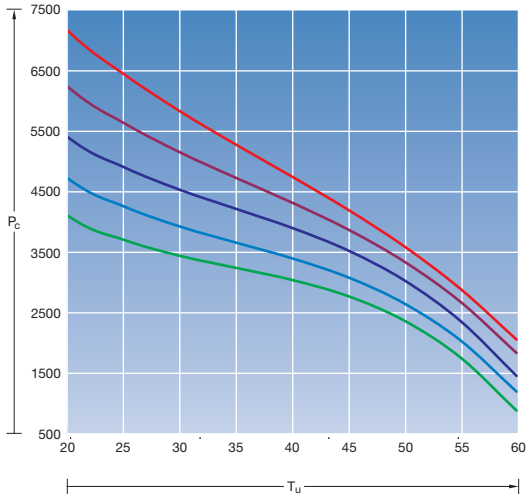
2.6 kW
SK 3187.630, .930



Enclosure internal temperature T_i
- 45 °C
- 40 °C
- 35 °C
- 30 °C
- 25 °C

P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

4.2 kW
SK 3188.640, .940



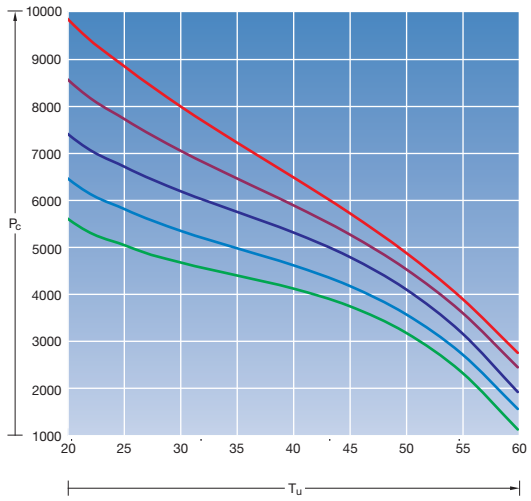
Enclosure internal temperature T_i
- 45 °C
- 40 °C
- 35 °C
- 30 °C
- 25 °C

P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

Wall-mounted cooling units Blue e+

Output class 5800 W (380 – 480 V, 3~, 50 – 60 Hz)

5.8 kW
SK 3189.640, .940



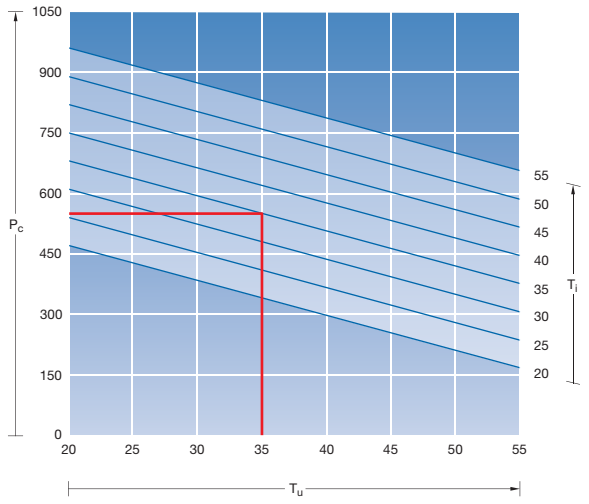
Enclosure internal temperature T_i
- 45 °C
- 40 °C
- 35 °C
- 30 °C
- 25 °C

P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

TopTherm roof-mounted cooling units Blue e

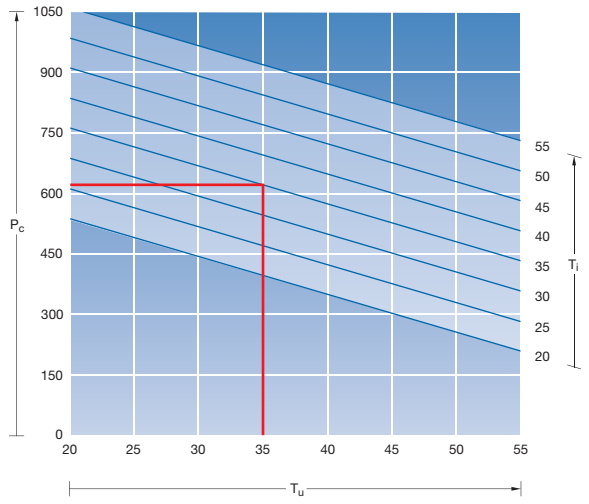
Output class 500 W (115/230 V, 1~)

50 Hz
SK 3382.500, .510, .600



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

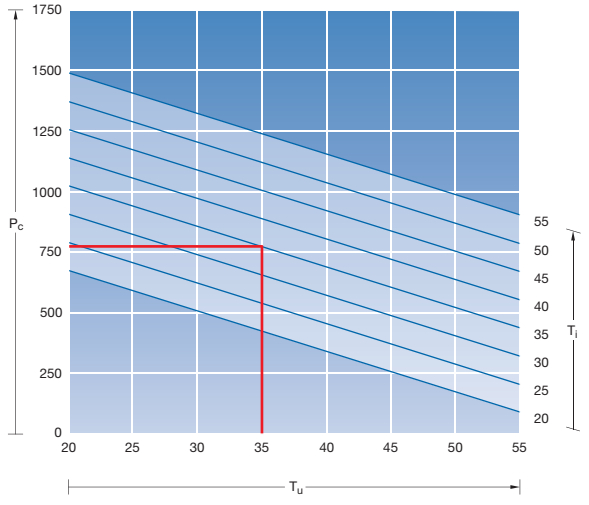
60 Hz
SK 3382.500, .510, .600



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

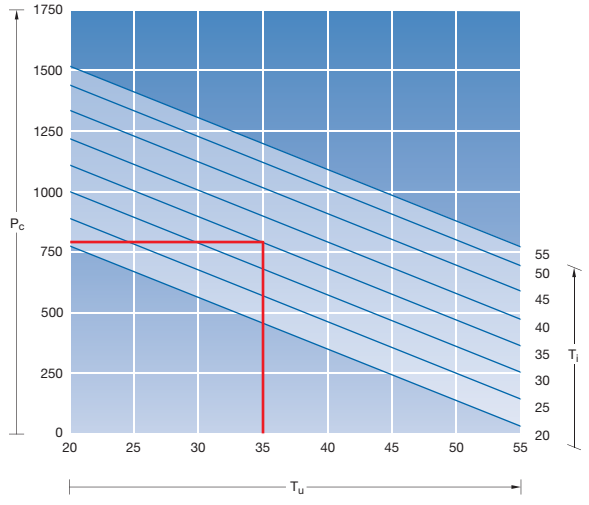
Output class 750 W (115/230 V, 1~, 400 V, 2~)

50 Hz
SK 3359.500, .510, .540, .600



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3359.500, .510, .540, .600

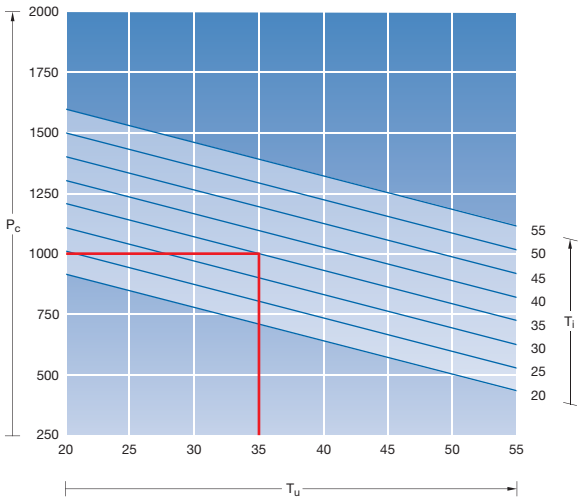


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm roof-mounted cooling units Blue e

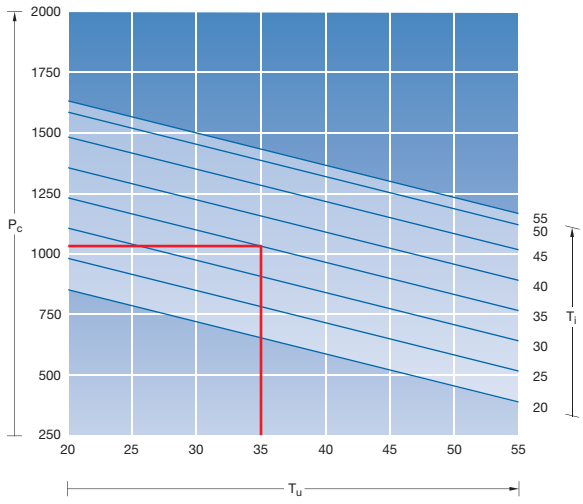
Output class 1000 W (115/230 V, 1~, 400 V, 2~)

50 Hz
3383.500, .510, .540, .600



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

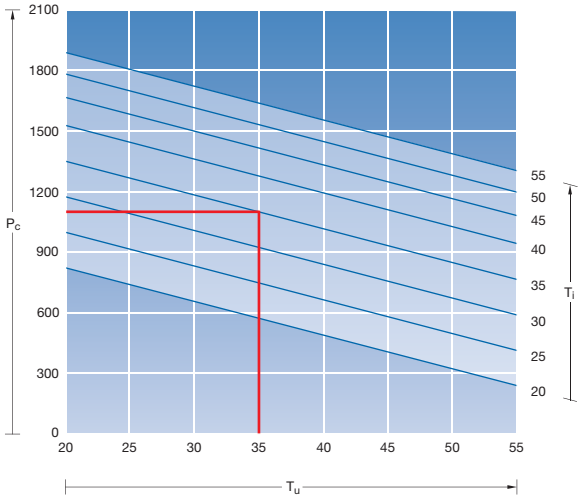
60 Hz
3383.500, .510, .540, .600



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

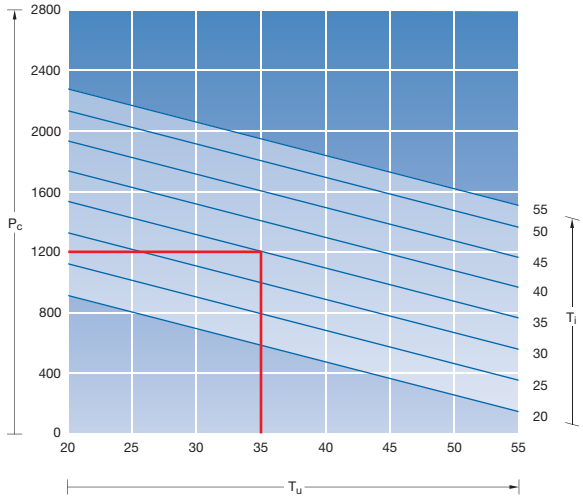
Output class 1100 W (115/230 V, 1~)

50 Hz
SK 3273.500, .515



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3273.500, .515

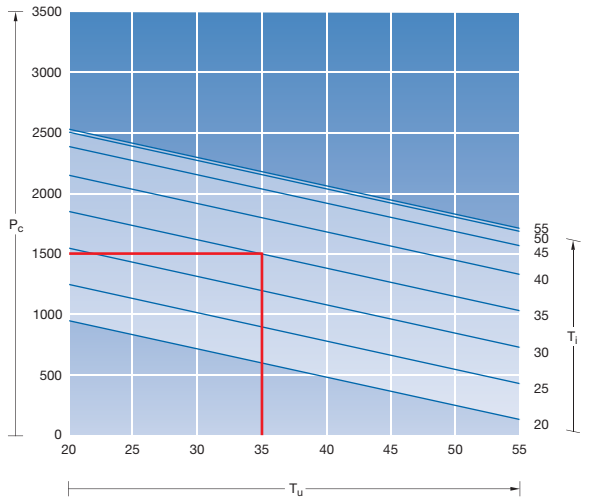


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm roof-mounted cooling units Blue e

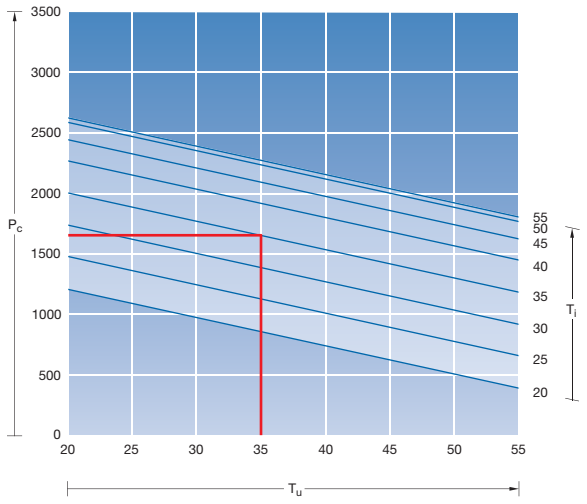
Output class 1500 W (115/230 V, 1~, 400 V, 2~)

50 Hz
3384.500, .510, .540, .600



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

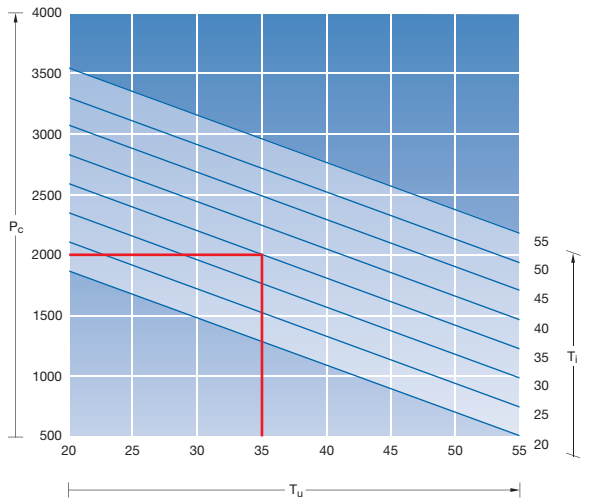
60 Hz
3384.500, .510, .540, .600



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

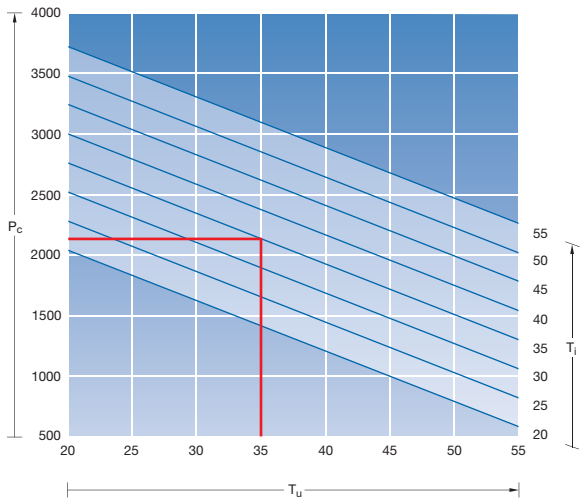
Output class 2000 W (115/230 V, 1~, 400 V, 2~)

50 Hz
SK 3385.500, .510, .540, .600, .640



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3385.500, .510, .540, .600, .640

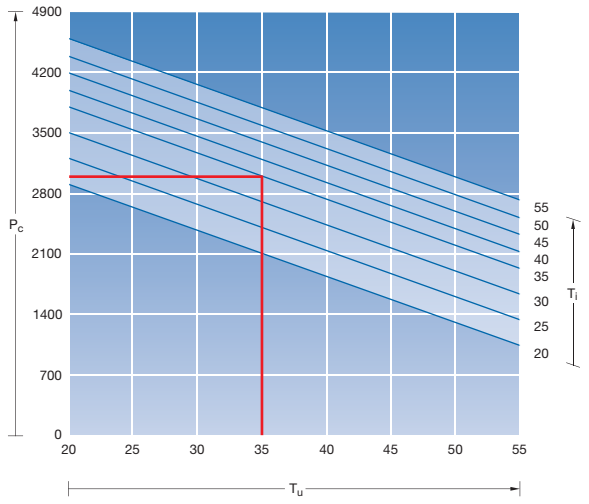


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm roof-mounted cooling units Blue e

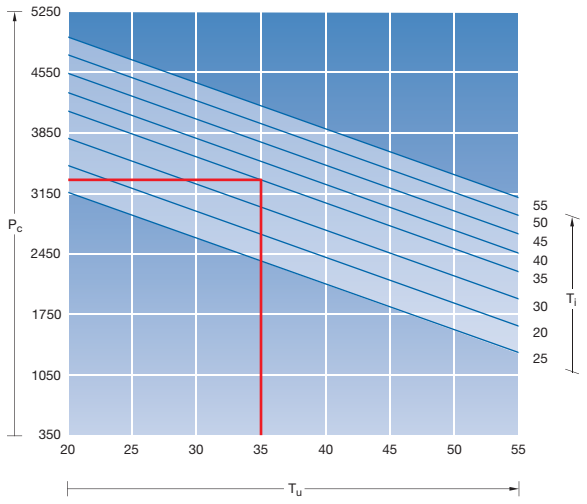
Output class 3000 W (400/460 V, 3~)

50 Hz
3386.540, .640



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

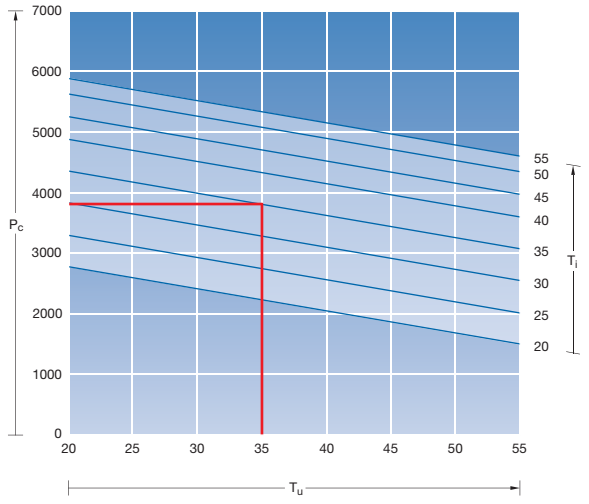
60 Hz
3386.540, .640



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

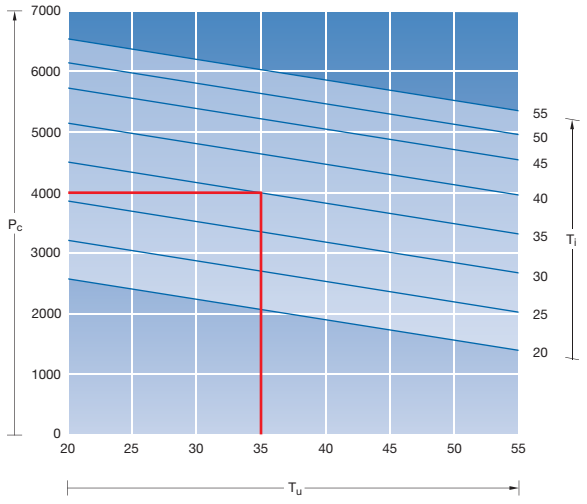
Output class 4000 W (400/460 V, 3~)

50 Hz
3387.540, .640



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
3387.540, .640

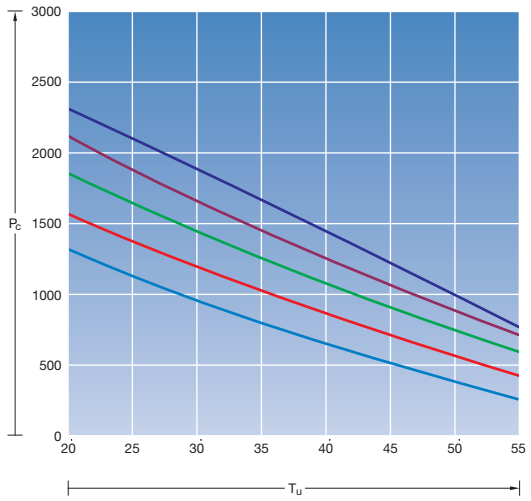


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Roof-mounted cooling unit Blue e+

Output class 1300 W (110 – 240 V, 1 ~, 50 – 60 Hz / 380 – 480 V, 3 ~, 50 – 60 Hz)

1.30 kW
SK 3185.730



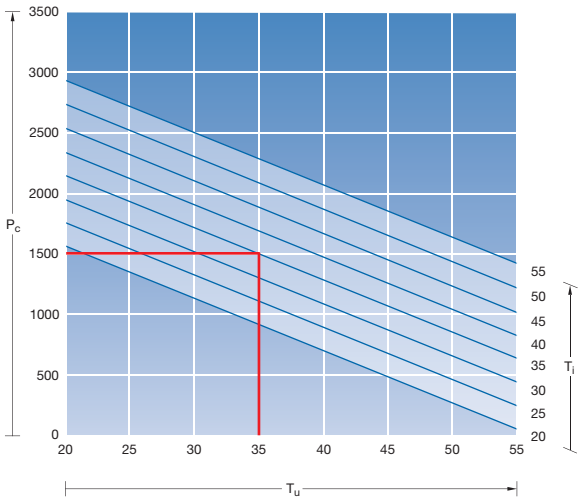
Enclosure internal temperature T_i
- 45 °C
- 40 °C
- 35 °C
- 30 °C
- 25 °C

P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

Modular climate control concept – Cooling module Blue e

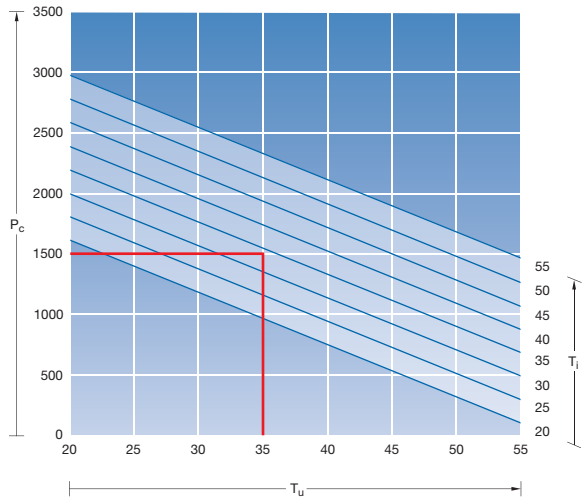
Output class 1500 W (230 V, 1~)

50 Hz
SK 3307.700



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

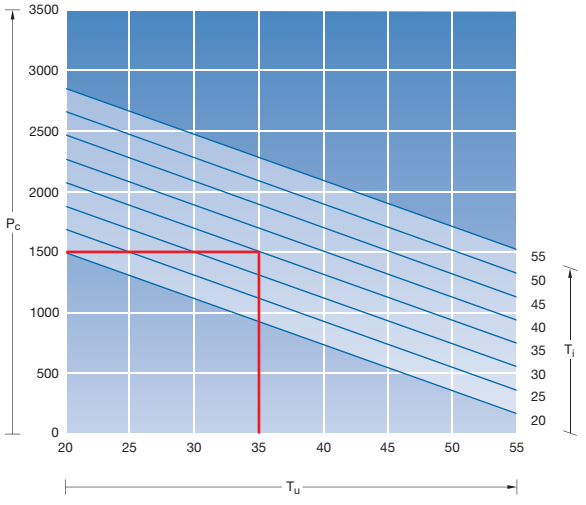
60 Hz
SK 3307.700



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

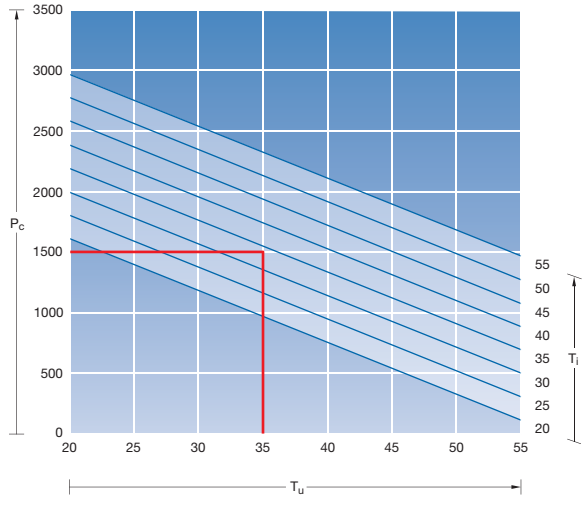
Output class 1500 W (400/460 V, 3~)

50 Hz
SK 3307.740



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3307.740

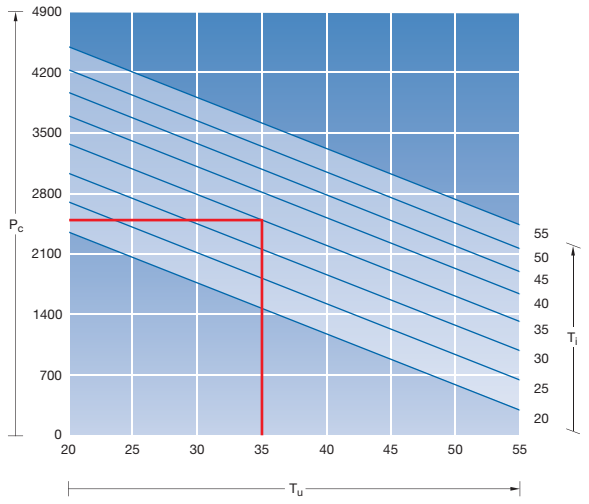


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Modular climate control concept – Cooling module Blue e

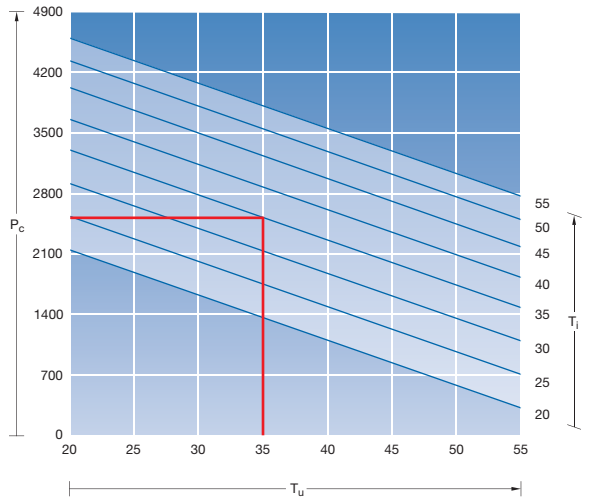
Output class 2500 W (230 V, 1~)

50 Hz
SK 3310.700



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

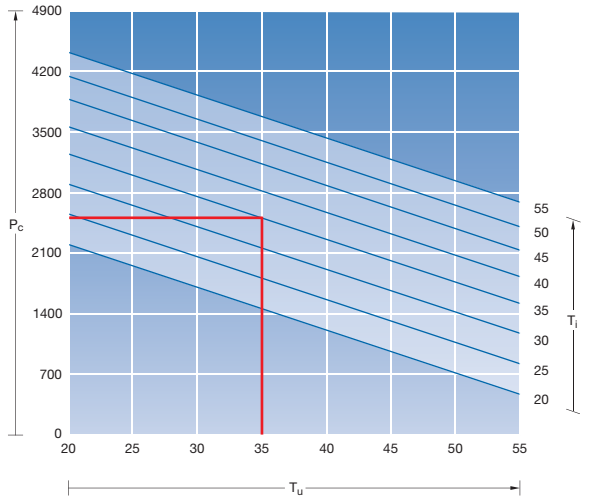
60 Hz
SK 3310.700



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

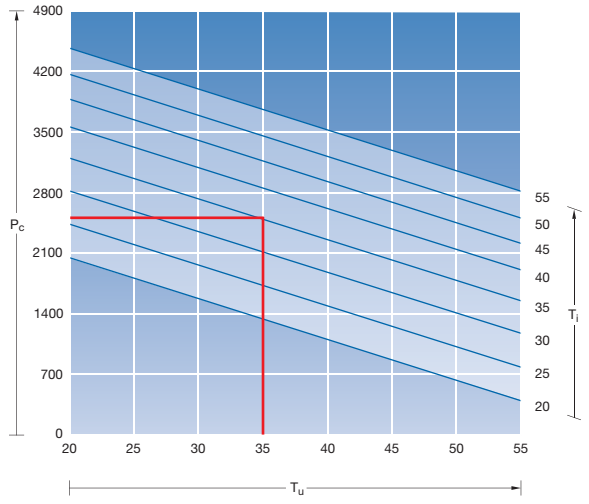
Output class 2500 W (400/460 V, 3~)

50 Hz
SK 3310.740



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3310.740

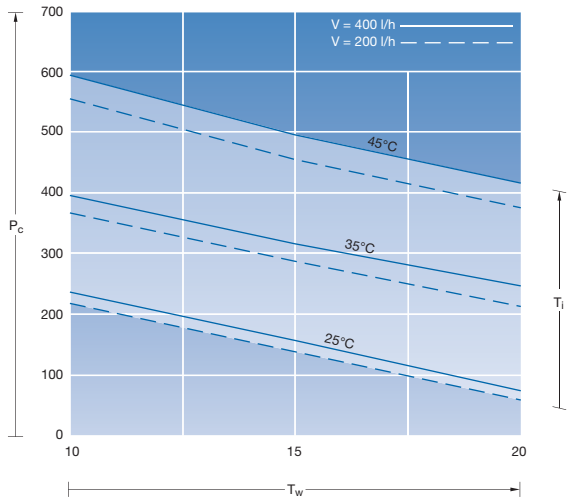


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Wall-mounted air/water heat exchangers

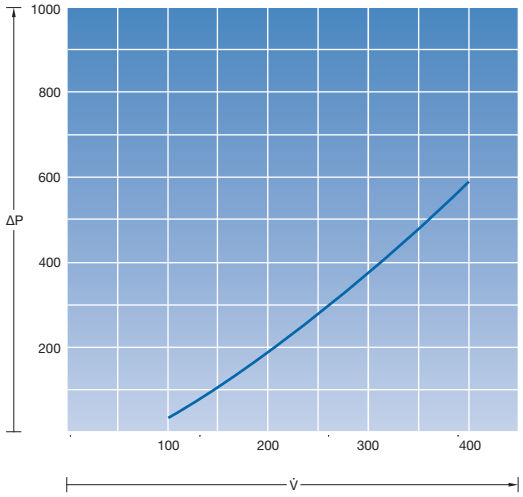
Output class 300 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50/60 Hz
SK 3212.024, .115, .230



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

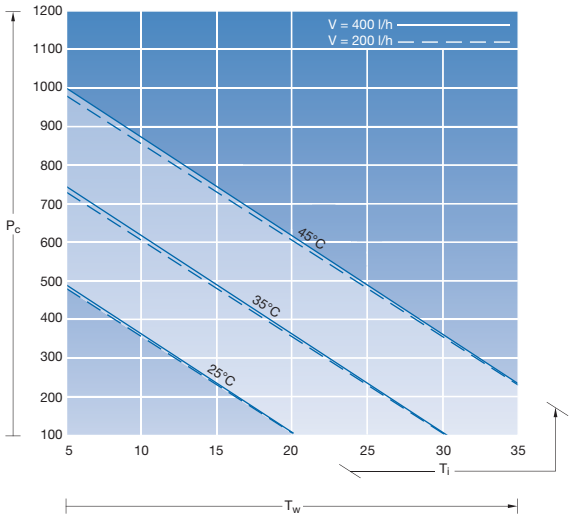
Water resistance diagram
SK 3212.024, .115, .230



$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

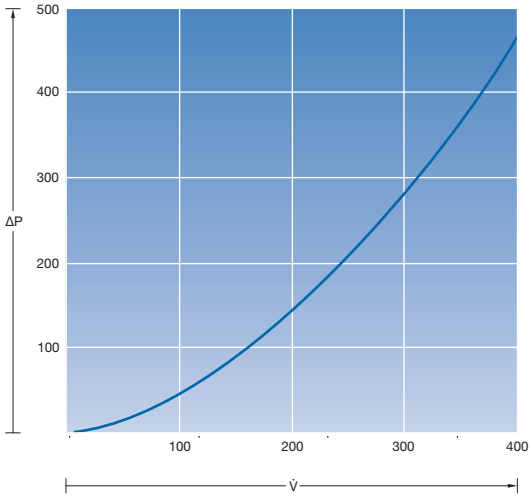
Output class 600 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50/60 Hz
SK 3214.100



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3214.100

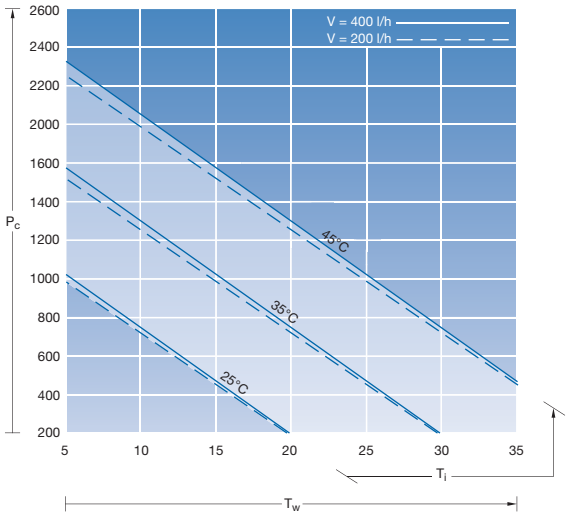


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

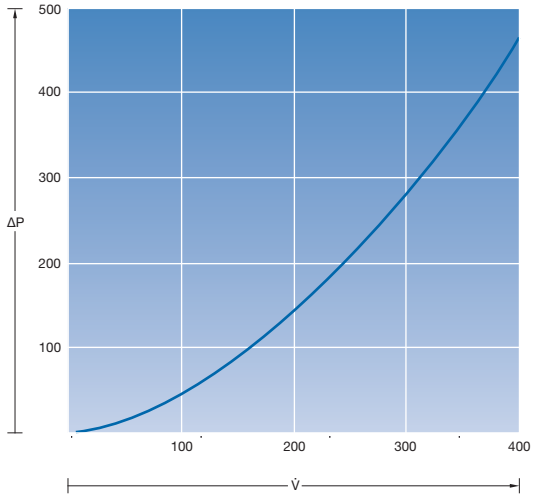
Output class 1250 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50/60 Hz
SK 3215.100



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

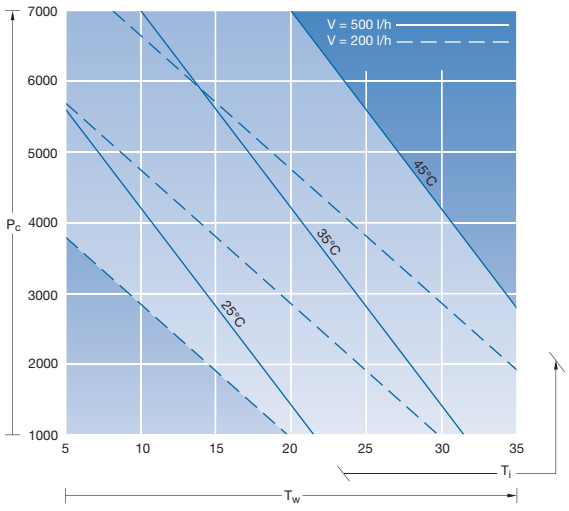
Water resistance diagram
SK 3215.100



$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

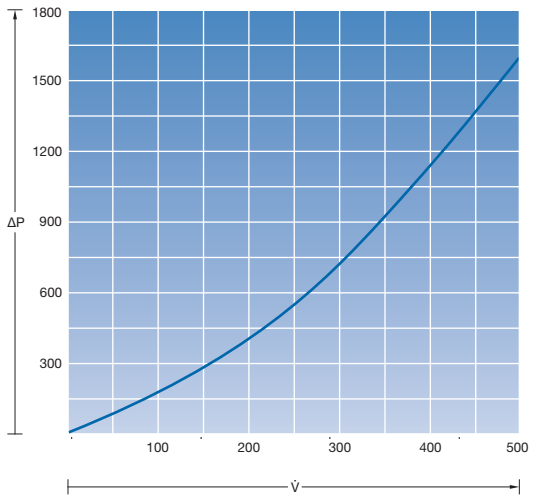
Output class 7000 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50/60 Hz
SK 3216.480



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3216.480

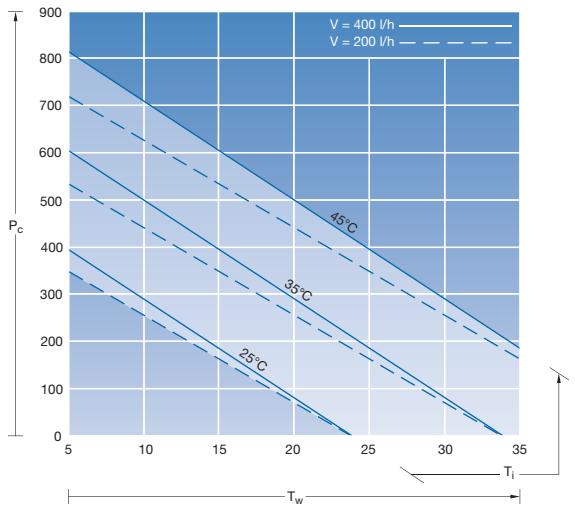


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

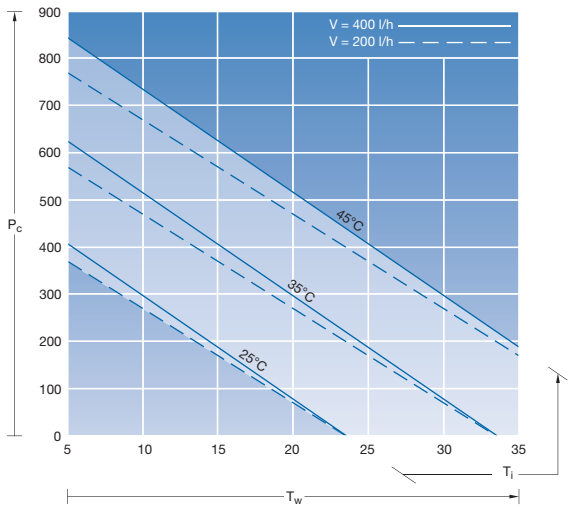
Output class 500 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz
SK 3363.100, .500



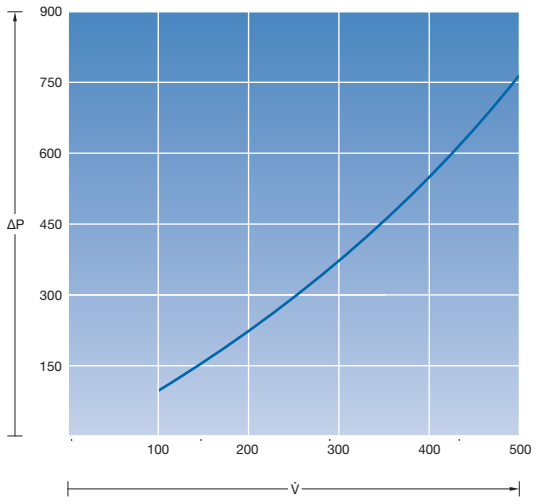
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3363.100, .500



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3363.100, .500

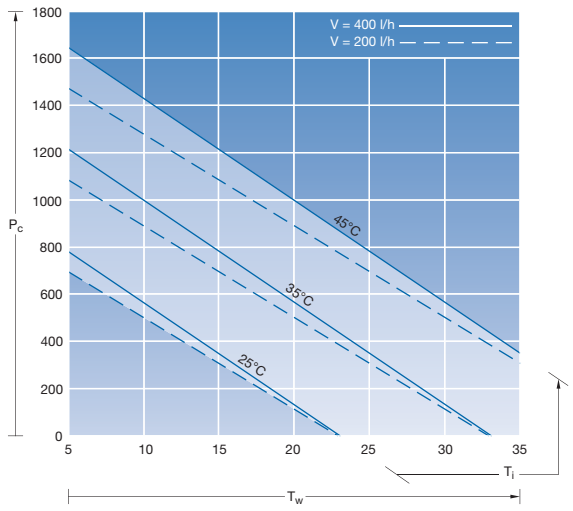


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

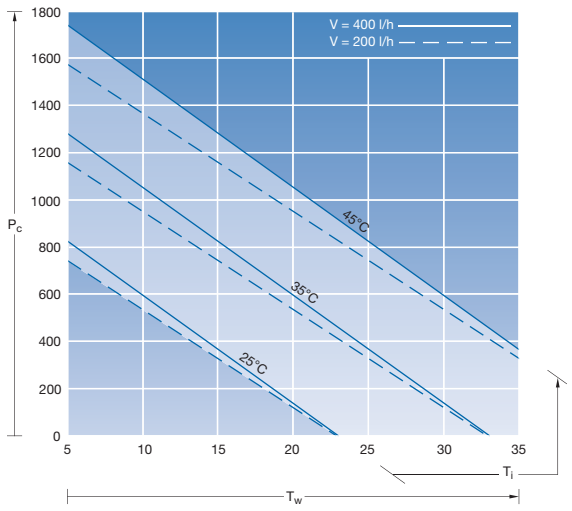
Output class 1000 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz
SK 3364.100, .500



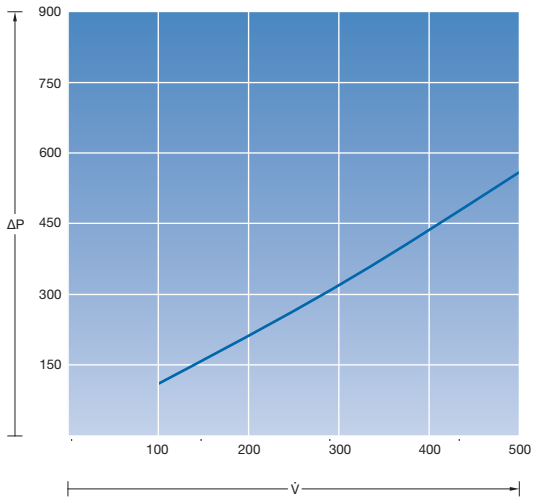
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3364.100, .500



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3364.100, .500

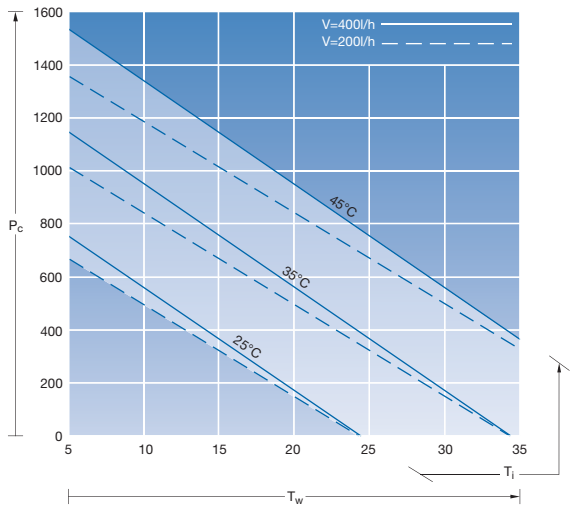


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

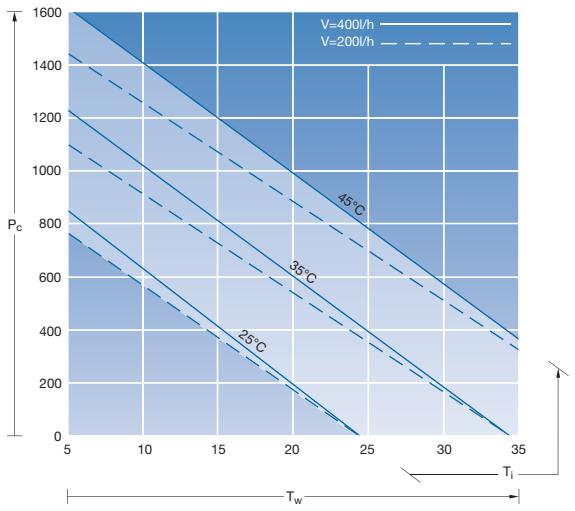
Output class 1000 W
Water-carrying parts: Stainless steel (1.4571)

50 Hz
SK 3364.504



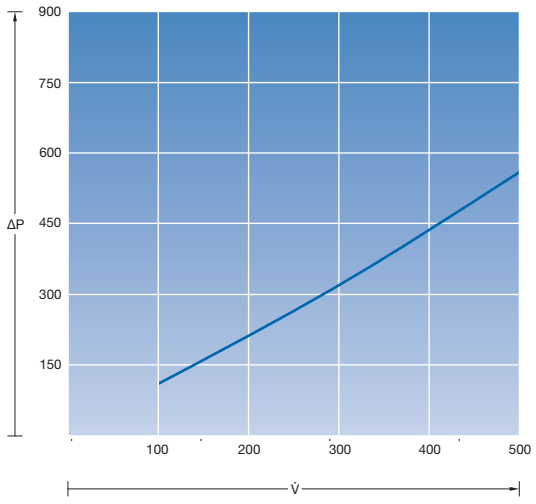
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3364.504



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3364.504

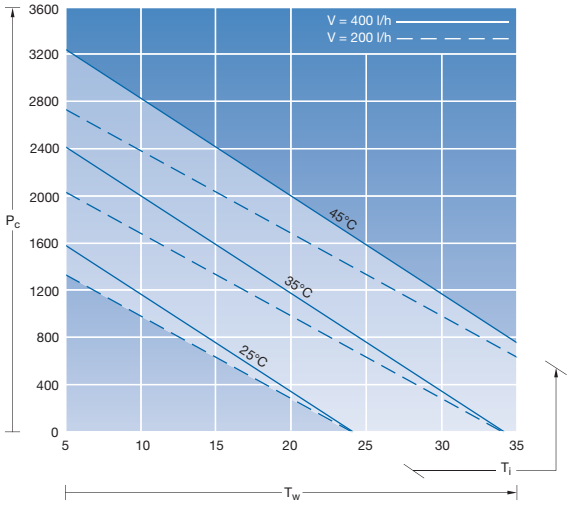


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

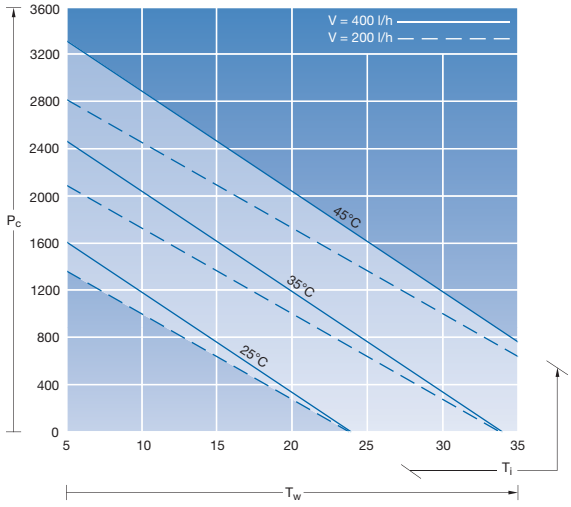
Output class 2000 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz
SK 3373.100, .500



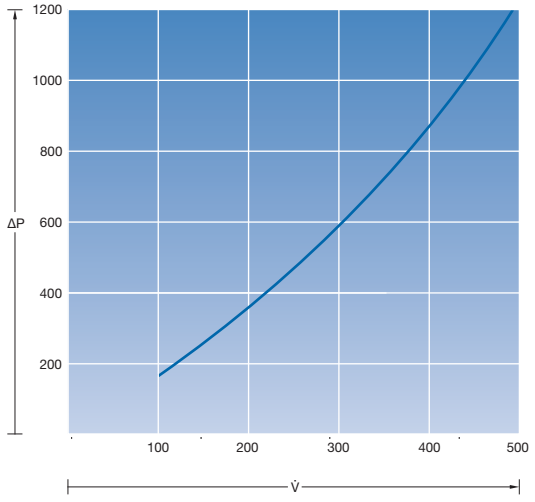
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3373.100, .500



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3373.100, .500

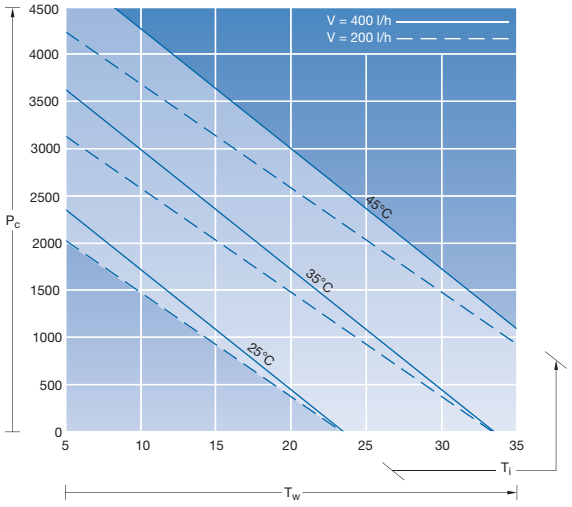


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

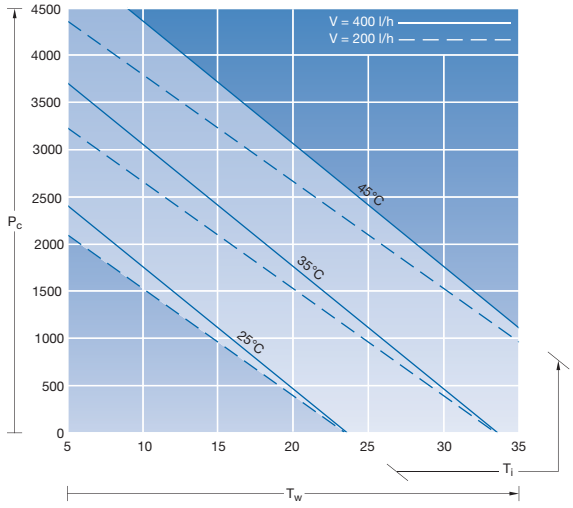
Output class 3000 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz
SK 3374.100, .500



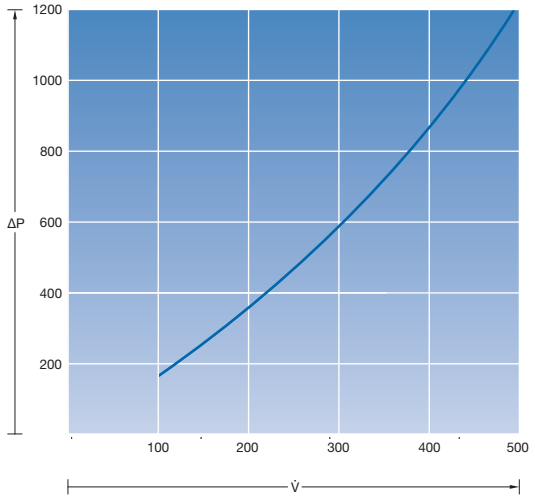
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3374.100, .500



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3374.100, .500

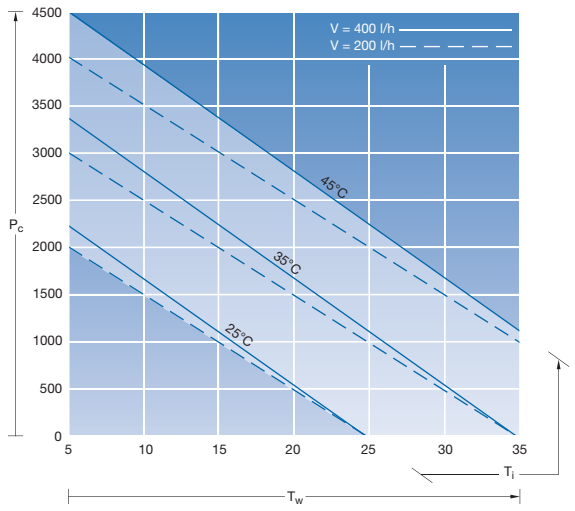


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

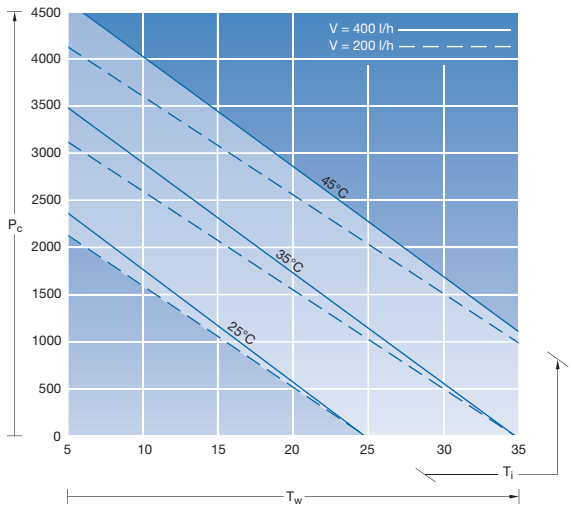
Output class 2500 W
Water-carrying parts: Stainless steel (1.4571)

50 Hz
SK 3374.504



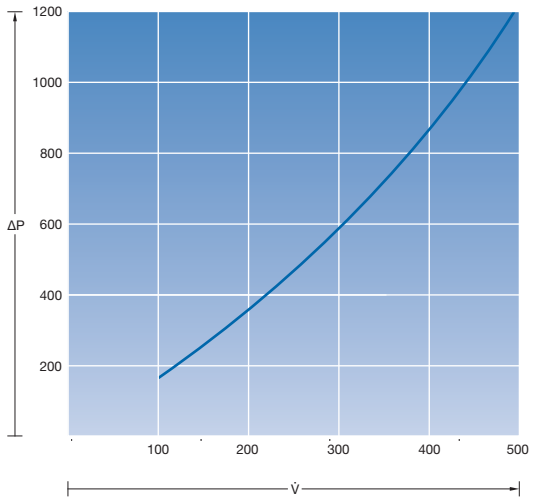
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3374.504



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3374.504

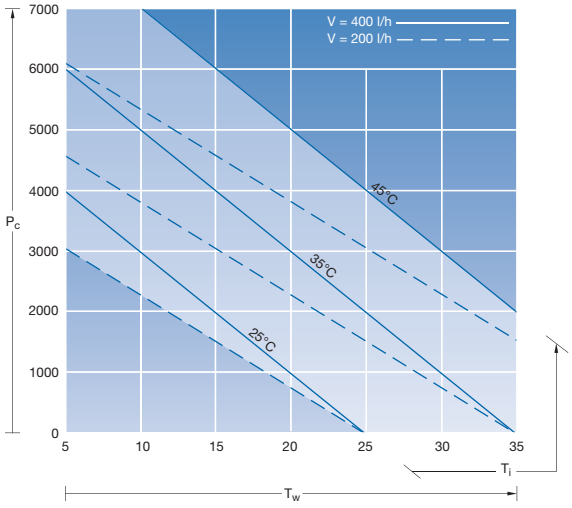


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

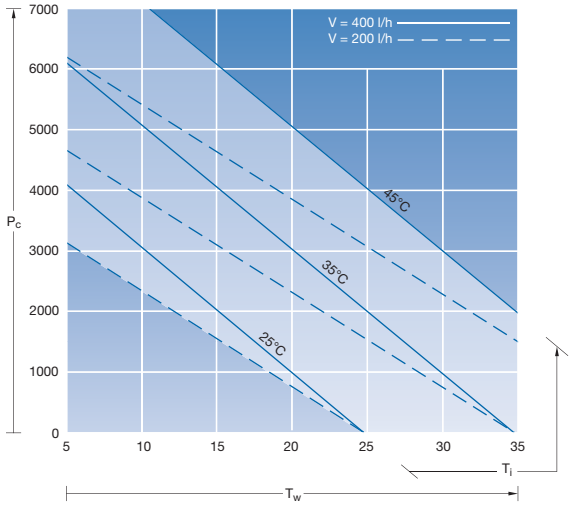
Output class 5000 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz
SK 3375.100, .500



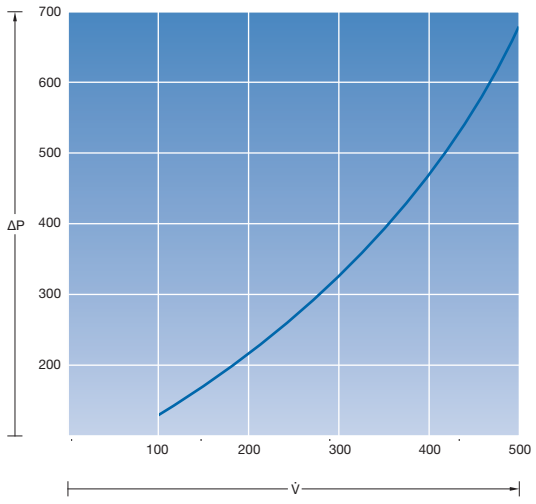
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3375.100, .500



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3375.100, .500

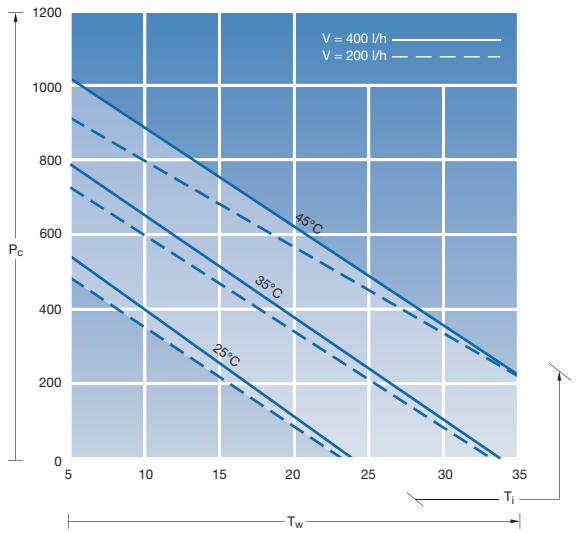


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers HD

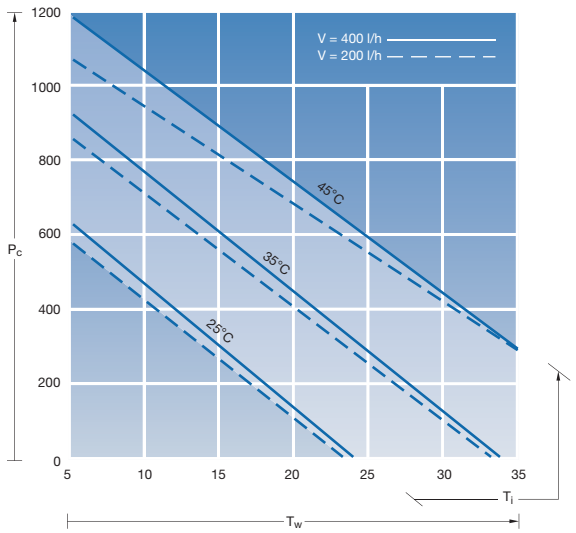
Output class 600/1200 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz
SK 3214.700



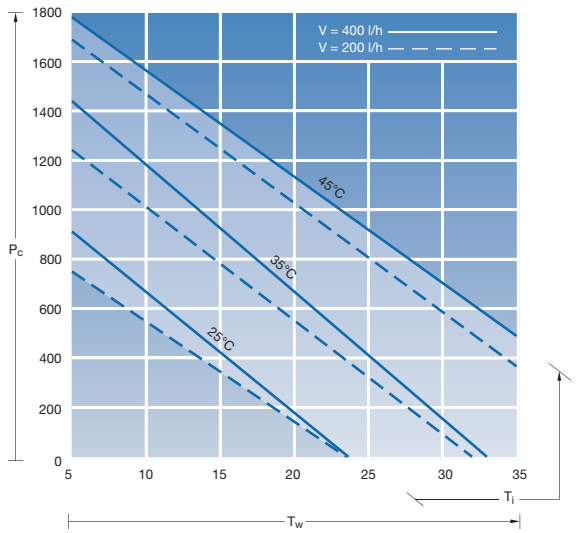
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3274.600



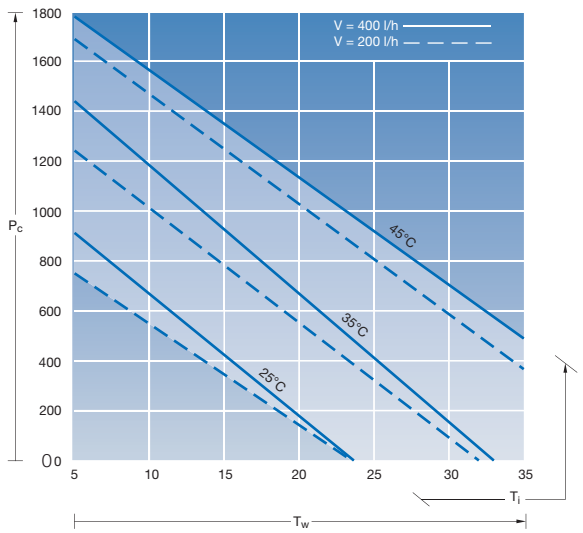
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

50 Hz
SK 3217.500



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3217.600

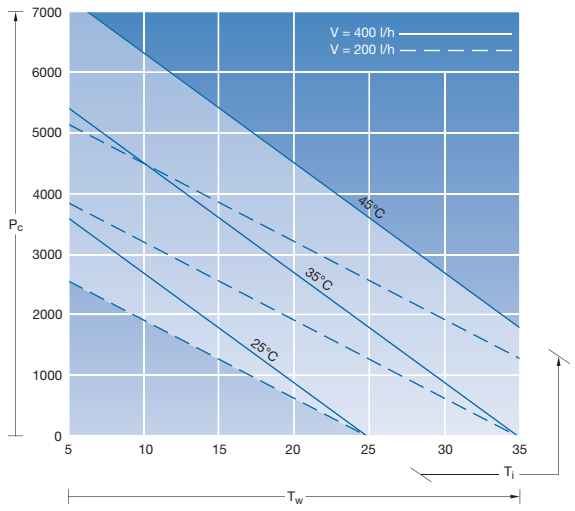


T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Wall-mounted air/water heat exchangers

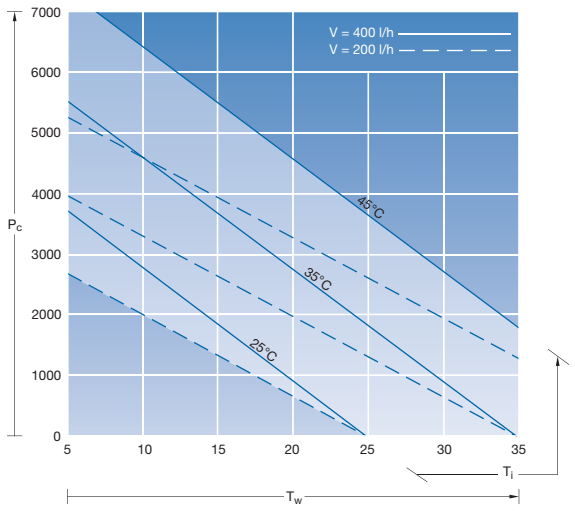
Output class 4000 W
Water-carrying parts: Stainless steel (1.4571)

50 Hz
SK 3375.504



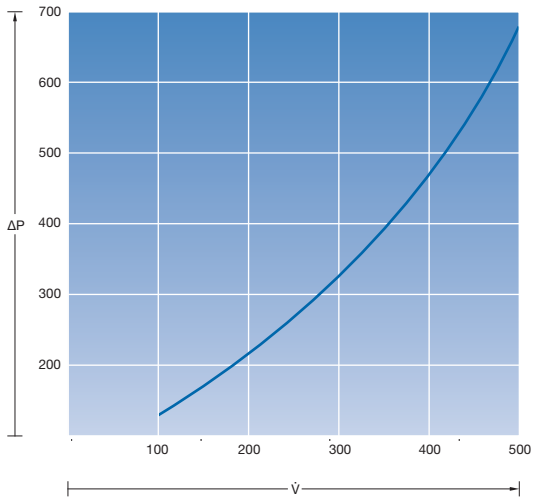
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3375.504



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3375.504

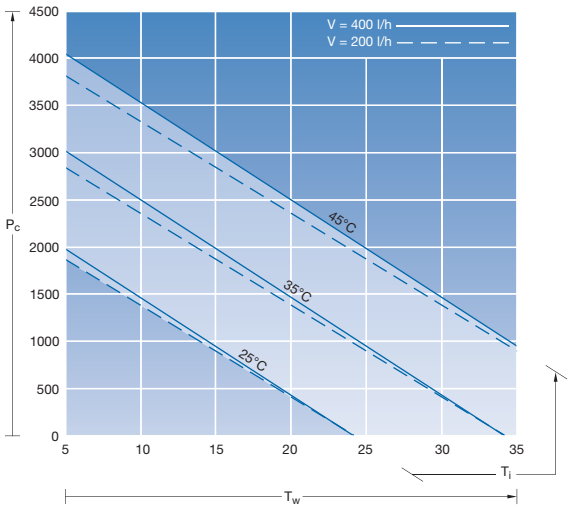


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Roof-mounted air/water heat exchangers

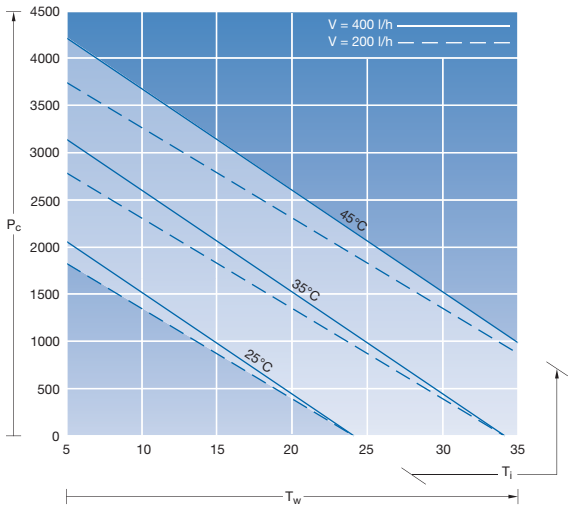
Output class 2500 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz
SK 3209.100, .500



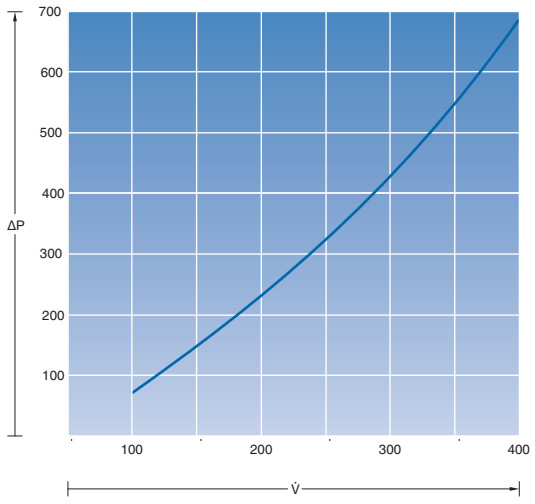
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3209.100, .500



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3209.100, .500

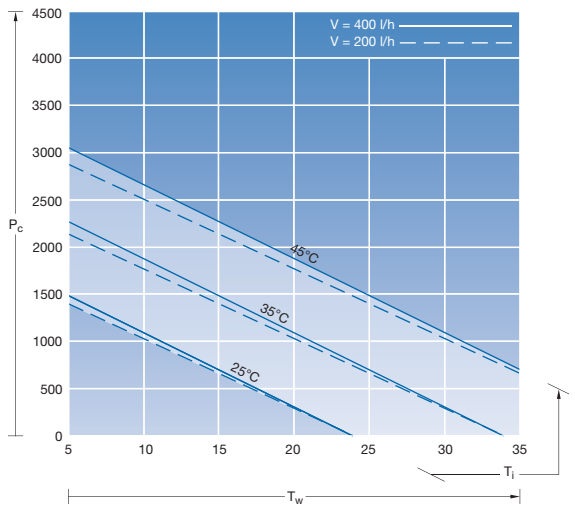


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Roof-mounted air/water heat exchangers

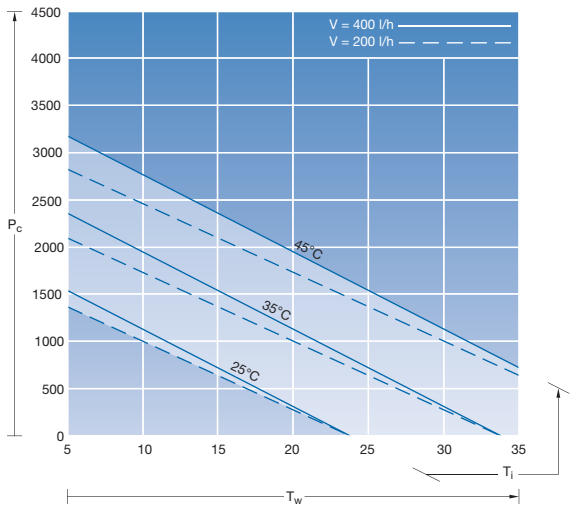
Output class 1875 W
Water-carrying parts: Stainless steel (1.4571)

50 Hz
SK 3209.504



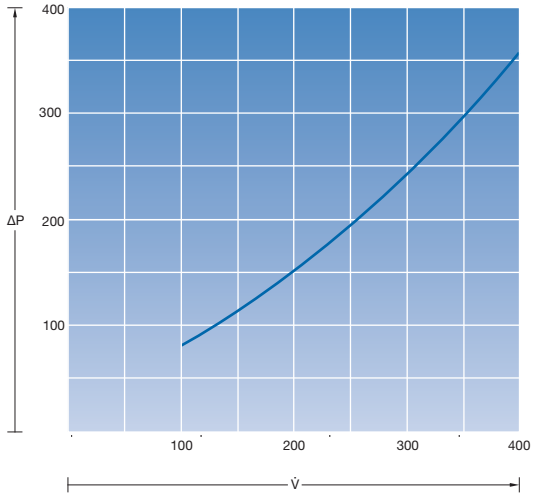
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3209.504



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3209.504

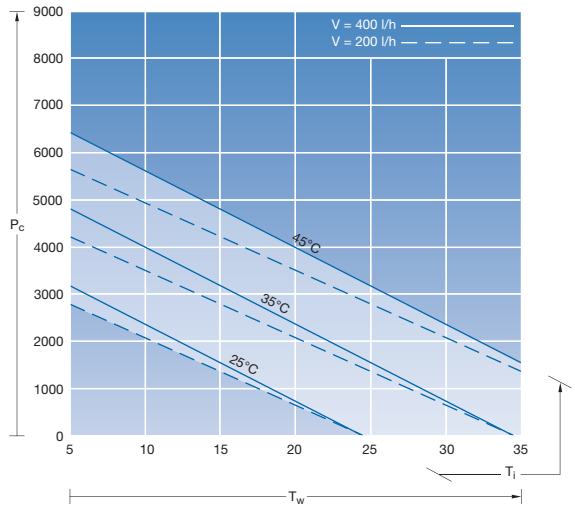


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Roof-mounted air/water heat exchangers

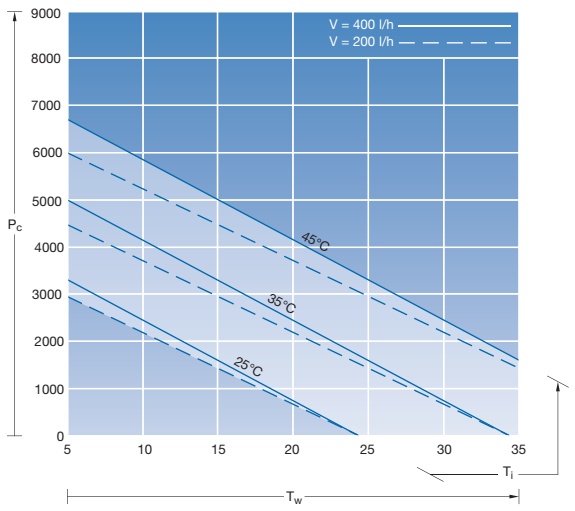
Output class 4000 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz
SK 3210.100, .500



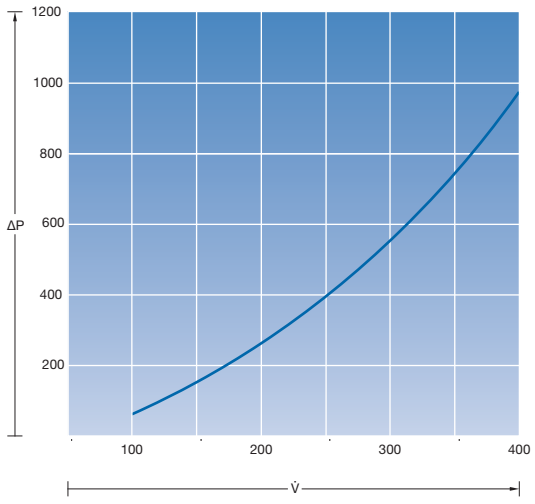
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3210.100, .500



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3210.100, .500

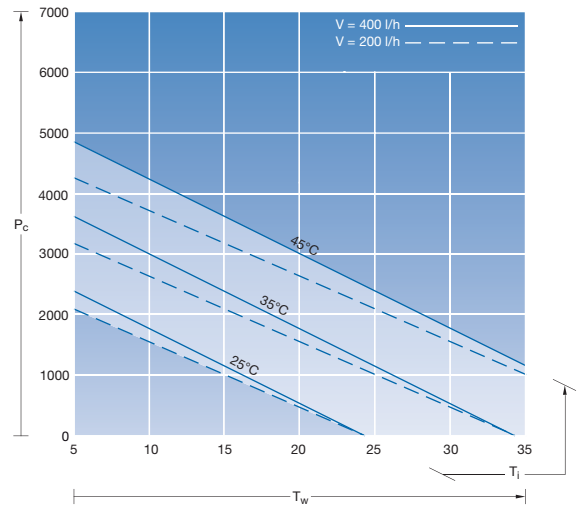


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Roof-mounted air/water heat exchangers

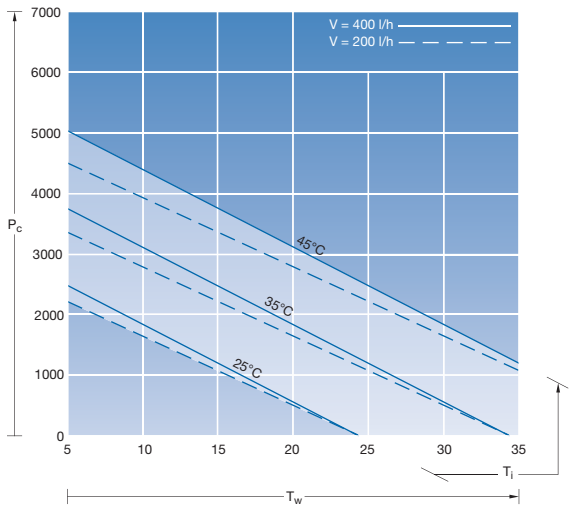
Output class 3000 W
Water-carrying parts: Stainless steel (1.4571)

50 Hz
SK 3210.504



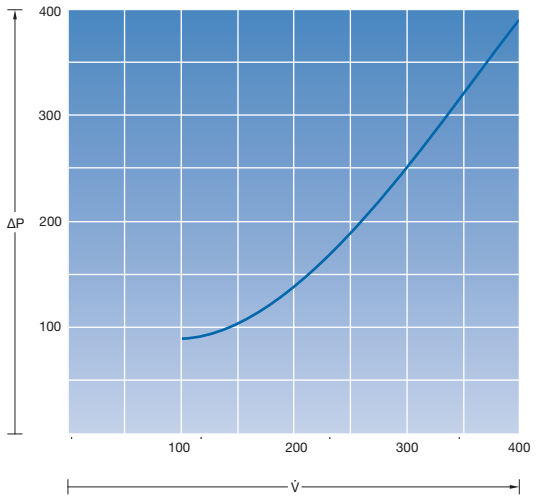
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3210.504



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3210.504

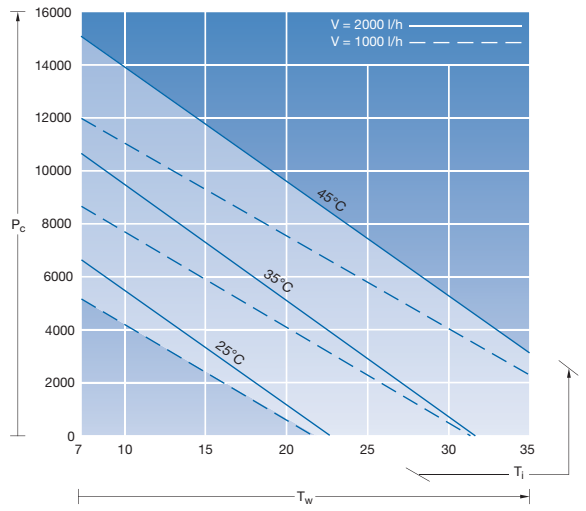


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Liquid Cooling Package

Output class 10 kW, LCP Rack Industry
Water-carrying parts: Copper/brass (Cu/CuZn)

50/60 Hz
SK 3378.200, .280

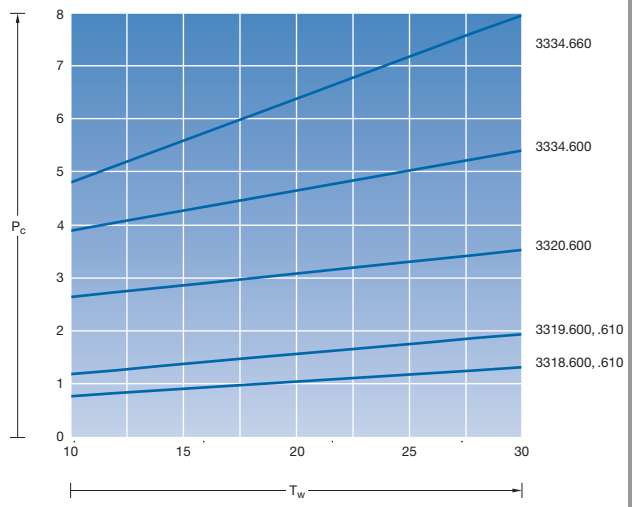


T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm chillers

Output class 1 – 6 kW

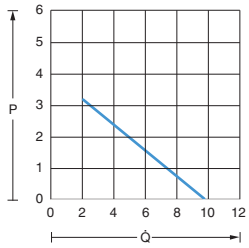
50 Hz at T_u = 32 °C
SK 3318.600, .610, 3319.600, .610, 3320.600, 3334.600, .660



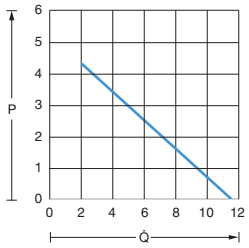
T_w = Water inlet temperature (°C)
T_u = Ambient temperature (°C)
P_c = Total cooling output (kW)

Characteristic curves of pump
SK 3318.600/SK 3318.610/SK 3319.600/SK 3319.610

50 Hz

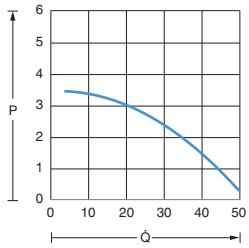


60 Hz

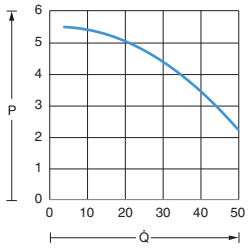


SK 3320.600/SK 3334.600/SK 3334.660

50 Hz



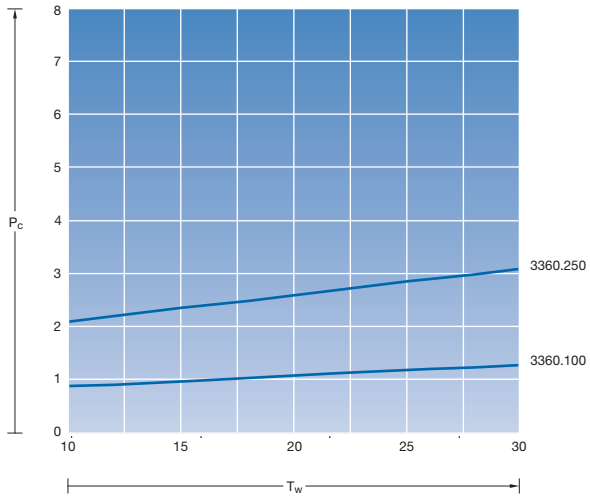
60 Hz



P = External static pressure [bar]
Q̇ = Delivery flow Q [l/min]

Output class 1 – 2.5 kW, wall-mounted

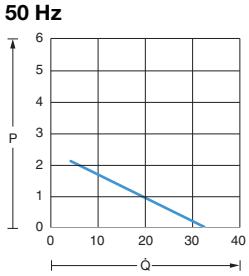
50 Hz at T_u = 32 °C
SK 3360.100, .250



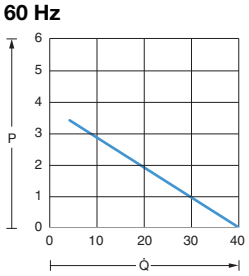
T_w = Water inlet temperature (°C)
T_u = Ambient temperature (°C)
P_c = Total cooling output (kW)

Characteristic curves of pump
SK 3360.100/SK 3360.250

50 Hz



60 Hz

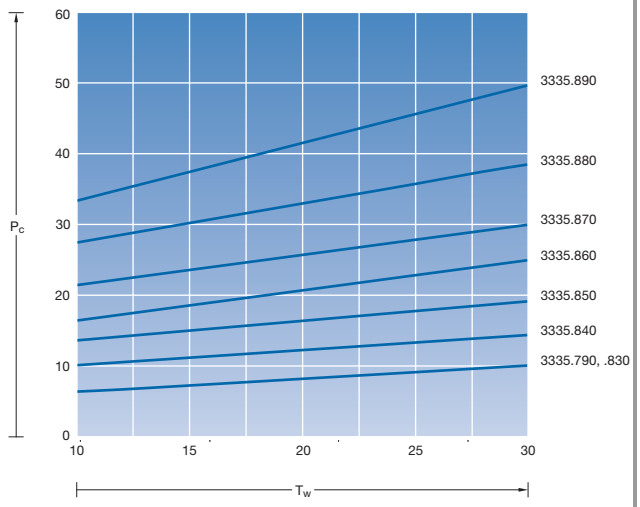


P = External static pressure [bar]
Q̇ = Delivery flow Q [l/min]

TopTherm chillers

Output class 8 – 40 kW

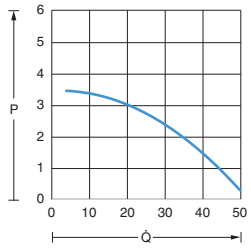
50 Hz at T_u = 32 °C
SK 3335.790, .830, .840, .850, .860, .870, .880, .890



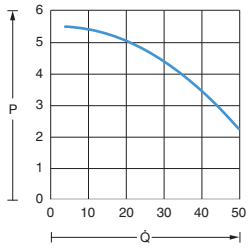
T_w = Water inlet temperature (°C)
T_u = Ambient temperature (°C)
P_c = Total cooling output (kW)

Characteristic curves of pump
SK 3335.790/SK 3335.830

50 Hz

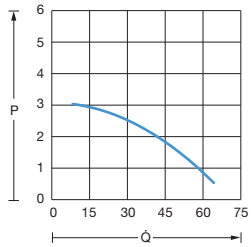


60 Hz

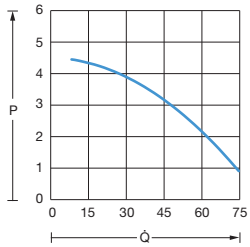


SK 3335.840

50 Hz

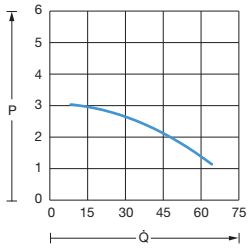


60 Hz

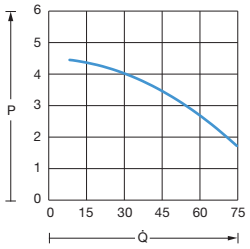


Characteristic curves of pump
SK 3335.850

50 Hz

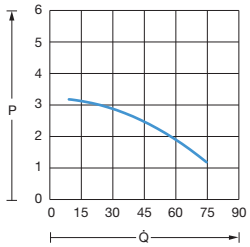


60 Hz

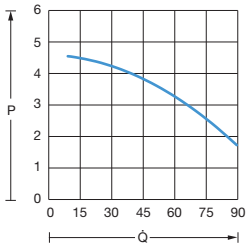


SK 3335.860

50 Hz

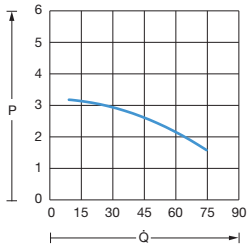


60 Hz

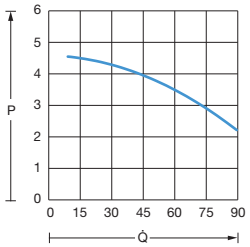


SK 3335.870

50 Hz

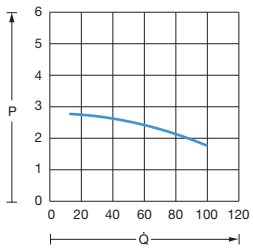


60 Hz

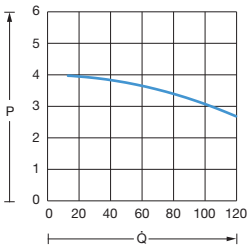


SK 3335.880

50 Hz

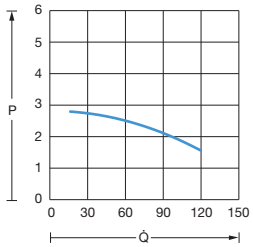


60 Hz

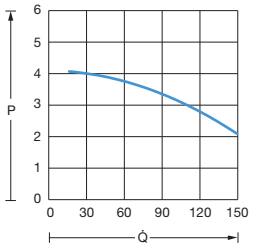


SK 3335.890

50 Hz



60 Hz

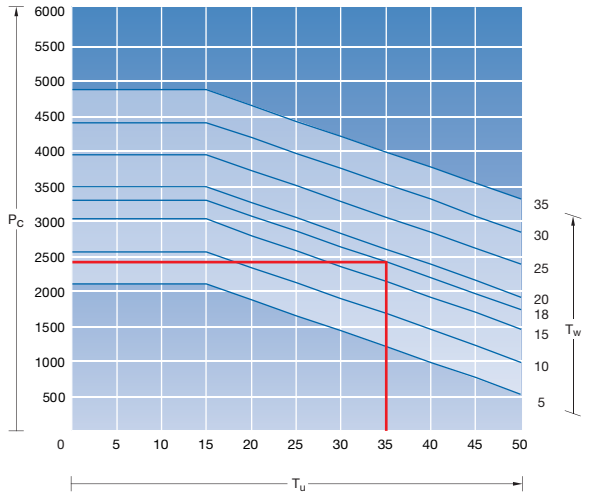


P = External static pressure [bar]
Q̇ = Delivery flow Q [l/min]

Blue e+ chillers

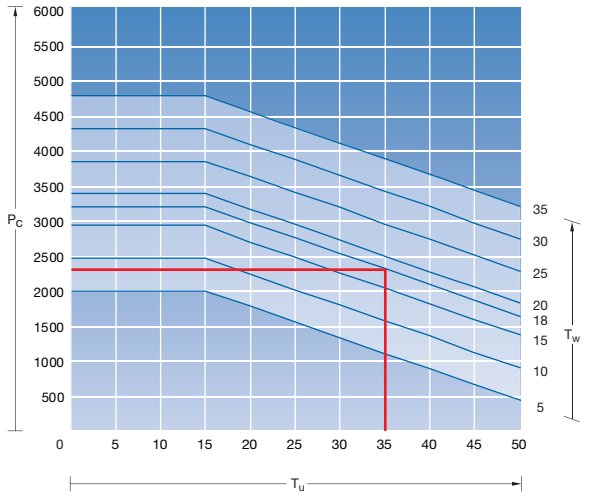
Output class 2.5 kW

50 Hz
SK 3320.200



T_w = Water inlet temperature [°C]
P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

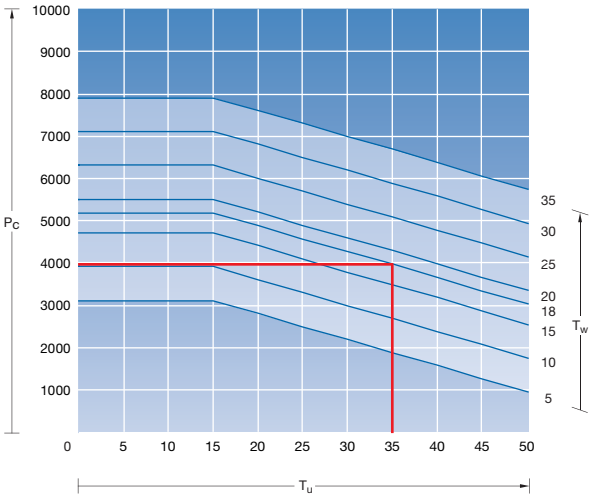
60 Hz
SK 3320.200



T_w = Water inlet temperature [°C]
P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

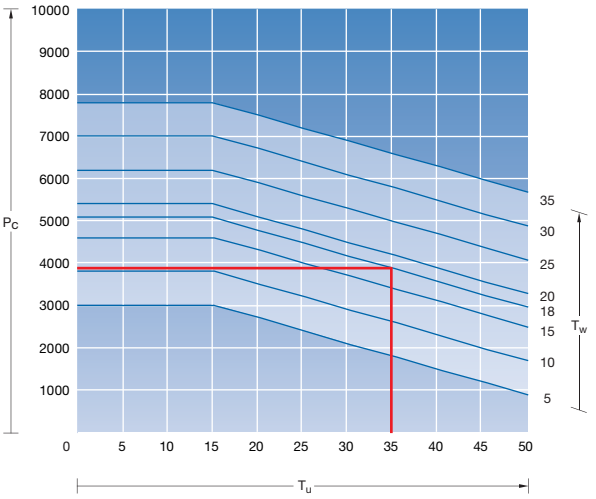
Output class 4.0 kW

50 Hz
SK 3334.300



T_w = Water inlet temperature [°C]
P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

60 Hz
SK 3334.300

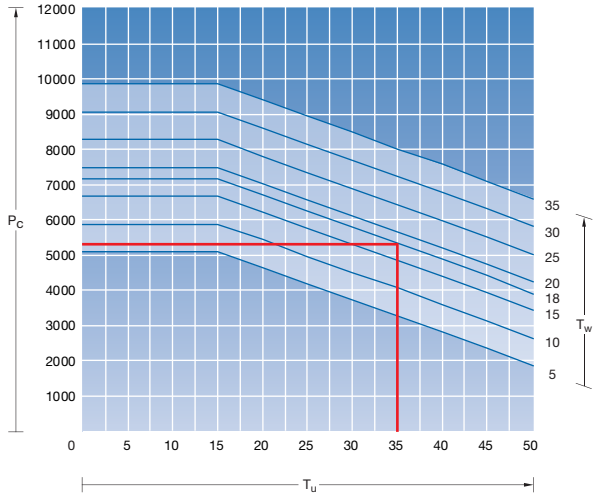


T_w = Water inlet temperature [°C]
P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

Blue e+ chillers

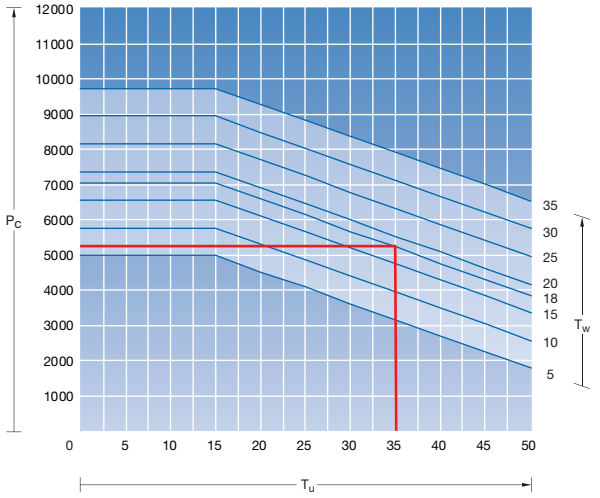
Output class 5.5 kW

50 Hz
SK 3334.400



T_w = Water inlet temperature [°C]
P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

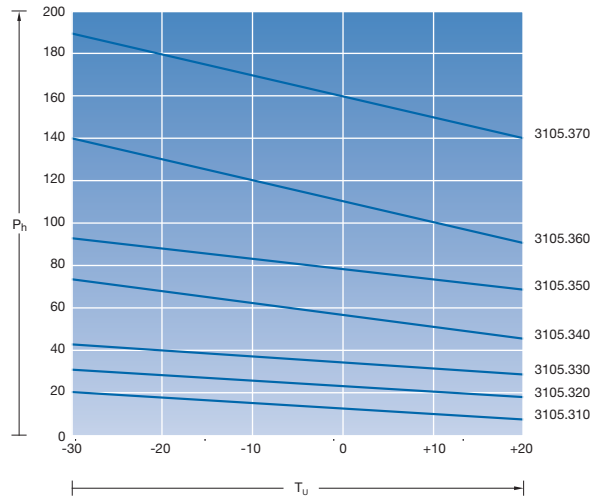
60 Hz
SK 3334.400



T_w = Water inlet temperature [°C]
P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

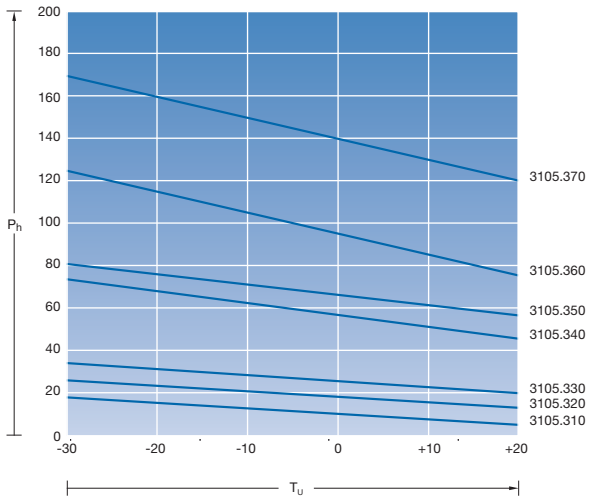
Enclosure heaters without fan

Heating output 230 V



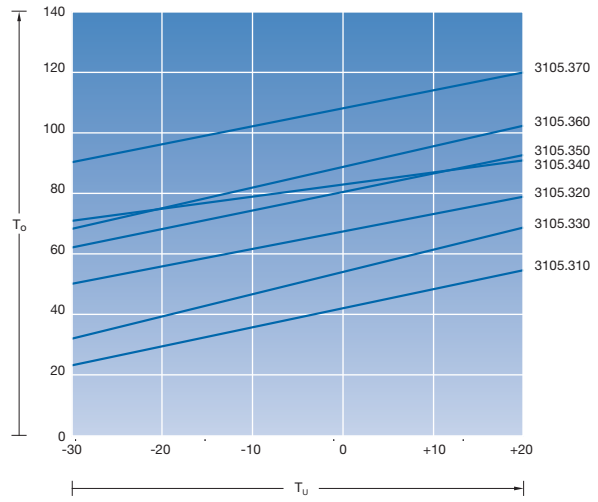
T_u = Ambient temperature (°C)
P_h = Heating output (W)

Heating output 110 V



T_u = Ambient temperature (°C)
P_h = Heating output (W)

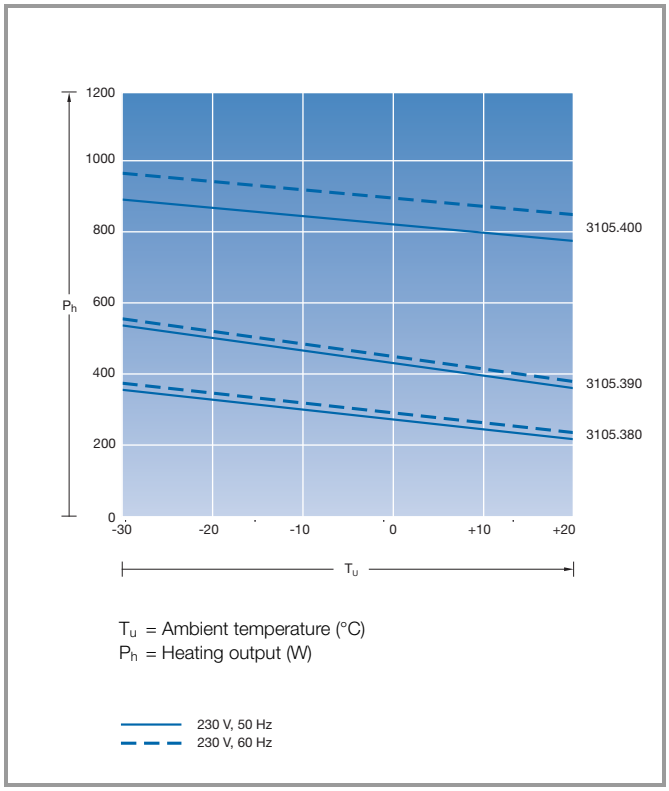
Maximum surface temperature



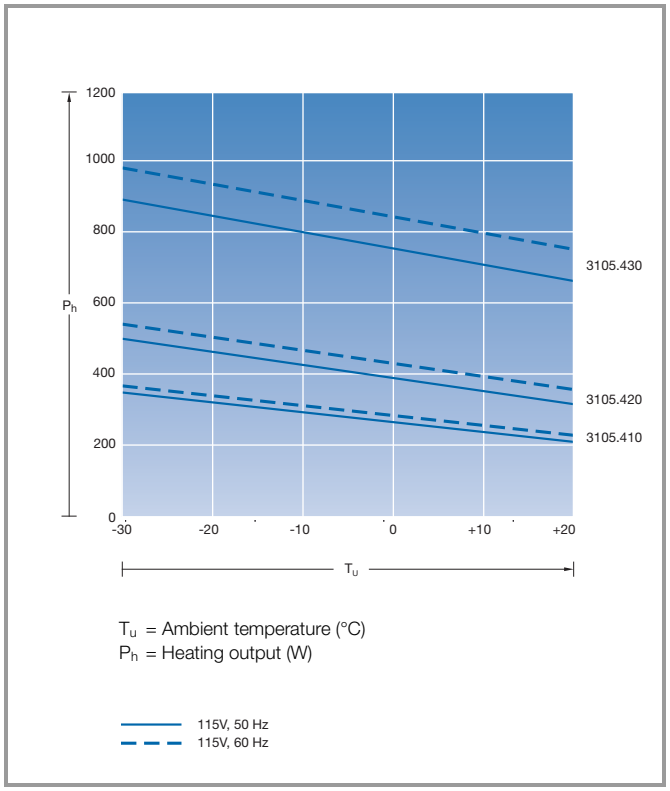
T_u = Ambient temperature (°C)
T_o = Surface temperature (°C)

Enclosure heaters with fan

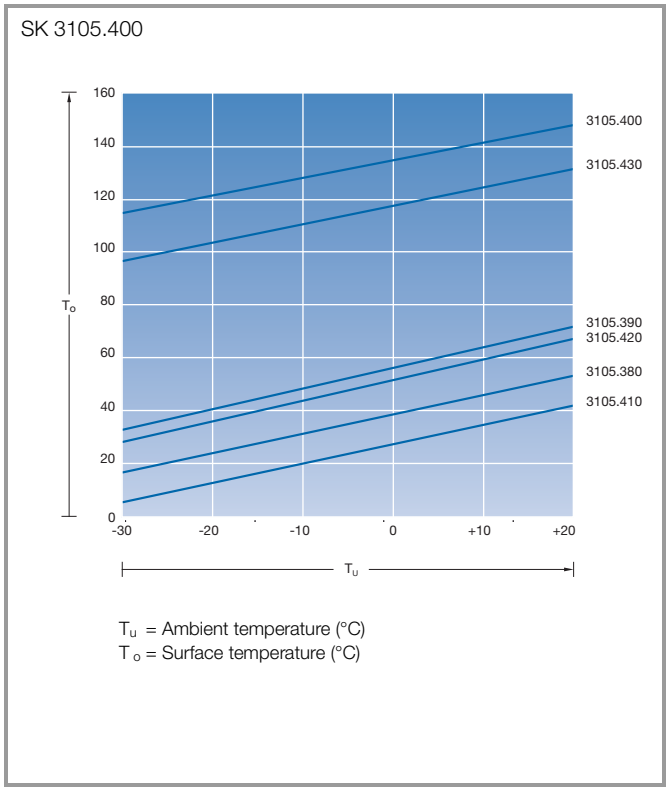
Heating output 230 V, 50/60 Hz



Heating output 115 V, 50/60 Hz



Maximum surface temperature



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Performance diagrams – Climate control



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Performance diagrams

Cooling with ambient air

TopTherm fan-and-filter units and EMC TopTherm fan-and-filter units
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TopTherm fan-and-filter units, with EC technology
Air throughput 55 – 900 m^3/h ..... 8 – 9
Roof-mounted fans
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Rack-mounted fans for 482.6 mm (19˝)
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Selection diagram for air/air heat exchangers 13

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VX25 Blue e+ integration solution
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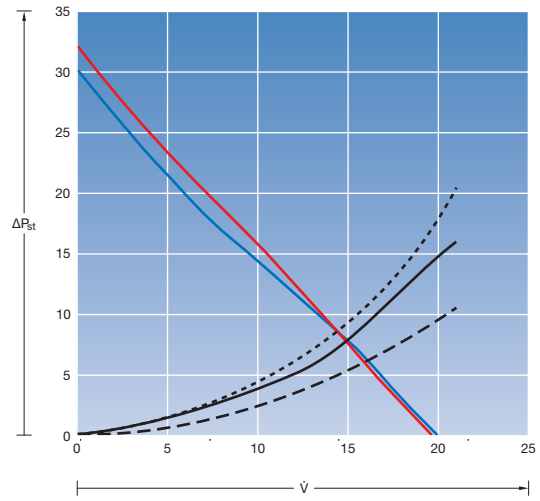
Enclosure heaters

Enclosure heaters without fan
Heating output 8 – 150 W 52
Enclosure heaters with fan
Heating output 250 – 800 W 53

TopTherm fan-and-filter units and EMC TopTherm fan-and-filter units

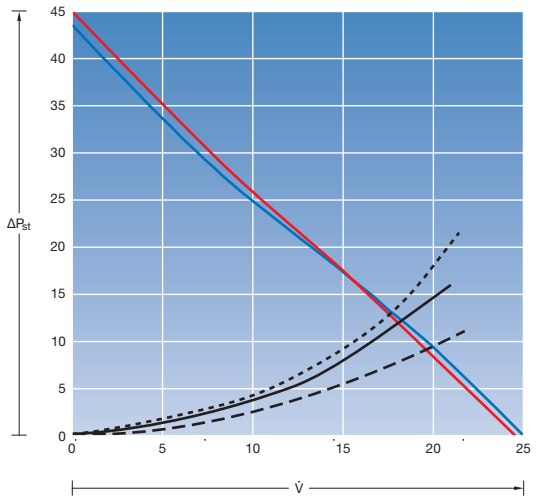
Air throughput 20/25 m³/h

50 Hz
SK 3237.100, .110, .124, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter

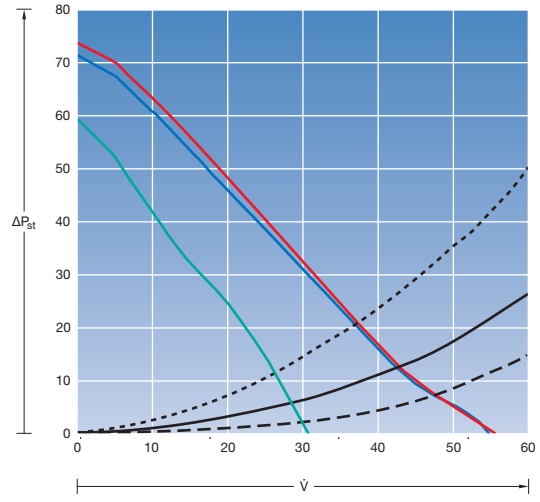
60 Hz
SK 3237.100, .110, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter

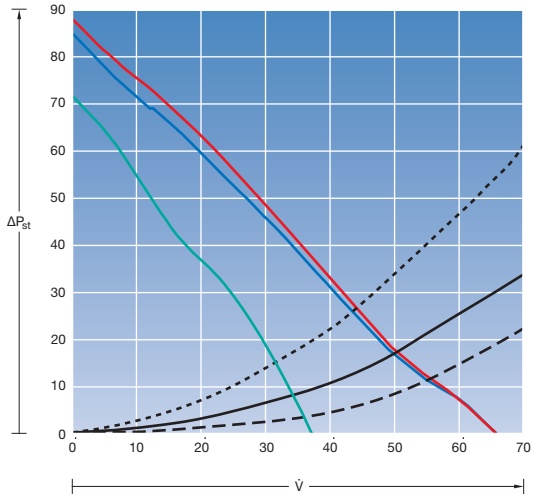
Air throughput 55/66 m³/h

50 Hz
SK 3238.100, .110, .124, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter

60 Hz
SK 3238.100, .110, .600

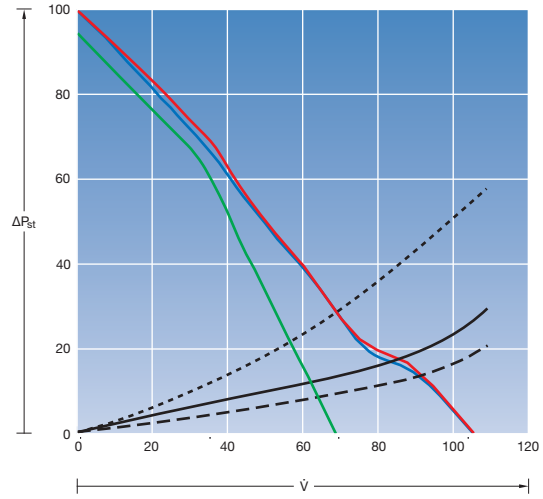


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter

TopTherm fan-and-filter units and EMC TopTherm fan-and-filter units

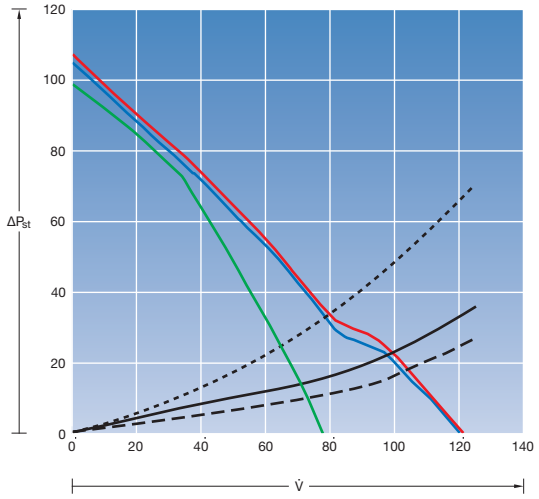
Air throughput 105/120 m³/h

50 Hz
SK 3239.100, .110, .124, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter

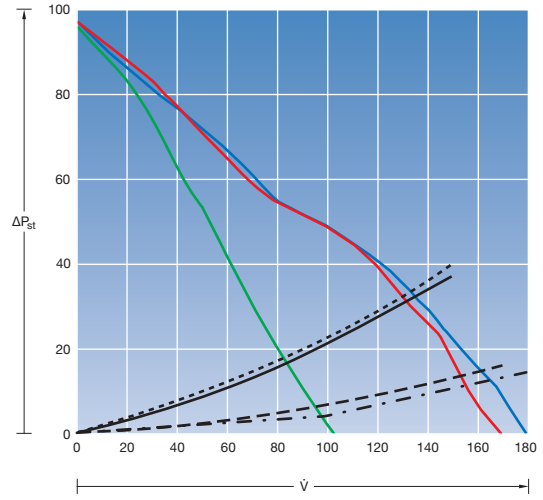
60 Hz
SK 3239.100, .110, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter

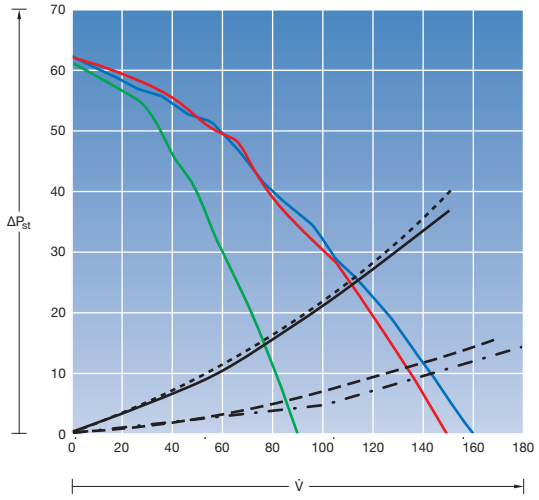
Air throughput 180/160 m³/h

50 Hz
SK 3240.100, .110, .124, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

60 Hz
SK 3240.100, .110, .600

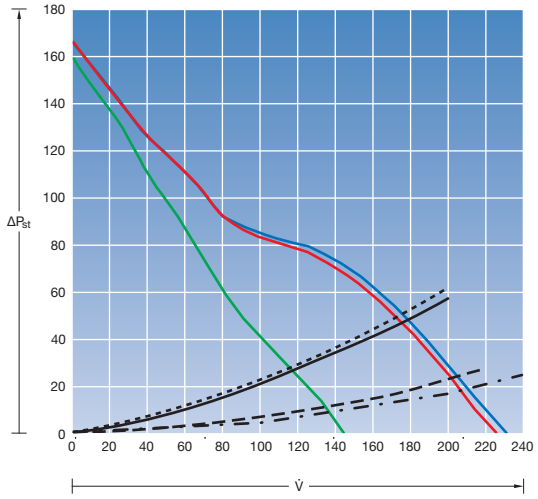


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

TopTherm fan-and-filter units and EMC TopTherm fan-and-filter units

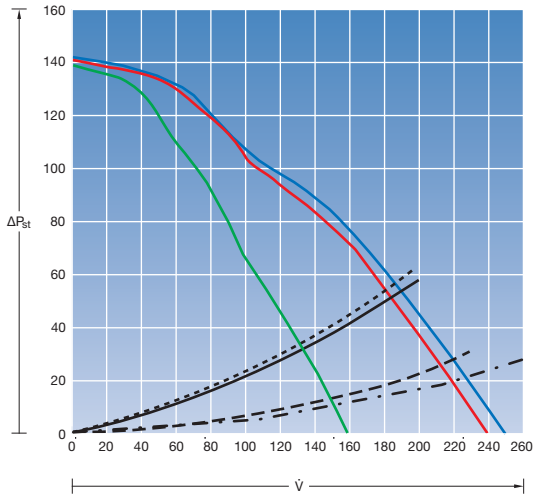
Air throughput 230/250 m³/h

50 Hz
SK 3241.100, .110, .124, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

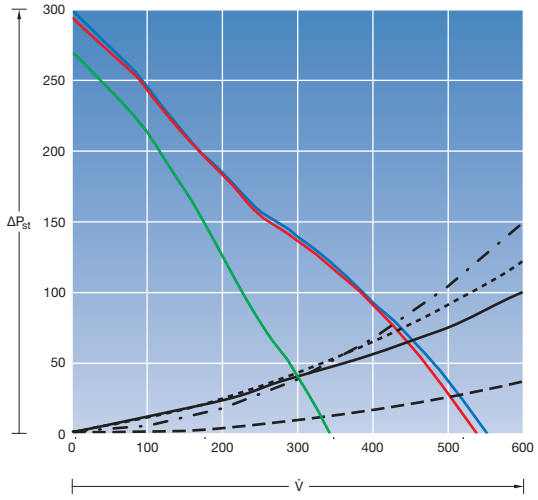
60 Hz
SK 3241.100, .110, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

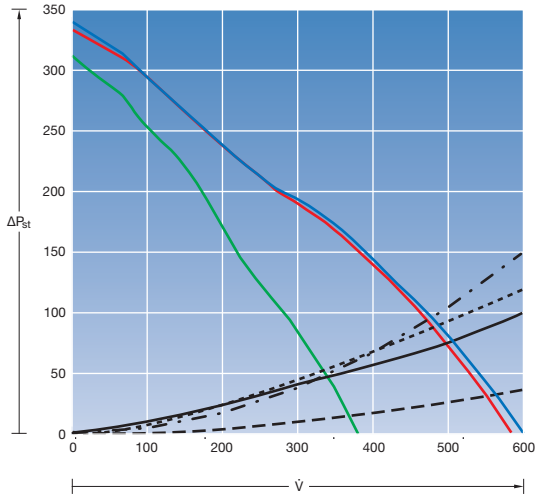
Air throughput 550/600 m³/h

50 Hz
SK 3243.100, .110, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

60 Hz
SK 3243.100, .110, .600

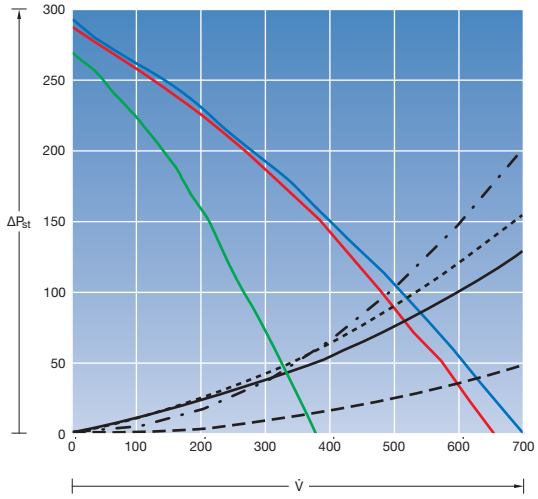


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

TopTherm fan-and-filter units and EMC TopTherm fan-and-filter units

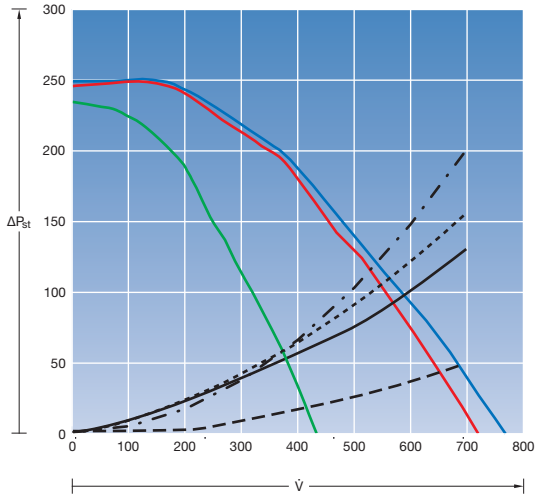
Air throughput 700/770 m³/h

50 Hz
SK 3244.100, .110, .140, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

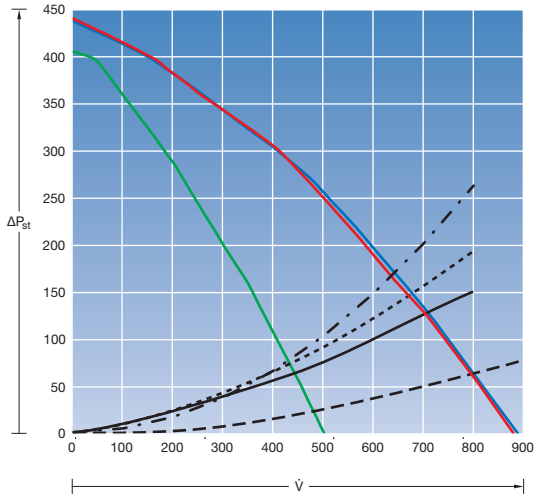
60 Hz
SK 3244.100, .110, .140, .600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

Air throughput 900 m³/h

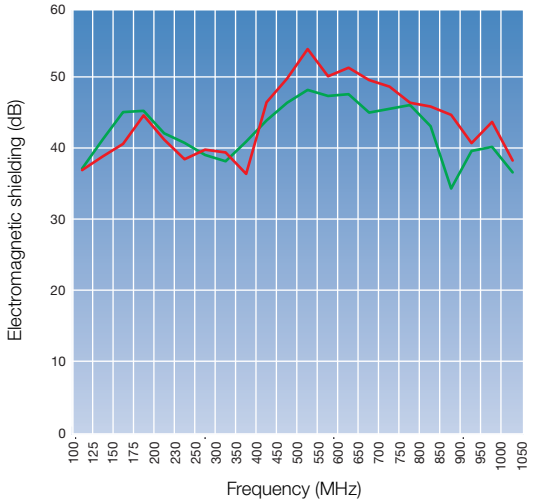
50/60 Hz
SK 3245.600



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

Shielding/attenuation diagram
Testing to EN 61587-3: 2006 – Electromagnetic shielding performance tests for cabinets, racks and sub-racks

TopTherm EMC fan-and-filter units/outlet filters
SK 3237.XXX – SK 3245.XXX

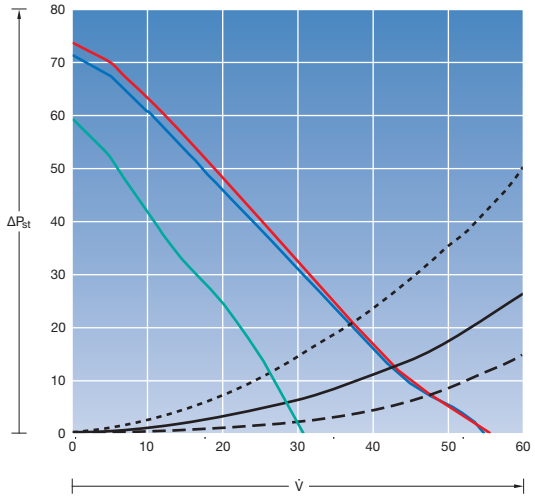


= vertical attenuation
= horizontal attenuation

TopTherm fan-and-filter units with EC technology

Air throughput 55 m³/h

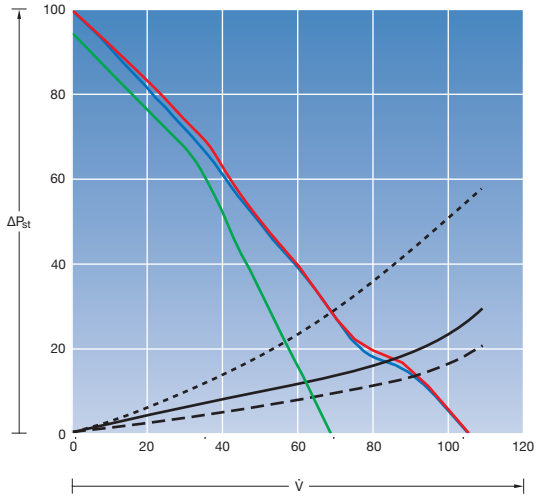
50/60 Hz
SK 3238.500



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter

Air throughput 105 m³/h

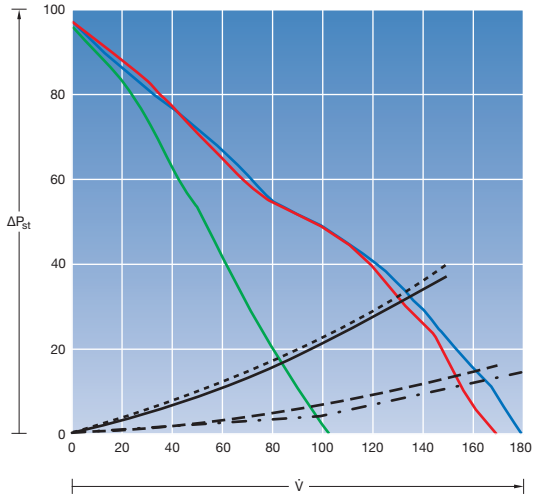
50/60 Hz
SK 3239.500



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter

Air throughput 180 m³/h

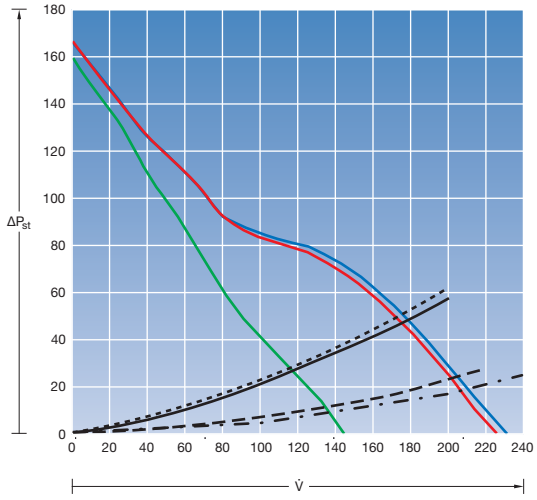
50/60 Hz
SK 3240.500



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

Air throughput 230 m³/h

50/60 Hz
SK 3241.500

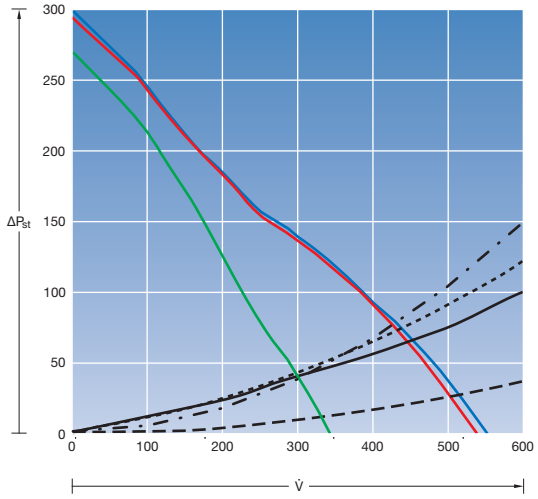


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

TopTherm fan-and-filter units with EC technology

Air throughput 550 m³/h

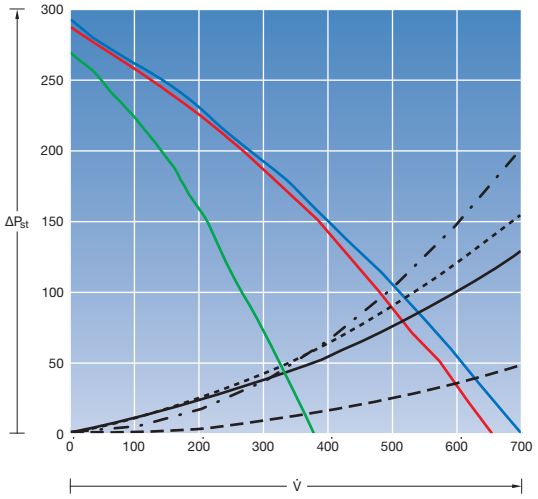
50/60 Hz
SK 3243.500



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

Air throughput 700 m³/h

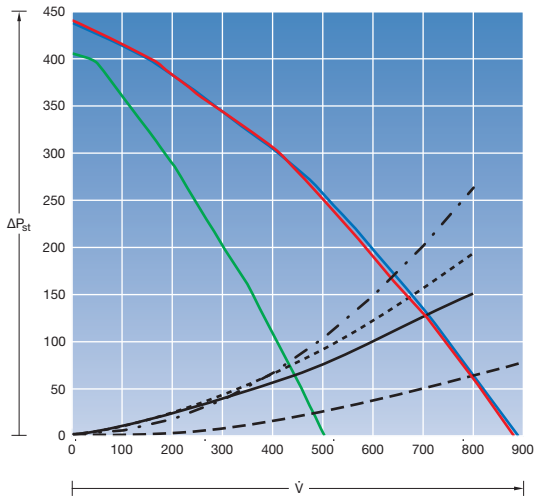
50/60 Hz
SK 3244.500



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

Air throughput 900 m³/h

50/60 Hz
SK 3245.500, .510



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= with standard filter
= with hose-proof hood
= with standard and fine filter
= 1 x outlet filter with hose-proof hood
= 1 x outlet filter
= 2 x outlet filter
= 1 x roof vent 3138.000 with filter

Roof-mounted fans

Using the base/plinth:

If the vented base/plinth is used as an air inlet instead of the outlet filter 3243.200, the resistance curves as indicated in the performance diagrams will apply as follows:

----- 1 x vented base/plinth with filter

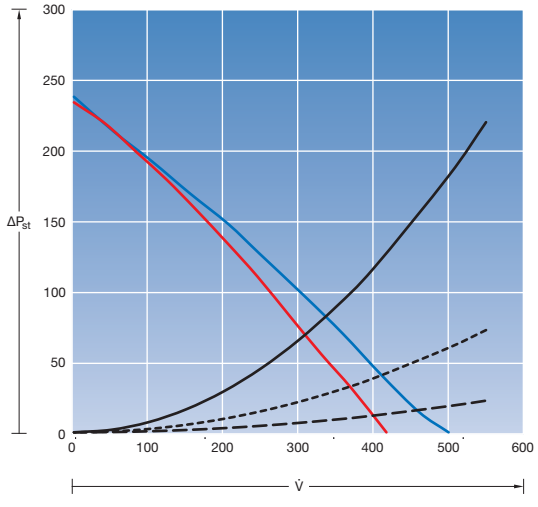
– – – 2 x vented base/plinth with filter

– – – 1 x vented base/plinth without filter

Roof-mounted fans

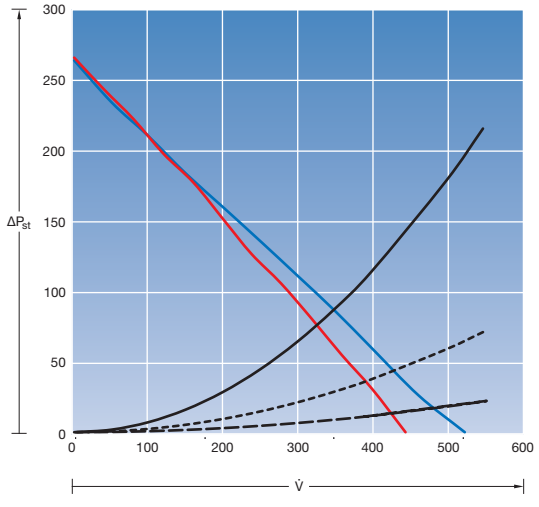
Air throughput 500/525 m³/h

50 Hz
SK 3139.100/.110



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= without filter mat (IP 22)
= with filter mat (IP 55)
= 1 x outlet filter 3243.200 with standard and fine filter (IP 55)
----- = 1 x outlet filter 3243.200 with standard filter (IP 54) or 2 x outlet filter 3243.200 with standard and fine filter (IP 55)
– – – = 2 x outlet filter 3243.200 with standard filter (IP 54)

60 Hz
SK 3139.100/.110

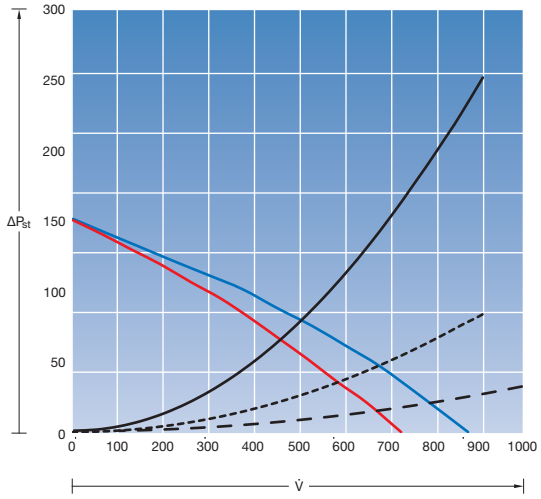


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= without filter mat (IP 22)
= with filter mat (IP 55)
= 1 x outlet filter 3243.200 with standard and fine filter (IP 55)
----- = 1 x outlet filter 3243.200 with standard filter (IP 54) or 2 x outlet filter 3243.200 with standard and fine filter (IP 55)
– – – = 2 x outlet filter 3243.200 with standard filter (IP 54)

Roof-mounted fans

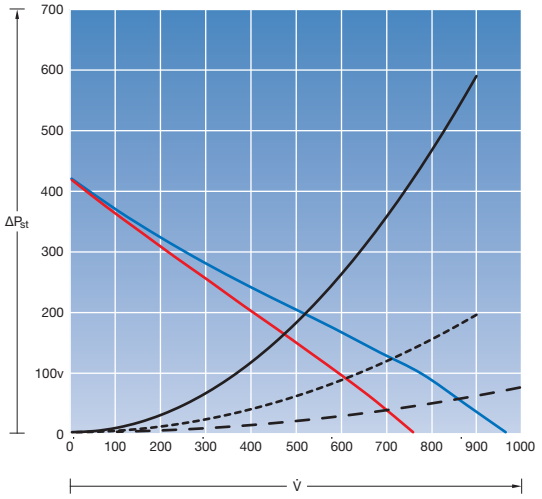
Air throughput 873/965 m³/h

50 Hz
SK 3140.100/.110



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
— = without filter mat (IP 22)
— = with filter mat (IP 55)
— = 1 x outlet filter 3243.200 with standard and fine filter (IP 55)
- - - = 1 x outlet filter 3243.200 with standard filter (IP 54) or 2 x outlet filter 3243.200 with standard and fine filter (IP 55)
- - - = 2 x outlet filter 3243.200 with standard filter (IP 54)

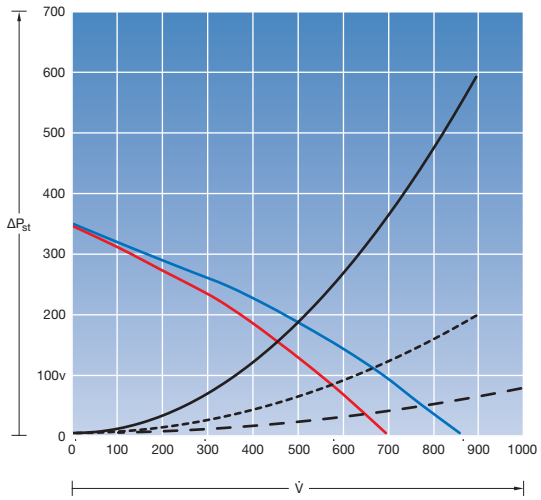
60 Hz
SK 3140.100/.110



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
— = without filter mat (IP 22)
— = with filter mat (IP 55)
— = 1 x outlet filter 3243.200 with standard and fine filter (IP 55)
- - - = 1 x outlet filter 3243.200 with standard filter (IP 54) or 2 x outlet filter 3243.200 with standard and fine filter (IP 55)
- - - = 2 x outlet filter 3243.200 with standard filter (IP 54)

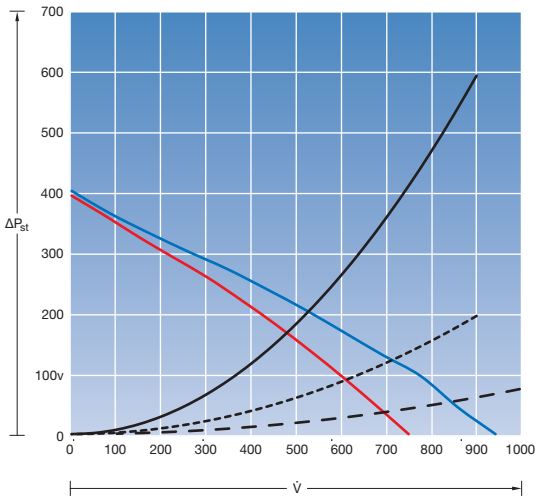
Air throughput 863/942 m³/h

400 V, 50 Hz
SK 3140.140



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
— = without filter mat (IP 22)
— = with filter mat (IP 55)
— = 1 x outlet filter 3243.200 with standard and fine filter (IP 55)
- - - = 1 x outlet filter 3243.200 with standard filter (IP 54) or 2 x outlet filter 3243.200 with standard and fine filter (IP 55)
- - - = 2 x outlet filter 3243.200 with standard filter (IP 54)

400 V, 60 Hz
SK 3140.140

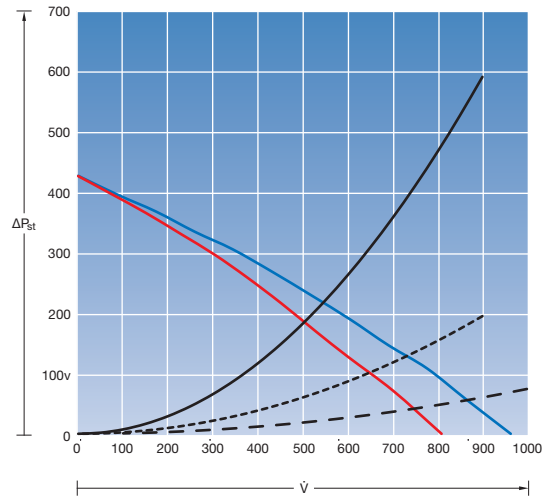


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
— = without filter mat (IP 22)
— = with filter mat (IP 55)
— = 1 x outlet filter 3243.200 with standard and fine filter (IP 55)
- - - = 1 x outlet filter 3243.200 with standard filter (IP 54) or 2 x outlet filter 3243.200 with standard and fine filter (IP 55)
- - - = 2 x outlet filter 3243.200 with standard filter (IP 54)

Roof-mounted fans

Air throughput 963 m³/h

460 V, 60 Hz
SK 3140.140

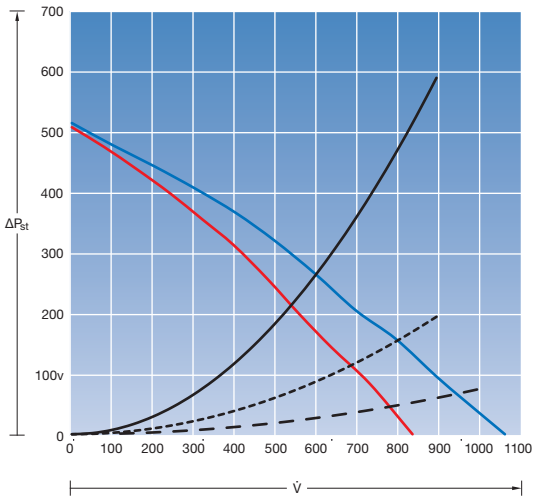


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= without filter mat (IP 22)
= with filter mat (IP 55)
= 1 x outlet filter 3243.200 with standard and fine filter (IP 55)
= 1 x outlet filter 3243.200 with standard filter (IP 54) or 2 x outlet filter 3243.200 with standard and fine filter (IP 55)
= 2 x outlet filter 3243.200 with standard filter (IP 54)

Roof-mounted fans with EC technology

Air throughput 1069 m³/h

50/60 Hz
SK 3140.500/.510

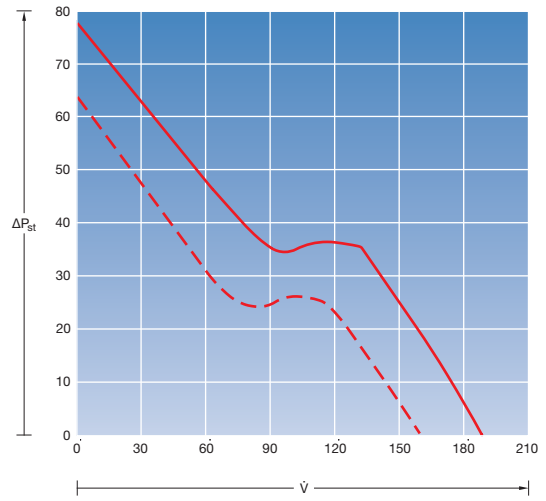


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= without filter mat (IP 22)
= with filter mat (IP 55)
= 1 x outlet filter 3243.200 with standard and fine filter (IP 55)
= 1 x outlet filter 3243.200 with standard filter (IP 54) or 2 x outlet filter 3243.200 with standard and fine filter (IP 55)
= 2 x outlet filter 3243.200 with standard filter (IP 54)

Rack-mounted fans for 482.6 mm (19˝)

Air throughput 320/480 m³/h

50/60 Hz
SK 3340.230, 3341.024, .115, .230, 3342.024, .230, .500, 3350.115, .230, 3351.230, 3352.230, .500

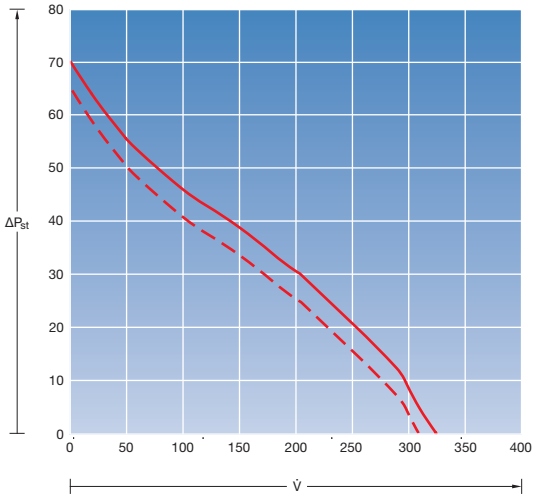


V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= 50 Hz
= 60 Hz

Tangential fans for 482.6 mm (19˝)

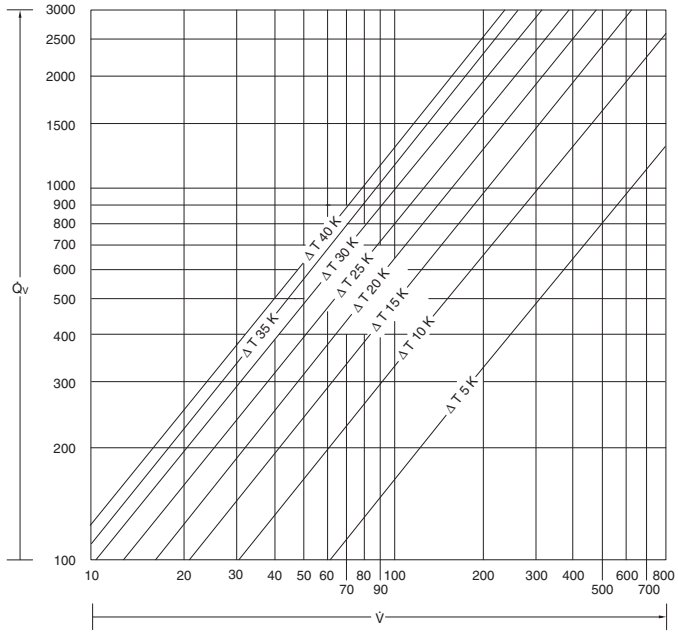
Air throughput 320 m³/h

50/60 Hz
SK 3144.000, 3145.000



V̇ = Volumetric flow (m³/h)
ΔPst = Stat. pressure difference (Pa)
= 50 Hz
= 60 Hz

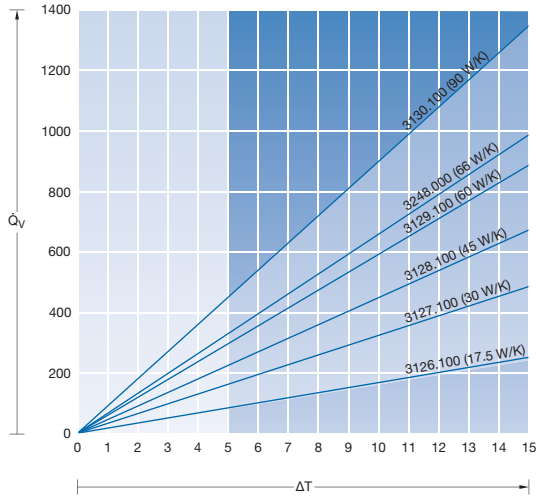
Selection diagram
for fans



$\dot{V}$ = Volumetric flow (m^3/h)
$\dot{Q}_V$ = Heat loss (W)

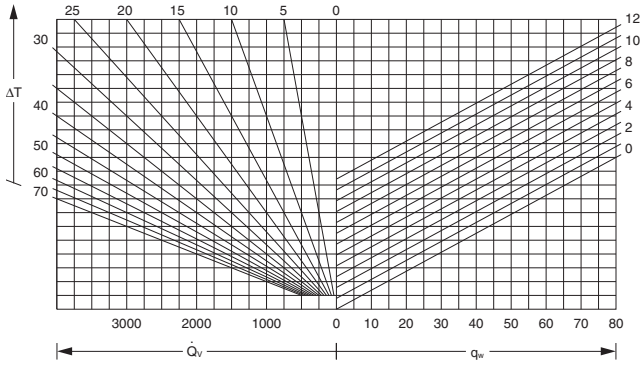
TopTherm air/air heat exchangers
Specific thermal output 17.5 – 90 W/K, wall-mounted with controller

50/60 Hz
SK 3126.100, 3127.100, 3128.100, 3129.100, 3130.100, 3248.000



$\dot{Q}_V$ = Heat loss (W)
ΔT = Temperature difference (K)

Selection diagram
for air/air heat exchangers

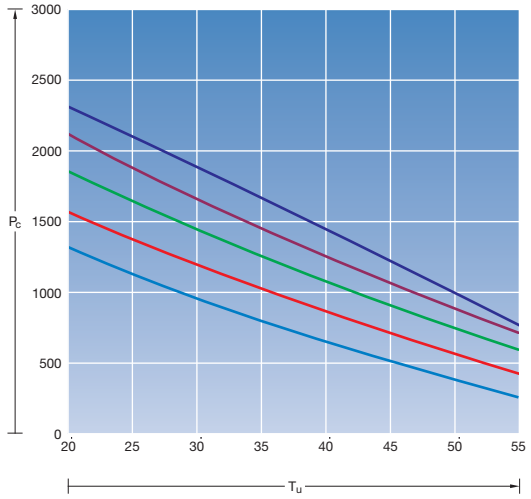


ΔT	=	Temperature difference (K)
$\dot{Q}_V$	=	Heat loss (W)
q_W	=	Specific thermal output (W/K)
A	=	Enclosure surface area to IEC 890 (m^2)
k	=	Heat transfer coefficient (W/m^2 K) for sheet steel k = 5.5 W/m^2 K

VX25 Blue e+ integration solution

Output class 1300 W (110 – 240 V, 1 ~, 50 – 60 Hz / 380 – 480 V, 3 ~, 50 – 60 Hz)

1.30 kW
SK 3185.030



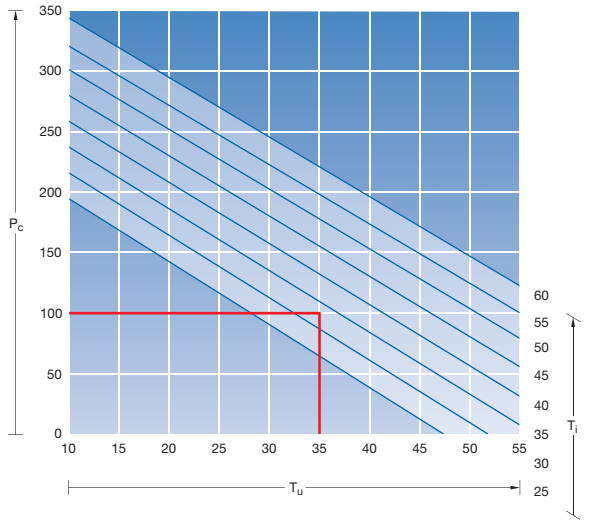
Enclosure internal temperature T_i
- 45 °C
- 40 °C
- 35 °C
- 30 °C
- 25 °C

P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

Thermoelectric coolers

Cooling output

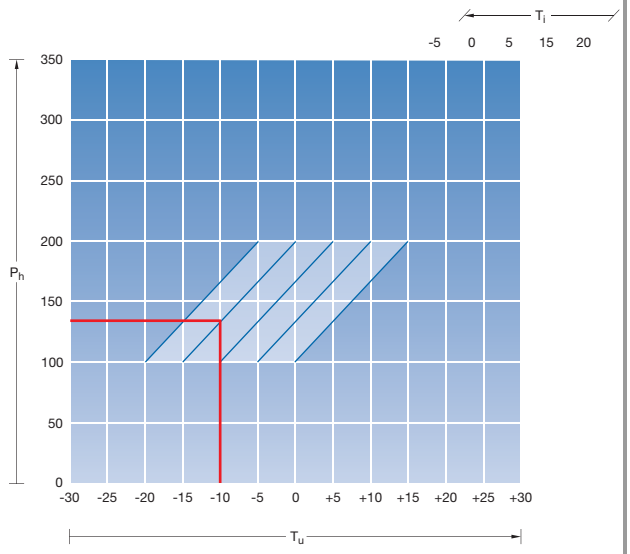
50/60 Hz
SK 3201.200, .300



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Heating output

50/60 Hz
SK 3201.200, .300

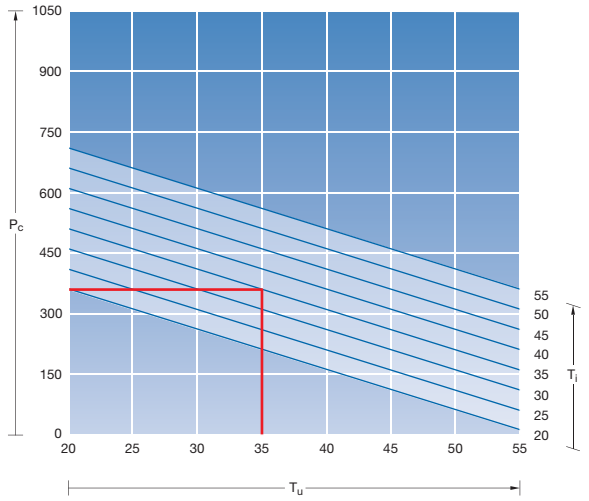


T_u = Ambient temperature (°C)
P_h = Heating output (W)
T_i = Enclosure internal temperature (°C)

TopTherm wall-mounted cooling units

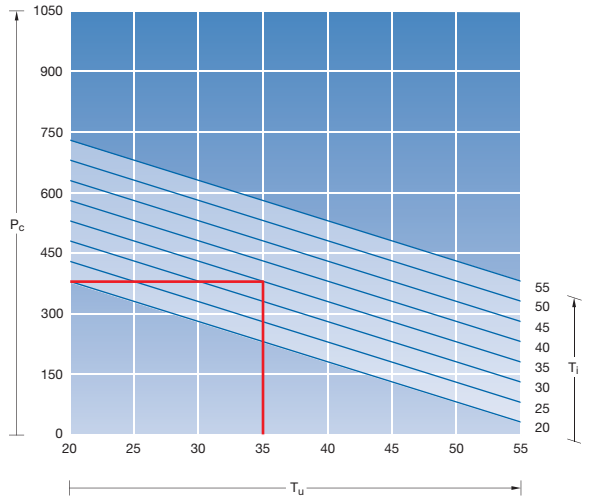
Output class 300 W (115/230 V, 1~)

50 Hz
SK 3302.300, .310, .100, .110, .200



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3302.300, .310, .100, .110, .200

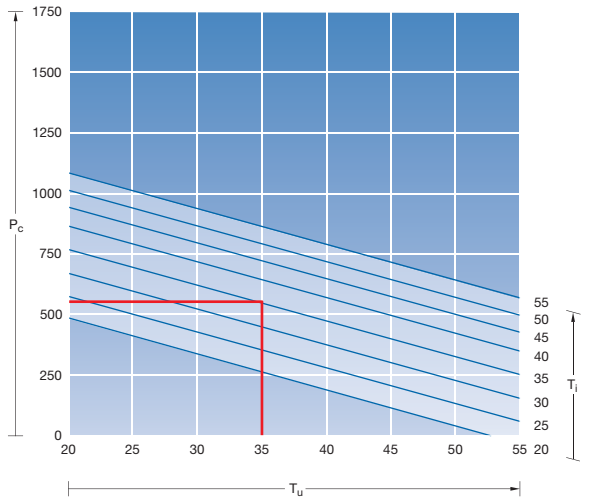


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm wall-mounted cooling units Blue e

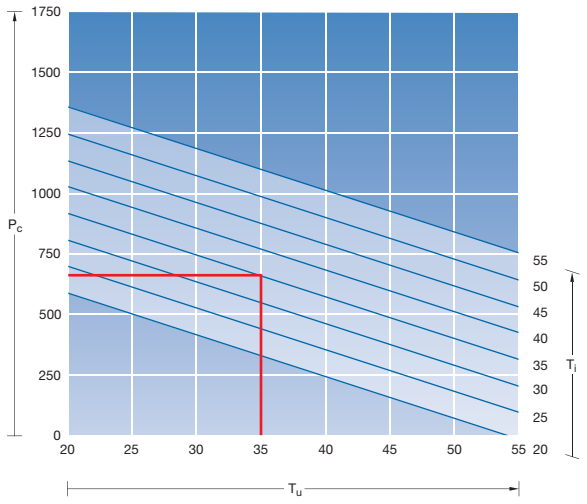
Output class 500 W (115/230 V, 1~)

50 Hz
SK 3303.500, .510, .600, .504, .514



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

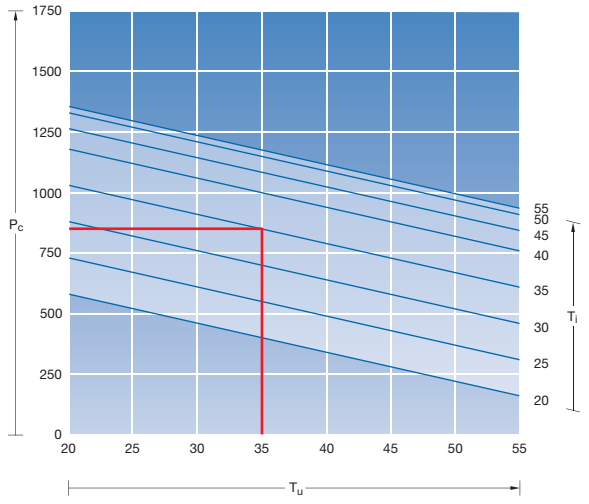
60 Hz
SK 3303.500, .510, .600, .504, .514



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

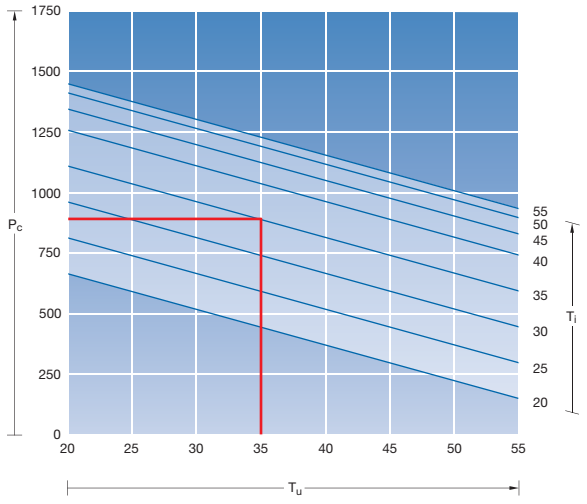
Output class 750 W (115/230 V, 1~, 400 V, 2~)

50 Hz
SK 3361.500, .510, .540, .600



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3361.500, .510, .540, .600

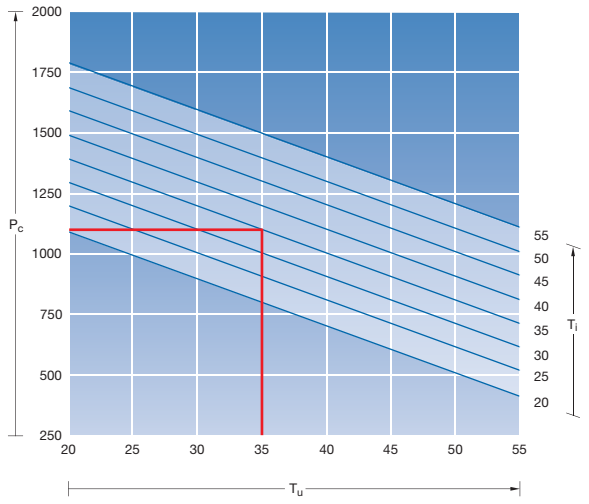


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm wall-mounted cooling units Blue e

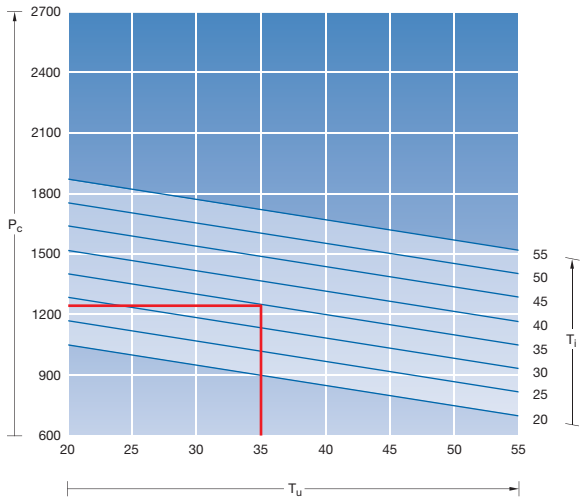
Output class 1000 W (115/230 V, 1~)

50 Hz
SK 3304.500, .510, .600, .504



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

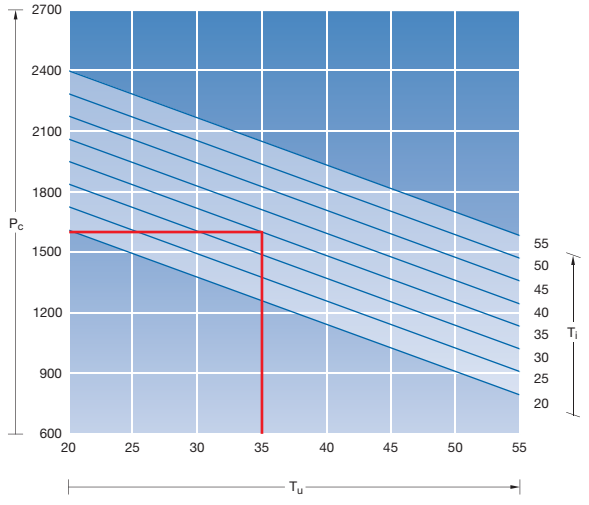
60 Hz
SK 3304.500, .510, .600, .504



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

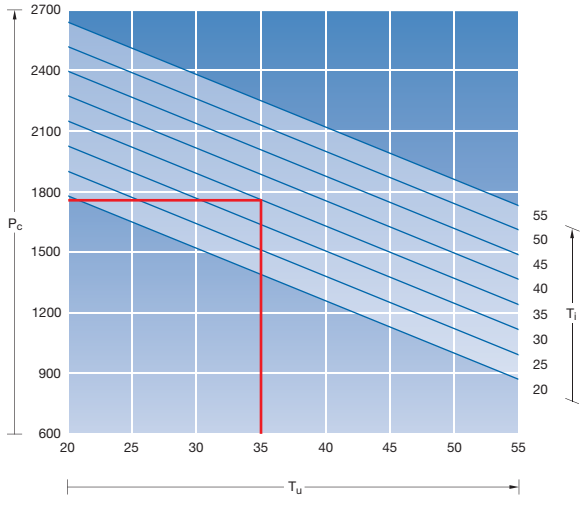
Output class 1500 W (115/230 V, 1~)

50 Hz
SK 3305.500, .510, .600, .504



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3305.500, .510, .600, .504

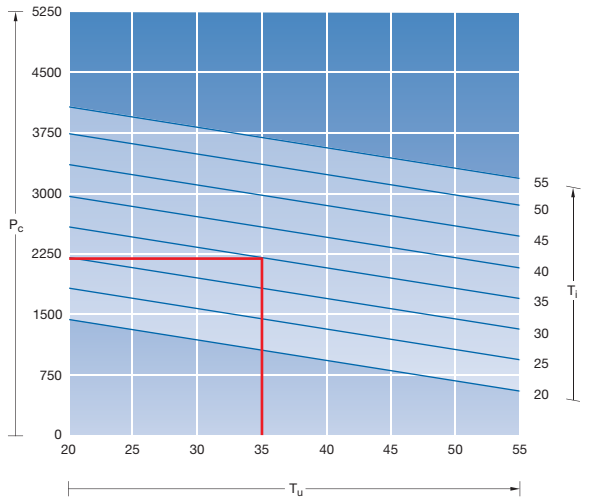


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm wall-mounted cooling units Blue e

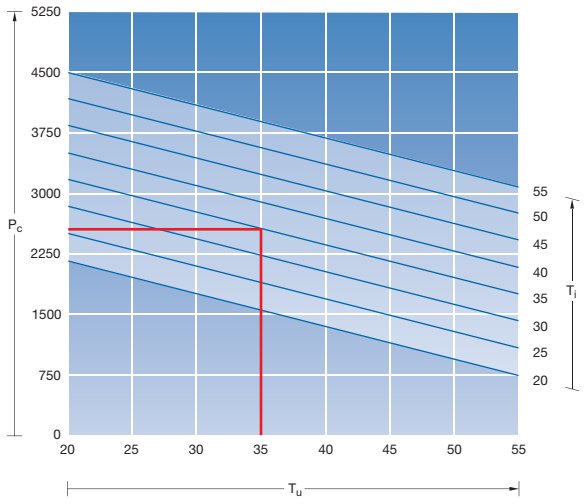
Output class 2000 W (115/230 V, 1~)

50 Hz
SK 3328.500, .510, .600, .504



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

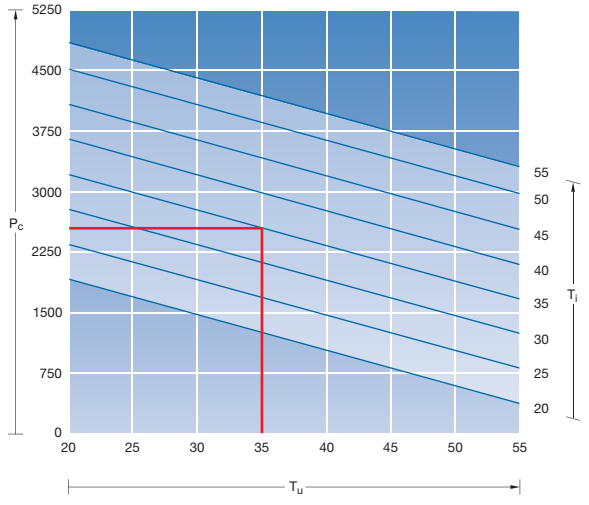
60 Hz
SK 3328.500, .510, .600, .504



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

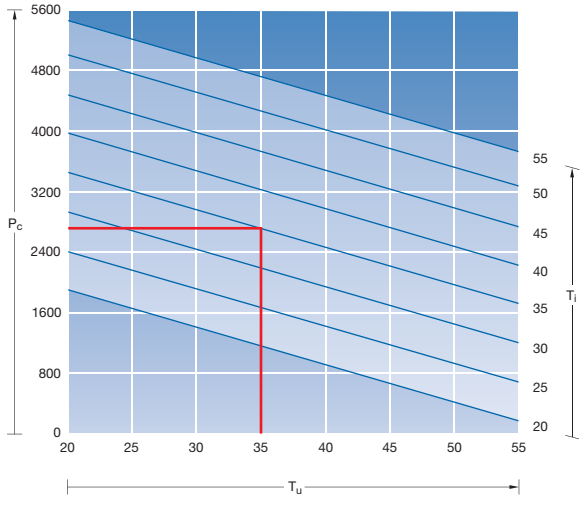
Output class 2500 W (115/230 V, 1~)

50 Hz
SK 3329.500, .510, .600, .504



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3329.500, .510, .600, .504

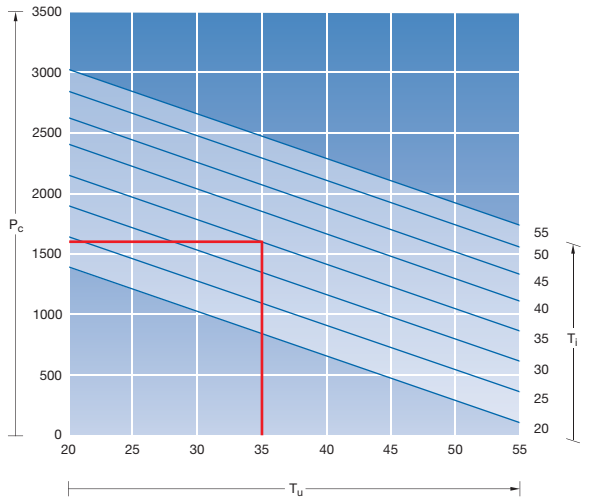


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm wall-mounted cooling units Blue e, slimline

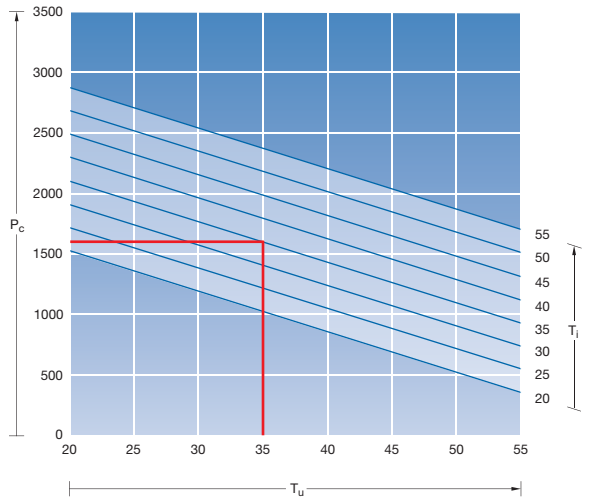
Output class 1500 W (230 V, 1~)

50 Hz
SK 3366.500



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

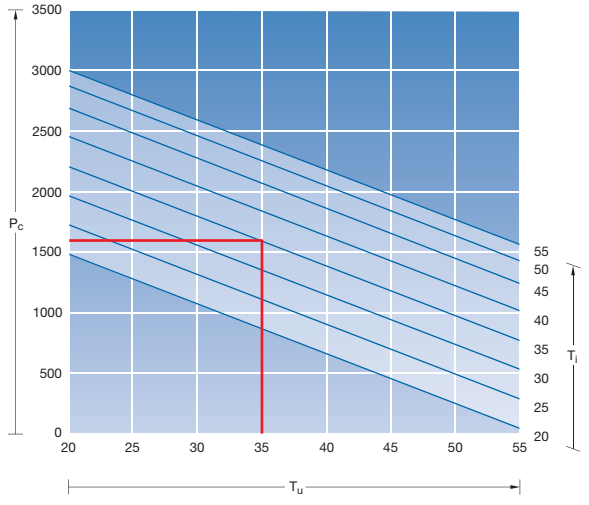
60 Hz
SK 3366.500



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

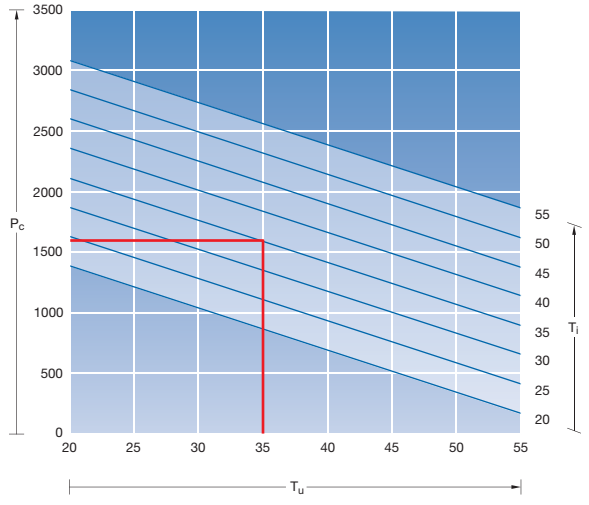
Output class 1500 W (400/460 V, 3~)

50 Hz
SK 3366.540



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3366.540

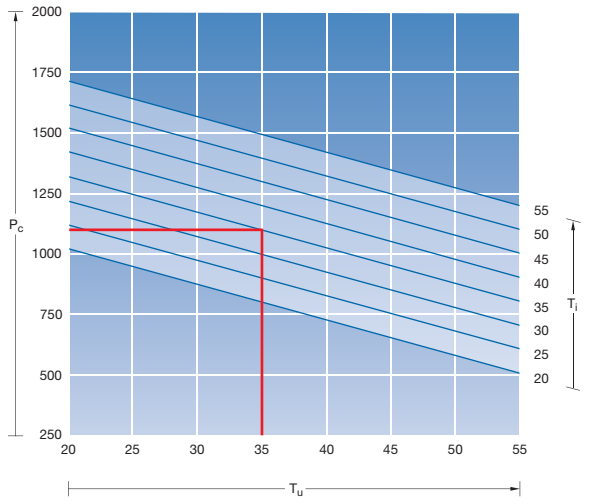


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm wall-mounted cooling units Blue e

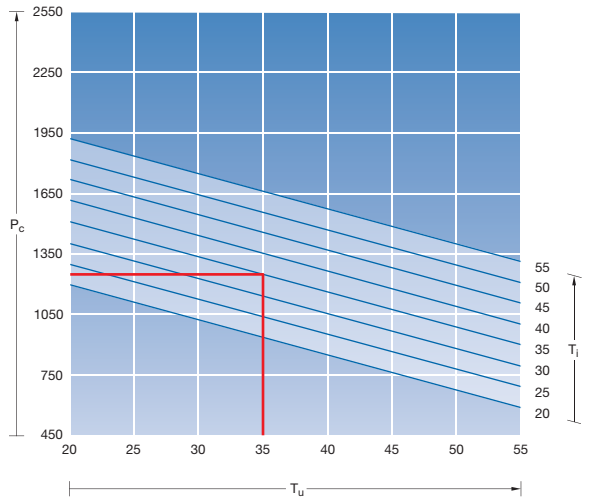
Output class 1000 W (400/460 V, 3~)

50 Hz
SK 3304.540, .640, .544



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

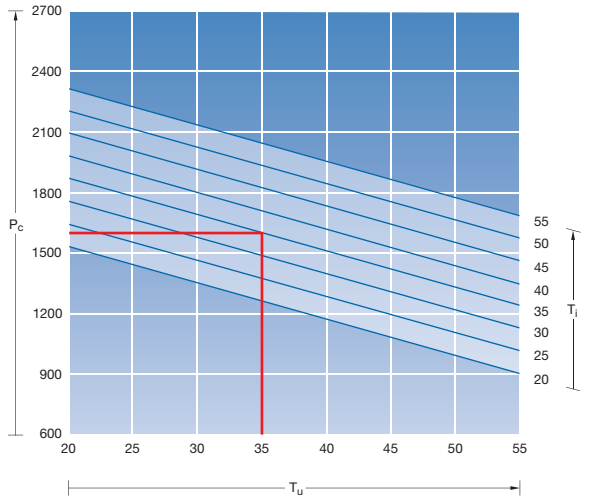
60 Hz
SK 3304.540, .640, .544



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

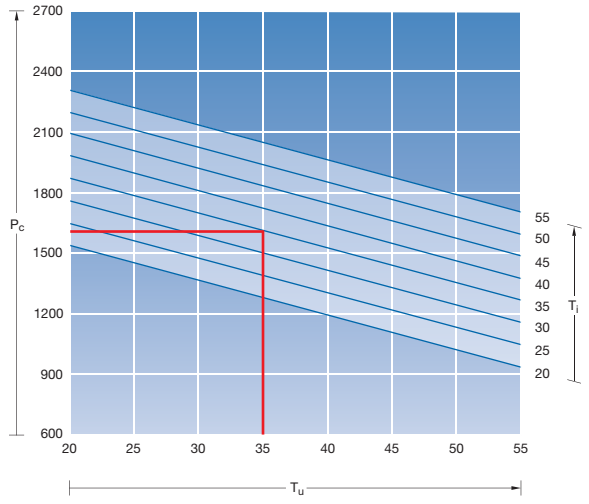
Output class 1500 W (400/460 V, 3~)

50 Hz
SK 3305.540, .640, .544



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3305.540, .640, .544

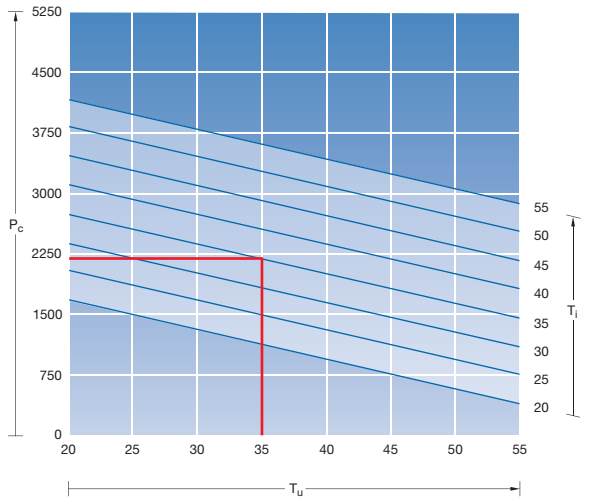


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm wall-mounted cooling units Blue e

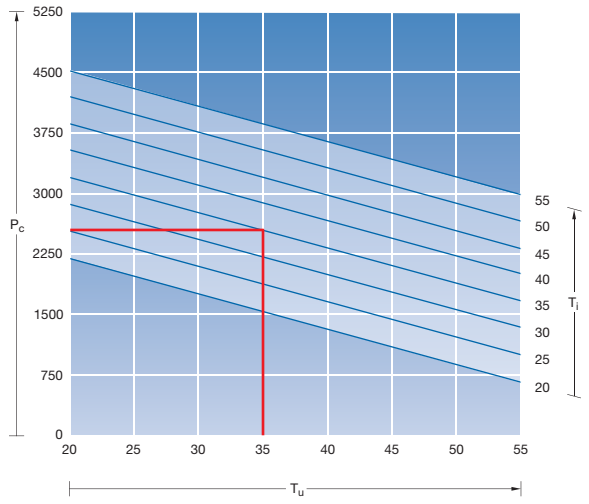
Output class 2000 W (400/460 V, 3~)

50 Hz
SK 3328.540, .640, .544



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

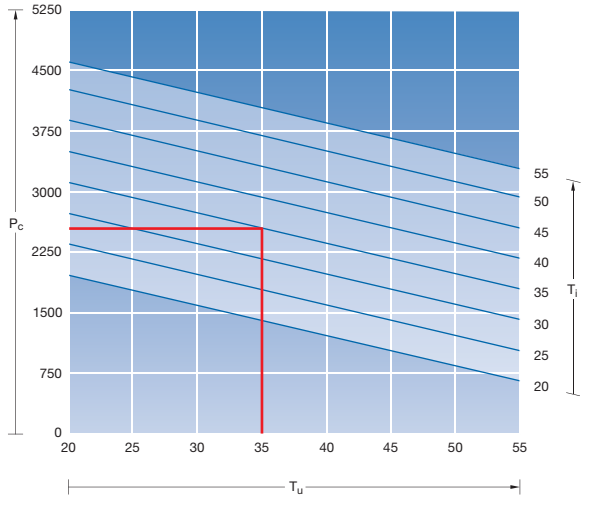
60 Hz
SK 3328.540, .640, .544



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

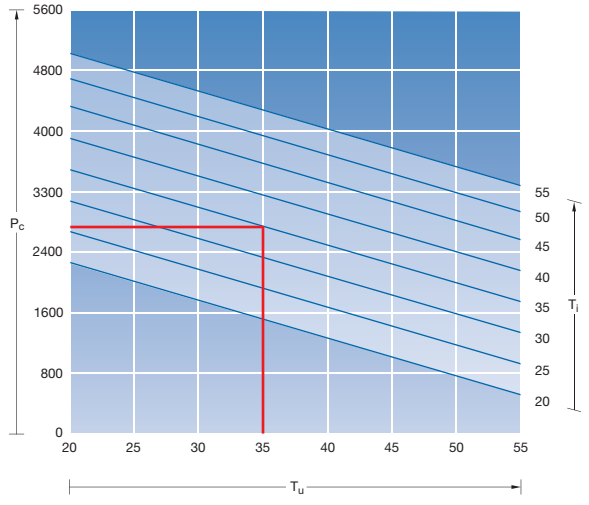
Output class 2500 W (400/460 V, 3~)

50 Hz
SK 3329.540, .640, .544



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3329.540, .640, .544

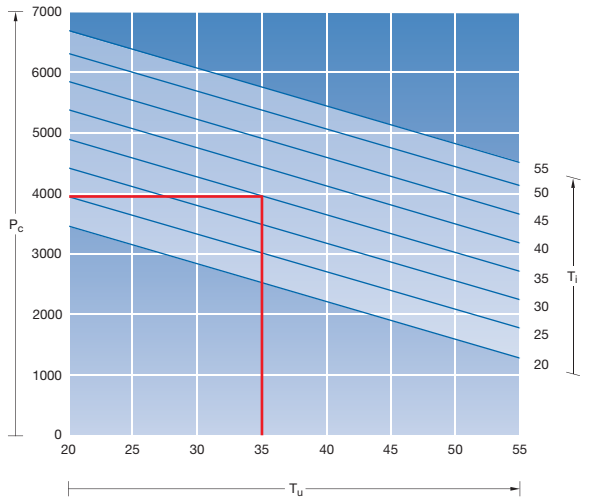


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm wall-mounted cooling units Blue e

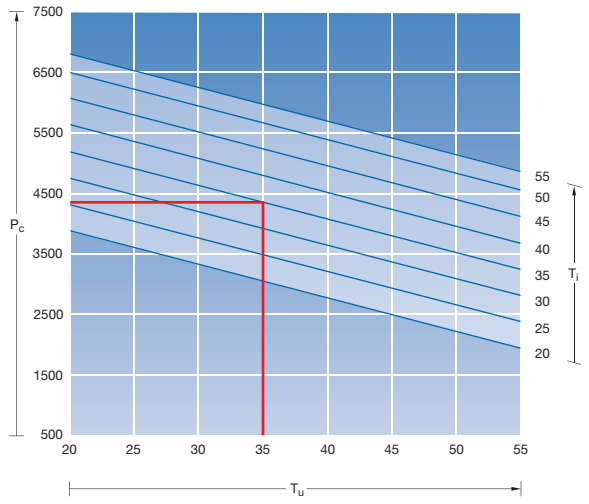
Output class 4000 W (400/460 V, 3~)

50 Hz
SK 3332.540, .640



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3332.540, .640

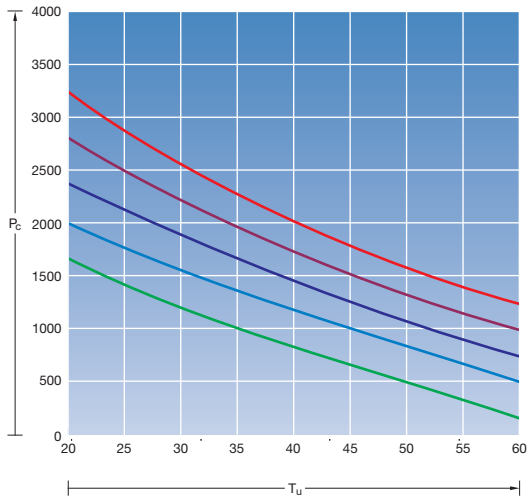


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Wall-mounted cooling units Blue e+

Output class 1600/2000 W (110 – 240 V, 1~, 50 – 60 Hz / 380 – 480 V, 3~, 50 – 60 Hz)

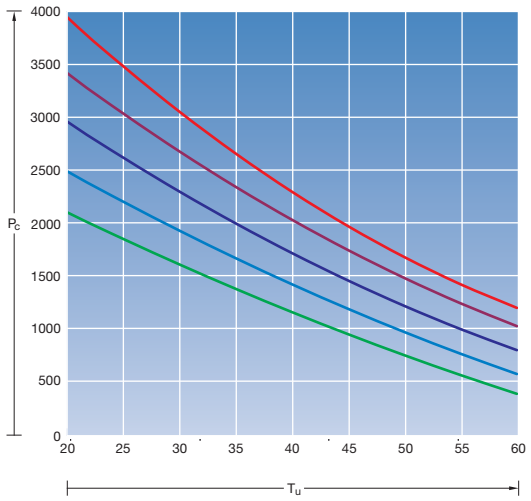
1.6 kW
SK 3185.530, .830



Enclosure internal temperature T_i
- 45 °C
- 40 °C
- 35 °C
- 30 °C
- 25 °C

P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

2 kW
SK 3186.630, .930

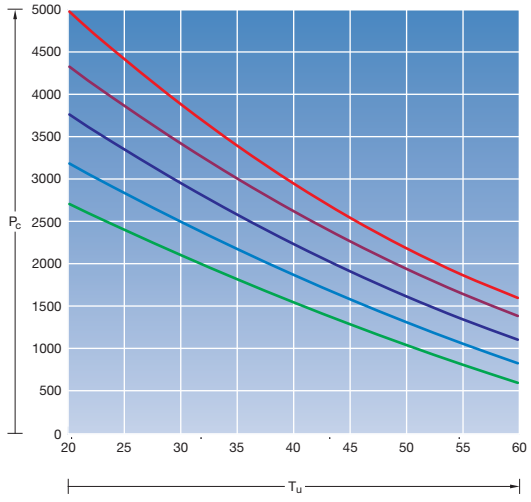


Enclosure internal temperature T_i
- 45 °C
- 40 °C
- 35 °C
- 30 °C
- 25 °C

P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

Output class 2600/4200 W (110 – 240 V, 1~, 50 – 60 Hz / 380 – 480 V, 3~, 50 – 60 Hz)

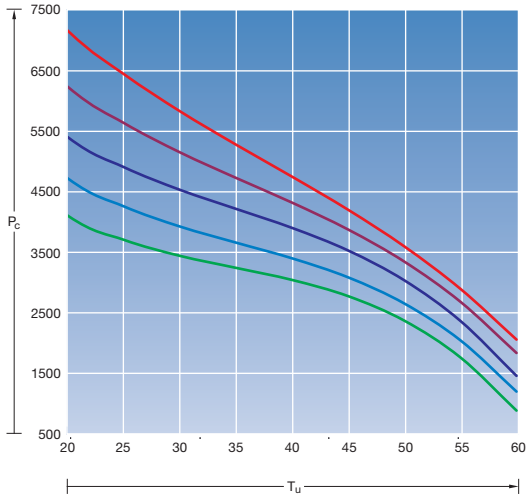
2.6 kW
SK 3187.630, .930



Enclosure internal temperature T_i
- 45 °C
- 40 °C
- 35 °C
- 30 °C
- 25 °C

P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

4.2 kW
SK 3188.640, .940



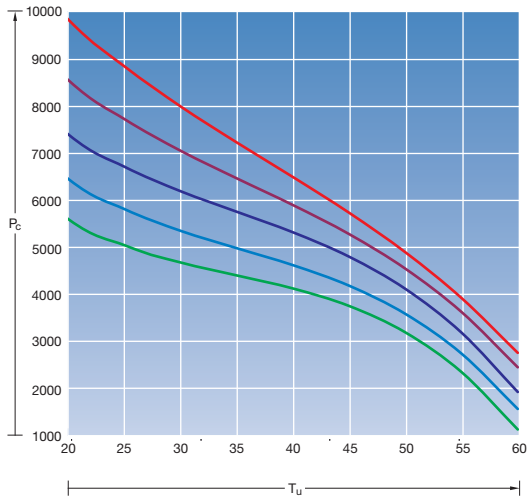
Enclosure internal temperature T_i
- 45 °C
- 40 °C
- 35 °C
- 30 °C
- 25 °C

P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

Wall-mounted cooling units Blue e+

Output class 5800 W (380 – 480 V, 3~, 50 – 60 Hz)

5.8 kW
SK 3189.640, .940



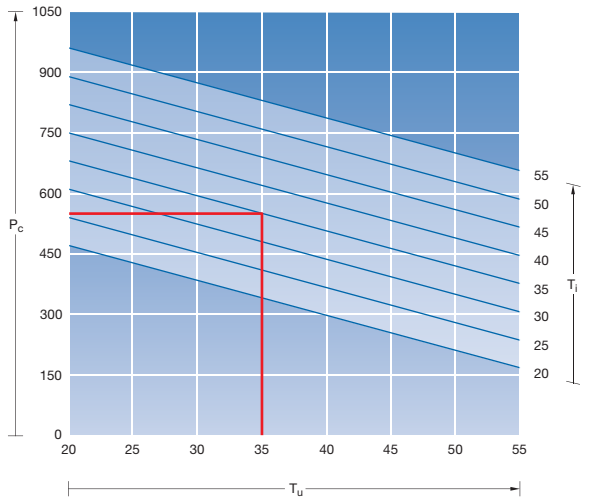
Enclosure internal temperature T_i
- 45 °C
- 40 °C
- 35 °C
- 30 °C
- 25 °C

P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

TopTherm roof-mounted cooling units Blue e

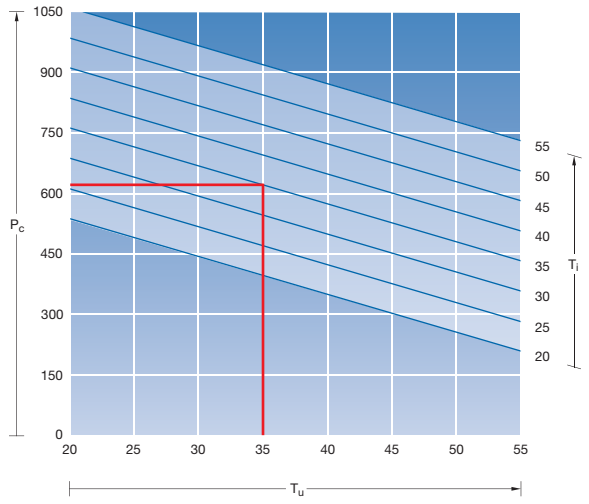
Output class 500 W (115/230 V, 1~)

50 Hz
SK 3382.500, .510, .600



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

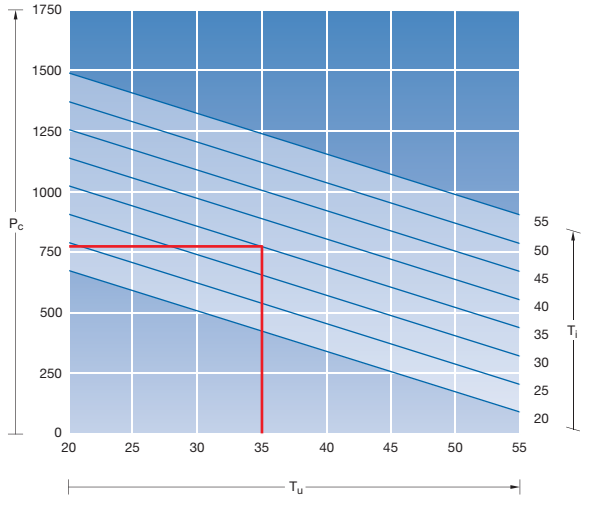
60 Hz
SK 3382.500, .510, .600



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

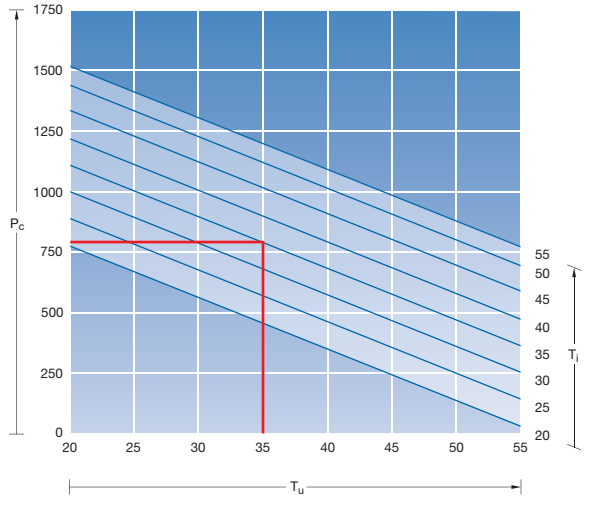
Output class 750 W (115/230 V, 1~, 400 V, 2~)

50 Hz
SK 3359.500, .510, .540, .600



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3359.500, .510, .540, .600

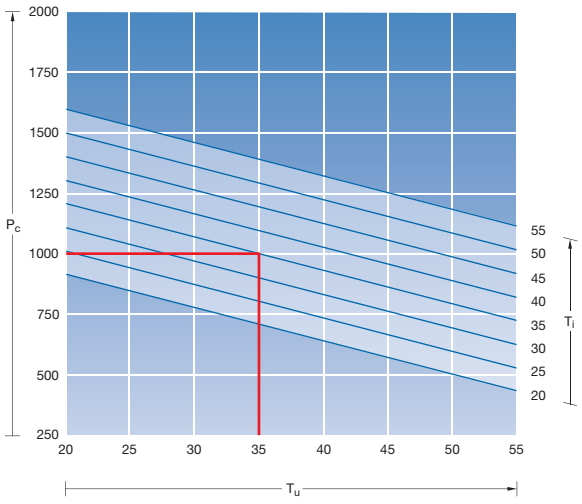


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm roof-mounted cooling units Blue e

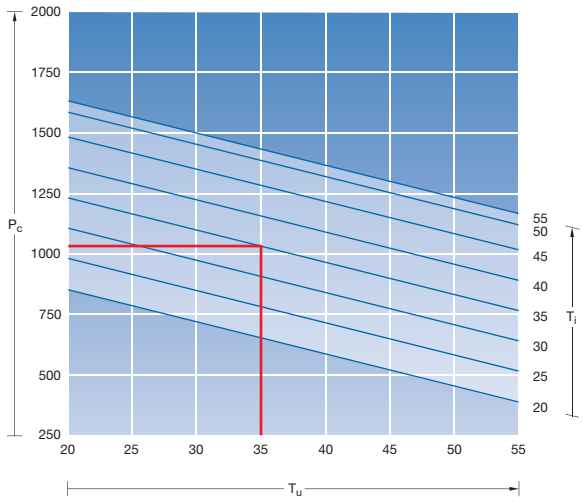
Output class 1000 W (115/230 V, 1~, 400 V, 2~)

50 Hz
3383.500, .510, .540, .600



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

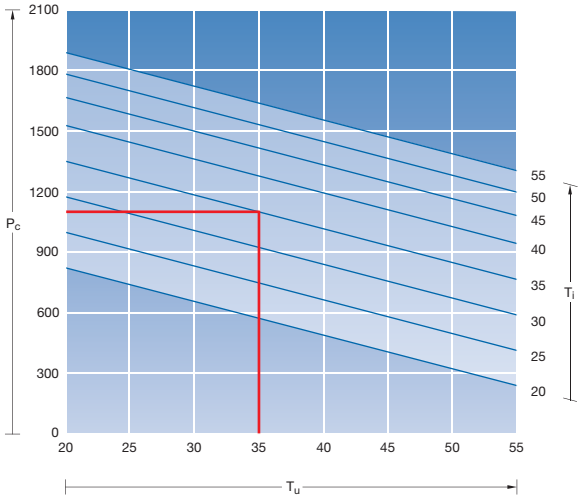
60 Hz
3383.500, .510, .540, .600



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

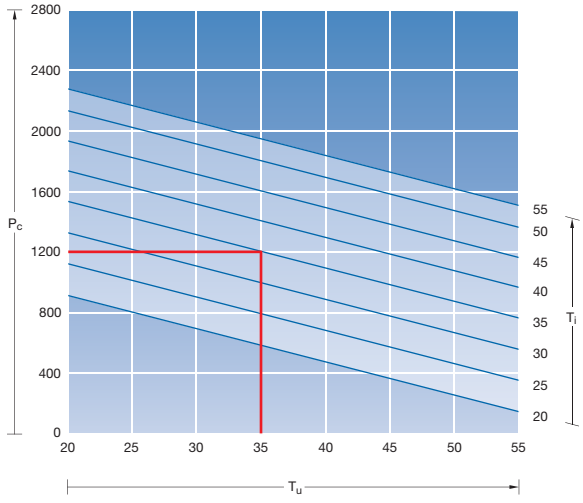
Output class 1100 W (115/230 V, 1~)

50 Hz
SK 3273.500, .515



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3273.500, .515

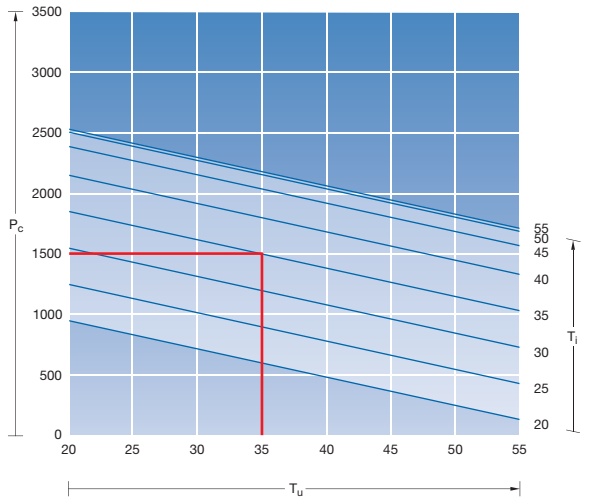


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm roof-mounted cooling units Blue e

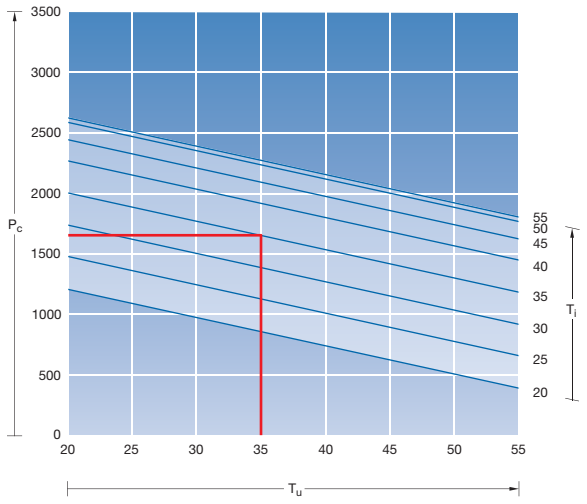
Output class 1500 W (115/230 V, 1~, 400 V, 2~)

50 Hz
3384.500, .510, .540, .600



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

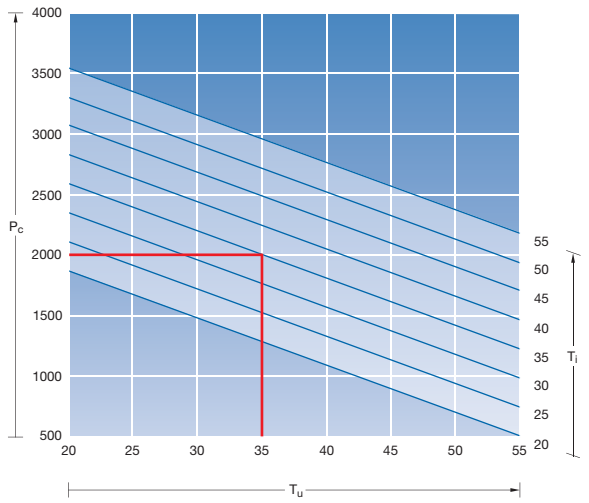
60 Hz
3384.500, .510, .540, .600



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

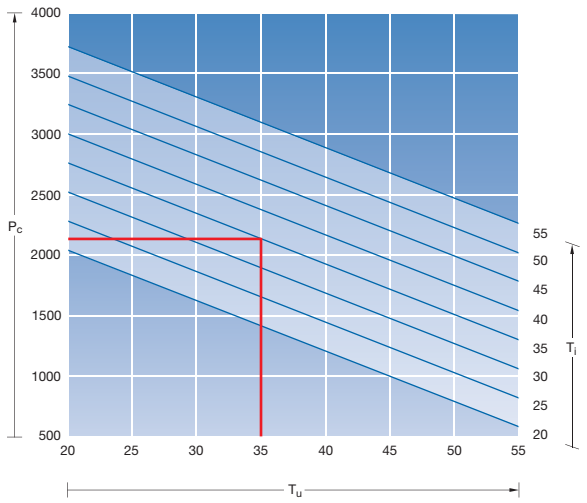
Output class 2000 W (115/230 V, 1~, 400 V, 2~)

50 Hz
SK 3385.500, .510, .540, .600, .640



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3385.500, .510, .540, .600, .640

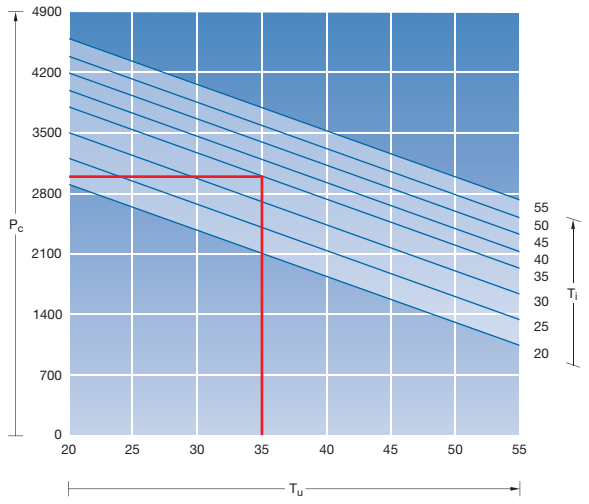


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm roof-mounted cooling units Blue e

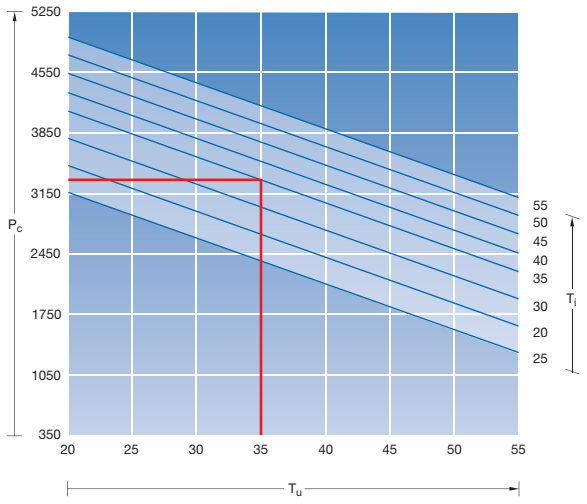
Output class 3000 W (400/460 V, 3~)

50 Hz
3386.540, .640



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

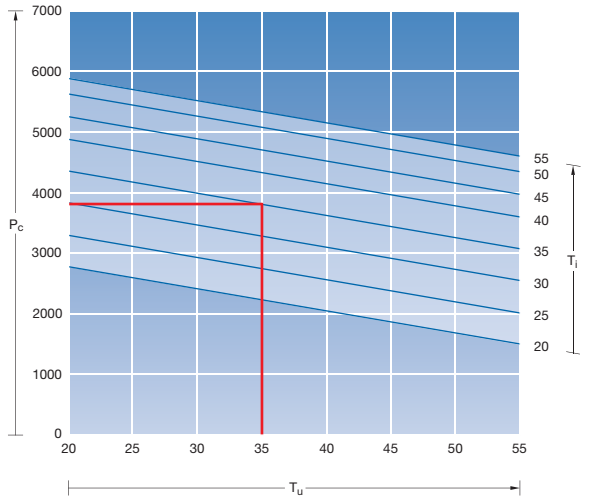
60 Hz
3386.540, .640



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

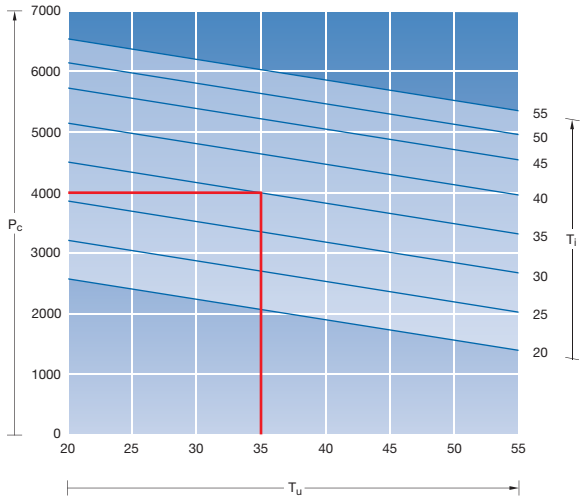
Output class 4000 W (400/460 V, 3~)

50 Hz
3387.540, .640



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
3387.540, .640

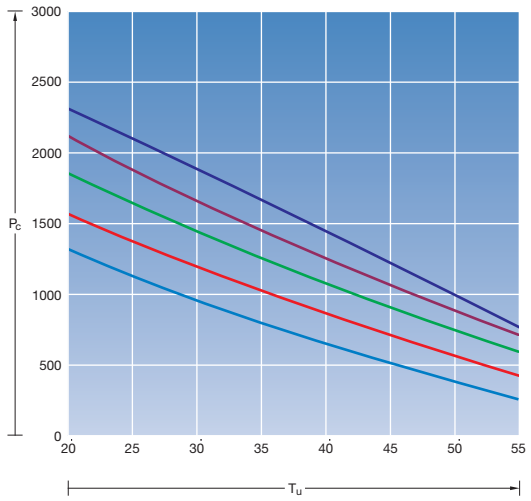


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Roof-mounted cooling unit Blue e+

Output class 1300 W (110 – 240 V, 1 ~, 50 – 60 Hz / 380 – 480 V, 3 ~, 50 – 60 Hz)

1.30 kW
SK 3185.730



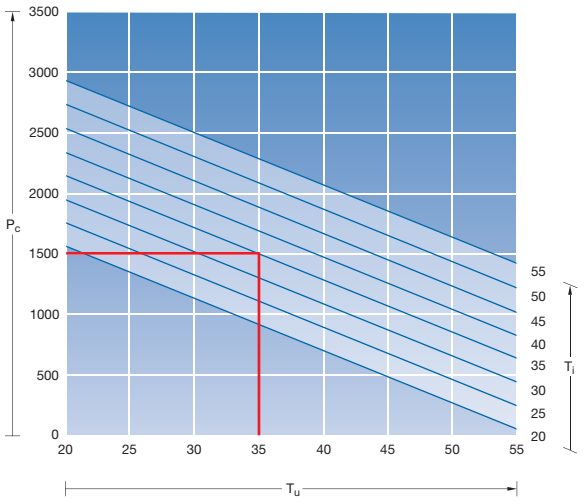
Enclosure internal temperature T_i
- 45 °C
- 40 °C
- 35 °C
- 30 °C
- 25 °C

P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

Modular climate control concept – Cooling module Blue e

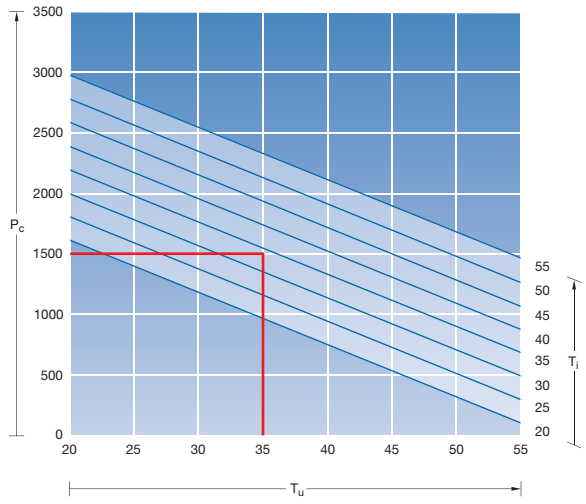
Output class 1500 W (230 V, 1~)

50 Hz
SK 3307.700



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

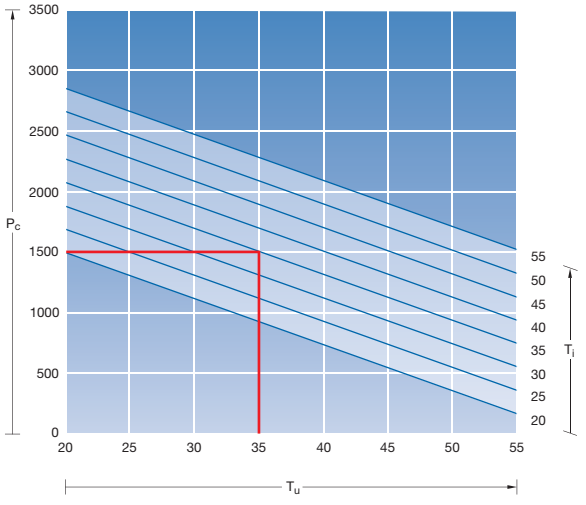
60 Hz
SK 3307.700



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

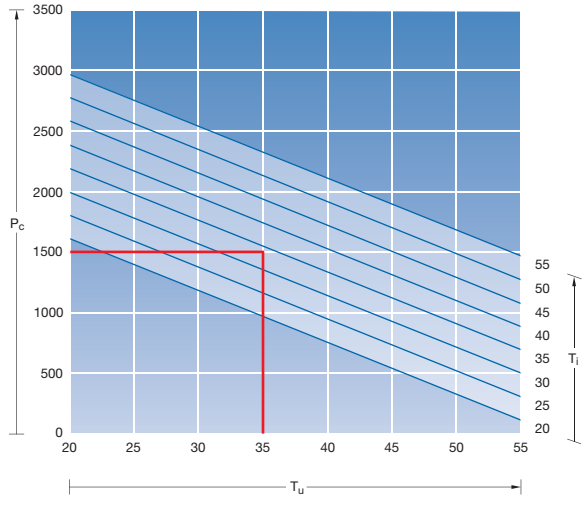
Output class 1500 W (400/460 V, 3~)

50 Hz
SK 3307.740



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3307.740

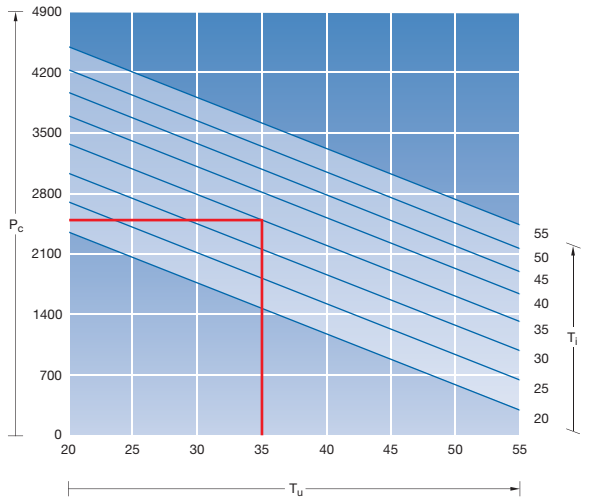


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Modular climate control concept – Cooling module Blue e

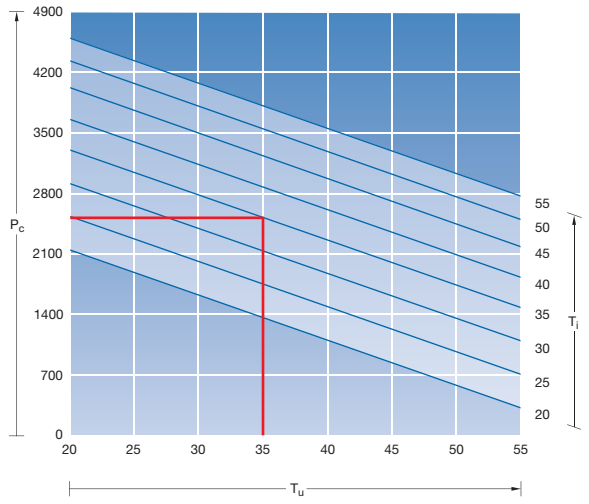
Output class 2500 W (230 V, 1~)

50 Hz
SK 3310.700



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

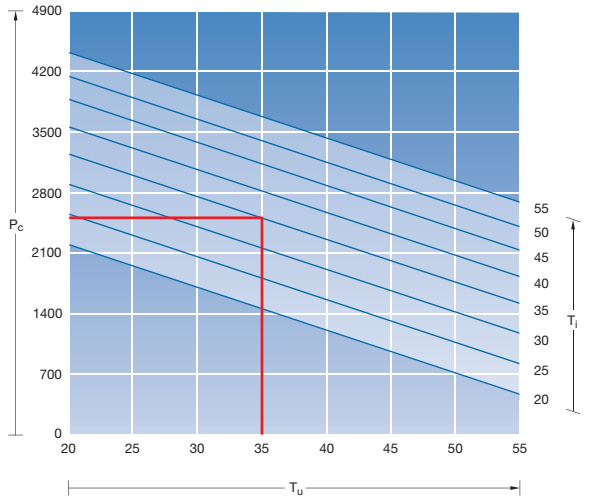
60 Hz
SK 3310.700



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

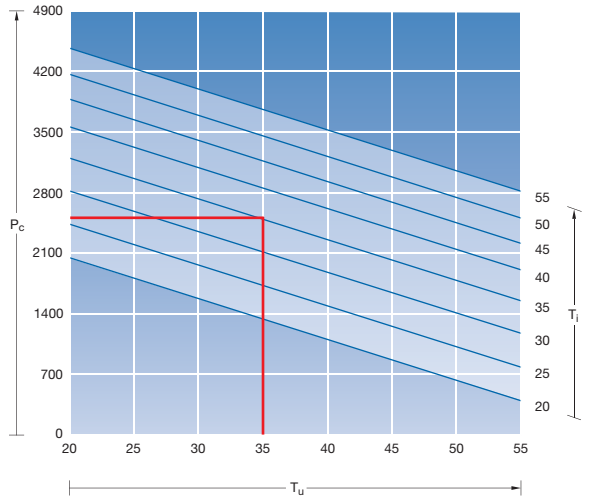
Output class 2500 W (400/460 V, 3~)

50 Hz
SK 3310.740



T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3310.740

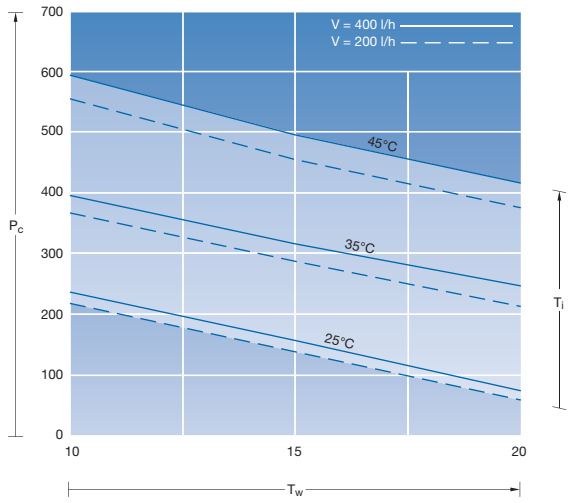


T_u = Ambient temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Wall-mounted air/water heat exchangers

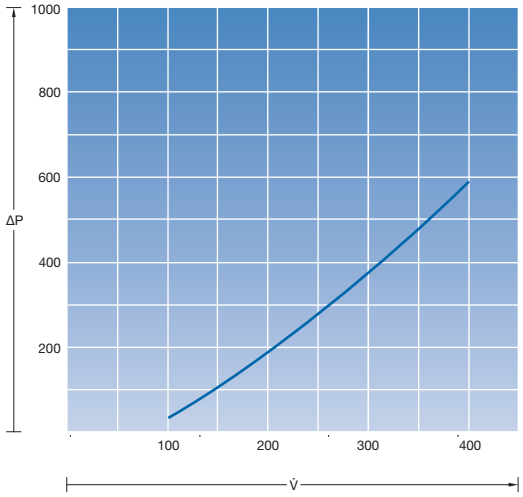
Output class 300 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50/60 Hz
SK 3212.024, .115, .230



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

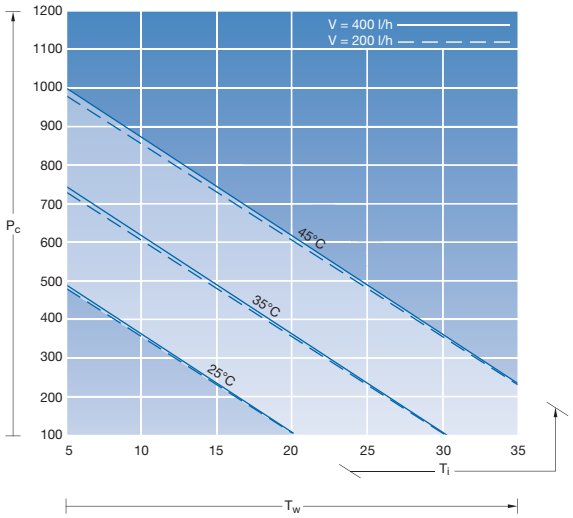
Water resistance diagram
SK 3212.024, .115, .230



$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

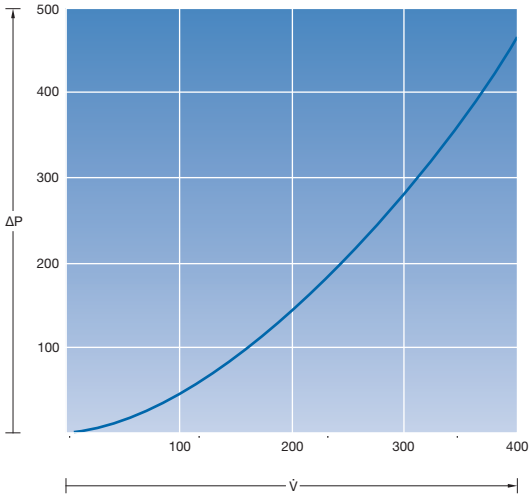
Output class 600 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50/60 Hz
SK 3214.100



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3214.100

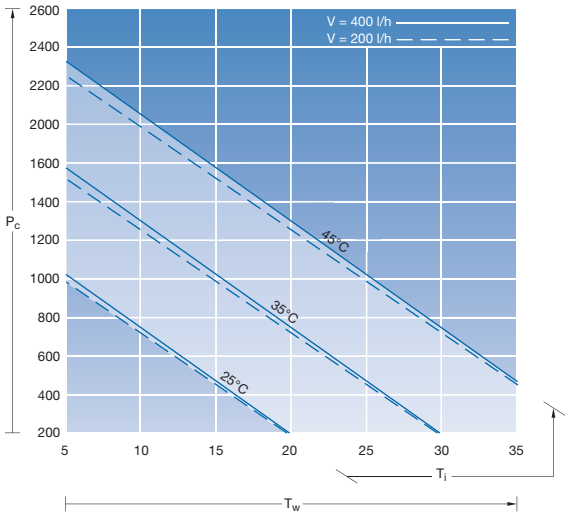


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

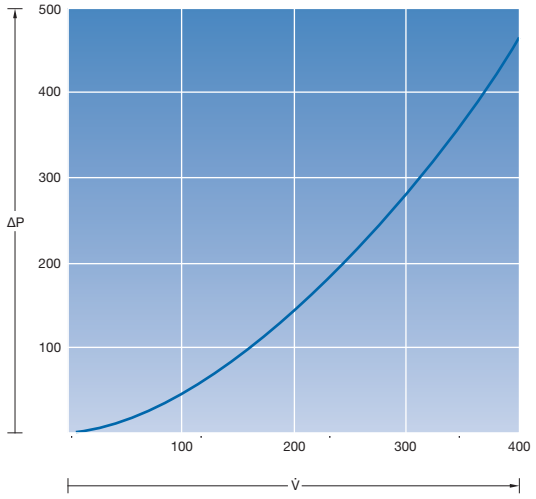
Output class 1250 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50/60 Hz
SK 3215.100



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

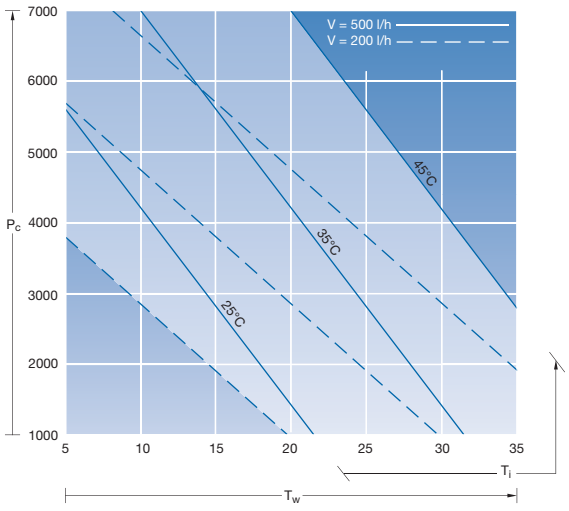
Water resistance diagram
SK 3215.100



$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

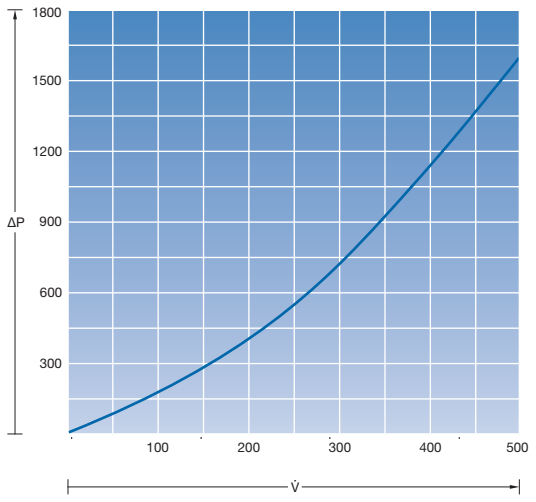
Output class 7000 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50/60 Hz
SK 3216.480



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3216.480

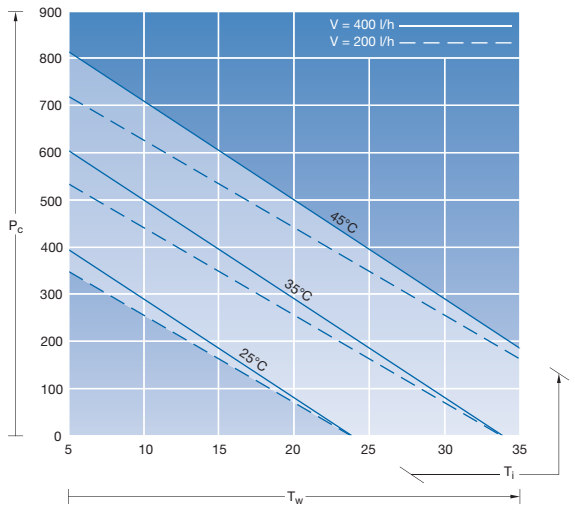


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

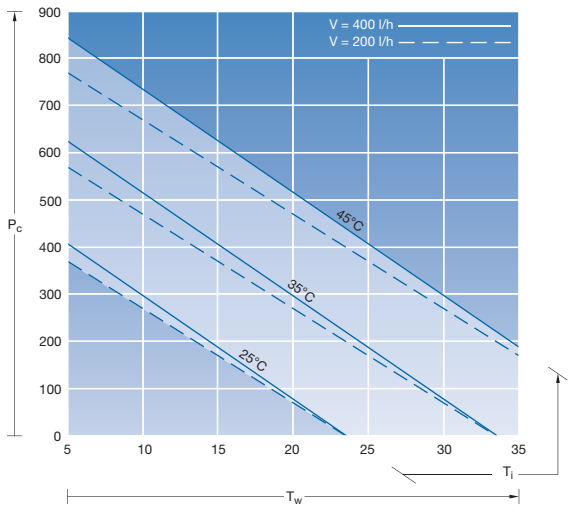
Output class 500 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz
SK 3363.100, .500



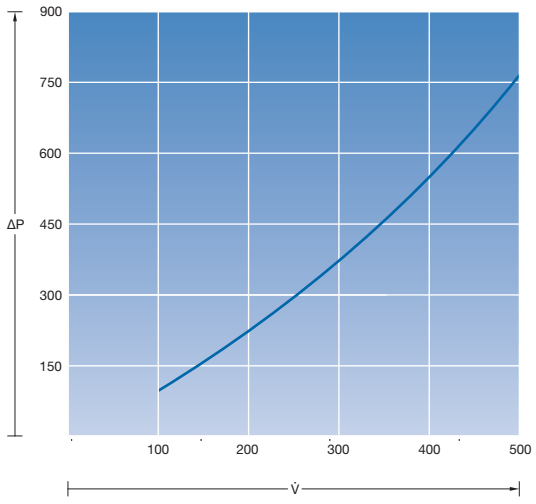
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3363.100, .500



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3363.100, .500

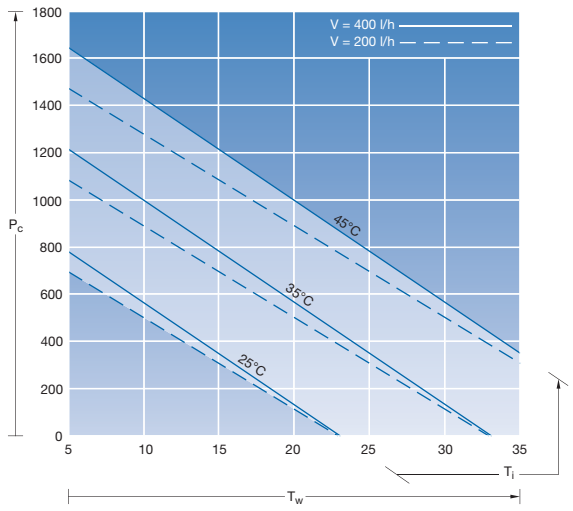


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

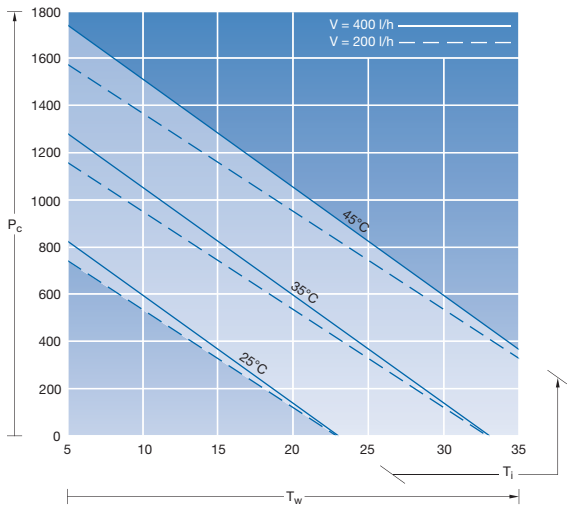
Output class 1000 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz
SK 3364.100, .500



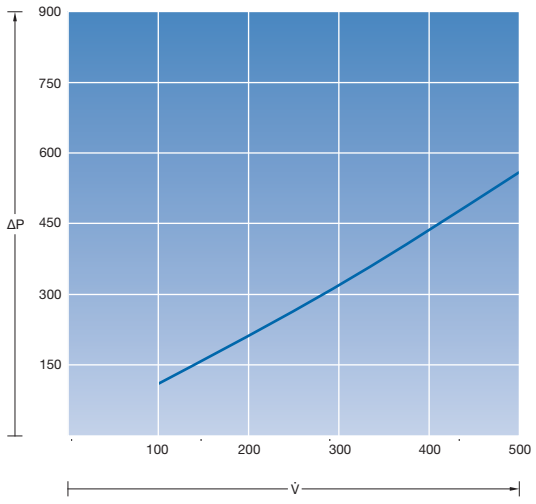
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3364.100, .500



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3364.100, .500

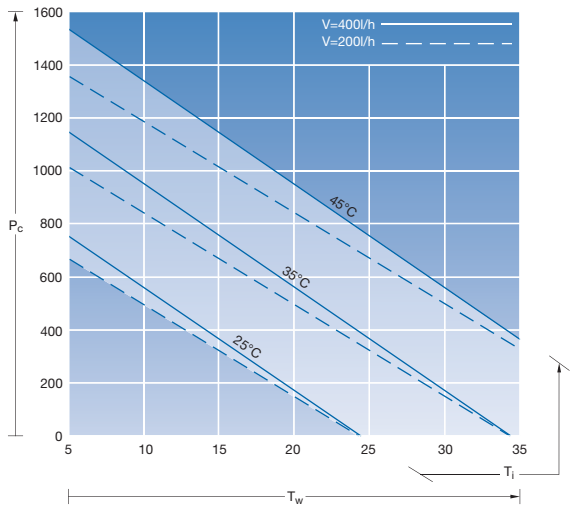


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

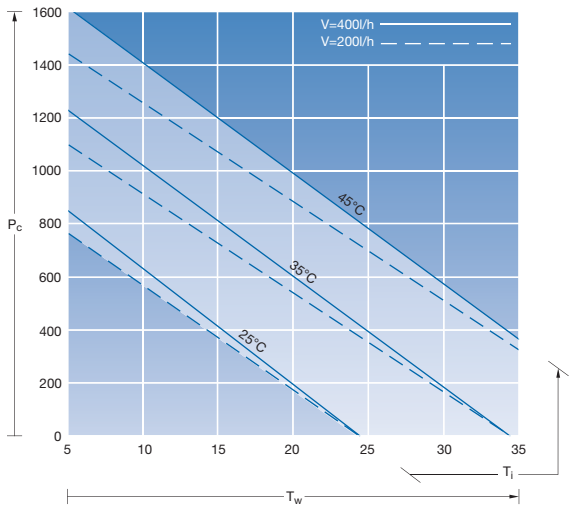
Output class 1000 W
Water-carrying parts: Stainless steel (1.4571)

50 Hz
SK 3364.504



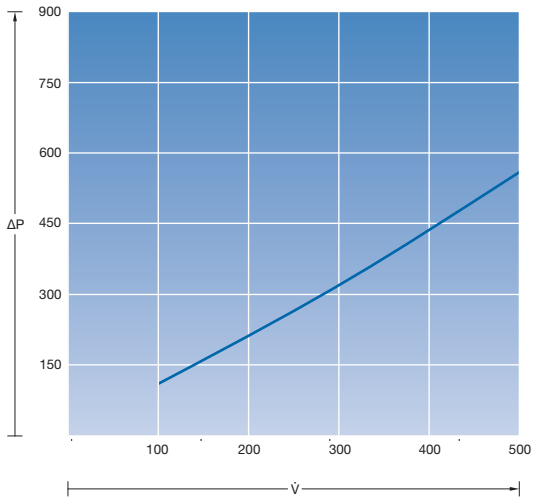
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3364.504



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3364.504

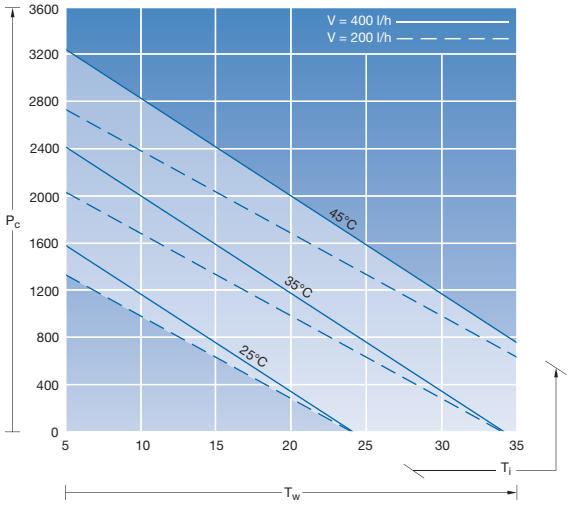


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

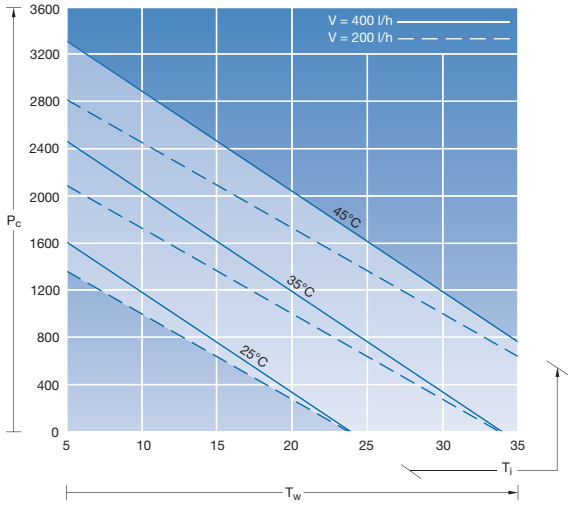
Output class 2000 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz
SK 3373.100, .500



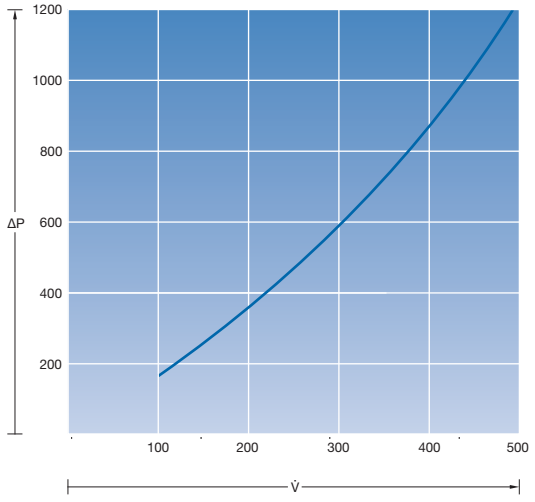
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3373.100, .500



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3373.100, .500

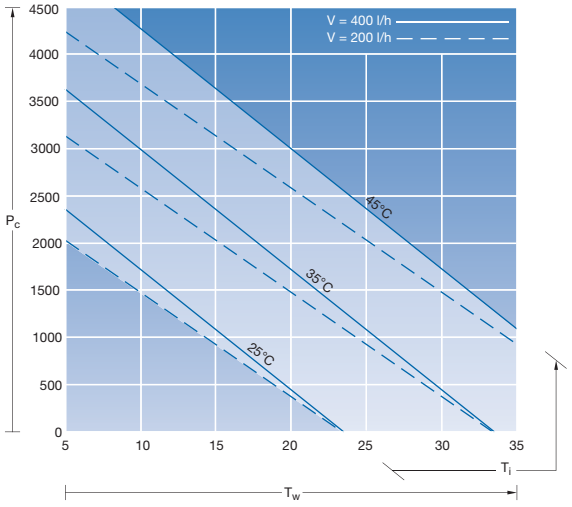


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

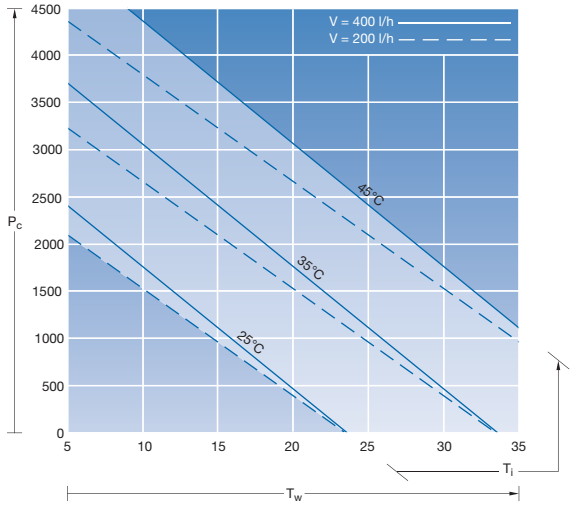
Output class 3000 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz
SK 3374.100, .500



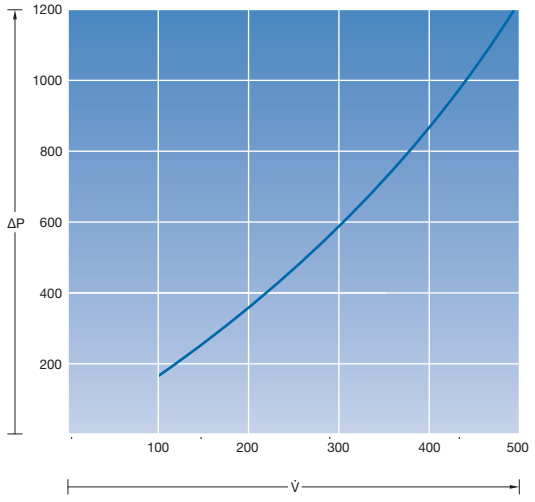
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3374.100, .500



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3374.100, .500

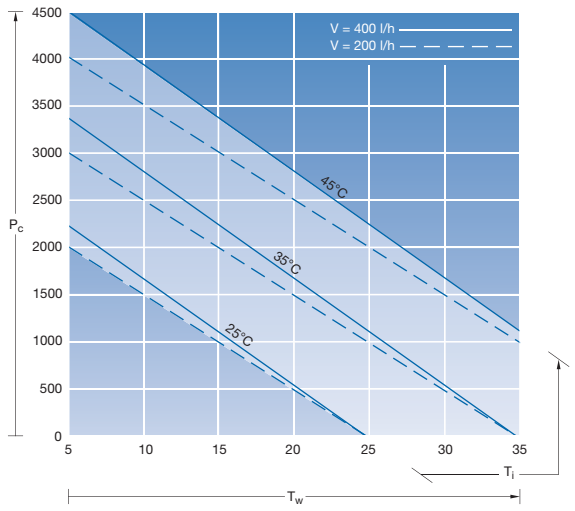


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

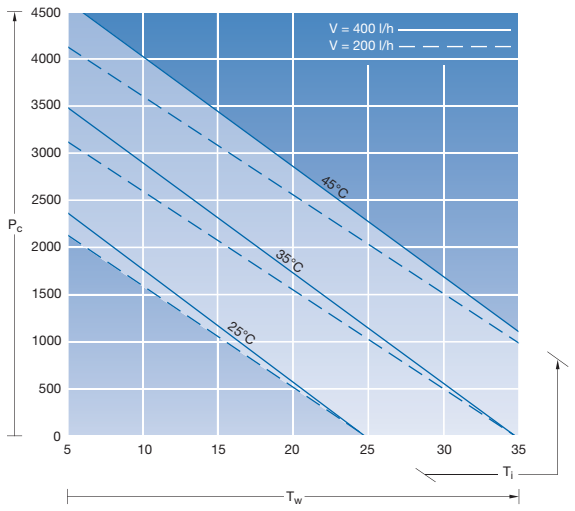
Output class 2500 W
Water-carrying parts: Stainless steel (1.4571)

50 Hz
SK 3374.504



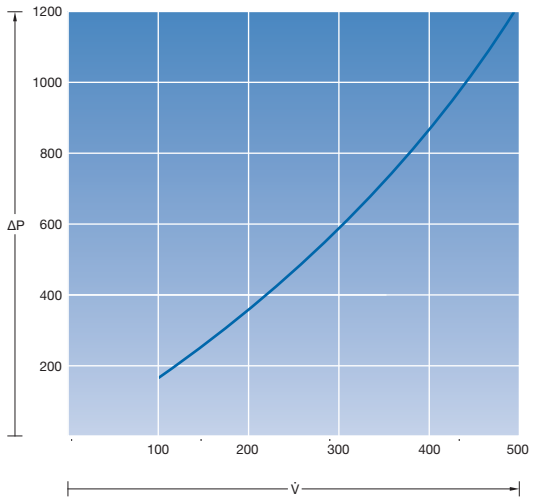
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3374.504



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3374.504

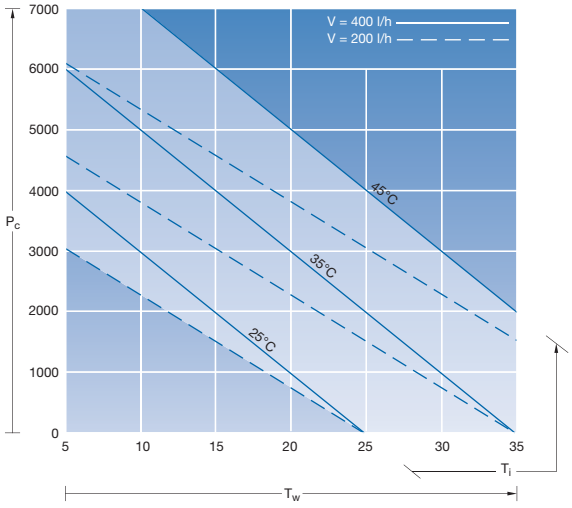


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers

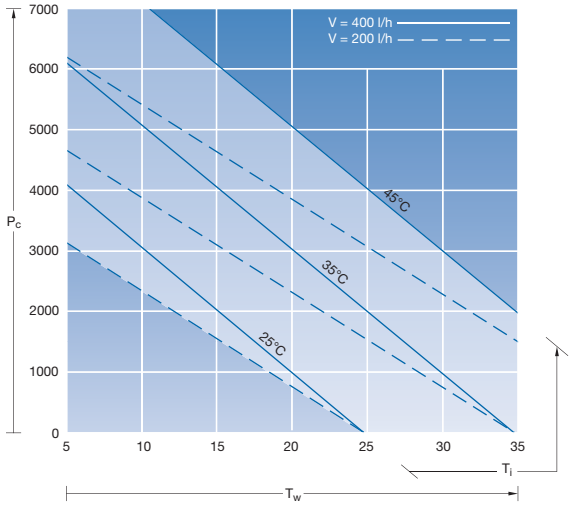
Output class 5000 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz
SK 3375.100, .500



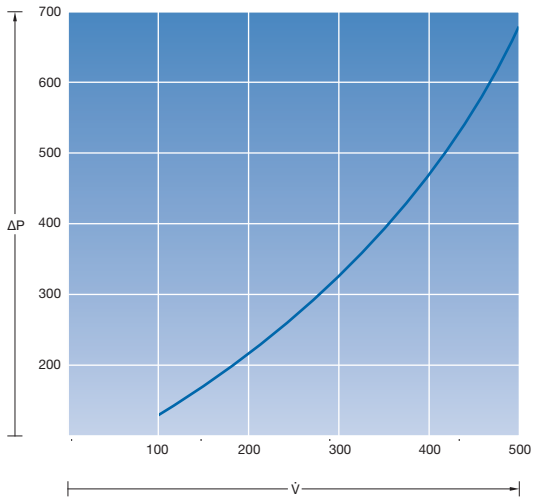
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3375.100, .500



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3375.100, .500

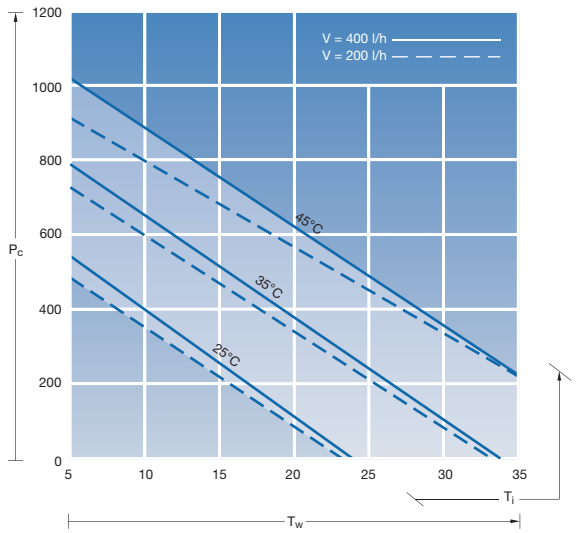


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Wall-mounted air/water heat exchangers HD

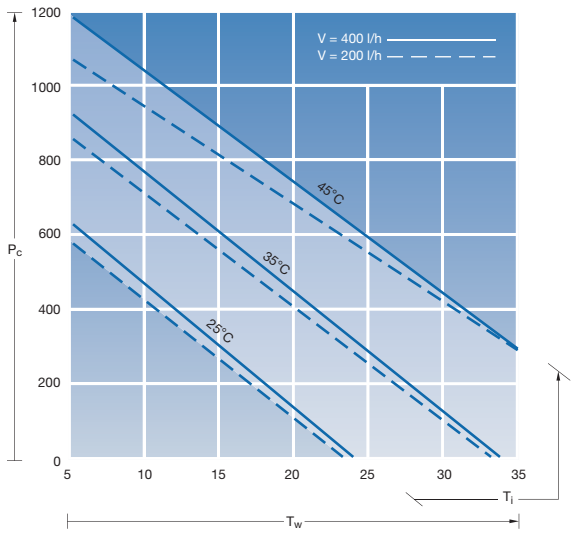
Output class 600/1200 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz
SK 3214.700



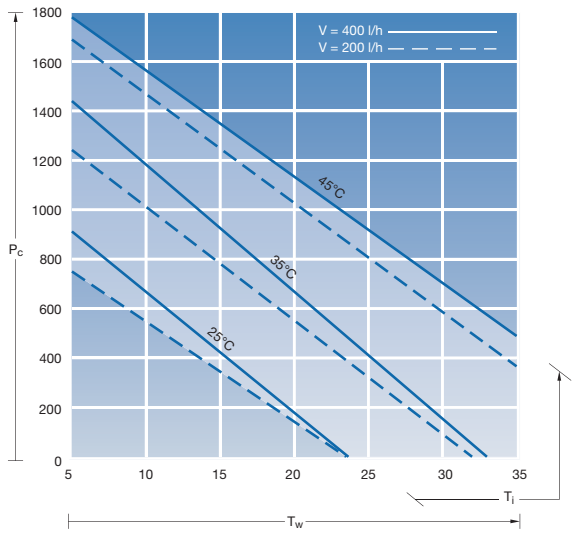
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3274.600



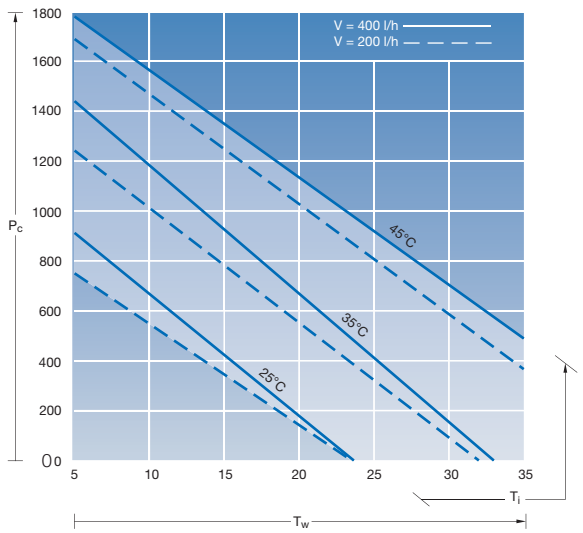
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

50 Hz
SK 3217.500



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3217.600

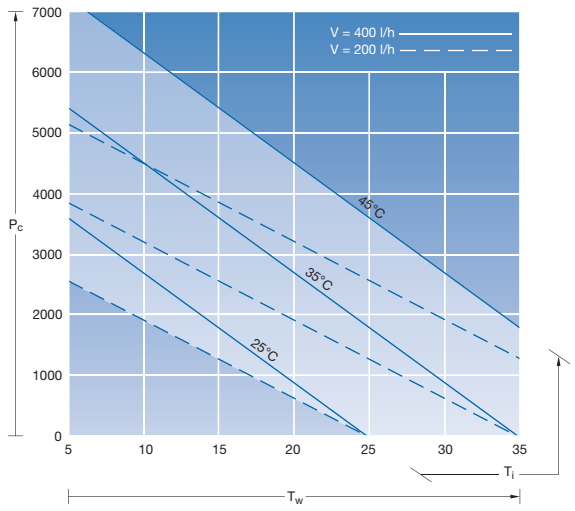


T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Wall-mounted air/water heat exchangers

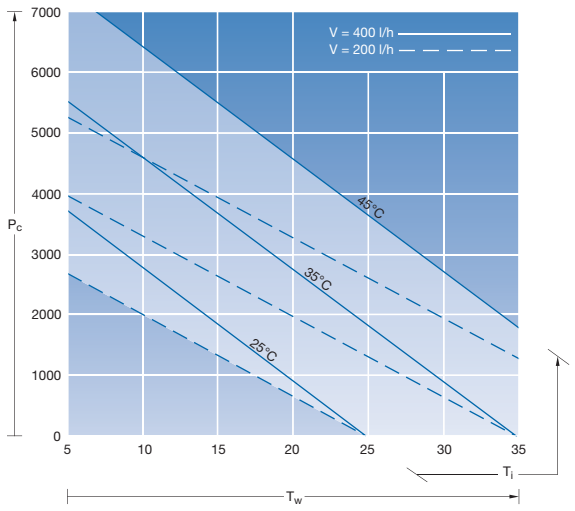
Output class 4000 W
Water-carrying parts: Stainless steel (1.4571)

50 Hz
SK 3375.504



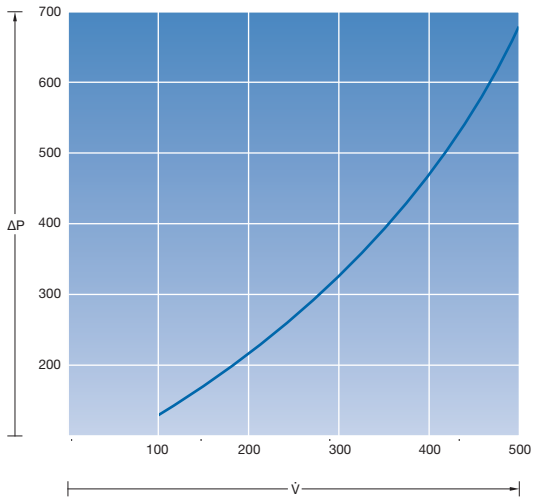
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3375.504



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3375.504

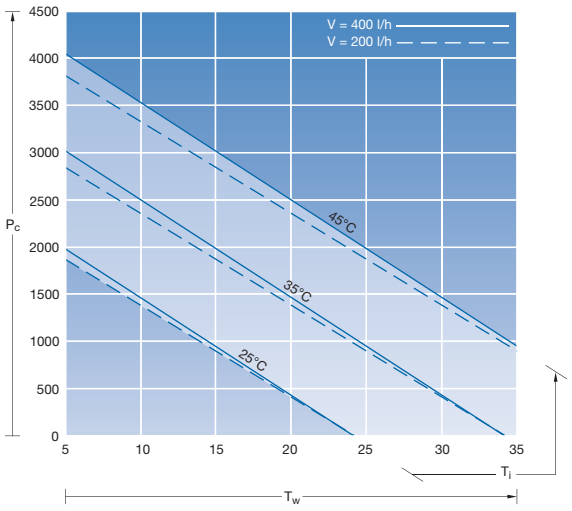


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Roof-mounted air/water heat exchangers

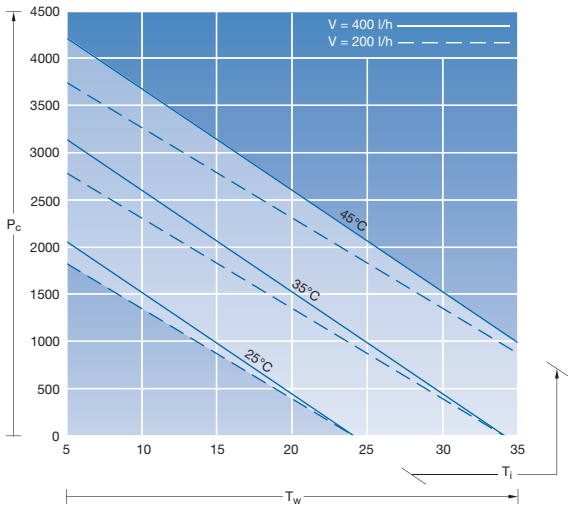
Output class 2500 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz
SK 3209.100, .500



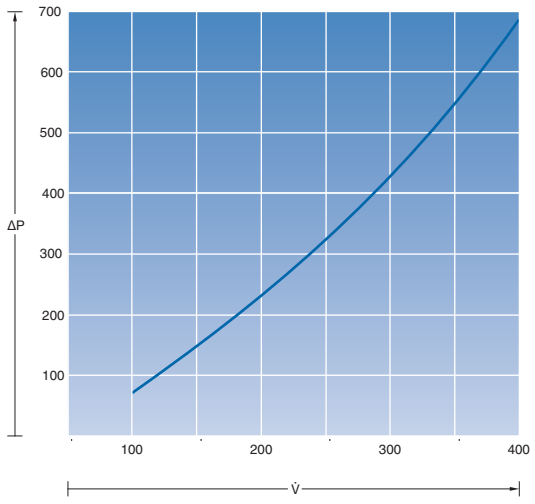
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3209.100, .500



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3209.100, .500

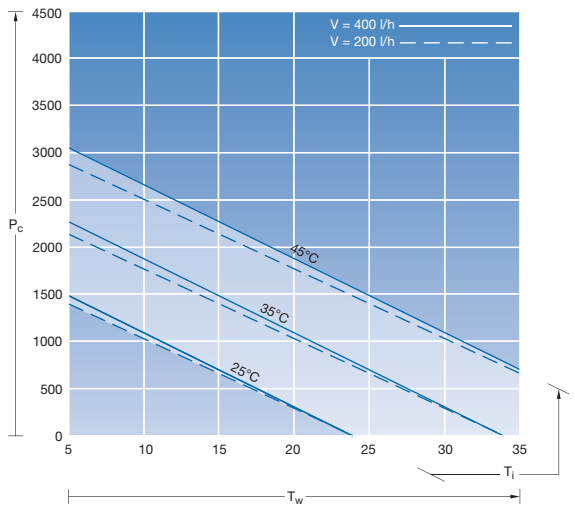


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Roof-mounted air/water heat exchangers

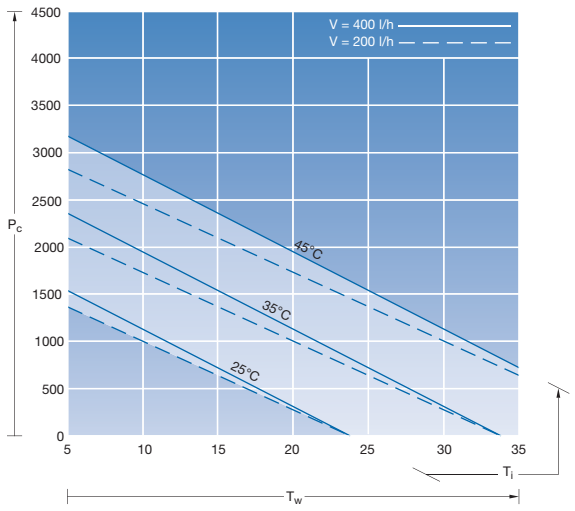
Output class 1875 W
Water-carrying parts: Stainless steel (1.4571)

50 Hz
SK 3209.504



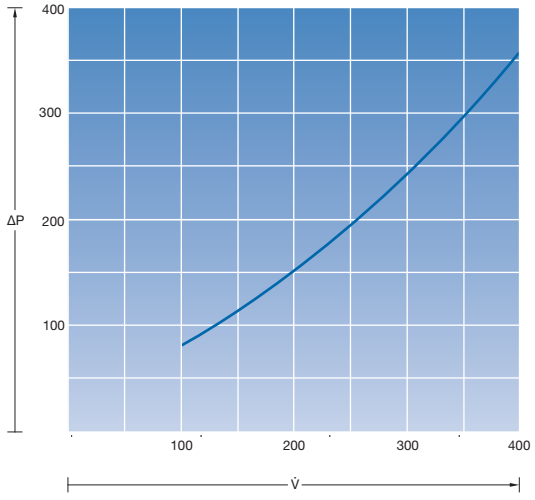
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3209.504



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3209.504

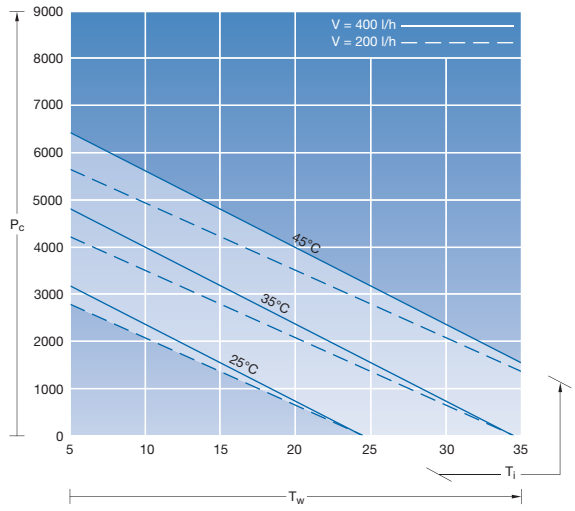


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Roof-mounted air/water heat exchangers

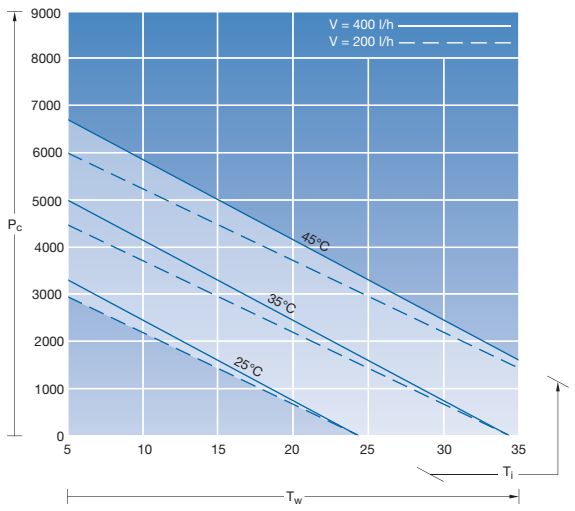
Output class 4000 W
Water-carrying parts: Copper/brass (Cu/CuZn)

50 Hz
SK 3210.100, .500



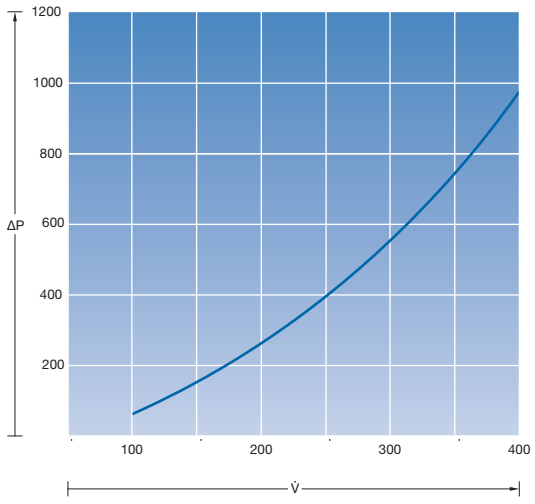
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3210.100, .500



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3210.100, .500

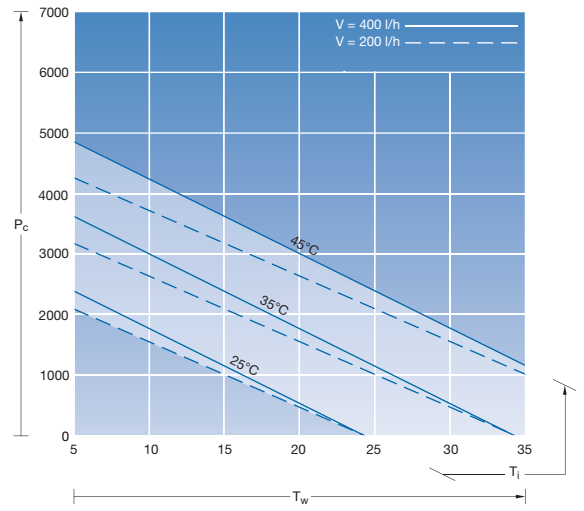


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Roof-mounted air/water heat exchangers

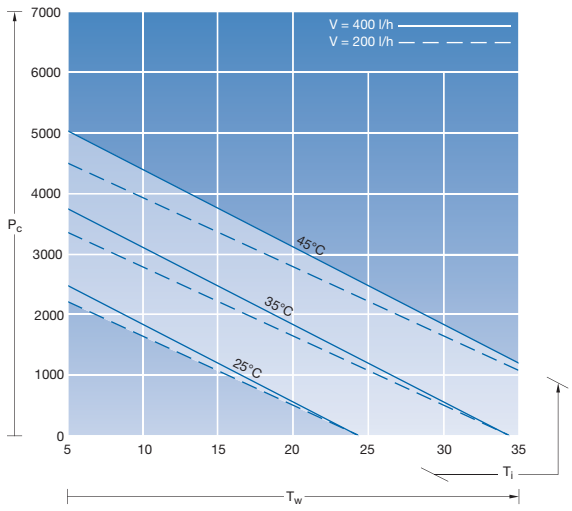
Output class 3000 W
Water-carrying parts: Stainless steel (1.4571)

50 Hz
SK 3210.504



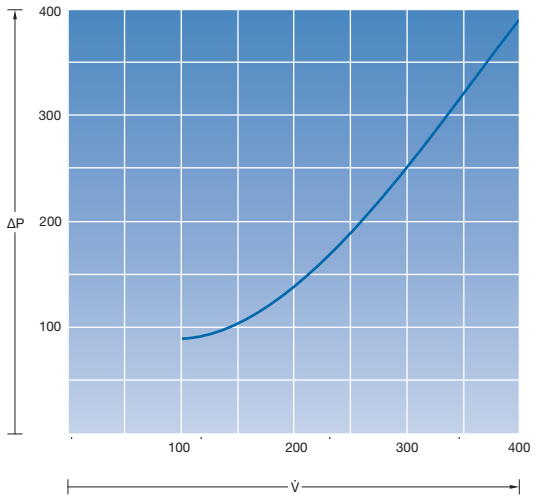
T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

60 Hz
SK 3210.504



T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

Water resistance diagram
SK 3210.504

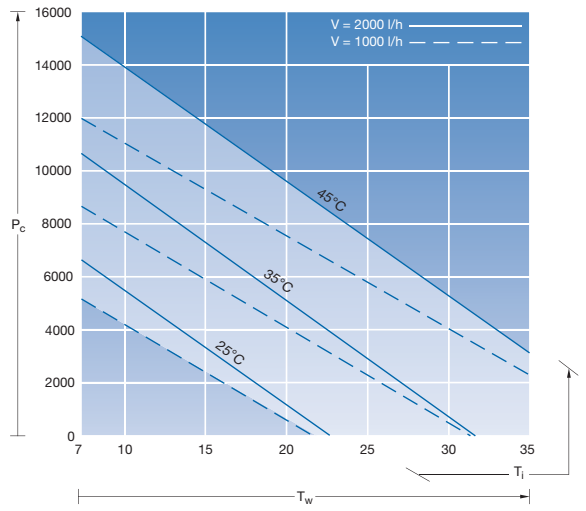


$\dot{V}$ = Volumetric flow (l/h)
ΔP = Water resistance (mbar)

Liquid Cooling Package

Output class 10 kW, LCP Rack Industry
Water-carrying parts: Copper/brass (Cu/CuZn)

50/60 Hz
SK 3378.200, .280

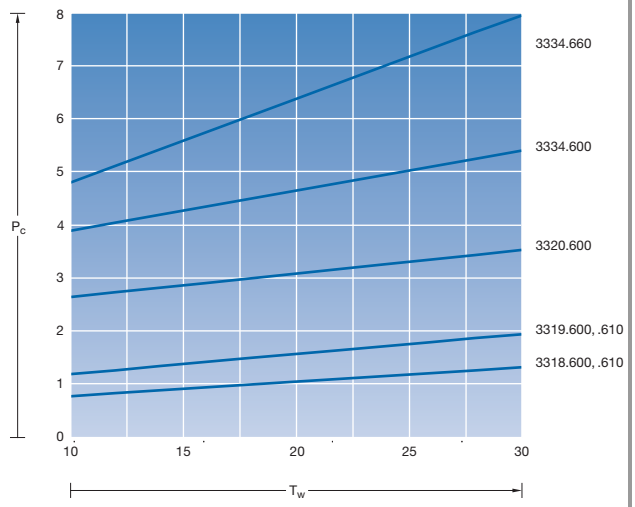


T_w = Water inlet temperature (°C)
P_c = Total cooling output (W)
T_i = Enclosure internal temperature (°C)

TopTherm chillers

Output class 1 – 6 kW

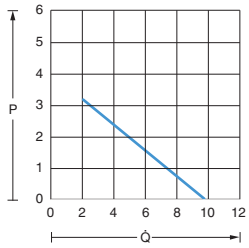
50 Hz at T_u = 32 °C
SK 3318.600, .610, 3319.600, .610, 3320.600, 3334.600, .660



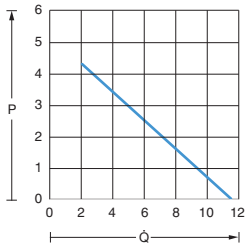
T_w = Water inlet temperature (°C)
T_u = Ambient temperature (°C)
P_c = Total cooling output (kW)

Characteristic curves of pump
SK 3318.600/SK 3318.610/SK 3319.600/SK 3319.610

50 Hz

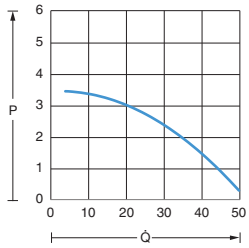


60 Hz

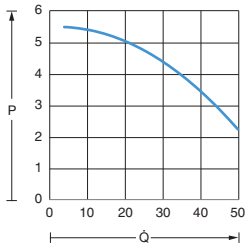


SK 3320.600/SK 3334.600/SK 3334.660

50 Hz



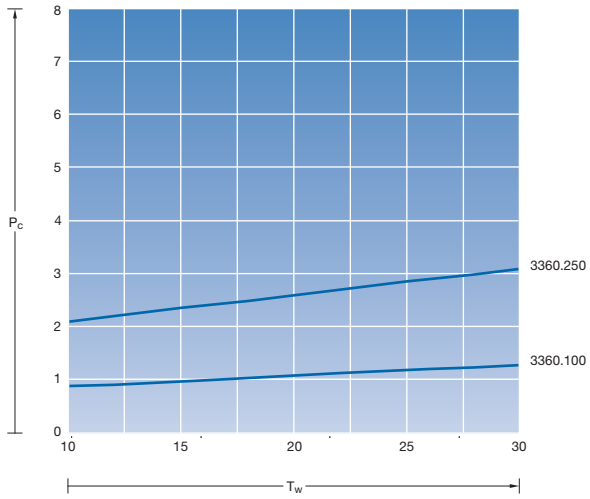
60 Hz



P = External static pressure [bar]
Q̇ = Delivery flow Q [l/min]

Output class 1 – 2.5 kW, wall-mounted

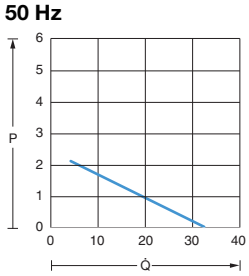
50 Hz at T_u = 32 °C
SK 3360.100, .250



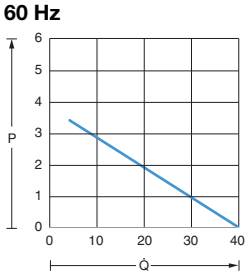
T_w = Water inlet temperature (°C)
T_u = Ambient temperature (°C)
P_c = Total cooling output (kW)

Characteristic curves of pump
SK 3360.100/SK 3360.250

50 Hz



60 Hz

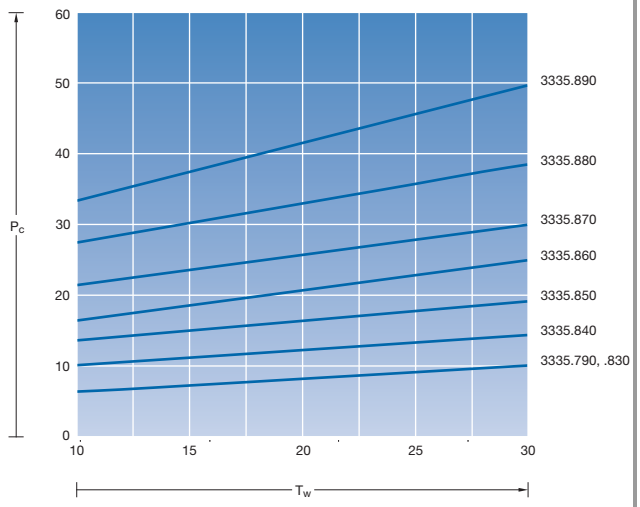


P = External static pressure [bar]
Q̇ = Delivery flow Q [l/min]

TopTherm chillers

Output class 8 – 40 kW

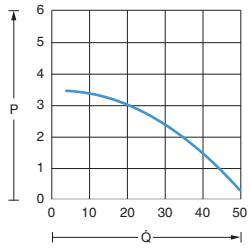
50 Hz at T_u = 32 °C
SK 3335.790, .830, .840, .850, .860, .870, .880, .890



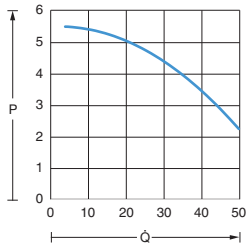
T_w = Water inlet temperature (°C)
T_u = Ambient temperature (°C)
P_c = Total cooling output (kW)

Characteristic curves of pump
SK 3335.790/SK 3335.830

50 Hz

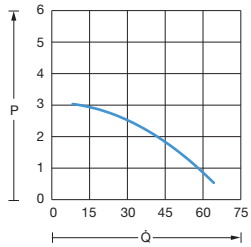


60 Hz

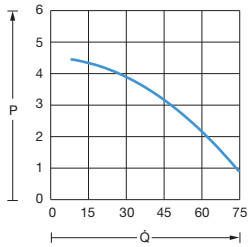


SK 3335.840

50 Hz

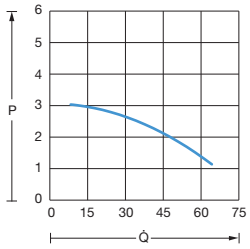


60 Hz

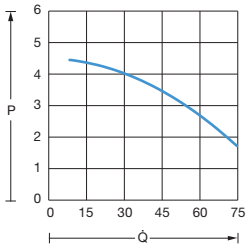


Characteristic curves of pump
SK 3335.850

50 Hz

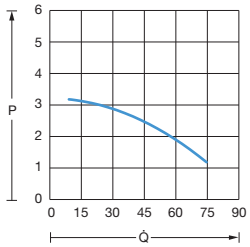


60 Hz

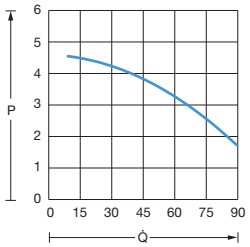


SK 3335.860

50 Hz

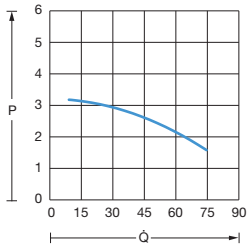


60 Hz

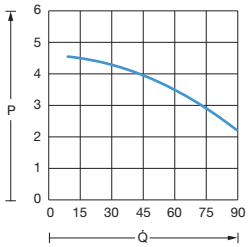


SK 3335.870

50 Hz

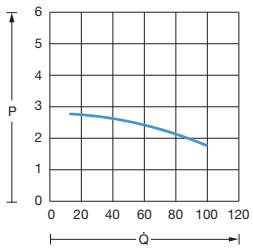


60 Hz

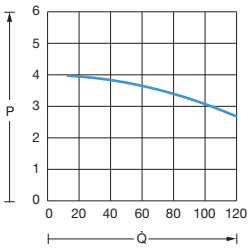


SK 3335.880

50 Hz

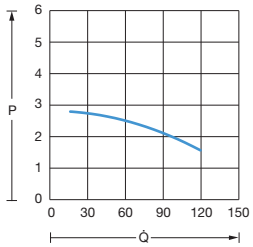


60 Hz

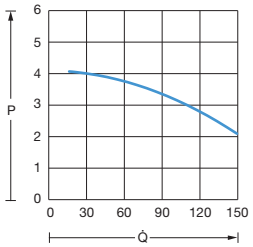


SK 3335.890

50 Hz



60 Hz

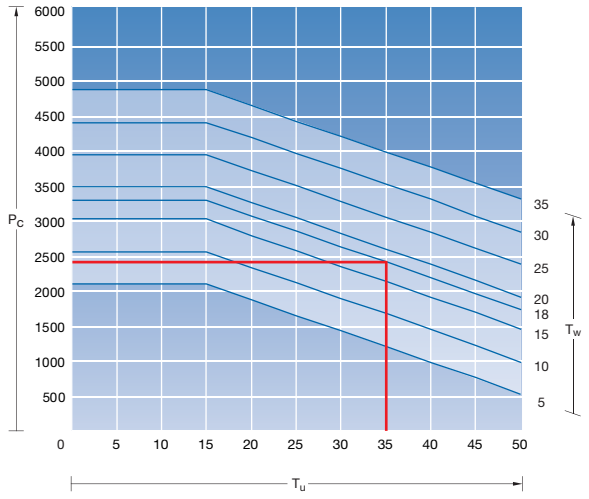


P = External static pressure [bar]
Q̇ = Delivery flow Q [l/min]

Blue e+ chillers

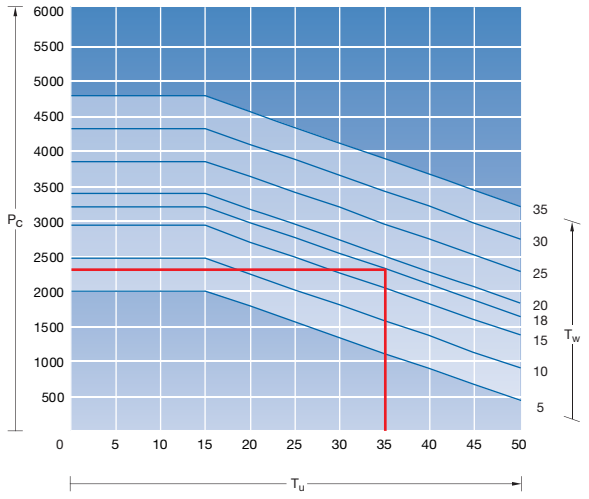
Output class 2.5 kW

50 Hz
SK 3320.200



T_w = Water inlet temperature [°C]
P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

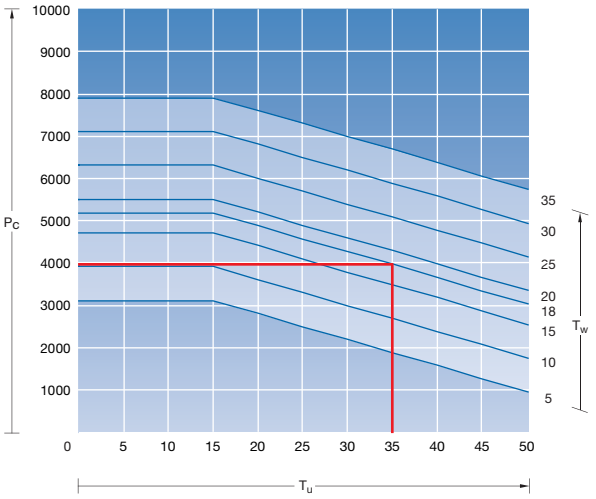
60 Hz
SK 3320.200



T_w = Water inlet temperature [°C]
P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

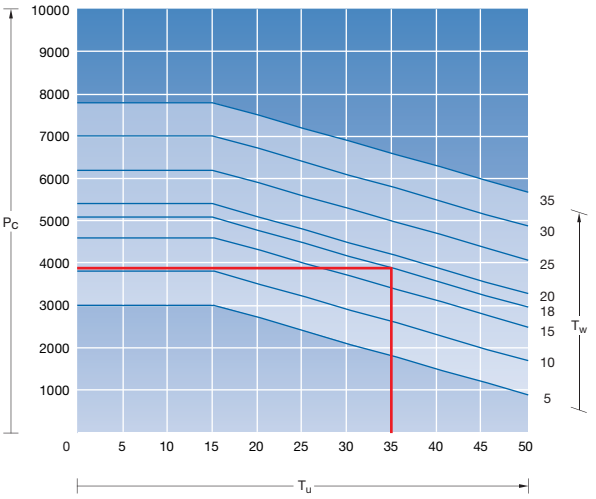
Output class 4.0 kW

50 Hz
SK 3334.300



T_w = Water inlet temperature [°C]
P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

60 Hz
SK 3334.300

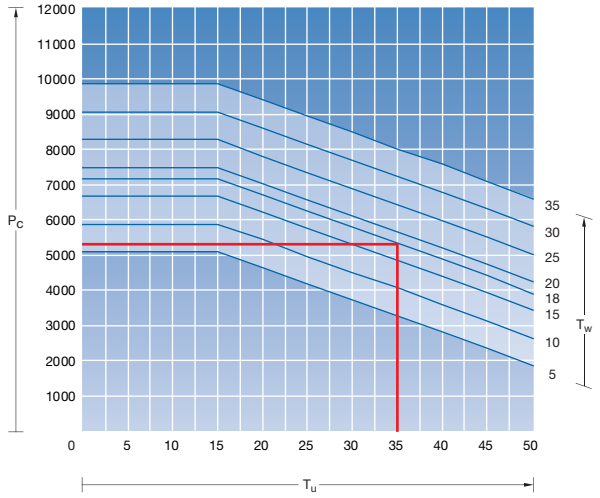


T_w = Water inlet temperature [°C]
P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

Blue e+ chillers

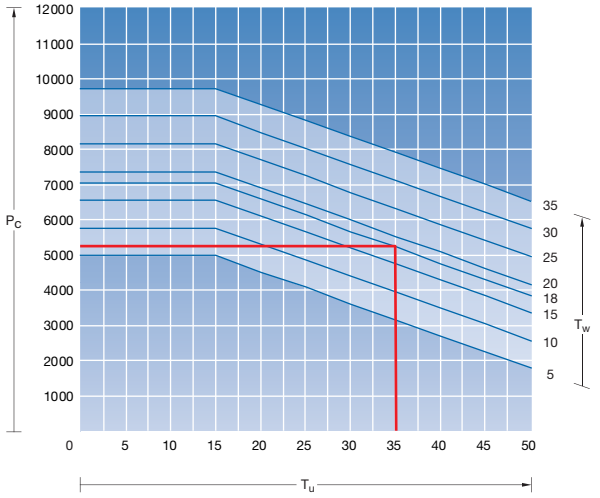
Output class 5.5 kW

50 Hz
SK 3334.400



T_w = Water inlet temperature [°C]
P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

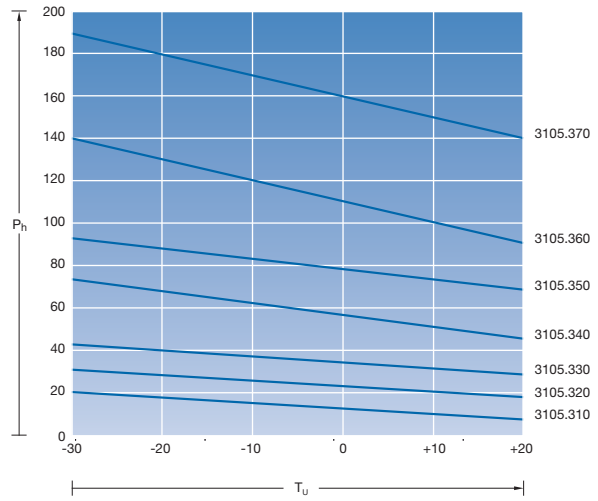
60 Hz
SK 3334.400



T_w = Water inlet temperature [°C]
P_c = Total cooling output [W]
T_u = Ambient temperature [°C]

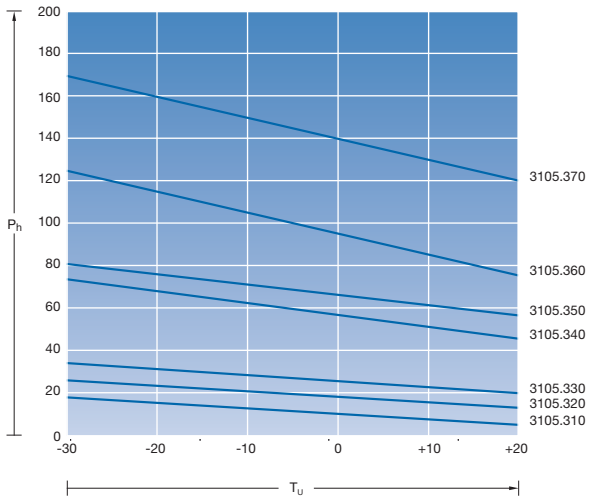
Enclosure heaters without fan

Heating output 230 V



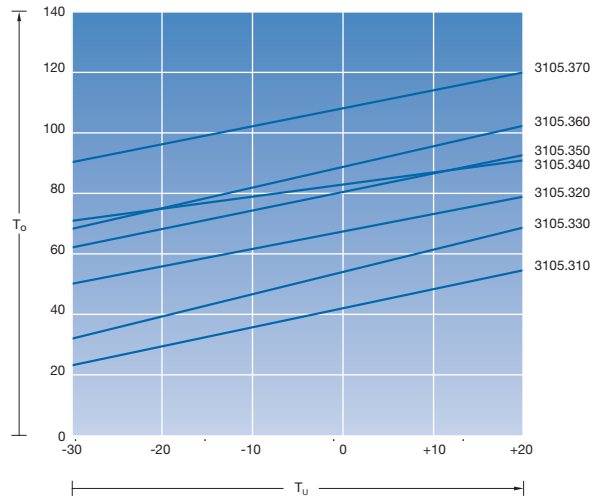
T_u = Ambient temperature (°C)
P_h = Heating output (W)

Heating output 110 V



T_u = Ambient temperature (°C)
P_h = Heating output (W)

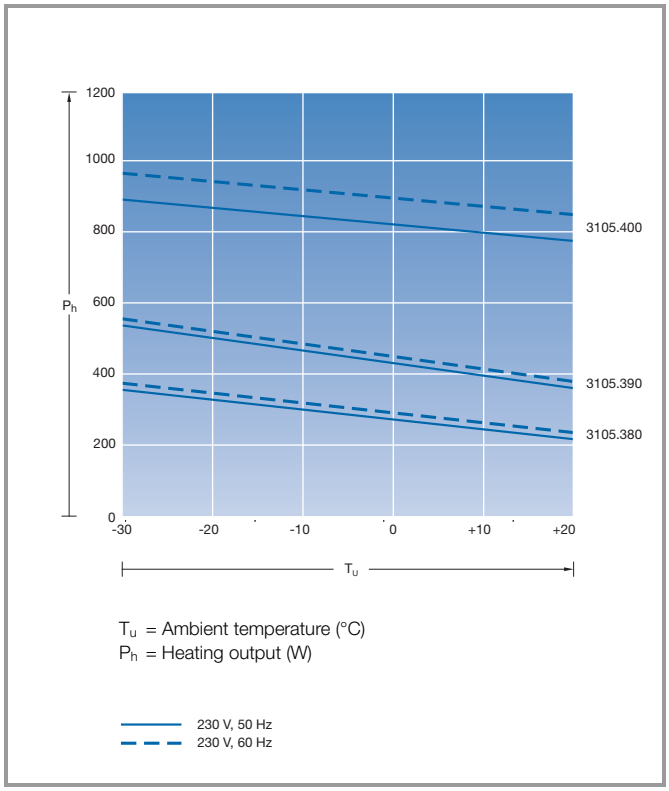
Maximum surface temperature



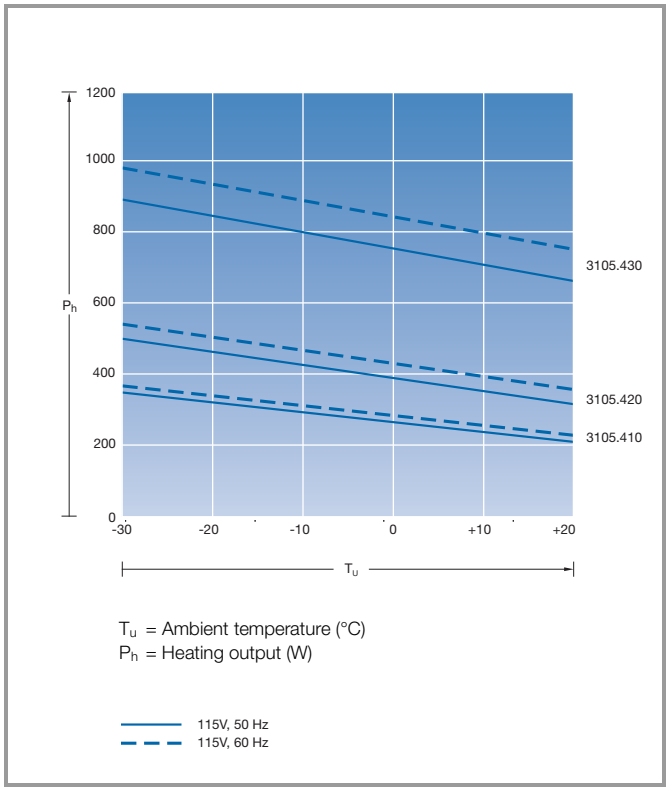
T_u = Ambient temperature (°C)
T_o = Surface temperature (°C)

Enclosure heaters with fan

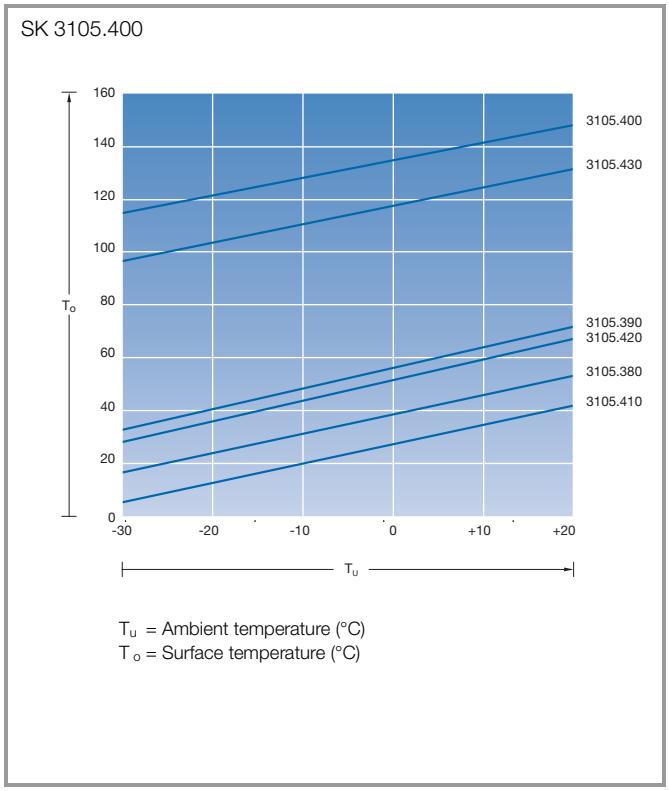
Heating output 230 V, 50/60 Hz



Heating output 115 V, 50/60 Hz



Maximum surface temperature



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XWW000079EN1901

Uninterruptible power supply - QUINT-UPS/ 24DC/ 24DC/40 - 2320241

Uninterruptible power supply with IQ technology for DIN rail mounting, input: 24 V DC, output: 24 V DC/40 A, including mounted universal DIN rail adapter UTA 107/30

We herewith declare the compliance of this product with the Chinese marking requirements set forth in the “Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products” (Order No. 32 of the MITT, etc.) and SJ/T 11364-2014 marking for the restriction of the use of hazardous substances in electrical and electronic product.

This product can be recycled and used safely during its environmentally friendly use period.



The Environmentally Friendly Use Period (EFUP) for the product is 25 years, unless otherwise marked. The Environmentally Friendly Use Period is valid only when the product is operated under the conditions defined in the product documentation.

This product should be recycled after its environmental protection use period has expired because it may contain substances or elements as shown in the following table:

	Hazardous Substance					
Part Name	**Lead (Pb)**	**Mercury (Hg)**	**Cadmium (Cd)**	**Hexavalent Chromium (Cr(VI))**	**Polybrominated biphenyls (PBB)**	**Polybrominated diphenyl ethers (PBDE)**
Electronic supplement[1]	X	O	O	O	O	O

This table is prepared in accordance with the provisions of SJ/T 11364.

O: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572

X: Indicates that said hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572

The table shows where these substances may be found in this Electrical and Electronic Product.

[1]) Electronic supplement includes additional parts which are not independent devices and are delivered with this article, for example a memory card for a controller.

Declaration of compliance with China RoHS – Devices

The information on substances corresponds to our present knowledge as well as the status of legislation mentioned in this declaration on the date of issue. In this respect we specifically take the statements and indications of our suppliers and service providers as a basis.

Issued at 2018-02-15 by:

Phoenix Contact GmbH & Co. KG
Flachsmarktstr. 8
32825 Blomberg
Germany

Phone: +49 52 35/3-00
Fax: +49 52 35/3-4 12 00

www.phoenixcontact.net/product/2320241
Download this document

Should you have any further questions please contact: DE-product_compliance@phoenixcontact.com

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Declaration of compliance with China RoHS – Devices

Energy storage - UPS-BAT/VRLA/24DC/12AH - 2320322

Energy storage device, lead AGM, VRLA technology, 24 V DC, 12 Ah, tool-free battery replacement, automatic detection, and communication with QUINT UPS-IQ

We herewith declare the compliance of this product with the Chinese marking requirements set forth in the “Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products” (Order No. 32 of the MITT, etc.) and SJ/T 11364-2014 marking for the restriction of the use of hazardous substances in electrical and electronic product.

This product can be recycled and used safely during its environmentally friendly use period.



The Environmentally Friendly Use Period (EFUP) for the product is 3 years, unless otherwise marked. The Environmentally Friendly Use Period is valid only when the product is operated under the conditions defined in the product documentation.

This product should be recycled after its environmental protection use period has expired because it may contain substances or elements as shown in the following table:

	Hazardous Substance					
Part Name	**Lead (Pb)**	**Mercury (Hg)**	**Cadmium (Cd)**	**Hexavalent Chromium (Cr(VI))**	**Polybrominated biphenyls (PBB)**	**Polybrominated diphenyl ethers (PBDE)**
Battery	O	O	O	O	O	O
PCB (printed circuit board)[1]	X	O	O	O	O	O

This table is prepared in accordance with the provisions of SJ/T 11364.

O: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572

X: Indicates that said hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572

The table shows where these substances may be found in this Electrical and Electronic Product.

[1]) Printed circuit board includes a printed circuit board and its components.

Declaration of compliance with China RoHS – Devices

The information on substances corresponds to our present knowledge as well as the status of legislation mentioned in this declaration on the date of issue. In this respect we specifically take the statements and indications of our suppliers and service providers as a basis.

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Flachsmarktstr. 8
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Germany

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Declaration of compliance with China RoHS – Devices

Power supply unit - TRIO-PS/3AC/24DC/40 - 2866404

Primary-switched TRIO POWER power supply for DIN rail mounting, input: 3-phase, output: 24 V DC/40 A

We herewith declare the compliance of this product with the Chinese marking requirements set forth in the “Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products” (Order No. 32 of the MITT, etc.) and SJ/T 11364-2014 marking for the restriction of the use of hazardous substances in electrical and electronic product.

This product can be recycled and used safely during its environmentally friendly use period.



The Environmentally Friendly Use Period (EFUP) for the product is 25 years, unless otherwise marked. The Environmentally Friendly Use Period is valid only when the product is operated under the conditions defined in the product documentation.

This product should be recycled after its environmental protection use period has expired because it may contain substances or elements as shown in the following table:

	Hazardous Substance					
Part Name	**Lead (Pb)**	**Mercury (Hg)**	**Cadmium (Cd)**	**Hexavalent Chromium (Cr(VI))**	**Polybrominated biphenyls (PBB)**	**Polybrominated diphenyl ethers (PBDE)**
Electronic supplement[1]	X	O	O	O	O	O

This table is prepared in accordance with the provisions of SJ/T 11364.

O: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572

X: Indicates that said hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572

The table shows where these substances may be found in this Electrical and Electronic Product.

[1]) Electronic supplement includes additional parts which are not independent devices and are delivered with this article, for example a memory card for a controller.

Declaration of compliance with China RoHS – Devices

The information on substances corresponds to our present knowledge as well as the status of legislation mentioned in this declaration on the date of issue. In this respect we specifically take the statements and indications of our suppliers and service providers as a basis.

Issued at 2018-02-15 by:

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Fax: +49 52 35/3-4 12 00

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SIEMENS

DE/EN

EG-Konformitätserklärung
EC Declaration of Conformity

Nr. Select-A1-3

Hersteller: *Manufacturer:*	Siemens Aktiengesellschaft Österreich Siemens Industrial Manufacturing, Engineering and Applications (SIMEA)
Anschrift: *Address:*	Siemensstraße 90 1210 Wien, Österreich
Produkt-bezeichnung: *Productdescription*	SITOP Stromversorgung / power supply PSE200U 6EP1961-2BA10, 6EP1961-2BA11, 6EP1961-2BA31, 6EP1961-2BA51 6EP1961-2BA20, 6EP1961-2BA21, 6EP1961-2BA41, 6EP1961-2BA61

Das bezeichnete Produkt stimmt in der von uns in Verkehr gebrachten Ausführung mit den Vorschriften folgender Europäischer Richtlinien überein:
The product described above in the form as delivered is in conformity with the provisions of the following European Directives:

2014/30/EU Richtlinie des europäischen Parlaments und des Rates zur Harmonisierung der Rechtsvorschriften der Mitgliedsstaaten über die Elektromagnetische Verträglichkeit.
Directive of the European Parliament and of the council on the harmonisation of the laws of the Member States relating to electromagnetic compatibility

2011/65/EU RICHTLINIE DES EUROPÄISCHEN PARLAMENTS UND DES RATES vom 8. Juni 2011 zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro – und Elektronikgeräten
DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment

Die Konformität mit den Richtlinien wird nachgewiesen durch die Einhaltung folgender Normen:
Conformity to the Directives is assured through the application of the following standards:

Referenznummer Reference number	Ausgabedatum Date of issue
EN 61000-6-2	2005
EN 61000-6-3	2007+A1:2011

Anhang/Annex Ex
Anhang/Annex multilingual

Wien / *Vienna*, den / *the* 20.07.2017

Siemens AG Österreich

Fr. Gamsjäger SIMEA	Hr. Kogard SIMEA PD-PA PLM2
i. V.	i. V. H. Kogard
Name, Funktion *Name, function*	Unterschrift *Signature*
Name, Funktion *Name, function*	Unterschrift *Signature*

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, ist jedoch keine Beschaffenheits- oder Haltbarkeitsgarantie. Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.
This declaration certifies the conformity to the specified directives but contains no assurance of properties. The safety documentation accompanying the product shall be considered in detail.

SIEMENS

Anhang EX zur EG-Konformitätserklärung
Annex EX to the EC - Declaration of Conformity

Nr. Select-A1-3

Produktbezeichnung: SITOP Stromversorgung / power supply PSE200U
6EP1961-2BA10, 6EP1961-2BA11, 6EP1961-2BA31, 6EP1961-2BA51
6EP1961-2BA20, 6EP1961-2BA21, 6EP1961-2BA41, 6EP1961-2BA61

Die Übereinstimmung des bezeichneten Produkts mit den Vorschriften der Richtlinie 2014/34/EU wird nachgewiesen durch die vollständige Einhaltung folgender Normen:
The conformity of the designated product with the provisions of Directive 2014/34/EU is proved by full compliance with the following standards:

Harmonisierte Europäische Normen:
Harmonised European standards:

Referenznummer Reference number	Ausgabedatum Date of issue	Referenznummer Reference number	Ausgabedatum Date of issue
EN 60079 - 15	2010.....	.....	.....
EN 60079 - 0	2012 + A11:2013	.....	.....

Name der zertifizierten Prüfstelle:
Bureau Veritas Consumer Product Services Germany GmbH
Business Park A96
D-86842 Türkheim
Germany

Zertifikat Nr: EPS 09 ATEX 1 169 X

Besondere Bedingungen / special conditions:

1) Die Stromversorgung ist in einem geeigneten Übergehäuse mit einem Schutzgrad von min. IP54 zu installieren, welches die Umgebungsbedingungen unter denen das Produkt betrieben wird, berücksichtigt.
The power supply types shall be installed in a suitable enclosure with a degree of protection of min. IP 54 taking into account, the environmental conditions under which the equipment will be used.

2) An den Ausgangsstromkreis dürfen nur Geräte angeschlossen werden, welche für den Betrieb in explosionsgefährdeten Bereichen der Zone 2 und die am Einsatzort vorliegenden Bedingungen geeignet sind.
Devices connected to the output shall be suitable for utilization in potentially explosive atmospheres of zone 2 as well as for the conditions at the field installation.

3) Vor Öffnen des umgebenden Schaltschrankes muss die Versorgungsspannung des Gerätes unterbrochen sein.
Before opening the enclosure the supply voltage of the device has to be disconnecte

4) Die zulässige Umgebungstemperatur beträgt -25° bis +60°C (70°C mit Derating).
The max. ambient range is: -25°...+60°C (70°C with derating)

Technical Data Sheet
ANTIFROGEN® N

HEAT TRANSFER FLUID



Product Description

Antifrogen N is a versatile, ethylene glycol based coolant and heat transfer fluid with highly efficient anti-corrosion additives.
Antifrogen N mixed with water offers reliable and long-lasting protection from frost, corrosion and deposits for closed heating and cooling systems and is used in a wide range of applications such as in HVAC, temperature control of industrial processes or component cooling in manufacturing technology.

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4132 Muttenz
Switzerland

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- Appearance: yellow liquid
- Ethylene glycol based
- Contains highly efficient corrosion inhibitors
- Fulfills and exceeds ASTM D 1384-05 corrosion test standard
- Corrosion inhibition free of borates, phosphates, nitrites, amines, silicates and CMR-substances (cancerogenic, mutagenic and reprotoxic)
- Minimum usage concentration: 20 % v/v Antifrogen N in water (corresponds to freezing point of ca. -9 °C)
- Permanent usage temperatures: ca. -50 °C to +150 °C
- Produced exclusively with high quality, pure glycol. No recycled glycol
- Available in both concentrate and various water mixtures

Applications

Antifrogen N is used as heat transfer fluid, antifreeze and corrosion inhibitor in closed cooling and heating systems (chillers, chilled water air-conditioning systems, re-coolers, heat pumps, heating circuits prone to frost, etc.) for various applications:

- Heating, ventilation and air conditioning – HVAC (shopping malls, clinics, hotels, office buildings, production, storage and exhbitions halls, data centers)
- Process cooling in chemical and plastic processing industry (injection moulding, thermoforming, blow moulding)
- Industrial heat recovery
- Dissipation of heat loads from CNC machines used in production engineering (spindle cooling, laser cooling, converter cooling)
- Cooling of frequency converters in trains, wind turbines, solar parks
- Under-soil heating systems
- Refrigeration of ice rinks

Technical Data[1]

Antifrogen N Concentrate

Basic composition	ethylene glycol, water, corrosion inhibitors	
Appearance	clear, yellow liquid	
Odor	almost odorless	
Density (20 °C)	1.114 g/cm³	DIN 51757
Refractive index (20 °C)	1.432	DIN 51423 part 2
pH value (20 °C, 33 %v/v in DI-water)	ca. 8	DIN 19268
Reserve alkalinity	min. 4 ml 0.1 M HCl	ASTM D 1121
Kin. viscosity (20 °C)	20 mm²/s	DIN 51562
Surface tension (20 °C, 33 %v/v in DI-water)	35 mN/m	DIN EN 14370
Electr. conductivity (25 °C, 33 %v/v in DI-water)	ca. 3000 µS/cm	DIN EN 27888
Boiling point (1013 mbar)	166 °C	ASTM D 1120
Flash point	119 °C	ASTM D 6450

[1] These characteristics are for guidance only and not to be taken as product specifications.

For further physical data, please see the **Antifrogen Online Calculator** on www.antifrogen.com.

Corrosion Protection

Antifrogen N contains a highly efficient combination of corrosion inhibitors which provide long-term corrosion protection for the metals of the cooling and heating installations by forming a thin protective film on the metal surface. In addition, Antifrogen N stabilizes the pH value of the liquid and keeps it within the optimal range. Metals such as carbon steel, brass, copper, cast iron, cast aluminum and many other metal alloys are thus protected against corrosion for many years.

To determine the efficiency of corrosion inhibitors in heat transfer fluids, the corrosion test ASTM D 1384 (88 °C, 6 l/h air, 336 h, synthetic corrosive water for dilution) has become established. The following table shows the results of Antifrogen N compared to ethylene glycol without any corrosion inhibitors.

Average change in weight of metals in g/m² due to corrosion, tested according to ASTM D 1384 (88 °C, 6 l/h air, synthetic corrosive water for dilution)

Metal	33 % v/v Antifrogen N in water (336 h)	33 % v/v Antifrogen N in water (3000 h)	33 % v/v Ethylene glycol without additives in water (336 h)	Limits[2]
Copper (SF Cu)	**-0.3**	**-0.6**	**-2.8**	**3.6**
Soft Solder (WL 30)	**-0.9**	**-1.0**	**-135**	**11.2**
Brass (MS 63)	**-0.5**	**-0.6**	**-7.6**	**3.6**
Steel (C15)	**-0.1**	**-0.2**	**-152**	**3.6**
Cast iron (CG 22)	**-0.2**	**-1.0**	**-273**	**3.5**
Cast aluminium (AlSi6Cu3)	**-0.6**	**-0.6**	**-16**	**10.4**

[2] maximum permitted weight changes acc. to ASTM D 3306-05 (for 336 h)

Antifrogen N shows superior performance in corrosion protection even after an extended test period of 3000 hours. The minimal weight losses of the tested metals and alloys confirm the suitability of Antifrogen N for long-term operation.

In contrast, **ethylene glycol-water mixtures without the addition of inhibitors** cannot be used due to their highly corrosive properties.

Galvanized components should be **avoided** if possible, as all glycol-water mixtures can dissolve zinc.

Frost Protection

The anti-freeze agent used in Antifrogen N is ethylene glycol. The frost protection depends on the mixing ratio with water (see table below).

Antifrogen N in water	Freezing point (ASTM D 1177)	Pour Point (DIN EN 23015)	Density, 20 °C (DIN 51757)	nD20 (DIN 51423)
20 % v/v	-9 °C	ca. -13 °C	1.028 g/cm³	1.355
25 % v/v	-12 °C	ca. -17 °C	1.035 g/cm³	1.360
30 % v/v	-16 °C	ca. -21 °C	1.042 g/cm³	1.365
35 % v/v	-20 °C	ca. -26 °C	1.049 g/cm³	1.371
40 % v/v	-25 °C	ca. -31 °C	1.056 g/cm³	1.376
45 % v/v	-31 °C	ca. -36 °C	1.063 g/cm³	1.381
50 % v/v	-37 °C	ca. -44 °C	1.069 g/cm³	1.387
55 % v/v	-45 °C	< -50 °C	1.075 g/cm³	1.392
60 % v/v	-53 °C	< -50 °C	1.081 g/cm³	1.397

The freezing point is the temperature at which ice crystals begin to form when cooling an Antifrogen N water mixture. If the temperature is lowered further, an ice slurry (still pumpable) is formed until the mixture eventually solidifies at the pour point. Below this temperature there is a risk of bursting for the installation.

Mixtures with an **Antifrogen N concentration of more than 60 % v/v** are **not recommended** because, as with all ethylene glycol water mixtures, the freezing point does not decrease any further from this concentration on, but rises instead.

To **determine the frost protection** of Antifrogen N water mixtures, a refractometer or an antifreeze tester suitable for ethylene glycol water mixtures (available from Antifrogen distributors) can be used for instance.

Our **Antifrogen Online Calculator** (www.antifrogen.com) assists you in calculating the amount of Antifrogen N or water needed to **increase or decrease the frost protection of your installation**. It also provides a more detailed conversion table for Antifrogen concentration – freezing point – refractive index.

Compatibility with Sealing Materials / Plastics

The plastics and elastomers listed in the following table are resistant to Antifrogen N water mixtures based on our experimental results and literature references. Please also refer to the data provided by the respective manufacturers regarding the chemical resistance of these materials.

ABS	Acrylonitrile-butadiene-styrene	**PA**	Polyamide
CPE	Polyethylene crosslinked	**PB**	Polybutene
CR	Polychlorbutadiene elastomers	**PC**	Polycarbonate
EPDM	Olefin rubber	**POM**	Polyacetal
FKM	Fluorocarbon elastomers	**PP**	Polypropylene
HR	Butyl rubber	**PTFE**	Polytetrafluorethylene
HDPE **LDPE**	Polyethylene high density Polyethylene low density	**uPVC**	Polyvinylchloride unplasticized
MFQ	Fluorosilicone rubber	**SBR**	Styrene butadien rubber up to 100 °C
NBR	Nitril rubber	**SI**	Silicone rubber
NR	Nature rubber up to 80 °C	**UP**	Polyester resins

Polyurethane elastomers (PU), flexible PVC and phenol formaldehyde resins are **not resistant**.

For pipe thread connections in which hemp is used, the application of sealing compounds such as Fermit® or Fermitol® has proven to be effective.

When sealing tapes made of polytetrafluoroethylene (PTFE) are used, leaks may occur due to the low surface tension of Antifrogen N water mixtures.

The lower surface tension and thus better wetting capacity of Antifrogen N in comparison to water can cause rust that is already present to get detached. Small corrosion damages can thus become visible as leaks when changing from water to an Antifrogen N water mixture.

Application Guidelines

1. Antifrogen N is **only to be applied in dilution with water**, for which demineralized water or tap water (chloride content: < 100 mg/kg, water hardness: 0 to 25 °dH) can be used. Concentrations lower than the **minimum concentration of 20 % v/v Antifrogen N in water** must not be used as too dilute mixtures do not provide sufficient corrosion protection and might lead to the growth of microorganisms and formation of biofilms. The maximum recommended usage concentration is 60 % v/v Antifrogen N in water. Homogeneous mixtures of water and Antifrogen N do not de-mix.
2. Antifrogen N should only be used in **closed systems** since the contact with atmospheric oxygen can affect the corrosion protection performance.
3. When installing the system, only **chloride-free solders** should be used as chloride residues can cause pitting corrosion.
4. Contact of Antifrogen N with **galvanized components** should be **avoided**, as zinc is dissolved by glycol-water mixtures. Though the steel under the zinc layer is protected by the Antifrogen N corrosion inhibitors, the zinc deposits can cause pump damage etc. in the system. To remove these deposits, the installation of a fine filter with a mesh size of approx. 100 to 150 µm has proven to be effective.
5. **Before the system is filled** with an Antifrogen N water mixture, it hast to be emptied, thoroughly rinsed with water (esp. if the system was filled with a brine or chloride containing fluid) and **checked for corrosion damages**. If necessary, **professional cleaning** (e.g. acid pickling) is recommended to remove rust, deposits or third-party products. Systems with corrosion or deposits (e.g. limescale, biofilm) present, cannot be operated corrosion-proof with Antifrogen N as the metals may be unevenly inhibited and the inhibitors may be prematurely consumed.
6. **Emptied systems** should be **refilled immediately** to avoid any risk of corrosion, even if the system is not to be put into operation until a later date.
7. **Mixing with other products must be avoided** as it can lead to corrosion, precipitations and foaming The system may only be topped up with an Antifrogen N water mixture!
8. Information about our Antifrogen Service can be found on www.antifrogen.com.

Physical Data

Physical data of Antifrogen N water mixtures are available in the **Antifrogen Online Calculator** on www.antifrogen.com.

Saftey Data Sheet

The latest Material Safety Data Sheet (MSDS) can be downloaded from www.antifrogen.com. It also contains information on storage, transport and disposal.

Antifrogen N is based on ethylene glycol and therefore classified as harmful if swallowed according to EC Regulation No. 1272/2008. It must not be used in systems where contamination of the food, pharmaceutical or drinking water areas cannot be completely excluded. For such applications, as well as for use in sprinkler systems, Antifrogen L is recommended, which is based on propylene glycol that is harmless to health.

Distributors

Antifrogen N is available as a concentrate or as a ready-to-use water mixtures from our Antifrogen distributors (see distributor overview on www.antifrogen.com).

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Power Supplies



User Manual

UPS-CONF

Order No.: -

Configuration and Management Software
UPS-CONF

Power Supplies

User Manual

Configuration and Management Software UPS-CONF

2012-07-02

Designation: UPS-CONF

Revision: 01

Order No.: -

This manual is valid for:

Designation	Order No.
UPS-CONF	2320403

Please observe the following notes

In order to ensure the safe use of the product described, you have to read and understand this manual. The following notes provide information on how to use this manual.



The pictured products do always exemplify the concerned topic.

Target audience for this documentation

The use of products described here solely addresses persons, who are qualified and familiar with electrical equipment and the appropriate and relevant safety concepts. Please also read the section titled "Qualified personnel" in the topic titled "Important safety notes (see page 10)".
Phoenix Contact accepts no liability for erroneous handling or damage to products from Phoenix Contact or third-party products resulting from disregard of information contained in this documentation.

Explanation of symbols used and signal words



DANGER
The danger symbol is used to indicate instructions where non-compliance may result in damage to hardware/software or personal injury (in indirect connection with dangerous process peripherals).



NOTE
The note symbol precedes notes that must be strictly observed in order to ensure error-free operation. It also gives you tips and advice on the efficient use of hardware and on software optimization to save you extra work.



The "Additional Details" symbol indicates cross references (hypertext links or bibliographical references) which lead to detailed descriptions of a term or additional details on the context in question.

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1 Functional overview

UPS-CONF is a management software to configure and monitor QUINT-UPS devices, that come with the IQ technology.

This technology with continuous battery monitoring and intelligent management provides you with information about the charging state, remaining runtime, and service life of your battery at all times. Intelligent communication informs you when a situation becomes critical. This reduces the amount of maintenance involved and increases your system availability.

IQ technology means

- Intelligent Battery Control: automatically detects the connected battery type and maximizes the remaining service life of the battery unit via an optimally adapted charging characteristic.
- Intelligent Battery Management: continuous status information is shown for
  - SOC (State of Charge): current charging state and remaining back-up time of the battery unit
  - SOH (State of Health): remaining life expectancy of the battery unit, provides early warning for a potential battery unit failure
  - SOF (State of Function): determines the current performance of the battery unit.
- Intelligent Charging: adapts the charging current and thereby ensures the fastest possible recharging and availability.
- Intelligent communication: the communication of UPS and PC allows configuration, extensive signaling and parameterization.



The IQ technology also works without UPS-CONF. With this software you have an easier monitoring and configurations can be done.



The UPS-CONF software is intended for a PC as well as an IPC (Industrial PC). In this documentation the term "PC" is used to address both.



The configurable QUINT-UPS device is also referred to as the "UPS" in this documentation.

Features supported by the UPS-CONF software

In order to optimally support the IQ technology, UPS-CONF provides the following features:

- Clear overview about condition of mains, battery, UPS device and connection from PC to UPS
- Automatic PC shutdown and restart functionality while the UPS runs in PC-Mode
- Start of application specific programs for system shutdown
- Configuration of switching outputs
- Chronological event logging
- Setting of customized parameters like the maximum charging current
- Choice of user interface language in the Software settings (see page 5).
  Currently supported languages: English, German



The topic titled Application samples (see page 52) guides through some typical scenarios.

2 Software setup

The UPS-CONF software has to be installed on a PC in order to configure and monitor an UPS system. If the buffered load is a PC, the UPS can be operated in the PC-Mode to additionally enable the automatic PC shutdown and restart functionality.

To setup the software, the following steps have to be executed:

1. Make sure all system requirements (see page 4) for the hardware and software are met.
2. Download and install the software (see page 5).
3. Follow the steps in the hardware setup (see page 11).
4. Start the software (see page 15).
5. Become familiar with the software settings (see page 5) supported by the UPS-CONF software and carry out the required settings.

2.1 System requirements

In order to run the UPS-CONF software, your computer must meet the following software and hardware requirements:

Software requirements

- Supported operating systems:
  - Windows 7, 32bit and 64bit
  - Windows Vista SP1
  - XP SP3 (requires .NET Framework 3.5 SP1)
- Supported browser: Internet Explorer version 6 or later

Hardware requirements		
CPU	1 GHz min. 2 GHz recommended	Windows 7 Windows Vista SP1
	Pentium III 1GHz min. 2 GHz recommended	Windows XP SP3
Main memory	1 GB RAM min. 2 GB RAM recommended	Windows 7 Windows Vista SP1
	512 MB RAM min. 1 GB RAM recommended	Windows XP SP3
Main memory used by UPS-CONF	max. 96 MB	
Hard disk drive (recommended) Hard disk used by UPS-CONF	850 MB max. 50 MB	
CD-ROM drive	not necessarily needed	
Interfaces	1 x USB 2.0	
Monitor	VGA, resolution 800 x 600 pixels minimum, 256 colors	
Network	Internet connection needed for program download	

2.2 Installation



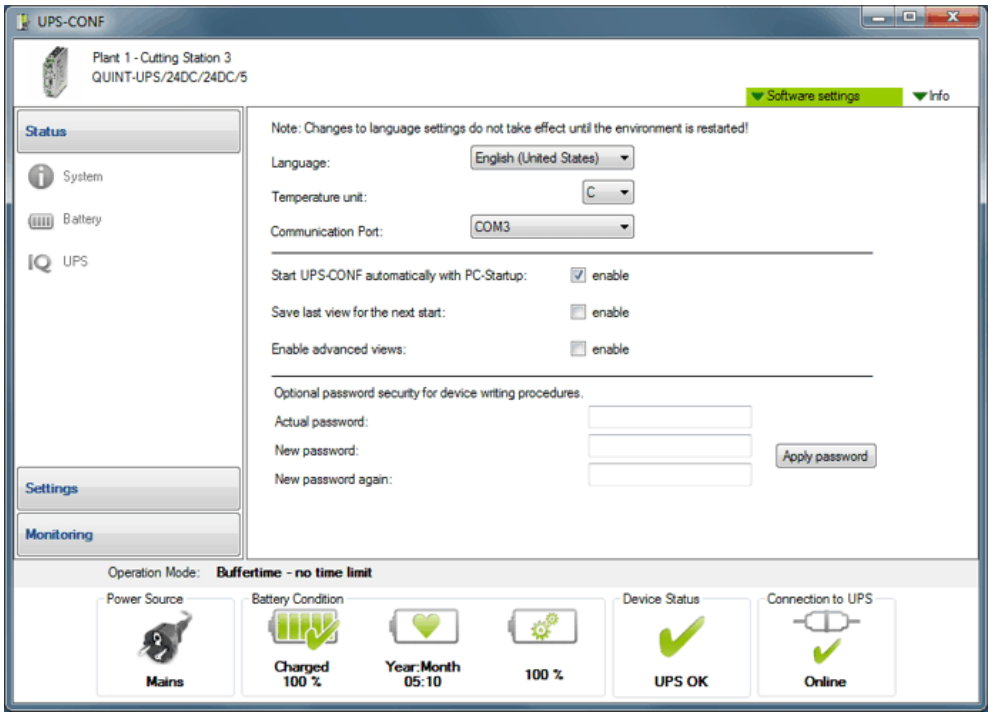
The UPS-CONF configuration and management software can be downloaded free of charge at www.phoenixcontact.net/catalog.

To install the software, proceed as follows:

1. Find UPS-CONF at www.phoenixcontact.net/catalog.
2. Save the UPS-CONF_Setup_v....exe file to the preferred download folder.
3. Make sure the IFS-USB-DATACABLE is unplugged.
4. Install UPS-CONF from the selected download folder. Simply follow the screen instructions.
   Read the EULA (End User License Agreement) carefully when it is displayed and agree it to continue the installation.
5. After having completed the UPS-CONF installation, connect the UPS device to the PC (see page 14). If required, select PC-Mode as operating mode (see page 12).
6. As soon as Windows detects the new USB hardware follow the instructions of the driver installation.

2.3 Software settings

The software settings can be shown by clicking the "Software settings" item in the system menu.



The following settings can be defined:

- Language of the user interface (English, German)

NOTE
To apply the changed language setting, you have to restart the UPS-CONF software.

- Temperature unit (Celsius, Kelvin, Fahrenheit)
- Communication (USB) port at the PC for the IFS-USB-DATACABLE (COMx)

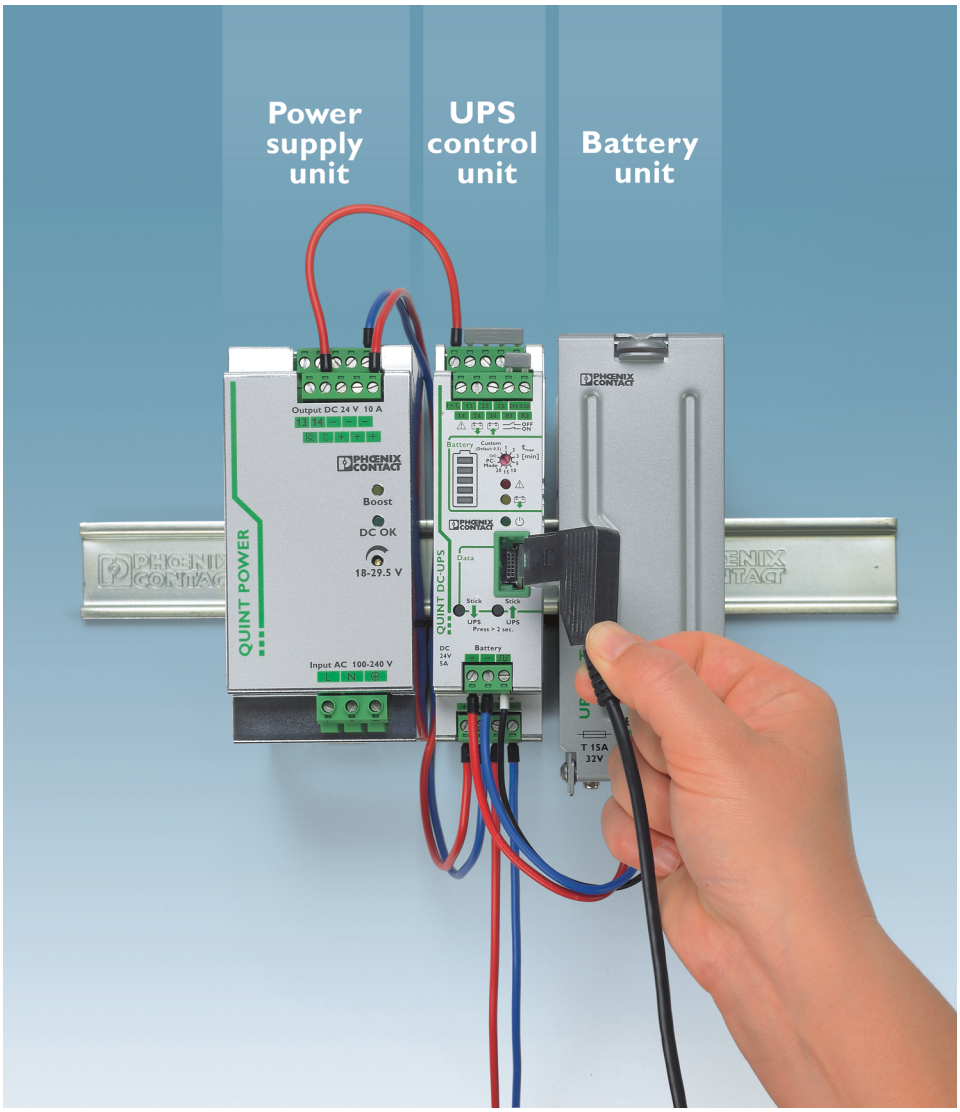
Normally, the communication port is set automatically by the UPS-CONF software when connecting the UPS devices. Under normal conditions there is no need to change this setting. If it has not been set automatically during the software installation, refer to the section Communication port (see page 56) in the Troubleshooting topic.

- Enable/disable automatic UPS-CONF startup after PC startup. This option must be checked if the UPS device shall buffer this PC.
- Restore the last view after the next software start.
- Hide or show the advanced views ("Battery Advanced" and "UPS Advanced" in the "Status" group and "Advanced" in the "Settings" group).
- An optional password, when parameters are written to the UPS device.

3 Hardware overview

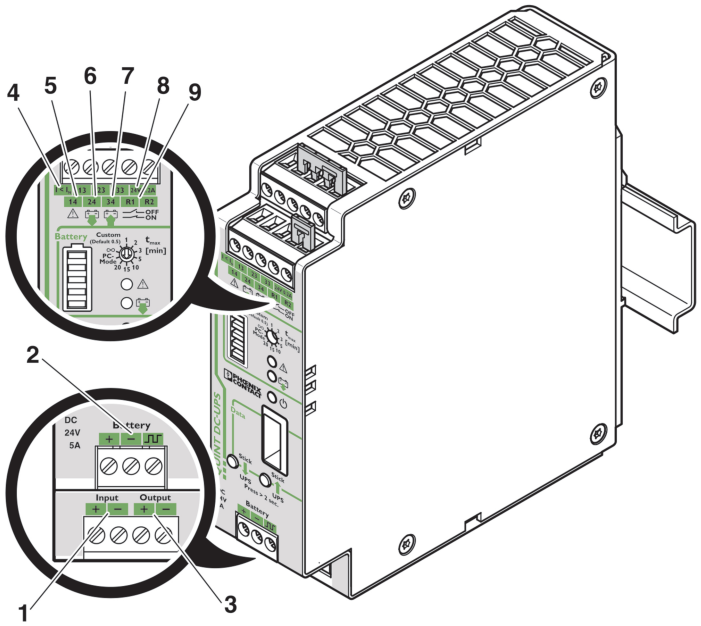
Choose your customized solution - for your application.

1. Choose your power supply.
2. Choose your UPS unit.
3. Choose your energy storage.

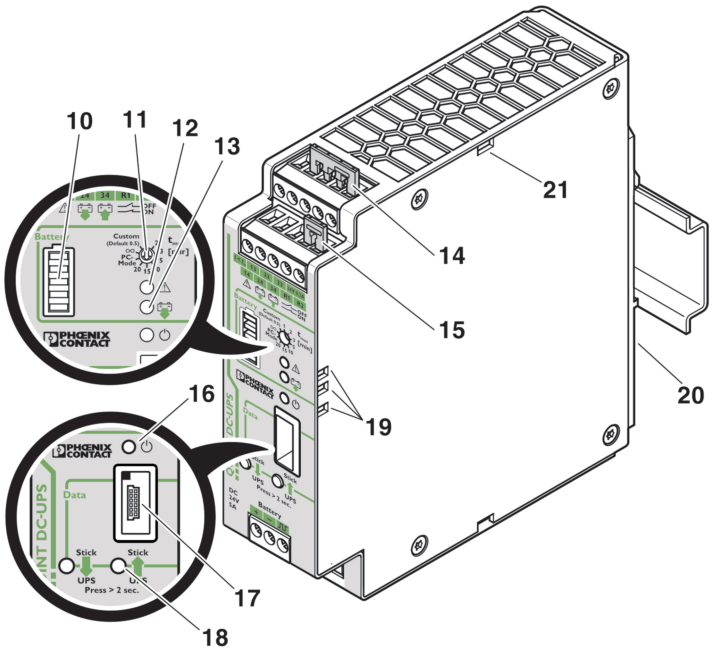


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In the next two graphics and their corresponding lists you can see the location of the main parts of the QUINT DC-UPS.



No.	Connections / Operating elements
1	DC input 18 V DC ... 30V DC
2	Power storage device connection, 24V DC (+,-, communication between UPS and power storage device)
3	DC output, 24 V DC, buffered
4	$I < I_N$, fast battery charging
5	Floating relay contact 13/14: alarm (Related parameter settings are provided in the "Reporting" view (see page 31).)
6	Floating relay contact 23/24: battery mode (Related parameter settings are provided in the "Reporting" view (see page 31).)
7	Floating relay contact 33/34 : battery charge (Related parameter settings are provided in the "Reporting" view (see page 31).)
8	24 V DC supply voltage, maximum current limit 0.2 A for the signal contacts 13, 23, 33
9	Remote control (R1, R2). (Related UPS parameter "Remote Status" (see page 27).)



No.	Connections / Operating elements
10	Bar graph for displaying the current charging state of the power storage device
11	Buffer time setting: unlimited ∞, 1 ... 20 mins., customized (customized default: 0.5), PC mode (refer to topic Buffer time selection (see page 12)).
12	Red LED: alarm (Corresponding indicators are displayed in the software's "Status" view (see page 20).)
13	Yellow LED: battery mode (Corresponding indicators are displayed in the software's "Status" view (see page 20).)
14	Plug-in bridge for signal contact supply voltages, pre-installed
15	Remote control plug-in bridge, pre-installed
16	Green LED: Power In OK, mains mode (Corresponding indicators are displayed in the software's "Status" view (see page 20).)
17	Data port (see page 13) for data linking to the PC or the use of a memory block
18	Button for use of the memory block
19	LED windows for flat mounting position
20	Universal snap-on foot for DIN rails
21	Accommodation for cable binders

3.1 Important safety notes



Please observe all the safety notes outlined in this topic when using UPS-CONF together with the QUINT-UPS device.

Requirements

Knowledge of the following is required:

- QUINT-UPS system
- UPS-CONF configuration software
- Safety regulations in the field of application

Qualified personnel

In the context of using the QUINT-UPS system and the UPS-CONF configuration software described in this documentation, the following operations may only be carried out by qualified personnel:

- Planning, configuration
- Installation, startup, servicing
- Maintenance, decommissioning

This documentation is therefore aimed at:

Qualified personnel who plan and design electrical equipment for machines and systems and are familiar with regulations governing safety in the workplace and accident prevention.

Within the context of the safety notes in this documentation, qualified personnel are persons who, because of their education, experience and instruction, and their knowledge of relevant standards, regulations, accident prevention regulations, and service conditions, have been authorized to carry out any required operations, and who are able to recognize and avoid any possible dangers.

4 Hardware setup

NOTE
Before setting up the hardware, install the software (see page 5).

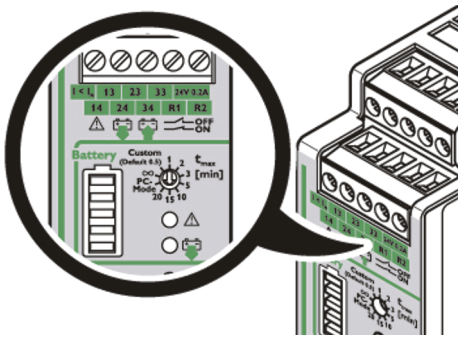
Regarding the communication with the PC and the UPS operation mode, it needs only three steps to setup the hardware:

1. Set the buffer time at the buffer time potentiometer, as described in the topic Buffer time selection. (see page 12)
2. Connect the Data port either with a PC or plug in a configuration stick, as described in the topic Data port (see page 13).
3. Connect the load to be supplied by the UPS (see technical datasheet for each QUINT-UPS).

NOTE
For further information about the hardware installation (connecting the battery module, etc.) please refer to the QUINT DC-UPS technical datasheet.

4.1 Buffer time selection

The buffer time potentiometer at the front of the QUINT-UPS has to be switched to the desired mode with a screwdriver.



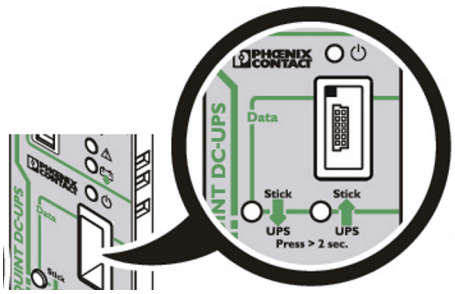
The following settings are available:

Operating mode	Description
Custom (default 0.5)	Buffer time can be set to a user-defined value; if no value is set 0.5 minutes is used, as described in the topic Custom Mode (see page 37).
1, 2, 3, 5, 10, 15, 20	Buffer time 1, 2, 3, 5, 10, 15, 20 minute(s).
PC-Mode	This mode is intended to buffer a PC and to initiate a controlled shut-down in battery mode. The buffer time depends on the "Shutdown Delay" time and on the "PC-Shutdown" time, as described in the PC-Mode (see page 38).
∞	No time limit, buffering is continued until the battery is empty (deep discharge security).

The current set buffer time is shown as "Operation mode" in the status bar (see page 17).

4.2 Data port

The Data port is located at the front of the UPS. Via this port, configuration and maintainance of the UPS is done.



The configuration can be done in 2 different ways, depending on what is connected to the Data port:

- Connect the PC (see page 14) with the installed UPS-CONF software, if you want to configure by software.
- Plug in a memory stick which is declared as configuration stick, if you want to configure by configuration stick (see page 46).

In order to perfom maintenance tasks (such as changing a battery), a service stick can be plugged into the Data port, so the UPS switches to service mode (see page 47).

4.3 Connecting the PC

A PC has to be connected to the UPS in one of the following cases:

- You want to configure or monitor the UPS by the UPS-CONF software.
- You want to display currently set QUINT-UPS parameters or modify them using UPS-CONF.
- You want to initiate a controlled PC shutdown in case of a mains failure and if battery runs low.

NOTE
First, install the software (see page 5) and then connect the PC afterwards.

To connect the PC to the QUINT-UPS, proceed as follows:

1. Connect the USB connector of the IFS-USB-DATACABLE to a free USB connector of your PC. After detecting the device, the used USB port is entered automatically in the software settings of UPS-CONF.



2. Connect the other side of the IFS-USB-DATACABLE to the Data port of the UPS:



5 Software overview

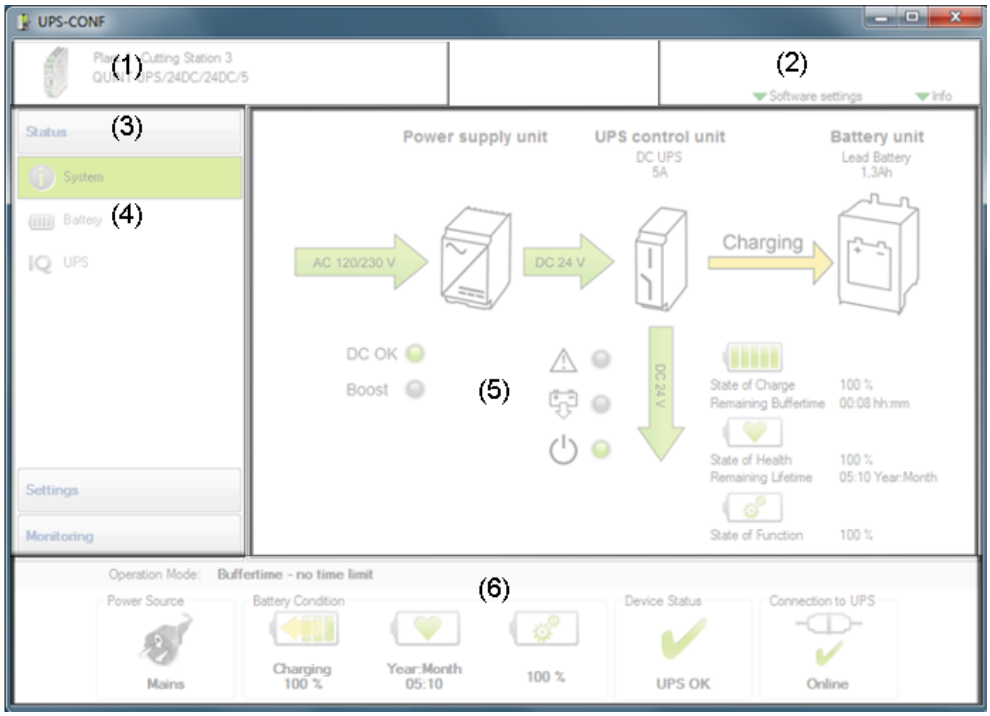
After installing the UPS-CONF software, the program starts up automatically.

As long as you do not change the related default software setting (see page 5), UPS-CONF always starts automatically after every PC reboot.

In the following sections you can get an overview about the screen areas of the UPS-CONF software and you can learn about the different status bar (see page 17) symbols and their meanings.

5.1 User interface

The screen layout consists of the following areas:



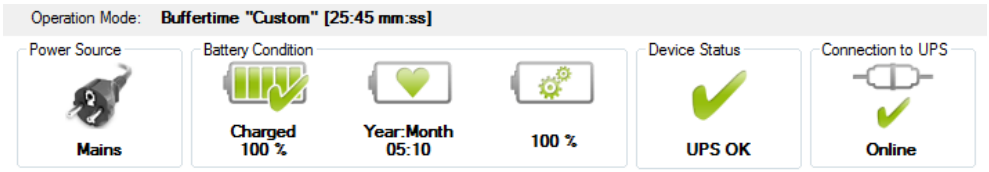
The following table explains the several areas.

Area	Description
(1)	Device information: Here, the type of the connected UPS is displayed. If text has been entered for the advanced UPS parameter "Place of installation" (see page 41), it is displayed above the UPS type.
(2)	System menu: Software settings (see page 5): A mouse click leads to the screen, where various software settings can be made. Info: A mouse click shows the contact information of Phoenix Contact.
(3)	Software menu: The Software menu provides various topic buttons such as status information display, parameter settings or monitoring values. A software menu button is expanded/collapsed by simply clicking it. When a software menu button is expanded the corresponding navigation items are listed.
(4)	Navigation items: After clicking a navigation item the corresponding information and parameters are displayed in the action area.
(5)	Action area: The content of the action area depends on the currently selected navigation item. This can be, for example, information, read from the device, or a parameterization table used for configuring the connected UPS.
(6)	Status bar (see page 17): Displays the status of all involved components thus providing a quick system overview. The status bar is always visible, also if the navigation and action area change.

5.2 Status bar

The status bar in the lower part of the screen shows information about the current system state.

When the power supply is available and the system is online and the battery is fully charged, the status bar looks like this:



The operation mode in the upper part of the status bar shows the current setting of the buffer time potentiometer of the UPS, as described in topic Buffer time selection (see page 12).

If it looks different, e.g. Power Source status "UPS off" or no connection to UPS ("Offline"), verify the following:

- All UPS components (QUINT-UPS, battery, power supply) are functional and properly connected.
- The QUINT-UPS is supplied with 24 V DC.
- The IFS-USB-DATACABLE is properly connected between QUINT-UPS and PC.

If an alarm is detected or an existing online connection between the PC and the QUINT-UPS is interrupted, the UPS-CONF software automatically becomes the active window. The status is queried every 5 seconds.

If your system status is like described, you can

- evaluate the UPS system status by displaying the various views contained in the software menu "Status" (see page 20) and/or
- start configuring the UPS by modifiying the default parameter settings in the various views of the software menu "Settings" (see page 29) and/or
- monitor your system.

In the topic Application samples (see page 52), some typical application scenarios are described.

The following tables explain the different status symbols that can be visible in the status bar:

Power Source	Symbol meaning
	The status "Mains" is shown, if the power supply is switched on and available.
	The status "Battery" is shown, if the power supply is switched off or not available. That means, the battery is discharging.
	The status "UPS off" is shown in either case: • The UPS is off, because battery mode is finished. The set buffer time has elapsed. • The power supply is available, but delivers an invalid output voltage.

Battery Condition	Symbol meaning
State of charge: 	Battery is "Fully charged".
State of charge: 	"Charging" is shown, if the battery is currently charging and not yet fully charged.
State of charge: 	The "Discharging" status is shown, if the battery is currently discharging because the system runs in battery mode. Usually, this status is shown in combination with the power source status "Battery".
State of charge: 	"Uncharged" is shown, if the battery mode is finished and the battery is empty.
State of health: 	The "State of Health" status shows the remaining lifetime of the battery. The lifetime value is shown below the symbol.

Battery Condition	Symbol meaning
State of function: 	The "State of Function" status shows the current performance of the battery. This efficiency value is measured in percent and is shown below the symbol.



During battery charging the battery conditions "State of Charge", "State of Health" and "State of Function" are shown as "unknown".

Device Status	Symbol meaning
	The "UPS OK" status is shown during normal UPS operation, i.e., when mains is available (battery mode not active) and no other event is currently upcoming.
	"Bat.-Mode deactivated" is shown, if the bridge is removed from the terminals R1 and R2. Refer to the parameter "Remote Status" in the topic UPS (see page 27).
	The "Alarm" status is shown, when a failure or critical situation exists, for example: • battery almost empty • battery not detected • battery replacement required

Connection to UPS	Symbol meaning
	This status informs about the communication connection between UPS-CONF and the QUINT-UPS device. The "Online" status is shown, if the IFS-USB-DATACABLE is connected. Normally, this status is automatically entered after connecting the UPS to the PC via the IFS-USB-DATACABLE.
	"Offline" means that no communication connection is established via the IFS-USB-DATACABLE.

6 Status - Reported information

If the "Status" group is selected, the following navigation items are available:

- "System (see page 20)": overview on the current system status
- "Battery (see page 25)": status information for all connected batteries
- "Battery Advanced (see page 26)": advanced status information for all connected batteries
- "UPS (see page 27)" : status information for the connected UPS
- "UPS Advanced (see page 28)": anvanced status information for the connected UPS

6.1 System

If the "System" item is selected in the software menu "Status", an overview on the current system status is visible in the action area. The values shown here are read cyclically from the UPS device, as long as a communication connection to the UPS is established.

The system components and their status information are arranged on the screen as "Power supply unit" on the left hand side, "UPS control unit" in the middle and "Battery unit" on the right hand side. The tables explain the symbols corresponding to the units.



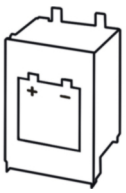
Power supply unit symbols:

Icon	Meaning of LEDs
DC OK	Green LED on: DC output is available. LED off: DC output is not available.
Boost	Yellow LED on: Boost signal is ON (power supply delivers additional current for a connected load). LED off: Boost signal is OFF.



UPS control unit symbols:

Icon	Meaning of LEDs
⚠	Red LED on: UPS alarm due to one of the reasons: • battery almost empty • battery not detected • battery replacement required LED off: No UPS alarm, power supply available, normal operation.
	Yellow LED on: Battery mode is ON, battery is discharging because power supply failed. LED off: Battery mode is OFF, i.e. mains available.
⏻	Green LED on: Mains is ON. LED off: Mains is OFF.

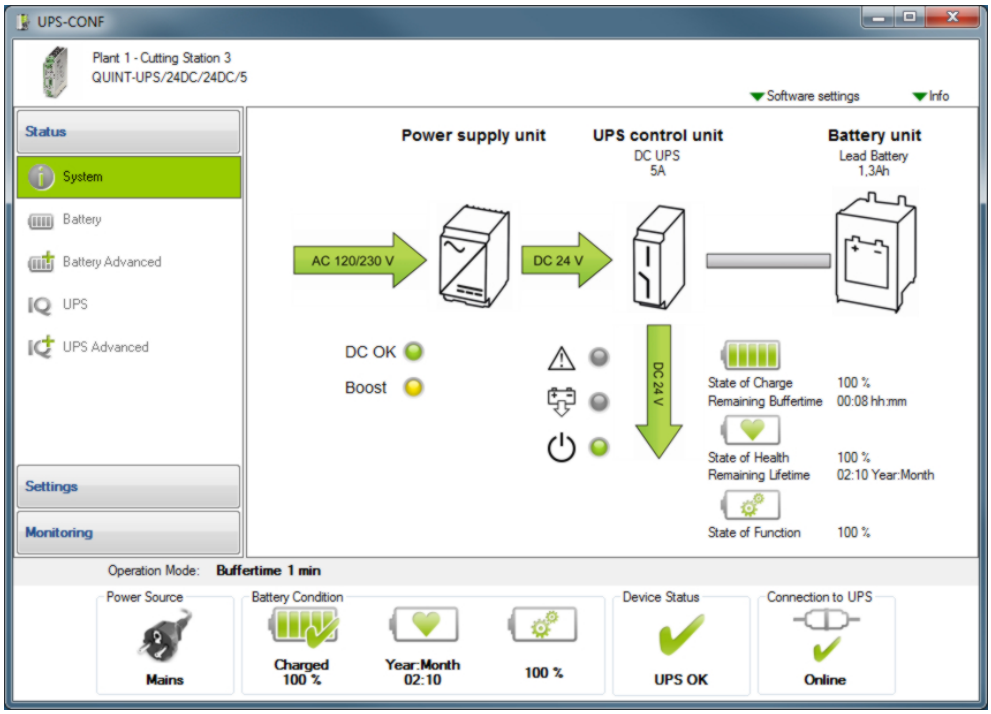


Battery unit symbols:

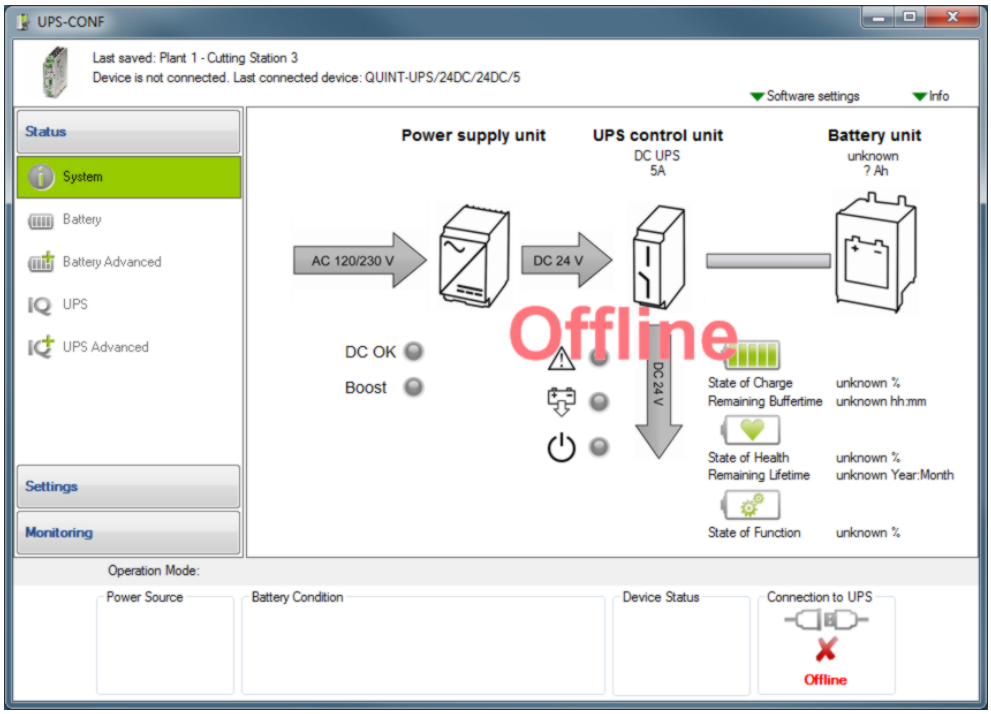
Icon	Meaning of LEDs
	SOC (State Of Charge) – current charging state and remaining back-up time of the battery unit.
	SOH (State Of Health) – remaining life expectancy of the battery unit, provides early warning for a potential battery unit failure.
	SOF (State Of Function) – determines the current performance of the battery unit.

NOTE
While charging the battery the status is "unknown".

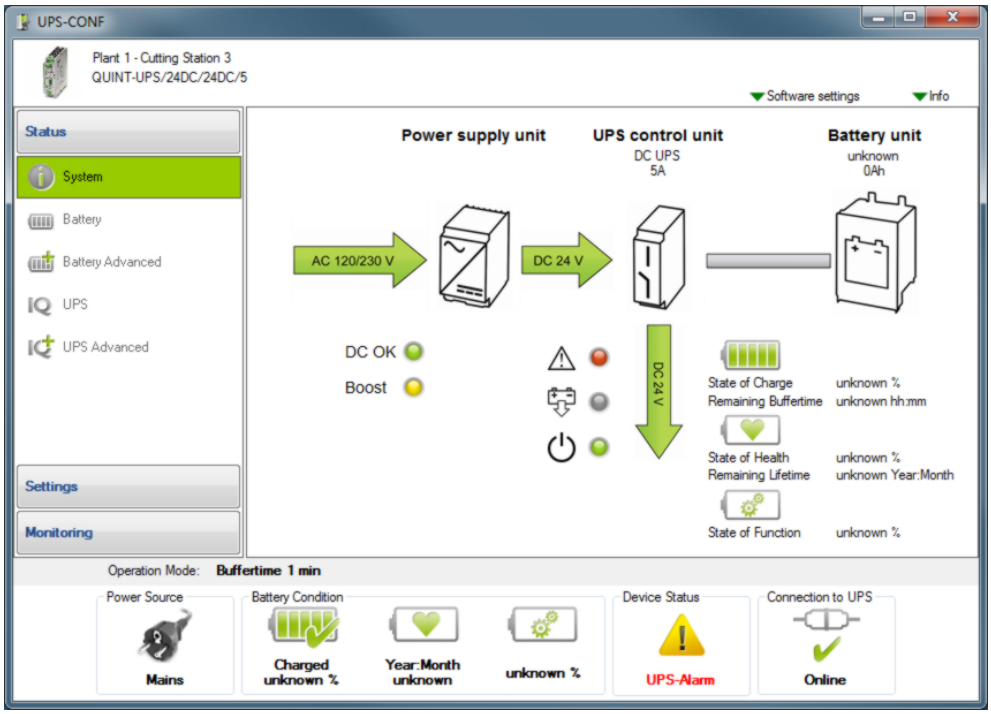
When the system is in normal operation (online and running), the screen looks like this:



When the UPS is offline and has no connection to the PC, the screen looks like this:



When the system status shows an alarm, the screen looks like this:



In such case refer to the topic Troubleshooting (see page 53).

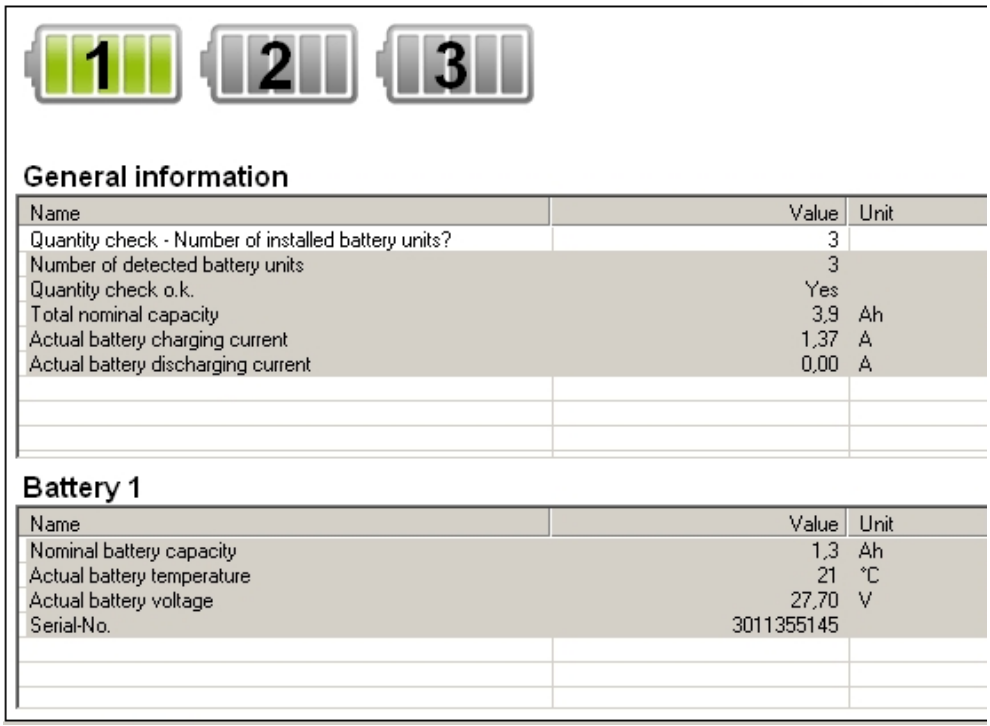
6.2 Battery

If the "Battery" item is selected in the software menu "Status", status information for all connected batteries is shown in the action area.

The information is headed by "General information" for all connected batteries, such as "Number of detected battery units" or "Total nominal capacity".

Individual information for every battery follows.
If several battery units are installed, the data of the individual units can be displayed by clicking on the battery icons on top of the action area:

The status information in the action area could for instance look similar like this:



Battery parameters	Meaning
Except of some parameters explained here, the status information is self-explanatory, this is why it is not explained in detail.	
Quantity check - Number of installed battery units?	This value can be set to the amount of batteries, that were built in.
Number of detected battery units	Number of batteries detected by the QUINT-UPS.

Battery parameters	Meaning
Quantity check o.k.	Shows "Yes", if the number of installed battery units complies with the number of detected batteries. Otherwise "No" is displayed.

6.3 Battery Advanced

This navigation item is only available if the "Enable advanced views" checkbox is marked in the software settings (see page 5).

If the "Battery Advanced" item is selected in the software menu "Status", advanced status information for all connected batteries is shown in the action area.

In normal operation it looks something like this:

Name	Value	Unit
Actual state of charge	100	%
Remaining backup time	00:08	hh:mm
Remaining battery life time	01:03	Year:Month
Actual battery performance	100	%
Actual battery voltage	27,57	V
Actual battery temperature (Average of all units)	26	°C

6.4 UPS

If the "UPS" item is selected in the software menu "Status", status information for the connected UPS is shown in the action area.

In normal operation it looks like this:



Name	Value	Unit
Actual Alarm	No Alarm	
Last Alarm	No Alarm	
Remote Status	UPS ready	
UPS in battery operation (Battery-Mode)	No	
Selected operation mode	Buffertime - no time limit	
Battery is charging (Battery-Charge)	No	

Parameter	Meaning
	Except of some parameters explained here, the status information is self-explanatory, this is why it is not explained in detail.
Remote Status	Remote control (contact R1, R2) The module can be switched on and off via a signal to contacts R1 / R2. Shutdown can take place in mains mode or while battery mode is active. Remote shutdown is deactivated UPS in function (delivery state) – The "R1" and "R2" terminal points are short circuited (delivery with plug-in bridge) OR 24 V DC is present at terminal point "R2". – In the event of a voltage supply failure, the UPS switches over to battery mode. Remote shutdown is activated – The "R1" and "R2" terminal points are not short circuited AND 0 V is present at terminal point "R2". – In the event of a voltage supply failure, the UPS does not switch over to battery mode and the device shuts down.
Selected operation mode	Shows the operation mode that is set via the buffer time potentiometer, as described in topic Buffer time selection (see page 12).

6.5 UPS Advanced

This navigation item is only available if the "Enable advanced views" checkbox is marked in the software settings (see page 5).

If the "UPS Advanced" item is selected in the software menu "Status", advanced status information for the connected UPS is shown in the action area.

The status information is self-explanatory, this is why it is not explained in detail here.

In normal operation it looks something like this:

Name	Value	Unit
Device type	QUINT-UPS/24DC/24DC/5	
Actual input voltage	23,91	V
Actual output voltage	23,66	V
Actual Device Temperature	30	°C
Shutdown event started	No	
UPS serial number	3012001033	
Device firmware	0x00000110	

7 Settings - Defining UPS device parameters

The navigation items contained in the "Settings" group allow access to the various UPS device parameters.
Parameter values can be entered in UPS-CONF and written to the device (see page 29) with only one click of the mouse.

If the software menu "Settings" is selected, the following navigation items are available:

- Reporting (see page 31): Trigger thresholds, switching outputs for UPS alarm, battery mode and battery charging as well as Email settings
- Time Setting (see page 36): Buffer times, (delay) times and programs to execute for PC shutdown
- Service (see page 39): Service mode activation and rights granting, declaration of service stick and configuration stick
- Advanced (see page 41): Battery charging values, wire sizes, thresholds, signaling times and others

How to write parameters

In each of the navigation items, different settings can be made in the action area in order to write it to the UPS.

Beneath settings, that can be made by checking a checkbox or by entering data into an input box, also numerical or textual values contained in the parameter tables can be changed.

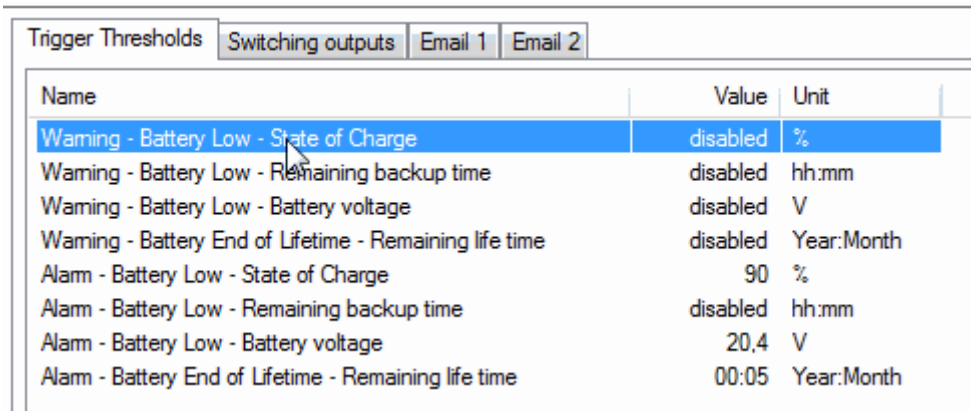
In these parameter tables, changeable parameter values have a white background color. Read-only values, i.e. the ones that are read from the device for monitoring purposes, are shown on a gray background.

To enter a new value for a parameter and write it to the UPS, proceed as follows:

1. Double-click the line, where the parameter text is located or click the "Write..." button in the lower right corner.
   An input box opens showing the currently set value.
2. Enter a value into the input box. Make sure that the chosen value is within the allowed value range and is suitable for your UPS system!
3. Click the "Write to device" button.
4. Verify that the new value is now displayed in the parameter table, i.e., has been accepted by the device.

Sample:

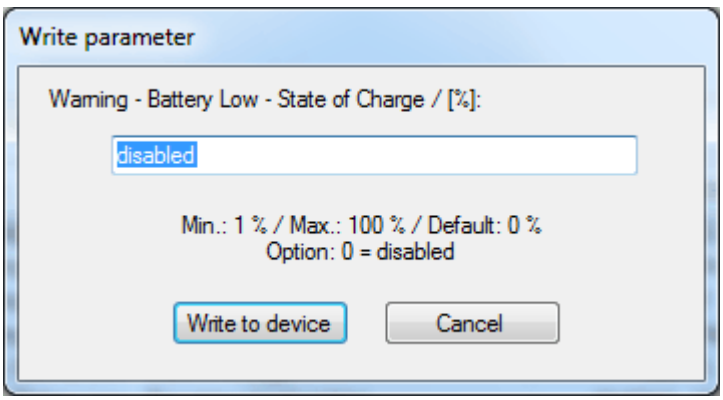
Select the "Reporting" navigation item in the "Settings" group and click the "Trigger Thresholds" tab in the action area.
In this tab, you can set a trigger value, at which battery charging level a "battery low" warning should be generated (first entry in the tab Trigger Thresholds (see page 31)). The value is entered as percentage, see below. By default, the trigger is "disabled", i.e. no warning is reported.



Set the trigger to 20% as follows:

1. Double-click the marked line, as shown in the figure above or left-click the line and then press the "Write..." button in the lower right corner.

   The following dialog appears:

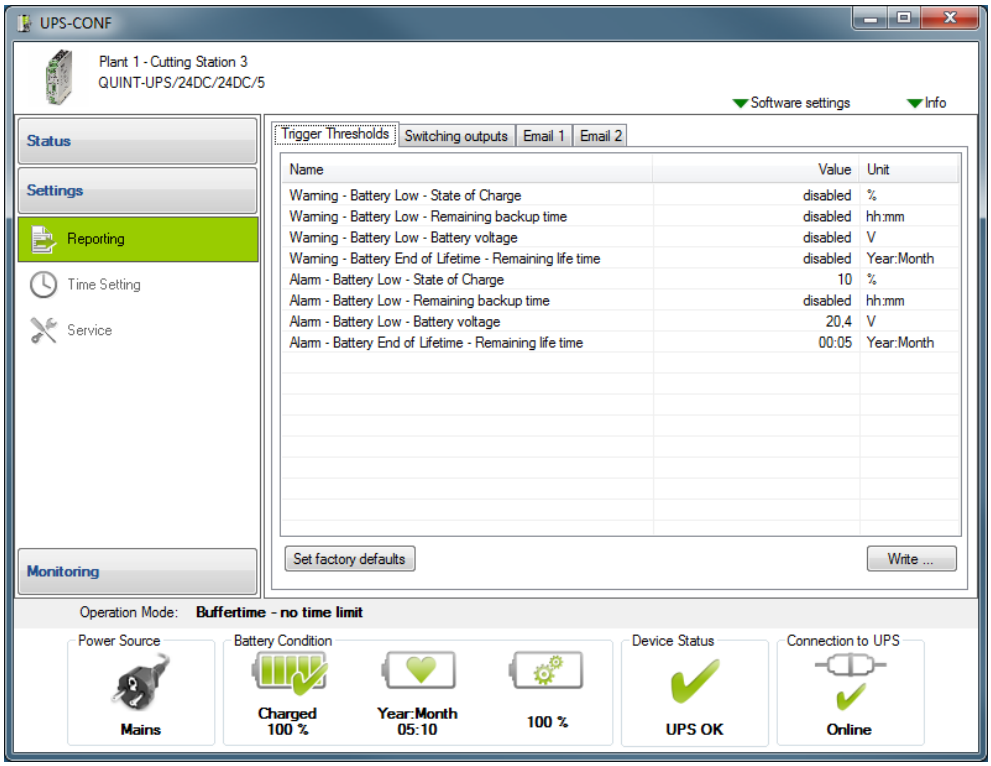
   Below the text field you can see the allowed input range.
2. Enter `20` in the input box and click the "Write to device" button.
3. Verify that the new value is shown in the table.

7.1 Reporting

If the "Reporting" item is selected in the software menu "Settings", the tabs "Trigger Thresholds", "Switching outputs", "Email 1" and "Email 2" are visible in the action area.

Trigger Thresholds

On the "Trigger Thresholds" tab you can define, whether warnings or alarms shall be reported by the UPS and define the threshold values which must be exceeded in order to trigger a message.



For each of the following conditions, both a warning and an alarm threshold value can be defined:

- Battery is low and the state of charge falls below a certain percentage number.
- Battery is low and the remaining backup time falls below a defined time.
- Battery is low and the battery voltage falls below a certain voltage.
- Battery is at it's end of lifetime and the remaining life time falls below a defined time.

If a warning or alarm is reported, you can define that a switching output must be triggered. For some of the warnings or alarms an Email to be sent can also be defined.

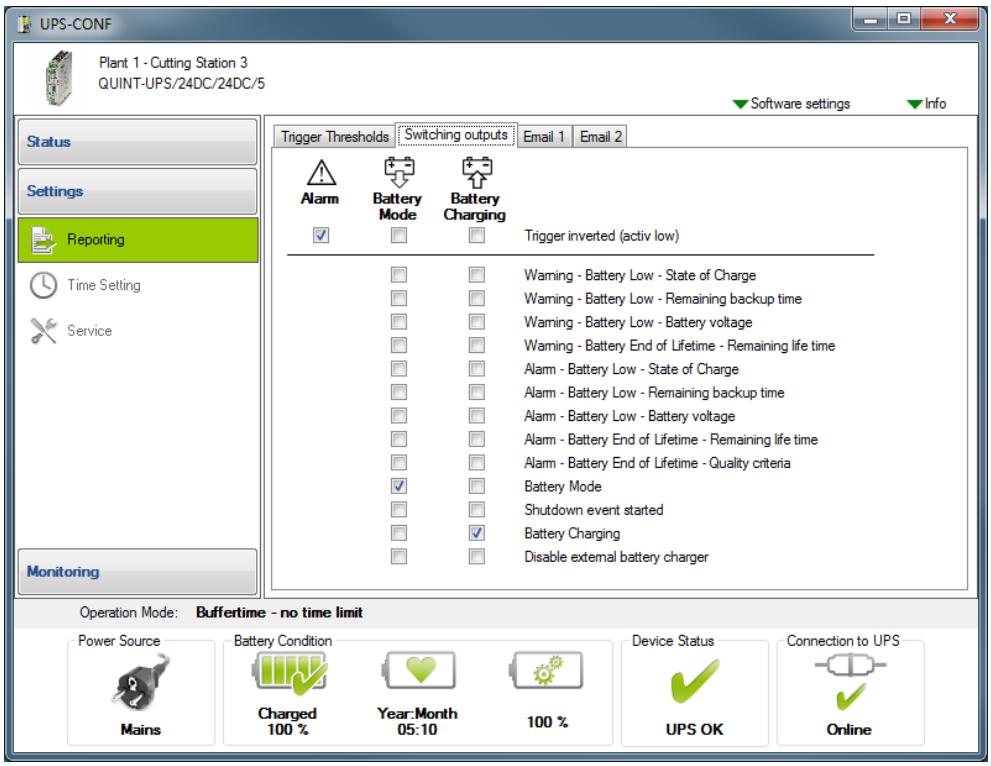
A reported alarm is additionally signaled by the LED at the front of the UPS device as well as in the status bar of the UPS-CONF software.

By means of warnings and alarms you can implement a two-level detection system:

1. Report a warning, when the first threshold value is exceeded.
   Example: battery lifetime is still one year.
2. Report an alarm, when the second threshold value is exceeded.
   Example: remaining lifetime of the battery is only some few months or weeks. Now an Email is additionally sent to the responsible person to ensure that a new battery is ordered in time.

Switching outputs

On the "Switching outputs" tab you can define a QUINT-UPS device output signal to be switched, when a certain trigger occurs. With such an output signal you can, for example, control a buzzer, that sounds, if the battery is low or the shutdown has been initiated.



Three different outputs are available to be switched:

- "Alarm",
- "Battery Mode"
- "Battery Charging"

All switching outputs can be triggered inverted, i.e., active low.

The "Battery Mode" and "Battery Charging" output signals can be switched with the following triggers:

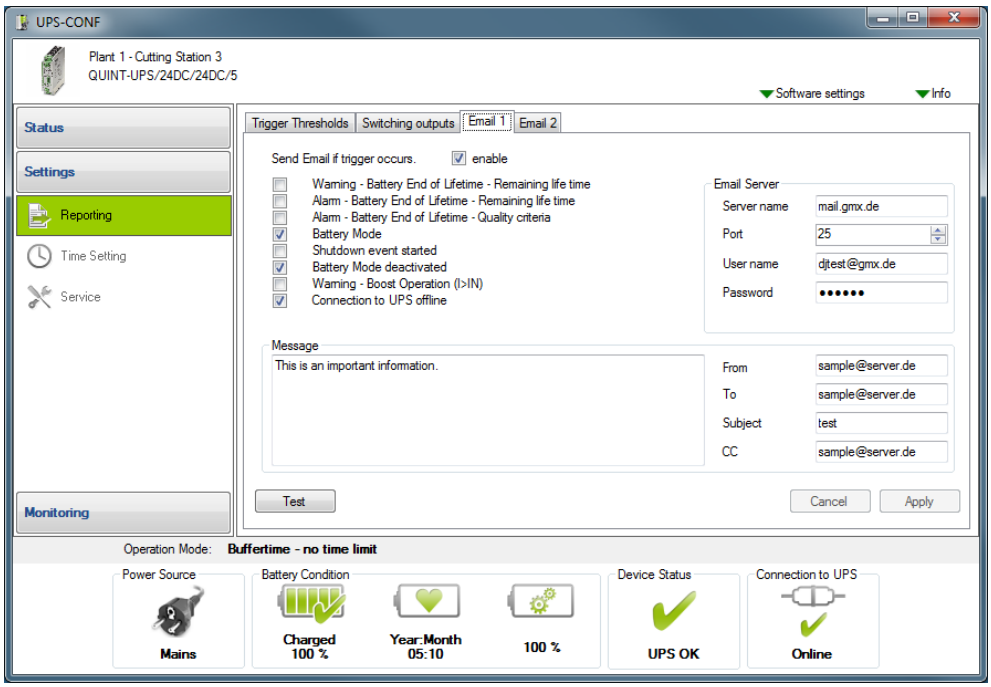
- The same triggers as described in section "Trigger Thresholds" for warning and/or alarm, e.g. triggers that are released by an exceeded or underrun threshold.
- The quality criteria is no more fulfilled. The IQ-Technology of the QUINT-UPS-IQ is able to calculate it's own save remaining lifetime for the battery. Based on this calculation, the quality criteria is evaluated as met or not.
- The system switches to battery mode.

- A shutdown event started.
- The battery switches to the "Battery Charging" status.
- For the "Disable external battery charger" trigger, see technical datasheet for the QUINT-UPS.

For "Alarm" switching output, no further options can be defined.

Email 1 / Email 2

On the "Email 1" and "Email 2" tabs you can define two separate Email addresses, to which Emails can be sent if certain events occur. To access the input fields, mark the "enable" checkbox in the upper part of the screen.



The available triggers to initiate Emails to be sent are:

- A warning occurs as battery is at it's end of lifetime and the remaining life time falls below a defined time.
- An alarm occurs as battery is at it's end of lifetime and the remaining life time falls below a defined time.
- An alarm occurs as the quality criteria is no more met.
- The battery switches to battery mode.
- A shutdown event started.
- The battery switches to "Battery Charging" status (battery mode deactivated).

- A warning occurs because boost operation was activated. The power supply now delivers BOOST current, which is up to 1.5 times the nominal current of the power supply (only available with QUINT POWER).
- The connection to the UPS was interrupted ("Offline" status).

In the Email Server area, you have to enter:

- "Server name" for the server managing your outgoing mail. Ask your administrator for details.
- "Port" for outgoing Emails is usually 25. The predefined port 25, however, can be changed.
- "User name" and "Password" of your Email account. In some accounts the "User name" is the Email address.

The Message area contains:

- Messagebox: A short explanation of the trigger, that caused the Email, is sent as default message. You can enter additional text, that will be appended to the default text.
- "From" textbox: Any Email address can be entered here.
- "To" textbox: A valid Email address has to be entered here, where the Email is sent to; it must be an Email address, that exists in the Email server´s configuration.
- "Subject" textbox: the title of your Email is user-defined; it is only used with the Email "Test" button. When the Email is successfully sent, click the "Apply" button.
- "CC" textbox: you can enter an Email address, where a copy is sent to.

You can test your settings by clicking on the "Test" button.

Sample Email:

A sample Email would look like this:

Email part	Content of Email part	Explanation
Subject	[UPS CONF: Parameters change notification]	
Message	*** UPS Status Mail ***	Header of the status mail message
	Hall 125	Place of installation, refer to the topic Advanced (see page 41)
	QUINT-UPS/24DC/24DC/5	Type of connected UPS, refer to the device information area in the User interface (see page 15)
	Trigger: Battery Mode Trigger	Kind of active trigger
	Threshold: -	Threshold (if applicable)
	This is an important information.	User defined text from the message textbox

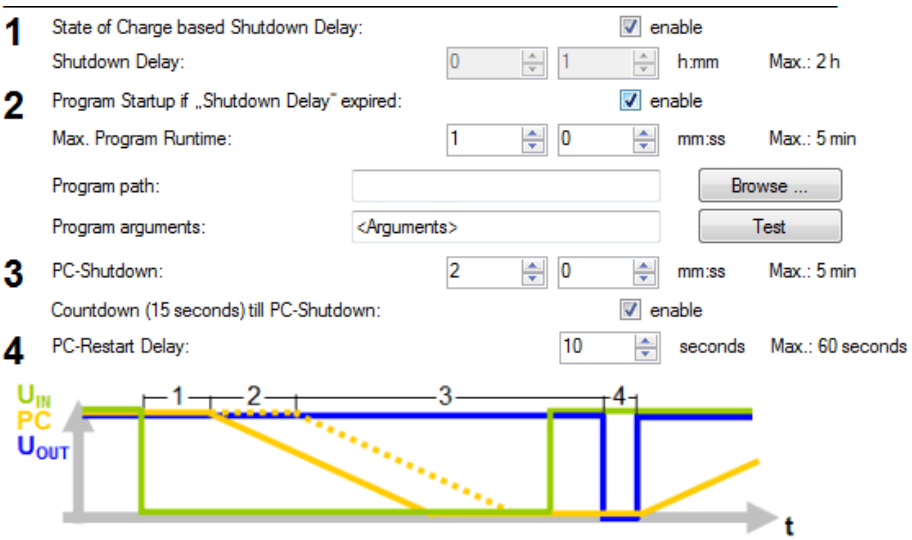
7.2 Time Setting

If the "Time setting" navigation item is selected in the "Settings" group, the action area provides various settings for two different UPS operating modes:

- The upper part (above the separation line) specifies the "Custom" mode.



- In the lower part (below the separation line), four different parameter categories can be set concerning the PC-Mode.

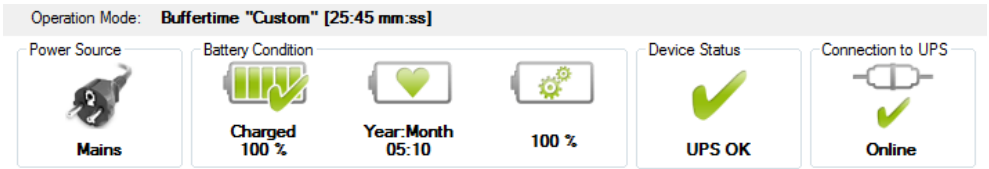


Custom mode

NOTE
These settings only apply if the UPS runs in Custom mode. To set this mode, the buffer time potentiometer located at the device front must be set to "Custom" (refer to topic buffer time selection (see page 12)).

In Custom mode the buffer time for the battery can be set to a maximum of 1 hour (30 seconds default).
When the power supply was interrupted the load will loose it's power after the user-defined buffer time has elapsed. The battery will buffer exactly the set buffer time. If no user-defined time is entered, the buffer time selected by the potentiometer is used.

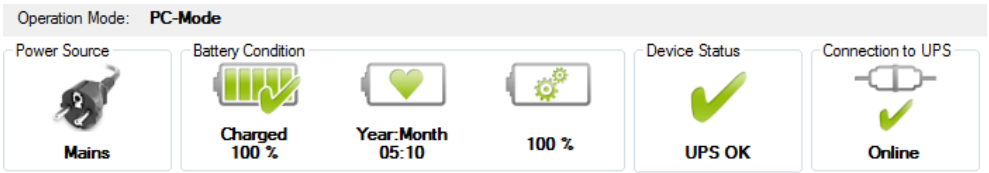
The set time is displayed in the "Operation Mode" of the status bar. An example with 25 minutes and 45 seconds set, shows the following status bar and operation mode:



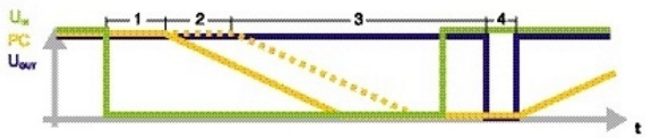
PC-Mode

NOTE
These settings only apply if the UPS runs in PC-Mode. To set this mode, the buffer time potentiometer located at the device front must be set to "PC-Mode" (refer to topic buffer time selection (see page 12).

When the PC-Mode is set, the status bar shows the operation mode "PC-Mode", as shown in the following screenshot:



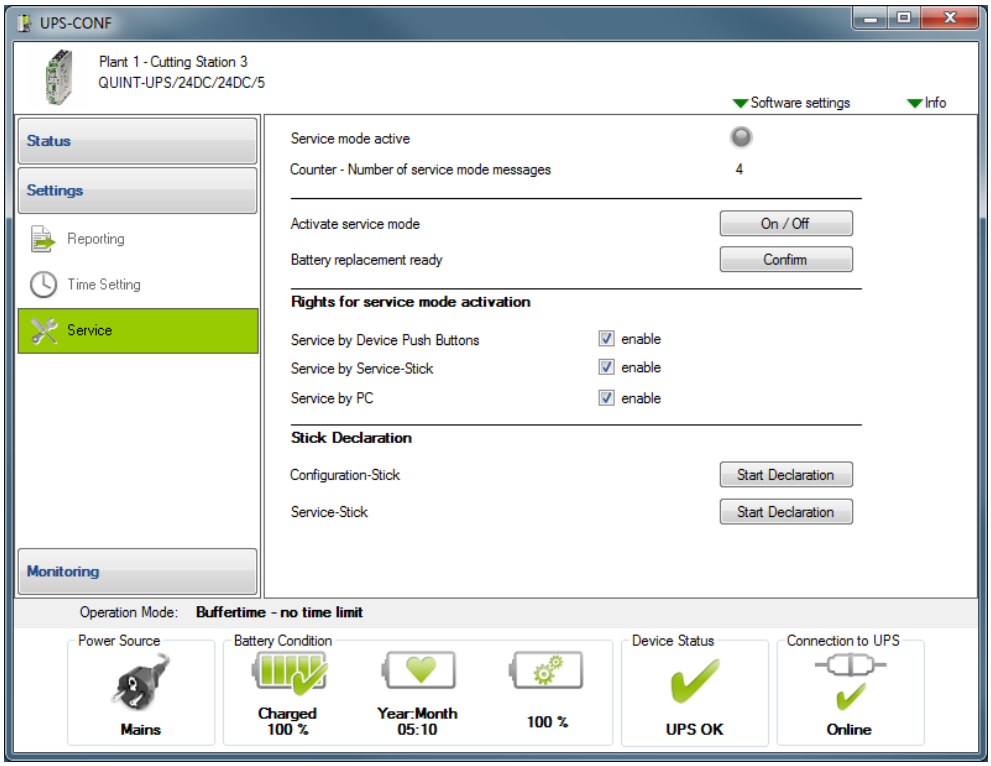
In the "PC Mode" setting on the UPS potentiometer, the UPS functionality follows a chronological sequence that can be parameterized via software, and is thus individually customized to the respective application.



Parameter	Meaning / Possible settings
1 Shutdown delay	Delay time is calculated automatically from the current remaining battery life minus the time required by the PC to shutdown. Alternatively, a fixed delay time may be chosen.
2 Program startup	After the delay time has expired it is possible to start a program. Example: a software starts that gradually backs up system data. You can test your settings by clicking on the "Test" button.
3 PC shutdown	The time required by the PC/IPC to shut down is set here.
4 PC restart delay	Only if the PC/IPC is shut down, and the mains has returned in the meantime, the output voltage will be interrupted for the reset time. The PC/IPC is then automatically restarted.

7.3 Service

If the "Service" item is selected in the software menu "Settings", all parameters of switching the UPS to service mode are accessible in the action area.



Here, you can:

- Operate the UPS in service mode (see page 47).
- Grant or deny rights for the service mode activation (see section below).
- Declare memory sticks as either configuration sticks or service sticks, as described in the topic Stick usage (see page 45).

Rights for service mode activation

The rights for all possible methods to activate or terminate the service mode can be defined in the "Rights for service mode activation" part of the "Service" navigation item´s action area. Possible activation methods are:

- Pressing both push buttons ("Stick -> UPS" and "UPS -> Stick") on the device front simultaneously.
- Plugging a service stick into the Data port of the UPS device.

- Clicking the service mode activation button in the "Service" navigation item´s action area in UPS-CONF.

When allowing a service stick for activating the service mode and disabling the use of the push buttons at the same time, the stick can be considered as a kind of hardware key: Only authorized persons who possess a service stick are allowed to switch the device to service mode. For that purpose, a memory stick must be declared accordingly as described in Stick usage (see page 45).



For further information please refer to the "Service stick usage - service mode (see page 47)".

7.4 Advanced



This navigation item is only available if the "Enable advanced views" checkbox is marked in the Software Settings (see page 5).

The "Advanced" navigation item within the "Settings" group allows to set more specific parameters. These are in detail:

Name of parameter:	Sample value:	Unit:	Explanation:
Place of installation (user defined)	Hall 125	(none)	The text entered here is dislayed in the device information area of the User interface (see page 15).
Initial charging current	1.36	A	The battery is charged with this current, when the power supply is available.
Absorption charging end voltage	28.00	V	An equalizing charge, that increases charging voltage to a higher value than the nominal capacity for a short period. This prevents battery stratification and reduces sulfation. When the battery is fully loaded, this voltage is tolerated as a maximum, before the voltage level gets a stable end value.
Float charging end voltage	27.60	V	The charger adjusts the end voltage based upon battery temperature. During high temperature periods, the actual battery voltage will be reduced and during low temperature periods it will be increased.
Temperature compensation	42	mV/K	High ambient temperatures have a negative impact on the service life of the battery. Therefore, the charging voltage should be lower with higher ambient temperatures. The adjustable values relate to one battery cell each.
Wire distance to the battery unit	300	mm	The maximal wire length from the UPS control unit to the battery unit.
Wire cross section to the battery unit	6.0	qmm	The wire cross section from the UPS control unit to the battery unit.

Name of parameter:	Sample value:	Unit:	Explanation:
Fast battery charging	On	(none)	Boost mode is allowed or not.
Dynamic backup threshold	Off	(none)	This parameter can be defined additionally to the overvoltage and undervoltage related parameters, see below. If set to On the voltage increase or decrease within a certain time period is watched (dynamically). The UPS switches to battery mode, if the relative increase/decrease is too much. In contrast the overvoltage and undervoltage parameters have static values. They can become active regardless the dynamic backup threshold did not trigger, because the voltage was alright.
Undervoltage backup threshold	19.00	V	When the DC voltage falls under this threshold (undervoltage), the system switches to battery mode.
Overvoltage backup threshold	30.00	V	When the DC voltage exceeds this threshold (overvoltage), the system switches to battery mode.
Return to mains time	3	seconds	After this time the system returns to mains, when it is in battery mode and the power supply is available again.
Discharging end voltage	19.20	V	The battery voltage may not sink below this voltage value, otherwise it would be deeply discharged and become defective.
Signaling time after battery low cutoff	00:10	hh:mm	When the battery low status has arrived, the UPS cuts off and the status of the power source firstly switches to "UPS off (see page 27)". After the time set here no more power or battery status is displayed, but only the Connection to UPS (see page 17) is offline.
Signaling time after time cutoff	00:10	hh:mm	When the buffer time has elapsed, the UPS cuts off and the status of the power source firstly switches to "UPS off (see page 27)". After the time set here no more power or battery status is displayed, but only the Connection to UPS (see page 17) is offline.

Name of parameter:	Sample value:	Unit:	Explanation:
Battery type (imported item)	"No value assigned"	(none)	The type of battery delivered by the manufacturer. This value is read by the UPS-CONF software.
Nominal capacity (imported item)	"No value assigned"	Ah	The nominal capacity of the battery delivered by the manufacturer. This value is read by the UPS-CONF software.



You can restore the default settings anytime by clicking the "Set factory defaults" button.



You can import / export the list in a .csv file by clicking the button "Import " or "Export".

8 Monitoring - Statistics and logging

If the "Monitoring" group is selected, the navigation items "Statistic (user defined)", "Statistic (system defined)" and "Logging" are available.

The items inform about counted and time measured statistic values and show logged information.

Statistic (user defined)

The "Statistic (user defined)" navigation item shows counter values which start at a user-defined value. If, for example, batteries have been replaced, you can set the values manually to "0" in order to start a new logging period. The following values are displayed and can be reset:

- Number of battery modes: How often did the UPS already change to battery mode?
- Total time of battery mode: How long altogether did the UPS stay in battery mode?
- Number of operation startups: How often was the UPS started?
- Total operation time: How long altogether did the UPS run?

Statistic (device defined)

The "Statistic (system defined)" navigation item shows counter values which always start from the value "0" with the initial device installation. Beneath the same values as shown in the "Statistic (user defined)" navigation item, additional values are displayed:

- Runtime of the current battery operation: How long does the current battery operation (if relevent) altready last?
- Number of battery low cutoffs: How often was the battery completely discharged?
- Number of all messages: How many warnings and alarms were signaled altogether?
- Number of remaining lifetime messages: How often was a remaining lifetime signaled?
- Number of quality criteria messages: How often was signaled, that the quality criteria is no more met?
- Number of battery presence messages: How often was a battery unit not detected, e.g. no fuse plugged or circuit broken?

Logging

The logging is done by the software itself.
The "Logging" navigation item lists events like "Offline", "Online" or "UPS in battery mode" with date and time stamp. The event colors differ between green and red depending on the type of event. They are chronologically sorted, the latest uppermost.



You can delete the list by clicking the button "Delete history".
You can export the list in a .csv file by clicking the button "Export".

9 Stick usage

At the Data port of the UPS device, a memory stick can be connected (see image below). After plugging in, the UPS either acts as configuration stick or as service stick, depending on how the respective stick has been declared before in the "Service" screen of the UPS-CONF software.



A configuration stick is used to copy parameterization data from/to the UPS device, as described in the topic Configuration stick usage (see page 46).

A service stick can be used to switch the device to service mode (see page 47) in order to perform maintenance tasks.

To declare a memory stick proceed as follows:

NOTE
When declaring a stick, its current content is deleted, i.e. already stored configuration data are lost.

1. Open the software menu "Settings".
2. Click the "Service" navigation item.
3. In the "Stick declaration" area of the action area, click the appropriate "Start declaration" button.

After this declaration, the UPS device automatically formats the stick after plugging it into the Data port the next time and then acts accordingly.

9.1 Configuration stick usage

A configuration stick stores UPS configurations, i.e.complete parameter sets. Configurations can be copied from the UPS to the stick and vice versa. This way, the stick can be used to transfer configurations from one UPS to another.



NOTE
The configuration stick cannot be used, while the UPS runs in battery mode. The power supply must be available.

The usage of configuration sticks is explained by the following steps:

1. Make sure that the used memory stick is already declared as configuration stick as described in the topic Stick usage (see page 45).
2. To transfer parameters between the stick and the UPS, execute one of the following steps:
   - To copy parameters from the stick to the QUINT-UPS push the "Stick -> UPS" button for more than 2 seconds.
   - To copy parameters from the QUINT-UPS to the stick push the "UPS -> Stick" button for more than 2 seconds.
3. Connect the configuration stick to the Data port of the UPS under consideration of the plug direction.
   The parameter transfer is started automatically and the progress is signalled by the LEDs:
   - While data is transferred they flash red - yellow - green.
   - A successful tranfer completion is signalled by a permanent green LED.
   - A faulty tranfer completion is signalled by a permanent red LED.
4. Remove the stick from the Data port.
5. After copying a parameter set from an UPS to the stick you can "clone" this configuration by plugging this stick into another UPS and copying the stored data from the stick into this UPS.

9.2 Service stick usage - service mode

The service mode is used, when installation and maintenance work has to be achieved, such as a battery has to be replaced.

There are several possibilities to switch the UPS to service mode.

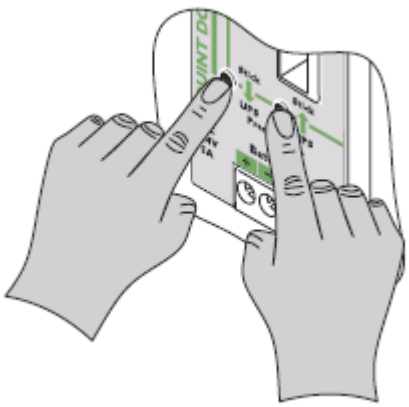
The corresponding activation rights have to be granted for service mode activation and deactivation, as described in the topic Rights for service mode activation (see page 39).

Service mode activation

The service mode cannot be activated, while the QUINT-UPS runs in battery mode. The power supply must be available.

Depending on the granted activation rights, the service mode can be activated in three different ways:

- By holding down both push buttons on the QUINT-UPS named "Stick -> UPS" and "UPS -> Stick" for at least 6 seconds.

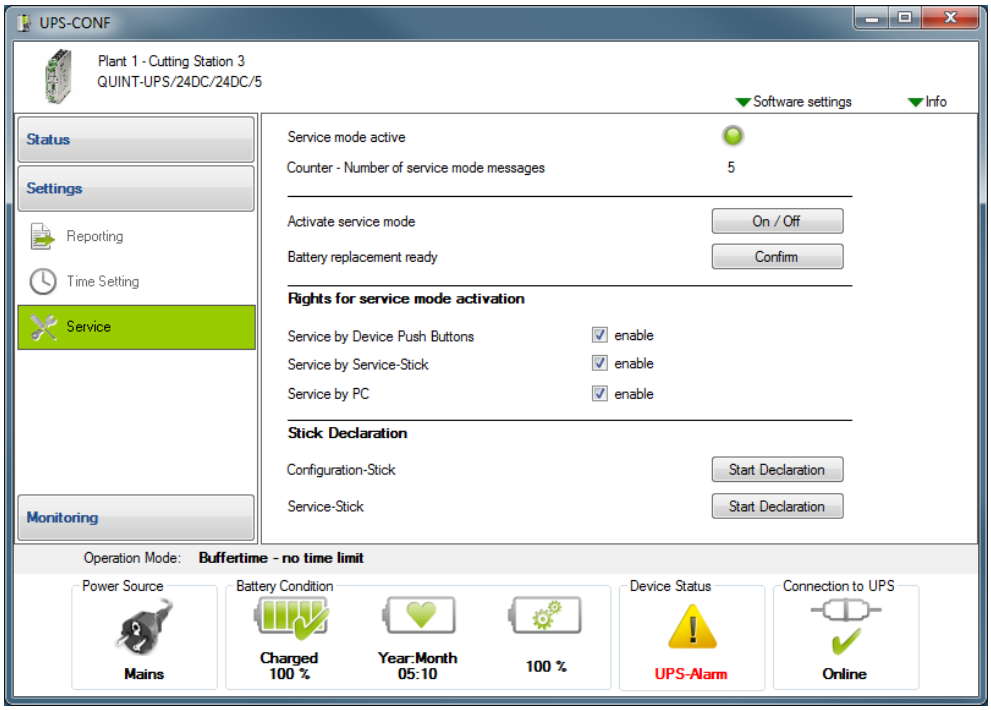


- By connecting a service stick (see page 45) to the Data port (see page 13) of the UPS.
- By using the UPS-CONF software as follows:
  In the "Settings" group, select the "Service" item, and click the "On / Off" button near the "Activate service mode" text.

While the service mode is active

- the alarm status is activated,

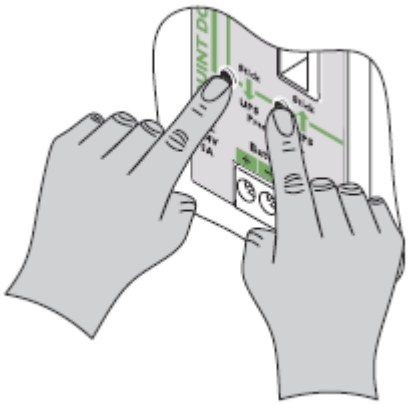
- the charging current is interrupted,
- the status LED "Service mode active" in the UPS-CONF software ("Settings" group / "Service" item) is green.



Service mode deactivation

The service mode can be deactivated in different ways:

- By holding down both push buttons on the QUINT-UPS named "Stick -> UPS" and "UPS -> Stick" for at least 6 seconds.



- By removing the service stick from the Data port of the UPS.
- By using the UPS-CONF software as follows:
  In the "Settings" group, select the "Service" item, and click the "On / Off" button near the "Activate service mode" text.

After the service mode is deactivated, the status LED "Service mode active" in the UPS-CONF software ("Settings" / "Status") switches back from green to gray.

Service mode operation

To operate the QUINT-UPS in the service mode in order to replace a battery for example, execute the steps described below.

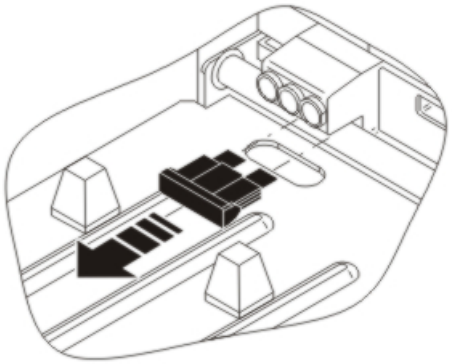
DANGER
Before activating the service mode read and obey carefully the safety instructions in the topic Important safety notes (see page 10).

DANGER
Watch polarity when connecting cables!

1. Activate the service mode by one of the ways described above.
2. Replace the battery as follows:.

   i. Open battery housing.

   ii. Remove fuses.

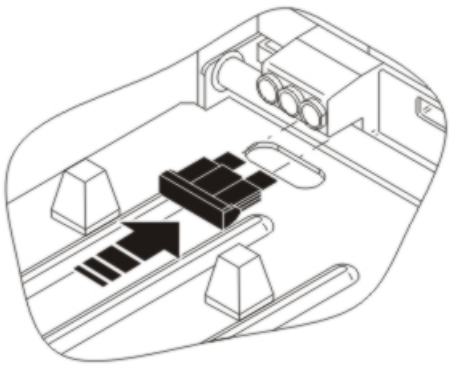


iii. Remove cabling.

iv. Change battery.

v. Connect cabling.

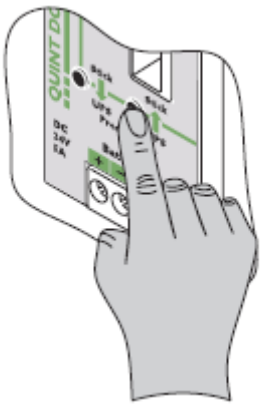
vi. Insert fuses.



vii. Close battery housing.

3. As soon as the work is finished, the parameters of the new battery have to be read into the UPS, so it's status information is available. To introduce this battery registration, do one of the following actions:

   - Push one of the push buttons on the QUINT-UPS named "Stick -> UPS" or "UPS -> Stick" and hold it down for more than 6 seconds.



or

- In the "Settings" group of the UPS-CONF software select the "Service" item, locate the text "Battery replacement ready" and click the "Confirm" button near the text.

The bar graph at the QUINT-UPS flashes, the alarm status is still active.

NOTE

If the service mode has been deactivated by removing the service stick from the Data port before the battery replacement has been confirmed, it can be confirmed by the UPS-CONF software. A popup window will remind the user to confirm the battery replacement.

4. Deactivate the service mode as described above.

10 Application samples



For further information, please take a look at the Software Tutorials or the Quick Start Poster on www.phoenixcontact.net/catalog. You will find the data if you link to UPS-CONF or QUINT-UPS.

10.1 Functional test

One of the main functions of the QUINT-UPS is to supply the load, when the mains fails. To test, if the UPS buffers the load, follow these steps:

1. Switch off the power supply of the QUINT-UPS.
2. Check if the QUINT-UPS buffers the load as long as set with the buffer time potentiometer, refer to Buffer time selection (see page 12).

10.2 PC-Mode: PC shutdown and restart

The IQ technology of the QUINT-UPS is able to control the power supply for a PC. For that purpose the PC with the UPS-CONF software installed has to be connected to the UPS and the PC-Mode activated. The PC-Mode enables the automatic PC shutdown and restart functionality.

To test the PC shutdown and restart functionality in the PC-Mode, proceed as follows:

1. Switch the buffer time potentiometer to "PC-Mode", as described in the topic Buffer time selection (see page 12).
2. Connect the UPS device to a USB port of the PC where UPS-CONF is installed (refer to topic Hardware setup (see page 11)).
3. Open the software menu "Settings" and click "Time Settings".
4. Set the parameters for the four different parameter categories, as described in the topic PC-Mode (see page 38).
5. Check if the PC shuts down and restarts corresponding to the set parameters. If a program execution has been set, verify that it is executed.

11 Troubleshooting

If your system does not work properly for any reason, approach the problem in the following manner:

1. Check the system status:

   - If the UPS-CONF software is installed, check the status bar (see page 17) and take a look at the system status.
   - If the UPS-CONF software is not installed, take a look at the front side of the UPS and check the LEDs (see page 20).

2. Proceed with the section Unexpected status symbols (see page 54) to find out, what is wrong.



The section Unexpected status symbols (see page 54) will lead you closer to the solution of the problem. If there are specific solutions for a single problem, you will be lead to the section, that describes the problem solving.

11.1 Unexpected status symbols

The meaning of status symbols showing an unexpected status is explained in the following topic.
The first table lists the symbols for the system status, that you can find in the action area and the second table lists the symbols from the status bar.

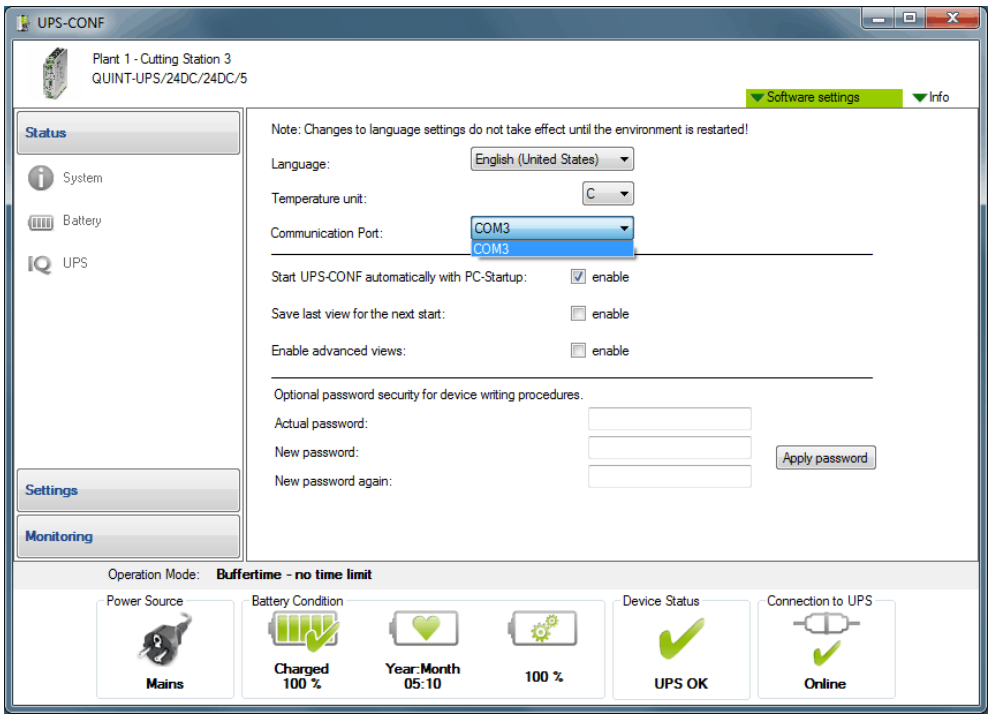
System status Symbol	Current situation and possible reason	Possible correction
 Gray: Mains OFF	There is no current available. Probably the Mains is switched OFF.	• Switch the Mains ON. • Take care that the power supply is available again.
DC  Gray: DC output not available	The power supply unit cannot deliver DC. Either the power supply is not available or the Mains switch is set to OFF.	• Switch the Mains ON. • Take care that the power supply is available again.
 Yellow: Battery mode	No current is available, thus the load gets it's power supply from the battery.	• Switch the Mains ON. • Take care that the power supply is available again.
 Red: UPS alarm	There may be different reasons: • No power supply is available. • The battery is soon empty. • The battery has to be replaced. • The battery cannot be detected. • There is another battery problem. • A set threshold has been reached.	• Switch the Mains ON. • Take care that the power supply is available again. • Check the set thresholds and compare with the current status. • Solve the battery problem. • Replace the battery. • Check the cables between UPS and battery. • Verify that the fuse is installed in the battery.

Status bar Symbol	Current situation and possible reason	Possible correction
	The UPS is in battery mode, because no power supply is available.	• Switch the Mains ON. • Take care that the power supply is available again.
	The bridge between the UPS terminals R1 and R2 is removed. Battery is deactivated therefore. Refer to the parameter "Remote Status" in the topic UPS (see page 27).	If you want the battery to be activated and the battery mode to be introduced, when the mains fail, bridge the terminals R1 and R2. Refer to the hardware overview (see page 7).
	There is no power supply available. One of these states is ongoing: • The UPS is off, because battery mode is finished. The set buffer time has elapsed. • The power source is not ok, because input voltage is in an invalid range.	If the UPS is off, because battery mode is finished, but the battery is funcional: • Switch the Mains ON. • Take care that the power supply is available again. If the UPS is off, because battery mode is finished, and the battery is no more funcional or at it's end of lifetime: • Change the battery. If the power source is not ok, because input voltage is in an invalid range: • Check the power supply.
	The battery is discharging, because no power supply is available.	• Switch the Mains ON. • Take care that the power supply is available again.
	The battery mode is finished, because the battery is empty.	• Take care that the power supply is available again to reload the battery. • Change the battery, if battery lifetime is exhausted.
	(see UPS alarm in the table above)	(see UPS alarm in the table above)
	• The connection between PC and UPS via the IFS-USB-DATACABLE is interrupted. • The communication port is not set.	• Connect the UPS and PC via the IFS-USB-DATACABLE. • Check if the communication port is set, as described in the topic Communication port (see page 56).

11.2 Communication port

The PC USB communication port for the communication between the UPS and the PC is automatically set during software installation. In case the communication port has not been set, the status bar shows the "Connection to UPS: Offline" status.

Although the communication port has not been set, it is detected automatically. Thus you can set it manually. You just have to select it in the software settings of the system menu.



If you click the combo box near the text "Communication port" the correct port is shown and you can select it.

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Power Supplies



User Manual

UPS-CONF

Order No.: -

Configuration and Management Software
UPS-CONF

Power Supplies

User Manual

Configuration and Management Software UPS-CONF

2012-07-02

Designation: UPS-CONF

Revision: 01

Order No.: -

This manual is valid for:

Designation	Order No.
UPS-CONF	2320403

Please observe the following notes

In order to ensure the safe use of the product described, you have to read and understand this manual. The following notes provide information on how to use this manual.



The pictured products do always exemplify the concerned topic.

Target audience for this documentation

The use of products described here solely addresses persons, who are qualified and familiar with electrical equipment and the appropriate and relevant safety concepts. Please also read the section titled "Qualified personnel" in the topic titled "Important safety notes (see page 10)".
Phoenix Contact accepts no liability for erroneous handling or damage to products from Phoenix Contact or third-party products resulting from disregard of information contained in this documentation.

Explanation of symbols used and signal words



DANGER
The danger symbol is used to indicate instructions where non-compliance may result in damage to hardware/software or personal injury (in indirect connection with dangerous process peripherals).



NOTE
The note symbol precedes notes that must be strictly observed in order to ensure error-free operation. It also gives you tips and advice on the efficient use of hardware and on software optimization to save you extra work.



The "Additional Details" symbol indicates cross references (hypertext links or bibliographical references) which lead to detailed descriptions of a term or additional details on the context in question.

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1 Functional overview

UPS-CONF is a management software to configure and monitor QUINT-UPS devices, that come with the IQ technology.

This technology with continuous battery monitoring and intelligent management provides you with information about the charging state, remaining runtime, and service life of your battery at all times. Intelligent communication informs you when a situation becomes critical. This reduces the amount of maintenance involved and increases your system availability.

IQ technology means

- Intelligent Battery Control: automatically detects the connected battery type and maximizes the remaining service life of the battery unit via an optimally adapted charging characteristic.
- Intelligent Battery Management: continuous status information is shown for
  - SOC (State of Charge): current charging state and remaining back-up time of the battery unit
  - SOH (State of Health): remaining life expectancy of the battery unit, provides early warning for a potential battery unit failure
  - SOF (State of Function): determines the current performance of the battery unit.
- Intelligent Charging: adapts the charging current and thereby ensures the fastest possible recharging and availability.
- Intelligent communication: the communication of UPS and PC allows configuration, extensive signaling and parameterization.



The IQ technology also works without UPS-CONF. With this software you have an easier monitoring and configurations can be done.



The UPS-CONF software is intended for a PC as well as an IPC (Industrial PC). In this documentation the term "PC" is used to address both.



The configurable QUINT-UPS device is also referred to as the "UPS" in this documentation.

Features supported by the UPS-CONF software

In order to optimally support the IQ technology, UPS-CONF provides the following features:

- Clear overview about condition of mains, battery, UPS device and connection from PC to UPS
- Automatic PC shutdown and restart functionality while the UPS runs in PC-Mode
- Start of application specific programs for system shutdown
- Configuration of switching outputs
- Chronological event logging
- Setting of customized parameters like the maximum charging current
- Choice of user interface language in the Software settings (see page 5).
  Currently supported languages: English, German



The topic titled Application samples (see page 52) guides through some typical scenarios.

2 Software setup

The UPS-CONF software has to be installed on a PC in order to configure and monitor an UPS system. If the buffered load is a PC, the UPS can be operated in the PC-Mode to additionally enable the automatic PC shutdown and restart functionality.

To setup the software, the following steps have to be executed:

1. Make sure all system requirements (see page 4) for the hardware and software are met.
2. Download and install the software (see page 5).
3. Follow the steps in the hardware setup (see page 11).
4. Start the software (see page 15).
5. Become familiar with the software settings (see page 5) supported by the UPS-CONF software and carry out the required settings.

2.1 System requirements

In order to run the UPS-CONF software, your computer must meet the following software and hardware requirements:

Software requirements

- Supported operating systems:
  - Windows 7, 32bit and 64bit
  - Windows Vista SP1
  - XP SP3 (requires .NET Framework 3.5 SP1)
- Supported browser: Internet Explorer version 6 or later

Hardware requirements		
CPU	1 GHz min. 2 GHz recommended	Windows 7 Windows Vista SP1
	Pentium III 1GHz min. 2 GHz recommended	Windows XP SP3
Main memory	1 GB RAM min. 2 GB RAM recommended	Windows 7 Windows Vista SP1
	512 MB RAM min. 1 GB RAM recommended	Windows XP SP3
Main memory used by UPS-CONF	max. 96 MB	
Hard disk drive (recommended) Hard disk used by UPS-CONF	850 MB max. 50 MB	
CD-ROM drive	not necessarily needed	
Interfaces	1 x USB 2.0	
Monitor	VGA, resolution 800 x 600 pixels minimum, 256 colors	
Network	Internet connection needed for program download	

2.2 Installation



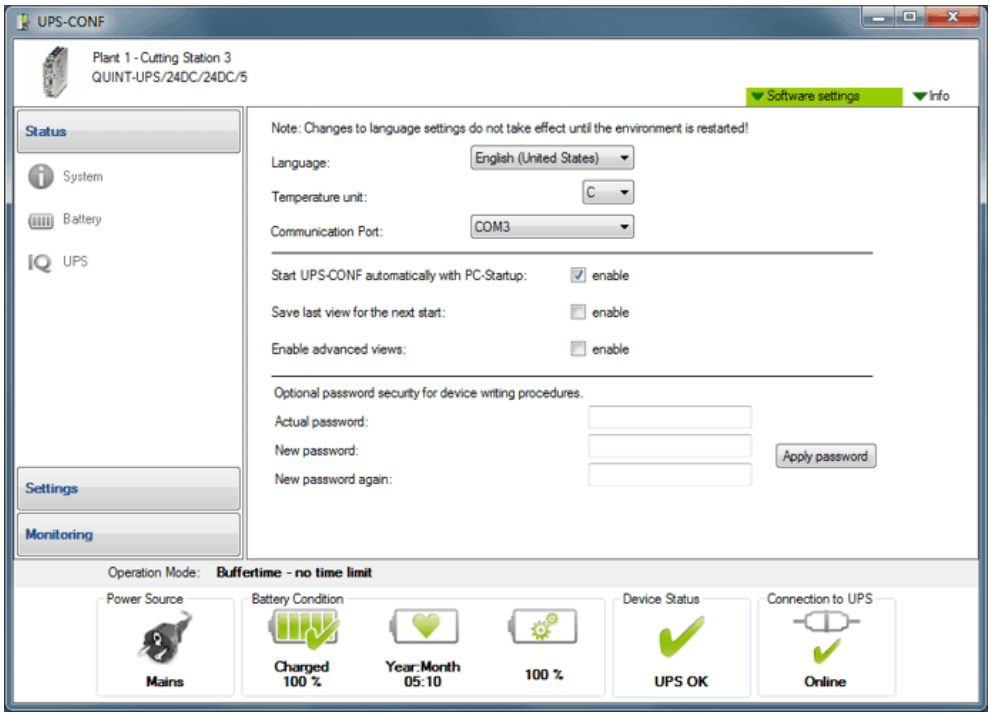
The UPS-CONF configuration and management software can be downloaded free of charge at www.phoenixcontact.net/catalog.

To install the software, proceed as follows:

1. Find UPS-CONF at www.phoenixcontact.net/catalog.
2. Save the UPS-CONF_Setup_v....exe file to the preferred download folder.
3. Make sure the IFS-USB-DATACABLE is unplugged.
4. Install UPS-CONF from the selected download folder. Simply follow the screen instructions.
   Read the EULA (End User License Agreement) carefully when it is displayed and agree it to continue the installation.
5. After having completed the UPS-CONF installation, connect the UPS device to the PC (see page 14). If required, select PC-Mode as operating mode (see page 12).
6. As soon as Windows detects the new USB hardware follow the instructions of the driver installation.

2.3 Software settings

The software settings can be shown by clicking the "Software settings" item in the system menu.



The following settings can be defined:

- Language of the user interface (English, German)

NOTE
To apply the changed language setting, you have to restart the UPS-CONF software.

- Temperature unit (Celsius, Kelvin, Fahrenheit)
- Communication (USB) port at the PC for the IFS-USB-DATACABLE (COMx)

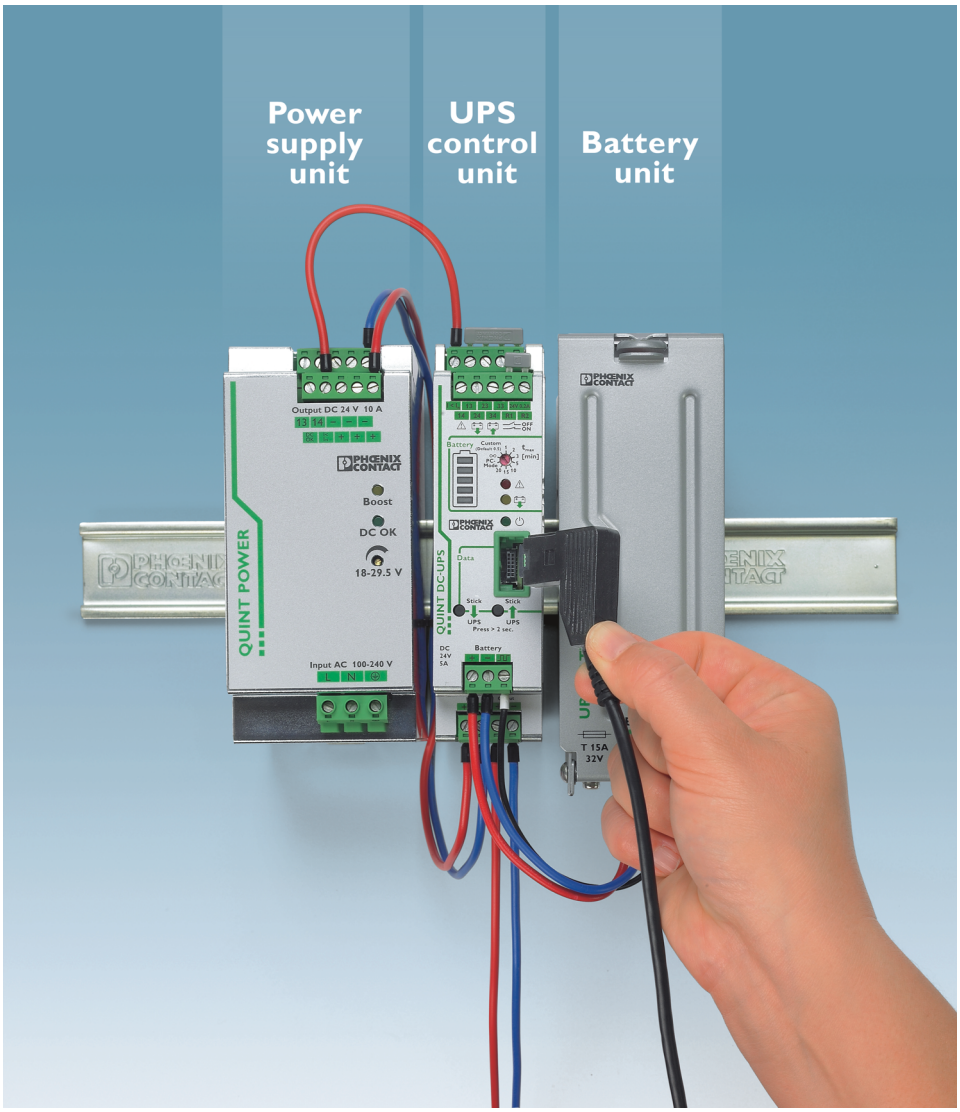
Normally, the communication port is set automatically by the UPS-CONF software when connecting the UPS devices. Under normal conditions there is no need to change this setting. If it has not been set automatically during the software installation, refer to the section Communication port (see page 56) in the Troubleshooting topic.

- Enable/disable automatic UPS-CONF startup after PC startup. This option must be checked if the UPS device shall buffer this PC.
- Restore the last view after the next software start.
- Hide or show the advanced views ("Battery Advanced" and "UPS Advanced" in the "Status" group and "Advanced" in the "Settings" group).
- An optional password, when parameters are written to the UPS device.

3 Hardware overview

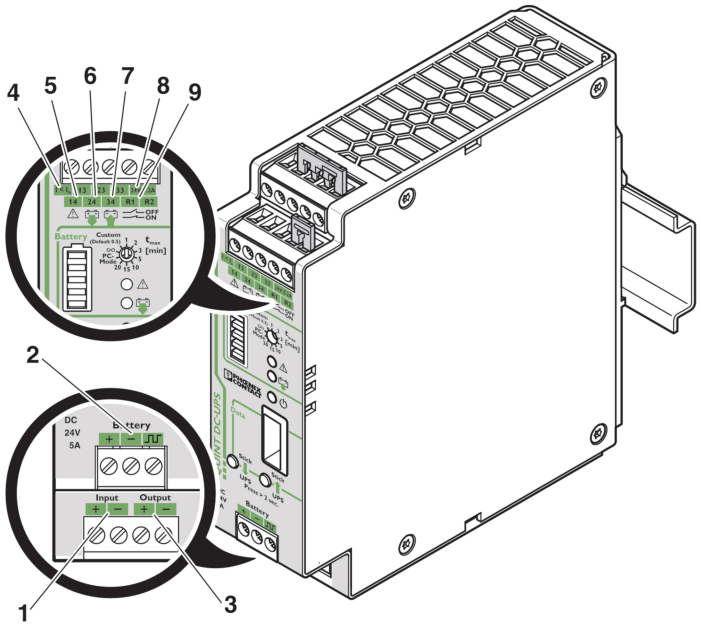
Choose your customized solution - for your application.

1. Choose your power supply.
2. Choose your UPS unit.
3. Choose your energy storage.

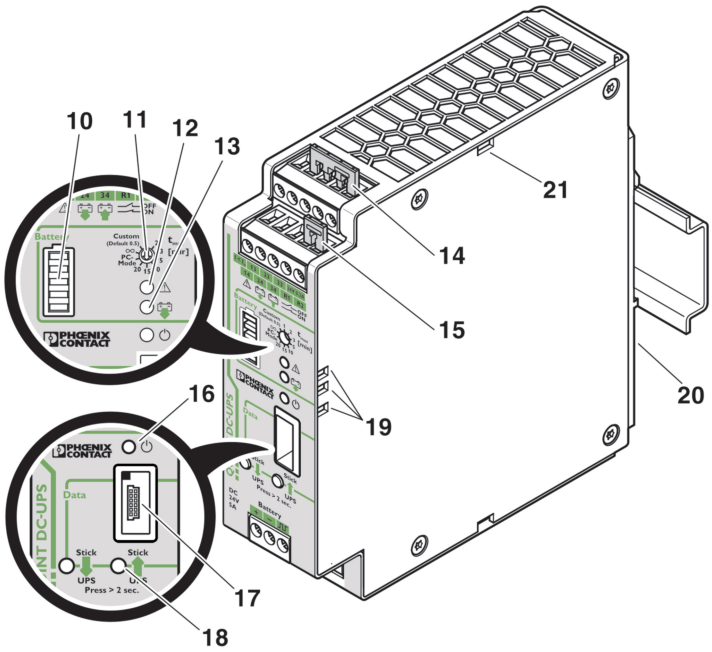


All Products are available in the e-shop: www.phoenixcontact.net/catalog

In the next two graphics and their corresponding lists you can see the location of the main parts of the QUINT DC-UPS.



No.	Connections / Operating elements
1	DC input 18 V DC ... 30V DC
2	Power storage device connection, 24V DC (+,-, communication between UPS and power storage device)
3	DC output, 24 V DC, buffered
4	$I < I_N$, fast battery charging
5	Floating relay contact 13/14: alarm (Related parameter settings are provided in the "Reporting" view (see page 31).)
6	Floating relay contact 23/24: battery mode (Related parameter settings are provided in the "Reporting" view (see page 31).)
7	Floating relay contact 33/34 : battery charge (Related parameter settings are provided in the "Reporting" view (see page 31).)
8	24 V DC supply voltage, maximum current limit 0.2 A for the signal contacts 13, 23, 33
9	Remote control (R1, R2). (Related UPS parameter "Remote Status" (see page 27).)



No.	Connections / Operating elements
10	Bar graph for displaying the current charging state of the power storage device
11	Buffer time setting: unlimited ∞, 1 ... 20 mins., customized (customized default: 0.5), PC mode (refer to topic Buffer time selection (see page 12)).
12	Red LED: alarm (Corresponding indicators are displayed in the software's "Status" view (see page 20).)
13	Yellow LED: battery mode (Corresponding indicators are displayed in the software's "Status" view (see page 20).)
14	Plug-in bridge for signal contact supply voltages, pre-installed
15	Remote control plug-in bridge, pre-installed
16	Green LED: Power In OK, mains mode (Corresponding indicators are displayed in the software's "Status" view (see page 20).)
17	Data port (see page 13) for data linking to the PC or the use of a memory block
18	Button for use of the memory block
19	LED windows for flat mounting position
20	Universal snap-on foot for DIN rails
21	Accommodation for cable binders

3.1 Important safety notes



Please observe all the safety notes outlined in this topic when using UPS-CONF together with the QUINT-UPS device.

Requirements

Knowledge of the following is required:

- QUINT-UPS system
- UPS-CONF configuration software
- Safety regulations in the field of application

Qualified personnel

In the context of using the QUINT-UPS system and the UPS-CONF configuration software described in this documentation, the following operations may only be carried out by qualified personnel:

- Planning, configuration
- Installation, startup, servicing
- Maintenance, decommissioning

This documentation is therefore aimed at:

Qualified personnel who plan and design electrical equipment for machines and systems and are familiar with regulations governing safety in the workplace and accident prevention.

Within the context of the safety notes in this documentation, qualified personnel are persons who, because of their education, experience and instruction, and their knowledge of relevant standards, regulations, accident prevention regulations, and service conditions, have been authorized to carry out any required operations, and who are able to recognize and avoid any possible dangers.

4 Hardware setup

NOTE
Before setting up the hardware, install the software (see page 5).

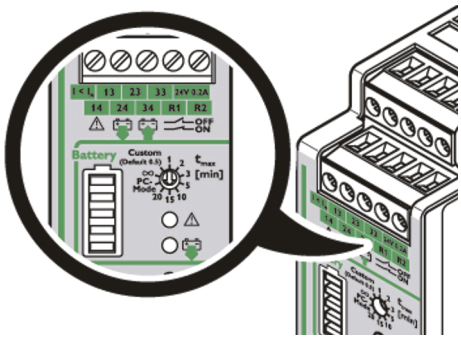
Regarding the communication with the PC and the UPS operation mode, it needs only three steps to setup the hardware:

1. Set the buffer time at the buffer time potentiometer, as described in the topic Buffer time selection. (see page 12)
2. Connect the Data port either with a PC or plug in a configuration stick, as described in the topic Data port (see page 13).
3. Connect the load to be supplied by the UPS (see technical datasheet for each QUINT-UPS).

NOTE
For further information about the hardware installation (connecting the battery module, etc.) please refer to the QUINT DC-UPS technical datasheet.

4.1 Buffer time selection

The buffer time potentiometer at the front of the QUINT-UPS has to be switched to the desired mode with a screwdriver.



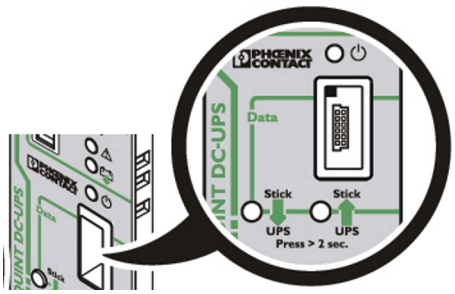
The following settings are available:

Operating mode	Description
Custom (default 0.5)	Buffer time can be set to a user-defined value; if no value is set 0.5 minutes is used, as described in the topic Custom Mode (see page 37).
1, 2, 3, 5, 10, 15, 20	Buffer time 1, 2, 3, 5, 10, 15, 20 minute(s).
PC-Mode	This mode is intended to buffer a PC and to initiate a controlled shut-down in battery mode. The buffer time depends on the "Shutdown Delay" time and on the "PC-Shutdown" time, as described in the PC-Mode (see page 38).
∞	No time limit, buffering is continued until the battery is empty (deep discharge security).

The current set buffer time is shown as "Operation mode" in the status bar (see page 17).

4.2 Data port

The Data port is located at the front of the UPS. Via this port, configuration and maintainance of the UPS is done.



The configuration can be done in 2 different ways, depending on what is connected to the Data port:

- Connect the PC (see page 14) with the installed UPS-CONF software, if you want to configure by software.
- Plug in a memory stick which is declared as configuration stick, if you want to configure by configuration stick (see page 46).

In order to perfom maintenance tasks (such as changing a battery), a service stick can be plugged into the Data port, so the UPS switches to service mode (see page 47).

4.3 Connecting the PC

A PC has to be connected to the UPS in one of the following cases:

- You want to configure or monitor the UPS by the UPS-CONF software.
- You want to display currently set QUINT-UPS parameters or modify them using UPS-CONF.
- You want to initiate a controlled PC shutdown in case of a mains failure and if battery runs low.

NOTE
First, install the software (see page 5) and then connect the PC afterwards.

To connect the PC to the QUINT-UPS, proceed as follows:

1. Connect the USB connector of the IFS-USB-DATACABLE to a free USB connector of your PC. After detecting the device, the used USB port is entered automatically in the software settings of UPS-CONF.



2. Connect the other side of the IFS-USB-DATACABLE to the Data port of the UPS:



5 Software overview

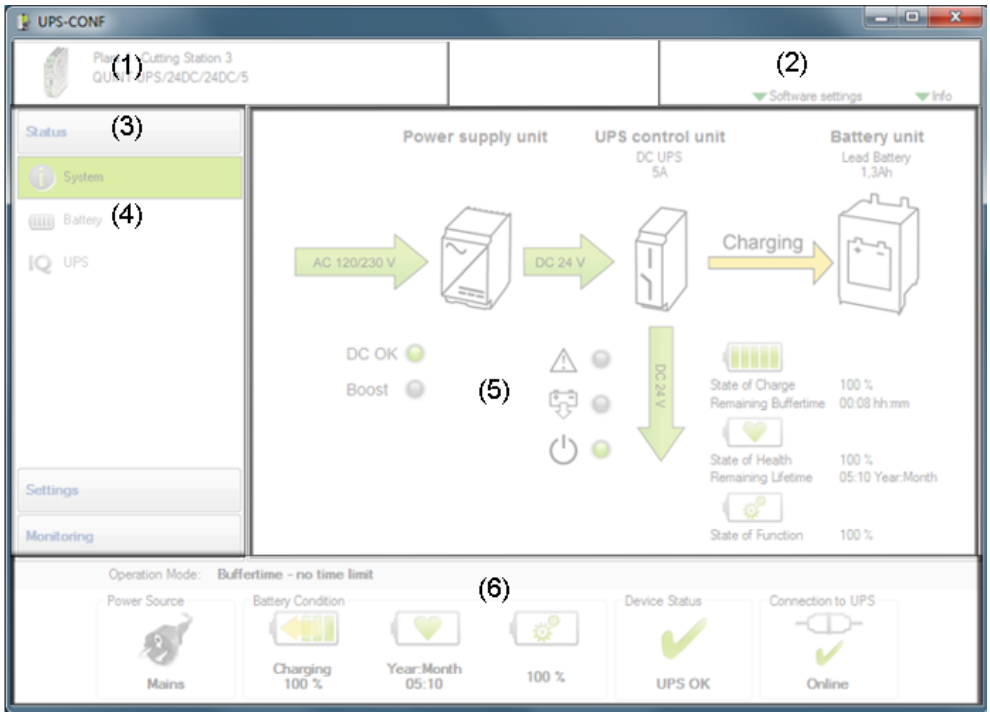
After installing the UPS-CONF software, the program starts up automatically.

As long as you do not change the related default software setting (see page 5), UPS-CONF always starts automatically after every PC reboot.

In the following sections you can get an overview about the screen areas of the UPS-CONF software and you can learn about the different status bar (see page 17) symbols and their meanings.

5.1 User interface

The screen layout consists of the following areas:



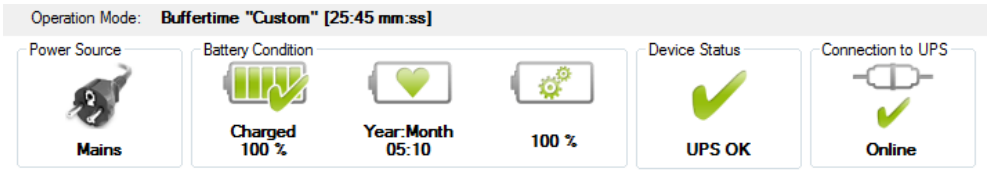
The following table explains the several areas.

Area	Description
(1)	Device information: Here, the type of the connected UPS is displayed. If text has been entered for the advanced UPS parameter "Place of installation" (see page 41), it is displayed above the UPS type.
(2)	System menu: Software settings (see page 5): A mouse click leads to the screen, where various software settings can be made. Info: A mouse click shows the contact information of Phoenix Contact.
(3)	Software menu: The Software menu provides various topic buttons such as status information display, parameter settings or monitoring values. A software menu button is expanded/collapsed by simply clicking it. When a software menu button is expanded the corresponding navigation items are listed.
(4)	Navigation items: After clicking a navigation item the corresponding information and parameters are displayed in the action area.
(5)	Action area: The content of the action area depends on the currently selected navigation item. This can be, for example, information, read from the device, or a parameterization table used for configuring the connected UPS.
(6)	Status bar (see page 17): Displays the status of all involved components thus providing a quick system overview. The status bar is always visible, also if the navigation and action area change.

5.2 Status bar

The status bar in the lower part of the screen shows information about the current system state.

When the power supply is available and the system is online and the battery is fully charged, the status bar looks like this:



The operation mode in the upper part of the status bar shows the current setting of the buffer time potentiometer of the UPS, as described in topic Buffer time selection (see page 12).

If it looks different, e.g. Power Source status "UPS off" or no connection to UPS ("Offline"), verify the following:

- All UPS components (QUINT-UPS, battery, power supply) are functional and properly connected.
- The QUINT-UPS is supplied with 24 V DC.
- The IFS-USB-DATACABLE is properly connected between QUINT-UPS and PC.

If an alarm is detected or an existing online connection between the PC and the QUINT-UPS is interrupted, the UPS-CONF software automatically becomes the active window. The status is queried every 5 seconds.

If your system status is like described, you can

- evaluate the UPS system status by displaying the various views contained in the software menu "Status" (see page 20) and/or
- start configuring the UPS by modifiying the default parameter settings in the various views of the software menu "Settings" (see page 29) and/or
- monitor your system.

In the topic Application samples (see page 52), some typical application scenarios are described.

The following tables explain the different status symbols that can be visible in the status bar:

Power Source	Symbol meaning
	The status "Mains" is shown, if the power supply is switched on and available.
	The status "Battery" is shown, if the power supply is switched off or not available. That means, the battery is discharging.
	The status "UPS off" is shown in either case: • The UPS is off, because battery mode is finished. The set buffer time has elapsed. • The power supply is available, but delivers an invalid output voltage.

Battery Condition	Symbol meaning
State of charge: 	Battery is "Fully charged".
State of charge: 	"Charging" is shown, if the battery is currently charging and not yet fully charged.
State of charge: 	The "Discharging" status is shown, if the battery is currently discharging because the system runs in battery mode. Usually, this status is shown in combination with the power source status "Battery".
State of charge: 	"Uncharged" is shown, if the battery mode is finished and the battery is empty.
State of health: 	The "State of Health" status shows the remaining lifetime of the battery. The lifetime value is shown below the symbol.

Battery Condition	Symbol meaning
State of function: 	The "State of Function" status shows the current performance of the battery. This efficiency value is measured in percent and is shown below the symbol.



During battery charging the battery conditions "State of Charge", "State of Health" and "State of Function" are shown as "unknown".

Device Status	Symbol meaning
	The "UPS OK" status is shown during normal UPS operation, i.e., when mains is available (battery mode not active) and no other event is currently upcoming.
	"Bat.-Mode deactivated" is shown, if the bridge is removed from the terminals R1 and R2. Refer to the parameter "Remote Status" in the topic UPS (see page 27).
	The "Alarm" status is shown, when a failure or critical situation exists, for example: • battery almost empty • battery not detected • battery replacement required

Connection to UPS	Symbol meaning
	This status informs about the communication connection between UPS-CONF and the QUINT-UPS device. The "Online" status is shown, if the IFS-USB-DATACABLE is connected. Normally, this status is automatically entered after connecting the UPS to the PC via the IFS-USB-DATACABLE.
	"Offline" means that no communication connection is established via the IFS-USB-DATACABLE.

6 Status - Reported information

If the "Status" group is selected, the following navigation items are available:

- "System (see page 20)": overview on the current system status
- "Battery (see page 25)": status information for all connected batteries
- "Battery Advanced (see page 26)": advanced status information for all connected batteries
- "UPS (see page 27)" : status information for the connected UPS
- "UPS Advanced (see page 28)": anvanced status information for the connected UPS

6.1 System

If the "System" item is selected in the software menu "Status", an overview on the current system status is visible in the action area. The values shown here are read cyclically from the UPS device, as long as a communication connection to the UPS is established.

The system components and their status information are arranged on the screen as "Power supply unit" on the left hand side, "UPS control unit" in the middle and "Battery unit" on the right hand side. The tables explain the symbols corresponding to the units.



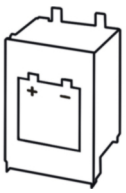
Power supply unit symbols:

Icon	Meaning of LEDs
DC OK	Green LED on: DC output is available. LED off: DC output is not available.
Boost	Yellow LED on: Boost signal is ON (power supply delivers additional current for a connected load). LED off: Boost signal is OFF.



UPS control unit symbols:

Icon	Meaning of LEDs
⚠	Red LED on: UPS alarm due to one of the reasons: • battery almost empty • battery not detected • battery replacement required LED off: No UPS alarm, power supply available, normal operation.
	Yellow LED on: Battery mode is ON, battery is discharging because power supply failed. LED off: Battery mode is OFF, i.e. mains available.
⏻	Green LED on: Mains is ON. LED off: Mains is OFF.

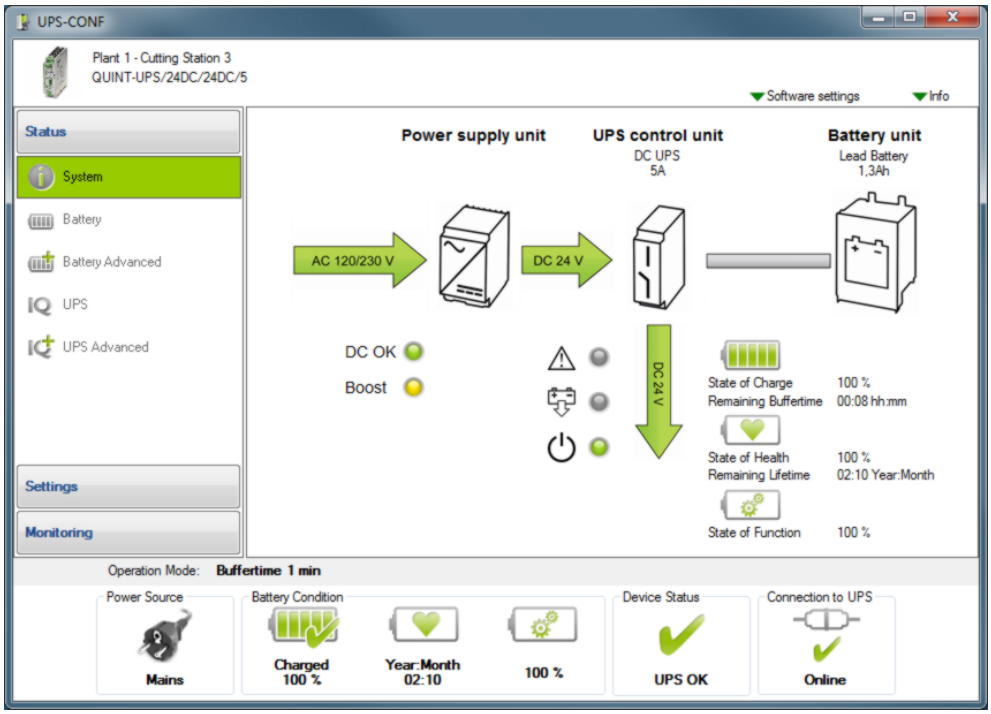


Battery unit symbols:

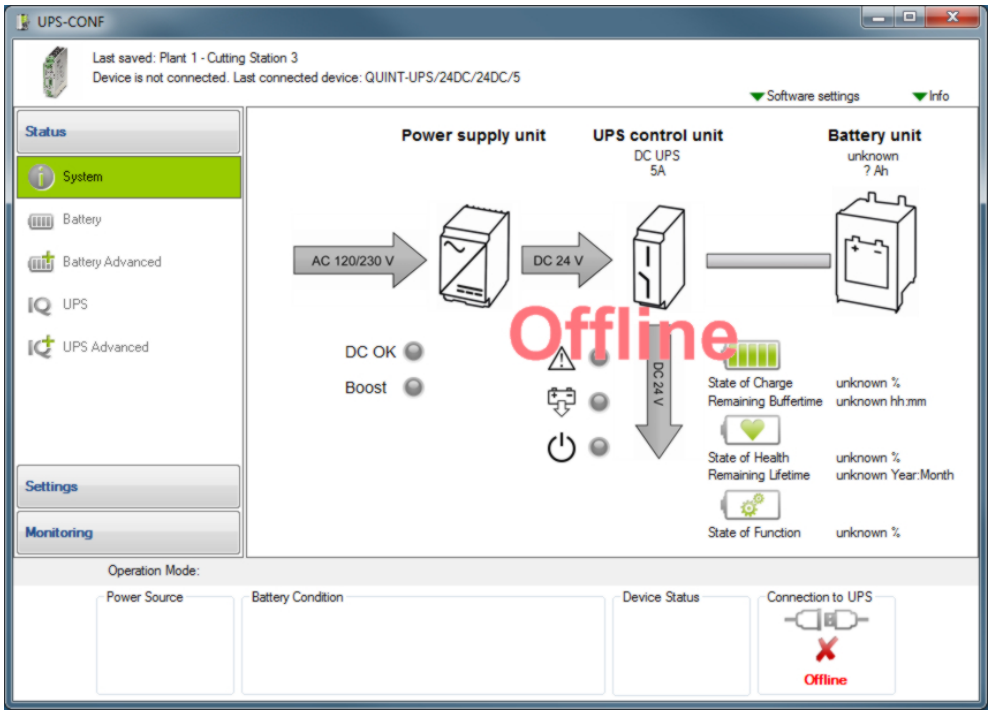
Icon	Meaning of LEDs
	SOC (State Of Charge) – current charging state and remaining back-up time of the battery unit.
	SOH (State Of Health) – remaining life expectancy of the battery unit, provides early warning for a potential battery unit failure.
	SOF (State Of Function) – determines the current performance of the battery unit.

NOTE
While charging the battery the status is "unknown".

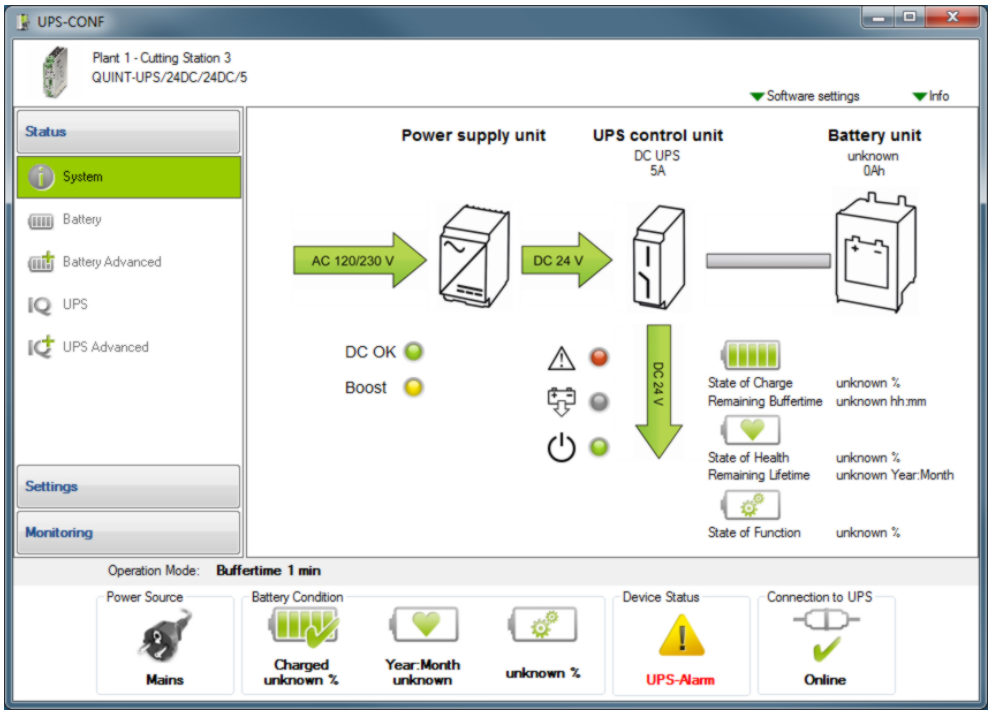
When the system is in normal operation (online and running), the screen looks like this:



When the UPS is offline and has no connection to the PC, the screen looks like this:



When the system status shows an alarm, the screen looks like this:



In such case refer to the topic Troubleshooting (see page 53).

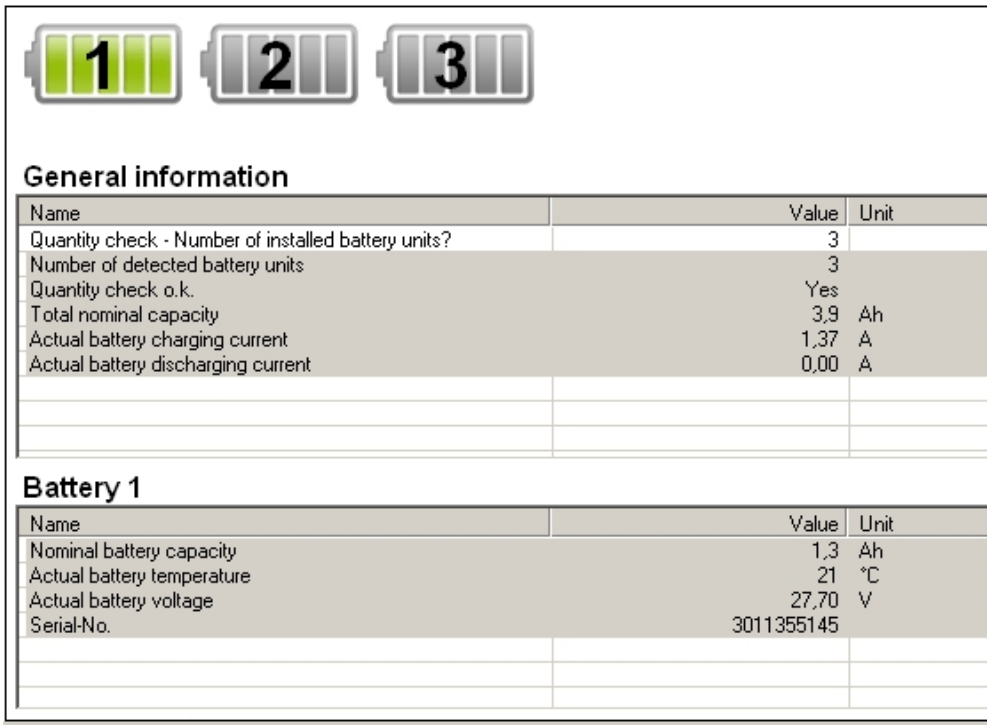
6.2 Battery

If the "Battery" item is selected in the software menu "Status", status information for all connected batteries is shown in the action area.

The information is headed by "General information" for all connected batteries, such as "Number of detected battery units" or "Total nominal capacity".

Individual information for every battery follows.
If several battery units are installed, the data of the individual units can be displayed by clicking on the battery icons on top of the action area:

The status information in the action area could for instance look similar like this:



Battery parameters	Meaning
Except of some parameters explained here, the status information is self-explanatory, this is why it is not explained in detail.	
Quantity check - Number of installed battery units?	This value can be set to the amount of batteries, that were built in.
Number of detected battery units	Number of batteries detected by the QUINT-UPS.

Battery parameters	Meaning
Quantity check o.k.	Shows "Yes", if the number of installed battery units complies with the number of detected batteries. Otherwise "No" is displayed.

6.3 Battery Advanced

This navigation item is only available if the "Enable advanced views" checkbox is marked in the software settings (see page 5).

If the "Battery Advanced" item is selected in the software menu "Status", advanced status information for all connected batteries is shown in the action area.

In normal operation it looks something like this:

Name	Value	Unit
Actual state of charge	100	%
Remaining backup time	00:08	hh:mm
Remaining battery life time	01:03	Year:Month
Actual battery performance	100	%
Actual battery voltage	27,57	V
Actual battery temperature (Average of all units)	26	°C

6.4 UPS

If the "UPS" item is selected in the software menu "Status", status information for the connected UPS is shown in the action area.

In normal operation it looks like this:



Name	Value	Unit
Actual Alarm	No Alarm	
Last Alarm	No Alarm	
Remote Status	UPS ready	
UPS in battery operation (Battery-Mode)	No	
Selected operation mode	Buffertime - no time limit	
Battery is charging (Battery-Charge)	No	

Parameter	Meaning
	Except of some parameters explained here, the status information is self-explanatory, this is why it is not explained in detail.
Remote Status	Remote control (contact R1, R2) The module can be switched on and off via a signal to contacts R1 / R2. Shutdown can take place in mains mode or while battery mode is active. Remote shutdown is deactivated UPS in function (delivery state) – The "R1" and "R2" terminal points are short circuited (delivery with plug-in bridge) OR 24 V DC is present at terminal point "R2". – In the event of a voltage supply failure, the UPS switches over to battery mode. Remote shutdown is activated – The "R1" and "R2" terminal points are not short circuited AND 0 V is present at terminal point "R2". – In the event of a voltage supply failure, the UPS does not switch over to battery mode and the device shuts down.
Selected operation mode	Shows the operation mode that is set via the buffer time potentiometer, as described in topic Buffer time selection (see page 12).

6.5 UPS Advanced

This navigation item is only available if the "Enable advanced views" checkbox is marked in the software settings (see page 5).

If the "UPS Advanced" item is selected in the software menu "Status", advanced status information for the connected UPS is shown in the action area.

The status information is self-explanatory, this is why it is not explained in detail here.

In normal operation it looks something like this:

Name	Value	Unit
Device type	QUINT-UPS/24DC/24DC/5	
Actual input voltage	23,91	V
Actual output voltage	23,66	V
Actual Device Temperature	30	°C
Shutdown event started	No	
UPS serial number	3012001033	
Device firmware	0x00000110	

7 Settings - Defining UPS device parameters

The navigation items contained in the "Settings" group allow access to the various UPS device parameters.
Parameter values can be entered in UPS-CONF and written to the device (see page 29) with only one click of the mouse.

If the software menu "Settings" is selected, the following navigation items are available:

- Reporting (see page 31): Trigger thresholds, switching outputs for UPS alarm, battery mode and battery charging as well as Email settings
- Time Setting (see page 36): Buffer times, (delay) times and programs to execute for PC shutdown
- Service (see page 39): Service mode activation and rights granting, declaration of service stick and configuration stick
- Advanced (see page 41): Battery charging values, wire sizes, thresholds, signaling times and others

How to write parameters

In each of the navigation items, different settings can be made in the action area in order to write it to the UPS.

Beneath settings, that can be made by checking a checkbox or by entering data into an input box, also numerical or textual values contained in the parameter tables can be changed.

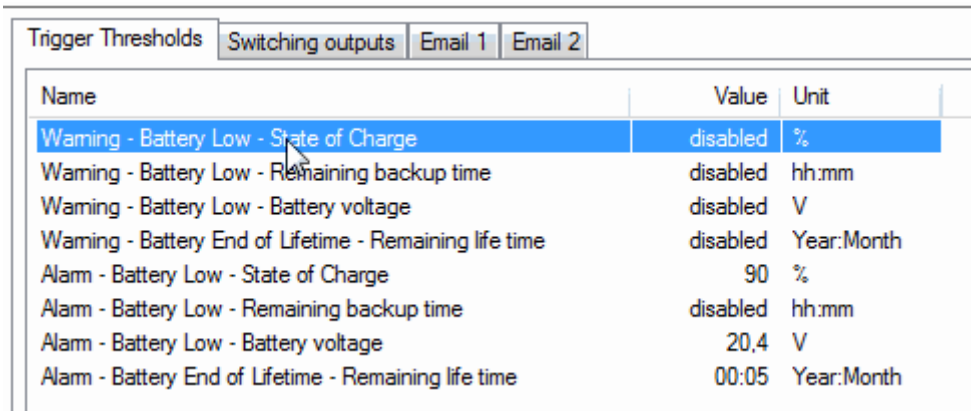
In these parameter tables, changeable parameter values have a white background color. Read-only values, i.e. the ones that are read from the device for monitoring purposes, are shown on a gray background.

To enter a new value for a parameter and write it to the UPS, proceed as follows:

1. Double-click the line, where the parameter text is located or click the "Write..." button in the lower right corner.
   An input box opens showing the currently set value.
2. Enter a value into the input box. Make sure that the chosen value is within the allowed value range and is suitable for your UPS system!
3. Click the "Write to device" button.
4. Verify that the new value is now displayed in the parameter table, i.e., has been accepted by the device.

Sample:

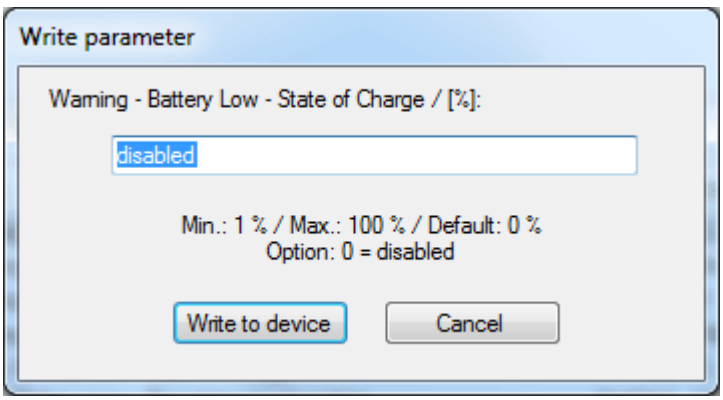
Select the "Reporting" navigation item in the "Settings" group and click the "Trigger Thresholds" tab in the action area.
In this tab, you can set a trigger value, at which battery charging level a "battery low" warning should be generated (first entry in the tab Trigger Thresholds (see page 31)). The value is entered as percentage, see below. By default, the trigger is "disabled", i.e. no warning is reported.



Set the trigger to 20% as follows:

1. Double-click the marked line, as shown in the figure above or left-click the line and then press the "Write..." button in the lower right corner.

   The following dialog appears:

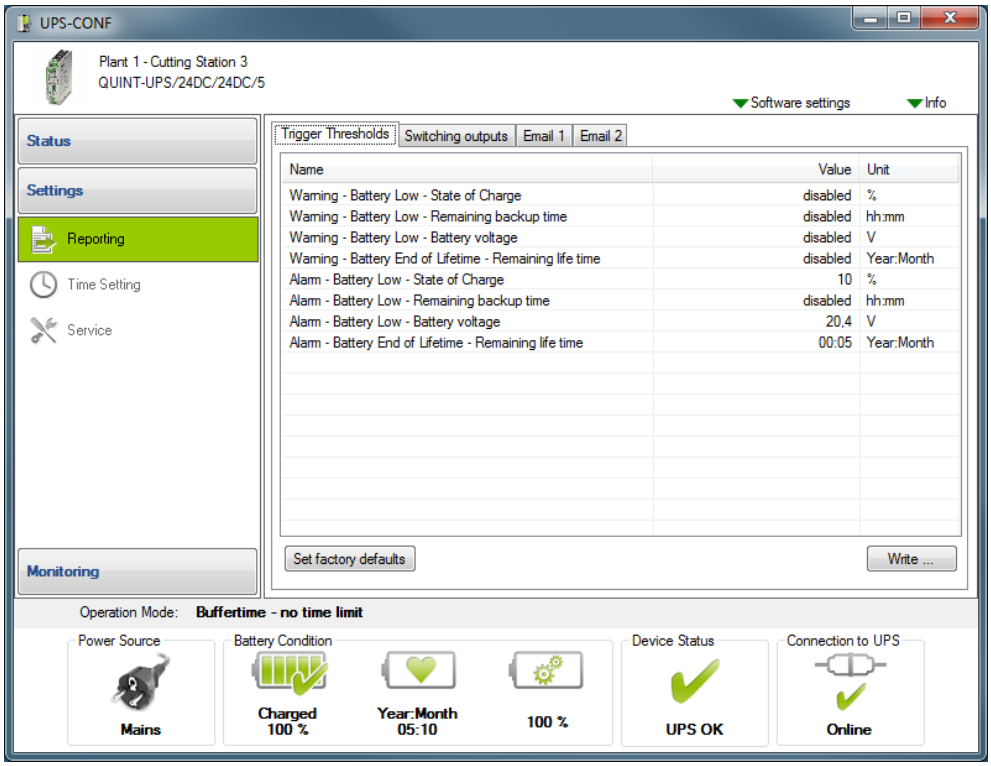
   Below the text field you can see the allowed input range.
2. Enter `20` in the input box and click the "Write to device" button.
3. Verify that the new value is shown in the table.

7.1 Reporting

If the "Reporting" item is selected in the software menu "Settings", the tabs "Trigger Thresholds", "Switching outputs", "Email 1" and "Email 2" are visible in the action area.

Trigger Thresholds

On the "Trigger Thresholds" tab you can define, whether warnings or alarms shall be reported by the UPS and define the threshold values which must be exceeded in order to trigger a message.



For each of the following conditions, both a warning and an alarm threshold value can be defined:

- Battery is low and the state of charge falls below a certain percentage number.
- Battery is low and the remaining backup time falls below a defined time.
- Battery is low and the battery voltage falls below a certain voltage.
- Battery is at it's end of lifetime and the remaining life time falls below a defined time.

If a warning or alarm is reported, you can define that a switching output must be triggered. For some of the warnings or alarms an Email to be sent can also be defined.

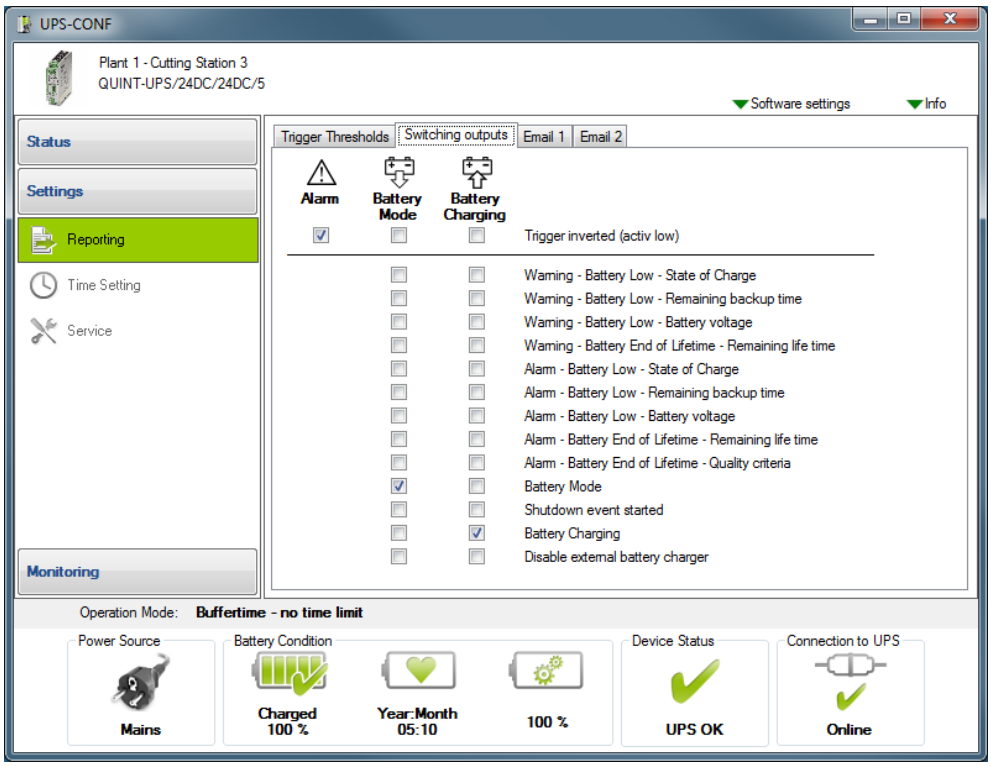
A reported alarm is additionally signaled by the LED at the front of the UPS device as well as in the status bar of the UPS-CONF software.

By means of warnings and alarms you can implement a two-level detection system:

1. Report a warning, when the first threshold value is exceeded.
   Example: battery lifetime is still one year.
2. Report an alarm, when the second threshold value is exceeded.
   Example: remaining lifetime of the battery is only some few months or weeks. Now an Email is additionally sent to the responsible person to ensure that a new battery is ordered in time.

Switching outputs

On the "Switching outputs" tab you can define a QUINT-UPS device output signal to be switched, when a certain trigger occurs. With such an output signal you can, for example, control a buzzer, that sounds, if the battery is low or the shutdown has been initiated.



Three different outputs are available to be switched:

- "Alarm",
- "Battery Mode"
- "Battery Charging"

All switching outputs can be triggered inverted, i.e., active low.

The "Battery Mode" and "Battery Charging" output signals can be switched with the following triggers:

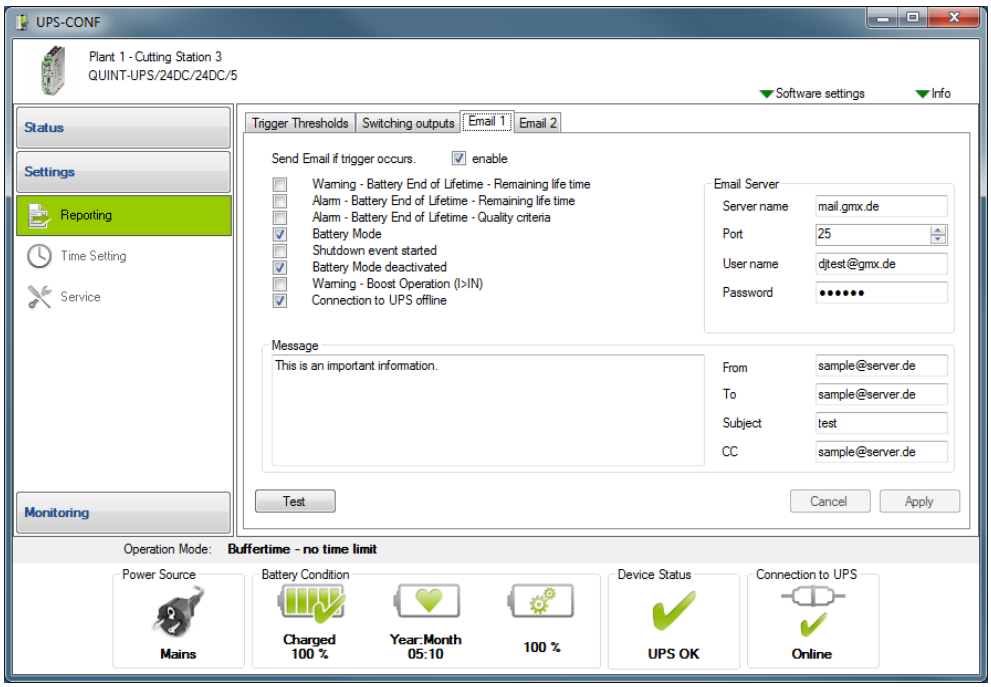
- The same triggers as described in section "Trigger Thresholds" for warning and/or alarm, e.g. triggers that are released by an exceeded or underrun threshold.
- The quality criteria is no more fulfilled. The IQ-Technology of the QUINT-UPS-IQ is able to calculate it's own save remaining lifetime for the battery. Based on this calculation, the quality criteria is evaluated as met or not.
- The system switches to battery mode.

- A shutdown event started.
- The battery switches to the "Battery Charging" status.
- For the "Disable external battery charger" trigger, see technical datasheet for the QUINT-UPS.

For "Alarm" switching output, no further options can be defined.

Email 1 / Email 2

On the "Email 1" and "Email 2" tabs you can define two separate Email addresses, to which Emails can be sent if certain events occur. To access the input fields, mark the "enable" checkbox in the upper part of the screen.



The available triggers to initiate Emails to be sent are:

- A warning occurs as battery is at it's end of lifetime and the remaining life time falls below a defined time.
- An alarm occurs as battery is at it's end of lifetime and the remaining life time falls below a defined time.
- An alarm occurs as the quality criteria is no more met.
- The battery switches to battery mode.
- A shutdown event started.
- The battery switches to "Battery Charging" status (battery mode deactivated).

- A warning occurs because boost operation was activated. The power supply now delivers BOOST current, which is up to 1.5 times the nominal current of the power supply (only available with QUINT POWER).
- The connection to the UPS was interrupted ("Offline" status).

In the Email Server area, you have to enter:

- "Server name" for the server managing your outgoing mail. Ask your administrator for details.
- "Port" for outgoing Emails is usually 25. The predefined port 25, however, can be changed.
- "User name" and "Password" of your Email account. In some accounts the "User name" is the Email address.

The Message area contains:

- Messagebox: A short explanation of the trigger, that caused the Email, is sent as default message. You can enter additional text, that will be appended to the default text.
- "From" textbox: Any Email address can be entered here.
- "To" textbox: A valid Email address has to be entered here, where the Email is sent to; it must be an Email address, that exists in the Email server´s configuration.
- "Subject" textbox: the title of your Email is user-defined; it is only used with the Email "Test" button. When the Email is successfully sent, click the "Apply" button.
- "CC" textbox: you can enter an Email address, where a copy is sent to.

You can test your settings by clicking on the "Test" button.

Sample Email:

A sample Email would look like this:

Email part	Content of Email part	Explanation
Subject	[UPS CONF: Parameters change notification]	
Message	*** UPS Status Mail ***	Header of the status mail message
	Hall 125	Place of installation, refer to the topic Advanced (see page 41)
	QUINT-UPS/24DC/24DC/5	Type of connected UPS, refer to the device information area in the User interface (see page 15)
	Trigger: Battery Mode Trigger	Kind of active trigger
	Threshold: -	Threshold (if applicable)
	This is an important information.	User defined text from the message textbox

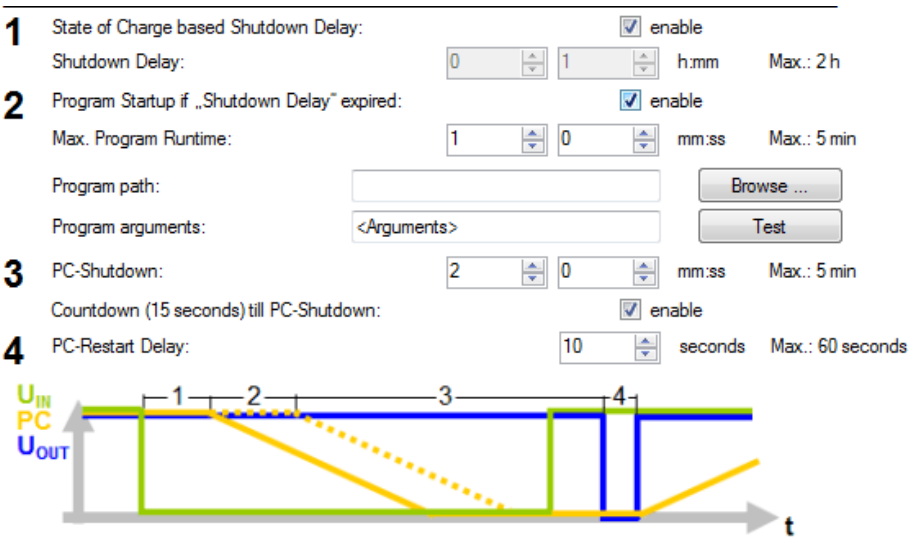
7.2 Time Setting

If the "Time setting" navigation item is selected in the "Settings" group, the action area provides various settings for two different UPS operating modes:

- The upper part (above the separation line) specifies the "Custom" mode.



- In the lower part (below the separation line), four different parameter categories can be set concerning the PC-Mode.

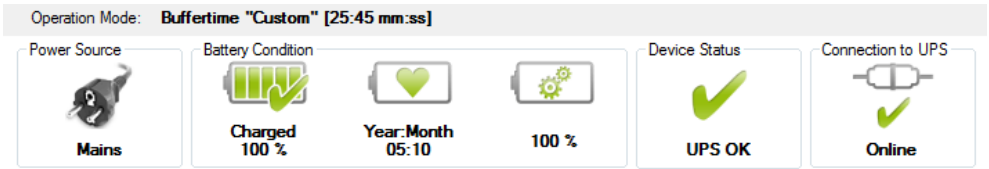


Custom mode

NOTE
These settings only apply if the UPS runs in Custom mode. To set this mode, the buffer time potentiometer located at the device front must be set to "Custom" (refer to topic buffer time selection (see page 12)).

In Custom mode the buffer time for the battery can be set to a maximum of 1 hour (30 seconds default).
When the power supply was interrupted the load will loose it's power after the user-defined buffer time has elapsed. The battery will buffer exactly the set buffer time. If no user-defined time is entered, the buffer time selected by the potentiometer is used.

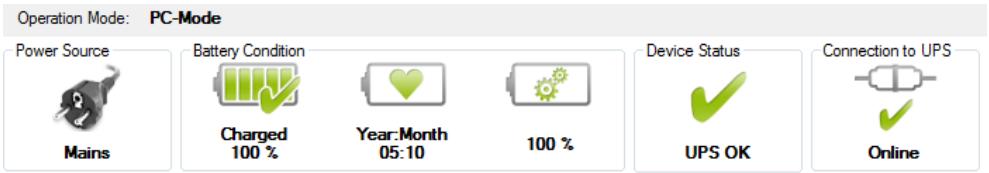
The set time is displayed in the "Operation Mode" of the status bar. An example with 25 minutes and 45 seconds set, shows the following status bar and operation mode:



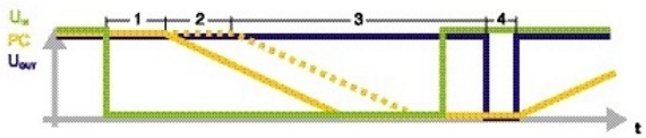
PC-Mode

NOTE
These settings only apply if the UPS runs in PC-Mode. To set this mode, the buffer time potentiometer located at the device front must be set to "PC-Mode" (refer to topic buffer time selection (see page 12).

When the PC-Mode is set, the status bar shows the operation mode "PC-Mode", as shown in the following screenshot:



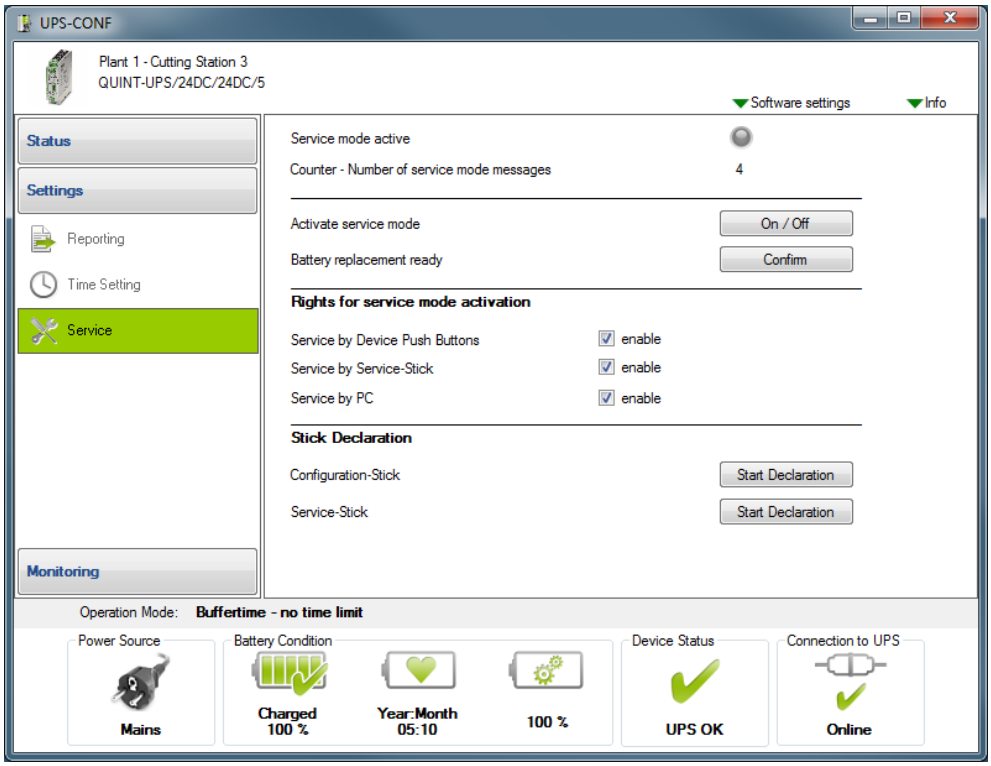
In the "PC Mode" setting on the UPS potentiometer, the UPS functionality follows a chronological sequence that can be parameterized via software, and is thus individually customized to the respective application.



Parameter	Meaning / Possible settings
1 Shutdown delay	Delay time is calculated automatically from the current remaining battery life minus the time required by the PC to shutdown. Alternatively, a fixed delay time may be chosen.
2 Program startup	After the delay time has expired it is possible to start a program. Example: a software starts that gradually backs up system data. You can test your settings by clicking on the "Test" button.
3 PC shutdown	The time required by the PC/IPC to shut down is set here.
4 PC restart delay	Only if the PC/IPC is shut down, and the mains has returned in the meantime, the output voltage will be interrupted for the reset time. The PC/IPC is then automatically restarted.

7.3 Service

If the "Service" item is selected in the software menu "Settings", all parameters of switching the UPS to service mode are accessible in the action area.



Here, you can:

- Operate the UPS in service mode (see page 47).
- Grant or deny rights for the service mode activation (see section below).
- Declare memory sticks as either configuration sticks or service sticks, as described in the topic Stick usage (see page 45).

Rights for service mode activation

The rights for all possible methods to activate or terminate the service mode can be defined in the "Rights for service mode activation" part of the "Service" navigation item´s action area. Possible activation methods are:

- Pressing both push buttons ("Stick -> UPS" and "UPS -> Stick") on the device front simultaneously.
- Plugging a service stick into the Data port of the UPS device.

- Clicking the service mode activation button in the "Service" navigation item´s action area in UPS-CONF.

When allowing a service stick for activating the service mode and disabling the use of the push buttons at the same time, the stick can be considered as a kind of hardware key: Only authorized persons who possess a service stick are allowed to switch the device to service mode. For that purpose, a memory stick must be declared accordingly as described in Stick usage (see page 45).



For further information please refer to the "Service stick usage - service mode (see page 47)".

7.4 Advanced



This navigation item is only available if the "Enable advanced views" checkbox is marked in the Software Settings (see page 5).

The "Advanced" navigation item within the "Settings" group allows to set more specific parameters. These are in detail:

Name of parameter:	Sample value:	Unit:	Explanation:
Place of installation (user defined)	Hall 125	(none)	The text entered here is dislayed in the device information area of the User interface (see page 15).
Initial charging current	1.36	A	The battery is charged with this current, when the power supply is available.
Absorption charging end voltage	28.00	V	An equalizing charge, that increases charging voltage to a higher value than the nominal capacity for a short period. This prevents battery stratification and reduces sulfation. When the battery is fully loaded, this voltage is tolerated as a maximum, before the voltage level gets a stable end value.
Float charging end voltage	27.60	V	The charger adjusts the end voltage based upon battery temperature. During high temperature periods, the actual battery voltage will be reduced and during low temperature periods it will be increased.
Temperature compensation	42	mV/K	High ambient temperatures have a negative impact on the service life of the battery. Therefore, the charging voltage should be lower with higher ambient temperatures. The adjustable values relate to one battery cell each.
Wire distance to the battery unit	300	mm	The maximal wire length from the UPS control unit to the battery unit.
Wire cross section to the battery unit	6.0	qmm	The wire cross section from the UPS control unit to the battery unit.

Name of parameter:	Sample value:	Unit:	Explanation:
Fast battery charging	On	(none)	Boost mode is allowed or not.
Dynamic backup threshold	Off	(none)	This parameter can be defined additionally to the overvoltage and undervoltage related parameters, see below. If set to On the voltage increase or decrease within a certain time period is watched (dynamically). The UPS switches to battery mode, if the relative increase/decrease is too much. In contrast the overvoltage and undervoltage parameters have static values. They can become active regardless the dynamic backup threshold did not trigger, because the voltage was alright.
Undervoltage backup threshold	19.00	V	When the DC voltage falls under this threshold (undervoltage), the system switches to battery mode.
Overvoltage backup threshold	30.00	V	When the DC voltage exceeds this threshold (overvoltage), the system switches to battery mode.
Return to mains time	3	seconds	After this time the system returns to mains, when it is in battery mode and the power supply is available again.
Discharging end voltage	19.20	V	The battery voltage may not sink below this voltage value, otherwise it would be deeply discharged and become defective.
Signaling time after battery low cutoff	00:10	hh:mm	When the battery low status has arrived, the UPS cuts off and the status of the power source firstly switches to "UPS off (see page 27)". After the time set here no more power or battery status is displayed, but only the Connection to UPS (see page 17) is offline.
Signaling time after time cutoff	00:10	hh:mm	When the buffer time has elapsed, the UPS cuts off and the status of the power source firstly switches to "UPS off (see page 27)". After the time set here no more power or battery status is displayed, but only the Connection to UPS (see page 17) is offline.

Name of parameter:	Sample value:	Unit:	Explanation:
Battery type (imported item)	"No value assigned"	(none)	The type of battery delivered by the manufacturer. This value is read by the UPS-CONF software.
Nominal capacity (imported item)	"No value assigned"	Ah	The nominal capacity of the battery delivered by the manufacturer. This value is read by the UPS-CONF software.



You can restore the default settings anytime by clicking the "Set factory defaults" button.



You can import / export the list in a .csv file by clicking the button "Import " or "Export".

8 Monitoring - Statistics and logging

If the "Monitoring" group is selected, the navigation items "Statistic (user defined)", "Statistic (system defined)" and "Logging" are available.

The items inform about counted and time measured statistic values and show logged information.

Statistic (user defined)

The "Statistic (user defined)" navigation item shows counter values which start at a user-defined value. If, for example, batteries have been replaced, you can set the values manually to "0" in order to start a new logging period. The following values are displayed and can be reset:

- Number of battery modes: How often did the UPS already change to battery mode?
- Total time of battery mode: How long altogether did the UPS stay in battery mode?
- Number of operation startups: How often was the UPS started?
- Total operation time: How long altogether did the UPS run?

Statistic (device defined)

The "Statistic (system defined)" navigation item shows counter values which always start from the value "0" with the initial device installation. Beneath the same values as shown in the "Statistic (user defined)" navigation item, additional values are displayed:

- Runtime of the current battery operation: How long does the current battery operation (if relevent) altready last?
- Number of battery low cutoffs: How often was the battery completely discharged?
- Number of all messages: How many warnings and alarms were signaled altogether?
- Number of remaining lifetime messages: How often was a remaining lifetime signaled?
- Number of quality criteria messages: How often was signaled, that the quality criteria is no more met?
- Number of battery presence messages: How often was a battery unit not detected, e.g. no fuse plugged or circuit broken?

Logging

The logging is done by the software itself.
The "Logging" navigation item lists events like "Offline", "Online" or "UPS in battery mode" with date and time stamp. The event colors differ between green and red depending on the type of event. They are chronologically sorted, the latest uppermost.



You can delete the list by clicking the button "Delete history".
You can export the list in a .csv file by clicking the button "Export".

9 Stick usage

At the Data port of the UPS device, a memory stick can be connected (see image below). After plugging in, the UPS either acts as configuration stick or as service stick, depending on how the respective stick has been declared before in the "Service" screen of the UPS-CONF software.



A configuration stick is used to copy parameterization data from/to the UPS device, as described in the topic Configuration stick usage (see page 46).

A service stick can be used to switch the device to service mode (see page 47) in order to perform maintenance tasks.

To declare a memory stick proceed as follows:

NOTE
When declaring a stick, its current content is deleted, i.e. already stored configuration data are lost.

1. Open the software menu "Settings".
2. Click the "Service" navigation item.
3. In the "Stick declaration" area of the action area, click the appropriate "Start declaration" button.

After this declaration, the UPS device automatically formats the stick after plugging it into the Data port the next time and then acts accordingly.

9.1 Configuration stick usage

A configuration stick stores UPS configurations, i.e.complete parameter sets. Configurations can be copied from the UPS to the stick and vice versa. This way, the stick can be used to transfer configurations from one UPS to another.



NOTE
The configuration stick cannot be used, while the UPS runs in battery mode. The power supply must be available.

The usage of configuration sticks is explained by the following steps:

1. Make sure that the used memory stick is already declared as configuration stick as described in the topic Stick usage (see page 45).
2. To transfer parameters between the stick and the UPS, execute one of the following steps:
   - To copy parameters from the stick to the QUINT-UPS push the "Stick -> UPS" button for more than 2 seconds.
   - To copy parameters from the QUINT-UPS to the stick push the "UPS -> Stick" button for more than 2 seconds.
3. Connect the configuration stick to the Data port of the UPS under consideration of the plug direction.
   The parameter transfer is started automatically and the progress is signalled by the LEDs:
   - While data is transferred they flash red - yellow - green.
   - A successful tranfer completion is signalled by a permanent green LED.
   - A faulty tranfer completion is signalled by a permanent red LED.
4. Remove the stick from the Data port.
5. After copying a parameter set from an UPS to the stick you can "clone" this configuration by plugging this stick into another UPS and copying the stored data from the stick into this UPS.

9.2 Service stick usage - service mode

The service mode is used, when installation and maintenance work has to be achieved, such as a battery has to be replaced.

There are several possibilities to switch the UPS to service mode.

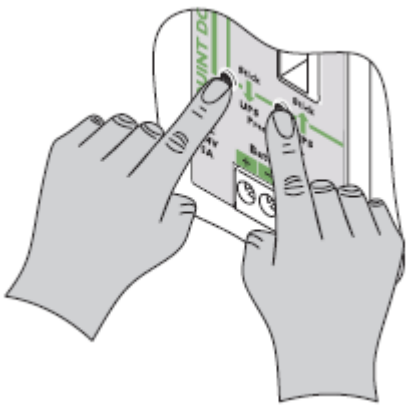
The corresponding activation rights have to be granted for service mode activation and deactivation, as described in the topic Rights for service mode activation (see page 39).

Service mode activation

The service mode cannot be activated, while the QUINT-UPS runs in battery mode. The power supply must be available.

Depending on the granted activation rights, the service mode can be activated in three different ways:

- By holding down both push buttons on the QUINT-UPS named "Stick -> UPS" and "UPS -> Stick" for at least 6 seconds.

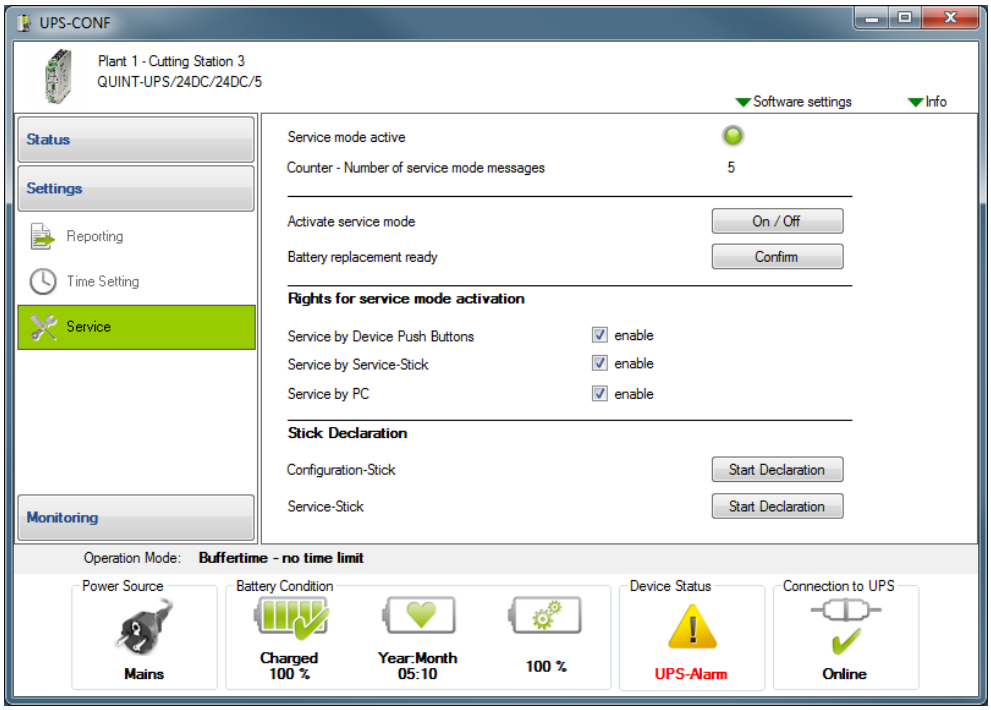


- By connecting a service stick (see page 45) to the Data port (see page 13) of the UPS.
- By using the UPS-CONF software as follows:
  In the "Settings" group, select the "Service" item, and click the "On / Off" button near the "Activate service mode" text.

While the service mode is active

- the alarm status is activated,

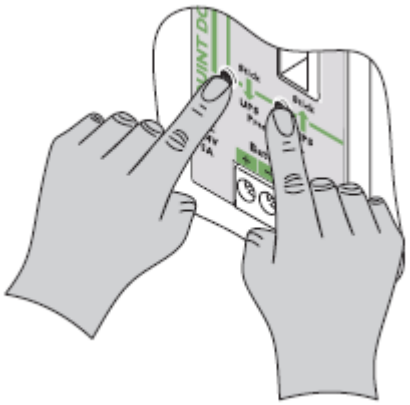
- the charging current is interrupted,
- the status LED "Service mode active" in the UPS-CONF software ("Settings" group / "Service" item) is green.



Service mode deactivation

The service mode can be deactivated in different ways:

- By holding down both push buttons on the QUINT-UPS named "Stick -> UPS" and "UPS -> Stick" for at least 6 seconds.



- By removing the service stick from the Data port of the UPS.
- By using the UPS-CONF software as follows:
  In the "Settings" group, select the "Service" item, and click the "On / Off" button near the "Activate service mode" text.

After the service mode is deactivated, the status LED "Service mode active" in the UPS-CONF software ("Settings" / "Status") switches back from green to gray.

Service mode operation

To operate the QUINT-UPS in the service mode in order to replace a battery for example, execute the steps described below.

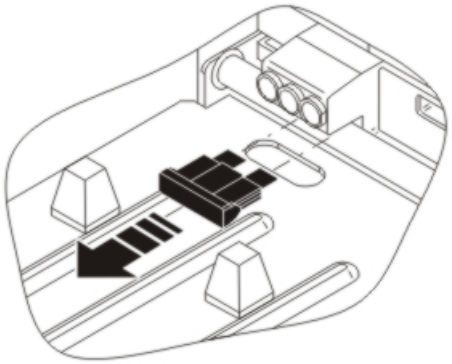
DANGER
Before activating the service mode read and obey carefully the safety instructions in the topic Important safety notes (see page 10).

DANGER
Watch polarity when connecting cables!

1. Activate the service mode by one of the ways described above.
2. Replace the battery as follows:.

   i. Open battery housing.

   ii. Remove fuses.

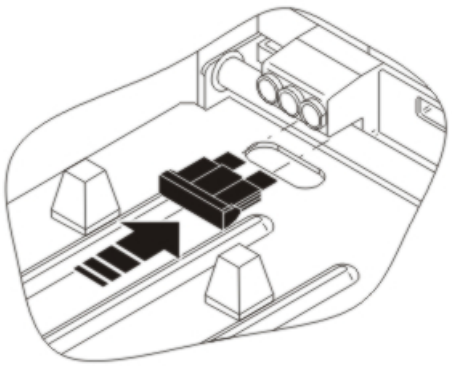


iii. Remove cabling.

iv. Change battery.

v. Connect cabling.

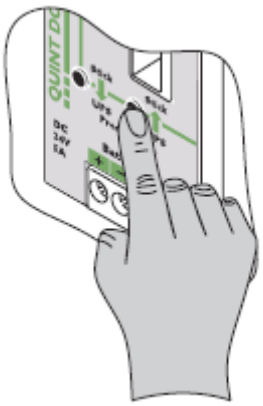
vi. Insert fuses.



vii. Close battery housing.

3. As soon as the work is finished, the parameters of the new battery have to be read into the UPS, so it's status information is available. To introduce this battery registration, do one of the following actions:

   - Push one of the push buttons on the QUINT-UPS named "Stick -> UPS" or "UPS -> Stick" and hold it down for more than 6 seconds.



or

- In the "Settings" group of the UPS-CONF software select the "Service" item, locate the text "Battery replacement ready" and click the "Confirm" button near the text.

The bar graph at the QUINT-UPS flashes, the alarm status is still active.

NOTE

If the service mode has been deactivated by removing the service stick from the Data port before the battery replacement has been confirmed, it can be confirmed by the UPS-CONF software. A popup window will remind the user to confirm the battery replacement.

4. Deactivate the service mode as described above.

10 Application samples



For further information, please take a look at the Software Tutorials or the Quick Start Poster on www.phoenixcontact.net/catalog. You will find the data if you link to UPS-CONF or QUINT-UPS.

10.1 Functional test

One of the main functions of the QUINT-UPS is to supply the load, when the mains fails. To test, if the UPS buffers the load, follow these steps:

1. Switch off the power supply of the QUINT-UPS.
2. Check if the QUINT-UPS buffers the load as long as set with the buffer time potentiometer, refer to Buffer time selection (see page 12).

10.2 PC-Mode: PC shutdown and restart

The IQ technology of the QUINT-UPS is able to control the power supply for a PC. For that purpose the PC with the UPS-CONF software installed has to be connected to the UPS and the PC-Mode activated. The PC-Mode enables the automatic PC shutdown and restart functionality.

To test the PC shutdown and restart functionality in the PC-Mode, proceed as follows:

1. Switch the buffer time potentiometer to "PC-Mode", as described in the topic Buffer time selection (see page 12).
2. Connect the UPS device to a USB port of the PC where UPS-CONF is installed (refer to topic Hardware setup (see page 11)).
3. Open the software menu "Settings" and click "Time Settings".
4. Set the parameters for the four different parameter categories, as described in the topic PC-Mode (see page 38).
5. Check if the PC shuts down and restarts corresponding to the set parameters. If a program execution has been set, verify that it is executed.

11 Troubleshooting

If your system does not work properly for any reason, approach the problem in the following manner:

1. Check the system status:

   - If the UPS-CONF software is installed, check the status bar (see page 17) and take a look at the system status.
   - If the UPS-CONF software is not installed, take a look at the front side of the UPS and check the LEDs (see page 20).

2. Proceed with the section Unexpected status symbols (see page 54) to find out, what is wrong.



The section Unexpected status symbols (see page 54) will lead you closer to the solution of the problem. If there are specific solutions for a single problem, you will be lead to the section, that describes the problem solving.

11.1 Unexpected status symbols

The meaning of status symbols showing an unexpected status is explained in the following topic.
The first table lists the symbols for the system status, that you can find in the action area and the second table lists the symbols from the status bar.

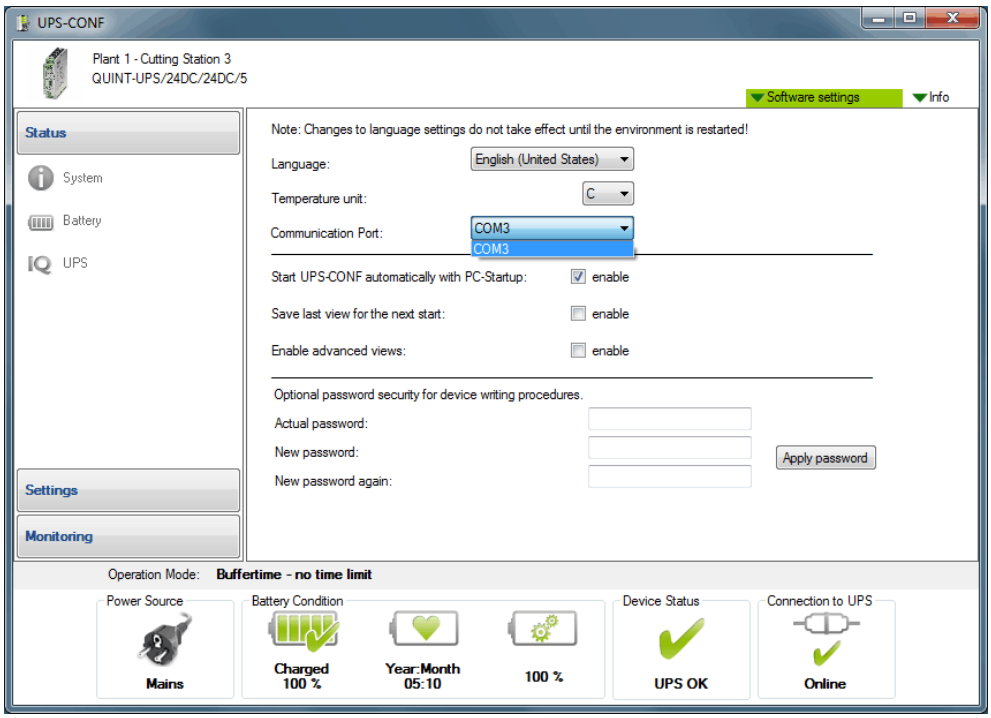
System status Symbol	Current situation and possible reason	Possible correction
 Gray: Mains OFF	There is no current available. Probably the Mains is switched OFF.	• Switch the Mains ON. • Take care that the power supply is available again.
DC  Gray: DC output not available	The power supply unit cannot deliver DC. Either the power supply is not available or the Mains switch is set to OFF.	• Switch the Mains ON. • Take care that the power supply is available again.
 Yellow: Battery mode	No current is available, thus the load gets it's power supply from the battery.	• Switch the Mains ON. • Take care that the power supply is available again.
 Red: UPS alarm	There may be different reasons: • No power supply is available. • The battery is soon empty. • The battery has to be replaced. • The battery cannot be detected. • There is another battery problem. • A set threshold has been reached.	• Switch the Mains ON. • Take care that the power supply is available again. • Check the set thresholds and compare with the current status. • Solve the battery problem. • Replace the battery. • Check the cables between UPS and battery. • Verify that the fuse is installed in the battery.

Status bar Symbol	Current situation and possible reason	Possible correction
	The UPS is in battery mode, because no power supply is available.	• Switch the Mains ON. • Take care that the power supply is available again.
	The bridge between the UPS terminals R1 and R2 is removed. Battery is deactivated therefore. Refer to the parameter "Remote Status" in the topic UPS (see page 27).	If you want the battery to be activated and the battery mode to be introduced, when the mains fail, bridge the terminals R1 and R2. Refer to the hardware overview (see page 7).
	There is no power supply available. One of these states is ongoing: • The UPS is off, because battery mode is finished. The set buffer time has elapsed. • The power source is not ok, because input voltage is in an invalid range.	If the UPS is off, because battery mode is finished, but the battery is funcional: • Switch the Mains ON. • Take care that the power supply is available again. If the UPS is off, because battery mode is finished, and the battery is no more funcional or at it's end of lifetime: • Change the battery. If the power source is not ok, because input voltage is in an invalid range: • Check the power supply.
	The battery is discharging, because no power supply is available.	• Switch the Mains ON. • Take care that the power supply is available again.
	The battery mode is finished, because the battery is empty.	• Take care that the power supply is available again to reload the battery. • Change the battery, if battery lifetime is exhausted.
	(see UPS alarm in the table above)	(see UPS alarm in the table above)
	• The connection between PC and UPS via the IFS-USB-DATACABLE is interrupted. • The communication port is not set.	• Connect the UPS and PC via the IFS-USB-DATACABLE. • Check if the communication port is set, as described in the topic Communication port (see page 56).

11.2 Communication port

The PC USB communication port for the communication between the UPS and the PC is automatically set during software installation. In case the communication port has not been set, the status bar shows the "Connection to UPS: Offline" status.

Although the communication port has not been set, it is detected automatically. Thus you can set it manually. You just have to select it in the software settings of the system menu.



If you click the combo box near the text "Communication port" the correct port is shown and you can select it.

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IT - ISTRUZIONI D'USO

1. DESCRIZIONE E DESTINAZIONE D'USO
I vasi d'espansione pressurizzati a membrana fissa e le autoclavi a membrana intercambiabile sono costruiti da Zilmet S.p.A. nel rispetto dei requisiti essenziali di sicurezza della Direttiva 97/23/CE sulle apparecchiature in pressione. Le seguenti istruzioni d'uso sono realizzate in conformità e con lo scopo di cui all'articolo 3.4 dell'allegato I della Direttiva 97/23/CE ("foglio destinato all'utilizzatore contenente tutte le informazioni utili ai fini della sicurezza.....") ed accompagnano i prodotti durante l'immissione nel mercato. Tutti i vasi incorporano una membrana sintetica elastica che separa l'acqua dalla riserva d'aria contenuta all'interno del vaso. I vasi d'espansione cui queste istruzioni fanno riferimento sono progettati e costruiti per gli scopi elencati nella tabella a pagina 6.

2. CARATTERISTICHE TECNICHE
Le caratteristiche tecniche del vaso d'espansione sono riportate nella targhetta identificativa applicata su ogni singolo prodotto, tra le quali le seguenti informazioni essenziali: identificazione del prodotto, volume, pressione e temperatura massima d'esercizio (si veda anche la tabella a pagina 6), pressione di precarica (di fabbrica o impostata per l'utilizzatore), anno di fabbricazione, numero di serie. La tabella presenta le caratteristiche tecniche generali del vaso di espansione: in particolare i valori della massima temperatura di esercizio e della massima pressione di esercizio elencati nella tabella devono essere intesi come i parametri di funzionamento massimi per i sistemi in cui sono installati i vasi d'espansione.

Qualunque utilizzo con pressioni e/o temperature continue, o anche istantanee, superiori ai limiti prescritti è **INSICURO** e può causare una riduzione della vita del vaso, danni alla proprietà, ferite e ustioni gravi alle persone o causarne la morte. Per prolungare la durata della vita del vaso, quando possibile installare il vaso in impianti in cui la temperatura massima sul vaso stesso sia non superiore ai 70 °C. A tale scopo si possono adottare tutti gli accorgimenti (ad esempio installazione nella parte più fredda dell'impianto, controllo termostatico ecc.) che assicurino di avere sul vaso una temperatura massima di 70 °C. Per quanto riguarda la temperatura minima, i vasi possono lavorare fino ad una temperatura di -10 °C utilizzando opportuni anticongelanti come il glicole etilenico (in una percentuale fino al 50%). In tal caso, vista la tossicità dei fluidi utilizzati, non è consentito l'utilizzo dei vasi stessi per l'accumulo e la produzione di acqua sanitaria/potabile. Inoltre devono essere adottati tutti i mezzi e le precauzioni opportune per evitare contaminazioni ambientali e possibili avvelenamenti, tenendo conto della legislazione e delle normative vigenti.

ATTENZIONE - Prima dell'istallazione è obbligatorio dimensionare e scegliere il modello corretto del vaso d'espansione in accordo al progetto dell'impianto, le specifiche, le istruzioni ed i requisiti operativi. Solamente personale qualificato ed autorizzato può eseguire il dimensionamento e la scelta del vaso secondo la legislazione e le normative vigenti. Solamente personale qualificato ed autorizzato può installare, mettere in servizio e eseguire la manutenzione di questo dispositivo in accordo al progetto dell'impianto, le specifiche, le istruzioni ed i requisiti operativi e secondo la legislazione e le normative vigenti in tema di installazioni termiche, idrauliche ed elettriche; devono inoltre essere rispettate la legislazione e le normative vigenti in tema di sicurezza, salute pubblica e sui luoghi di lavoro, protezione ambientale e qualunque altra disposizione applicabile. Queste istruzioni devono essere passate al personale incaricato dell'istallazione. Tutte le istruzioni devono essere lette accuratamente prima di installare il vaso d'espansione. Dopo l'installazione, queste istruzioni devono essere conservate per riferimento futuro.

3. AVVERTENZE
Il sistema nel quale si installa un vaso d'espansione deve avere un dispositivo di limitazione della pressione (valvola di sicurezza). ● L'etichetta è applicata sul vaso d'espansione e non deve in alcun caso essere rimossa o modificata nei contenuti. ● Se il vaso ZILMET è privo di etichetta o le caratteristiche tecniche sull'etichetta ZILMET non sono leggibili, non installare il vaso di espansione: si prega di contattare direttamente ZILMET al numero di telefono +39 049 7664901 o all'indirizzo di posta elettronica zilmet@zilmet.it ● Per prevenire i fenomeni di corrosione dovu□ alle corren□ vaganti e galvaniche, l'impianto deve essere adeguatamente messo a terra in accordo alla legislazione e alla normativa vigente e, se necessario, si può dotare il vaso di giunti dielettrici dopo aver considerato attentamente le caratteristiche dell'installazione. ● Altre possibili cause per i fenomeni di corrosione devono essere considerate, ad esempio le cara□ eris□che stesse dell'acqua (inclusa la sua temperatura), presenza di ossigeno, sali disciolti, l'utilizzo negli stessi sistemi di dispositivi in cui sono utilizzati materiali di diverso tipo (ad esempio acciaio al carbonio e acciaio inossidabile, acciaio al carbonio e rame). Tutti questi fattori devono essere considerati dal costruttore del sistema completo e dal personale incaricato dell'installazione e della manutenzione, tenendo in considerazione anche la legislazione e le normative vigenti. ● Non usare il vaso d'espansione con i seguen□ fluidi: a) prodo□ chimici, solven□, deriva□ dal petrolio, acidi, basi o qualsiasi altra sostanza che possa danneggiare il vaso, b) fluidi appartenenti al gruppo 1 secondo la direttiva 97/23/CE, ovvero con fluidi classificati come esplosivi, estremamente infiammabili, infiammabili, estremamente tossici, tossici e comburenti secondo la direttiva 67/548/CEE. ● U□lizzare il vaso d'espansione solamente con fluidi appartenen□ al gruppo 2 secondo la direttiva 97/23/CE ed aventi un tensione di vapore superiore di almeno 0,5 bar alla pressione atmosferica normale (1013 mbar) alla temperatura massima di esercizio del vaso d'espansione. ● Non usare il vaso d'espansione con acqua che contenga sabbia, argilla o altre sostanze solide che possono danneggiare il vaso (in particolare il rivestimento interno) e/o ostruirne il raccordo. ● Devono essere previs□ mezzi adeguati per prevenire l'accumulo d'aria, durante il funzionamento dell'impianto, nella camera del vaso (lato acqua) collegata al sistema. ● Il vaso ed il sistema connesso devono essere opportunamente protetti da temperature inferiori al limite di congelamento, ad esempio mediante l'utilizzo di anticongelanti o l'installazione in ambienti adatti. ● Non u□lizzare il vaso d'espansione per nessun altro scopo che non sia quello previsto. ● **Il vaso d'espansione, le tubazioni e le connessioni con il tempo possono avere delle perdite. Pertanto è necessario installare il vaso d'espansione in un adeguato locale tecnico, che sia provvisto di un adeguato sistema di drenaggio e scarico in modo tale che qualunque perdita non danneggi l'area circostante e non causi scottature o ustioni alle persone. Il costruttore non sarà responsabile di alcun danno causato dall'acqua a persone e/o cose e proprietà in relazione all'utilizzo del vaso d'espansione.** ● Il costruttore non risponde in alcun modo dei danni derivanti da un errato trasporto e/o movimentazione, per i quali dovranno essere utilizzati i mezzi più idonei atti a garantire l'integrità dei prodotti e la sicurezza delle persone. ● Come in tu□ i prodo□ u□lizza□ nelle installazioni idrauliche, nel vaso d'espansione può esserci crescita di batteri, soprattutto durante i periodi di non utilizzo. Le autorità competenti e gli uffici preposti devono essere consultati riguardo le procedure che il personale incaricato dell'installazione e della manutenzione deve adottare per disinfettare efficacemente ed in condizioni di sicurezza l'impianto. ● É proibito forare, scaldare con fiamma, aprire o manome□ere in qualunque modo il vaso di espansione. ● A□enzione, per le autoclavi che hanno il raccordo superiore, notare che questo è aperto per consentire l'installazione di un raccordo a tre vie su cui possono essere installati un manometro ed una valvola di sicurezza. ● Nel caso sia necessario cambiare la precarica di fabbrica, il nuovo valore di precarica può essere determinato (calcolato) solo da personale tecnico specializzato. Il calcolo deve assicurare che, in tutte le condizioni prevedibili di funzionamento, i limiti specificati (in particolare la pressione massima d'esercizio) non siano mai superati e che siano rispettate la legislazione e le normative vigenti. In ogni caso è consigliabile che il nuovo valore di precarica sia al massimo uguale al 50% della pressione massima d'esercizio del vaso; tale valore deve essere riportato nell'apposito spazio (precarica impostata) previsto sull'etichetta. ● Assicurarsi che la disposizione dell'impianto renda possibile la manutenzione del vaso e che sia disponibile a□orno al vaso uno spazio di lavoro sufficiente a consentire la sua sostituzione quando necessario. ● Lo smaltimento del vaso d'espansione deve essere effettuato solamente nei centri di raccolta autorizzati in accordo alla normative e leggi vigenti. ● Qualora in prossimità del vaso d'espansione siano presenti vibrazioni meccaniche, devono essere adottate idonee misure al fine di evitare la trasmissione delle vibrazioni al vaso stesso (ad esempio mediante installazione con dispositivi antivibranti).

4. ISTRUZIONI GENERALI PER L'INSTALLAZIONE
Per posizionare ed installare il vaso d'espansione, bisogna assicurarsi che siano utilizzati tutti i mezzi di movimentazione e trasporto necessari e adottate tutte le precauzioni relative. ● Non installare il vaso all'aperto, ma solamente in ambienti chiusi e ben aerati, al riparo dagli agenti atmosferici e lontano da fonti di calore, generatori elettrici ed ogni altra sorgente che possa essere dannosa per il vaso stesso. ● A seconda del modello, il peso del vaso riempito d'acqua viene sopportato dalle tubazioni dell'impianto. Perciò è importante, quando necessario, che le tubazioni siano adeguatamente sostenute, ad esempio con supporti, fasce, appoggi adeguati. Inoltre, se il vaso non ha una base d'appoggio ed è installato orizzontalmente, deve essere adeguatamente sostenuto. ● Togliere l'energia elettrica all'impianto ed interrompere l'alimentazione dell'acqua allo stesso. **Per evitare il rischio di gravi ferite e/o ustioni, assicurarsi che l'impianto non sia in pressione e che sia completamente raffreddato.** ● Prima dell'installazione, rimuovere il cappuccio di plastica sulla valvola di precarica dell'aria e controllare, con un manometro tarato, che il valore di precarica sia quello impostato in fabbrica con una tolleranza di ± 20% ● Regolare la precarica del vaso al valore richiesto; riposizionare e stringere il cappuccio di plastica sulla valvola di precarica. ● Installare il vaso nel punto previsto dal progetto dell'impianto, preferibilmente in posizione verticale e con il raccordo verso il basso (vedere i disegni) e nelle seguenti posizioni:
- sulle tubazioni di ritorno, negli impianti di riscaldamento chiusi (fig. 1)
- in un punto tra il bollitore e la valvola di non ritorno, o la valvola di ritenuta o la valvola riduttrice di pressione, negli impianti di generazione d'acqua calda sanitaria (fig. 2)
- dopo la valvola di non ritorno posta all'uscita della pompa, negli impianti per il contenimento e il sollevamento dell'acqua (fig. 3). ● Dopo l'installazione del vaso e il riavvio dell'impianto, controllare che non ci siano perdite nello stesso e rimuovere l'aria dal sistema. Accertarsi che la pressione e la temperatura siano entro i limiti previsti; se necessario, scaricare dell'acqua per portare la pressione del sistema entro limiti di sicurezza e/o regolare il controllo di temperatura per portarla ai valori previsti. ● Non serrare eccessivamente la connessione file□ata.

Attenzione: la procedura d'installazione sopra descritta fornisce solamente indicazioni di carattere generale e pertanto deve essere utilizzata insieme alle istruzioni relative all'impianto in cui il vaso viene installato, le specifiche relative, i requisiti operativi, la legislazione e le normative vigenti.

5. MANUTENZIONE - Attenzione, solamente personale qualificato ed autorizzato può svolgere le attività di manutenzione.
Per eseguire le attività di manutenzione e controllo, assicurarsi che il sistema sia spento, raffreddato e non in pressione, che i sistemi elettrici non siano in tensione e che il vaso sia completamente scarico. ● Almeno una volta ogni sei mesi il vaso d'espansione deve essere verificato, controllando che la precarica sia nei limiti indicati sull'etichetta (precarica di fabbrica oppure impostata per l'utilizzatore) con una tolleranza di ± 20%, se non altrimenti specificato. ● Per una maggior durata della protezione esterna del vaso d'espansione, deve essere eseguita una pulizia periodica esterna utilizzando solamente acqua e sapone. ● Il vaso d'espansione include delle par□ so□oposte ad usura; nel caso queste par□ dovessero deteriorarsi nel tempo, in particolare in presenza di fenomeni di corrosione, il vaso deve essere sostituito. ● U□lizzare solamente par□ di ricambio originali ZILMET. ● Per garantire il buon funzionamento dell'impianto, sostituire il vaso d'espansione con uno nuovo in caso di usura eccessiva e comunque entro 5 anni dalla data di installazione.

Zilmet S.p.A. non sarà responsabile per alcun danno alle cose e alla proprietà e/o per danni fisici alle persone dovuti alla non osservanza di tutte le istruzioni sopra riportate, e, in particolare, dovuti ad un dimensionamento e scelta, installazione, funzionamento e manutenzione impropri del vaso stesso e/o del sistema connesso.

EN – INSTRUCTIONS FOR THE USER

1. DESCRIPTIONS AND USE
ZILMET pressurised expansion vessels with fixed and interchangeable membrane are manufactured according to the safety essential requirements of 97/23/EC pressure equipment directive. These instructions for use have been prepared in accordance with the purpose of article 3.4 of Annex 1 of 97/23/EC Directive ("instructions for the user, containing all the necessary safety information relating to....."") and are enclosed with the product when placed on the market. All the vessels incorporate a flexible synthetic diaphragm to keep the system water or fluid from contacting the sealed in air cushion in the tank. The expansion vessels which these instructions refer to have been designed and manufactured for the purposes listed in the table at page 6.

2. TECHNICAL CHARACTERISTICS
The technical characteristics of the expansion vessel are written on the identifying label applied to each product; among them, the most important information are: product identification, vessel volume, maximum working pressure and temperature (please, see the table at page 6), pre-charge pressure (factory set or user set), production year, serial number. The table shows the general technical characteristics of expansion vessels: in particular the values of the maximum working temperature and the maximum working pressure shown in this table must be intended as maximum working parameters for the systems in which the expansion vessels are installed.

Any use at sustained or instantaneous pressure and temperatures exceeding the prescribed limits is **unsafe** and can cause reduced vessel life, property damage, serious scalding and/or bodily injuries or result in death. The vessel may be utilised in systems having a maximum working temperature as in the table, providing all the means that ensure the temperature on the vessel is 70 °C at maximum (installation in the coldest part of the system, thermostatic control and so on). About the minimum temperature, the vessels may work, using proper antifreeze as ethylene glycol (with a percentage up to 50%), at a temperature not lower than -10 °C. Due to the toxicity of such substances, the vessels may not be used for the production and storage of sanitary/potable water. Moreover, all the proper means and precautions for avoiding dispersion in the environment and possible poisoning must be adopted. Please, refer to local safety, occupational, health and environmental codes and standards.

ATTENTION - Before the installation, it is mandatory to calculate and to choose the correct type of vessel according to the system design, specifications, instructions and operation requirements. Only qualified and licensed technicians may perform the calculation and the choice of the vessel according to local codes and standards. Only qualified and licensed personnel may install, operate and service this equipment in accordance with system design, specifications and instructions, operation requirements and local thermal, plumbing, and electrical codes and standards. Moreover, all local safety, occupational, health environmental and whatever other applicable codes and standards must be followed. Please, pass these instructions on the personnel in charge for installation, operation and service. All instructions must be carefully read before installing this expansion vessel. After the installation, these instructions must be kept for future reference.

3. WARNINGS
The system in which the expansion vessel is installed must have a pressure-limiting device (pressure relief valve). ● The label is firmly applied to the vessel and must not be removed tampered or changed. ● If the label on the ZILMET vessel is missing or the technical characteristics on the ZILMET label are not readable, please do not install the expansion vessel: please contact directly ZILMET by phone at +39 049 7664901 or by e-mail at zilmet@zilmet.it ● To prevent corrosion due to stray and galvanic currents, the system must be grounded properly according to local electrical and plumbing codes and standards and, if needed, the vessel may be provided with dielectric joints after evaluating carefully the characteristics of the installation. ● Other possible causes for pin holing and corrosion phenomena have to be considered, for instance, water characteristics (included its temperature), presence of oxygen, melted salts, the use in the same system of devices made of different materials (e.g. carbon steel and stainless steel, carbon steel and copper). All of these factors have to been considered by the manufacturer of the complete system and by the personnel in charge for the installation and maintenance, taking into account also all the local plumbing, electrical and safety standards and regulations. ● Do not use this vessel with following fluids: a) chemicals, solvents, petroleum products, acids, bases, or any other substance that may be detrimental to the vessels itself, b) fluids in Group 1 according to 97/23/EC directive, that is fluids defined

as explosive, extremely flammable, flammable, very toxic, toxic and oxidizing according to 67/548/EEC directive. ● Use this vessel just with fluids in Group 2 according to 97/23/EC and having a vapour pressure greater than 0,5 bar above the normal atmosphere pressure (1013 mbar) at the maximum working temperature of the expansion vessel. ● Do not use this vessel with water containing sand, clay or other solid substances that may damage the vessel (particularly the internal coating) and/or clog its connection. ● Proper means must be provided for preven ng the air from accumulating, during the working of the plant, in the chamber of the vessel (water side) connected to the system. ● The vessel and the connected system must be protected against below freezing temperatures, for instance using proper antifreeze or installing the vessel in suitable areas. ● Do not use this expansion tank for any other purpose that it has been intended for. ● **The expansion vessel, piping and connections may in time leak. Therefore it is necessary to install the expansion vessel in a suitable technical room, which must be provided with adequate system to drain and discharge so that any leakage will not damage the surrounding area and will not cause scalding injuries. The manufacturer shall not be responsible for any water damage to people and/or things and properties in connection with this expansion vessel.** ● The manufacturer of this vessel shall not be responsible for any possible damage to things and property and/or injuries to persons due to improper transport and/or handling of the tank itself. ● As in all plumbing products, bacteria can grow in this expansion vessel, especially during mes of non-use. The local plumbing official and the competent authorities must be consulted regarding any step the personnel in charge for service and maintenance takes to safely disinfect the plumbing system. ● It is forbidden to drill, open, heat with flames or tamper with the vessel in any way. ● A en on, for the pressure tanks which have the upper connec on, please note this is opened to allow for the installa on of a three way connection on which a manometer and a pressure relief valve may be installed. ● Should it be necessary to change the factory pre-charge, only specialised technical personnel should calculate or determine the new pre-charge. The calculation must ensure that, for all foreseeable working conditions, the specified limits (particularly the maximum working pressure) are never exceeded and local codes and standards are observed. In any case it is advisable the pre charge does not exceed 50% of the maximum working pressure: the new value of the pre-charge pressure (user set) must be written on the fit space on the label. ● Make sure that the system layout allows for future maintenance and provides sufficient working space around the system to allow for replacement of components whenever necessary. ● The vessel disposal must be done only at selec ve waste collec on authorised centres, according to the local codes and standards. ● If vibra on is likely to occur in the vicinity, proper means must be provided in order to insulate the expansion vessel from vibrations (e.g. installation on a resilient mount).

4. GENERAL INSTRUCTIONS FOR INSTALLATION
Make sure all the suitable and required lifting and transport means are used and all the precautions are adopted when positioning and installing this expansion tank. ● Do not install this vessel outdoors, but only in closed and well aerated areas, far from heat sources, electric generators and any other source that may be detrimental to the vessel itself. ● Depending on the model, the weight of the expansion vessel filled with water is supported by the system piping. Therefore, it is important that, where appropriate, the piping has suitable bracing (strapping, hanger, brackets). Moreover, if the vessel has not a support base and is installed horizontally, it must be properly supported. ● Shut off the electric power and the water supply to the system. **Make sure the system is cooled and not pressurised for avoiding scalding and/or serious bodily injuries.** ● Before the installa on, remove the plas c cap on the air valve of the vessel and check for the correct factory set pre-charge (with a tolerance of ± 20%) with a controlled manometer. Adjust the tank pre-charge to the required value; replace and tighten the plastic cap on the air valve. ● Install the vessel at the point specified by the system design, specifications and instructions, preferably in vertical position and with the connection in downward direction (please, see the diagram) and in the following positions:
- in closed hydraulic heating systems, on the runback piping (fig. 1)
- in systems for the production of sanitary hot water, at a point between the water heater and the back-flow preventer, check valve or pressure reducing valve (fig. 2)
- in pump systems for storage and lifting of sanitary/potable water, after the back-flow preventer at the exit of the pump (fig. 3) ● After the installation of the vessel and the re-start of the plant, check it for leakage and remove all air from the system. Check to make sure that the system pressure and temperature are within a safe operating range; if necessary, remove system water to bring the system pressure within safe limits and/or adjust the temperature control up to the desired ending temperature. ● Do not over-tighten the threaded connection.

Please, note the above described installation is just a reference procedure and for this reason must be used taking into account the specifications and instructions of the plant on which the vessel is installed, the system design, the operation requirements and the local codes and standards.

5. MAINTENANCE - Please, note that only qualified and licensed personnel may perform service and maintenance.
● To perform maintenance and control, make sure the system is off, cooled and not pressurised, all the electric parts are not energised and the vessel is completely empty. ● At least once every six months the expansion vessel has to be verified, checking that the pre-charge is within the value indicated on the label (factory pre-charge or customer set pre-charge) with a tolerance of ± 20%, if not otherwise stated. ● For a longer life of the expansion tank external protection, a periodical external cleaning shall be performed, only using water and soap. ● This expansion vessel includes components which undergo stresses; in the case such components should deteriorate in time, the vessel must be replaced. ● Use only ZILMET original spare parts. ● For ensuring the proper functioning of the system, the expansion vessel must be changed with a new one in case of excessive deterioration and, anyway, at the latest 5 years from the installation date.

ZILMET shall not be responsible for any damage to things, property and/or injuries to persons due to not observing all the above instructions and, particularly, to improper calculation and choice, installation, operation and maintenance of the tank itself and/or the connected system.

FR – INSTRUCTIONS D'UTILISATION

1. DESCRIPTION
Les vases d'expansion à membrane fixe et les réservoirs à vessie interchangeable sont fabriqués chez Zilmet S.p.A. en conformité aux exigences essentielles de sûreté dictées par la directive 97/23/CE en matière d'appareils sous pression. Les instructions d'utilisation suivantes sont réalisées en conformité et avec l'objectif donné par l'article 3.4 joint de la directive 97/23/CE ("feuillet destiné à la personne utilisatrice, qui contient tous les renseignements utiles pour la sûreté...") et sont jointes au produit lors de l'introduction sur le marché. Tous les vases contiennent une membrane synthétique souple qui sépare l'eau de la réserve d'air contenue dans le vase. Les vases d'expansion aux quels ces instructions d'utilisation font référence sont destinés aux installations comme indiqué dans le tableau à la page 6.

2. CARACTERISTIQUES TECHNIQUES
Les caractéristiques techniques du vase d'expansion et/ou des réservoirs sont écrites sur la plaquette identificatrice de chaque produit, parmi lesquelles les caractéristiques techniques essentielles: identification du matériel, volume, pression et température maximum d'exercice (voir également le tableau à la page 6), pression de pré-gonflage (de série ou spécialement requise par l'utilisateur), année de fabrication, numéro de série. Le tableau illustre les caractéristiques techniques du vase d'expansion: en particulier les valeurs de température et de pression maximales d'exercice doivent être considérées comme des paramètres de fonctionnement maximum pour les systèmes sur lequel vous avez installé les vases d'expansion.

La non observation des limites de pression et/ou températures maximales est **dangereuse** et peut réduire la durée de vie du produit, le rendre inutilisable et également causer des dommages matériels ou des blessures mortelles aux personnes. Le vase peut être utilisé dans des installations ayant une température maximale de fonctionnement comme dans le tableau (en tout état de cause jamais supérieure à celles mentionnées dans le tableau), à condition de mettre en œuvre des moyens (par exemple installation dans la partie la plus froide du circuit, contrôle thermostatique, ...) permettant de limiter à 70°C la température d'arrivée d'eau dans le vase. Concernant la température minimale, les vases peuvent travailler jusqu'à -10°C avec l'usage d'antigels, y compris pour l'éthylène-glycol (concentration maximum: 50%). Dans ce cas compte-tenu de la toxicité de ces fluides, l'usage pour eau sanitaire est prohibé. De plus, toutes les précautions nécessaires à éviter la dispersion de substances toxiques doivent être mises en place.

ATTENTION - Avant l'installation d'un vase d'expansion et d'un réservoir il est indispensable qu'un dimensionnement soit fait per un technicien selon des règles de calcul précises qui dépendent du projet d'installation. L'installation, la mise en service et la maintenance du vase d'expansion ou du réservoir doit être effectuée exclusivement par un technicien qualifié et autorisé et ce en accord avec le projet d'installation, les performances requises et selon la législation en vigueur sur les installations thermiques, hydrauliques et électriques. De plus les législations en vigueur en terme de sécurité, de santé publique sur le lieu de travail, protection environnementale et tout autre disposition devront être respectées. Ces instructions devront être transmises au technicien chargé de l'installation, qui devra les lire attentivement avant l'installation. Ces instructions devront être conservées en cas de besoin après la mise en service de l'appareil.

3. PRESCRIPTIONS DE SECURITE
Le système dans lequel est monté le vase doit être muni d'un dispositif de limitation de la pression (soupape de sûreté). ● La plaque e est appliquée sur le vase d'expansion et/ou le réservoir et elle ne doit jamais être déplacée ou son contenu modifié. ● Si l'é que e est illisible ou absente sur le vase d'expansion Zilmet, vous ne devez pas installer le vase d'expansion mais veuillez contacter Zilmet au numéro +39 049 7664901 ou à l'adresse e-mail zilmet@zilmet.it ● Pour prévenir les phénomènes de corrosion dû aux courants galvaniques et de dispersion, le système doit être mis à terre correctement selon la législation en vigueur concernant les installations électriques et hydrauliques. Des raccords diélectriques peuvent être installés au besoin après avoir vérifié attentivement les caractéristiques de l'installation. ● Il faut aussi considérer d'autres possibles causes des phénomènes de corrosion, par exemple les caractéristiques de l'eau (inclus sa température), la présence d'oxygène, de sels dissous, l'utilisation dans le même système de dispositifs dans lesquels on utilise des matériaux divers (par exemple acier au carbone et acier inoxydable, acier au carbone et cuivre) . Le constructeur du système complet et le personnel en charge de l'installation et de la manutention doivent bien tenir compte de tous ces facteurs en considérant en même temps les normes en vigueur. ● Ne jamais u liser le vase d'expansion avec les fluides suivants: a) produits chimiques, dissolvants, dérivés du pétrole, acides et toutes autres substances qui pourraient endommager le vase d'expansion, b) les fluides du groupe 1 selon la directive 97/23/CE considérés comme substances explosives, extrêmement inflammables, facilement inflammables, inflammables, hautement toxiques, toxiques et comburants selon la directive 67/548/CE ● U liser le vase d'expansion uniquement avec des fluides qui appar ennent au groupe 2 selon la directive 97/23/EC et dont la pression de vapeur, à la température maximale admissible du vase d'expansion, est supérieure de 0,5 bar à la pression atmosphérique normale (1013 mbar). ● L'eau ne doit pas contenir de particules solides (sable, argile, ...) qui pourraient endommager le vase (particulièrement le revêtement intérieur) ou obstruer le raccord. ● Il faut prévoir tous moyens à fin de prévenir, lors du fonctionnement du système, l'accumulation de l'air dans la partie du vase (côté de l'eau) qui est branchée au système générale. ● Le vase et le système connexe doivent être protégés des températures inférieures à la limite de gel, par exemple au moyen d'un antigel ou de l'installation dans une ambiance adaptée. ● Ne pas u liser le vase d'expansion pour un autre usage que celui prévu. ● **Avec le temps, le vase d'expansion, les tuyauteries et les raccords peuvent éventuellement fuir. Par voie de conséquence, il est indispensable d'installer le vase d'expansion dans un local technique adapté contre toutes inondations et surtensions. Le but étant d'empêcher d'éventuels dégâts des eaux ou surtensions de provoquer des blessures corporelles et d'endommager les infrastructures à proximité du vase d'expansion. Le fabricant ne peut pas être tenu responsable des dégâts occasionnés aux personnes et/ou aux biens en relation avec le vase.** ● Le constructeur ne répond en aucun cas des dommages provoqués par le transport et/ou la manutention, lesquels doivent être aptes à garantir l'intégrité des produits et la sûreté des personnes. ● Comme pour tous les produits u lisés dans les installa ons hydrauliques, des bactéries peuvent se développer au niveau du vase, surtout dans les périodes de repos. Les autorités compétentes doivent être consultées sur les procédures que devra suivre le responsable de l'installation et de la maintenance pour désinfecter efficacement l'installation. ● Ne pas percer, chauffer avec une flamme ou ouvrir le vase d'expansion. ● Pour les autoclaves qui ont le raccordement supérieur, noter que ceci est ouvert pour perme re l'installa on d'un raccordement à 3 voies sur lequel on peut installer un manomètre et une soupape de sûreté. ● Dans le cas où il est nécessaire de modifier la pression de pré-gonflage standard de l'usine, la nouvelle valeur de pré-gonflage ne pourra être déterminée (calculée) que par un technicien qualifié. Le calcul doit garantir toutes les conditions de fonctionnement, que les limites de pression et température ne soient jamais dépassées et que les législations en vigueur soient respectées. Dans tous les cas la nouvelle valeur de pré-gonflage doit être inférieure à 50% de la pression maximale d'exercice du vase: la pression de gonflage ajustée par l'installateur doit être inscrite dans l'espace prévu à cet effet sur l'étiquette du vase. ● Le vase d'expansion doit être installé dans un local avec un accès approprié pour permettre d'éventuelles interventions ou le remplacement du vase. ● La mise en décharge des vases d'expansion doit se faire exclusivement dans des installa ons de stockage et de retraitement prévus à cet effet, conformément à la législation locale en vigueur en matière environnementale. ● Si l'installa on est à proximité d'émissions de vibrations mécaniques, il est indispensable de prendre toutes mesures nécessaires permettant d'isoler le vase d'expansion de ces vibrations, par exemple, à l'aide de blocs amortisseurs.

4. INSTRUCTIONS D'INSTALLATION
Pour positionner et installer le vase d'expansion il faut s'assurer que tous les moyens de manutention et de transport sont utilisés et que toutes précautions relatives sont adoptées. ● Installer le vase dans un espace fermé et bien aéré, à l'abri des agents atmosphériques et éloigné d'une source de chaleur, d'un générateur électrique ou de tout autre source d'émission dangereuse pour le vase. ● Le vase doit être supporté par des moyens de levage convenables: canalisations de l'installation et en cas de besoins, potences, socles... Les vases pourvus de socle ou pattes de fixation sont prévus pour être montés verticalement: prévoir un autre système de fixation suffisant lorsqu'ils sont montés horizontalement. ● Couper l'alimentation électrique et l'arrivée d'eau. **Pour éviter de graves dégâts ou blessures, s'assurer que l'installation soit en condition de repos (chauffage éteint) et complètement refroidie.** ● Avant l'installa on, enlever le capuchon plas que de la valve de gonflage et contrôler la pression à l'aide d'un manomètre taré: la pression de pré-gonflage doit être le standard de fabrication avec une tolérance ± 20%. Régler la pression de pré-gonflage à la valeur requise et remettre le capuchon sur la valve. ● Installer le vase à l'endroit prévu dans le projet de l'installation, de préférence en position verticale avec le raccord vers le bas (cfr. croquis) et dans les positions suivantes :
- Sur les canalisations de retour, dans les installations de chauffage en circuit fermé (fig. 1)
- Entre le chauffe-eau et le clapet anti-retour ou le réducteur de pression dans les installations de production d'eau chaude sanitaire (fig. 2)
- Après le clapet anti-retour monté à la sortie de la pompe, dans les installations de relevage (fig. 3). ● Après l'installation du vase et la mise en route du circuit, vérifier qu'il n'y ait pas de fuite d'eau et purger l'air. S'assurer que la pression et la température soient dans les limites prévues; au besoin vidanger un peu d'eau pour faire retomber la pression et/ou réguler la température pour faire tomber ces valeurs aux niveaux requis. ● Veuillez ne pas serrez excessivement le manchon fileté du vase d'expansion.

Attention: la procédure d'installation décrite ci-dessus ne donne que des informations à caractère général et doit être utilisée avec les autres instructions relatives à l'installation sur laquelle le vase doit être installé et relatives aux normes en vigueur.

5. MAINTENANCE - Attention: l'entretien doit être effectué par un technicien qualifié.
S'assurer que le vase soit en condition de repos (chauffage éteint, installation refroidie) et que l'alimentation électrique soit coupée et que le vase est complètement déchargée ● Le vase d'expansion doit être contrôlé au moins une fois tous les six mois, en vérifiant que la pression de pré-gonflage soit identique à la pression reportée sur l'étiquette (pression de pré-gonflage standard ou réglée par l'installateur) avec une tolérance ± 20%. ● Pour une meilleure tenue de la peinture extérieure du vase, nettoyer le vase à l'eau et au savon. ● Le vase d'expansion est cons tué de pièces d'usure. Si certaines parties se détériorent, notamment sous l'action de la corrosion, il est nécessaire de changer le vase. ● Veuillez u liser exclusivement des pièces de rechange d'origine Zilmet. ● Afin d'assurer le bon fonctionnement de l'installation, il est préconisé de remplacer le vase d'expansion tous les 5 ans à compter de sa date d'installation, et ou en cas d'usure excessive.

Zilmet S.p.A. n'accepte aucune responsabilité pour des dommages matériels ou corporels qui dérivent d'un usage incorrect, d'une mauvaise installation (en particulier d'un mauvais dimensionnement), ou de mauvaises conditions d'exercice du produit.

DE - MONTAGE-UND BEDIENUNGSANLEITUNG

1. AUSFÜHRUNG UND EINSATZBEREICH
Die Membrandruckausdehnungsgefäße (MAG) mit fester Membrane und tauschbarer Membrane werden von Zilmet S.p.A. gemäß den Anforderungen der Druckgeräterichtlinie 97/23 EG und der DIN EN 13831 gefertigt. Diese Bedienungsanleitung wurde in Übereinstimmung mit Artikel 3.4, Anhang 1 der Druckgeräterichtlinie 97/23 EG erstellt und liegt jedem ausgelieferten MAG bei. Erfüllt werden außerdem die Anforderungen nach DIN EN 12828, sowie die der noch gültigen Teile der DIN 4807. Die Ausdehnungsgefäße, die diese Anleitung bezieht sich auf konzipiert und für die in der Tabelle auf Seite 6 genannten Zwecke hergestellt worden sein. Alle MAG sind mit einer flexiblen, synthetischen Membrane ausgestattet, um das Systemwasser oder die Systemflüssigkeit vom Gaspolster zu trennen. Alle ZILMET Membranen entsprechen den Anforderungen der DIN EN 13831, die für Trinkwasser geeigneten Membranen außerdem den Anforderungen nach W270 und KTW-C.

2.TECHNISCHE EIGENSCHAFTEN
Die technischen Eigenschaften des MAG werden auf dem Typenschild, das auf jedem Produkt aufgebracht ist, angegeben: Produktidentifikation, Volumen des MAG, max. Betriebsdruck und max. Betriebstemperatur (siehe auch nachstehende Tabelle), Vordruck (voreingestellt oder individuell eingestellt), Produktionsjahr, Seriennummer. Die Tabelle auf Seite 6 beinhaltet die allgemeinen technischen Eigenschaften des jeweiligen MAG: Besonders der max. Betriebsdruck und die max. Betriebstemperatur, entsprechend den Anforderungen der Druckgeräterichtlinie 97/23/EG, gelten als maximale Arbeitsparameter der MAG.

Der Gebrauch bei Drücken oder Temperaturen, welche höher sind wie oben angegeben, ist nicht sicher und kann die Lebensdauer des MAG reduzieren, Sachschäden sowie ernste Verbrennungen und/oder Körperverletzung mit Todesfolge verursachen. Das MAG darf nur in Systemen mit Betriebswerten entsprechend der o.g. Tabelle eingesetzt werden. Es muss sichergestellt sein, dass die max. Temperatur am Gefäß 70°C (bzw. 100°C bei Solarplus, Solarplus Safe und Solarplus TM) nicht überschreitet (Installation im kältesten Teil des Systems mit Kontrolle durch Thermometer). Die Mindestarbeitstemperatur (min. Temperatur) bei Einsatz eines Frostschutzmittels, wie z.B. Ethylenglykol (Mischungsverhältnis max. 50%) beträgt -10°C. Wegen der Giftigkeit solcher Medien, darf dasselbe MAG später nicht in Trinkwassersystemen eingesetzt werden, bzw. Glykol in das Trinkwasser gelangen. Darüber hinaus müssen alle Vorkehrungen getroffen werden, um bei möglichem Austritt eine Verschmutzung der Umwelt, bzw. jegliche anderen Vergiftungsformen, zu verhindern. Es gelten dazu die örtlichen Sicherheitsbestimmungen. Gemäß den gesetzlichen Bestimmungen bzw. den allgemeinen Geschäftsbedingungen, die dem Kaufvertrag zwischen Zilmet und dem Käufer zugrunde liegen, dürfen der max. Betriebsdruck und die max. Betriebstemperatur nicht überschritten werden. Bitte beachten Sie immer die gültigen Spezifikationen, die mit dem Planer/Betreiber vereinbarten techn. Abstimmungen, die Bedienungsanleitung und/oder die gesetzlichen Bestimmungen, Vorschriften und Normen. Es gelten außerdem immer die aktuellen, allgemein anerkannten Regeln der Technik.

Vor der Installation muss der richtige MAG Typ berechnet und ausgewählt werden. Das MAG muss entsprechend der Spezifikation, den Vorschriften und den Betriebsvorgaben berechnet werden. Nur qualifiziertes Fachpersonal darf die Berechnung und Auswahl von MAG unter Beachtung der gültigen Normen und Vorschriften vornehmen. Ebenso dürfen Installation, Inbetriebnahme und Service nur von Fachpersonal gemäß den Vorgaben durch die jeweils gültigen Regelwerke (Heizung, Sanitär, Elektro etc.) durchgeführt werden. Darüber hinaus müssen die lokalen Sicherheitsvorgaben, Arbeitsschutzbestimmungen und sonstige Vorschriften beachtet werden. Diese Anleitung ist an das zuständige Personal weiterzugeben. Vor der Installation des MAG müssen alle Anweisungen sorgfältig gelesen werden und die Bedienungsanleitung muss für einen zukünftigen Gebrauch aufbewahrt werden. Besonders ist der Gasvordruck des MAG zu prüfen und den Anlagenparametern anzupassen.

3. SICHERHEITSHINWEISE
● Das System, in welches das MAG installiert wird, muss ein Sicherheitsventil haben. ● Durch das Typenschild ist das MAG als ZILMET Produkt gekennzeichnet. Das Typenschild ist fest auf dem Gefäß aufgebracht und darf nicht entfernt oder geändert werden. ● Sollte das Typenschild am MAG fehlen oder unlesbar sein, sehen Sie bitte von einer Installation ab. Kontaktieren Sie umgehend Zilmet S.p.A. unter Tel.:+039 049 8840662 oder Email: zilmet@zilmet.it (Zilmet Deutschland GmbH Tel.:+049 2762/9242-0 oder Email: info@zilmet.de) ● Um Korrosion aufgrund von elektrolytischer und galvanischer Strömung zu vermeiden, muss das System nach den geltenden Vorschriften geerdet werden. In Sonderfällen und nur nach genauer Überprüfung des Gesamtsystems durch einen Fachbetrieb, kann die Notwendigkeit bestehen, dass das MAG mit nicht leitenden Verbindungen versehen werden muss. ● Andere mögliche Auslöser für Lochkorrosion oder weitere Korrosionsarten müssen berücksichtigt werden z.B. Wassereigenschaften (auch die Temperatur), die Anwesenheit von Sauerstoff, gelöste Salze, der Einsatz in Systemen mit unterschiedlichen Materialien (Materialmix), z.B. unlegierter Stahl mit Edelstahl. All diese Faktoren müssen vom Planer/Betreiber/Hersteller der kompletten Anlage, sowie dem vor Ort ausführenden Betrieb für Installation und Wartung berücksichtigt werden. Bitte beachten Sie immer die gültigen Spezifikationen, die mit dem Planer/Betreiber vereinbarten techn. Abstimmungen, die Bedienungsanleitung und/oder die gesetzlichen Bestimmungen, Vorschriften und Normen. Es gelten außerdem immer die aktuellen, allgemein anerkannten Regeln der Technik. ● Das MAG ist für folgende Flüssigkeiten nicht geeignet: a) Chemikalien, Lösungsmittel, Petroleum, Säuren oder andere Flüssigkeiten, die das Gefäß schädigen könnten, b) Flüssigkeiten aus Gruppe 1 nach 97/23/EC, die explosiv, brennbar, giftig oder brandfördernd gemäß 67/548/EEC sind. ● Das MAG ist nur für Flüssigkeiten aus Gruppe 2 nach 97/23/EG geeignet, die einen Dampfdruck > 0.5 bar über dem normalen Atmosphärendruck (1013 mbar) bei max. Betriebstemperatur des MAG. ● Benutzen Sie kein sandhaltiges oder lehmhaltiges Wasser, oder Wasser mit anderen festen Substanzen, die das MAG beschädigen (besonders die Innenbeschichtung), oder die den Anschluss verstopfen könnten. ● Durch geeignete Bauteile (Entlüfter, etc.) sowie durch eine fachgerechte Installation muss jederzeit sichergestellt sein, dass sich zu keiner Zeit Luft/Sauerstoff auf der Medienseite des MAG ansammeln kann. ● Das MAG und das System muss gegen Temperaturen unter dem Gefrierpunkt geschützt sein, zum Beispiel durch Frostschutzmittel oder Aufstellung in entsprechenden Räumlichkeiten. ● Das MAG darf nicht für andere Bereiche als vorgesehen eingesetzt werden. ● Das MAG, die Rohrleitung und auch die Anschlüsse können möglicherweise undicht werden. Aus diesem Grund sollte das MAG in einem Haustechnikraum mit geeignetem Bodenablauf installiert werden. So kommt es im Fall einer Undichtigkeit zu keinen Sach- oder Personenschaden. Der Hersteller haftet nicht für Wasserschäden an Personen oder Gegenständen, die in Verbindung mit dem MAG entstehen können. ● Der Hersteller haftet nicht für Sach- oder Personenschäden durch falschen Transport oder Handhabung des MAG. ● Wie bei allen Bestandteilen der sanitären Installationen oder Anlagen können sich auch im MAG Bakterien bilden, besonders in Ruhezeiten. Im Fall einer Desinfizierung des Systems, oder des MAG müssen die für die Installation und Wartung zuständigen Personen und die entsprechenden Behörden informiert werden, um eine fachgerechte Desinfektion der Anlage vorzunehmen. ● Es ist verboten, das MAG anzubohren, es zu öffnen, es offenen Flammen auszusetzen, oder es in irgendeiner anderen Art zu manipulieren. ● Achtung bei MAG mit auswechselbarer Membrane, die zusätzlich zu dem unteren Systemanschluss noch einen oberen Anschluss haben: Es ist zu beachten, dass dieser lediglich für die Installation eines Manometers,
eines Entlüfters, oder eines Sicherheitsventils geeignet ist.Der Anschluss kann auch mit einer Kappe druckdicht verschlossen werden. ● Falls es notwendig ist, den voreingestellten Vordruck zu verändern, muss der anlagenspezifische Vordruck von einem Planer/Fachmann ermittelt werden. Die Berechnung muss sicherstellen, dass für alle vorhersehbaren Betriebsbedingungen die entsprechenden Höchstwerte (besonders der max. Betriebsdruck) nicht überschritten werden. Bitte beachten Sie die mit dem Planer/Betreiber vereinbarten techn. Abstimmungen und/oder die gesetzlichen Bestimmungen, Vorschriften und Normen. Es gelten außerdem immer die aktuellen, allgemein anerkannten Regeln der Technik. Eine Ergänzung des Gaspolsters darf nur mit einem ungiftigen Inertgas unter Verwendung einer zulässigen Befüllarmatur erfolgen. In jedem Fall sollte der Vordruck 50% des max. Betriebsdrucks nicht überschreiten. ● Es ist sicherzustellen, dass bei/nach der Installation auf ausreichenden Platz zur Durchführung von späteren Wartungen geachtet wird. Die Möglichkeit eines evtl. Austauschs von Komponenten muss in jedem Fall gewährleistet sein. ● Die Entsorgung des MAG darf nur durch zugelassene Entsorgungsunternehmen gemäß den jeweils gültigen Bestimmungen erfolgen. ● Im Fallder Übertragung von möglichen Vibrationen aus dem System auf das MAG, sollte dieses sicherheitshalber mit Hilfe von Kompensatoren angeschlossen werden, um einen vibrationsfreien Betrieb zu gewährleisten.

4. ALLGEIMEINE ANWEISUNGEN ZUR INSTALLATION
Es ist sicherzustellen, dass nur geeignete und notwendige Transportmöglichkeiten bei der Aufstellung und Installation des MAG genutzt werden. ● Das Gefäß darf nicht im Freien, sondern nur in geschlossenen Räumen, nicht in der Nähe von Wärmequellen, elektrischen Generatoren oder anderen Energiequellen, die dem MAG schaden könnten, installiert werden. ● Je nach Größe des Modells, kann das Gewicht des mit Wasser gefüllten MAG von der Rohrleitung gehalten werden. Dazu ist es wichtig, dass die Rohrleitung passende Aufhängungen hat. Wenn das Gefäß horizontal montiert wird und keine Aufhängung vorhanden ist, sollte das Gefäß von unten gestützt werden. Die Anordnung, Aufstellung und Befestigung des MAG muss so erfolgen, dass im Prüf- oder Störfall neben dem Eigengewicht des Behälters auch das Gewicht des mit Wasser gefülltem MAG gehalten werden kann. ● Die Strom-und Wasserversorgung im System ist abzustellen. Es ist sicherzustellen, dass das System ausgekühlt und drucklos ist, um Verbrennungen und andere Verletzungen zu verhindern. ● Vor der Installation ist der Plastikverschluss am Stickstoffventil zu entfernen und der voreingestellte Vordruck (mit einer Toleranz von +/- 20%) mit einem Vordruckprüfer zu überprüfen. Der Vordruck ist auf den erforderlichen Wert anzupassenund das Stickstoffventil wieder mit der Plastikkappe zu verschließen. ● Das MAG ist gemäß der Systemzeichnung und den entsprechenden Vorgaben, bevorzugt in vertikaler Position und Anschluss unten (je nach Typ und Größe, genaue Installationsbeschreibung siehe extra Beipackzettel) wie folgt zu installieren (s. Zeichnung):
-in geschlossenen Heizungssystemen im Rücklauf, in Nähe des Wärmeerzeugers unter Verwendung eines Kappenventils (Bild 1)
- in Trinkwassererwärmungsanlagen auf der Kaltwasserzulaufseite zwischen Wassererwärmer und Rückflussverhinderer. Der zulässige Ansprechdruck des Sicherheitsventils ist zu überprüfen. Das Sicherheitsventil wird duch das MAG nicht ersetzt. (Bild 2)
- in Druckerhöhungsanlagen jeglicher Art hinter dem Rückflussverhinderer auf der Druckseite in unmittelbarer Nähe der Pumpe (Bild 3) ● Nach der Installation des Gefäßes und dem Neustart der Anlage, ist diese auf Undichtigkeit zu überprüfen und das komplette System zu entlüften. Speziell sollte geprüft und dokumentiert werden, dass sich der Anlagendruck und die Anlagentemperatur innerhalb der zugelassenen Grenzen befinden. Falls nötig, ist Systemwasser zu entfernen, um den Anlagendruck an die entsprechenden Maximalwerte und/oder die Temperatur auf die gewünschte Endtemperatur anzupassen. ● Der Systemanschluss ist bei der Installation nach den allgemein anerkannten Regeln der Technik nicht zu fest anzuziehen.

Bitte beachten Sie, dass die oben beschriebene Installationsvorschrift nur als Orientierungshilfe/Empfehlung dienen kann. Aus diesem Grund beachten Sie immer die aktuellen, allgemeinen anerkannten Regeln der Technik, die mit dem Planer/Betreiber vereinbarten techn. Abstimmungen, die Betriebsbedingungen und/oder die gültigen örtlichen Bestimmungen, Vorschriften und Normen. Für die Prüfung der Behälter gelten die Forderungen der BetrSichV. Die Installation des MAG darf nur durch Fachpersonal erfolgen.

5. WARTUNG
Bitte beachten Sie, dass ausschließlich qualifiziertes Fachpersonal die Wartung vornehmen darf. ● Für die Durchführung der Wartung muss das System ausgeschaltet, ausgekühlt und das MAG drucklos sein (Kappenventil schließen, MAG entleeren). Alle elektrischen Systemkomponenten müssen abgeschaltet sein. ● Falls nicht anders vereinbart, sollte das MAG spätestens alle 6 Monate überprüft werden. Vordruckkontrolle entsprechend dem Typenschild (entweder voreingestellt oder kundenspezifisch) mit einer Toleranz von +/- 20%. ● Um die Lackierung zu schützen, sollte das MAG von außen mit Wasser und Seife gereinigt werden. ● Das MAG enthält Komponenten, die einer Dauerbelastung ausgesetzt sind. Diese Teile sind einem natürlichen Verschleiß ausgesetzt. Ggf. muss das MAG nach einem bestimmten Zeitraum ausgewechselt werden. ● Bitte setzen Sie nur original ZILMET Ersatzteile ein.

Achtung: Wie alle Komponenten einer Hausinstallation sind auch Membranausdehnungsgefäße einem natürlichen Verschleiß ausgesetzt. Um einen dauerhaften, einwandfreien Betrieb der gesamten Anlage zu gewährleisten, wird empfohlen das MAG im Fall von besonderer Beanspruchung oder Verschleiß, in jedem Fall aber in einem gewissen Zeitraum nach dem ursprünglichem Installationsdatum, auszutauschen. Dieser Zeitraum ist abhängig von der jeweiligen Anlagencharakteristik und/oder den Betriebsbedingungen.

ZILMET haftet nicht für Sach- oder Personenschäden, die durch Nichtbeachtung dieser Anweisungen entstehen sowie nicht für Schäden, die aufgrund von falscher Berechnung, Installation, Betrieb oder Wartung des MAG oder der Anlage entstehen.

NL - GEBRUIKSAANWIJZING

1. BESCHRIJVING EN GEBRUIKSDOEL
De druk-expansievaten met vast membraan en de watertanken met uitwisselbaar membraan worden gebouwd door Zilmet S.p.A. in overeenstemming met de minimum eisen voor de veiligheid, zoals in de richtlijn 97/23/CE betreffende apparatuur onder druk. De volgende gebruiksaanwijzing is geschreven in overeenstemming en met het doel zoals in artikel 3.4 van bijlage I van de Richtlijn 97/23/CE ("blad voor de gebruiker met alle informatie, die kan dienen voor een grotere veiligheid.....") en wordt samen met de producten op de markt gebracht. De expansievaten, die deze instructies verwijzen naar zijn ontworpen en vervaardigd voor de in de tabel op pagina 6 doeleinden.

2. TECHNISCHE EIGENSCHAPPEN
De technische eigenschappen van het expansievat zijn vermeld op het identificatieplaatje op elk afzonderlijk product, waaronder de volgende fundamentele gegevens: identificatie van het product, volume, maximale bedrijfsdruk en –temperatuur (tevreden, zie de tabel op pagina 6), vuldruk (van fabriek of ingesteld door de gebruiker), bouwjaar, serienummer. De volgende tabel geeft de algemene technische henmerken van expansievaten: in het bijzonder, de waarden van de maximale bedrijfstemperatuur en de maximale bedrijfsdruk weergegeven in deze tabel moet beschouwd worden als de maximale bedrijfsparameters voor expansievaten.

Elk gebruik met continue of ook zeer korte druk of temperatuur, die hoger zijn dan de voorgeschreven grenzen, is ONVEILIG en kan een verkorting van de levensduur van het vat veroorzaken, of schade aan eigendommen, ernstige verwondingen of verbrandingen aan personen, en zelfs de dood. Het vat kan in ieder geval gebruikt worden in installaties waarvan de maximale temperatuur hoger is dan 70°C (in ieder geval niet hoger dan aangegeven in de vorige tabel), op voorwaarde dat alle voorzieningen getroffen worden (bijvoorbeeld installatie in het koudste gedeelte van de installaties, thermostatische regeling enz), waardoor men kan garanderen dat er op het vat een maximale temperatuur is van 70 °C. De vaten kunnen werken tot een minimum temperatuur van –10 °C, indien men geschikte antivriesmiddelen gebruikt, zoals ethyleenglycol (in een percentage tot 50%). In dat geval mag men de vaten niet gebruiken voor de opslag en de productie van drink-/tapwater, vanwege de giftigheid van deze vloeistoffen. Bovendien moet men dan alle voorzorgsmaatregelen nemen om milieuvervuiling en mogelijke vergiftiging te voorkomen en daarbij rekening houden met de wetgeving en de van kracht zijnde normen. Naargelang de lokale normen of de bepalingen overeengekomen tussen ZILMET en de klant, mogen de maximale bedrijfsdruk en de maximale bedrijfstemperatuur lager zijn dan die gegeven in de bovenstaande tabel (maar ze niet overschrijden): raadpleeg altijd de overeengekomen bepalingen, het instructiebladen/of de lokale regels, normen en voorschriften.

Voor de installatie is men verplicht om het juiste model expansievat te berekenen en te kiezen in overeenstemming met het ontwerp van de installatie, de specificaties, de aanwijzingen en de eisen in verband met het gebruik. Uitsluitend gekwalificeerd en bevoegd personeel mag de dimensionering uitvoeren en het vat uitkiezen in overeenstemming met de wetgeving en de van kracht zijnde normen. Uitsluitend gekwalificeerd en bevoegd personeel mag het product installeren, in gebruik nemen en het onderhoud uitvoeren, in overeenstemming met het ontwerp van de installatie, de specificaties, de aanwijzingen en de eisen in verbandmet het gebruik, en volgens de wetgeving en de van kracht zijnde normen betreffende warmte-, hydraulische en electrische installaties; verder moeten de wetgeving en de van kracht zijnde normen worden nagevolgd op het gebied van veiligheid, volksgezondheid en werkplaatsen, milieubescherming en elke andere van toepassing zijnde verordening. Deze aanwijzingen moeten worden overhandigd aan het personeel dat met de installatie belast is. Alle aanwijzingen moeten zorgvuldig worden gelezen voordat het expansievat wordt

geïnstalleerd. Na de installatie moet deze gebruiksaanwijzing worden bewaard voor toekomstig gebruik.

3. WAARSCHUWINGEN
De installatie waarin een expansievat wordt geïnstalleerd, moet een voorziening hebben voor de beperking van de druk (veiligheidsklep). ● Het expansievat wordt aan de hand van een label geïdentificeerd als zijnde geproduceerd door ZILMET. Dit label is stevig bevestigd aan het vat en mag niet verwijderd of gewijzigd worden. ● Indien het label op het ZILMET-vat ontbreekt of de technische kenmerken op het ZILMET-label onleesbaar zijn, gelieve het expansievat niet te installeren: contacteer rechtstreeks ZILMET op het nummer +39 049 7664901 of per e-mail op het adres zilmet@zilmet.it ● Om corrosie te wijten aan galvanische en zwerfstroom, moet het systeem correct geaard worden, volgens de lokale elektrische en hydraulische normen en het vat moet, indien nodig, uitgerust worden met diëlektrische koppelingen, na de eigenschappen van de installatie aandachtig te hebben geëvalueerd. ● Andere mogelijke oorzaken van corrosie moeten in acht genomen worden, bijvoorbeeld, de eigenschappen van het water (inclusief de temperatuur van het water), de aanwezigheid van zuurstof, zouten, het gebruik in hetzelfde systeem van inrichtingen vervaardigd van verschillende materialen (vb. koolstofstaal en roestvrij staal, koolstofstaal en koper). Al deze factoren moeten in acht genomen worden door de fabrikant van het hele systeem en het installatie- en onderhoudspersoneel, waarbij ook rekening gehouden moet worden met alle lokale hydraulische, elektrische en veiligheidsvoorschriften en normen. ● Gebruik dit vat niet met de volgende vloeistoffen: a) chemicaliën, oplosmiddelen, olieproducten, zuren, basen of andere stoffen die het vat kunnen beschadigen, b) vloeistoffen van de Groep 1 volgens de richtlijn 97/23/EG, d.w.z. explosieve, bijzonder ontvlambare, ontvlambare, heel toxische. toxische en oxiderende vloeistoffen, volgens de richtlijn 67/548/EEG. ● Gebruik dit vat alleen met de vloeistoffen van de Groep 2, volgens de richtlijn 97/23/EG, met een dampdruk van meer dan 0,5 bar boven de normale atmosferische druk (1013 mbar) bij de maximale bedrijfstemperatuur van het expansievat. ● Gebruik het expansievat niet met water waar zand, klei of andere vaste deeltjes in zitten, die het vat kunnen beschadigen (in het bijzonder de interne bekleding) en/of de toegang ervan kan verstoppen. ● Men moet met geschikte middelen voorkomen dat lucht zich tijdens bedrijf in het vat (het deel met water) kan verzamelen. ● Het vat en het aangesloten systeem moeten op de juiste manier worden beschermd tegen te lage temperaturen (onder vriespunt), bijvoorbeeld door antivriesmiddelen of door installatie in ruimten waar het gevaar niet aanwezig is. ● Gebruik het expansievat voor geen enkel andere toepassing, die hier niet genoemd is. ● Het expansievat, de leidingen en de verbindingen kunnen met verloop van tijd gaan lekken. Daarom is het noodzakelijk het expansievat te installeren in een geschikte technische ruimte voorzien van geschikte systemen voor de afvoer, zodat eventuele lekken de omgevende zone niet beschadigen en geen brandwonden veroorzaken. De fabrikant zal niet aansprakelijk zijn voor waterschade aan personen en/of voorwerpen en bezittingen die te maken hebben met dit expansievat. ● De fabrikant aanvaardt geen aansprakelijkheid voor schade, die voortvloeit uit een verkeerde manier van transporteren en/of verplaatsing: hiervoor moet men de meest geschikte middelen kiezen, die geen schade aan de producten of letsel aan personen kunnen veroorzaken. ● Zoals in alle producten, die in water-installatie worden gebruikt, kunnen zich in het expansievat bacterieen voortkwekken, vooral als men deze voor een tijd niet gebruikt. Het personeel dat met de installatie en het onderhoud belast is, moet zich informeren bij de bevoegde instanties voor de procedures om de installatie op de juiste manier en veilig te ontsmetten. ● Het is verboden om het expansievat op enige manier te doorboren, met vuur te verwarmen, te openen of op andere manier te schenden. ● Let op, watertanken met een aansluiting aan de bovenkant zijn open, om er een driewegenstuk op te kunnen zetten, op die manier kan men een manometer en een veiligheidsklep toevoegen. ● In het geval dat men de vuldruk van de fabriek moet veranderen, mag de nieuwe waarde hiervoor alleen door gespecialiseerd personeel worden berekend. Deze berekening moet garanderen dat de gegeven grenswaarden (in het bijzonder de maximale bedrijfsdruk) onder geen enkele te voorziene gebruiksomstandigheid kan worden overschreden en dat de wetgeving en de van kracht zijnde normen worden gerespecteerd. In ieder geval is het aan te raden om de nieuwe vuldruk niet meer dan 50% boven de maximale bedrijfsdruk van het vat te kiezen. De nieuwe waarde van de voordruk (door gebruiker bepaald) moet op de daartoe bestemde ruimte van het label worden geschreven. ● Zorg ervoor dat de systeemlay-out het toekomstige onderhoud mogelijk maakt en dat er voldoende ruimte is rond het systeem om de onderdelen indien nodig te kunnen verplaatsen. ● De vaten mogen uitsluitend afgedankt worden in geautoriseerde ophaalcentra, volgens de lokale normen en voorschriften. ● Als er zich in de buurt trillingen kunnen voordoen, moeten de juiste middelen aangewend worden om het vat tegen deze trillingen te beschermen (vb. de installatie op een verende ondergrond).

4. ALGEMENE AANWIJZINGEN VOOR DE INSTALLATIE
Om het expansievat te plaatsen en te installeren moet men zeker stellen dat alle noodzakelijke middelen voor het transporteren en/of de verplaatsing beschikbaar zijn, en dat alle voorzorgsmaatregelen worden genomen. ● Installeer het vat niet buiten, maar uitsluitend in gesloten en goed geventileerde ruimten, beschermd tegen weersinvloeden en ver van warmtebronnen, electrische generatoren en elke andere mogelijke oorzaak van schade. ● Afhankelijk van het model zal het gewicht van het met water gevulde vat door de leidingen van de installaties moeten worden gedragen. Het is dus belangrijk dat de leidingen eventueel op de juiste manier worden ondersteund, bijvoorbeeld met steunen, banden, enz. Bovendien moet het vat ondersteund worden als deze horizontaal wordt geïnstalleerd. ● Schakel de electrische energie naar de installatie uit en sluit de watertoevoer hiernaar af. Om het risico voor ernstig letsel en/of brandwonden te voorkomen, moet men controleren dat de installatie niet onder druk staat en helemaal is afgekoeld. ● Voor de installatie moet men het plastic kapje op de vulklep eraf halen en met een geijkte manometer controleren dat de vuldruk met een tolerantie van ± 20% gelijk is aan die van de fabrikant. Regel de vuldruk van het vat op de gewenste waarde; zet het plastic kapje weer vast op de vulklep. ● Installeer het vat op het punt zoals voorzien in het ontwerp van de installatie, het liefst in verticale stand en met het aansluitstuk naar onder (zie tekeningen) en in de volgende posities:
- op de retourleidingen, in gesloten verwarmingsinstallaties (fig. 1)
- in installaties voor de bereiding van warm tapwater (fig. 2): in een punt tussen boiler en de anti-terugkeerklep, of het ventiel, of de drukreductor.
- in installaties voor het vasthouden en het oppompen van water (fig. 3): na de anti-terugkeerklep op de pomp-uitgang. ● Na de installatie van het vat en het opstarten van de installatie moet men controleren dat er geen lekken zijn en de installatie ontluchten. Controleer dat druk en temperatuur binnen de voorziene grenzen liggen; eventueel
laat men wat water eruit lopen om de druk in het goede bereik te brengen en/of regelt men de temperatuur op een veilige waarde. ● Span de schroefdraadverbindingen niet te veel aan.

Opgelet: de boven beschreven installatieprocedure geeft alleen algemene aanwijzingen en men moet daarom altijd rekening houden met de aanwijzingen van de installatie zelf, de manier waarop deze wordt gebruikt en met de wetgeving en de van kracht zijnde normen.

5. ONDERHOUD - Opgelet, uitsluitend gekwalificeerd en bevoegd personeel mag het onderhoud uitvoeren.
Om het onderhoud en de controles uit te mogen voeren, moet men eerst controleren dat de installatie uit, afgekoeld en niet onder druk staat, dat de electrische systemen geen spanning voeren en dat het vat helemaal leeg is. ● Tenminste eens per zes maanden moet het expansievat worden gecontroleerd, ga na dat de vuldruk binnen het bereik lig zoals aangegeven op het etiket (vuldruk van de fabriek of van de gebruiker) met een tolerantie van ± 20% als niet anders is aangegeven. ● Voor een lange levensduur van het externe oppervlak moet het expansievat af en toe worden schoongemaakt met alleen water + zeep. ● Het expansievat heeft delen die aan slijtage onderhevig zijn; indien deze delen na een bepaalde tijd achteruit gaan, vooral als gevolg van corrosie, dan moet het vat worden vervangen. ● Gebruik alleen originele wisselonderdelen van Zilmet.

N.B.: Om borg te staan voor de correcte werking van het systeem, moet het expansievat vervangen worden door een nieuw in geval van overmatige slijtage en, in ieder geval, ten laatste 5 jaar na de installatiedatum.

Zilmet S.p.A. kan niet aansprakelijk worden gesteld voor enige schade aan goederen, eigendommen en/of letsel aan personen, voortvoeiend uit het niet navolgen van alle boven gegeven aanwijzingen, in het bijzonder door verkeerde dimensionering en keuze, installatie, gebruik en onderhoud van het vat zelf en/of van het hierop aangesloten systeem.

ES - INSTRUCCIONES DE USO

1. DESCRIPCIÓN Y USO
Los vasos de expansión Zilmet a membrana fija y los acumuladores hidroneumáticos de membrana recambiable están construidos según los requisitos esenciales de seguridad de la Directiva 97/23/CE en materia de equipos a presión. Las presentes instrucciones de uso han sido confeccionadas de acuerdo a las indicaciones del anexo 1, artículo 3.4, de la Directiva 97/23/CE ("instrucciones para el usuario, conteniendo toda la información necesaria de seguridad relativa a...") y se incluyen en el embalaje de venta junto con el producto. Todos los vasos disponen de un diafragma sintético flexible para mantener la red de distribución o del fluido del contacto con el sellado en la almohadilla de aire del tanque. Los vasos de expansión a los que se refieren las presentes instrucciones han sido diseñados y fabricados para los usos como se especifica en la tabla de la página 6.

2. CARACTERÍSTICAS TÉCNICAS
Las características técnicas del vaso de expansión están presentes en la etiqueta de identificación aplicada a cada producto, entre ellas, las más importantes son: identificación del producto, volumen del vaso, presión y temperatura máxima de trabajo (por favor, vea la tabla de la página 6), presión de precarga (valor ajustado en fábrica o valor ajustado por el usuario), año de fabricación, número de serie. La siguiente tabla muestra las características generales de los vasos de expansión: en particular los valores de temperatura máxima de trabajo y de presión máxima de trabajo que se reflejan en esta tabla, deben entenderse como valores máximos de trabajo para los sistemas en los que están instalados los vasos de expansión.

Todo uso a temperaturas o presiones aceptadas o instantánea que exceda los límites prescritos deben considerarse **nocivos** y pueden provocar la reducción de la vida útil del vaso, daños o quemaduras y/o lesiones corporales serias o incluso, mortales. El vaso debe utilizarse en sistemas que tengan una temperatura máxima de trabajo dentro del rango ilustrado en la tabla, predisponiendo todos los medios para que la temperatura del vaso sea como máximo de 70 °C (instalación en la parte más fría del sistema, control termostático, etc). A la temperatura mínima, el vaso debe trabajar, usando un anticongelante apropiado como etilenglicol (con un porcentaje de hasta un 50%), a una temperatura que no sea inferior a los -10 °C. Puesto que dichas sustancias son tóxicas, el vaso no ser utilizado para la producción y el almacenamiento de agua potable/sanitaria. Además, deben adoptarse todos los medios y precauciones apropiados para evitar la dispersión y contaminación del ambiente. Deben observarse las normas y códigos ambientales, sanitarios, de prevención de accidentes y de seguridad.

ATTENCION - Antes de la instalación, se debe calcular y escoger el tipo correcto de vaso según el diseño del sistema, las especificaciones, las instrucciones y los requisitos de funcionamiento. La selección y el cálculo del vaso debe ser efectuado únicamente por técnicos calificados en conformidad con lo estipulado por los códigos y normas locales. Las operaciones de instalación, funcionamiento y mantenimiento deben ser efectuadas únicamente por personal calificado y autorizado en conformidad con los requisitos de funcionamiento, las instrucciones y las especificaciones del sistema y con las normas y códigos locales eléctricos, hidráulicos y térmicos. Deben observarse las normas locales de seguridad, prevención de accidentes, sanitarias y de los otros códigos aplicables. Por favor, proporcione estas instrucciones al personal encargado de la instalación, funcionamiento y mantenimiento. Antes de instalar el vaso de expansión deben leerse atentamente todas las instrucciones. Las presentes instrucciones deben guardarse para que estén disponibles para futuras consultas.

3. ADVERTENCIAS
● El sistema donde será instalado el vaso de expansión debe disponer de un limitador de presión (válvula disipadora de presión). ● La e queta está colocada firmemente en el vaso y no debe ser extraída, adulterada o cambiada. ● Si la e queta del vaso de expansión Zilmet se perdiera, o las características técnicas de la misma no se leyeran correctamente, por favor no instale el vaso de expansión: contacte directamente con Zilmet en el teléfono +39 049 7664901 o a través e-mail zilmet@zilmet.it para que le sea repuesta. ● Para evitar la corrosión por dispersión y corrientes galvánicas, el sistema debe ser conectado a tierra correctamente en conformidad con las normas y los códigos locales de electricidad y fontanería. En caso de necesidad, los vasos de expansión pueden suministrarse con juntas dieléctricas, después haber evaluado atentamente las características de la instalación. ● Otras causas posibles de corrosión y picado dependen de las características del agua (incluida su temperatura), de la presencia de oxígeno, sales fundidas, el uso en el mismo sistema de dispositivos fabricados con materiales diferentes (por ej, acero al carbono y acero inoxidable, acero al carbono y cobre). Todos estos factores deben ser considerados por el fabricante del sistema y por el personal encargado de la instalación y mantenimiento, teniendo en cuenta todas las regulaciones y normas locales de seguridad, eléctricas e hidráulicas. ● No usar este vaso con: a) solventes químicos, productos de petróleo, ácidos o con fluidos que puedan ser perjudiciales para el vaso, b) líquidos indicados en el Grupo 1 de la Directiva 97/23/CE, como explosivos, altamente inflamables, inflamables, altamente tóxicos, tóxicos y oxidantes según la Directiva 67/548/EEC. ● Use estos vasos únicamente con líquidos indicados en el Grupo 2 de la Directiva 97/23/CE, con una presión de vapor mayor de 0,5 bar superior a la presión atmosférica normal (1013 mbar), con la temperatura máxima de trabajo indicada para el vaso de expansión. ● No usar este vaso con agua que contenga arena, arcilla u otras sustancias sólidas que puedan dañar el vaso (especialmente el aislamiento interno) y/o atascar su conexión. ● Deben tomarse las medidas necesarias para evitar la acumulación de aire durante el funcionamiento de la planta, en la cámara del vaso (lado agua) conectado al sistema. ● El vaso y el sistema conectado debe protegerse contra las temperaturas de congelación, utilizando para ello anticongelantes apropiados o instalando el vaso en áreas adecuadas. ● No usar este tanque de expansión para usos diferentes para los cuales ha sido diseñado. **● El vaso de expansión, las tuberías y las conexiones pueden provocar fugas con el tiempo. Por tanto sé necesario instalar el vaso de expansión en un adecuado local técnico, que sea provisto de un idóneo sistema de drenaje y descarga en manera que cualquier pérdidas no provoque daños a las cercanías y no amenaze quemaduras a cosas y personas. El fabricante se exime de toda responsabilidad por daños a personas y/o cosos por daños por escapes de agua del vaso de expansión.** ● El fabricante se exime de toda responsabilidad por daños a personas y/o cosas y/o heridas a las personas por transporte y/o manipulación inapropiada del vaso. ● Como en los productos de fontanería, en el vaso de expansión pueden formarse bacterias, especialmente durante los períodos de inactividad. Debe consultarse al oficial hidráulico y a las autoridades competentes para recibir las instrucciones adecuadas para que el personal encargado del funcionamiento y de mantenimiento desinfecte el sistema hidráulico. ● Se prohíbe, perforar, abrir, calentar con llamas o adulterar el vaso. ● Atención, con los tanques de presión que enen una conexión alta, nótese que el mismo está abierto para permitir la instalación de una conexión de tres vías donde deben instalarse un manómetro y una válvula disipadora de presión. ● Será necesario cambiar la precarga de fábrica, solo el personal técnico especializado debe calcular o determinar la precarga. El cálculo debe asegurar que, para todas las condiciones de trabajo previsible, nunca se superen los límites especificados (particularmente la presión de trabajo máxima) y que se observen las normas y los códigos locales. De todos modos, es conveniente que la precarga no exceda el 50% de la presión de trabajo máxima: el nuevo valor de presión de precarga (definido por el usuario) deberá escribirse en el espacio indicado sobre la etiqueta. ● Asegúrese de que la instalación permita mantenimientos futuros y prevea espacio suficiente de trabajo en la misma para permitir la sustitución de componentes cuando sea necesaria. ● El desecho del vaso deberá hacerse a través de centros de reciclado autorizados, de acuerdo a las normativas locales en esta materia. ● Si se puede dar el caso de vibraciones en el entorno del vaso, deberá tenerse en cuenta el aislar el vaso de expansión de las vibraciones (p.ej. instalando soportes antivibratorios).

4. INSTRUCCIONES GENERALES PARA LA INSTALACIÓN
● Asegúrese que se u licen todos los medios apropiados y adecuados de transporte y elevación y que se tomen todas las medidas de precaución durante la instalación y posicionamiento del tanque de expansión. ● No instale este vaso al aire libre sino únicamente en un local cerrado bien ventilado, lejos de las fuentes de calor, de generadores eléctricos y de toda otra fuente perjudicial para el vaso. ● Dependiendo del modelo, el peso del vaso de expansión lleno con agua está soportado por el sistema de tuberías. Sin embargo, es conveniente, donde fuera apropiado, que la tubería disponga de refuerzos apropiados (zunchados, ganchos, herrajes de soporte). Además, si el vaso no tiene una base de soporte y si se lo instala horizontalmente, debe disponer de soportes apropiados. ● Cierre la alimentación eléctrica y el suministro de agua que va al sistema. **Asegúrese que el sistema está enfriado y no presurizado para evitar quemaduras y/o lesiones corporales serias.** ● Antes de efectuar la instalación, quite el capuchón plástico de la válvula de aire del vaso y controle la configuración de precarga de fábrica (con una tolerancia de ± 20%) con un manómetro calibrado. Ajuste el tanque de precarga al valor requerido (no excede el 50% de la presión de trabajo máxima); repone y apriete el capuchón de plástico en la válvula de aire. ● Instale el vaso en el punto especificado en el diseño del sistema, en las especificaciones e instrucciones, preferiblemente en una posición vertical y con la conexión en dirección descendente (véase el diagrama) y en las siguientes posiciones:
- en los sistemas de calefacción hidráulicos cerrados, en la tubería de retroceso (fig. 1).

- en los sistemas para la producción de agua caliente sanitaria, en un punto entre el calentador de agua y la válvula contra reflujo, válvula de controle o el regulador de presión (fig. 2).
- en los sistemas de bombeo, para el almacenamiento y elevación de agua potable/sanitaria, después de la válvula contra reflujo en la salida de la bomba (fig.3).
● Después de la instalación del vaso y la nueva puesta en marcha de la planta, controle la presencia de fugas y extraiga el aire del sistema. Controle que la temperatura y la presión del sistema estén dentro del rango de seguridad de funcionamiento; si fuera necesario, extraiga el agua del sistema para llevar la presión del mismo dentro de los límites de seguridad y/o ajuste el control de la temperatura a la temperatura final deseada. ● No sobre apretar las conexiones roscadas.

Por favor, la instalación descrita anteriormente es solo un procedimiento de referencia y por este motivo, debe ser utilizada tomando en cuenta las especificaciones e instrucciones de la planta donde está instalado el vaso, el diseño del sistema, los requisitos de funcionamiento y las normas y códigos locales.

5. MANTENIMIENTO - Solo el personal calificado y autorizado puede llevar a cabo las operaciones de funcionamiento y mantenimiento.
● Para las operaciones de mantenimiento y control, asegúrese que el sistema esté apagado, enfriado y no presurizado, que todas las partes eléctricas estén desconectadas y que el vaso esté totalmente vacío. ● Por lo menos, cada seis meses debe efectuarse un control del vaso de expansión, controlando que la precarga se encuentre dentro del valor indicado en la etiqueta (precarga de la planta o configuración precarga efectuada por el usuario) con una tolerancia de ± 20%, salvo indicaciones en contrario. ● Para extender la vida útil de la protección exterior del tanque de expansión, deberá efectuarse una limpieza externa periódica utilizando solo agua y jabón. ● Este vaso de expansión incluye componentes some□dos a esfuerzos; en esos casos, dichos componentes se deteriorarán con el tiempo debiéndose sustituir el vaso. ● U□lice solo repuestos originales de la firma Zilmet. ● Para garantizar el funcionamiento correcto del sistema, el vaso de expansión debe cambiarse por uno nuevo en caso de deterioro excesivo y después de 5 años de su fecha de instalación.

Zilmet S.p.A. se exime de toda responsabilidad por los daños causados a las cosas, propiedades y/o a las personas por inobservancia de las instrucciones y, especialmente, aquellos daños provocados por la instalación, funcionamiento y mantenimiento inapropiado del tanque y/o del sistema conectado al mismo.

PT - INSTRUÇÕES DE USO

1. DESCRIÇÃO E DESTINAÇÃO DE USO
Os tanques hidropneumáticos pressurizados com membrana fixa e os tanques hidropneumáticos com membrana intercambiável são construídos pela ZILMET S.p.A atendendo os requisitos essenciais de segurança da Diretriz 97/23/CE sobre equipamentos em pressão. As seguintes instruções de uso são realizadas em conformidade e com a finalidade de quanto citado no artigo 3.4 do anexo I da Diretriz 97/23/CE ("folha destinada ao utilizador contendo todas as informações úteis para fins de segurança...") e acompanham os produtos durante a imissão no mercado. Os tanques hidropneumáticos objeto deste manual foram projetados e construídos para as seguintes finalidades (veja tabela a seguir): Todos os tanques incorporam uma membrana sintética elástica que separa a água da reserva de ar contida dentro do tanque.

2. CARACTERÍSTICAS TÉCNICAS
As características técnicas do tanque hidropneumático são impressas na plaqueta identificativa aplicada em cada produto individual, dentre delas as seguintes informações essenciais: identificação do produto, volume, pressão e temperatura máxima de trabalho (por favor consultar também a seguinte tabela), pressão de pré-carga (de fábrica ou impostada pelo utilizador), ano de fabricação, número de série. A seguinte tabela apresenta as características técnicas gerais do tanque hidropneumático: em especial modo os valores da máxima temperatura de trabalho e da máxima pressão de trabalho, ilustrados na seguinte tabela, deverão ser considerados como os parâmetros de funcionamento máximos para os tanques hidropneumáticos.

Qualquer utilização com pressões e/ou temperaturas continuas, ou mesmo instantâneas, superiores aos limites prescritos é INSEGURA e pode causar uma redução da vida do tanque, danos à propriedade, feridas e queimaduras às pessoas ou causar a morte delas. Para prolongar a duração da vida da membrana, quando possível instalar o tanque em instalações em que a temperatura máxima sobre o próprio tanque seja não superior aos 70°C. Para tal finalidade podem ser adotadas todas as medidas (por exemplo instalação na parte mais fria do sistema, controle termostático, etc.) que garantam ter sobre o tanque uma temperatura máxima de 70°C. Em relação à temperatura mínima, os tanques podem trabalhar até uma temperatura de -10 °C utilizando oportunos anticongelantes como o glicol etileno (em percentual até o 50%). Neste caso, considerando a toxicidade dos fluidos utilizados, não é consentida a utilização dos mesmos tanques para o armazenamento e la produção de água tratada/potável. Além disso devem ser adotados todas as medidas e os cuidados oportunos para evitar contaminações ambientais e possíveis envenenamentos, levando em consideração a legislação e as normas vigentes. De acordo com regulamentos locais ou devido a especificações técnicas concordadas entre o comprador e ZILMET, a máxima pressão de trabalho e a máxima temperatura de trabalho podem ser inferiores (mas não exceder) aos valores indicados na tabela acima: observar sempre as especificações concordadas, os regulamentos e normas técnicas locais.

Antes da instalação é obrigatório dimensionar e escolher o modelo correto de tanque hidropneumático de acordo com o projeto, as especificações, as instruções e os requisitos operacionais. Somente pessoal qualificado e autorizado pode executar o dimensionamento e a escolha do vaso de acordo com a legislação e as normas vigentes. Somente pessoal qualificado e autorizado pode instalar, por em exercício e executar a manutenção deste dispositivo de acordo com o projeto das instalações, as especificações, as instruções e os requisitos operacionais e de acordo com a legislação e as normas vigentes em matéria de instalações térmicas, hidráulicas e elétricas; devem ainda ser respeitadas a legislação e as normas vigentes em matéria de segurança, saúde pública, e sobre os lugares de trabalho, proteção ambiental e qualquer outra disposição aplicável. Estas instruções devem ser repassadas ao pessoal encarregado da instalação. Todas as instruções devem ser lidas cuidadosamente antes de instalar o tanque hidropneumático. Após a instalação, estas instruções devam ser guardadas para referência futura.

3. ADVERTÊNCIAS
O sistema em que se instala um tanque hidropneumático deve ter um dispositivo de limitação da pressão (válvula de segurança). ● O tanque hidropneumático é identificado como produto da ZILMET por meio de uma etiqueta identificativa. A etiqueta é aplicada sobre o tanque hidropneumático e não deve em nenhum caso ser removida ou modificada nos conteúdos. ● Se o tanque ZILMET está sem a etiqueta ou as características técnicas sobre a etiqueta ZILMET não são legíveis, não instalar o tanque hidropneumático: por favor contatar diretamente ZILMET pelo número de telefone +39 049 7664901 ou pelo endereço e-mail zilmet@zilmet.it ● Para prevenir os fenômenos de corrosão devidos às correntes vagantes e galvânicas, as instalações devem ser adequadamente aterradas de acordo com a legislação e as normas vigentes e, se necessário se pode dotar o vaso de juntas dielétricas apos ter considerado atentamente as características da instalação. ● Outras possíveis causas para os fenômenos de corrosão devem ser consideradas, por exemplo as próprias características da água (inclusive sua temperatura), presença de oxigênio, sais dissolvídos, a utilização nos mesmos sistemas de dispositivos nos quais são utilizados materiais de diverso tipo (por exemplo aço carbono e aço inoxidável, aço carbono e cobre). Todos estes fatores devem ser considerados pelo construtor do sistema completo e pelo pessoal encarregado da instalação e da manutenção, observando ainda a legislação e as normas vigentes. ● Não usar o tanque hidropneumático com os seguintes fluidos: a) produtos químicos, solventes, derivados do petróleo, ácidos, bases ou qualquer outra substância que possa danificar o tanque, b) fluidos pertencentes ao grupo 1 de acordo com a diretriz 97/23/CE, ou seja com fluidos classificados como explosivos, extremamente inflamáveis, inflamáveis, extremamente tóxicos, tóxicos e comburentes de acordo com a diretriz 67/548/CEE. ● Utilizar o tanque hidropneumático somente com fluidos pertencentes ao grupo 2 de acordo com a diretriz 97/23/CE e com uma tensão de vapor superior de pelo menos 0,5 bar em relação à pressão atmosférica normal (1013 mbar) na temperatura máxima de trabalho do tanque hidropneumático. ● Não usar o tanque hidropneumático com água que contenha areia, argila, ou outras substâncias sólidas que possam danificar o tanque (em especial modo a camada de revestimento interno) e/ou entupir sua conexão. ● Devem ser previstos meios adequados para prevenir a acumulação de ar, durante o funcionamento das instalações, na câmara do tanque (lado água) ligada ao sistema. ● O tanque e o sistema conectado devem ser oportunamente protegidos das temperaturas inferiores ao limite de congelamento, por exemplo mediante a utilização de anticongelantes ou a instalação em ambientes apropriados. ● Não utilizar o tanque hidropneumático para nenhuma outra finalidade que não seja a prevista. ● O tanque hidropneumático, as tubulações e as conexões com o passar do tempo podem ter vazamentos. Portanto é necessário instalar o tanque num local técnico adequado, que seja dotado de um adequado sistema de drenagem e escoamento de forma que qualquer vazamento não danifique a área em volta e não provoque escaldaduras ou queimaduras às pessoas. O construtor não será responsável por nenhum dano causado pela água a pessoas e/ou objetos e propriedades em relação à utilização do tanque hidropneumático. ● O construtor não responde de maneira alguma pelos danos derivantes de um errado transporte e/ou movimentação, para os quais deverão ser utilizados os meios mais idôneos aptos a garantir a integridade dos produtos e a segurança das pessoas. ● Como em todos os produtos utilizados em instalações hidráulicas, no tanque hidropneumático pode haver crescimento de bactérias, principalmente durante os períodos em que não é utilizado. As autoridades competentes e os órgãos responsáveis devem ser consultados acerca dos procedimentos que o pessoal encarregado da instalação e da manutenção deve adotar para desinfetar com eficácia e em condições de segurança as instalações.
•É proibido furar, esquentar com chama, abrir ou violar de qualquer maneira o tan-que hidropneumático. ● Atenção, para os tanques hidropneumáticos que têm a conexão superior, notar que este é aberto para consentir a instalação de uma conexão a três vias sobre a qual podem ser instalados um manômetro e uma válvula de segurança. ● Caso seja necessário trocar a pré-carga de fábrica, o novo valor de pré-carga pode ser determinado (calculado) somente por pessoal técnico especializado. O cálculo deve assegurar que, em todas as condições previsíveis de funcionamento, os limites especificados (em especial modo a pressão máxima de trabalho) nunca sejam superados e que sejam respeitadas a legislação e as normas vigentes. Em todos os casos é aconselhável que o novo valor de pré-carga seja, no máximo, igual ao 50 % da pressão máxima de trabalho do tanque; tal valor deve ser indicado no espaço apósito (pré-carga regulada) previsto na etiqueta. ● Assegurar-se que a disposição das instalações torne possível a manutenção do tanque e que esteja disponível em volta do tanque um espaço de trabalho suficiente a permitir sua substituição quando for necessário. ● O recolhimento do tanque hidropneumático deve ser realizado somente nos centros de coleta autorizados de acordo com as normas e as leis vigentes. ● Se, por acaso, próximo ao tanque houver vibrações mecânicas, devem ser adotadas medidas idôneas para evitar a transmissão das vibrações ao próprio tanque (por exemplo mediante a instalação com dispositivos anti vibrantes).

4.INSTRUÇÕES PARA INSTALAÇÃO
Para posicionar e instalar o tanque hidropneumático precisa assegurar-se que sejam utilizados todos os meios de movimentação e transporte necessários e adotadas todas as precauções do caso. ● Não instalar o tanque em área externa, mas somente em ambientes fechados e bem ventilados, ao abrigo dos agentes atmosféricos e longe de fontes de calor, geradores elétricos e qualquer outra fonte que possa ser prejudicial para o próprio tanque. ● De acordo com o modelo, o peso do tanque cheio de água é suportado pelas tubulações das instalações. Por isso é importante, quando for necessário, que as tubulações sejam adequadamente sustentadas, por exemplo com suportes, abraçadeiras, apoios adequados. Além disso, se o tanque não tiver uma base de apoio e for instalado horizontalmente, deve ser adequadamente sustentado. ● Desligar a energia elétrica nas instalações e interromper a alimentação da água nas mesmas. Para evitar o risco de graves feridas e/ou queimaduras, assegurar-se que as instalações não estejam em pressão e que estejam completamente resfriadas. ● Antes da instalação, remover a tampa de plástico sobre a válvula de pré-carga do ar e controlar, com um manômetro calibrado, que o valor de pré-carga seja aquele regulado na fábrica com uma tolerância de ± 20%. Regular a pré-carga do tanque no valor exigido; reposicionar e apertar a tampa de plástico sobre a válvula de pré-carga. ● Instalar o tanque no ponto previsto no projeto das instalações, preferencialmente em posição vertical e com a conexão virada para baixo (ver desenhos) e nas seguintes posições:
- Nas tubulações de retorno, nas instalações de aquecimentos fechadas (fig. 1);
- Em um ponto entre o ebulidor e a válvula de não-retorno, ou a válvula de retenção ou a válvula redutora de pressão, nas instalações de geração de água quente sanitarizada (fig. 2);
- Depois da válvula de não retorno colocada na saída da bomba, nas instalações para armazenamento e elevação de água (fig. 3). ● Depois da instalação do tanque e a retomada de funcionamento do sistema, controlar que não haja vazamentos nele e remover o ar do sistema. Verificar que a pressão e a temperatura estejam dentro dos limites previstos; caso seja necessário, retirem um pouco de água para restabelecer a pressão do sistema dentro dos limites de segurança e/ou regular o controle de temperatura para restabelecer os valores previstos. ● Não apertar excessivamente a conexão rosqueada.

Atenção: o procedimento de instalação acima descrito fornece somente indicações de caráter geral e portanto deve ser utilizada junto às instruções referentes às instalações em que o tanque é instalado, as especificações referentes, os requisitos operacionais, a legislação e as normas vigentes.

5. MANUTENÇÃO - Atenção, somente pessoal qualificado e autorizado pode executar as atividades de manutenção.
Para executar as atividades de manutenção e controle, assegurar-se que o siste-ma esteja desligado, resfriado e não em pressão, que os sistemas elétricos não estejam em tensão e que o tanque esteja completamente descarregado. ● Pelo menos uma vez a cada seis meses o tanque hidropneumático deve ser verificado, controlando que a pré-carga esteja nos limites indicados na etiqueta (pré-carga regulada na fábrica ou regulada pelo utilizador) com uma tole-rância de ± 20% caso não seja especificado de forma diferente. ● Para uma maior durabilidade da proteção externa do tanque hidropneumático, deve ser realizada uma limpeza periódica externa utilizando somente água e sabão. ● O tanque de expansão inclui partes submetidas a desgaste; caso estas partes estraguem ao longo do tempo, de modo especial em presença de fenômenos de corrosão, o tanque deve ser substituído. ● Utilizar somente peças de reposição originais ZILMET.

Para garantir o bom funcionamento das instalações substituir o tanque hidropneumático por um novo em caso de desgaste excessivo e de qualquer forma dentro de 5 anos da data de instalação.

ZILMET S.p.A não será responsável por nenhum dano aos objetos e à propriedade e/ou para danos físicos às pessoas devidos ao descumprimento de todas as instruções acima citadas, e, especificamente em relação àqueles, devidos a um dimensionamento e escolha, instalação, funcionamento e manutenção impróprios do tanque e/ou do sistema conectado.

PL - INSTRUKCJE DLA UŻYTKOWNIKA

1. OPIS I UŻYTKOWANIE
Ciśnieniowe naczynia przeponowe ZILMET z wymienną i stałą membraną są wykonane zgodnie z wymaganiami bezpieczeństwa zawartymi w dyrektywie urządzeń ciśnieniowych 97/23/WE. Ta instrukcja użytkowania została opracowana zgodnie z artykułem 3.4 aneksu 1 do Dyrektywy 97/23/EC („instrukcja dla użytkownika, zawierająca wszystkie niezbędne informacje o bezpieczeństwie nawiązujące do ....") i jest załączona do produktu w chwili sprzedaży na rynku. Naczynia wzbiorcze przeponowe do których odnosi się ta instrukcja zostały zaprojektowane dla następujących celów (patrz tabela poniżej). Wszystkie naczynia przeponowe posiadają syntetyczną, elastyczną membranę aby oddzielić wodę/ciecz z systemu od kontaktu z poduszką powietrzną w zbiorniku.

2. CHARAKTERYSTYKA TECHNICZNA
Charakterystyka techniczna naczyń przeponowych jest opisana na naklejkach identyfikacyjnych na każdym produkcie; pośród nich, najważniejszymi informacjami są: identyfikacja produktu, wielkość naczynia, maksymalne ciśnienie robocze i temperatura (patrz załączona tabela), ciśnienie wstępne (fabryka ustawia lub użytkownik ustawia), rok produkcji, numer seryjny. Poniższa tabela pokazuje ogólną charakterystykę techniczną naczyń przeponowych, w szczególności wartości maksymalnej temperatury roboczej i maksymalnego ciśnienia roboczego pokazane w tej tabeli muszą być traktowane jako maksymalne parametry pracy dla naczyń przeponowych.

Każde użycie chwilowe lub trwałe przekraczające podaną maksymalną roboczą temperaturę lub ciśnienie jest niebezpieczne i może spowodować skrócenie wytrzymałości naczynia, zniszczenie mienia, poważne oparzenia i/lub uszkodzenia ciała lub skutek śmiertelny. Naczynie może być wykorzystane w systemach posiadających maksymalną temperaturę roboczą jak w tabeli, zapewniając pod każdym względem że temperatura w naczyniu wynosi maksymalnie 70°C (instalacja w najzimniejszej części systemu, kontrola termostatyczna itd.). Odnośnie najniższej temperatury w której naczynie może pracować, to przy użyciu płynu nie zamarzającego, np. glikolu etylenowego (o stężeniu procentowym do 50%), jest to temperatura nie niższa niż -10°C. W związku z toksycznością tych substancji, naczynia nie mogą być używane do zaopatrzenia w wodę użytkową. Ponadto muszą być zastosowane wszystkie właściwe środki ostrożności aby uniknąć rozproszenia w środowisku i możliwości skażenia.
W kwestii bezpieczeństwa, zdrowia i przepisów należy stosować się do lokalnych norm. Zgodnie z lokalnymi przepisami lub specyfikacją uzgodnioną pomiędzy ZILMET a kupującym, maksymalne ciśnienie robocze i maksymalna temperatura robocza mogą być niższe (ale nie przekraczające) wartości podanych w powyższej tabeli: należy zawsze stosować się do specyfikacji i/lub do lokalnych przepisów, rozporządzeń i norm.

Przed instalacją konieczne są obliczenia i wybór poprawnego typu naczynia według konstrukcji systemu, specyfikacji, instrukcji i wymagań użytkowych. Obliczeń i doboru odpowiedniego naczynia do konstrukcji systemu mogą dokonywać wyłącznie licencjonowani specjaliści stosownie do lokalnych przepisów i norm. Wyłącznie wykwalifikowany i licencjonowany personel może instalować, obsługiwać i serwisować to wyposażenie, zgodnie z konstrukcją systemu, specyfikacją, instrukcją, wymogami, miejscowymi wymaganiami termicznymi, hydraulicznymi i elektrycznymi.
Ponadto należy stosować się do wszystkich wymagań zdrowotnych, bezpieczeństwa, jakkolwiek inne normy i wymogi muszą być również zachowane.
Należy przedstawić powyższą instrukcję personelowi zajmującemu się instalacją i obsługą tego urządzenia. Instrukcję należy przeczytać uważnie przed instalacją tego naczynia przeponowego. Po instalacji należy zachować tą instrukcję.

3. OSTRZEŻENIA
System w którym zainstalowano naczynie przeponowe musi być wyposażony w urządzenie ograniczające ciśnienie (zawór upustowy lub zawór bezpieczeństwa). ● Naklejka jest ściśle przypisana do konkretnego naczynia i nie może być odklejana czy zmieniana. ● Jeśli brakuje naklejki na naczyniu ZILMET lub jeśli charakterystyka techniczna na naklejce ZILMET jest nieczytelna, należy nie instalować naczynia: należy skontaktować się bezpośrednio z Zilmet pod nr. telefonu +39 049 8840662 lub przez e-mail na adres: zilmet@zilmet.it ● Aby zapobiec korozji związanej z błądzącymi prądami galwanicznymi, system musi być odpowiednio uziemiony zgodnie z obowiązującymi przepisami, jeśli to niezbędne naczynie może być dostarczone z końcówkami dielektrycznymi po wnikliwej analizie charakterystyki instalacji. ● Inne możliwe przyczyny powstawania korozji punktowej i zjawiska korozji muszą być rozpatrzone, na przykład, charakterystyka wody (włącznie z jej temperaturą), obecność tlenu, roztopionych soli, użycie w tym samym systemie urządzeń wykonanych z różnych materiałów (np. stal węglowa i stal nierdzewna, stal węglowa i miedź). Wszystkie te czynniki muszą być rozważone przez wytwórcę kompletnego systemu i przez personel dokonujący instalacji i konserwacji, biorąc pod uwagę wszystkie lokalne względy hydrauliczne, elektryczne i bezpieczeństwa. ● Nie używać w naczyniach przeponowych następujących płynów: a) chemikaliów, ropuszczalników, produktów ropopochodnych, paliw, kwasów ani żadnych innych substancji lub ich baz będących szkodliwymi dla samych naczyń, b) płynów z Grupy 1 wg. Dyrektywy ciśnieniowej 97/23/WE, są to płyny zdefiniowane jako wybuchowe, skrajnie łatwopalne, łatwopalne, bardzo toksyczne, toksyczne i utleniające wg. dyrektywy 67/548/EEC. ● Używać tych naczyń wyłącznie z płynami z Grupy 2 Dyrektywy Ciśnieniowej 97/23/WE i posiadającymi ciśnienie pary większe niż 0,5 bar powyżej normalnego ciśnienia atmosferycznego (1013 mbar) przy maksymalnej temperaturze roboczej naczynia przeponowego. ● Nie używać naczyń przeponowych przy wodzie zawierającej piasek, glinę, lub inne substancje stałe które mogą uszkodzić naczynie (szczególnie wewnętrzną powłokę) i/lub zatkać jego przyłącze. ● Odpowiednie środki muszą być zapewnione aby zapobiec akumulacji powietrza w komorze naczynia (strona wodna) podłączonej do systemu. ● Naczynie i podłączony do niego system musi być zabezpieczony przed mrozem i ujemną temperaturą np. przez użycie odpowiednich środków przeciw zamarzaniu lub instalację naczynia w odpowiednich obszarach. ● Nie używać naczyń przeponowych w żadnych innych celach niż zamierzone przez producenta. ● Naczynie przeponowe, rury i złączki mogą z czasem przeciekać. Dlatego niezbędnym jest aby zainstalować naczynie przeponowe w odpowiednim pomieszczeniu technicznym, które musi być wyposażone w odpowiedni system do odpływu i spustu wody z systemu ogrzewania, tak aby jakikolwiek wyciek nie uszkodził niczego w otoczeniu i nie spowodował poparzeń.
Producent nie jest odpowiedzialny za jakiekolwiek wodne uszkodzenia w stosunku do osób i/lub rzeczy i mienia w związku z tym naczyniem przeponowym. ● Producent tego naczynia przeponowego nie odpowiada za żadne możliwe uszkodzenia rzeczy i mienia i/lub obrażeń osób związanych z niewłaściwym transportem i/lub samą obsługą. ● Jak we wszystkich produktach hydraulicznych, w naczyniu przeponowym mogą powstawać bakterie, zwłaszcza w czasie przerw w użytkowaniu. Należy skonsultować się z lokalnym urzędnikiem z branży hydraulicznej i kompetentnym autorytetem odnośnie jakichkolwiek kroków podejmowanych w celu obsługi i serwisu aby bezpiecznie zdezynfekować układ hydrauliczny. ● Zabronione jest wiercenie, otwieranie, podgrzewanie płomieniem, majsterkowanie przy naczyniu pod każdym względem. ● Uwaga, dla zbiorników z górnym przyłączem, przyłącze jest otwarte aby pozwolić na instalacje trójnika na którym musi być zainstalowany manometr i zawór upustowy. ● Konieczne jest aby zmiany ciśnienia wstępnego w naczyniu ustawionego fabrycznie dokonywał wyspecjalizowany personel techniczny kalkulując i ustalając nowe ciśnienie wstępne. Kalkulacja musi zapewniać, że dla wszystkich do przewidzenia warunków pracy, określone granice (szczególnie maksymalne ciśnienie robocze) nigdy nie będą przekroczone i lokalne normy/zalecenia są przestrzegane. W każdym przypadku jest wskazane aby ciśnienie wstępne nie przekraczało 50% maksymalnego ciśnienia roboczego: nowa wartość ciśnienia wstępnego (ustawienie użytkownika) musi być zapisane w wolnym miejscu na naklejce. ● Należy się upewnić że sprzęt i wyposażenie układu hydraulicznego zapewnia wystarczające miejsce do pracy dla konserwacji systemu aby umożliwić wymianę podzespołów kiedykolwiek to niezbędne. ● Złomowanie naczyń musi być wykonane wyłącznie na wybranych składach zgodnie z lokalnymi rozporządzeniami i normami. ● Jeśli w sąsiedztwie występują wibracje, należy zapewnić odpowiednią izolację aby odizolować naczynie przeponowe od wibracji (np. instalacja na sprężystym mocowaniu).

4. OGÓLNE INSTRUKCJE DLA INSTALACJI
Należy się upewnić, że wszystkie odpowiednie i wymagane zasady odnośnie podnoszenia i transportu zostały przestrzegane i zastosowano wszystkie środki ostrożności podczas pozycjonowania i instalacji naczynia przeponowego. ● Nie instalować tego naczynia na zewnątrz pomieszczeń, lecz wyłącznie w zamkniętym i dobrze napowietrzonym obszarze, z dala od źródeł ciepła, generatorów elektrycznych i jakichkolwiek innych źródeł które mogą być szkodliwe dla samego naczynia. ● Zależnie od modelu, waga naczynia przeponowego wypełnionego wodą jest wsparta przez system rur. Dlatego jest ważnym aby rury gdzie należy miały odpowiednie uchwyty (mocowania, wieszaki). Ponadto jeśli naczynie nie ma wsparcia podstawy i jest zainstalowane poziomo, musi być właściwie podparte. ● Odciąć zasilanie elektryczne i zasilanie wody do systemu. Aby uniknąć poparzeń i/lub poważnych obrażeń cielesnych należy upewnić się że system jest wystudzony i nie znajduje się pod ciśnieniem. ● Przed instalacją należy usunąć plastikową zaślepkę na zaworze powietrznym naczynia przeponowego i sprawdzić poprawność ustawienia fabrycznego ciśnienia wstępnego (z tolerancją ± 20%) za pomocą legalizowanego manometru. Dostosować ciśnienie wstępne w zbiorniku do wymaganej wartości; zamontować i dokręcić plastikową pokrywę zaworu powietrznego. ● Zainstalować naczynie w określonym przez konstrukcję, specyfikacje i instrukcje systemu miejscu, preferuje się pozycję pionową z przyłączeniem od dołu (patrz schemat) i w następujących pozycjach:
- w zamkniętym hydraulicznym układzie ogrzewania na rurach powrotnych (Rys.1)
- w systemach do produkcji ciepłej wody użytkowej w miejscu pomiędzy podgrzewaczem wody i zaworem zabezpieczającym przed ciśnieniem zwrotnym (zawór zwrotny) lub reduktorem ciśnienia (Rys.2)
- w systemach pomp dla magazynowania i podnoszenia wody użytkowej, za zaworem zabezpieczającym przed przepływem wstecznym na wyjściu pompy (Rys.3) ● Po instalacji naczynia przeponowego i ponownym uruchomieniu system hydraulicznego, należy sprawdzić układ na obecność wycieków oraz wypuścić całe powietrze z system. Należy sprawdzić i upewnić się że ciśnienie oraz temperatura systemu są w bezpiecznym zakresie pracy; jeśli to konieczne usunąć wodę z systemu aby przywrócić ciśnienie w systemie do bezpiecznych granic i/lub dostosować temperaturę do pożądanej końcowej temperatury. ● Nie dokręcać przyłącza gwintowanego zbyt mocno aby nie przeciągnąć gwintu.

Proszę zauważyć, że powyżej opisane kroki są jedynie procedurą wzorcową i z tego względu należy brać pod uwagę specyfikacje i instrukcje miejsca docelowego gdzie naczynie przeponowe jest instalowane, konstrukcję systemu, wymagania pracy oraz lokalne przepisy i normy.

5. KONSERWACJA
Proszę zauważyć, że jedynie licencjonowany i kwalifikowany personel może podejmować się konserwacji i serwisu. ● Aby wykonać konserwację i kontrolę, należy upewnić się że system jest wyłączony, ostudzony i nie pod ciśnieniem, wszystkie części elektryczne nie są zasilane i naczynie przeponowe jest całkowicie puste. ● Należy zweryfikować naczynie przeponowe co najmniej raz na każde 6 miesięcy, sprawdzając czy ciśnienie wstępne mieści się w zakresie zaznaczonym na naklejce (fabryczne ciśnienie wstępne, lub ustawienie wstępne klienta) z tolerancją ±20%, jeśli inaczej opisano wcześniej. ● Dla dłuższego życia naczyń przeponowych należy je okresowo czyścić z zewnątrz przy użyciu jedynie wody i mydła. ● To naczynie przeponowe zawiera podzespoły które poddane są naprężeniom; w tym przypadku stan podzespołów pogarsza się z czasem, naczynie powinno być wymienione. ● Używać jedynie oryginalnych części zamiennych Zilmet.
Uwaga:dla zapewnienia prawidłowego funkcjonowania system, naczynie przeponowe powinno być wymienione na nowe w przypadku nadmiernego pogorszenia się parametrów, najpóźniej 5 lat od daty instalacji.

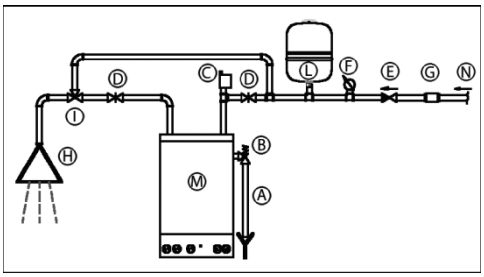
ZILMET nie jest odpowiedzialny za jakiekolwiek uszkodzenia rzeczy, własności i/lub obrażeń osób w skutek nie stosowania się do powyższych instrukcji a szczególnie do nieprawidłowej kalkulacji i wyboru, instalacji, obsługi i konserwacji samego zbiornika i/lub podłączonego systemu.

CARATTERISTICHE TECNICHE / TECHNICAL CHARACTERISTICS / CARACTERISTIQUES TECHNIQUES / TECHNISCHE EIGENSCHAFTEN / TECHNISCHE EIGENSCHAPPEN CARACTERÍSTICAS TÉCNICAS / CARACTERÍSTICAS TÉCNICAS / CHARAKTERYSTYKA TECHNICZNA

Model (1)	V (L) / Pmax (bar)	Tmax (2)	Application (3)	Model (1)	V (L) / Pmax (bar)	Tmax (2)	Application (3)
521 / 521 XL / 531 / 522 / 541	3 bar	90 °C	H - R	20014	8 – 500 L / 10 bar 24 L / 8-10 bar 750 L / 8-10 bar 1000 L / 6-8-10 bar	99 °C	P – SW - H
537 / 537 XL	3 bar	90 °C	H – R	20015	10 bar	99 °C	P – SW - H
539 / 539 XL	3 bar	90 °C	H – R	20016 HYDRO-PRO / HYDRO-PLUS / EASY-PRO	10 bar	99 °C	SW - P - H
637/L	3-4 bar	90 °C	H – R	20016 SOLAR	10 bar	110 °C	S - H
				20016 CAL-PRO	10 bar	99 °C	H - R
				20018	0.16 L / 15 bar 0,5 – 18 L / 10 bar	99 °C	SW - P - H
20013 CAL-PRO	4 – 8 L / 5 bar 12 – 50 L / 4 bar 80 – 900 L / 6 bar	99 °C	H – R	20020	16 bar	99 °C	P – SW - H
564	8 / 10 bar		SW - H	20021	10-16-20-25 bar	99 °C	P – SW - H

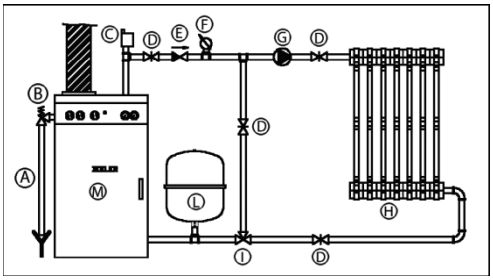
IT (1) Modello - (2) Temperatura massima d'esercizio - (3) Applicazione: H = riscaldamento, R = refrigerazione, S = solare, SW = acqua sanitaria/potabile, P = sollevamento acqua/pompe - **Nota: per caratteristiche tecniche aggiornate, fare riferimento all'etichetta applicata al vaso.**
EN (1) Model - (2) Maximum operating temperature of the system - (3) Use: H = heating, R = refrigeration, S = solar, SW = sanitary/potable water, P = water lifting / pumps **Note: for updated technical characteristics, please refer to the label on the vessel.**
FR (1) Modèle - (2) Température maximale de fonctionnement du système - (3) Application : H = chauffage, R = climatisation, S = solaire, SW = eau chaud sanitaire, P = relevage/réservoir pompe - **Note: prière de faire référence à la plaquette du vase pour toutes informations techniques mises à jour.**
DE (1) Modell - (2) Maximale Betriebstemperatur - (3) Einsatz: H = Heizung, R = Kühlung, S = Solar, SW = Sanitär / Trinkwasser, P = Wasserhebe / Pumpen **Achtung: evtl. technische Änderungen entnehmen Sie bitte dem MAG Typenschild**
NL (1) Model - (2) Maximale temperatuur van het systeem - (3) Gebruik: H = verwarming, R = koeling, S = zonne-energie, SW = tap-/drinkwater, P = oppompen water **N.B.: voor geactualiseerde technische informatie wordt verwezen naar het etiket op het vat**
ES (1) Modelo – (2) Temperatura máxima de funcionamiento del sistema – (3) Aplicación: H = calefacción, R = refrigeración, S = solar, SW = agua sanitaria/ potable, P= elevación de agua/ bombas - **Nota: para disponer de las características técnicas actualizadas, por favor remítase a la etiqueta colocada en el vaso.**
PT (1) Modelo - (2) Temperatura máxima do sistema - (3) Utilização: H= aquecimento, R= condicionamento/ climatização, S= solar, SW= água tratada/ potável, P= elevação da água/ bombas - **N.B.: para características técnicas atualizadas, verificar na etiqueta aplicada ao tanque**
PL (1) Model - (2) Maksymalna temperatura pracy systemu - (3) Użycie: H=ogrzewanie, R=chłodzenie, S=systemy solarne, SW=CWU, P=przesył wody/pompy **Uwaga: dla obecnych parametrów technicznych, należy zapoznać się z etykietą na zbiorniku.**

FIG. 1



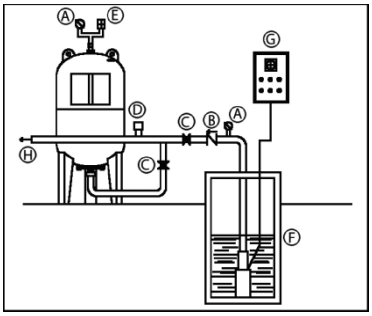
	IT	EN	FR	DE	NL	ES	PT	PL
A	Scarico	Draining	Décharge	Abflussleitung	Drainage	Drenaje	Drenagem	Odpływ
B	Valvola di sicurezza	Safety valve	Soupape de sûreté	Sicherheitsventil	Veiligheidsklep	Válvula de seguridad	Válvula de segurança	Zawór bezpieczeństwa
C	Valvola di sfiato	Air bleed valve	Soupape d'évacuation	Entlüfter	Luchtaflaatklep	Válvula de purga de aire	Válvula de ar	Zawór odpowietrzający
D	Valvola a saracinesca	Gate valve	Robinet-vanne	Absperrventil	Schuifafsluiter	Válvula de compuerta	Válvula de corte	Zasuwa
E	Valvola di non ritorno	Backflow preventer	Soupape de non-retour	Rückfluss-verhinderer	Keerklep	Válvula contra reflujo	Válvula anti-retorno	Zawór zwrotny
F	Manometro	Manometer	Manomètre	Manometer	Manómetro	Manómetro		Manometr
G	Pompa	Pump	Pompe	Pumpe	Pomp	Bomba	Bomba circuladora	Pompa
H	Utilizzatori	Utilities	Usager finale	Heizkörper	Utility's	Dispositivos	Radiador	System ogrzewania
I	Valvola miscelatrice	Mixing valve	Mélangeur	Mischventil	Mengklep	Válvula mezcladora	Válvula misturadora	Zawór mieszający
L	Vaso d'espansione	Expansion vessel	Vase d'expansion	Membran-Druckausdehnungs-gefäß	Expansievat	Vaso de expansión	Vaso de expansão	Naczynie przeponowe
M	Caldaia	Boiler	Chaudière	Heizkessel	Boiler	Caldera	Caldeira	Kocioł

FIG. 2



	IT	EN	FR	DE	NL	ES	PT	PL
A	Scarico	Draining	Décharge	Abblasleitung	Drainage	Drenaje	Drenagem	Odpływ
B	Valvola di sicurezza	Safety valve	Soupape de sûreté	Sicherheitsventil	Veiligheidsklep	Válvula de seguridad	Válvula de segurança	Zawór bezpieczeństwa
C	Valvola di sfiato	Air bleed valve	Soupape d'évacuation	Entlüfter	Luchtaflaatklep	Válvula de purga de aire	Válvula de ar	Zawór odpowietrzający
D	Valvola a saracinesca	Gate valve	Robinet-vanne	Absperrventil	Schuifafsluiter	Válvula de compuerta	Válvula de corte	Zasuwa
E	Valvola di non ritorno	Backflow preventer	Soupape de non-retour	Rückfluss-verhinderer	Keerklep	Válvula contra reflujo	Válvula anti-retorno	Zawór zwrotny
F	Manometro	Manometer	Manomètre	Manometer	Manometer	Manómetro	Manómetro	Manometr
G	Valvola d'interruzione	Shutoff valve	Soupape d'interruption	Absperrarmatur	Afsluitklep	Válvula de corte	Válvula de corte	Zawór odcinający
H	Utilizzatori	Utilities	Usager finale	zum Verbraucher	Utility's	Dispositivos	Saída de água	Instalacja
I	Valvola miscelatrice	Mixing valve	Mélangeur	Mischventil	Mengklep	Válvula mezcladora	Válvula misturadora	Zawór mieszający
L	Vaso d'espansione	Expansion vessel	Vase d'expansion	Membran-Druckausdehnungs-gefäß	Expansievat	Vaso de expansión	Vaso de expansão	Naczynie wzbiorcze
M	Bollitore	Water heater	Bouilleur	Warmwasser-bereiter	Water-verwarmer	Calentador de agua	Caldeira	Podgrzewacz wody

FIG. 3



	IT	EN	FR	DE	NL	ES	PT	PL
A	Manometro	Manometer	Manomètre	Manometer	Manometer	Manómetro	Manómetro	Manometr
B	Valvola di non ritorno	Backflow preventer	Soupape de non-retour	Rückfluss-verhinderer	Keerklep	Válvula contra reflujo	Válvula anti-retorno	Zawór zwrotny
C	Valvola a sfera	Globe valve	Soupape à bille	Absperreinheit	Kogelklep	Válvula de globo	Válvula de esfera	Zawór kulowy
D	Pressostato	Pressure switch	Pressostat	Druckschalter	Drukschakelaar	Presostato	Pressostato	Przełącznik ciśnienia
E	Valvola di sicurezza	Safety valve	Soupape de sûreté	Sicherheitsventil	Veiligheidsklep	Válvula de seguridad	Válvula de segurança	Zawór bezpieczeństwa
F	Vasca con pompa ad immersione	Basin with submerged pump	Cuve avec pompe d'immersion	Becken mit Unterwasserpumpe	Kuip met ondergedompelde pump	Cubeta con bomba sumergida	Electrobomba	Zbiornik z zanurzoną pompą
G	Quadro elettrico comandi	Switch board	Tableau électrique	Schaltkasten	Schakelbord	Tablero de control	Quadro eléctrico	Panel sterowania
H	Impianto	Water system	Réseau hydraulique	Wassersystem	Watersysteem	Sistema de agua	Saída de água	System wodny
I	Autoclave a membrana intercambiabile	Interchangeable membrane pressure tank	Réservoir à membrane interchangeable	MAG mit tauschbarer Membrane	Verwisselbaar membraan druktank	Acumulador hidropneumático con membrana recambiable	Autoclave con membrana substituível	Naczynie przeponowe z wymienną membraną

02 RFO Certificate

ROSETTI MARINO	123A90 - HOLLANDSE KUST NOORD WIND PARK BLPH Project	CROSSWIND

Ready For Operation (RFO) Certificate

COMPLETE	Y	PARTIAL	

Revision:	1		Issued on:	XX/XX/25	
System:	85	/	BESS		
SubSystem:	N/A	/	N/A		

We hereby confirm that all Mechanical Completion (MC) and Pre-Commissioning/Commissioning (Pre-Comm./Comm.) activities for the above-mentioned System/Sub-System have been successfully completed in accordance with project specifications, relevant standards and contractual requirements. The System/Sub-System has been tested and verified to ensure readiness for operation. Issuance of this Certificate shall not release CONTRACTOR from any of his obligations, responsibilities or liabilities under the CONTRACT.

	Mechanical Completion: All required MC activities have been completed and approved
	Pre-Commissioning & Commissioning: All required Pre-Comm. and Comm. activities and OTPs have been completed and approved (Status Index attached)
	Punch List: All Punch items categorized as A and B have been cleared (PL report attached)
	Documentation: As-built documentation and Commissioning dossier has been completed, reviewed and approved

PUNCH LIST	PENDING POINTS
Note: All Category "A" and "B" Items must be cleared prior to issuance of the Ready For Operation (RFO) Certificate	B: 2

REMARKS:

TEXM

	CONTRACTOR Commissioning Manager	**COMPANY** Commissioning Lead
Name	_NAME	_NAME
Date	_DATE	_DATE
Signature	_SIGN	_SIGN

03 Consolidated Punchlist

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM 85 Battery Energy and Storage System

SUBSYSTEM 85-00 BESS Package (A-85000)

Electrical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000814	A	83014-CEL C10000532	The cable termination is not complete . (side BESS LV1 CABINET)	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000821	A	83015-CEL C10000533	The cable termination is not complete	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000828	A	82006-CEC C10002321	Cable termination is not complete with appropriate pin	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000833	A	82006-CEC C10002321	Missing the Thermo-shrink of on the final destination cable. (see document 123A90-DDL-EL-DD-20090 sh.8)	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000838	A	82006-CEC C10002321	Cable termination is not complete with appropriate pin	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000839	A	82006-CEC C10002321	Missing the Thermo-shrink of on the final destination cable. (see document 123A90-DDL-EL-DD-20090 sh.8)	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000844	A	85001-CEC C10002325	Cable termination is not complete with appropriate pin	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000845	A	85001-CEC C10002325	Missing the Thermo-shrink of on the final destination cable. BESS A-85000 (see document 123A90-DDL-EL-DD-20090 sh.8)	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000849	A	85001-CEC C10002325	Missing the Thermo-shrink of on the cores. restore the mechanical protection of the cable (see document 123A90-DDL-EL-DD-20090 sh.8)	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM 85 Battery Energy and Storage System
SUBSYSTEM 85-00 BESS Package (A-85000)

Electrical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000852	A	85001-CEC C10002325	Missing the Thermo-shrink of on the final destination cable. BESS A-85000 (see document 123A90-DDL-EL-DD-20090 sh.8)	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000854	A	85001-CEC C10002325	Cable termination is not complete with appropriate pin. BESS A-85000	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000806	B	83011-CEL C10000522	Core identification tags are wrong . Cabinet side SG-200N1 . (see document 123A90-DDL-IN-DG-40016 sh.3)	.		APolo 2024-11-23	2025-02-15	AAndreani 2025-02-15	2025-02-15
C30000807	B	83011-CEL C10000522	Missing plastic cable tag inside BESS cabinet CP-850E3.	.		APolo 2024-11-23	2025-04-10	JDuinhoven 2025-04-10	2025-04-10
C30000808	B	83011-CEL C10000522	Core identification tags are missing inside BESS cabinet CP-850E3. (see document 123A90-DDL-IN-DG-40016 sh.3)	.		APolo 2024-11-23		JDuinhoven	JDuinhoven
C30000809	B	83011-CEL C10000522	Documentation: document 123A90-DDL-EL-DG-20149 sh.22 does not report what was installed in the field (CP-850E3).	.		APolo 2024-11-23	2024-12-27	Ecarotenuto 2024-12-27	2024-12-27
C30000810	B	83011-CEL C10000522	The cable termination is not complete. (side BESS PCS CABINET)	.		APolo 2024-11-23	2025-02-04	APolo 2025-02-04	2025-02-04
C30000813	B	83014-CEL C10000532	Core identification tags are wrong cabinet side SG-200N1. (see document 123A90-DDL-IN-DG-40016 sh.3)	.		APolo 2024-11-23	2025-02-15	AAndreani 2025-02-15	2025-02-15
C30000815	B	83014-CEL C10000532	Missing cable tag by BESS LV1 CABINET side	.		APolo 2024-11-23		JDuinhoven	JDuinhoven

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM 85 Battery Energy and Storage System
SUBSYSTEM 85-00 BESS Package (A-85000)

Electrical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000816	B	83014-CEL C10000532	Missing core identification tags side BESS LV1 . (see document 123A90-DDL-EL-DD-20092 sh.7-8)	.		APolo 2024-11-23		JDuinhoven	JDuinhoven
C30000817	B	83011-CEL C10000522	The cable is not supported and fixed to the rack (inside and outside BESS panel)	.		APolo 2024-11-23	2025-02-04	APolo 2025-02-04	2025-02-04
C30000819	B	83014-CEL C10000532	Documentation: document 123A90-DDL-EL-DG-20149 sh.22 does not report what was installed in the field (CP-850E1).	.		APolo 2024-11-23		JDuinhoven	JDuinhoven
C30000820	B	83015-CEL C10000533	Core identification tags are wrong cabinet side SG-200N1. (see document 123A90-DDL-IN-DG-40016 sh.3)	.		APolo 2024-11-23	2025-02-15	AAndreani 2025-02-15	2025-02-15
C30000822	B	83015-CEL C10000533	Missing cable tag by BESS LV2 CABINET side	.		APolo 2024-11-23		JDuinhoven	JDuinhoven
C30000823	B	83015-CEL C10000533	Missing core identification tag by cabinet BESS LV2 side . (see document 123A90-DDL-EL-DD-20092 sh.7-8)	.		APolo 2024-11-23		JDuinhoven	JDuinhoven
C30000824	B	83015-CEL C10000533	The cable is not supported and fixed to the rack (inside and outside BESS panel)	.		APolo 2024-11-23	2025-02-04	APolo 2025-02-04	2025-02-04
C30000825	B	82006-CEC C10002321	Core identification tags are wrong cabinet side SG-100D1. (see document 123A90-DDL-IN-DG-40016 sh.3)	.		APolo 2024-11-23	2025-02-19	AAndreani 2025-02-19	2025-02-19
C30000826	B	82006-CEC C10002321	Missing cable tag by cabinet BESS UCP	.		APolo 2024-11-23		JDuinhoven	JDuinhoven

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM 85 Battery Energy and Storage System
SUBSYSTEM 85-00 BESS Package (A-85000)

Electrical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000827	B	82006-CEC C10002321	Missing core identification tags Cabinet side BESS UCP . (see document 123A90-DDL-EL-DD-20092 sh.7-8)	.		APolo 2024-11-23		JDuinhoven	JDuinhoven
C30000836	B	82007-CEC C10002322	Missing cable tag by cabinet BESS UCP	.		APolo 2024-11-23		JDuinhoven	JDuinhoven
C30000837	B	82006-CEC C10002321	Missing core identification tags by Cabinet side BESS UCP . (see document 123A90-DDL-EL-DD-20092 sh.7-8)	.		APolo 2024-11-23		JDuinhoven	JDuinhoven
C30000841	B	85001-CEC C10002325	Missing cable tags inside cabinet BESS A-85000	.		APolo 2024-11-23		JDuinhoven	JDuinhoven
C30000842	B	85001-CEC C10002325	Missing the cross-ferruling (Cores) . Cabinet BESS A-85000. (see document 123A90-DDL-EL-DD-20092 sh.7-8)	.		APolo 2024-11-23		JDuinhoven	JDuinhoven
C30000846	B	85001-CEC C10002325	Spare cores to be properly isolated (bess A-85000)	.		APolo 2024-11-23	2025-02-04	APolo 2025-02-04	2025-02-04
C30000847	B	85001-CEC C10002325	Spare cores to be properly isolated by SG-100D1 side	.		APolo 2024-11-23	2025-02-04	APolo 2025-02-04	2025-02-04
C30000848	B	85001-CEC C10002325	Core identificatio tags are wrong side SG-100D1 . (see document 123A90-DDL-EL-DD-20092 sh.7-8)	.		APolo 2024-11-23	2025-02-19	AAndreani 2025-02-19	2025-02-19
C30000850	B	85002-CEC C10002326	Missing cable tags both cabinet side B400-EMCS-001 / BESS A-85000.	.		APolo 2024-11-23	2025-03-04	JKrizanic 2025-03-04	2025-03-04

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM 85 Battery Energy and Storage System
SUBSYSTEM 85-00 BESS Package (A-85000)

Electrical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000851	B	85002-CEC C10002326	Missing core identification tags both Cabinet side B400-EMCS-001 / BESS A-85000 . (see document 123A90-DDL-EL-DD-20092 sh.7-8)	.		APolo 2024-11-23			
C30001005	B	A-85000	Cables in electrical cabinets/panels are missing proper lables and identification for single wires. Many cable connections are missing			CPY 2024-11-28		JDuinhoven	JDuinhoven
C30001006	B	A-85000	Cables in electrical cabinets/panels are missing proper lables and identification for single wires. Many cable connections are missing			CPY 2024-11-28		JDuinhoven	JDuinhoven
C30001007	B	A-85000	Missing operating manual (PCS Container - Control Cabinet 1)			CPY 2024-11-28		JDuinhoven	JDuinhoven
C30001009	B	A-85000	Missing lables, clear marking on cables and ferrules/crimps (BESS 1 - Battery Cabinets)			CPY 2024-11-28		JDuinhoven	JDuinhoven
C30001010	B	A-85000	Missing lables, clear marking on cables and ferrules/crimps (BESS 2 - Battery Cabinets)			CPY 2024-11-28		JDuinhoven	JDuinhoven
C30001012	B	A-85000	Cables in electrical cabinets/panels are missing proper lables and identification for single wires. Many cable connections are missing			CPY 2024-11-28		JDuinhoven	JDuinhoven
C30001013	B	A-85000	As built drawing needed for electrical schematics, GA and mechanical drawings of external and internals of contianers (BESS System)			CPY 2024-11-28		JDuinhoven	JDuinhoven

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM 85 Battery Energy and Storage System
SUBSYSTEM 85-00 BESS Package (A-85000)

Instrumental

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000857	A	C-85-XS-001/B400-SIS-001 C10001447	Cable termination to be redone with appropriate pin both side (B400-SIS-001 / A-85000)	.		APolo 2024-11-23	2024-11-26	APolo 2024-11-26	2024-11-26
C30000860	A	P320PLC/B400-SIS-001 C10001453	Cable termination to be redone with appropriate pin both side B400-SIS-001 / BESS A-85000 UCP	.		APolo 2024-11-25	2024-11-26	APolo 2024-11-26	2024-11-26
C30000866	A	P320PLC/B400-FGS-003 C10001464	Cable termination is not complete with appropriate pin. cabinet side B400-FGS-003 / BESS A-85000 UCP	.		APolo 2024-11-25	2024-11-26	APolo 2024-11-26	2024-11-26
C30000855	B	C-85-XS-001/B400-SIS-001 C10001447	Missing cable tags both cabinet B400-SIS-001 / A-85000	.		APolo 2024-11-23	2025-02-27	JKrizanic 2025-02-27	2025-02-27
C30000856	B	C-85-XS-001/B400-SIS-001 C10001447	Missing core identification tags both side B400-SIS-001 / A-85000 . (see document 123A90-DDL-IN-DG-40016 sh.3)	.		APolo 2024-11-23			
C30000858	B	P320PLC/B400-SIS-001 C10001453	Missing cable tags by both panel sides B400-SIS-001 / BESS A-85000 UCP.	.		APolo 2024-11-25	2025-02-20	JKrizanic 2025-02-20	2025-02-20
C30000859	B	P320PLC/B400-SIS-001 C10001453	Missing core identification tags by both side B400-SIS-001 / BESS A-85000 UCP . (see document 123A90-DDL-IN-DG-40016 sh.3)	.		APolo 2024-11-25			
C30000861	B	P320PLC/B400-FGS-003 C10001464	Missing cable tags both panels side B400-FGS-003 / BESS A-85000 UCP.	.		APolo 2024-11-25	2025-02-20	JKrizanic 2025-02-20	2025-02-20
C30000863	B	P320PLC/B400-FGS-003 C10001464	Missing core identification tags both Cabinet side B400-FGS-003 / BESS A-85000 UCP . (see document 123A90-DDL-IN-DG-40016 sh.3)	.		APolo 2024-11-25	2025-03-04	JKrizanic 2025-03-04	2025-03-04

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM 85 Battery Energy and Storage System
SUBSYSTEM 85-00 BESS Package (A-85000)

Mechanical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000871	B	A-85000 C10002359	missing the name plates of containers as per 123A90-DDL-EL-DD-20101 sh.1	.		APolo 2024-11-25			
C30000872	B	A-85000 C10002359	Earthing System is not as indicated by the Electrical Typical Installation Details document . see 123A90-DDL-EL-DD-20090 sh.3	.		APolo 2024-11-25	2025-01-23	APolo 2025-01-23	2025-01-23
C30000873	B	A-85000 C10002359	The earthing and connection conductors (green/yellow) have a section of 95mm2 different from that indicated in document	.		APolo 2024-11-25	2024-12-27	Ecarotenuto 2024-12-27	2024-12-27
C30000874	B	A-85000 C10002359	In the container "BESS 01", the door opening/closing handle is missing	.		APolo 2024-11-25			
C30001008	B	A-85000	Check on coolant liquid level and overpressure collection bottle after transportation and after first re-commisisoning (PCS Container - Converter			CPY 2024-11-28		JDuinhoven	JDuinhoven
C30001011	B	A-85000	Missing castell lock to be installed on door (PCS Container - Transformer Area)			CPY 2024-11-28		JDuinhoven	JDuinhoven
C30001014	B	A-85000	Install three cranes in Battery rooms (BESS 1)			CPY 2024-11-28	2024-12-19	GMccann 2024-12-19	JMackillop 2024-12-19
C30001015	B	A-85000	Install three cranes in Battery rooms (BESS 2)			CPY 2024-11-28	2024-12-19	GMccann 2024-12-19	JMackillop 2024-12-19
C30001016	B	A-85000	Battery mounting brackets on floor need to be installed (BESS 1 - Battery Cabinets)			CPY 2024-11-28	2024-12-19	GMccann 2024-12-19	JMackillop 2024-12-19

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM	85	Battery Energy and Storage System
SUBSYSTEM	85-00	BESS Package (A-85000)

Mechanical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30001017	B	A-85000	Battery mounting brackets on floor need to be installed (BESS 2 - Battery Cabinets)			CPY 2024-11-28	2024-12-19	GMccann 2024-12-19	JMackillop 2024-12-19
C30004331	B	A-85000	During execution of Cause & Effect OTP doc. n. 123A90-PML-COM-PRO-03054, it had been noted that on equipment packages provided with			GDelmissier 2025-04-15			

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM	85	Battery Energy and Storage System
SUBSYSTEM	85-00	BESS Package (A-85000)

Telecom

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000936	B	P320PLC/B400-NET-001.01 C10004357	The copper conductor of the cable armor must be individually connected to the earthing bar. B400-NET-001. See 123A90-DDL-EL-DD-20090.	.		APolo 2024-11-26	2025-01-22	APolo 2025-01-22	2025-01-22
C30000937	B	P320PLC/B400-NET-001.01 C10004357	Missing cable tag , cabinet input BESS A-850000.	.		APolo 2024-11-26		JDuinhoven	JDuinhoven
C30000940	B	P320PLC/B400-NET-001.02 C10004358	The copper conductor of the cable armor must be individually connected to the earthing bar B400-NET-001. See 123A90-DDL-EL-DD-20090.	.		APolo 2024-11-26	2025-02-04	APolo 2025-02-04	2025-02-04
C30000941	B	P320PLC/B400-NET-001.02 C10004358	Missing cable tag , cabinet input BESS A-850000	.		APolo 2024-11-26		JDuinhoven	JDuinhoven

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04 ITR’s E&I

CROSSWIND	**123A90 - HOLLANDSE KUST NOORD WIND PARK BLPH Project** **COMMISSIONING DOSSIER INDEX**	ROSETTI MARINO

05 ITR's P&M

06 As-Built E&I

STATRON
NON STOP POWER

Battery Energy Storage System (BESS)
BASE LOAD POWER HUB

Statron ref. 331497

Project Code: K559-2254
Purchase Order Number: CW-I-WP4-2022-01

SDRL Code: C10
Sequence Number: 001
Rev: 002
Document number: K559-2254-CWIWP4202201-C10-001
Document description: Electrical Schematics

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Electrical Schematics
C10

for Base Load Power Hub (BLPH) Project

Classification: confidential

Document no.	C10
Document name	Electrical Schematics
Component / System	BESS
Project code	K559-2254

Version	Date	Name	Description
1.0	2023-03-13	C. Palenzuela	First version
2.0	2024-12-18	M. Müller	First revised version

Table 1: Version overview

	Date	Name
Editor	2023-03-13	C. Palenzuela
Checked by	2023-03-14	A. Fritz
Approved by	2023-03-14	C. Palenzuela

Table 2: Approval overview

Imprint

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You can also visit us on our website **http://www.freqcon.com** to find more information about our products and solutions.

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Identification

Product Version / Document Version

Product version
Prototype

Document release date
December 2024

Doc Code
K559-2254-CWIWP4202201-C10-001

Name and Address of Manufacturer

Manufacturer of the product
FREQCON GmbH
Bürgerwiesenweg 5
D-27336 Rethem, Germany

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Original document

This document is an original document of FREQCON GmbH.

1 Introduction

1.1 About this Document

This document is part of the documentation for the Base Load Power Hub (BLPH) Project (K559-2254). In case of any contradiction resulting by the information or specification given in this document, phase 2 or later documents supersede the information provided in this document.

1.2 Display Elements

Symbol	Meaning
➜	Action with one or several steps for which the sequence is irrelevant.
Step 1 : **Step 2 :**	Action with several steps for which the sequence is relevant.
•	First level of list.
-	Second level of list.

Table 1: Display Elements

1.3 Other Applicable Documents

The following documents are applicable:

Document type	Document Name
BESS and PCS circuit diagram	10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20241105_V1.2

Table 2: Other applicable documents

1.4 Generic Terms and Abbreviations Used

This following list should help you understand some of the abbreviations used in this document.

Generic Term and Abbreviation	Description
BESS	Battery Energy Storage System
BLPH	Base Load Power Hub
PCS	Power Conversion System

Table 3: Generic terms and abbreviations used

2 General

The electrical schematics are attached to this document (*see section 1.3 "Other Applicable Documents"*).

3 Appendix

1. 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20241105_V1.2

Freqcon GmbH

Bürgerwiesenweg 5
D-27336 Rethem
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info@freqcon.com

Customer:	Statron	
Project:	Shell Crosswind BESS FQ 1MW 5MWh Offshore	
Type:	BESS MSC-1000-620-8	
Product	CONVERTER CONTAINER	
Circuit diagram No:	10354_23A2007	20241105_V1.2

Producer (company):	Freqcon GmbH	53396
Project:	Shell Crosswind BESS FQ 1MW 5MWh Offshore	CT_Ausbau_1 53457 CT_Ausbau_2 53765
Type:	BESS MSC-1000-620-8	CONV 53399
Project manager:	Freqcon_CP	

created on:	17.09.2019			
edited on:	05.11.2024	edited by:	Freqcon_DG	total pages: 498

previous page:

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	3	INDEX	05.11.2024	Freqcon_DG
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	5	INDEX	05.11.2024	Freqcon_DG
	6	INDEX	05.11.2024	Freqcon_DG
	7	INDEX	05.11.2024	Freqcon_DG
	8	INDEX	05.11.2024	Freqcon_DG
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	18a	TEMPERATURE TRANSFORMER UNIT_01+02	05.11.2024	Freqcon_DG
&EFS ++CONV		Circuit diagram Converter		
	78	GRID CONNECTION	18.06.2024	Freqcon_JD
	80	BG CIRCUIT BREAKER 1000A AC GRID	18.06.2024	Freqcon_JD
	82	PI INDUCTORS GRID SIDE	18.06.2024	Freqcon_JD
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	201	IGBT & INDUCTOR FOR GRID PHASE 1	18.06.2024	Freqcon_JD
	202	IGBT & INDUCTOR FOR GRID PHASE 2	18.06.2024	Freqcon_JD
	203	IGBT & INDUCTOR FOR GRID PHASE 3	18.06.2024	Freqcon_JD
	207	IGBT & INDUCTOR SUB 3_1 - 3_3	18.06.2024	Freqcon_JD
	211	IGBT & INDUCTOR SUB 2_1 -2_3	18.06.2024	Freqcon_JD
	217	IGBT & INDUCTOR SUB 4_1 -4_3	18.06.2024	Freqcon_JD
	227	SUBSYSTEM 3_1 - 3_1 DC 3 x 250A	18.06.2024	Freqcon_JD
	227.a	SUBSYSTEM 3_1 - 3_1 DC 3 x 250A	18.06.2024	Freqcon_JD
	228	DC SURGE ARRESTER 3_1 - 3_3	18.06.2024	Freqcon_JD
	231	SUBSYSTEM 2_1 - 2_3 DC 3 x 250A	18.06.2024	Freqcon_JD
	231.a	SUBSYSTEM 2_1 - 2_3 DC 3 x 250A	18.06.2024	Freqcon_JD
	237	SUBSYSTEM 4_1 - 4_3 DC 3 x 250A	18.06.2024	Freqcon_JD
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	281	CIRCUIT BREAKER CABINET CLIMATE	18.06.2024	Freqcon_JD
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	100	CONTROL CABINET COVER PAGE	18.06.2024	Freqcon_JD
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	114	HELMHOLZ	02.07.2024	Freqcon_JD
	115	UMTS ROUTER	18.06.2024	Freqcon_JD
	120	ET200 24V DC	20.06.2024	Freqcon_JD
	121	ET200SP DIGITAL INPUTS DI_01 - DI_03	14.06.2024	Freqcon_JD
	122	ET200SP DIGITAL INPUTS DI_04 + DI_05	14.06.2024	Freqcon_JD
	123	ET200SP DIGITAL OUTPUTS DO_01 - DO_03	14.06.2024	Freqcon_JD
	123.a	ET200SP DIGITAL OUTPUTS DO_01 - DO_03	18.06.2024	Freqcon_JD
	124	ET200SP ANALOG INPUTS AI_01 - AI_03	14.06.2024	Freqcon_JD
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	130	DIGITAL INPUTS SUBSYSTEM 2_3 / 3_1	18.06.2024	Freqcon_JD
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	132	DIGITAL INPUTS SUBSYSTEM 4_2 / 4_3	29.07.2024	Freqcon_DG
	133	DIGITAL INPUTS SPARE	05.11.2024	Freqcon_DG
	134	DIGITAL INPUTS SMOKE DETECTORS	18.06.2024	Freqcon_JD
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	350	OUTPUTS DC CONTACTORS SUBSYSTEM 3_1	18.06.2024	Freqcon_JD
	351	OUTPUTS DC CONTACTORS SUBSYSTEM 3_2 - 3_3	29.07.2024	Freqcon_DG
	352	OUTPUTS DC CONTACTORS SUBSYSTEM 4_1	29.07.2024	Freqcon_DG
	353	OUTPUTS DC CONTACTORS SUBSYSTEM 4_2 - 4_3	29.07.2024	Freqcon_DG
	440	PIII PROFINET IGBT IRT INTERFACE 1	18.06.2024	Freqcon_JD
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&EPC ++CONV		Parts List Converter		
	1	PARTS LIST	05.11.2024	Freqcon_DG
&EPC ++CONV +CON		Parts List Converter Converter cabinet		
	1	PARTS LIST	05.11.2024	Freqcon_DG
	2	PARTS LIST	05.11.2024	Freqcon_DG
	3	PARTS LIST	05.11.2024	Freqcon_DG
	4	PARTS LIST	05.11.2024	Freqcon_DG
&EPC ++CONV +IND		Parts List Converter Inductor cabinet		
	1	PARTS LIST	05.11.2024	Freqcon_DG
&EPC ++CONV +CIR		Parts List Converter Circuit Breaker cabinet		
	1	PARTS LIST	05.11.2024	Freqcon_DG
	2	PARTS LIST	05.11.2024	Freqcon_DG
	3	PARTS LIST	05.11.2024	Freqcon_DG
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&EPC ++CONV +AC_DC		Parts List Converter AC and DC connection cabinet		
	1	PARTS LIST	05.11.2024	Freqcon_DG
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&EPC ++CT		Parts List Control cabinets		
	1	PARTS LIST	05.11.2024	Freqcon_DG
&EPC ++CT +CTRL_1.1		Parts List Control cabinets Control cabinet 1 Cabinet door		
	1	PARTS LIST	05.11.2024	Freqcon_DG
&EPC ++CT +CTRL_1.2		Parts List Control cabinets Control cabinet 1 Left side		
	1	PARTS LIST	05.11.2024	Freqcon_DG
&EPC ++CT +CTRL_1.3		Parts List Control cabinets Control cabinet 1 Main mounting plate		
	1	PARTS LIST	05.11.2024	Freqcon_DG
	2	PARTS LIST	05.11.2024	Freqcon_DG
	3	PARTS LIST	05.11.2024	Freqcon_DG
	4	PARTS LIST	05.11.2024	Freqcon_DG
	5	PARTS LIST	05.11.2024	Freqcon_DG
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	7	PARTS LIST	05.11.2024	Freqcon_DG

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	9	PARTS LIST	05.11.2024	Freqcon_DG
	10	PARTS LIST	05.11.2024	Freqcon_DG
	11	PARTS LIST	05.11.2024	Freqcon_DG
	12	PARTS LIST	05.11.2024	Freqcon_DG
	13	PARTS LIST	05.11.2024	Freqcon_DG
&EPC ++CT +CTRL_1.4		Parts List Control cabinets Control cabinet 1 Right side		
	1	PARTS LIST	05.11.2024	Freqcon_DG
	2	PARTS LIST	05.11.2024	Freqcon_DG
	3	PARTS LIST	05.11.2024	Freqcon_DG
	4	PARTS LIST	05.11.2024	Freqcon_DG
	5	PARTS LIST	05.11.2024	Freqcon_DG
&EPC ++CT +CTRL_1.5		Parts List Control cabinets Control cabinet 1 above		
	1	PARTS LIST	05.11.2024	Freqcon_DG
&EPC ++CT +CTRL_1		Parts List Control cabinets Control cabinet 1		
	1	PARTS LIST	05.11.2024	Freqcon_DG
&EPC ++CT +CTRL_2.1		Parts List Control cabinets Control cabinet 2 Cabinet door		
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&EPC ++FAN		Parts List FAN		
	1	PARTS LIST	05.11.2024	Freqcon_DG
&EPA ++TRA		Summarized part list medium voltage transformer		
	1	SUMMARIZED PARTS LIST	05.11.2024	Freqcon_DG
&EPA ++CONV		Summarized part list Converter		
	1	SUMMARIZED PARTS LIST	05.11.2024	Freqcon_DG
	2	SUMMARIZED PARTS LIST	05.11.2024	Freqcon_DG
&EPA ++CT		Summarized part list Control cabinets		
	1	SUMMARIZED PARTS LIST	05.11.2024	Freqcon_DG
	2	SUMMARIZED PARTS LIST	05.11.2024	Freqcon_DG
&EMB ++TRA		Cable list medium voltage transformer		
	1	CABEL LIST	05.11.2024	Freqcon_DG
&EMB ++CONV		Cable list Converter		
	1	CABEL LIST	05.11.2024	Freqcon_DG
	2	CABEL LIST	05.11.2024	Freqcon_DG
	3	CABEL LIST	05.11.2024	Freqcon_DG
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	9	CABEL LIST	05.11.2024	Freqcon_DG
	10	CABEL LIST	05.11.2024	Freqcon_DG
	11	CABEL LIST	05.11.2024	Freqcon_DG
	12	CABEL LIST	05.11.2024	Freqcon_DG
	13	CABEL LIST	05.11.2024	Freqcon_DG
	14	CABEL LIST	05.11.2024	Freqcon_DG
	15	CABEL LIST	05.11.2024	Freqcon_DG
&EMB ++CONV +CIR		Cable list Converter Circuit Breaker cabinet		
	1	CABEL LIST	05.11.2024	Freqcon_DG
	2	CABEL LIST	05.11.2024	Freqcon_DG
	3	CABEL LIST	05.11.2024	Freqcon_DG
&EMB ++CT		Cable list Control cabinets		
	1	CABEL LIST	05.11.2024	Freqcon_DG
	2	CABEL LIST	05.11.2024	Freqcon_DG
	3	CABEL LIST	05.11.2024	Freqcon_DG
	4	CABEL LIST	05.11.2024	Freqcon_DG
	5	CABEL LIST	05.11.2024	Freqcon_DG
	6	CABEL LIST	05.11.2024	Freqcon_DG
	7	CABEL LIST	05.11.2024	Freqcon_DG
	8	CABEL LIST	05.11.2024	Freqcon_DG
	9	CABEL LIST	05.11.2024	Freqcon_DG

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	11	CABEL LIST	05.11.2024	Freqcon_DG
&EMB ++FAN		Cable list FAN		
	1	CABEL LIST	05.11.2024	Freqcon_DG
&EMB ++EXTERN		Cable list		
	1	CABEL LIST	05.11.2024	Freqcon_DG
&EMZ ++CONV +IND		Terminals Converter Inductor cabinet		
	1000	Klemmenleistenübersicht : =UNIT_01++CONV+IND-207L1.1 - =UNIT_01++CONV+IND-217L1.3	05.11.2024	Freqcon_DG
	2000	Klemmenplan =UNIT_01++CONV+IND-207L1.1	05.11.2024	Freqcon_DG
	2001	Klemmenplan =UNIT_01++CONV+IND-207L1.2	05.11.2024	Freqcon_DG
	2002	Klemmenplan =UNIT_01++CONV+IND-207L1.3	05.11.2024	Freqcon_DG
	2003	Klemmenplan =UNIT_01++CONV+IND-211L1.1	05.11.2024	Freqcon_DG
	2004	Klemmenplan =UNIT_01++CONV+IND-211L1.2	05.11.2024	Freqcon_DG
	2005	Klemmenplan =UNIT_01++CONV+IND-211L1.3	05.11.2024	Freqcon_DG
	2006	Klemmenplan =UNIT_01++CONV+IND-217L1.1	05.11.2024	Freqcon_DG
	2007	Klemmenplan =UNIT_01++CONV+IND-217L1.2	05.11.2024	Freqcon_DG
	2008	Klemmenplan =UNIT_01++CONV+IND-217L1.3	05.11.2024	Freqcon_DG
&EMZ ++CONV +CIR		Terminals Converter Circuit Breaker cabinet		
	1000	Klemmenleistenübersicht : =UNIT_01++CONV+CIR-227U1-X3.1 - =UNIT_01++CONV+CIR-237U1-X3.2	05.11.2024	Freqcon_DG
	2000	Klemmenplan =UNIT_01++CONV+CIR-227U1-X3.1	05.11.2024	Freqcon_DG
	2001	Klemmenplan =UNIT_01++CONV+CIR-227U1-X3.2	05.11.2024	Freqcon_DG
	2002	Klemmenplan =UNIT_01++CONV+CIR-227U1-X3.2	05.11.2024	Freqcon_DG

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	2004	Klemmenplan =UNIT_01++CONV+CIR-231U1-X3.2	05.11.2024	Freqcon_DG
	2005	Klemmenplan =UNIT_01++CONV+CIR-231U1-X3.2	05.11.2024	Freqcon_DG
	2006	Klemmenplan =UNIT_01++CONV+CIR-237U1-X3.1	05.11.2024	Freqcon_DG
	2007	Klemmenplan =UNIT_01++CONV+CIR-237U1-X3.2	05.11.2024	Freqcon_DG
	2008	Klemmenplan =UNIT_01++CONV+CIR-237U1-X3.2	05.11.2024	Freqcon_DG
&EMZ ++CONV +AC_DC		Terminals Converter AC and DC connection cabinet		
	1000	Klemmenleistenübersicht : =UNIT_01++CONV+AC_DC-X3.43 - =UNIT_01++CONV+AC_DC-X3.43	05.11.2024	Freqcon_DG
	2000	Klemmenplan =UNIT_01++CONV+AC_DC-X3.43	05.11.2024	Freqcon_DG
	2001	Klemmenplan =UNIT_01++CONV+AC_DC-X3.43	05.11.2024	Freqcon_DG
	2002	Klemmenplan =UNIT_01++CONV+AC_DC-X3.43	05.11.2024	Freqcon_DG
	2003	Klemmenplan =UNIT_01++CONV+AC_DC-X3.43	05.11.2024	Freqcon_DG
&EMZ ++CT		Terminals Control cabinets		
	1000	Klemmenleistenübersicht : =UNIT_01++CT+-XT1 - =UNIT_01++CT+-XT1	05.11.2024	Freqcon_DG
	2000	Klemmenplan =UNIT_01++CT+-XT1	05.11.2024	Freqcon_DG
	2001	Klemmenplan =UNIT_01++CT+-XT1	05.11.2024	Freqcon_DG
&EMZ ++CT +CTRL_1.3		Terminals Control cabinets Control cabinet 1 Main mounting plate		
	1000	Klemmenleistenübersicht : =UNIT_01++CT+CTRL_1.3-X1 - =UNIT_01++CT+CTRL_1.3-XV	05.11.2024	Freqcon_DG
	2000	Klemmenplan =UNIT_01++CT+CTRL_1.3-X1	05.11.2024	Freqcon_DG
	2001	Klemmenplan =UNIT_01++CT+CTRL_1.3-X3	05.11.2024	Freqcon_DG
	2002	Klemmenplan =UNIT_01++CT+CTRL_1.3-X3	05.11.2024	Freqcon_DG
	2003	Klemmenplan =UNIT_01++CT+CTRL_1.3-X3	05.11.2024	Freqcon_DG
	2004	Klemmenplan =UNIT_01++CT+CTRL_1.3-X3.10	05.11.2024	Freqcon_DG

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	2006	Klemmenplan =UNIT_01++CT+CTRL_1.3-X3.12	05.11.2024	Freqcon_DG
	2007	Klemmenplan =UNIT_01++CT+CTRL_1.3-X3.13	05.11.2024	Freqcon_DG
	2008	Klemmenplan =UNIT_01++CT+CTRL_1.3-X5	05.11.2024	Freqcon_DG
	2009	Klemmenplan =UNIT_01++CT+CTRL_1.3-X5	05.11.2024	Freqcon_DG
	2010	Klemmenplan =UNIT_01++CT+CTRL_1.3-X5.1	05.11.2024	Freqcon_DG
	2011	Klemmenplan =UNIT_01++CT+CTRL_1.3-150X1	05.11.2024	Freqcon_DG
	2012	Klemmenplan =UNIT_01++CT+CTRL_1.3-XDC1	05.11.2024	Freqcon_DG
	2013	Klemmenplan =UNIT_01++CT+CTRL_1.3-XDC1	05.11.2024	Freqcon_DG
	2014	Klemmenplan =UNIT_01++CT+CTRL_1.3-XDC2	05.11.2024	Freqcon_DG
	2015	Klemmenplan =UNIT_01++CT+CTRL_1.3-XDC2	05.11.2024	Freqcon_DG
	2016	Klemmenplan =UNIT_01++CT+CTRL_1.3-XDC2	05.11.2024	Freqcon_DG
	2017	Klemmenplan =UNIT_01++CT+CTRL_1.3-XDC3	05.11.2024	Freqcon_DG
	2018	Klemmenplan =UNIT_01++CT+CTRL_1.3-XDC4	05.11.2024	Freqcon_DG
	2019	Klemmenplan =UNIT_01++CT+CTRL_1.3-XDC5.1	05.11.2024	Freqcon_DG
	2020	Klemmenplan =UNIT_01++CT+CTRL_1.3-XDC5.2	05.11.2024	Freqcon_DG
	2021	Klemmenplan =UNIT_01++CT+CTRL_1.3-XE	05.11.2024	Freqcon_DG
	2022	Klemmenplan =UNIT_01++CT+CTRL_1.3-XT	05.11.2024	Freqcon_DG
	2023	Klemmenplan =UNIT_01++CT+CTRL_1.3-XT	05.11.2024	Freqcon_DG
	2024	Klemmenplan =UNIT_01++CT+CTRL_1.3-190XT1	05.11.2024	Freqcon_DG
	2025	Klemmenplan =UNIT_01++CT+CTRL_1.3-191XT1	05.11.2024	Freqcon_DG
	2026	Klemmenplan =UNIT_01++CT+CTRL_1.3-XV	05.11.2024	Freqcon_DG
	2027	Klemmenplan =UNIT_01++CT+CTRL_1.3-XV	05.11.2024	Freqcon_DG
&EMZ ++CT +CTRL_1.4		Terminals Control cabinets Control cabinet 1 Right side		
	1000	Klemmenleistenübersicht : =UNIT_01++CT+CTRL_1.4-350X1.21 - =UNIT_01++CT+CTRL_1.4-XV.20	05.11.2024	Freqcon_DG
	2000	Klemmenplan =UNIT_01++CT+CTRL_1.4-350X1.21	05.11.2024	Freqcon_DG

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Table of contents

FREQCON_INHALT_04_de_en

Assignment	Page	Page description	Date	Edited by
&EMZ ++CT +CTRL_1.4		Terminals Control cabinets Control cabinet 1 Right side		
	2001	Klemmenplan =UNIT_01++CT+CTRL_1.4-350X1.21	05.11.2024	Freqcon_DG
	2002	Klemmenplan =UNIT_01++CT+CTRL_1.4-XE2	05.11.2024	Freqcon_DG
	2003	Klemmenplan =UNIT_01++CT+CTRL_1.4-XV.20	05.11.2024	Freqcon_DG
	2004	Klemmenplan =UNIT_01++CT+CTRL_1.4-XV.20	05.11.2024	Freqcon_DG
&EMZ ++CT +CTRL_2.1		Terminals Control cabinets Control cabinet 2 Cabinet door		
	1000	Klemmenleistenübersicht : =UNIT_01++CT+CTRL_2.1-149X1 - =UNIT_01++CT+CTRL_2.1-149X1	05.11.2024	Freqcon_DG
	2000	Klemmenplan =UNIT_01++CT+CTRL_2.1-149X1	05.11.2024	Freqcon_DG
&EMZ ++FAN		Terminals FAN		
	1000	Klemmenleistenübersicht : =UNIT_01++FAN+-52G1-181X1 - =UNIT_01++FAN+-52G1-181X3	05.11.2024	Freqcon_DG
	2000	Klemmenplan =UNIT_01++FAN+-52G1-181X1	05.11.2024	Freqcon_DG
	2001	Klemmenplan =UNIT_01++FAN+-52G1-181X3	05.11.2024	Freqcon_DG

SPECIFICATION

TERMINAL STRIP

-XE1	MAIN POWER SUPPLY 600V AC
-XE2	DC POWER SUPPLY 1000V DC
-XE	MAIN POWER SUPPLY 400V AC
-X1	MAIN POWER 400V/230V AC
-X2	LIGHT CABINET 230V AC
-X3	CONTROL VOLTAGE 24V DC
-14X1	CONTROL VOLTAGE 24V DC (TO DC CONTACTORS)
-X5	LOW-VOLTAGE SIGNALS
-XDC0	24V DC POWER SUPPLY
-XDC1-4	CONTROL VOLTAGE 24V DC (UPS)
-XT	TRANSFER TERMINAL BLOCK 24V DC / 230V AC

WIRING COLOR

L1 / L2 / L3	=	BLACK
N	=	LIGHT BLUE (IEC) / GREY (UL)
PE	=	YELLOW-GREEN
EXTERNAL VOLTAGE	=	ORANGE
CONTROL VOLTAGE 24 V DC	=	DARK BLUE
ANALOG SIGNALS	=	WHITE

PLACE

+CTRL	=	Control cabinet
+CON	=	Converter cabinet
+IND	=	Inductor cabinet
+CIR	=	Circuit breaker cabinet
+COSY	=	Cooling System
+FAN	=	External fan

previous page: &EAB/14

next page: 6a

SPECIFICATION of grounding

	from frame to			
1	**roof & side walls & doors**	**EVD_1**	**Flachband**	**2x25 mm²**
2	**frame**	**EVD_2**	**Flachband**	**2x25 mm²**
3	**base**	**EVD_3**	**Flachband**	**2x25 mm²**
4	**Mounting plate & partitions**	**EVD_4**	**H07-V-K**	**2x25 mm²**
5	**inductors**	**EVD_5**	**H07-V-k**	**2x25 mm²**
6	**Powerstack**	**EVD_6**	**H07-V-K**	**2x25 mm²**
7	**DC Switch & Fuse**	**EVD_7**	**H07-V-K**	**2x25 mm²**
8	**AC Filter**	**EVD_8**	**H07-V-K**	**2x25 mm²**
9	**circuit-breaker**	**EVD_9**	**H07-V-K**	**2x25 mm²**
10	**Freqcon_Fast_Disconektor**	**EVD_10**	**H07-V-K**	**2x25 mm²**
11	**Freqcon_Rectifier_Modul**	**EVD_11**	**H07-V-K**	**2x25 mm²**
12	**capacitor banks**	**EVD_12**	**H07-V-K**	**2x25 mm²**
13	**water distributor**	**EVD_13**	**H07-V-K**	**2x25 mm²**
14	**SPARE**	**EVD_14**	**H07-V-K**	**2x25 mm²**
15	**SPARE**	**EVD_15**	**H07-V-K**	**2x25 mm²**
16	**SPARE**	**EVD_16**	**H07-V-K**	**2x25 mm²**
17	**SPARE**	**EVD_17**	**H07-V-K**	**2x25 mm²**
18	**SPARE**	**EVD_18**	**H07-V-K**	**2x25 mm²**
	from door to			
19	**PROFINET IRT IGBT Interface**	**EVD_19**	**H07-V-K**	**1,5 mm²**
20	**HMI**	**EVD_20**	**H07-V-K**	**1,5 mm²**
21	**SPARE**	**EVD_21**	**H07-V-K**	**??? mm²**
22	**SPARE**	**EVD_22**	**H07-V-K**	**??? mm²**

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next page: &EFA/1a

Editor	Freqcon_JD			Statron	FREQCON	Specification Earthing	20241105_V1.2	= UNIT_01	Converter Container 1
Date	14.06.2024	Norm						& EAC	Explanatory documents
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++	page: 6a
Date								+	total: 498

Single line diagram

=UNIT_01++TRA

=UNIT_01++CONV

+AC_DC

+CIR

+IND

+CON

+IND

+CIR

+AC_DC

medium voltage transformer
-18T1
&EFS++TRA/18.2
1,25MVA
6,6kV/0,62 kV AC

Gehäuse Erdung

V1_L1 V1_L2 V1_L3

-78W1 - 78W3
GRID L1 -L3
&EFS++CONV/78.1

NSGAFöu 3x4x50mm²

3WL1112-2BB36-1BJ2-Z
A08+H07+M06+M21+R10

-80Q1
max.
1250 A
&EFS++CONV/80.0

-83U1
Filter Caps 3*600µF
Overvoltage protect
&EFS++CONV/83.2

PT100
201L1 - 203L1
Inductor
1*1000A
0,2mH
&EFS++CONV/201.1

PIII 1_1
-
PIII_1_3
201Q1 - 203Q1
1000A Stack x 3
AC
DC

V1_DC+ V1_DC-
UDC +
UDC N
UDC -

PIII 2_1
-
PIII_2_3
-211Q1
3X250A Stack
DC DC DC DC DC

PT100
-211L1
&EFS++CONV/211.1
0,6mH
3*250A

V3_L2 V3_L3 -231U1 VA_182
&EFS++CONV/231.0
DC Switch & Fuse 3*250A
Filter Caps 3*340µF
-K1 -F1 1500V 300A 1250V 400A
-K7 -F2
-K2 -F5
-K8 -F6
-K3 -F9
-K9 -F10
-C1 -C7 -C13 340µF
V3_L1 VA_186 VA_184

NSGAFöu 6x1x50mm²

-224W10 DC 1.4 + Pos.
-224W11 DC 1.4 - Pos.
-224W12 DC 1.5 + Pos.
-224W13 DC 1.5 - Pos.
-224W14 DC 1.6 + Pos.
-224W15 DC 1.6 - Pos.

HELUTHERM 2x1x70mm²

=UNIT_02++
BAT 1-3
BAT 4-5
BAT 6-8
LFP Battery Modul

V3_DC- V3_Ub -227U1 VA_188
&EFS++CONV/227.0
DC Switch & Fuse 3*250A
Filter Caps 3*340µF
-K1 -F1 1500V 300A 1250V 400A
-K7 -F2
-K2 -F5
-K8 -F6
-K3 -F9
-K9 -F10
-C1 -C7 -C13 340µF
V3_DC+ VA_192 VA_190

-231W10 DC 2.1 + Pos.
-231W11 DC 2.1 - Pos.
-231W12 DC 2.2 + Pos.
-231W13 DC 2.2 - Pos.
-231W14 DC 2.3 + Pos.
-231W15 DC 2.3 - Pos.

BAT 9-11
BAT 1-3
=UNIT_03++

PIII 3_1
-
PIII_3_3
-207Q1
3X250A Stack

PT100
-207L1
&EFS++CONV/207.1
0,6mH
3*250A

V4_L1 V4_L3 -237U1 V4_L2
&EFS++CONV/237.0
DC Switch & Fuse 3*250A
Filter Caps 3*340µF
-K1 -F1 1500V 300A 1250V 400A
-K7 -F2
-K2 -F5
-K8 -F6
-K3 -F9
-K9 -F10
-C1 -C7 -C13 340µF
V4_DC+ V4_DC- V4_Ub

-237W10 DC 2.4 + Pos.
-237W11 DC 2.4 - Pos.
-237W12 DC 2.5 + Pos.
-237W13 DC 2.5 - Pos.
-237W14 DC 2.6 + Pos.
-237W15 DC 2.6 - Pos.

BAT 4-6
BAT 7-8
BAT 9-11

PIII 4_1
-
PIII_4_3
-217Q1
3X250A Stack

PT100
-217L1
&EFS++CONV/217.1
0,6mH
3*250A

N
78W4:N
&EFS++CONV/78.3
PEN
78W5:PE
&EFS++CONV/78.2

UDC_LINK_+ 2a.2 /
UDC_LINK_N 2a.5 /
UDC_LINK_- 2a.2 /

previous page: &EAC/6a
next page: 2a

Editor	Freqcon_JD			Statron	FREQCON	SYSTEMS OVERVIEW	20241105_V1.2
Date	18.06.2024	Norm		Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007
Proved by							
Date							

=	UNIT_01	Converter Container 1
&	EFA	Single line diagram
++		page: 1a
+		total: 498

Single line diagram

Control circuit

++CONV

++CT
+CTRL_1

CTRL

UDC_LINK_+ / 1a.4

UDC_LINK_- / 1a.4

UDC_LINK_N / 1a.4

+4

-173F2 &EFS++CT/173.2 10A

-173F3 &EFS++CT/173.4 1A

-173K2 1500V 30A DC

-173R3 500 Ohm 150 W

-173R4 500 Ohm 150 W

-173K1 1500V 30A DC

-173R1 500 Ohm 150 W

-173R2 500 Ohm 150 W

V1_DC-

V1_DC+

+4

V1_L1 V1_L2 V1_L3

-85U1 &EFS++CT/85.6 L1 L2 L3 DC+ DC-

-171F1 &EFS++CT/171.2 10A

-171K1 &EFS++CT/171.7 1500V 50A DC

-171K2 &EFS++CT/171.8 1500V 50A DC

-171R1 &EFS++CT/171.1 15 Ohm 300W

-171R2 &EFS++CT/171.2 15 Ohm 300W

Grid 400V
inc. overvotage fuse
& Fuse ??A(20A)

+3
Main mounting plate

1-6
-XE
1

-84F2

>+
CTRL_1.1
-84Q1

AC L1,L2,L3

101T1 &EFS++CT/101.2

24V DC supply unit

102G1 &EFS++CT/102.2
24V DC UPS

+24VDC GND

+ 24V DC
24V GND

-102G2 &EFS++CT/102.6 Battery

-103F1 - 103F4 &EFS++CT/103.2 F2, 10A 60VDC

-103F5 &EFS++CT/103.9 F2, 10A 60VDC

-186K1 &EFS++CT/186.6

-186B1 &EFS++CT/186.6

24V Supply
Main PLC
ET200SP

+24V DC
for Control Cabinet

24V GND

Precharge
Resistors

400V AC
Control Cabinet

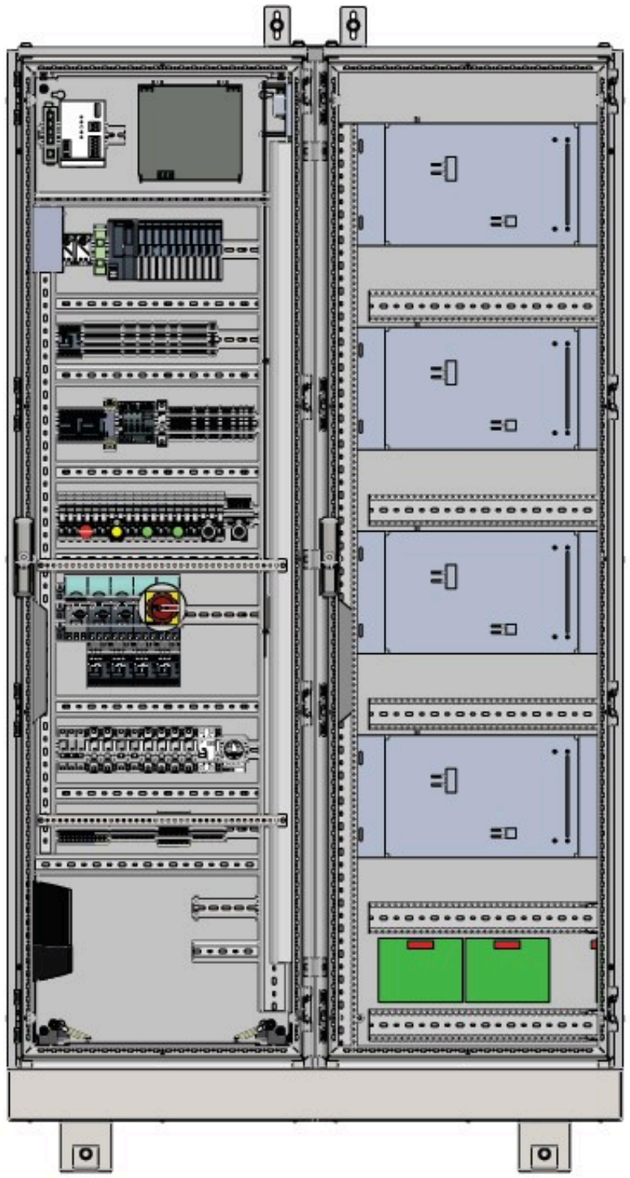
Thermostat
for start PLC

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next page: &ELU/5a

Editor	Freqcon_JD			Statron	FREQCON	SYSTEMS OVERVIEW	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	18.06.2024	Norm						& EFA Single line diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++	page: 2a
Date								+	total: 498

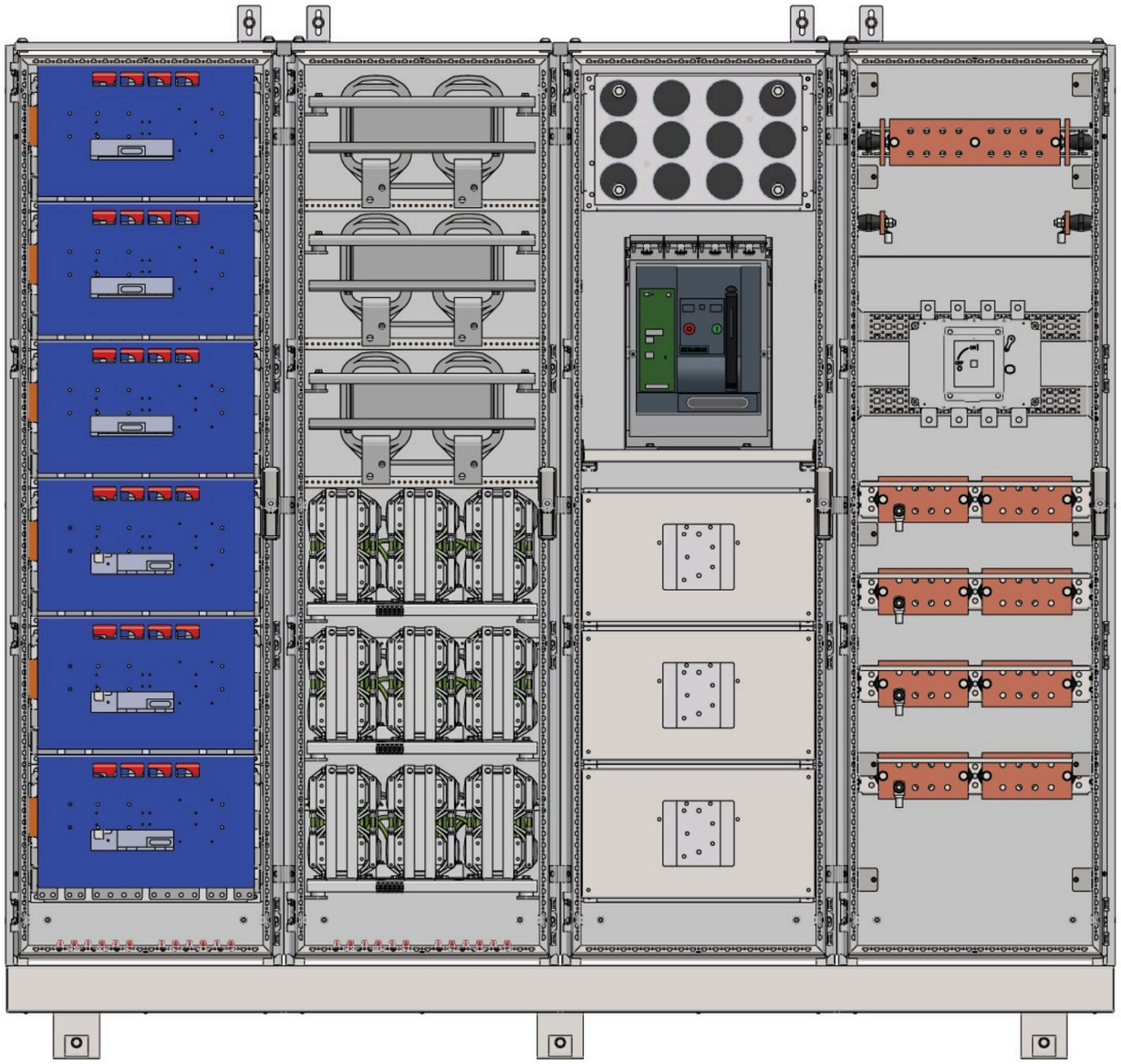
0	1	2	3	4	5	6	7	8	9



+CTRL_1
Control cabinet 1

+CTRL_2
Control cabinet 2

++CT Control cabinets



+CON
Converter cabinet

+IND
Inductor cabinet

+CIR
Circuit Breaker cabinet

+AC_DC
AC and DC connection cabinet

++CONV Converter



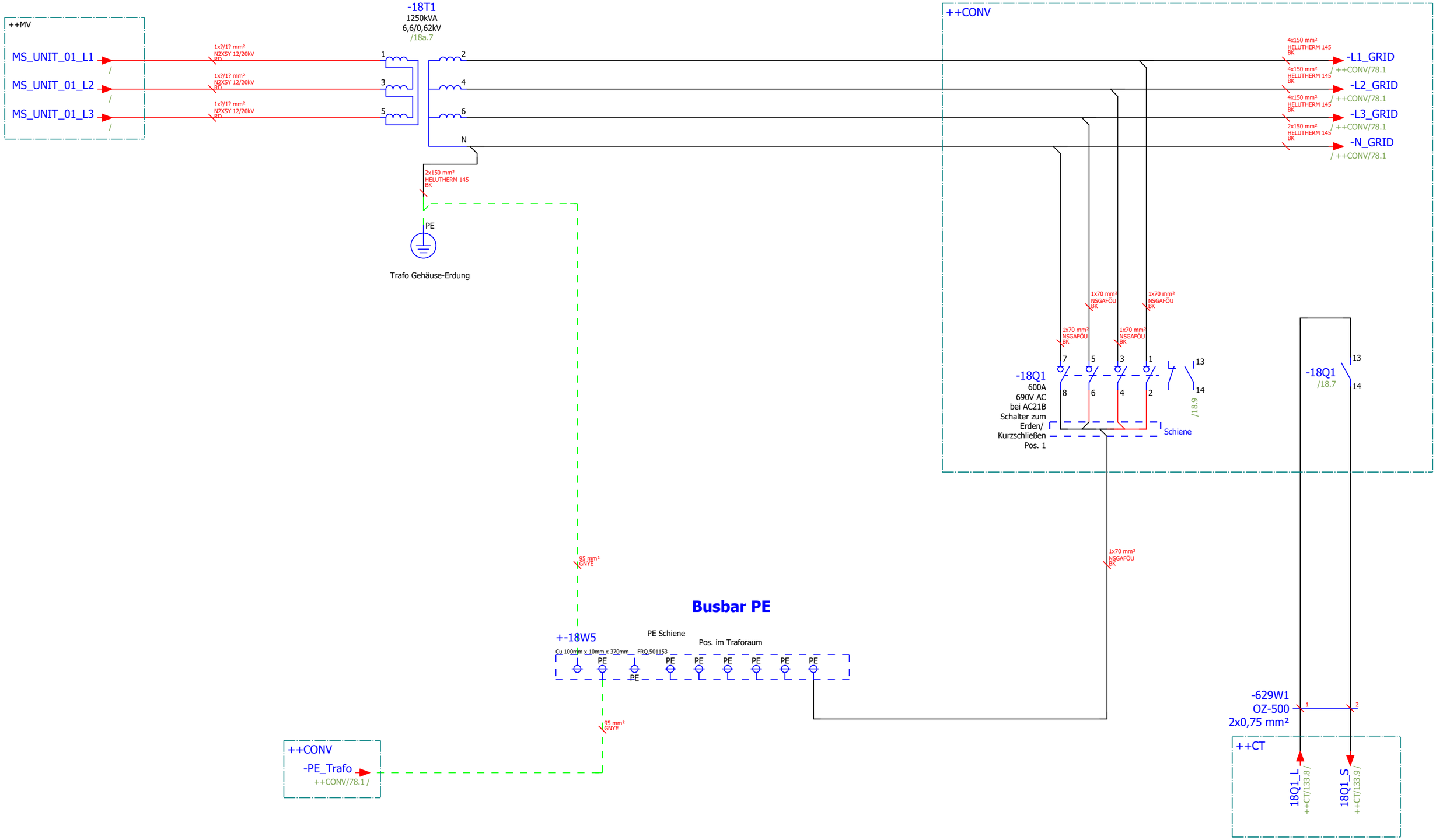


++FAN
FAN

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&EFA/2a

next page:
&EFS++TRA/18

Editor	Freqcon_DG			Statron	FREQCON	CABINETS OVERVIEW	20241105_V1.2	= UNIT_01	Converter Container 1
Date	05.11.2024	Norm						& ELU	Cabinet Overview
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++	page: 5a
Date								+	total: 498



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&ELU++/5a

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18a

Editor	Freqcon_DG			Statron	FREQCON	MV-TRANSFORMER UNIT_01+02	20241105_V1.2	= UNIT_01 Converter Container 1
Date	05.11.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ TRA medium voltage transformer page: 18
Date								+ total: 498

++CT
+CTRL_1.2
-18B1
PWR07
Trafo-
Temperaturüberwachung
Pos: in Tür +ASC

SUPPLY
24-240V AC DC

ALARM

FAULT

FAN

PT100 SENSORS

CH 1

CH 2

CH 3

CH 4

40 41 42 4 5 6 7 8 9 1 2 3 4 5 6 13 14 15 16 17 18 19 20 21 22 23 24

0,75 mm² RT

-18W2
JZ-500
8G1,5 mm²

1 GNYE 2 3 4 5 6

-18W1
F-CY-OZ (LiY-CY)
10x1,5 mm²
500V
geschirmt

1 2 3 4 5 6 7 8 9

-18T1
/18.2

3x PT100 Fühler in NS-Wicklung Trafo

CH 3 CH 2 CH 1

3 2 1 3 2 1 3 2 1

++CT

-1L+3 ++CT/103.2/
-1PE5 ++CT/103.4/
-1M6 ++CT/103.3/
-PreAlarm ++CT/133.0/
-Trip ++CT/133.0/
-Fault ++CT/133.0/
-Fan ++CT/133.0/

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++CONV/78

Editor	Freqcon_DG			Statron	FREQCON	TEMPERATURE TRANSFORMER UNIT_01+02	20241105_V1.2	= UNIT_01	Converter Container 1
Date	05.11.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ TRA	medium voltage transformer
Date								+	

page: 18a
total: 498

Grid Busbars L1, L2, L3

++TRA

-L1_GRID ++TRA/18.9 /
-L2_GRID ++TRA/18.9 /
-L3_GRID ++TRA/18.9 /

+AC_DC-78W1 GRID L1 Pos. 1/ Links
Cu 100mm x 10mm x 370mm FRQ.52163 &EFA++/1a.0
+AC_DC-78W2 GRID L2 Pos. 1/ Mitte
Cu 100mm x 10mm x 370mm FRQ.52163
+AC_DC-78W3 GRID L3 Pos. 1/ Rechts
Cu 100mm x 10mm x 370mm FRQ.52163

4x50 mm² NSGAFöu BK → -L1CON1 / 80.0
4x50 mm² NSGAFöu BK → -L2CON1 / 80.0
4x50 mm² NSGAFöu BK → -L3CON1 / 80.0

25 mm² NSGAFöu BK

+AC_DC -78F1 690Vac 100A gL/gG NH00 /78.8
1 3 5 13 21 / 2 4 6 14 22

-1F2 / ++CT/127.4
F3 / 238b.9

-238W7 OZ-500 2x0,75 mm² /238a.2
0,75 mm² BU
+AC_DC -X3.43 20 19
-78W7 OZ-500 2x0,75 mm²
+AC_DC -78F1 /78.6 13 14

+AC_DC -78F2 Typ 1 + Typ 2 400/690 V~ L1 L2 L3 PE PE
+AC_DC -78F3 20A, aR 1 3 5 / 2 4 6
-78W6 OZ-600 3x2,5 mm² 0,6kV/1kV 1 2 3

-CHA_L1 ++CT/85.1 /
-CHA_L2 ++CT/85.1 /
-CHA_L3 ++CT/85.1 /

35 mm² GNYE

Busbars N

-N_GRID ++TRA/18.9 /

+AC_DC-78W4 GRID N &EFA++/1a.1 Pos. unten Links
Cu 50mm x 10mm x 370mm FRQ.50622
2x50 mm² NSGAFöu BK → GRID_N / 99.5

16 mm² NSGA Föu BK
-AC_F_N.1 83.3 /
-AC_F_N.2 83.3 /
-AC_F_N.3 83.3 /

Busbars PE

Einspeisung_IEC_Seite 78
Einbauort_Sicherung in Connection cabinet

+AC_DC-78W5 GRID PE &EFA++/1a.1 Pos. unten rechts
Cu 100mm x 10mm x 370mm FRQ.50070

-PE_Trafo ++TRA/18.2 /

PE PE PE PE PE PE PE PE PE PE PE PE PE PE

95 mm² GNYE
35 mm² GNYE

PE_2_1 238a.1 /
PE_2_2 238a.4 /
PE_2_3 238a.8 /
PE_3_1 228.1 /
PE_3_2 228.4 /
PE_3_3 228.8 /
PE_4_1 238b.1 /
PE_4_2 238b.4 /
PE_4_3 238b.8 /

=UNIT_02 PE_BAT_CONV_1 =UNIT_02++Container/278.5 /
=UNIT_03 PE_BAT_CONV_2 =UNIT_03++Container/278.5 /

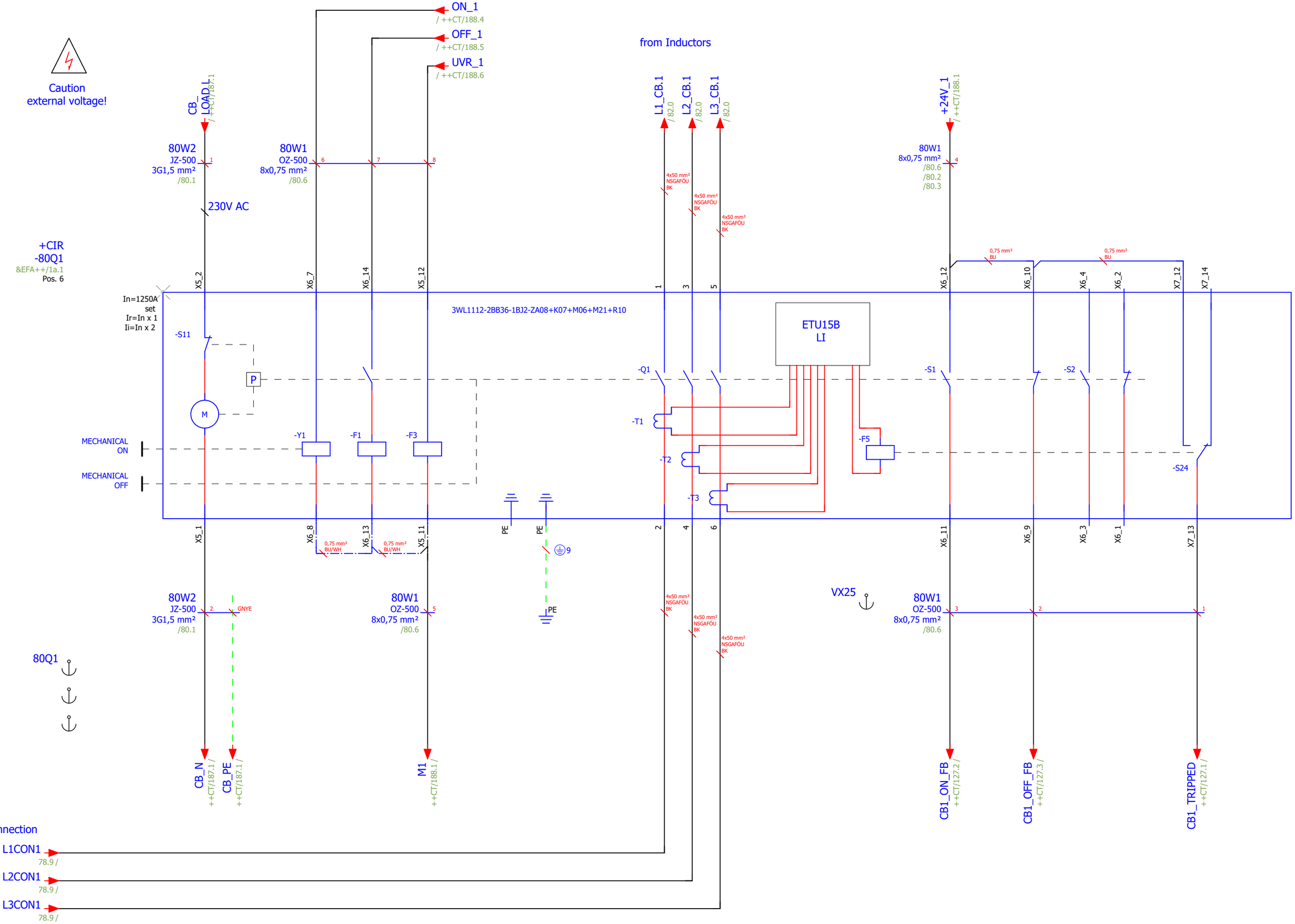
PE Container
PE Cabinet base frame front side
PE Cabinet base frame back side

400V TYP 1

previous page: ++TRA/18a
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Editor	Freqcon_JD			Statron	FREQCON	GRID CONNECTION	20241105_V1.2	= UNIT_01	Converter Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV	Converter
Date								+	

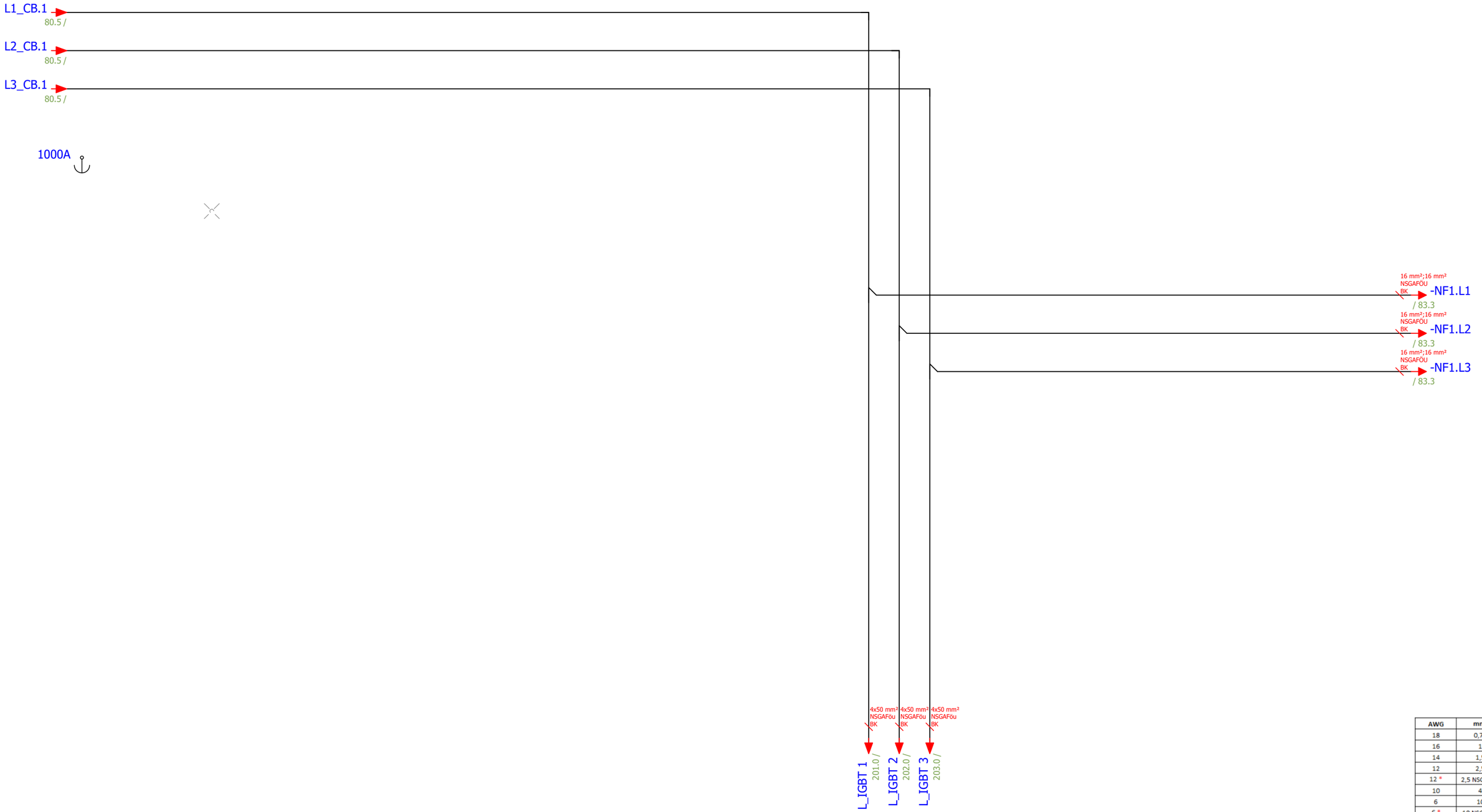
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total: 498



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Editor	Freqcon_JD			Statron		BG CIRCUIT BREAKER 1000A AC GRID	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV Converter	page: 80
Date								+	total: 498



AWG	mm²
18	0,75
16	1
14	1,5
12	2,5
12 *	2,5 NSGAFÖu
10	4
6	10
6 *	10 NSGAFÖu
4	16
2	25
2 *	16 NSGAFÖu
1	35
250 kcmil	95 ALU
2x2	1x70 NSGAFÖu
2x4	2x70 NSGAFÖu
4x250 kcmil	4x70 NSGAFÖu
6x250 kcmil	6x70 NSGAFÖu

*cable into seperate UL protective tube

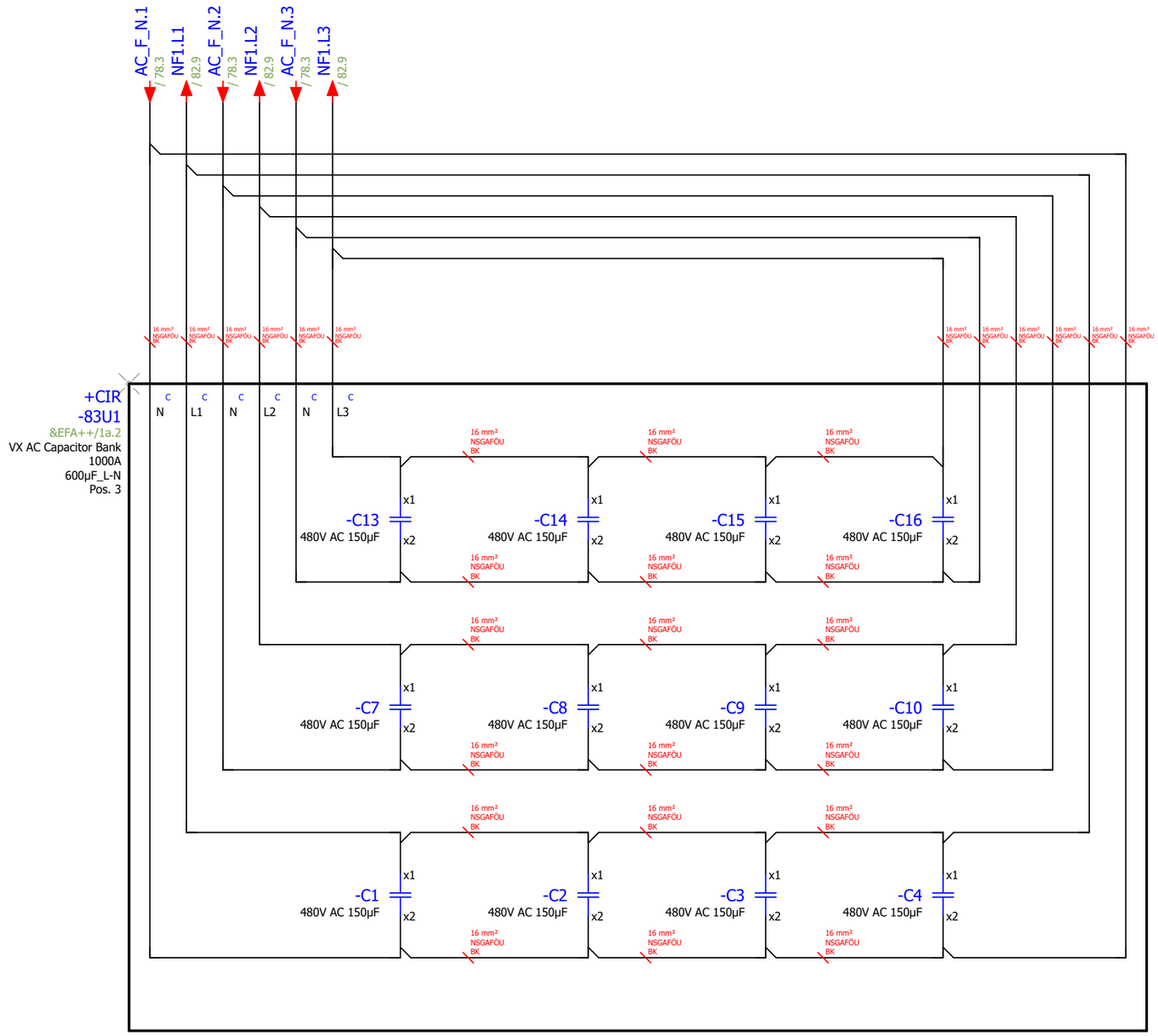
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83

Editor	Freqcon_JD			Statron	FREQCON	PI INDUCTORS GRID SIDE	20241105_V1.2	= UNIT_01	Converter Container 1	
Date	18.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV	Converter	page: 82
Date								+		total: 498

to polarity bar

behind main breaker



AWG	mm²
18	0,75
16	1
14	1,5
12	2,5
12 *	2,5 NSGAFöu
10	4
6	10
6 *	10 NSGAFöu
4	16
2	25
2 *	16 NSGAFöu
1	35
250 kcmil	95 ALU
2x2	1x70 NSGAFöu
2x4	2x70 NSGAFöu
4x250 kcmil	4x70 NSGAFöu
6x250 kcmil	6x70 NSGAFöu

*cable into seperate UL protective tube

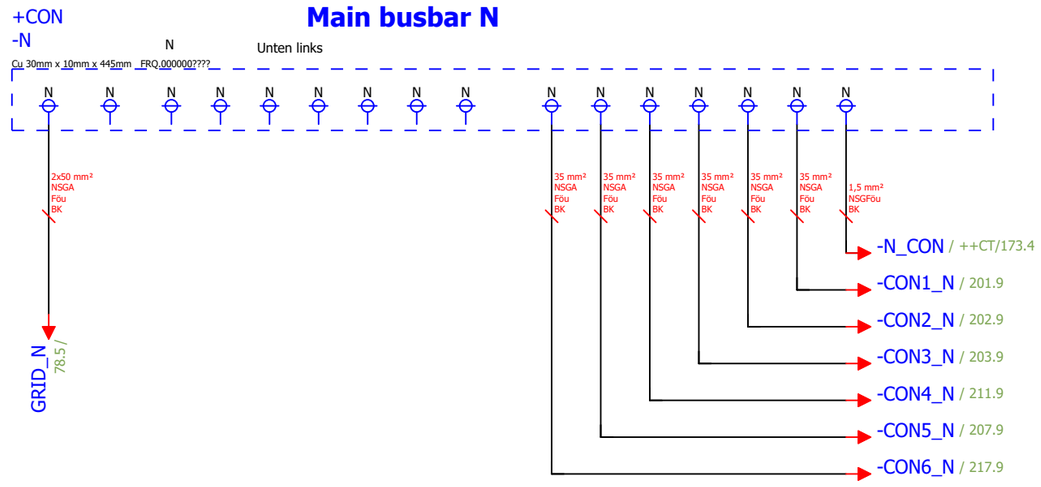
83U1

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Editor	Freqcon_JD			Statron	FREQCON	GRID AC FILTER 3* 600 µF + OVERVOLTAGE PROTECTOR	20241105_V1.2	= UNIT_01 Converter Container 1
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV Converter page: 83
Date								+ total: 498

in converter cabinet



1000A

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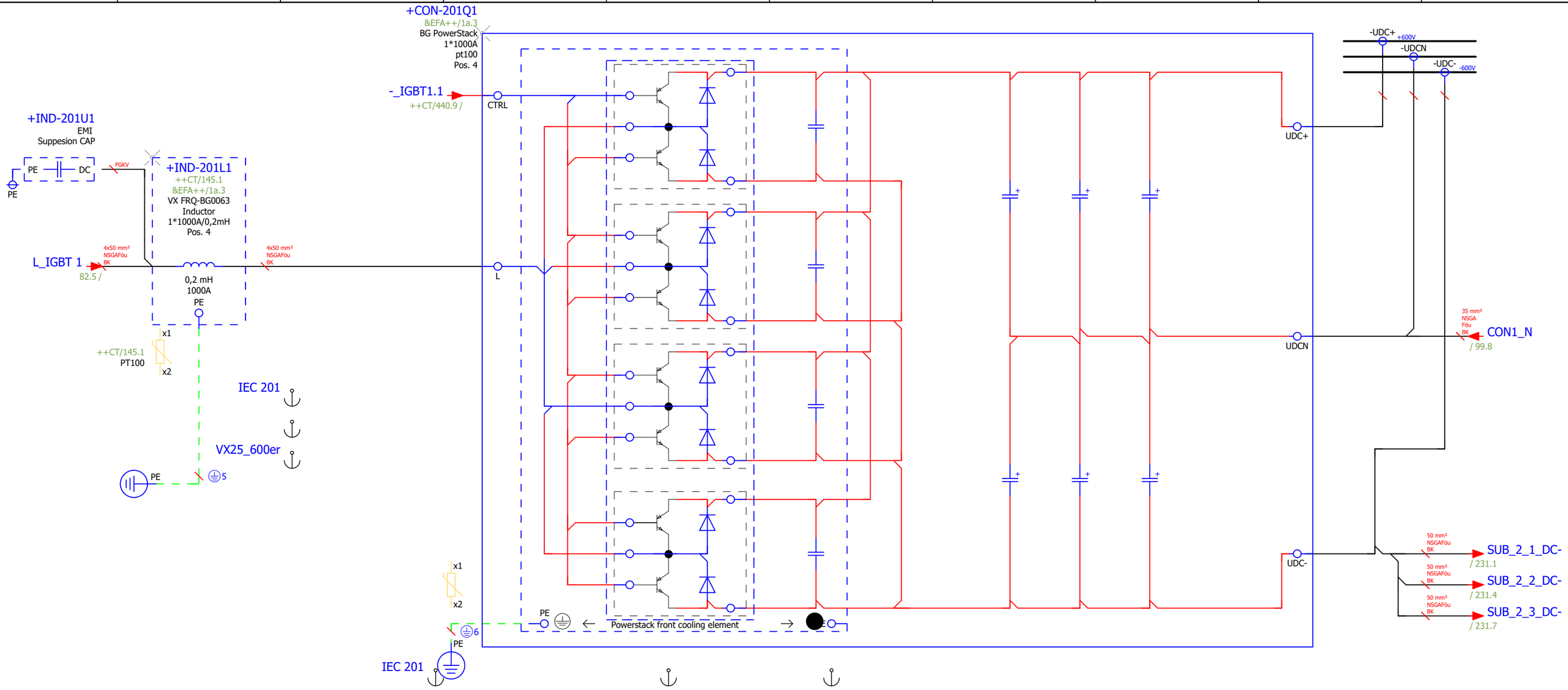
Editor	Freqcon_JD			Statron	FREQCON	BUSBARS N, PE	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV Converter	page: 99
Date								+	total: 498

Power Circuits

Pages 200 - 299

- Converter cabinet
- Inductor cabinet
- Circuit Breaker cabinet

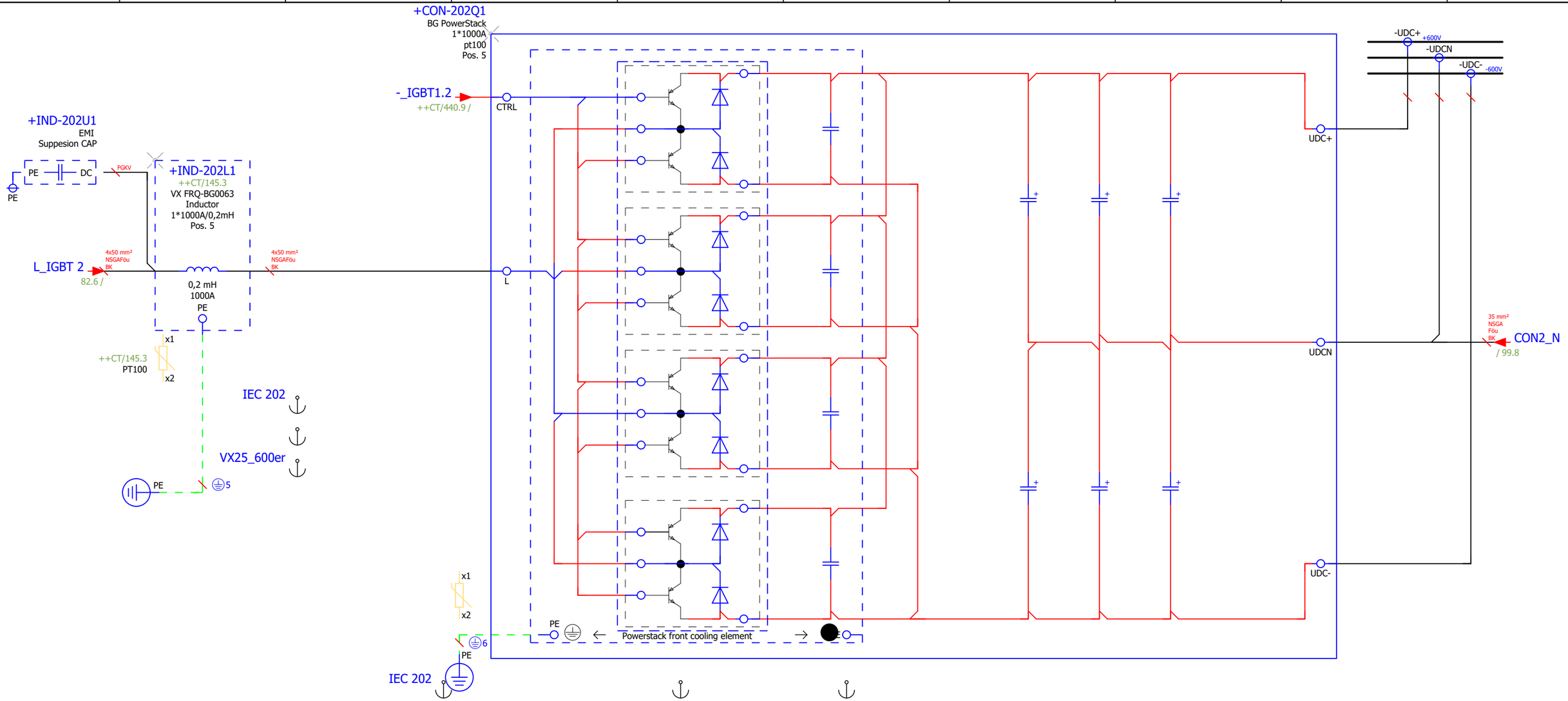
Editor	Freqcon_JD			Statron	FREQCON	POWER CIRCUITS COVER PAGE	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	14.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV Converter	page: 200
Date								+	total: 498



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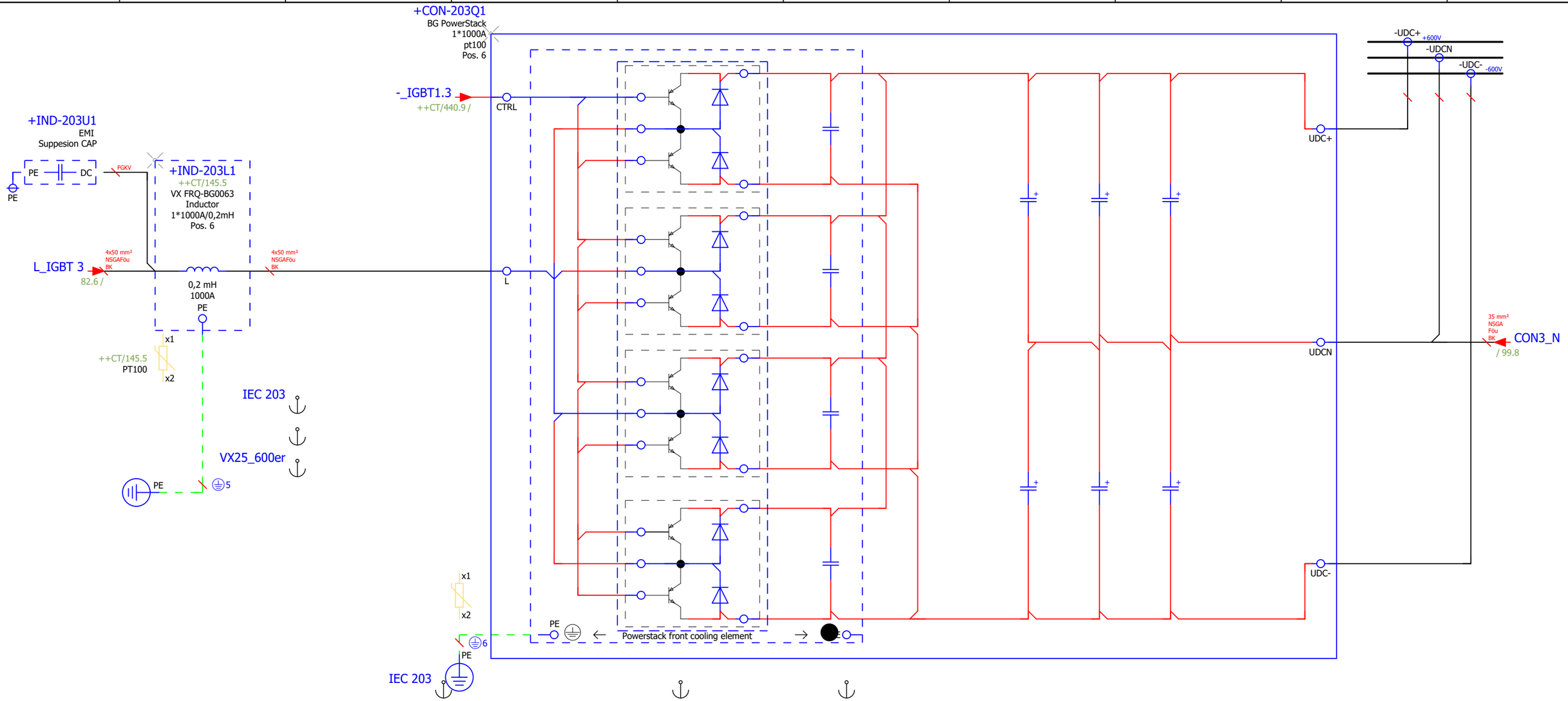
Editor	Freqcon_JD			Statron	FREQCON	IGBT & INDUCTOR FOR GRID PHASE 1	20241105_V1.2	= UNIT_01	Converter Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV	Converter page: 201
Date								+	total: 498



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Editor	Freqcon_JD			Statron	FREQCON	IGBT & INDUCTOR FOR GRID PHASE 2	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV Converter	page: 202
Date								+	total: 498



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Editor	Freqcon_JD			Statron	FREQCON	IGBT & INDUCTOR FOR GRID PHASE 3	20241105_V1.2	= UNIT_01	Converter Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV	Converter
Date								+	

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total: 498

+CON-207Q1
&EFA++/1a.4
VX BG PowerStack
3*250A
Pos. 1

-_IGBT3.1_2
207.9 /
CTRL

+IND-207L1
&EFA++/1a.5
VX FRQ-BG0060
Inductor
3*250A/0,6mH
Pos. 1

L_IGBT 3_1
227.0 /
50 mm² NSGAFöu BK
0,6mH
L:1

L_IGBT 3_2
227.3 /
50 mm² NSGAFöu BK
0,6mH
L:2

L_IGBT 3_3
227.6 /
50 mm² NSGAFöu BK
0,6mH
L:3

PE.1 PE.2 PE.3

IEC 204 DC

++CT/146.5
PT100
++CT/146.7
++CT/147.1
x1 x2

VX25

PE
5
6

IEC 204

-UDC+ +600V
-UDCN
-UDC- -600V

UDC+
UDCN
UDC-

35 mm² NSGA Föu BK
CON5_N
/ 99.8

+CON-207Q1-U1
FRQ-M00080-1
Pos. 1

-_IGBT3.1
++CT/442.9 /
X1
25-POL SUB-D SOCKET

-_IGBT3.2
++CT/442.9 /
X2
25-POL SUB-D SOCKET

-_IGBT3.3
++CT/442.9 /
X3
25-POL SUB-D SOCKET

SKiiP 3 Adapter

FRQ-M00080
FREQCON

Shield connect by a ring cable lug
SH

X4
26-POL Stiftleiste (für Flachband) SOCKET

-_IGBT3.1_2
/ 207.3

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Editor	Freqcon_JD			Statron	FREQCON	IGBT & INDUCTOR SUB 3_1 - 3_3	20241105_V1.2	= UNIT_01 Converter Container 1
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV Converter page: 207
Date								+ total: 498

+CON-211Q1
&EFA++/1a.4
VX BG PowerStack
3*250A
Pos. 2

-_IGBT2.1_2
211.9 /
CTRL

+IND-211L1
&EFA++/1a.5
VX FRQ-BG0060
Inductor
3*250A/0,6mH
Pos. 2

L_IGBT 2_1
231.0 /
50 mm² NSGAFöu BK
0,6mH
L:1

L_IGBT 2_2
231.3 /
50 mm² NSGAFöu BK
0,6mH
L:2

L_IGBT 2_3
231.6 /
50 mm² NSGAFöu BK
0,6mH
L:3

PE.1 PE.2 PE.3

IEC 211 DC

++CT/145.7
PT100
x1 x2

++CT/146.1
x1 x2

++CT/146.3
x1 x2

VX25

PE
5

PE
5

PE
5

x1
x2

6
PE

IEC 211

-UDC+ +600V
-UDCN
-UDC- -600V

UDC+
UDCN
UDC-

35 mm² NSGA Föu BK
CON4_N
/ 99.8

+CON-211Q1-U1
FRQ-M00080-1
Pos. 1

-_IGBT2.1
++CT/441.9 /
X1
25-POL SUB-D SOCKET

-_IGBT2.2
++CT/441.9 /
X2
25-POL SUB-D SOCKET

-_IGBT2.3
++CT/441.9 /
X3
25-POL SUB-D SOCKET

Shield connect by a ring cable lug
SH

SKiiP 3 Adapter

FRQ-M00080
FREQCON

X4
26-POL Stiftleiste (für Flachband) SOCKET

-_IGBT2.1_2
/ 211.3

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Editor	Freqcon_JD			Statron	FREQCON	IGBT & INDUCTOR SUB 2_1 -2_3	20241105_V1.2	= UNIT_01 Converter Container 1
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV Converter page: 211
Date								+ total: 498

+CON-217Q1
&EFA++/1a.4
VX BG PowerStack
3*250A
Pos. 2

-_IGBT4.1_2
217.9 /
CTRL

+IND-217L1
&EFA++/1a.5
VX FRQ-BG0060
Inductor
3*250A/0,6mH
Pos. 2

L_IGBT 4_1
237.0 /
50 mm² NSGAFöu BK
0,6mH
L:1

L_IGBT 4_2
237.3 /
0,6mH
L:2

L_IGBT 4_3
237.6 /
0,6mH
L:3

PE.1 PE.2 PE.3

IEC 211 DC

++CT/147.3
PT100
++CT/148.3
++CT/148.7
x1 x2

VX25

PE
5

x1 x2
6
PE

IEC 211

-UDC+ +600V
-UDCN
-UDC- -600V

UDC+
UDCN
UDC-

35 mm² NSGA Föu BK
CON6_N
/ 99.8

50 mm² NSGAFöu BK
SUB_3_1_DC-
/ 227.1
SUB_3_2_DC-
/ 227.4
SUB_3_3_DC-
/ 227.7
SUB_4_1_DC-
/ 237.1
SUB_4_2_DC-
/ 237.4
SUB_4_3_DC-
/ 237.7

+CON-217Q1-U1
FRQ-M00080-1
Pos. 1

-_IGBT4.1
++CT/443.9 /
X1
25-POL SUB-D SOCKET

-_IGBT4.2
++CT/443.9 /
X2
25-POL SUB-D SOCKET

-_IGBT4.3
++CT/443.9 /
X3
25-POL SUB-D SOCKET

Shield connect by a ring cable lug
SH

SKiiP 3 Adapter

FRQ-M00080
FREQCON

X4
26-POL Stiftleiste (für Flachband) SOCKET
-_IGBT4.1_2
/ 217.3

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next page: 227

Editor	Freqcon_JD			Statron	FREQCON	IGBT & INDUCTOR SUB 4_1 -4_3	20241105_V1.2	= UNIT_01	Converter Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV	Converter
Date								+	

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total: 498

VX25

224

Spare connections, if the BSU will be from here 20A supplied.

* cable intro seperate UL protrctive tube

+CIR
-227U1
/227.a.0
&EFA++/1a.6
VX DC switch and Fuse
3*250A
1000V
Pos. 1

L_IGBT 3_1 / 207.0
SUB_3_1_V / ++CT/163.9
SUB_3_1_DC- / 217.9
SUB_3_1_V.1 / ++CT/162.9
L_IGBT 3_2 / 207.0
SUB_3_2_V / ++CT/163.9
SUB_3_2_DC- / 217.9
SUB_3_2_V.1 / ++CT/162.9
L_IGBT 3_3 / 207.0
SUB_3_3_V / ++CT/163.9
SUB_3_3_DC- / 217.9
SUB_3_3_V.1 / ++CT/162.9

227W1 OZ-600 2x0,75 mm²
227W2 OZ-600 2x0,75 mm²
227W3 OZ-600 2x0,75 mm²

50 mm² NSGAFöu BK

PE
PE
Rear mounting plate
7

IGBT1 1+ | V_IGBT1 1+ | UDC [1]- | V_DC1 1+ | V_DC 1-
IGBT2 2+ | V_IGBT2 2+ | UDC [2]- | V_DC2 2+
IGBT3 3+ | V_IGBT3 3+ | UDC [3]- | V_DC3 3+

F3 1A
F4 1A [20A, aR (BSU)]
F0 [20A, aR (BSU)]
F7 1A
F8 1A
F11 1A
F12 1A

2,5 mm² NSGAFöu BK

-C1 -C7 -C13
x1 x2
340µF, 1320V DC Epcos

16 mm² NSGAFöu BK

Front mounting plate
PE
-U1
EMI
Suppesion CAP
16 mm² FGKV
16 mm² in Shrin-kable Tube FGKV
1 2 3 4 5 6

-K1 /227.a.1 1500V 300A
-K7 /227.a.3 1500V 300A
-K2 /227.a.2 1500V 300A
-K8 /227.a.4 1500V 300A
-K3 /227.a.2 1500V 300A
-K9 /227.a.5 1500V 300A
A1 A2

70 mm² NSGAFöu BK

-F1 /227.a.7 1250V 400A 1KN/110 HLS Datenblatt
-F2 /227.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS
-F5 /227.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS
-F6 /227.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS
-F9 /227.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS
-F10 /227.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS

IEC

DC1 + / DC1 -
DC2 + / DC2 -
DC3 + / DC3 -

AWG	mm²	*cable into seperate UL protective tube	AWG	mm²
18	0,75		2	25
16	1		2 *	16 NSGAFöu
14	1,5		1	35
12	2,5		250 kcmil	95 ALU
12 *	2,5 NSGAFöu		2x2	1x70 NSGAFöu
10	4		2x4	2x70 NSGAFöu
6	10		4x250 kcmil	4x70 NSGAFöu
6 *	10 NSGAFöu		6x250 kcmil	6x70 NSGAFöu
4	16			

*2
The single conductor must be placed in the protective tube

+AC_DC-227W10 Cu 100mm x 10mm x 195mm FRQ.50604 SUB 3_1 + Pos. =UNIT_02 DC+3_1_BAT / =UNIT_02++ASC/678.7
+AC_DC-227W11 Cu 100mm x 10mm x 195mm FRQ.50604 SUB 3_1 - Pos. DC-3_1_BAT / =UNIT_02++ASC/678.7
DC-3_1 / 228.1
DC+3_1 / 228.1

+AC_DC-227W12 Cu 100mm x 10mm x 195mm FRQ.50604 SUB 3_2 + Pos.
+AC_DC-227W13 Cu 100mm x 10mm x 195mm FRQ.50604 SUB 3_2 - Pos.
DC-3_2 / 228.4
DC+3_2 / 228.4

+AC_DC-227W14 Cu 100mm x 10mm x 195mm FRQ.50604 SUB 3_3 + Pos. =UNIT_03 DC+3_3_BAT / =UNIT_03++ASC/678.0
+AC_DC-227W15 Cu 100mm x 10mm x 195mm FRQ.50604 SUB 3_3 - Pos. DC-3_3_BAT / =UNIT_03++ASC/678.0
DC-3_3 / 228.8
DC+3_3 / 228.7

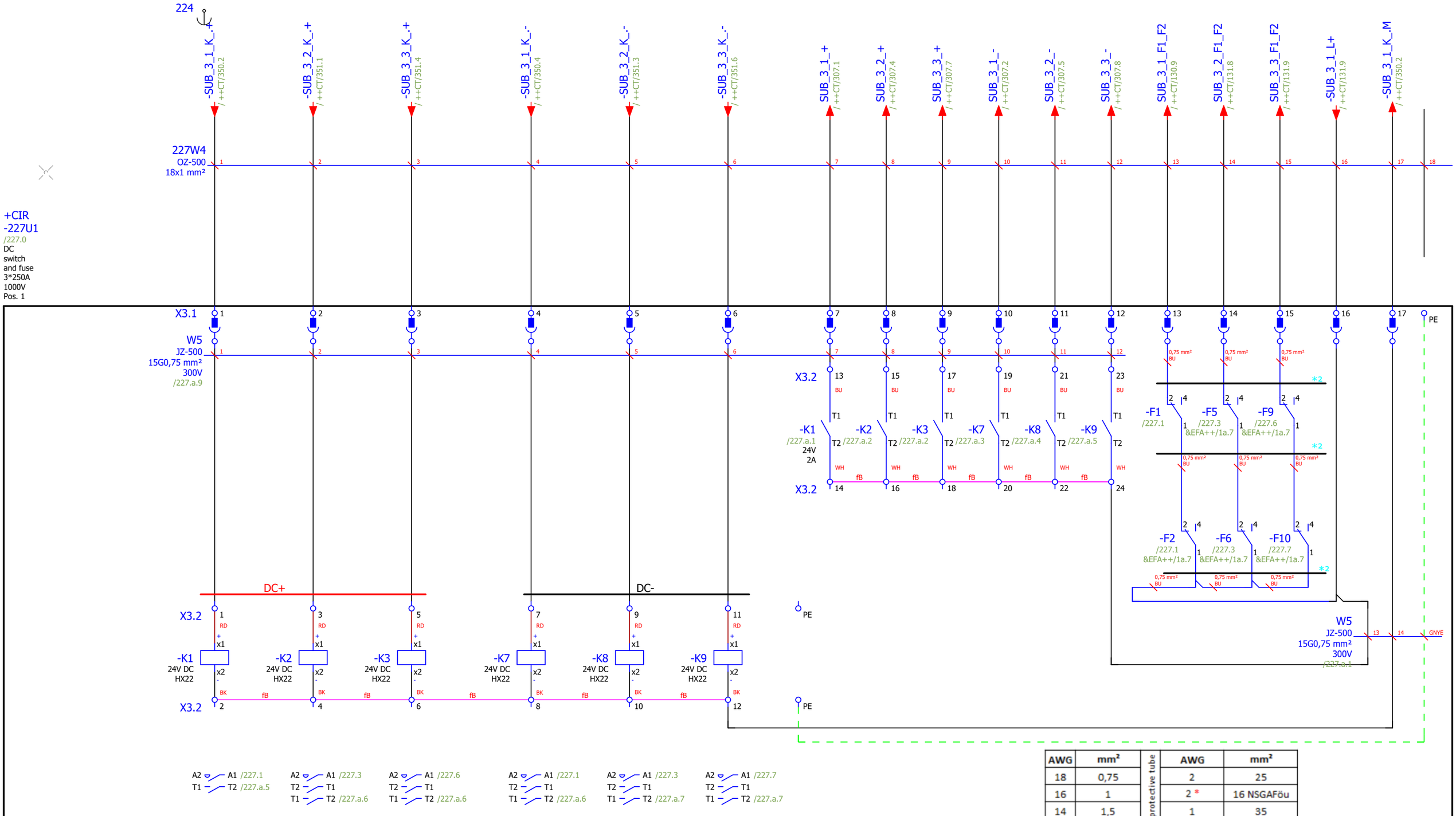
EEC

DC+ and DC- Busbars in Connection cabinet

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next page: 227.a

Editor	Freqcon_JD			Statron	FREQCON	SUBSYSTEM 3_1 - 3_1 DC 3 x 250A	20241105_V1.2
Date	18.06.2024						
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007
Date							

=	UNIT_01	Converter Container 1	
&	EFS	Circuit diagram	
++	CONV	Converter	page: 227
+			total: 498



AWG	mm²	* cable into seperate UL protective tube	AWG	mm²
18	0,75		2	25
16	1		2 *	16 NSGAFöu
14	1,5		1	35
12	2,5		250 kcmil	95 ALU
12 *	2,5 NSGAFöu		2x2	1x70 NSGAFöu
10	4		2x4	2x70 NSGAFöu
6	10		4x250 kcmil	4x70 NSGAFöu
6 *	10 NSGAFöu		6x250 kcmil	6x70 NSGAFöu
4	16			

*2 The single conductor must be placed in the protective tube

IEC

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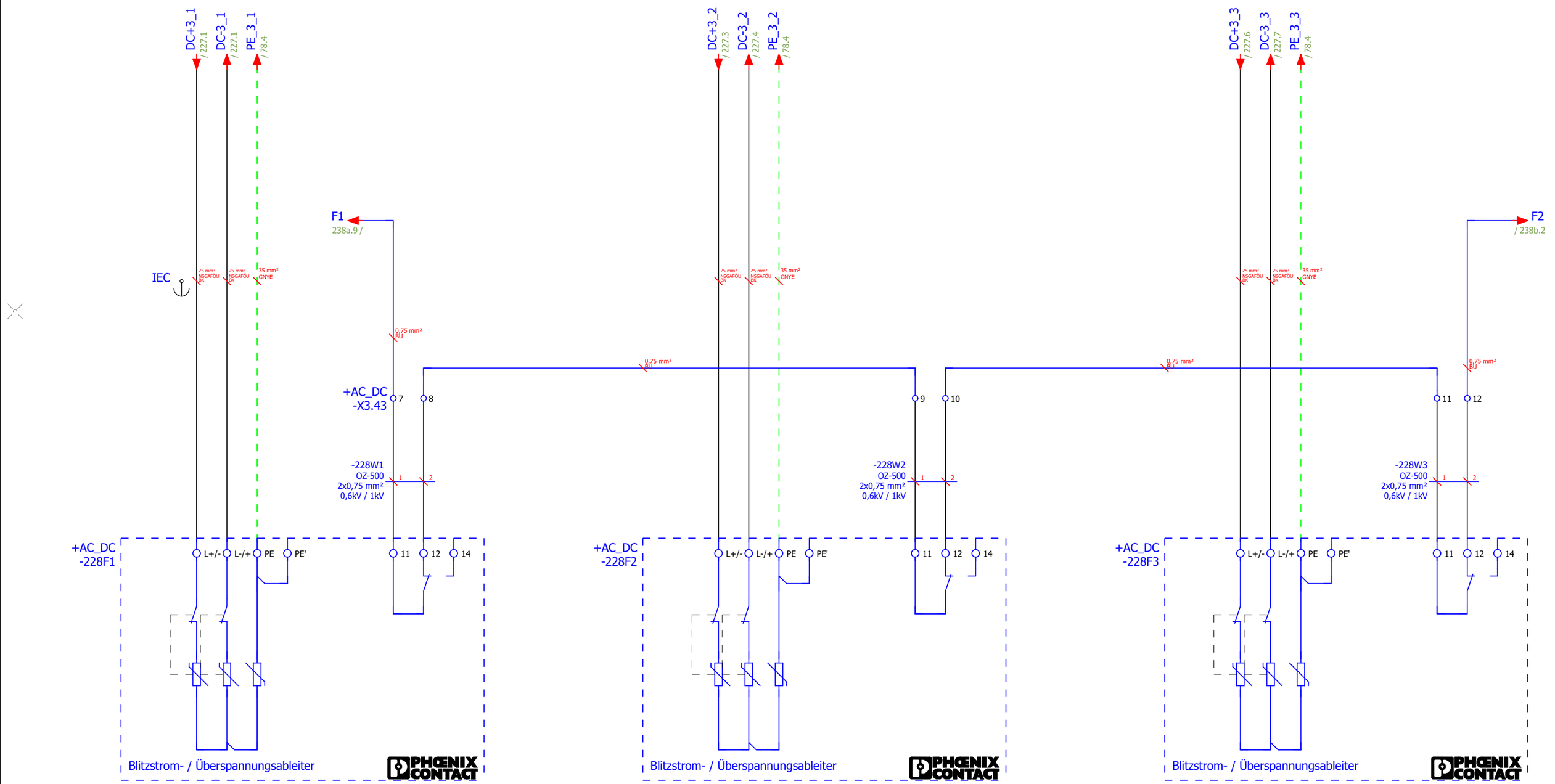
next page: 228

Editor	Freqcon_JD			Statron	FREQCON	SUBSYSTEM 3_1 - 3_1 DC 3 x 250A	20241105_V1.2
Date	18.06.2024						= UNIT_01 Converter Container 1
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			& EFS Circuit diagram
Date						10354_23A2007	++ CONV Converter page: 227.a
							+ total: 498

DC+ and DC- Busbars

DC+ and DC- Busbars

DC+ and DC- Busbars



SURGE ARRESTER
DC SUBSYSTEM 3_1

SURGE ARRESTER
DC SUBSYSTEM 3_2

SURGE ARRESTER
DC SUBSYSTEM 3_3

in Connection cabinet

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227.a

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Editor	Freqcon_JD			Statron	FREQCON	DC SURGE ARRESTER 3_1 - 3_3	20241105_V1.2	= UNIT_01 Converter Container 1
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV Converter page: 228
Date								+ total: 498

0	1	2	3	4	5	6	7	8	9

VX25

221

Spare connections,
if the BSU
will be from here
20A supplied.

* cable intro seperate UL protrctive tube

L_IGBT 2_1 / 211.0 | SUB_2_1_V / ++CT/163.9 | SUB_2_1_DC- / 201.9 | SUB_2_1_V.1 / ++CT/162.9

L_IGBT 2_2 / 211.0 | SUB_2_2_V / ++CT/163.9 | SUB_2_2_DC- / 201.9 | SUB_2_2_V.1 / ++CT/162.9

L_IGBT 2_3 / 211.0 | SUB_2_3_V / ++CT/163.9 | SUB_2_3_DC- / 201.9 | SUB_2_3_V.1 / ++CT/162.9

231W1 OZ-600 2x0,75 mm²

231W2 OZ-600 2x0,75 mm²

231W3 OZ-600 2x0,75 mm²

+CIR
-231U1
/231.a.0
&EFA++/1a.6
VX DC
switch
and Fuse
3*250A
1000V
Pos. 2

50 mm² NSGAFöu BK

PE

7

PE

Rear mounting plate

IGBT1 1+ | V_IGBT1 1+ | V_DC1 1+ | V_DC 1-

UDC [1]-

IGBT2 2+ | V_IGBT2 2+ | V_DC2 2+

UDC [2]-

IGBT3 3+ | V_IGBT3 3+ | V_DC3 3+

UDC [3]-

F3 1A

F4 1A [20A, aR (BSU)]

F0 [20A, aR (BSU)]

F7 1A

F8 1A

F11 1A

F12 1A

2,5 mm² NSGAFöu BK

-C1 | -C7 | -C13

x1 x2

340µF, 1320V DC
Epcos

16 mm² NSGAFöu BK

AWG	mm²	*cable into seperate UL protective tube	AWG	mm²
18	0,75		2	25
16	1		2 *	16 NSGAFöu
14	1,5		1	35
12	2,5		250 kcmil	95 ALU
12 *	2,5 NSGAFöu		2x2	1x70 NSGAFöu
10	4		2x4	2x70 NSGAFöu
6	10		4x250 kcmil	4x70 NSGAFöu
6 *	10 NSGAFöu		6x250 kcmil	6x70 NSGAFöu
4	16			

Front mounting plate

PE

-U1
EMI
Suppesion CAP

16 mm² FGKV

16 mm² in Shrin-kable Tube FGKV

-K1 /231.a.1 1500V 300A | -K7 /231.a.3 1500V 300A

-K2 /231.a.2 1500V 300A | -K8 /231.a.4 1500V 300A

-K3 /231.a.2 1500V 300A | -K9 /231.a.5 1500V 300A

A1 A2

70 mm² NSGAFöu BK

-F1 /231.a.7 1250V 400A 1KN/110 HLS Datenblatt

-F2 /231.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS

-F5 /231.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS

-F6 /231.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS

-F9 /231.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS

-F10 /231.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS

IEC

*2

The single conductor
must be placed
in the protective tube

DC1 + | DC1 -

DC2 + | DC2 -

DC3 + | DC3 -

2,5 mm² NSGAFöu BK

+AC_DC-231W10 Cu 100mm x 10mm x 195mm FRQ 50604 =UNIT_02&EFA++/1a.5

+AC_DC-231W11 Cu 100mm x 10mm x 195mm FRQ 50604 =UNIT_02&EFA++/1a.5

+AC_DC-231W12 Cu 100mm x 10mm x 195mm FRQ 50604 &EFA++/1a.7

+AC_DC-231W13 Cu 100mm x 10mm x 195mm FRQ 50604 &EFA++/1a.7

+AC_DC-231W14 Cu 100mm x 10mm x 195mm FRQ 50604 &EFA++/1a.7 =UNIT_03&EFA++/1a.0

+AC_DC-231W15 Cu 100mm x 10mm x 195mm FRQ 50604 &EFA++/1a.7 =UNIT_03&EFA++/1a.0

SUB 2_1 + =UNIT_02 DC+2_1_BAT / =UNIT_02++ASC/678.0

SUB 2_1 - DC-2_1_BAT / =UNIT_02++ASC/678.0

SUB 2_2 + =UNIT_02 DC+2_2_BAT / =UNIT_02++ASC/678.2

SUB 2_2 - DC-2_2_BAT / =UNIT_02++ASC/678.2

SUB 2_3 + =UNIT_02 DC+2_3_BAT / =UNIT_02++ASC/678.5

SUB 2_3 - DC-2_3_BAT / =UNIT_02++ASC/678.5

DC-2_1 / 238a.1

DC+2_1 / 238a.1

DC-2_2 / 238a.4

DC+2_2 / 238a.4

DC-2_3 / 238a.8

DC+2_3 / 238a.7

EEC

DC+ and DC- Busbars
in Connection cabinet

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next page:
231.a

Editor	Freqcon_JD			Statron	FREQCON	SUBSYSTEM 2_1 - 2_3 DC 3 x 250A	20241105_V1.2	= UNIT_01 Converter Container 1
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV Converter page: 231
Date								+ total: 498

231

-SUB_2_1_K_.+ /++CT/150.2
-SUB_2_2_K_.+ /++CT/151.1
-SUB_2_3_K_.+ /++CT/151.4
-SUB_2_1_K_.- /++CT/150.4
-SUB_2_2_K_.- /++CT/151.3
-SUB_2_3_K_.- /++CT/151.6
SUB_2_1_+ /++CT/306.1
SUB_2_2_+ /++CT/306.4
SUB_2_3_+ /++CT/306.7
SUB_2_1_- /++CT/306.2
SUB_2_2_- /++CT/306.5
SUB_2_3_- /++CT/306.8
SUB_2_1_F1_F2 /++CT/129.8
SUB_2_2_F1_F2 /++CT/129.9
SUB_2_3_F1_F2 /++CT/130.8
-SUB_2_1_L+ /++CT/129.9
-SUB_2_1_K_.M /++CT/150.2

231W4
OZ-500
18x1 mm²

+CIR
-231U1
/231.0
DC
switch
and fuse
3*250A
1000V
Pos. 2

X3.1
W5
JZ-500
15G0,75 mm²
300V
/231.a.9

X3.2
-K1 /231.a.1 24V 2A
-K2 /231.a.2
-K3 /231.a.2
-K7 /231.a.3
-K8 /231.a.4
-K9 /231.a.5
BU T1 T2 WH fB

-F1 /231.1
-F5 /231.3 &EFA++/1a.7
-F9 /231.6 &EFA++/1a.7
-F2 /231.1 &EFA++/1a.7
-F6 /231.3 &EFA++/1a.7
-F10 /231.7 &EFA++/1a.7
0,75 mm² BU
*2

W5
JZ-500
15G0,75 mm²
300V
/231.a.1
13 14 GNYE

PE

DC+
DC-
X3.2
-K1 -K2 -K3 -K7 -K8 -K9
24V DC HX22
RD x1 x2 BK fB

A2 A1 /231.1 T1 T2 /231.a.5
A2 A1 /231.3 T2 T1 T1 T2 /231.a.6
A2 A1 /231.6 T2 T1 T1 T2 /231.a.6
A2 A1 /231.1 T2 T1 T1 T2 /231.a.6
A2 A1 /231.3 T2 T1 T1 T2 /231.a.7
A2 A1 /231.7 T2 T1 T1 T2 /231.a.7

AWG	mm²	* cable into seperate UL protective tube	AWG	mm²
18	0,75		2	25
16	1		2 *	16 NSGAFöu
14	1,5		1	35
12	2,5		250 kcmil	95 ALU
12 *	2,5 NSGAFöu		2x2	1x70 NSGAFöu
10	4		2x4	2x70 NSGAFöu
6	10		4x250 kcmil	4x70 NSGAFöu
6 *	10 NSGAFöu		6x250 kcmil	6x70 NSGAFöu
4	16			

*2 The single conductor must be placed in the protective tube

IEC

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next page: 237

Editor	Freqcon_JD			Statron	FREQCON	SUBSYSTEM 2_1 - 2_3 DC 3 x 250A	20241105_V1.2
Date	18.06.2024						= UNIT_01 Converter Container 1
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			& EFS Circuit diagram
Date						10354_23A2007	++ CONV Converter page: 231.a
							+ total: 498

VX25
224

Spare connections,
if the BSU
will be from here
20A supplied.

* cable intro seperate UL protrctive tube

+CIR
-237U1
/237.a.0
&EFA++/1a.6
VX DC
switch
and Fuse
3*250A
1000V
Pos. 3

L_IGBT 4_1 / 217.0
SUB_4_1_V / ++CT/164.9
SUB_4_1_DC- / 217.9
SUB_4_1_V.1 / ++CT/164.9
L_IGBT 4_2 / 217.0
SUB_4_2_V / ++CT/164.9
SUB_4_2_DC- / 217.9
SUB_4_2_V.1 / ++CT/164.9
L_IGBT 4_3 / 217.0
SUB_4_3_V / ++CT/164.9
SUB_4_3_DC- / 217.9
SUB_4_3_V.1 / ++CT/164.9

237W1 OZ-600 2x0,75 mm²
237W1 OZ-600 2x0,75 mm²
237W2 OZ-600 2x0,75 mm²
237W2 OZ-600 2x0,75 mm²
237W3 OZ-600 2x0,75 mm²
237W3 OZ-600 2x0,75 mm²

50 mm² NSGAFöu BK

PE
PE
Rear mounting plate
7

IGBT1 1+ | V_IGBT1 1+ | V_DC1 1+ | V_DC 1-
UDC [1]-
IGBT2 2+ | V_IGBT2 2+ | V_DC2 2+
UDC [2]-
IGBT3 3+ | V_IGBT3 3+ | V_DC3 3+
UDC [3]-

F3 1A
F4 1A [20A, aR (BSU)]
F0 [20A, aR (BSU)]
F7 1A
F8 1A
F11 1A
F12 1A

2,5 mm² NSGAFöu BK
-C1
-C7
-C13
x1 x2
340µF, 1320V DC Epcos
16 mm² NSGAFöu BK

Front mounting plate
-U1
EMI
Suppesion CAP
16 mm² FGKV
1 2 3 4 5 6
16 mm² in Shrin-kable Tube FGKV

-K1 /237.a.1 1500V 300A
-K7 /237.a.3 1500V 300A
-K2 /237.a.2 1500V 300A
-K8 /237.a.4 1500V 300A
-K3 /237.a.2 1500V 300A
-K9 /237.a.5 1500V 300A
70 mm² NSGAFöu BK

-F1 /237.a.7 1250V 400A 1KN/110 HLS Datenblatt
-F2 /237.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS
-F5 /237.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS
-F6 /237.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS
-F9 /237.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS
-F10 /237.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS

IEC

DC1 + / DC1 -
DC2 + / DC2 -
DC3 + / DC3 -

*2
The single conductor
must be placed
in the protective tube

AWG	mm²	*cable into seperate UL protective tube	AWG	mm²
18	0,75		2	25
16	1		2 *	16 NSGAFöu
14	1,5		1	35
12	2,5		250 kcmil	95 ALU
12 *	2,5 NSGAFöu		2x2	1x70 NSGAFöu
10	4		2x4	2x70 NSGAFöu
6	10		4x250 kcmil	4x70 NSGAFöu
6 *	10 NSGAFöu		6x250 kcmil	6x70 NSGAFöu
4	16			

EEC

+AC_DC-237W10 SUB 4_1 + Pos. =UNIT_03 → DC+4_1_BAT / =UNIT_03++ASC/678.2
+AC_DC-237W11 SUB 4_1 - Pos. → DC-4_1_BAT / =UNIT_03++ASC/678.2
+AC_DC-237W12 SUB 4_2 + Pos. =UNIT_03 → DC+4_2_BAT / =UNIT_03++ASC/678.5
+AC_DC-237W13 SUB 4_2 - Pos. → DC-4_2_BAT / =UNIT_03++ASC/678.5
+AC_DC-237W14 SUB 4_3 + Pos. =UNIT_03 → DC+4_3_BAT / =UNIT_03++ASC/678.7
+AC_DC-237W15 SUB 4_3 - Pos. → DC-4_3_BAT / =UNIT_03++ASC/678.7

Cu 100mm x 10mm x 195mm FRQ.50604 &EFA++/1a.7 =UNIT_03&EFA++/1a.0
Cu 100mm x 10mm x 195mm FRQ.50604 &EFA++/1a.7 =UNIT_03&EFA++/1a.5

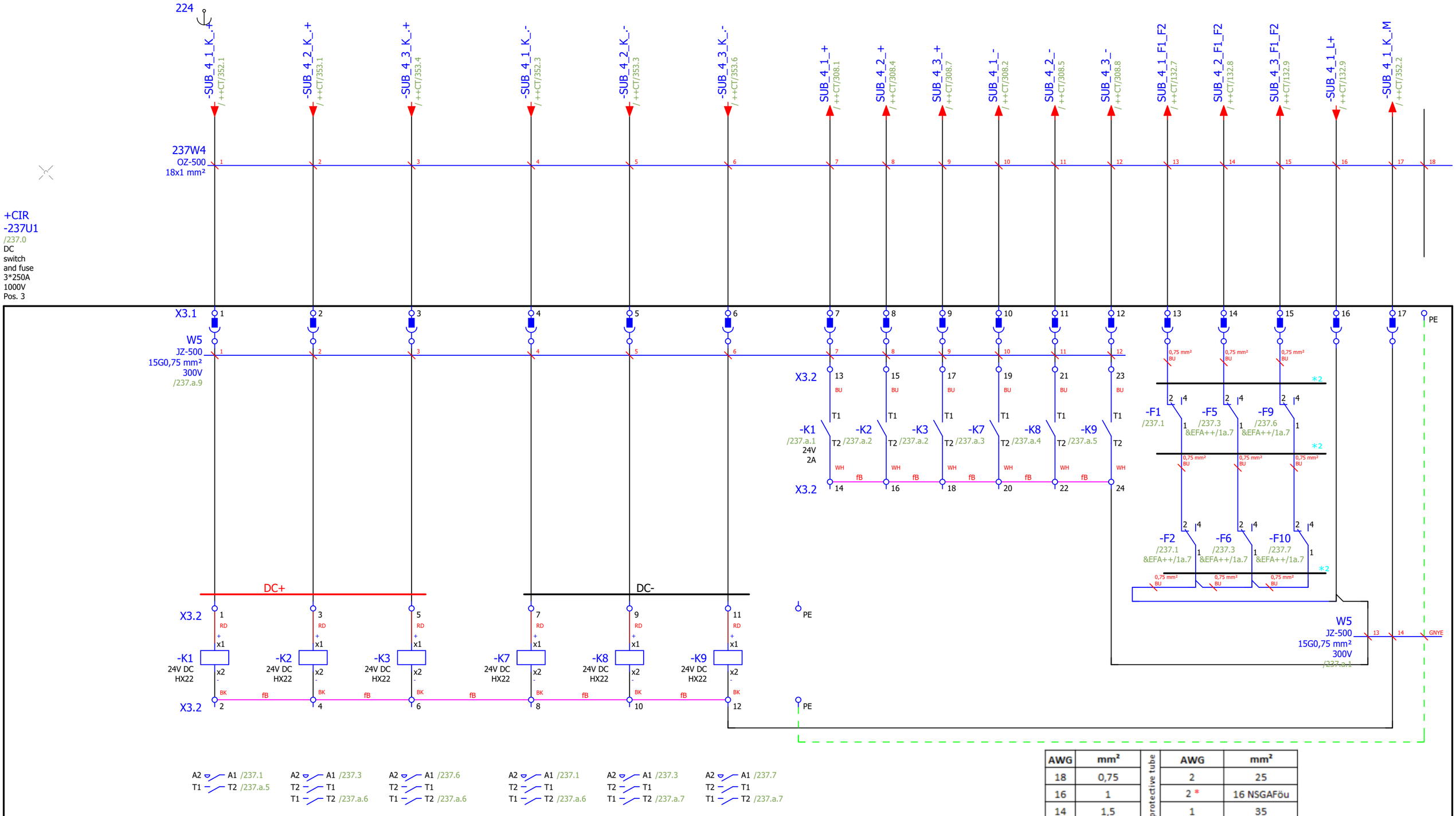
DC+4_1 / 238b.1
DC-4_1 / 238b.1
DC+4_2 / 238b.4
DC-4_2 / 238b.4
DC+4_3 / 238b.7
DC-4_3 / 238b.8

DC+ and DC- Busbars
in Connection cabinet

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next page: 237.a

Editor	Freqcon_JD			Statron	FREQCON	SUBSYSTEM 4_1 - 4_3 DC 3 x 250A	20241105_V1.2
Date	18.06.2024						10354_23A2007
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			
Date							

=	UNIT_01	Converter Container 1	
&	EFS	Circuit diagram	
++	CONV	Converter	page: 237
+			total: 498



AWG	mm²	* cable into seperate UL protective tube	AWG	mm²
18	0,75		2	25
16	1		2 *	16 NSGAFöu
14	1,5		1	35
12	2,5		250 kcmil	95 ALU
12 *	2,5 NSGAFöu		2x2	1x70 NSGAFöu
10	4		2x4	2x70 NSGAFöu
6	10		4x250 kcmil	4x70 NSGAFöu
6 *	10 NSGAFöu		6x250 kcmil	6x70 NSGAFöu
4	16			

*2 The single conductor must be placed in the protective tube

IEC

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Editor	Freqcon_DG			Statron	FREQCON	SUBSYSTEM 4_1 - 4_3 DC 3 x 250A	20241105_V1.2
Date	29.07.2024						
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007
Date							

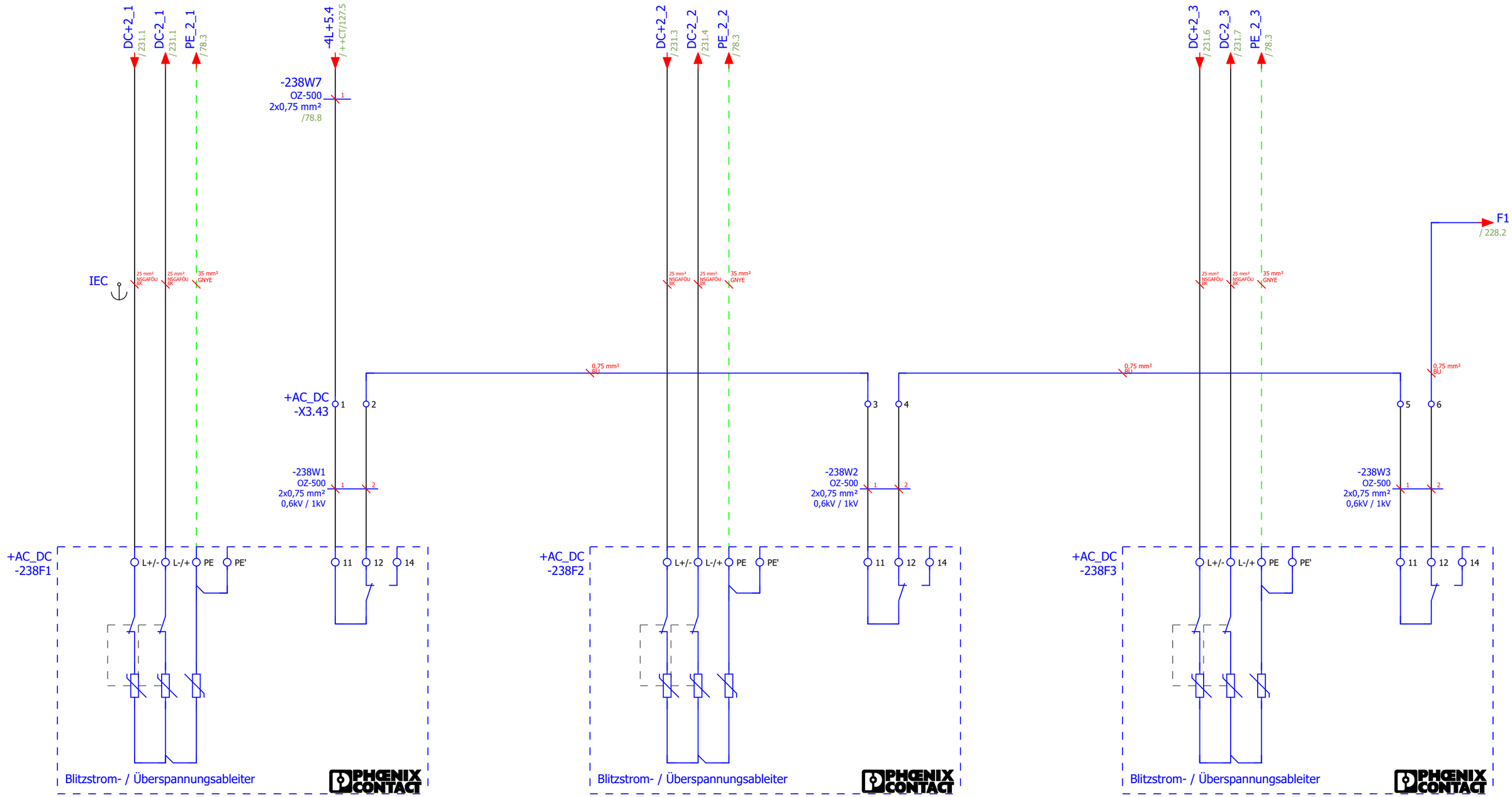
=	UNIT_01	Converter Container 1
&	EFS	Circuit diagram
++	CONV	Converter
+		

page: 237.a
total: 498

DC+ and DC- Busbars

DC+ and DC- Busbars

DC+ and DC- Busbars



SURGE ARRESTER
DC SUBSYSTEM 2_1

SURGE ARRESTER
DC SUBSYSTEM 2_2

SURGE ARRESTER
DC SUBSYSTEM 2_3

in Connection cabinet

previous page:
237.a

next page:
238b

Editor	Freqcon_JD			Statron	FREQCON	DC SURGE ARRESTER 2_1 - 2_3	20241105_V1.2	= UNIT_01 Converter Container 1
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV Converter page: 238a
Date								+ total: 498

DC+ and DC- Busbars

DC+4_1 / 237.1
DC-4_1 / 237.1
PE_4_1 / 78.4

IEC

25 mm² NSGAFÖU BK
25 mm² NSGAFÖU BK
35 mm² GNYE

F2
228.9 /

0,75 mm² BU

+AC_DC
-X3.43
13 14

-238W4
OZ-500
2x0,75 mm²
0,6kV / 1kV
1 2

+AC_DC
-238F4
L+/- L-/+ PE PE'
11 12 14

Blitzstrom- / Überspannungsableiter
PHOENIX CONTACT

SURGE ARRESTER
DC SUBSYSTEM 4_1

DC+ and DC- Busbars

DC+4_2 / 237.3
DC-4_2 / 237.4
PE_4_2 / 78.4

25 mm² NSGAFÖU BK
25 mm² NSGAFÖU BK
35 mm² GNYE

0,75 mm² BU

15 16

-238W5
OZ-500
2x0,75 mm²
0,6kV / 1kV
1 2

+AC_DC
-238F5
L+/- L-/+ PE PE'
11 12 14

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PHOENIX CONTACT

SURGE ARRESTER
DC SUBSYSTEM 4_2

DC+ and DC- Busbars

DC+4_3 / 237.6
DC-4_3 / 237.7
PE_4_3 / 78.5

25 mm² NSGAFÖU BK
25 mm² NSGAFÖU BK
35 mm² GNYE

0,75 mm² BU

F3
/ 78.9

17 18

-238W6
OZ-500
2x0,75 mm²
0,6kV / 1kV
1 2

+AC_DC
-238F6
L+/- L-/+ PE PE'
11 12 14

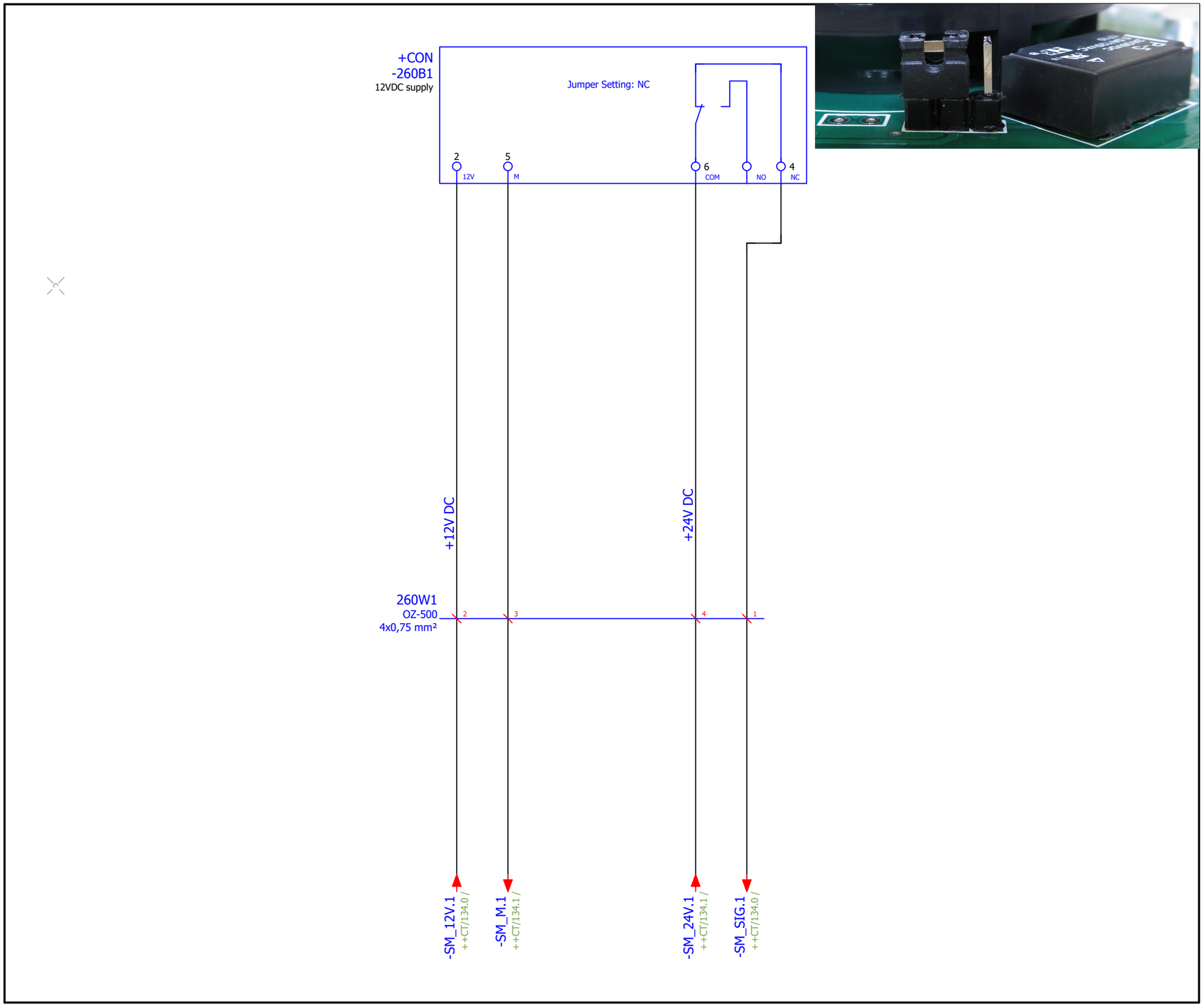
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SURGE ARRESTER
DC SUBSYSTEM 4_3

in Connection cabinet

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Editor	Freqcon_JD			Statron	FREQCON	DC SURGE ARRESTER 4_1 - 4_3	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV Converter	page: 238b
Date								+	total: 498

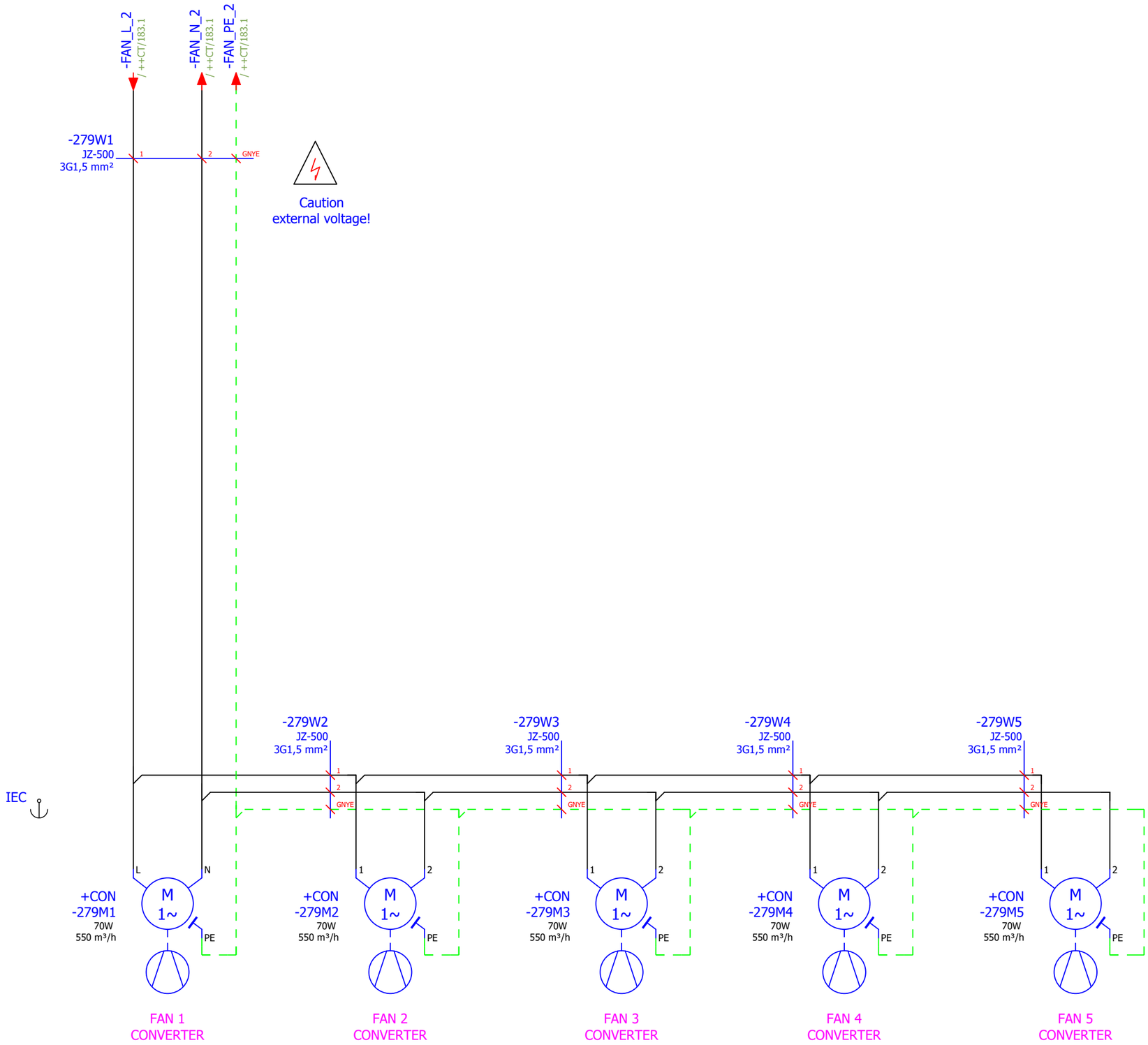


SMOKE DETECTOR
+CON CABINET

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238b

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279

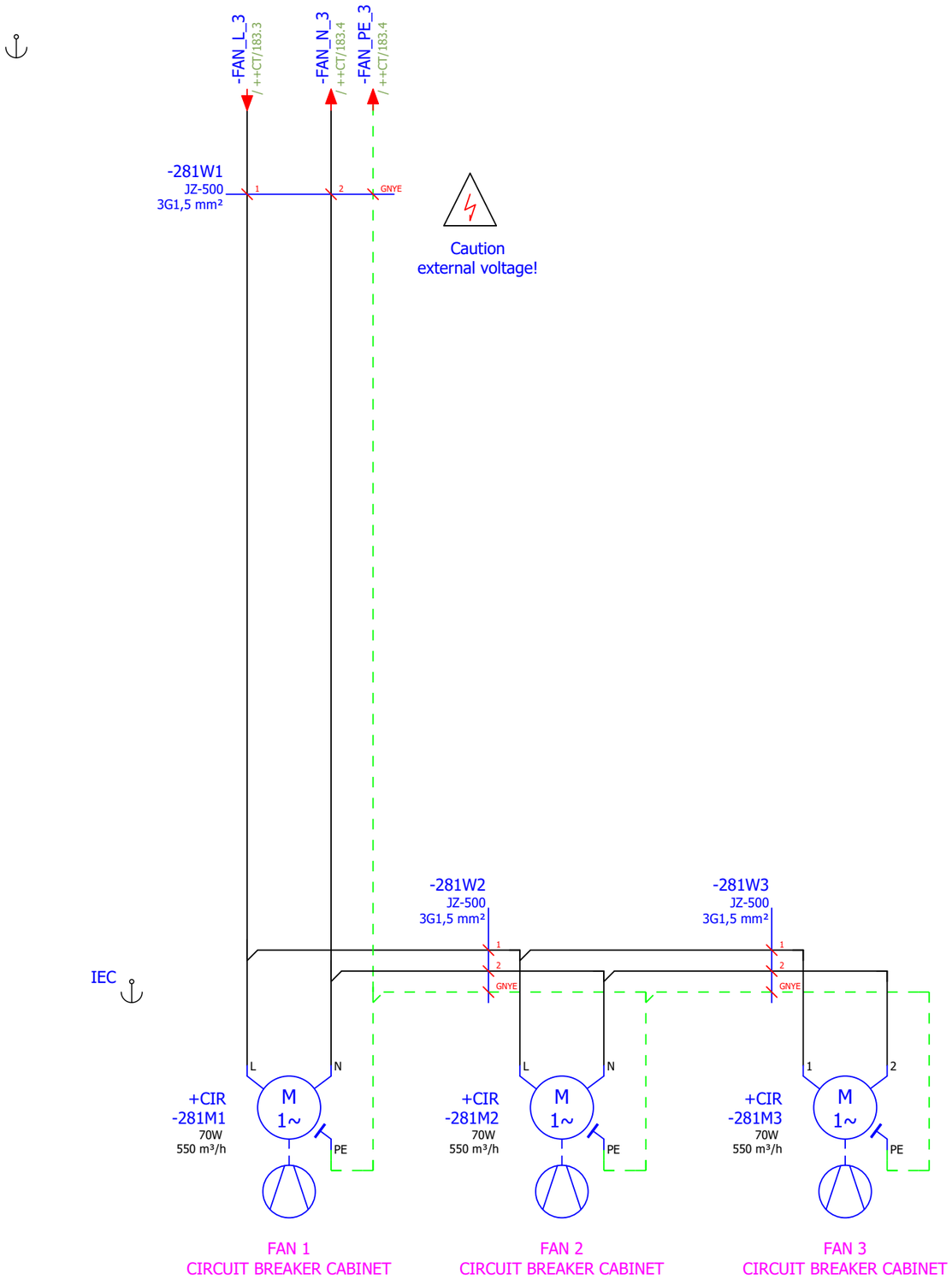
Editor	Freqcon_JD			Statron	FREQCON	SMOKE DETECTOR	20241105_V1.2	= UNIT_01	Converter Container 1	
Date	18.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV	Converter	page: 260
Date								+		total: 498



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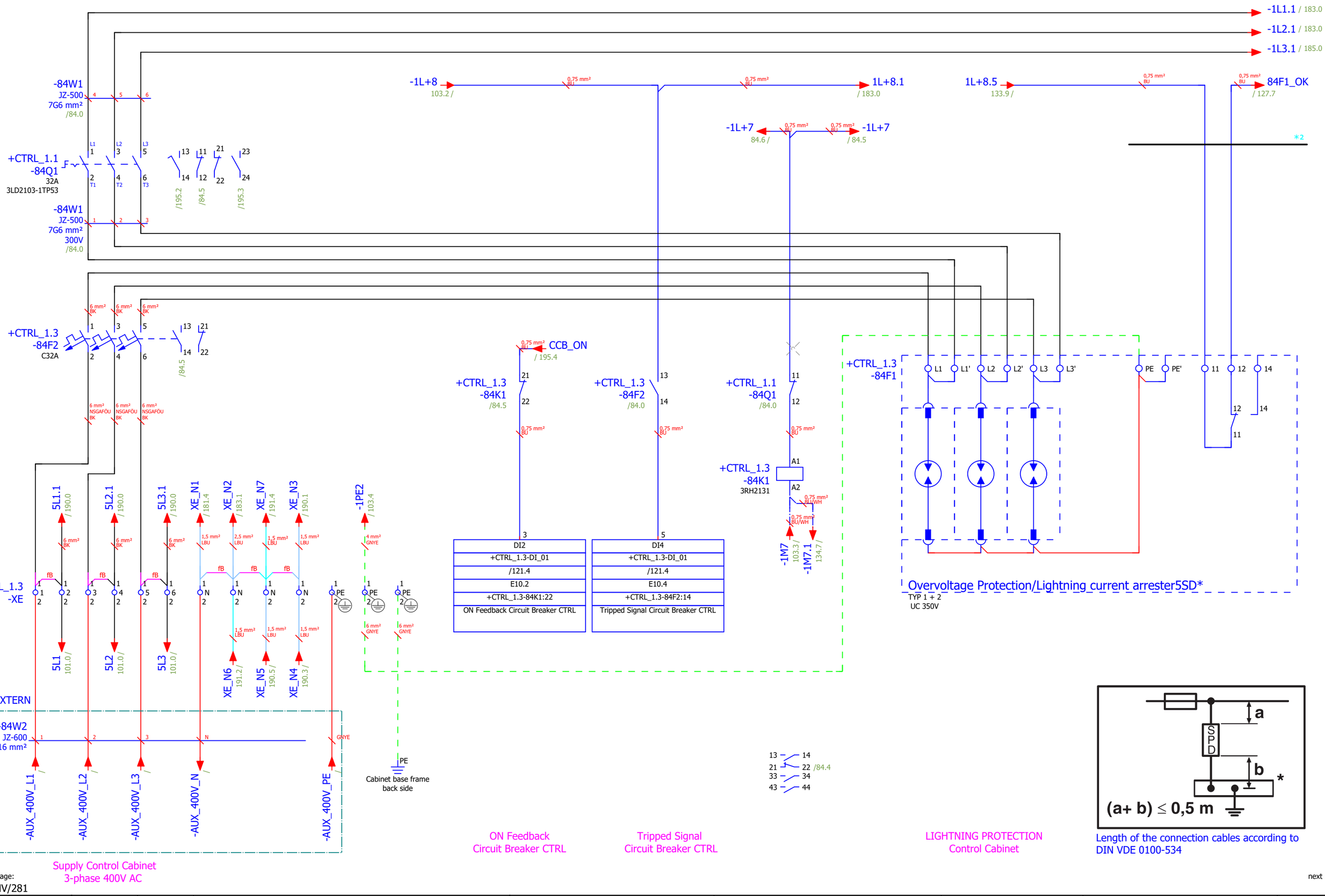
Editor	Freqcon_JD			Statron	FREQCON	CONVERTER CABINET CLIMATE	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV Converter	page: 279
Date								+	total: 498



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279

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++CT/84

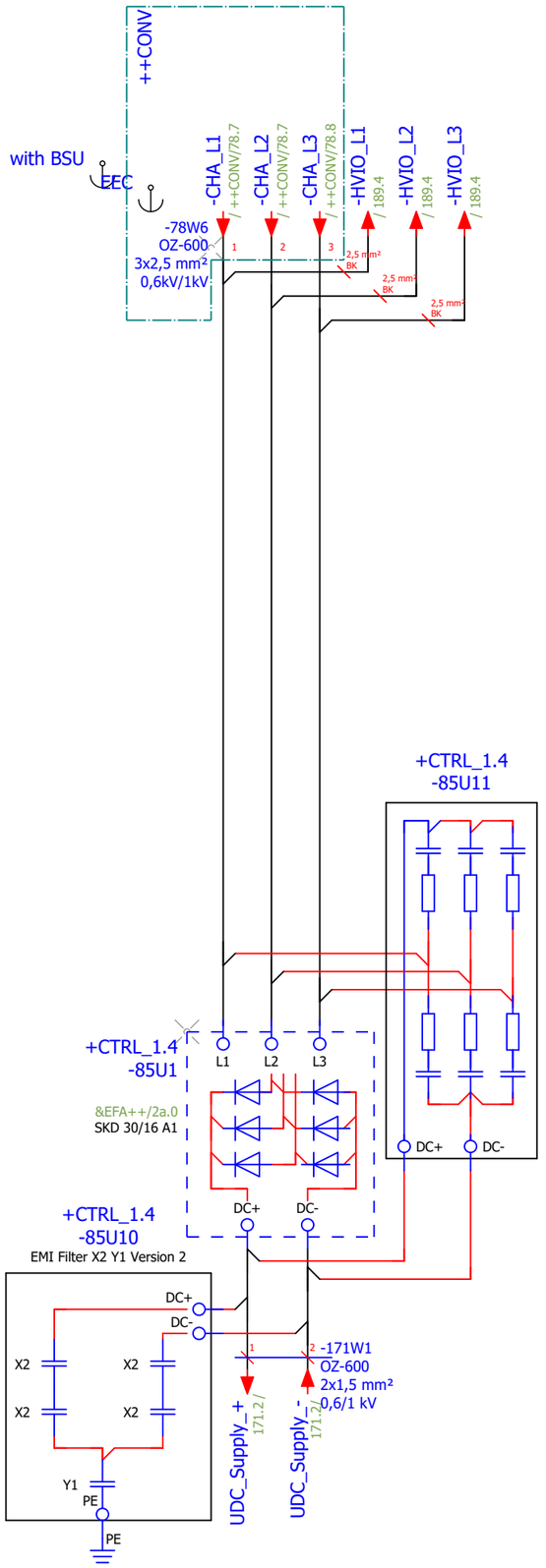
Editor	Freqcon_JD			Statron	FREQCON	CIRCUIT BREAKER CABINET CLIMATE	20241105_V1.2	= UNIT_01	Converter Container 1	
Date	18.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV	Converter	page: 281
Date								+		total: 498



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++CONV/281

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Editor	Freqcon_DG			Statron	FREQCON	FEEDING CONTROL CABINET (CTRL)	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	29.07.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 84
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earthing via cooling element

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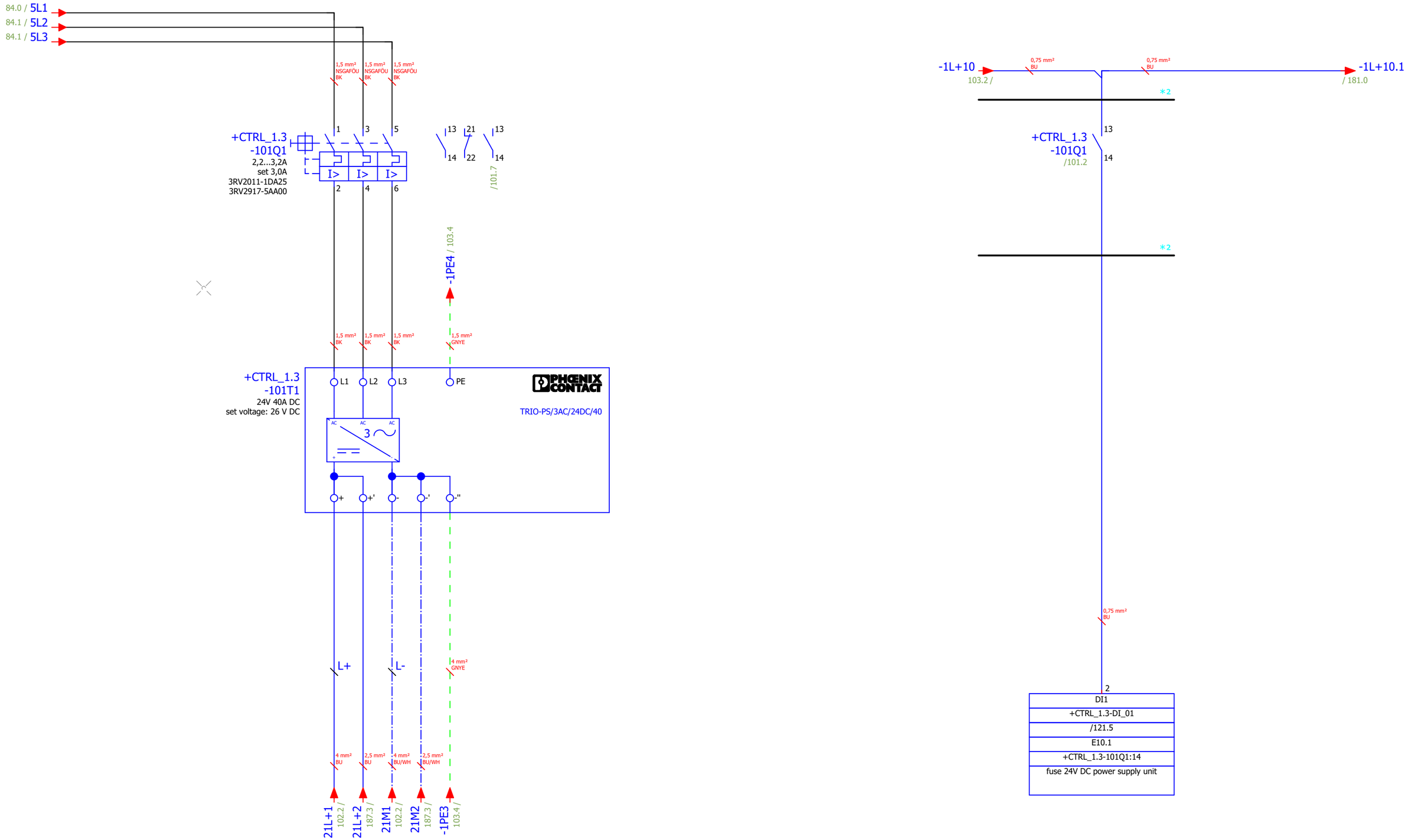
Editor	Freqcon_DG			Statron	FREQCON	SUPPLY UDC	20241105_V1.2	= UNIT_01	Converter Container 1	
Date	29.07.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 85
Date								+		total: 498

Control Cabinet

Pages 100 - 199

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*2

The single conductor must be placed in the protective tube

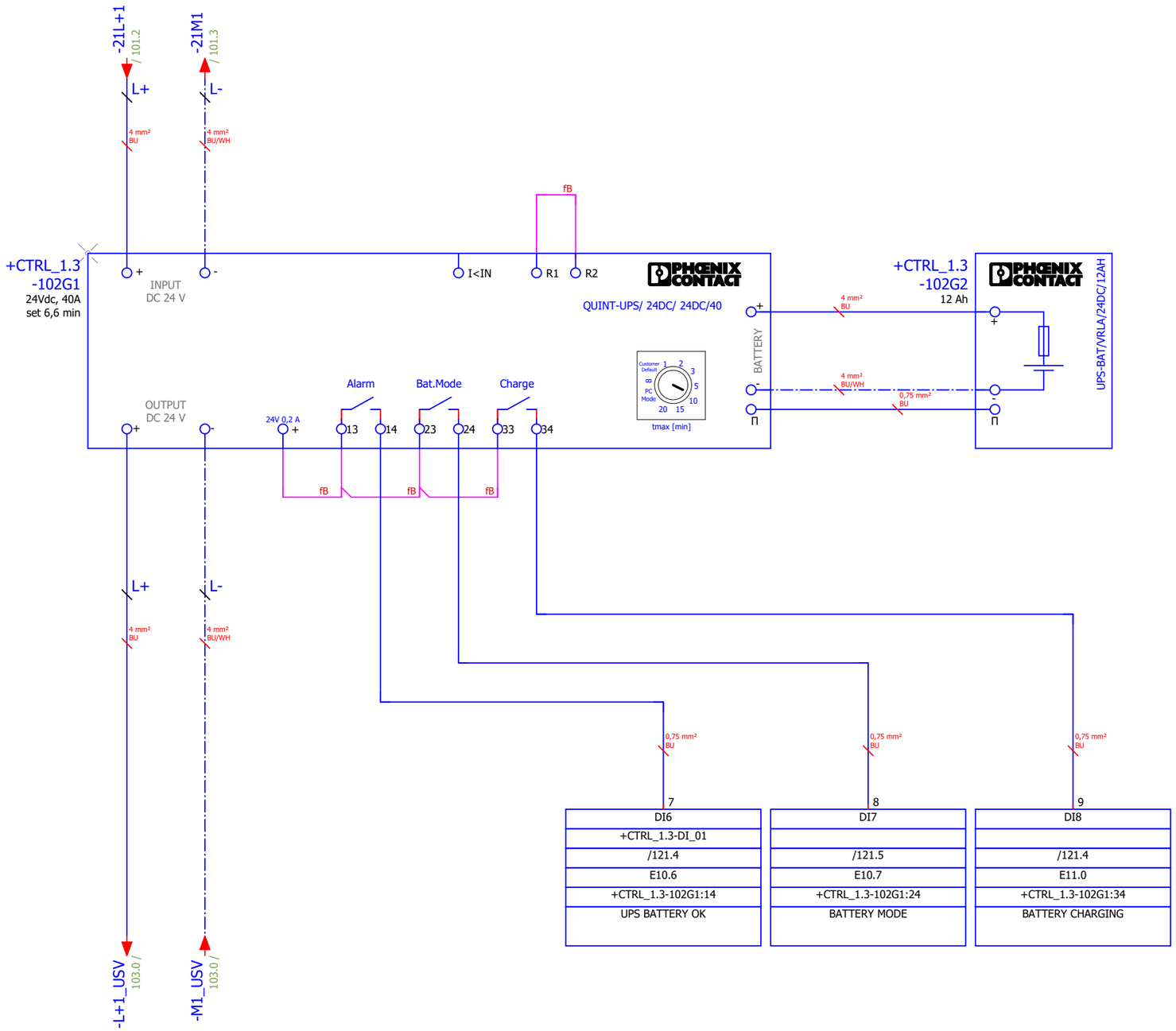
fuse
24V DC power supply unit

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Power supply unit from 400V AC

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Editor	Freqcon_DG			Statron	FREQCON	CONTROL VOLTAGE POWER SUPPLY UNIT	20241105_V1.2	= UNIT_01	Converter Container 1
Date	05.11.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets page: 101
Date								+	total: 498

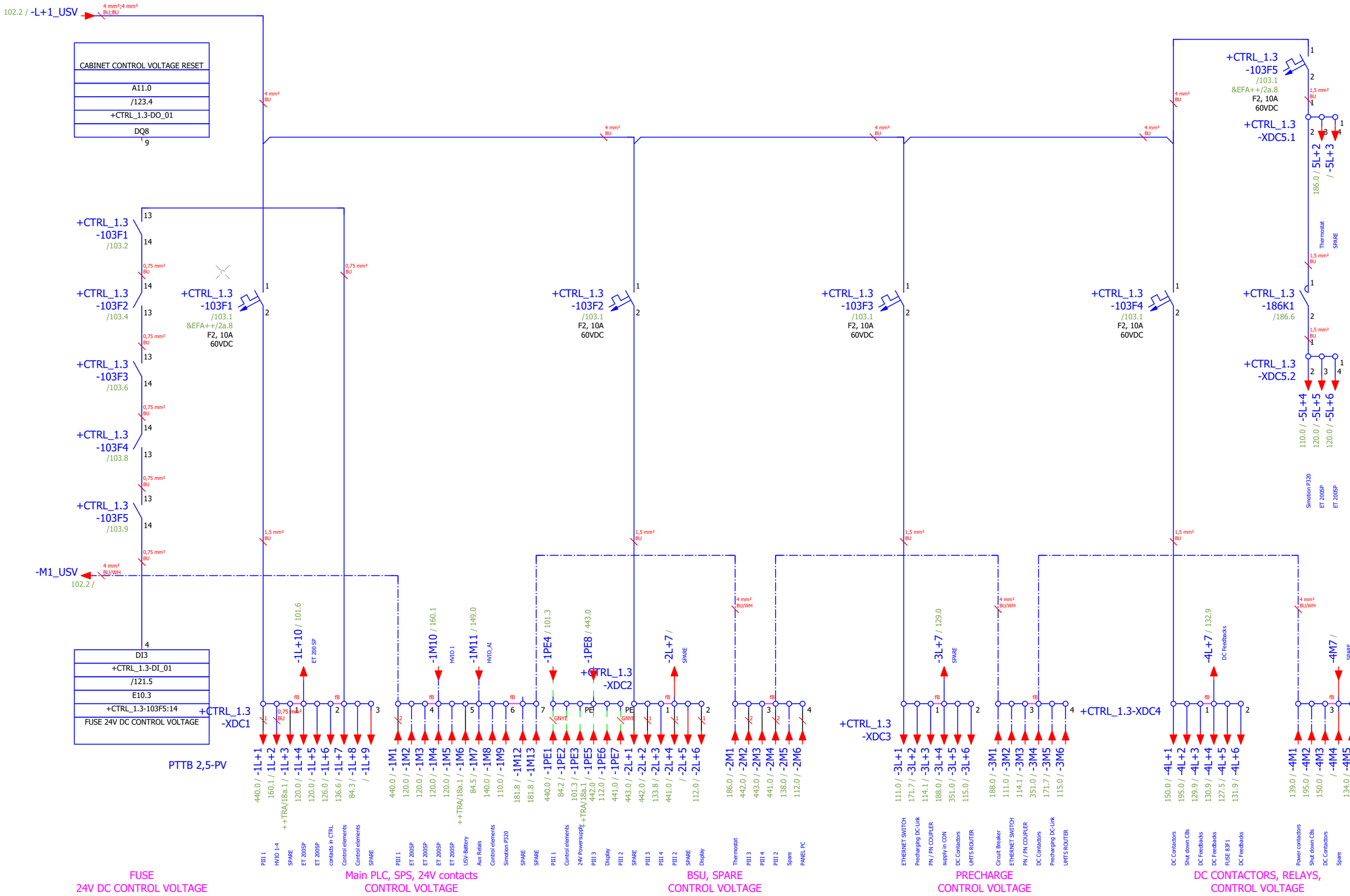


UPS BATTERY OK | BATTERY MODE | BATTERY CHARGING

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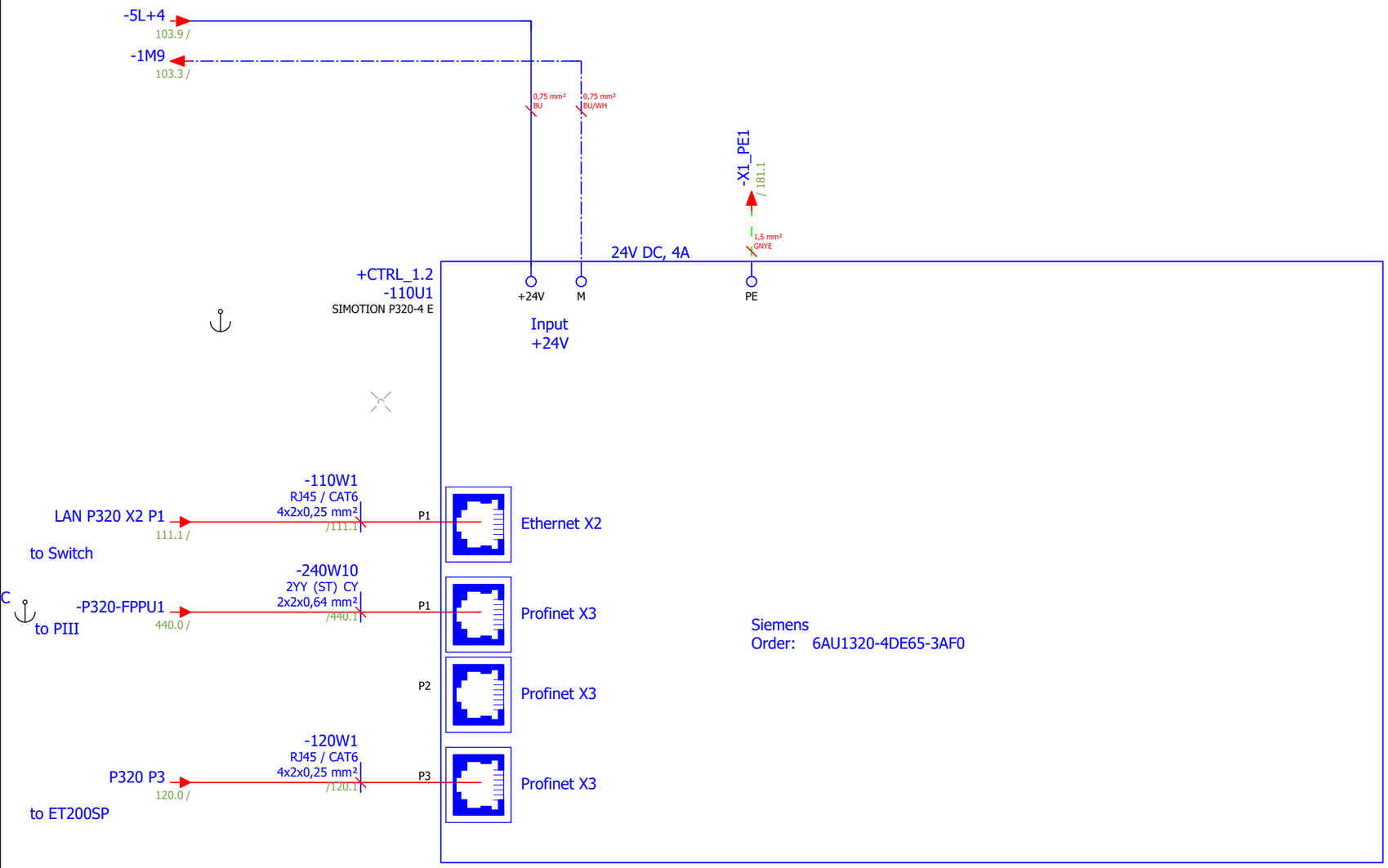
Editor	Freqcon_JD			Statron		CONTROL VOLTAGE UPS	20241105_V1.2	= UNIT_01 Converter Container 1
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets page: 102
Date								+ total: 498



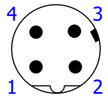
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Editor	Freqcon_DG			Statron	FREQCON	CONTROL VOLTAGE FUSE	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	29.07.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 103
Date								+	total: 498



Plug with D-coded



Top view of the pinheader

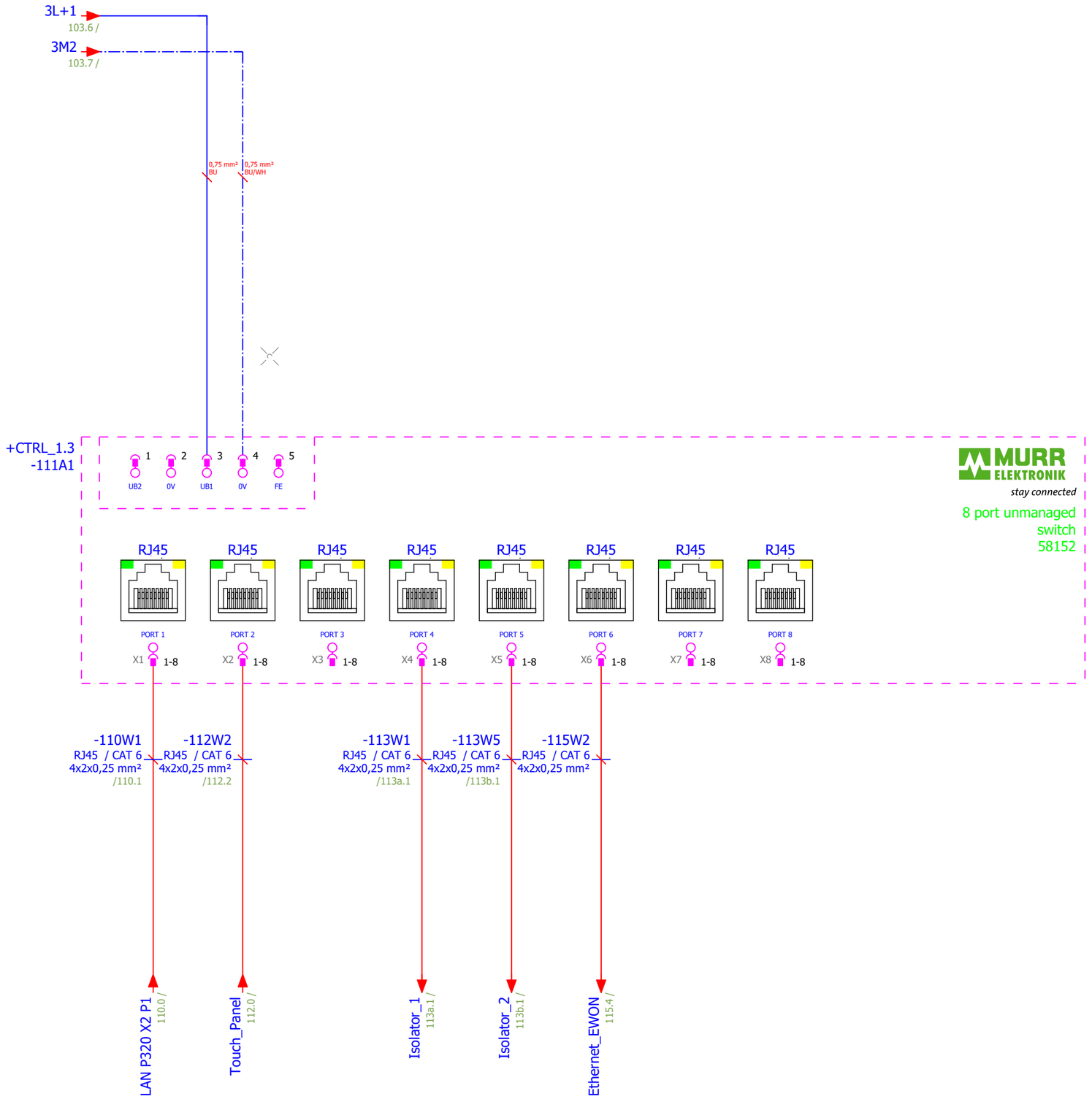
Signal	Colour	RJ45	M12 plug
TD+	yellow	1	1
TD-	orange	2	3
RD+	white	3	2
RD-	blue	6	4

Connection P320 -- PIII

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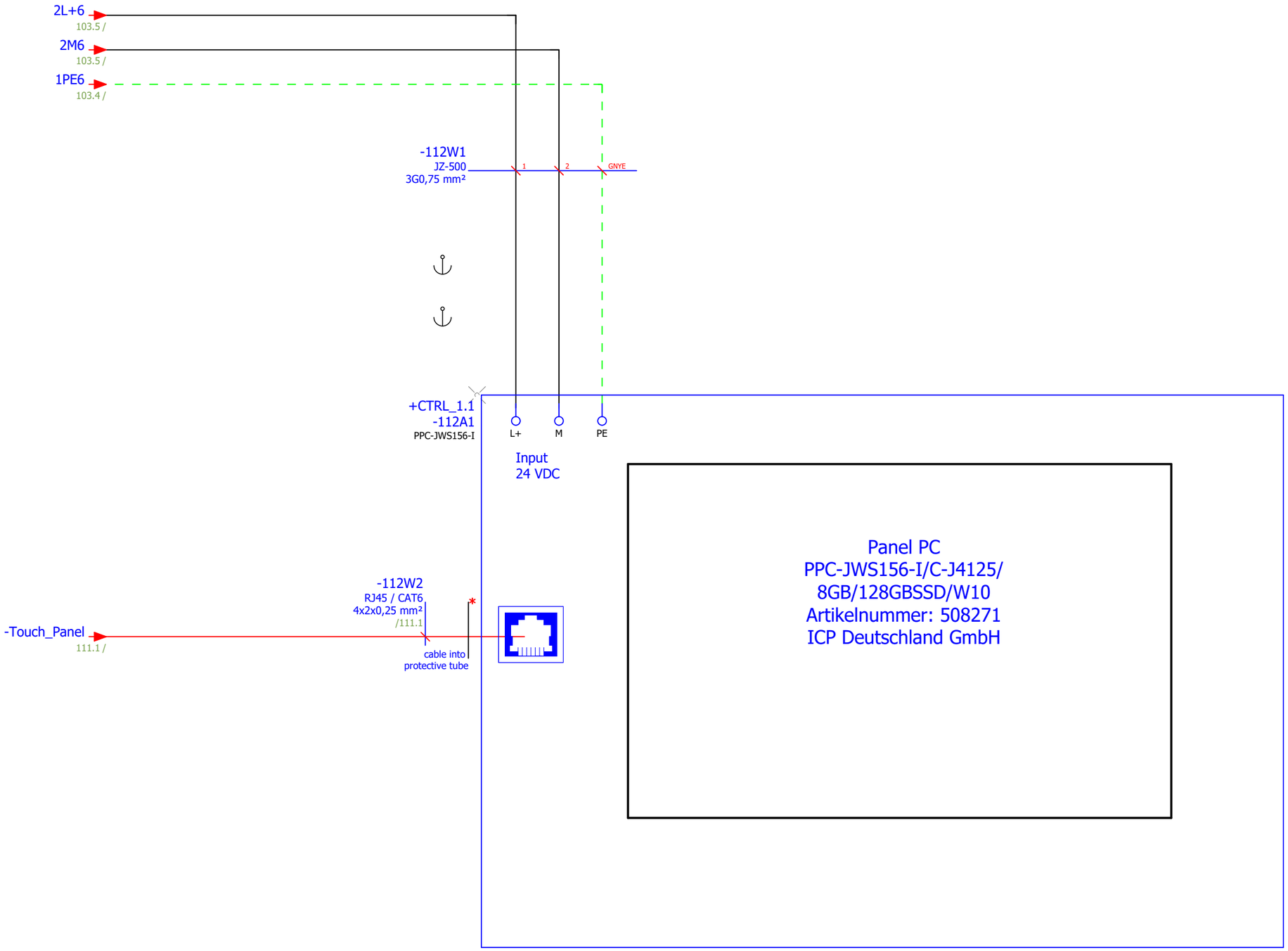
Editor	Freqcon_JD			Statron	FREQCON	MAIN PLC	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	20.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 110
Date								+	total: 498



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Editor	Freqcon_JD			Statron	FREQCON	ETHERNET SWITCH	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 111
Date								+	total: 498

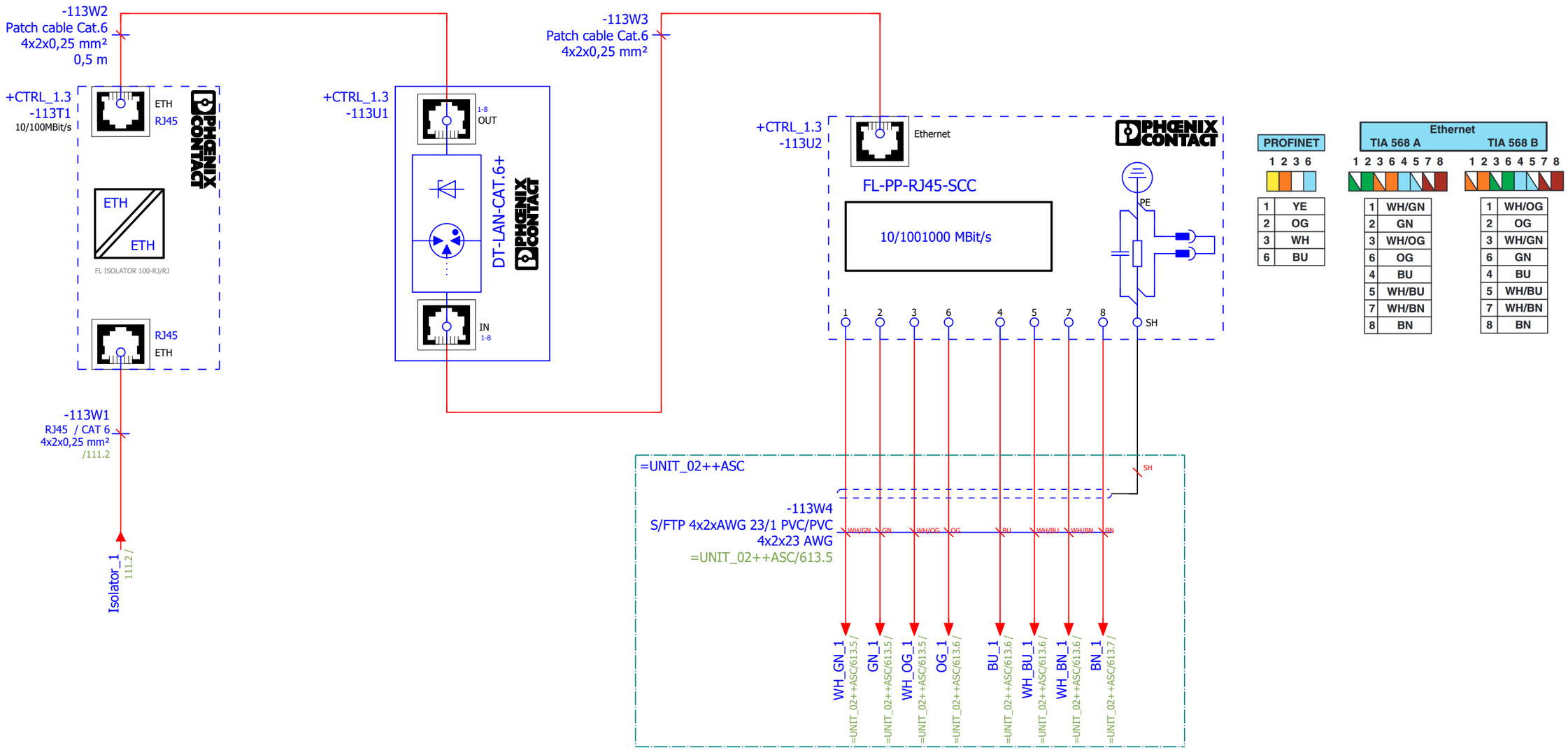


PANEL PC

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113a

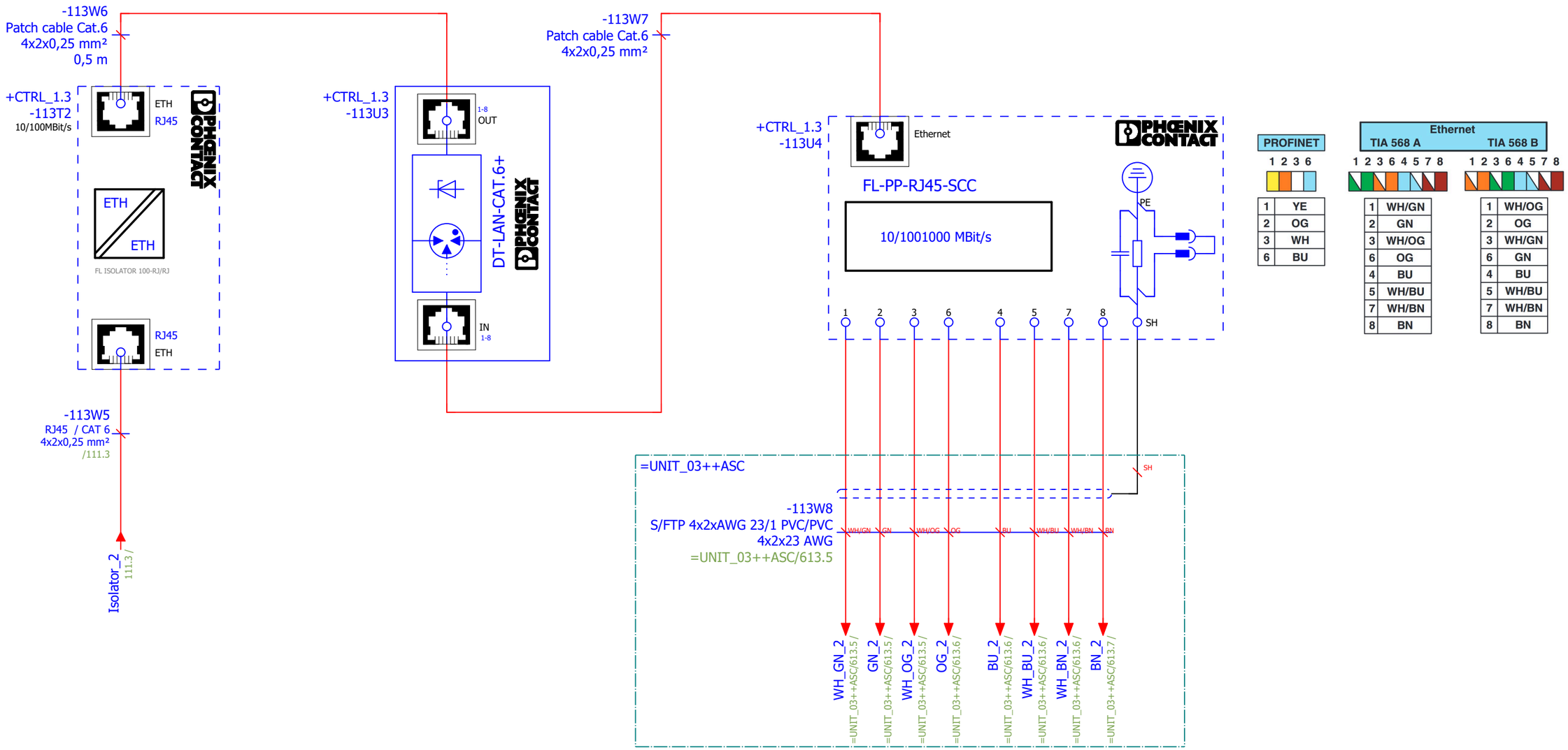
Editor	Freqcon_JD			Statron	FREQCON	PANEL PC HMI	20241105_V1.2	= UNIT_01	Converter Container 1	
Date	18.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 112
Date								+		total: 498



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113b

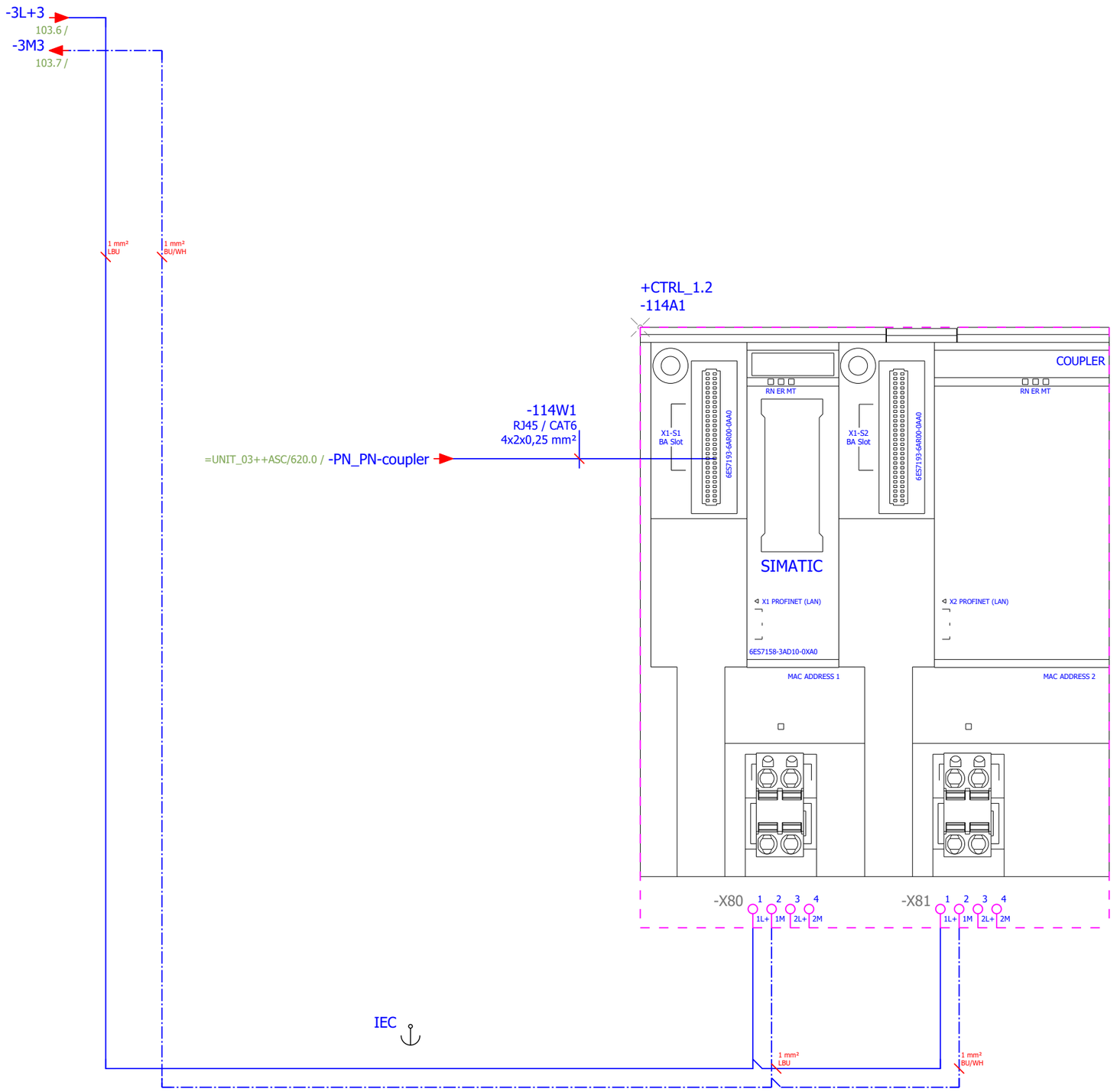
Editor	Freqcon_JD			Statron	FREQCON	ETHERNET / PROFINET ISOLATOR	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 113a
Date								+	total: 498



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Editor	Freqcon_JD			Statron	FREQCON	ETHERNET / PROFINET ISOLATOR	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 113b
Date								+	total: 498

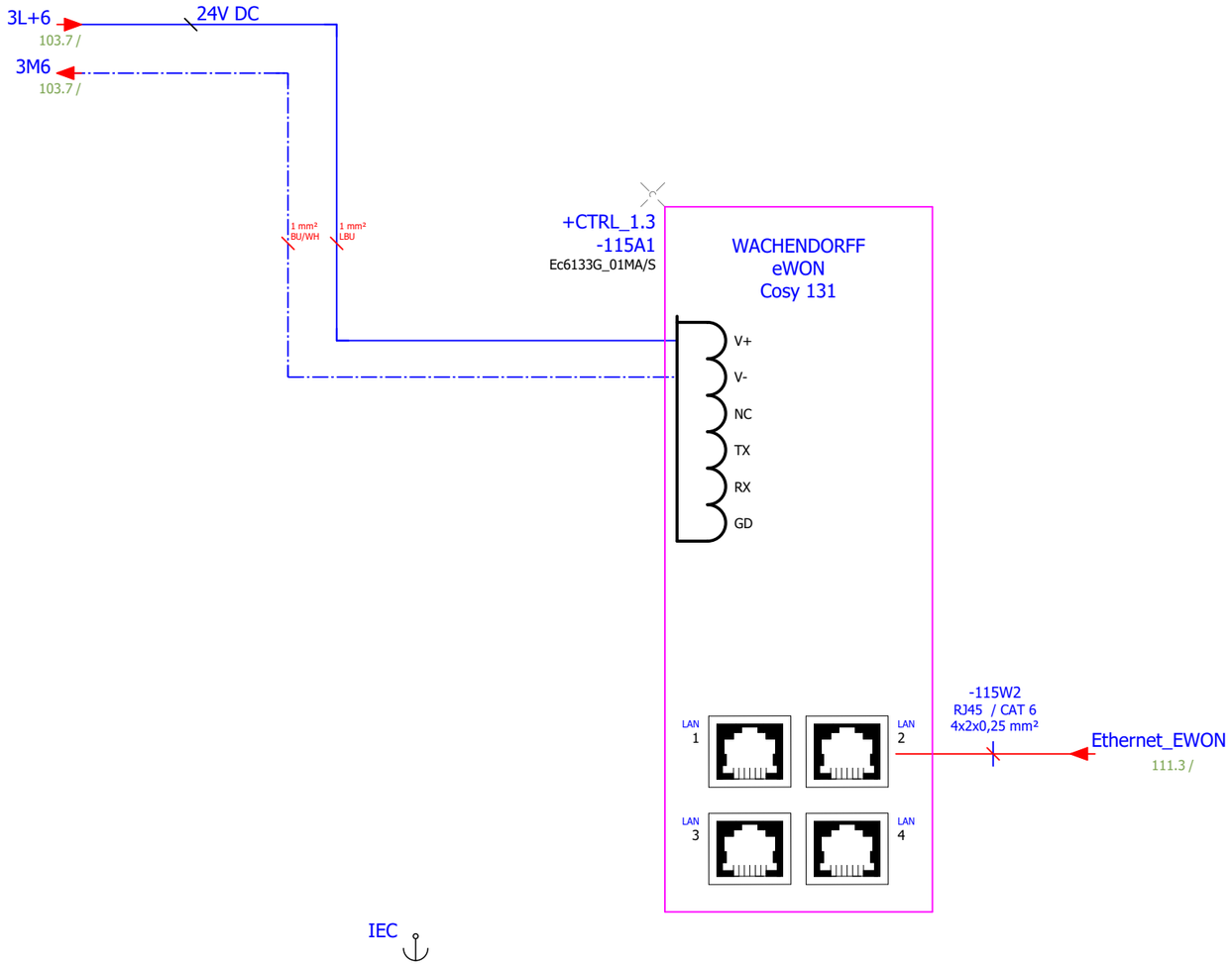


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113b

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115

Editor	Freqcon_JD			Statron	FREQCON	HELMHOLZ	20241105_V1.2	= UNIT_01	Converter Container 1
Date	02.07.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets
Date								+	

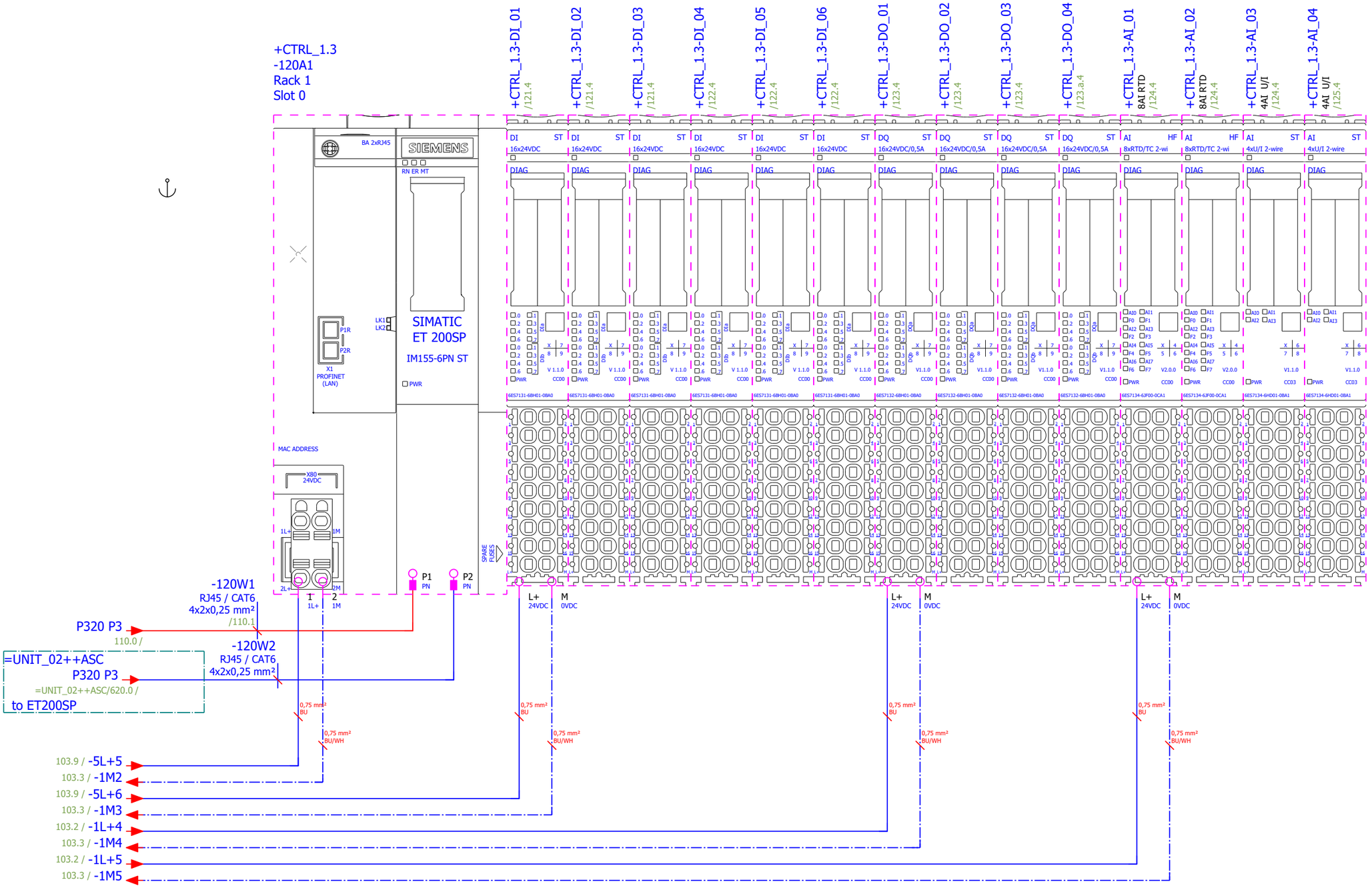
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total: 498



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Editor	Freqcon_JD			Statron	FREQCON	UMTS ROUTER	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 115
Date								+	total: 498



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Editor	Freqcon_JD			Statron	FREQCON	ET200 24V DC	20241105_V1.2	= UNIT_01	Converter Container 1	
Date	20.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 120
Date								+		total: 498

+CTRL_1.3-DI_01

/120.3

		DI0 1	E10.0	E10.1 2 DI1	/101.7	fuse 24V DC power supply unit
ON Feedback Circuit Breaker CTRL	/84.4	DI2 3	E10.2	E10.3 4 DI3	/103.1	FUSE 24V DC CONTROL VOLTAGE
Tripped Signal Circuit Breaker CTRL	/84.5	DI4 5	E10.4	E10.5 6 DI5	/127.7	LIGHTNING PROTECTION in Control Cabinet OPTIONAL
UPS BATTERY OK	/102.5	DI6 7	E10.6	E10.7 8 DI7	/102.6	BATTERY MODE
BATTERY CHARGING	/102.7	DI8 9	E11.0	E11.1 10 DI9	/126.1	RESET -126S1
FUSE FOR PUMP	/181.2	DI10 11	E11.2	E11.3 12 DI11	/182.2	FAN 1 HEAT EXCHANGER
FUSE FOR HEATER	/181.5	DI12 13	E11.4	E11.5 14 DI13		
Fuse Fans CON, IND Cabinets	/183.6	DI14 15	E11.6	E11.7 16 DI15	/185.9	supply light, fan, heater, power unit in cabinet
	/120.3	24VDC L+		M 0VDC	/120.3	

+CTRL_1.3-DI_02

/120.3

FAULT SIGNAL SAFETY RELAY	/195.4	DI0 1	E12.0	E12.1 2 DI1	/187.6	FUSES SUPPLY FOR CIRCUIT BREAKER 1+2
CB 1 ON GRID	/127.2	DI2 3	E12.2	E12.3 4 DI3	/127.3	CB 1 OFF GRID
CB 1 Tripped GRID	/127.1	DI4 5	E12.4	E12.5 6 DI5	/127.4	FUSE AND LIGHTNING PROTECTION
Smoke detector CON	/134.0	DI6 7	E12.6	E12.7 8 DI7	/129.0	SUBSYSTEM 2_1_DC + Contactor K1 is on
SUBSYSTEM 2_1_DC -Contactor K7 is on	/129.1	DI8 9	E13.0	E13.1 10 DI9	/129.2	SUBSYSTEM 2_2_DC + Contactor K2 is on
SUBSYSTEM 2_2_DC -Contactor K8 is on	/129.3	DI10 11	E13.2	E13.3 12 DI11	/129.4	SUBSYSTEM 2_3_DC + Contactor K3 is on
SUBSYSTEM 2_3_DC -Contactor K9 is on	/129.5	DI12 13	E13.4	E13.5 14 DI13	/129.6	SUBSYSTEM 2_3_DC + SPARE
SUBSYSTEM 2_DC -SPARE	/129.7	DI14 15	E13.6	E13.7 16 DI15	/129.8	SUBSYSTEM 2_1_DC FUSE OK
		24VDC L+		M 0VDC		

+CTRL_1.3-DI_03

/120.3

SUBSYSTEM 2_2_DC FUSE OK	/129.9	DI0 1	E14.0	E14.1 2 DI1	/130.0	SUBSYSTEM 3_1_DC + Contactor K1 is on
SUBSYSTEM 3_1_DC -Contactor K7 is on	/130.1	DI2 3	E14.2	E14.3 4 DI3	/130.2	SUBSYSTEM 3_2_DC + Contactor K2 is on
SUBSYSTEM 3_2_DC -Contactor K8 is on	/130.3	DI4 5	E14.4	E14.5 6 DI5	/130.4	SUBSYSTEM 3_3_DC + Contactor K3 is on
SUBSYSTEM 3_3_DC -Contactor K9 is on	/130.5	DI6 7	E14.6	E14.7 8 DI7	/130.6	SUBSYSTEM 3_DC + SPARE
SUBSYSTEM 3_DC -SPARE	/130.7	DI8 9	E15.0	E15.1 10 DI9	/130.8	SUBSYSTEM 2_DC FUSE OK
SUBSYSTEM 3_1_DC FUSE OK	/130.9	DI10 11	E15.2	E15.3 12 DI11	/131.0	SUBSYSTEM 4_1_DC + Contactor K1 is on
SUBSYSTEM 4_1_DC -Contactor K7 is on	/131.1	DI12 13	E15.4	E15.5 14 DI13	/131.2	SUBSYSTEM 4_2_DC + Contactor K2 is on
SUBSYSTEM 4_2_DC -Contactor K8 is on	/131.3	DI14 15	E15.6	E15.7 16 DI15	/131.4	SUBSYSTEM 4_3_DC + Contactor K3 is on
		24VDC L+		M 0VDC		

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+CTRL_1.3-DI_04

/120.4

		DI			DI		
SPARE	/133.1	DI0 1	E16.0	E16.1 2 DI1	/133.2	SPARE	
SPARE	/133.3	DI2 3	E16.2	E16.3 4 DI3	/133.4	TRIP	
Earthing switch in On Transformer 620V side	/133.9	DI4 5	E16.4	E16.5 6 DI5			
		DI6 7	E16.6	E16.7 8 DI7			
		DI8 9	E17.0	E17.1 10 DI9			
Fuse 230V AC for Container Air Conditioning	/133.6	DI10 11	E17.2	E17.3 12 DI11	/128.1	CB 2 Tripped ISLAND GRID	
CB 2 ON ISLAND GRID	/128.2	DI12 13	E17.4	E17.5 14 DI13	/128.3	CB 2 OFF ISLAND GRID	
FUSE AND LIGHTNING PROTECTION 2	/128.4	DI14 15	E17.6	E17.7 16 DI15	/182.5	FAN 2 HEAT EXCHANGER (OPTIONAL)	
		24VDC L+		M 0VDC			

+CTRL_1.3-DI_05

/120.4

		DI			DI		
SUBSYSTEM 4_3_DC -Contactor K9 is on	/131.5	DI0 1	E18.0	E18.1 2 DI1	/131.6	SUBSYSTEM 4_DC + SPARE	
SUBSYSTEM 4_DC -SPARE	/131.7	DI2 3	E18.2	E18.3 4 DI3	/131.8	SUBSYSTEM 3_2_DC FUSE OK	
SUBSYSTEM 3_3_DC FUSE OK	/131.9	DI4 5	E18.4	E18.5 6 DI5	/132.0		
	/132.1	DI6 7	E18.6	E18.7 8 DI7	/132.2		
	/132.3	DI8 9	E19.0	E19.1 10 DI9	/132.4		
	/132.5	DI10 11	E19.2	E19.3 12 DI11	/132.6		
SUBSYSTEM 4_1_DC FUSE OK	/132.7	DI12 13	E19.4	E19.5 14 DI13	/132.8	SUBSYSTEM 4_2_DC FUSE OK	
SUBSYSTEM 4_3_DC FUSE OK	/132.9	DI14 15	E19.6	E19.7 16 DI15			
		24VDC L+		M 0VDC			

+CTRL_1.3-DI_06

/120.4

		DI			DI		
Shut-down to BESS	/136.6	DI0 1	E20.0	E20.1 2 DI1			
		DI2 3	E20.2	E20.3 4 DI3			
		DI4 5	E20.4	E20.5 6 DI5			
		DI6 7	E20.6	E20.7 8 DI7			
incoming CB is open	/136.8	DI8 9	E21.0	E21.1 10 DI9	/136.9	cmd island mode	
		DI10 11	E21.2	E21.3 12 DI11			
		DI12 13	E21.4	E21.5 14 DI13			
		DI14 15	E21.6	E21.7 16 DI15			
		24VDC L+		M 0VDC			

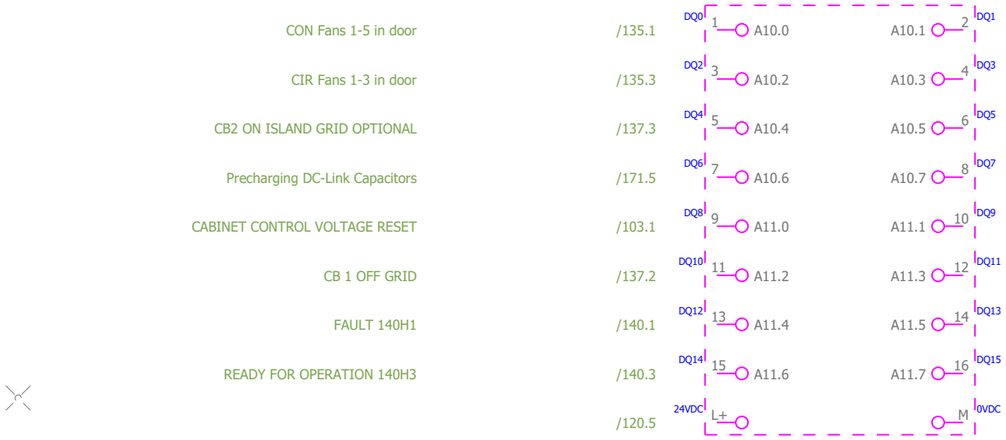
previous page: 121

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Editor	Freqcon_JD			Statron		ET200SP DIGITAL INPUTS DI_04 + DI_05	20241105_V1.2	= UNIT_01	Converter Container 1	
Date	14.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 122
Date								+		total: 498

+CTRL_1.3-DO_01

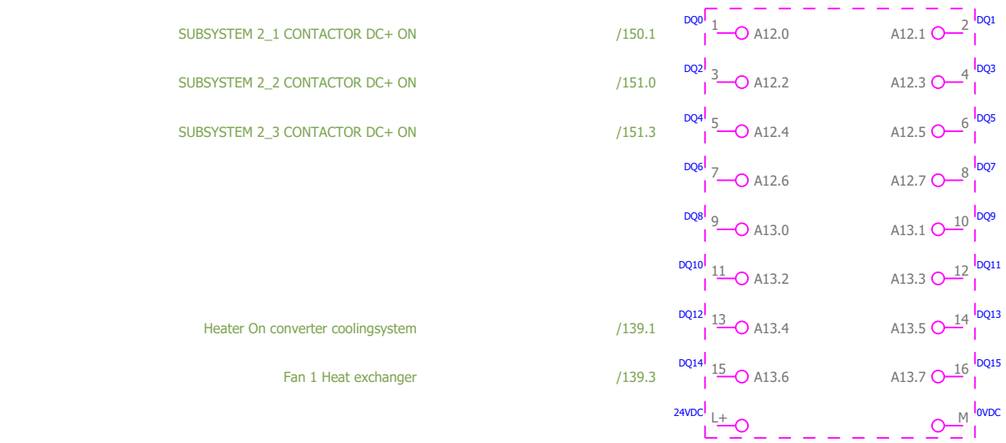
/120.5



CON Fans 1-5 in door	/135.1			/135.2	FAN 1 Control cabinet
CIR Fans 1-3 in door	/135.3			/135.4	SPARE 230V
CB2 ON ISLAND GRID OPTIONAL	/137.3			/137.4	CB 2 OFF ISLAND GRID OPTIONAL
Precharging DC-Link Capacitors	/171.5			/173.6	Discharge CON
CABINET CONTROL VOLTAGE RESET	/103.1			/137.1	CB1 ON GRID
CB 1 OFF GRID	/137.2			/189.1	GRID FAULT
FAULT 140H1	/140.1			/140.2	PREHEATING 140H2
READY FOR OPERATION 140H3	/140.3			/140.4	OPERATING 140H4
	/120.5			/120.5	

+CTRL_1.3-DO_02

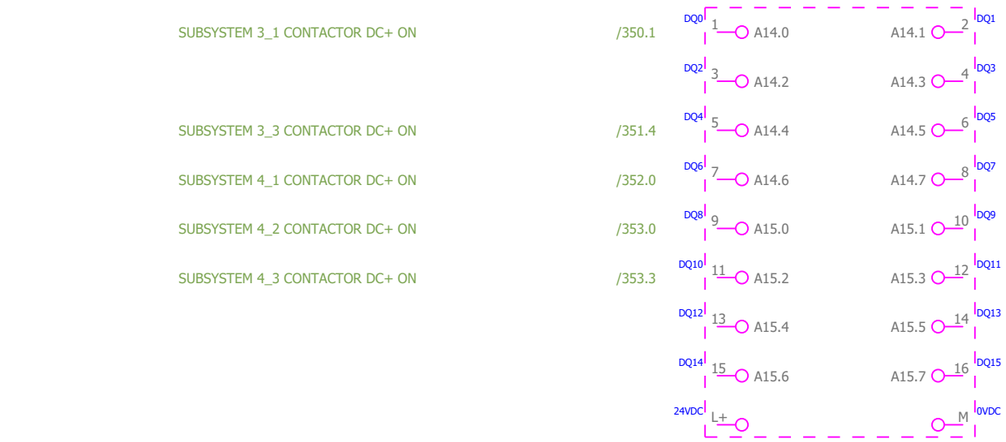
/120.5



SUBSYSTEM 2_1 CONTACTOR DC+ ON	/150.1			/150.3	SUBSYSTEM 2_1 CONTACTOR DC-ON
SUBSYSTEM 2_2 CONTACTOR DC+ ON	/151.0			/151.2	SUBSYSTEM 2_2 CONTACTOR DC-ON
SUBSYSTEM 2_3 CONTACTOR DC+ ON	/151.3			/151.5	SUBSYSTEM 2_3 CONTACTOR DC-ON
				/135.5	SPARE
				/139.4	Fan 2 Heat exchanger optional
Heater On converter coolingsystem	/139.1			/139.2	Pump converter coolingsystem
Fan 1 Heat exchanger	/139.3			/134.8	Reset the smoke detectors

+CTRL_1.3-DO_03

/120.5



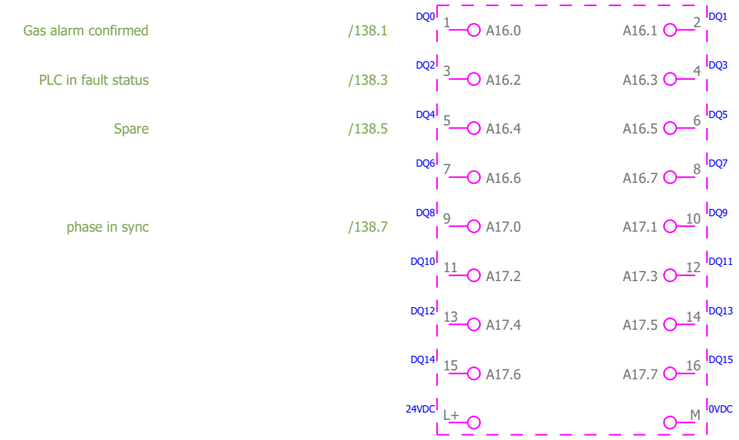
SUBSYSTEM 3_1 CONTACTOR DC+ ON	/350.1			/350.3	SUBSYSTEM 3_1 CONTACTOR DC-ON
SUBSYSTEM 3_3 CONTACTOR DC+ ON	/351.4			/351.5	SUBSYSTEM 3_3 CONTACTOR DC-ON
SUBSYSTEM 4_1 CONTACTOR DC+ ON	/352.0			/352.2	SUBSYSTEM 4_1 CONTACTOR DC-ON
SUBSYSTEM 4_2 CONTACTOR DC+ ON	/353.0			/353.2	SUBSYSTEM 4_2 CONTACTOR DC-ON
SUBSYSTEM 4_3 CONTACTOR DC+ ON	/353.3			/353.5	SUBSYSTEM 4_3 CONTACTOR DC-ON

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+CTRL_1.3-DO_04

/120.6



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Editor	Freqcon_JD			Statron	FREQCON	ET200SP DIGITAL OUTPUTS DO_01 - DO_03	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 123.a
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+CTRL_1.3-AI_01

/120.6

INDUCTOR GRID PHASE L1 TEMPERATURE 1_1	/145.1	M0+	1	PIW150	PIW152	2	M1+	/145.3	INDUCTOR GRID PHASE L2 TEMPERATURE 1_2
INDUCTOR GRID PHASE L3 TEMPERATURE 1_3	/145.5	M2+	3	PIW154	PIW156	4	M3+	/145.7	INDUCTOR DC SUB 2_1 TEMPERATURE 2_1
INDUCTOR DC SUB 2_2 TEMPERATURE 2_2	/146.1	M4+	5	PIW158	PIW160	6	M5+	/146.3	INDUCTOR DC SUB 2_3 TEMPERATURE 2_3
INDUCTOR DC SUB 3_1 TEMPERATURE 3_1	/146.5	M6+	7	PIW162	PIW164	8	M7+	/146.7	INDUCTOR DC SUB 3_2 TEMPERATURE 3_2
INDUCTOR GRID PHASE L1 TEMPERATURE 1_1	/145.1	M0-	9	PIW150	PIW152	10	M1-	/145.3	INDUCTOR GRID PHASE L2 TEMPERATURE 1_2
INDUCTOR GRID PHASE L3 TEMPERATURE 1_3	/145.5	M2-	11	PIW154	PIW156	12	M3-	/145.7	INDUCTOR DC SUB 2_1 TEMPERATURE 2_1
INDUCTOR DC SUB 2_2 TEMPERATURE 2_2	/146.1	M4-	13	PIW158	PIW160	14	M5-	/146.3	INDUCTOR DC SUB 2_3 TEMPERATURE 2_3
INDUCTOR DC SUB 3_1 TEMPERATURE 3_1	/146.5	M6-	15	PIW162	PIW164	16	M7-	/146.7	INDUCTOR DC SUB 3_2 TEMPERATURE 3_2
	/120.6	24VDC	L+		M	0VDC		/120.6	

+CTRL_1.3-AI_02

/120.6

INDUCTOR DC SUB 3_3 TEMPERATURE 3_3	/147.1	M0+	1	PIW166	PIW168	2	M1+	/147.3	INDUCTOR DC SUB 4_1 TEMPERATURE 4_1
CONTROL CABINET TEMPERATURE	/147.5	M2+	3	PIW170	PIW172	4	M3+	/147.7	CONVERTER CABINET TEMPERATURE
COOLING WATER TEMPERATURE	/148.1	M4+	5	PIW174	PIW176	6	M5+	/148.3	INDUCTOR DC SUB 4_2 TEMPERATURE 4_2
CIR CABINET TEMPERATURE	/148.5	M6+	7	PIW178	PIW180	8	M7+	/148.7	INDUCTOR DC SUB 4_3 TEMPERATURE 4_3
INDUCTOR DC SUB 3_3 TEMPERATURE 3_3	/147.1	M0-	9	PIW166	PIW168	10	M1-	/147.3	INDUCTOR DC SUB 4_1 TEMPERATURE 4_1
CONTROL CABINET TEMPERATURE	/147.5	M2-	11	PIW170	PIW172	12	M3-	/147.7	CONVERTER CABINET TEMPERATURE
COOLING WATER TEMPERATURE	/148.1	M4-	13	PIW174	PIW176	14	M5-	/148.3	INDUCTOR DC SUB 4_2 TEMPERATURE 4_2
CIR CABINET TEMPERATURE	/148.5	M6-	15	PIW178	PIW180	16	M7-	/148.7	INDUCTOR DC SUB 4_3 TEMPERATURE 4_3
		24VDC	L+		M	0VDC			

+CTRL_1.3-AI_03

/120.7

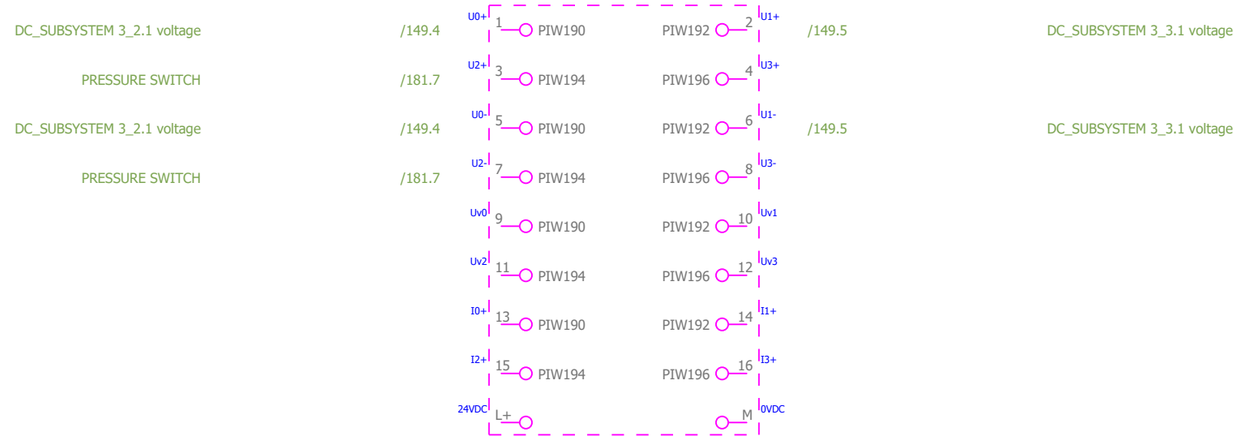
DC_SUBSYSTEM 2_1.1 voltage	/149.0	U0+	1	PIW182	PIW184	2	U1+	/149.1	DC_SUBSYSTEM 2_2.1 voltage
DC_SUBSYSTEM 2_3.1 voltage	/149.2	U2+	3	PIW186	PIW188	4	U3+	/149.3	DC_SUBSYSTEM 3_1.1 voltage
DC_SUBSYSTEM 2_1.1 voltage	/149.0	U0-	5	PIW182	PIW184	6	U1-	/149.1	DC_SUBSYSTEM 2_2.1 voltage
DC_SUBSYSTEM 2_3.1 voltage	/149.2	U2-	7	PIW186	PIW188	8	U3-	/149.3	DC_SUBSYSTEM 3_1.1 voltage
		Uv0	9	PIW182	PIW184	10	Uv1		
		Uv2	11	PIW186	PIW188	12	Uv3		
		I0+	13	PIW182	PIW184	14	I1+		
		I2+	15	PIW186	PIW188	16	I3+		
		24VDC	L+		M	0VDC			

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+CTRL_1.3-AI_04

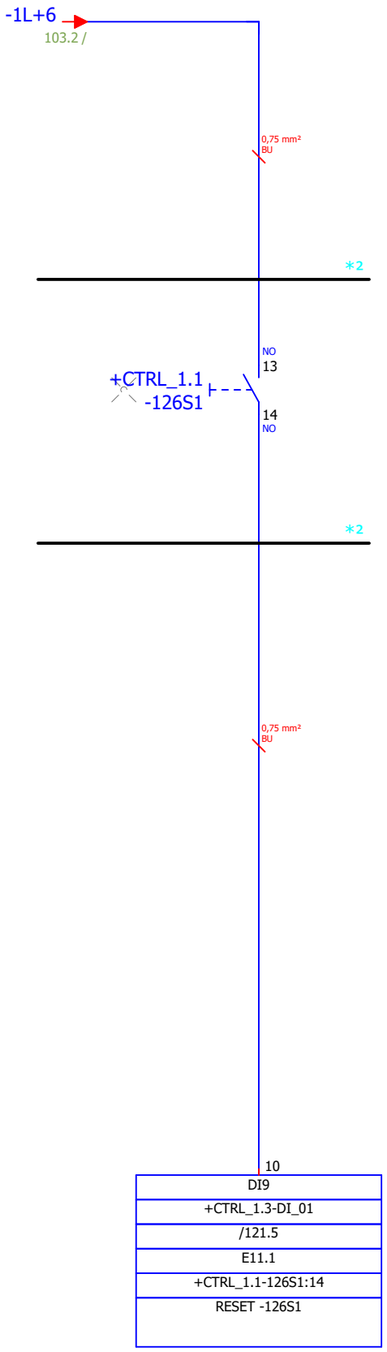
/120.7



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Editor	Freqcon_JD			Statron	FREQCON	ET200SP ANALOG INPUTS AI_04	20241105_V1.2	= UNIT_01	Converter Container 1	
Date	14.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 125
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RESET
-126S1

*2
The single conductor
must be placed
in the protective tube

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Editor	Freqcon_JD			Statron	FREQCON	INPUTS CONTROL ELEMENTS	20241105_V1.2	= UNIT_01	Converter Container 1	
Date	02.07.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 126
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EC

3WL

++CONV

-CB1_TRIPPED / ++CONV/80.8

-CB1_ON_FB / ++CONV/80.7

-CB1_OFF_FB / ++CONV/80.7

-1F2 / ++CONV/78.9

-4L+5.4 / ++CONV/238a.2

-80W1
OZ-500
8x0,75 mm²

-238W7
OZ-500
2x0,75 mm²

-24V_Signal / 189.5

-4L+5.3 / 134.0

84F1_OK / 84.9

+CTRL_1.3
-X3

0,75 mm² BU

fB

bridge

-4L+5 / 103.8

-4L+5.1 / 128.5

DI14	DI2	DI3	DI5
+CTRL_1.3-DI_02	+CTRL_1.3-DI_02		
/121.4	/121.4	/121.5	/121.5
E12.4	E12.2	E12.3	E12.5
++CONV+CIR-80Q1:X7_13	++CONV+CIR-80Q1:X6_11	++CONV+CIR-80Q1:X6_9	++CONV+AC_DC-78F1:13
CB 1 Tripped GRID	CB 1 ON GRID	CB 1 OFF GRID	FUSE AND LIGHTNING PROTECTION

DI5
+CTRL_1.3-DI_01
/121.5
E10.5
+CTRL_1.3-84F1:12
LIGHTNING PROTECTION in Control Cabinet OPTIONAL

Info:
true = not fail,
false = cb tripped
CB = Circuit Breaker

CB 1 Tripped GRID

CB 1 ON GRID

CB 1 OFF GRID

FUSE AND LIGHTNING PROTECTION

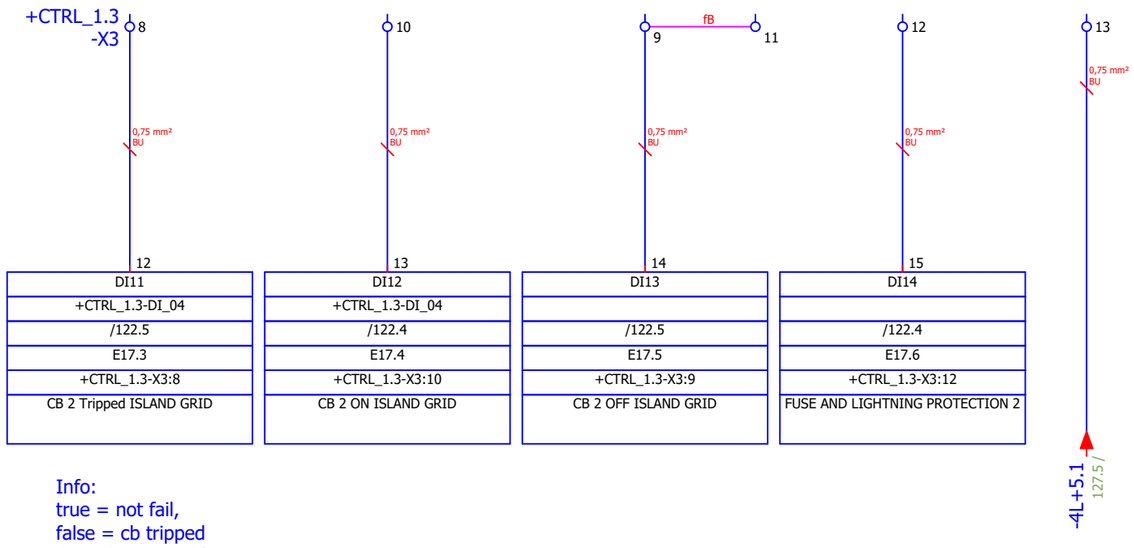
LIGHTNING PROTECTION in Control Cabinet OPTIONAL

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Editor	Freqcon_JD			Statron		DIGITAL INPUTS CB 1	20241105_V1.2	= UNIT_01	Converter Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets
Date								+	

0	1	2	3	4	5	6	7	8	9



Info:
true = not fail,
false = cb tripped
CB = Circuit Breaker

CB 2 Tripped ISLAND GRID

CB 2 ON ISLAND GRID

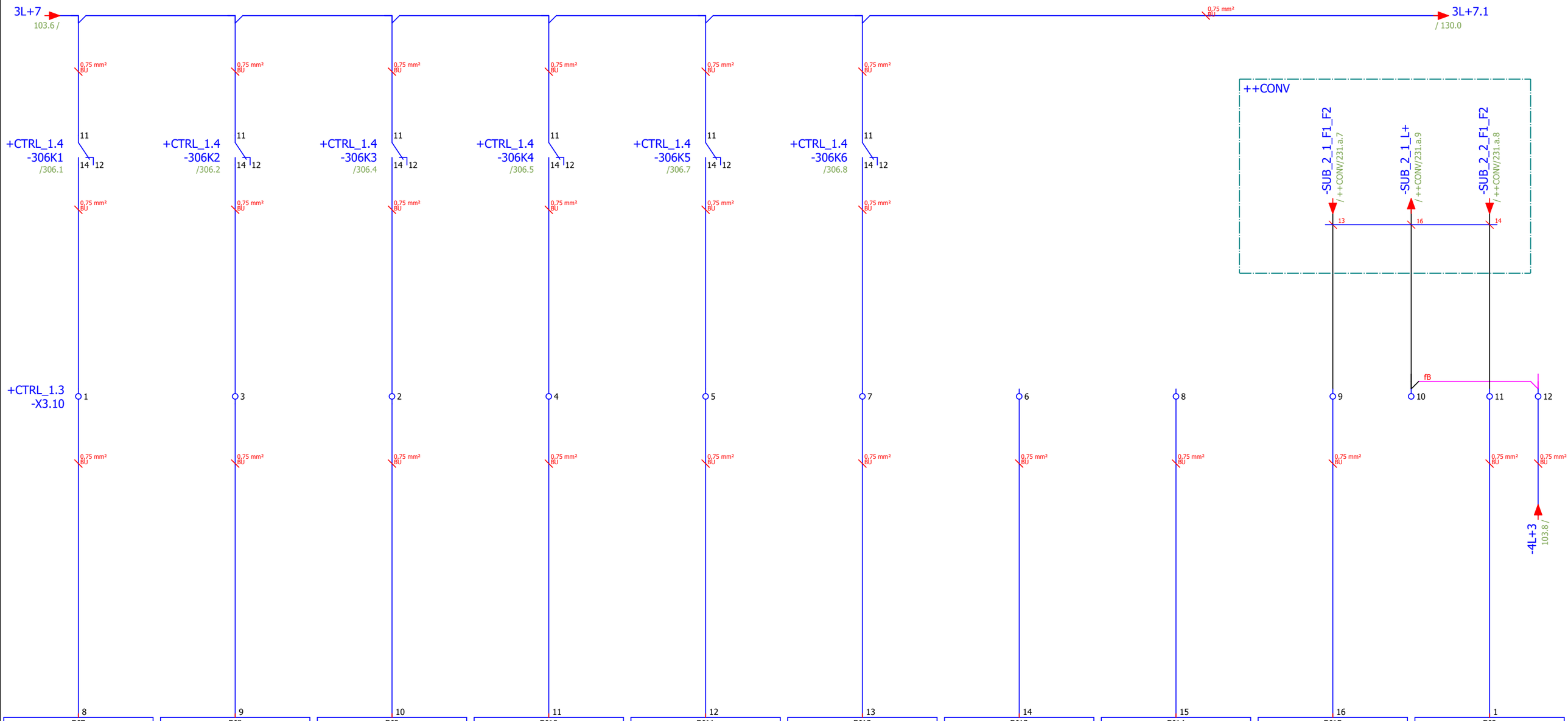
CB 2 OFF ISLAND GRID

FUSE AND LIGHTNING PROTECTION 2

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Editor	Freqcon_JD			Statron		DIGITAL INPUTS CB 2	20241105_V1.2	= UNIT_01	Converter Container 1	
Date	18.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 128
Date								+		total: 498



Feedback of DC Contactors

SUBSYSTEM 2_1_DC + Contactor K1 is on

SUBSYSTEM 2_1_DC - Contactor K7 is on

SUBSYSTEM 2_2_DC + Contactor K2 is on

SUBSYSTEM 2_2_DC - Contactor K8 is on

SUBSYSTEM 2_3_DC + Contactor K3 is on

SUBSYSTEM 2_3_DC - Contactor K9 is on

SUBSYSTEM 2_3_DC + SPARE

SUBSYSTEM 2_DC - SPARE

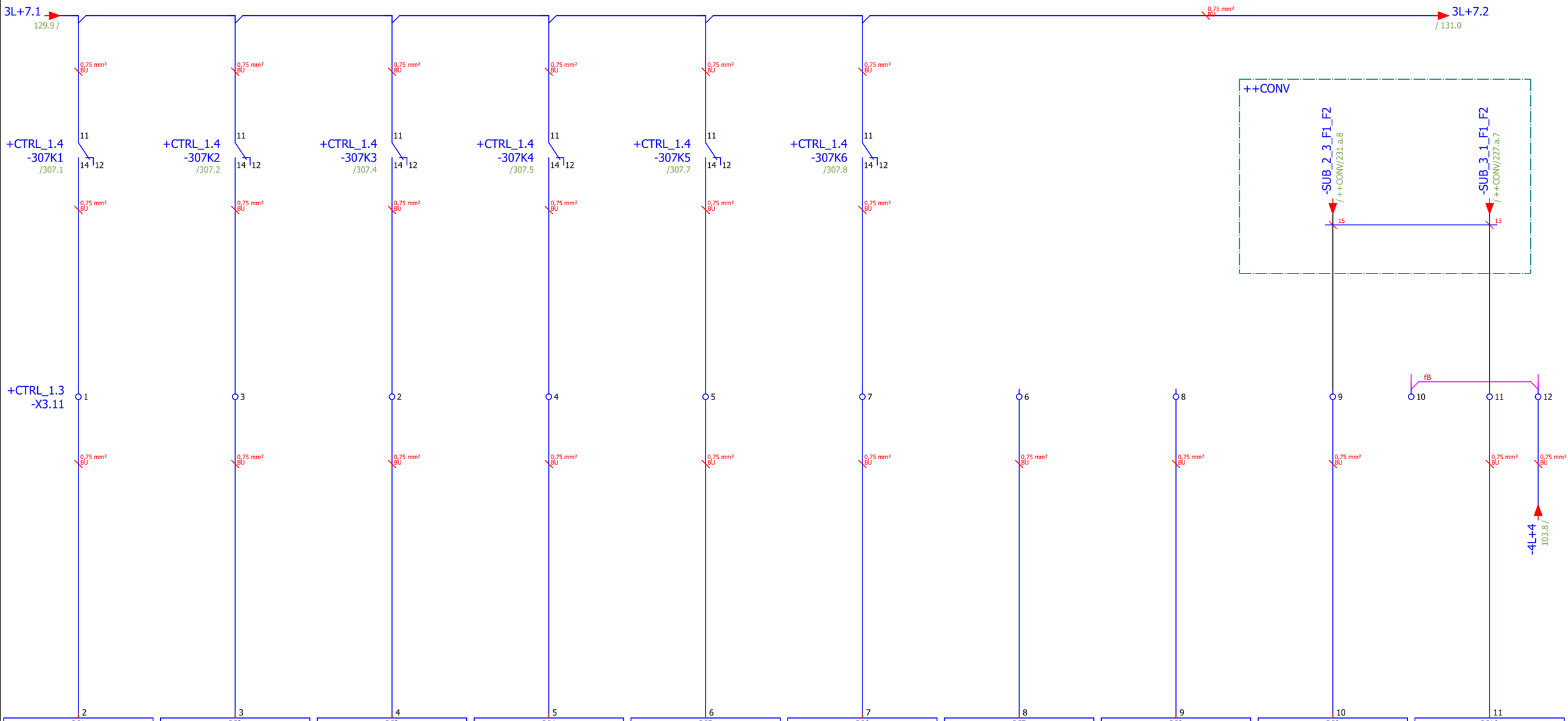
SUBSYSTEM 2_1_DC FUSE OK

SUBSYSTEM 2_2_DC FUSE OK

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Editor	Freqcon_JD			Statron	FREQCON	DIGITAL INPUTS SUBSYSTEM 2_1 / 2_2	20241105_V1.2	= UNIT_01	Converter Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets page: 129
Date								+	total: 498



2	3	4	5	6	7	8	9	10	11
DI1	DI2	DI3	DI4	DI5	DI6	DI7	DI8	DI9	DI10
+CTRL_1.3-DI_03	+CTRL_1.3-DI_03	+CTRL_1.3-DI_03	+CTRL_1.3-DI_03	+CTRL_1.3-DI_03	+CTRL_1.3-DI_03	+CTRL_1.3-DI_03	+CTRL_1.3-DI_03	+CTRL_1.3-DI_03	+CTRL_1.3-DI_03
/121.5	/121.4	/121.5	/121.4	/121.5	/121.4	/121.5	/121.4	/121.5	/121.4
E14.1	E14.2	E14.3	E14.4	E14.5	E14.6	E14.7	E15.0	E15.1	E15.2
+CTRL_1.4-307K1:14	+CTRL_1.4-307K2:14	+CTRL_1.4-307K3:14	+CTRL_1.4-307K4:14	+CTRL_1.4-307K5:14	+CTRL_1.4-307K6:14	+CTRL_1.3-X3.11:6	+CTRL_1.3-X3.11:8	++CONV+CIR-231U1-F9:2	++CONV+CIR-227U1-F1:2
SUBSYSTEM 3_1_DC + Contactor K1 is on	SUBSYSTEM 3_1_DC -Contactor K7 is on	SUBSYSTEM 3_2_DC + Contactor K2 is on	SUBSYSTEM 3_2_DC -Contactor K8 is on	SUBSYSTEM 3_3_DC + Contactor K3 is on	SUBSYSTEM 3_3_DC -Contactor K9 is on	SUBSYSTEM 3_DC + SPARE	SUBSYSTEM 3_DC -SPARE	SUBSYSTEM 2_DC FUSE OK	SUBSYSTEM 3_1_DC FUSE OK

Feedback of DC Contactors

SUBSYSTEM 3_1_DC + Contactor K1 is on

SUBSYSTEM 3_1_DC - Contactor K7 is on

SUBSYSTEM 3_2_DC + Contactor K2 is on

SUBSYSTEM 3_2_DC - Contactor K8 is on

SUBSYSTEM 3_3_DC + Contactor K3 is on

SUBSYSTEM 3_3_DC - Contactor K9 is on

SUBSYSTEM 3_DC + SPARE

SUBSYSTEM 3_DC - SPARE

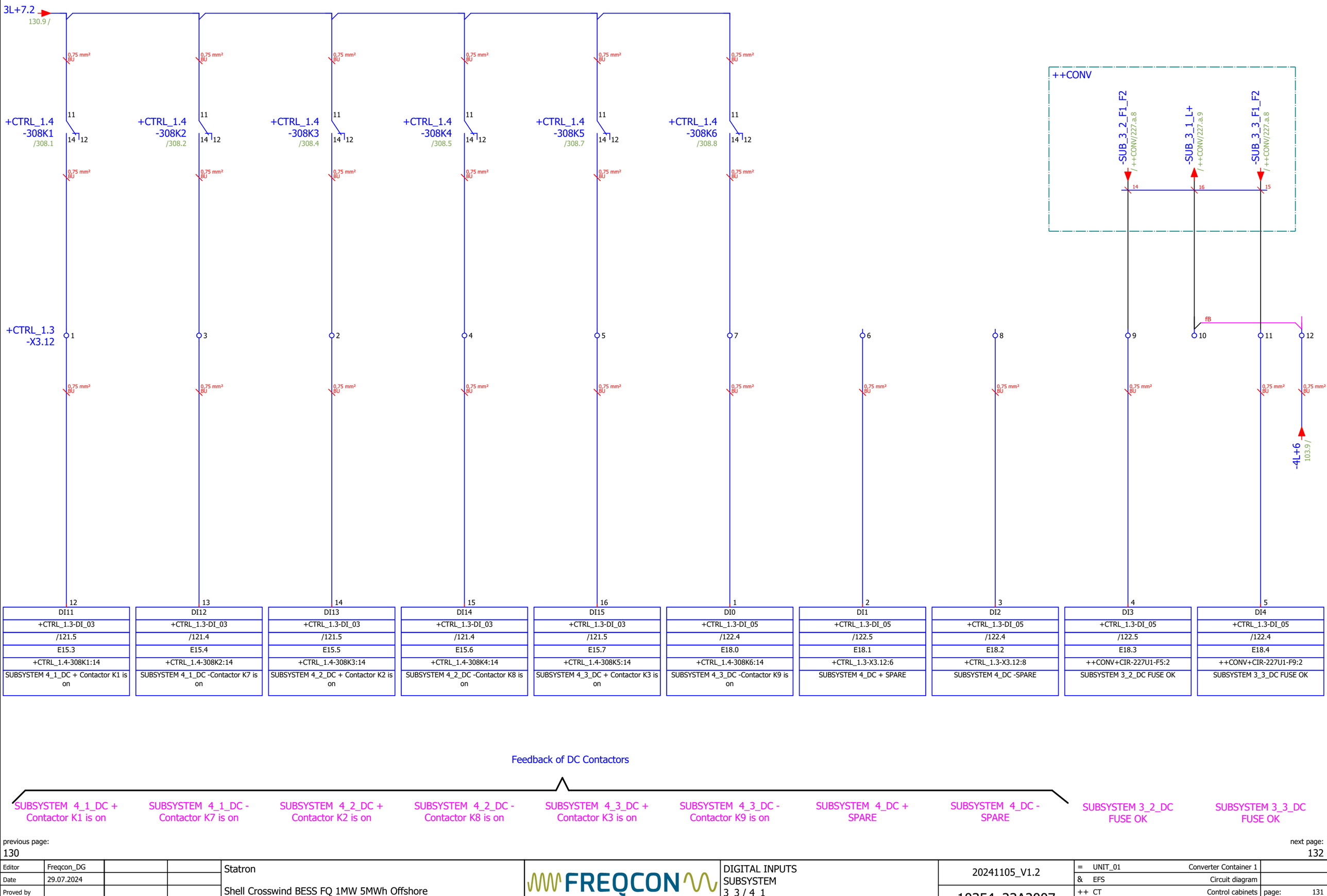
SUBSYSTEM 2_DC FUSE OK

SUBSYSTEM 3_1_DC FUSE OK

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Editor	Freqcon_JD			Statron	FREQCON	DIGITAL INPUTS SUBSYSTEM 2_3 / 3_1	20241105_V1.2	= UNIT_01 Converter Container 1
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets page: 130
Date								+ total: 498



12	13	14	15	16	1	2	3	4	5
DI11	DI12	DI13	DI14	DI15	DI0	DI1	DI2	DI3	DI4
+CTRL_1.3-DI_03	+CTRL_1.3-DI_03	+CTRL_1.3-DI_03	+CTRL_1.3-DI_03	+CTRL_1.3-DI_03	+CTRL_1.3-DI_05	+CTRL_1.3-DI_05	+CTRL_1.3-DI_05	+CTRL_1.3-DI_05	+CTRL_1.3-DI_05
/121.5	/121.4	/121.5	/121.4	/121.5	/122.4	/122.5	/122.4	/122.5	/122.4
E15.3	E15.4	E15.5	E15.6	E15.7	E18.0	E18.1	E18.2	E18.3	E18.4
+CTRL_1.4-308K1:14	+CTRL_1.4-308K2:14	+CTRL_1.4-308K3:14	+CTRL_1.4-308K4:14	+CTRL_1.4-308K5:14	+CTRL_1.4-308K6:14	+CTRL_1.3-X3.12:6	+CTRL_1.3-X3.12:8	++CONV+CIR-227U1-F5:2	++CONV+CIR-227U1-F9:2
SUBSYSTEM 4_1_DC + Contactor K1 is on	SUBSYSTEM 4_1_DC -Contactor K7 is on	SUBSYSTEM 4_2_DC + Contactor K2 is on	SUBSYSTEM 4_2_DC -Contactor K8 is on	SUBSYSTEM 4_3_DC + Contactor K3 is on	SUBSYSTEM 4_3_DC -Contactor K9 is on	SUBSYSTEM 4_DC + SPARE	SUBSYSTEM 4_DC -SPARE	SUBSYSTEM 3_2_DC FUSE OK	SUBSYSTEM 3_3_DC FUSE OK

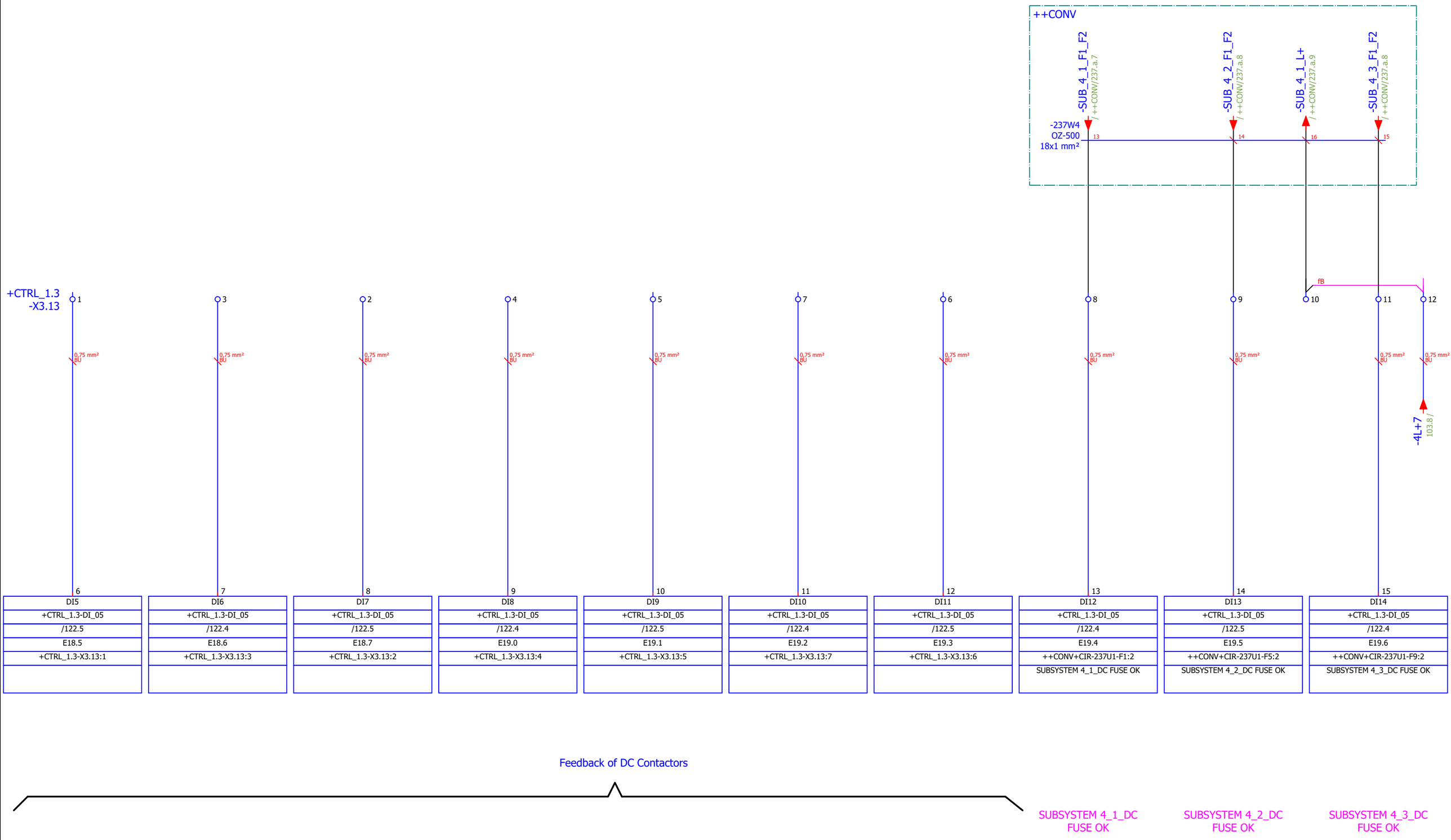
Feedback of DC Contactors

SUBSYSTEM 4_1_DC + Contactor K1 is on | SUBSYSTEM 4_1_DC - Contactor K7 is on | SUBSYSTEM 4_2_DC + Contactor K2 is on | SUBSYSTEM 4_2_DC - Contactor K8 is on | SUBSYSTEM 4_3_DC + Contactor K3 is on | SUBSYSTEM 4_3_DC - Contactor K9 is on | SUBSYSTEM 4_DC + SPARE | SUBSYSTEM 4_DC - SPARE | SUBSYSTEM 3_2_DC FUSE OK | SUBSYSTEM 3_3_DC FUSE OK

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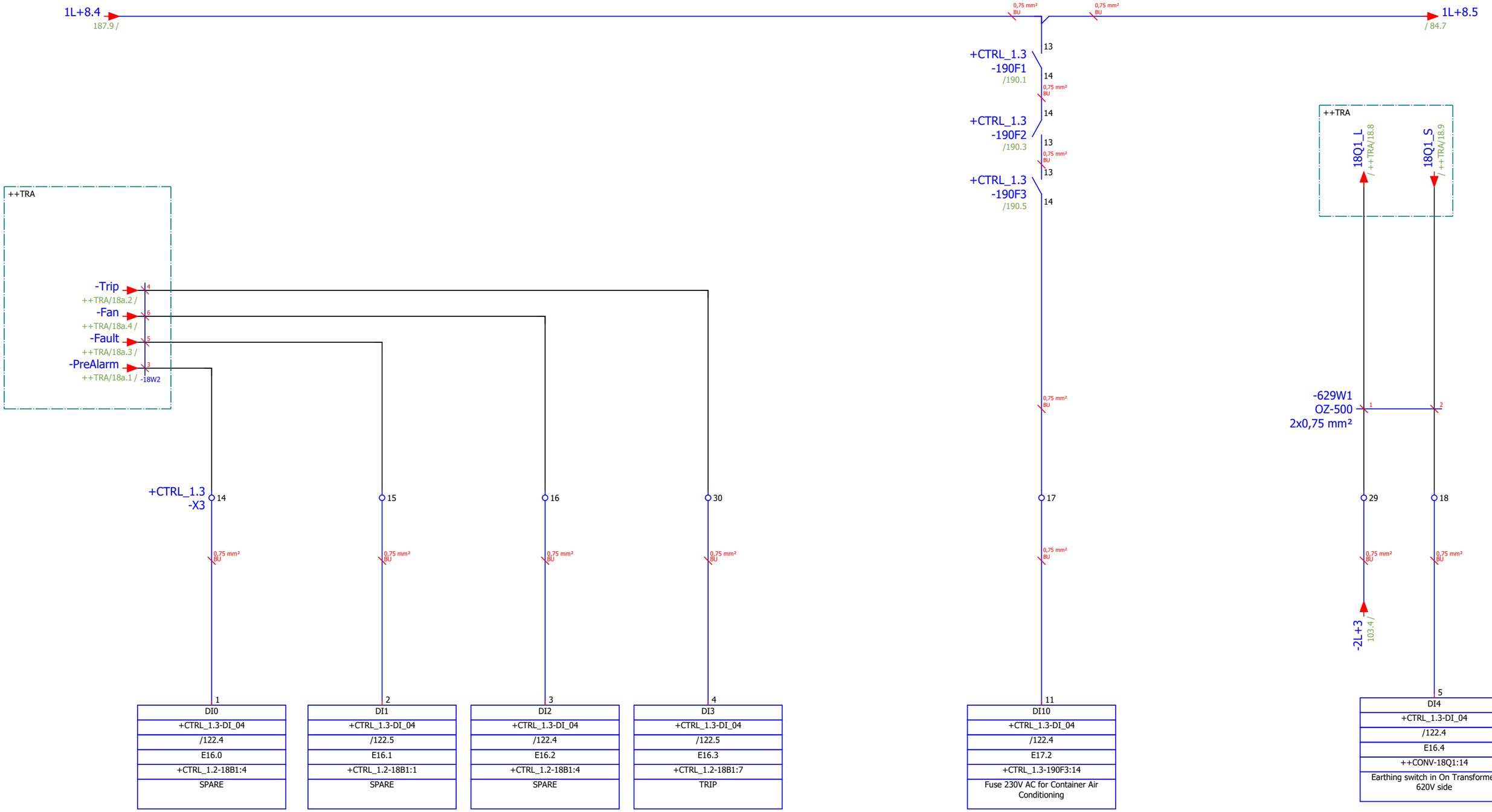
Editor	Freqcon_DG			Statron	FREQCON	DIGITAL INPUTS SUBSYSTEM 3_3 / 4_1	20241105_V1.2	= UNIT_01 Converter Container 1
Date	29.07.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets page: 131
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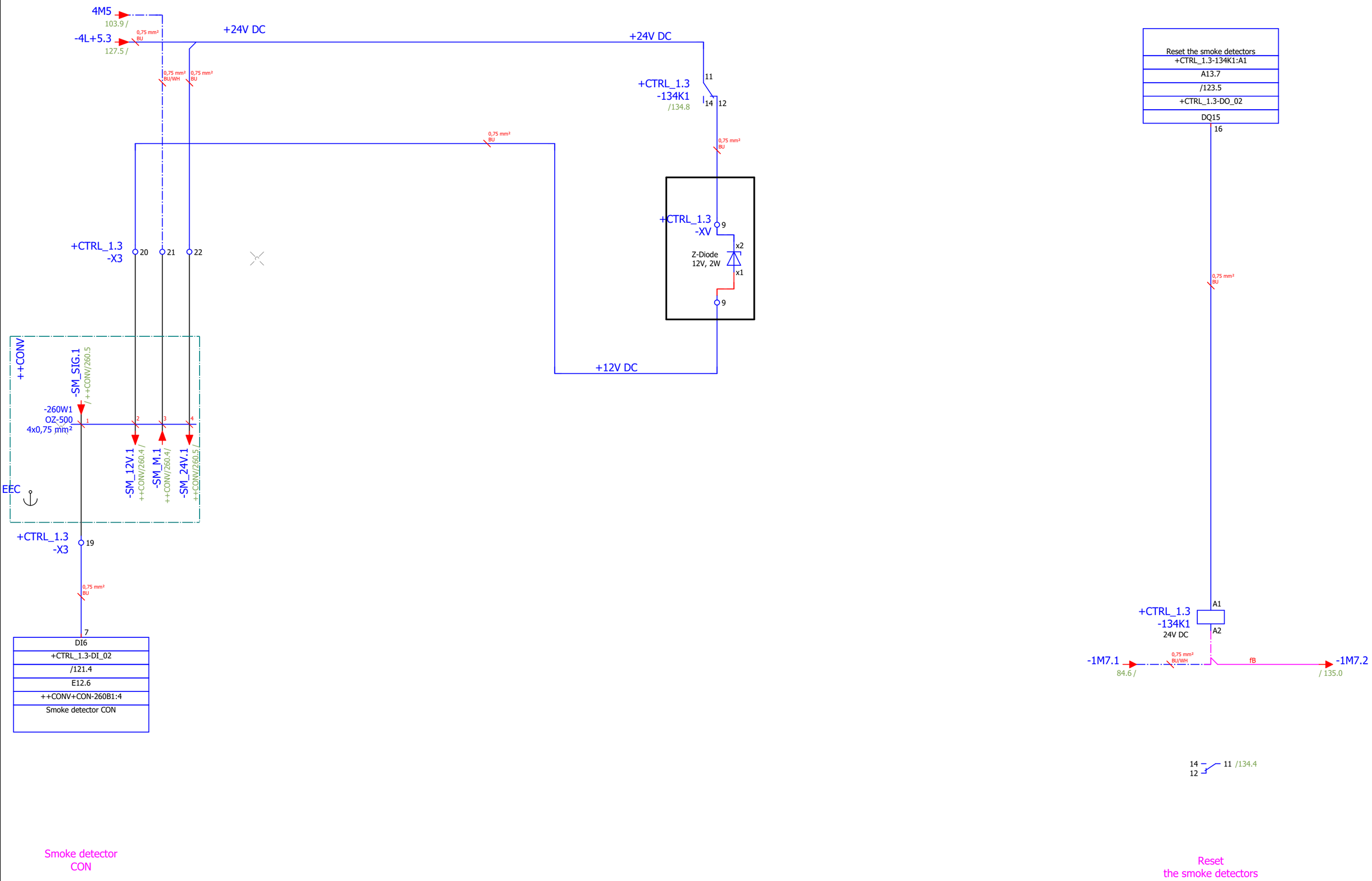
Editor	Freqcon_DG			Statron	FREQCON	DIGITAL INPUTS SUBSYSTEM 4_2 / 4_3	20241105_V1.2	= UNIT_01	Converter Container 1
Date	29.07.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets page: 132
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Editor	Freqcon_DG			Statron	FREQCON	DIGITAL INPUTS SPARE	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	05.11.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 133
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Smoke detector
CON

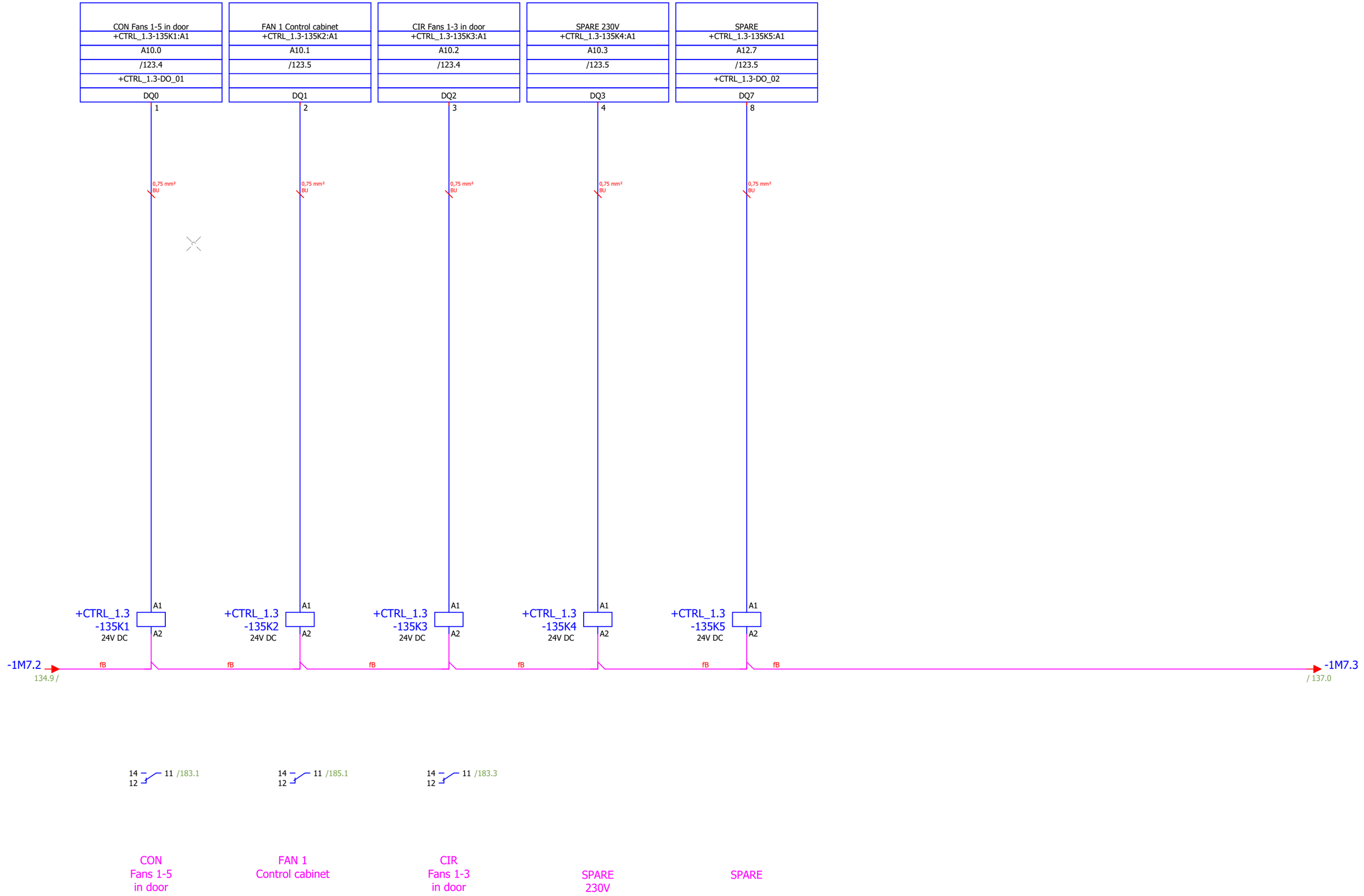
Reset
the smoke detectors

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Editor	Freqcon_JD			Statron	FREQCON	DIGITAL INPUTS SMOKE DETECTORS	20241105_V1.2	= UNIT_01	Converter Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets
Date								+	

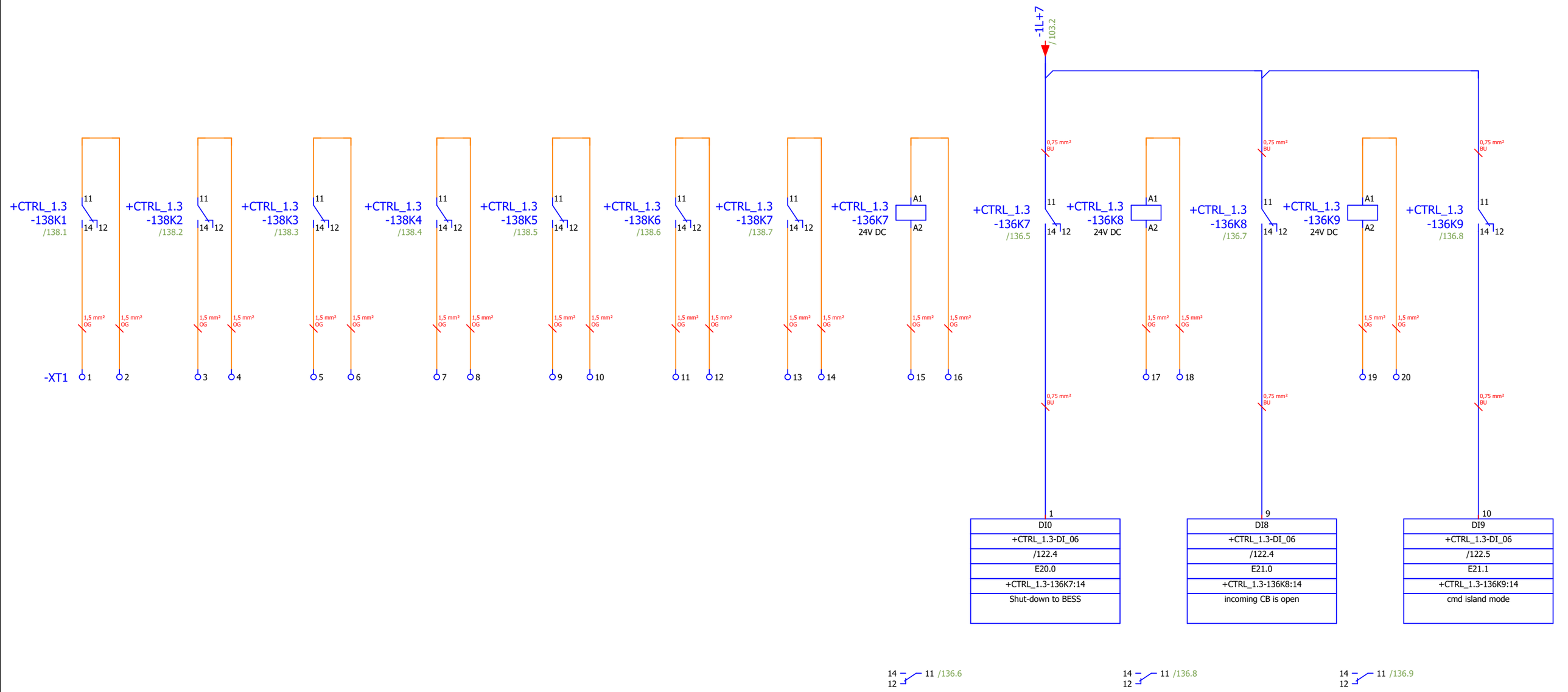
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total: 498



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Editor	Freqcon_JD			Statron	FREQCON	OUTPUTS FAN	20241105_V1.2	= UNIT_01	Converter Container 1
Date	19.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets page: 135
Date								+	total: 498

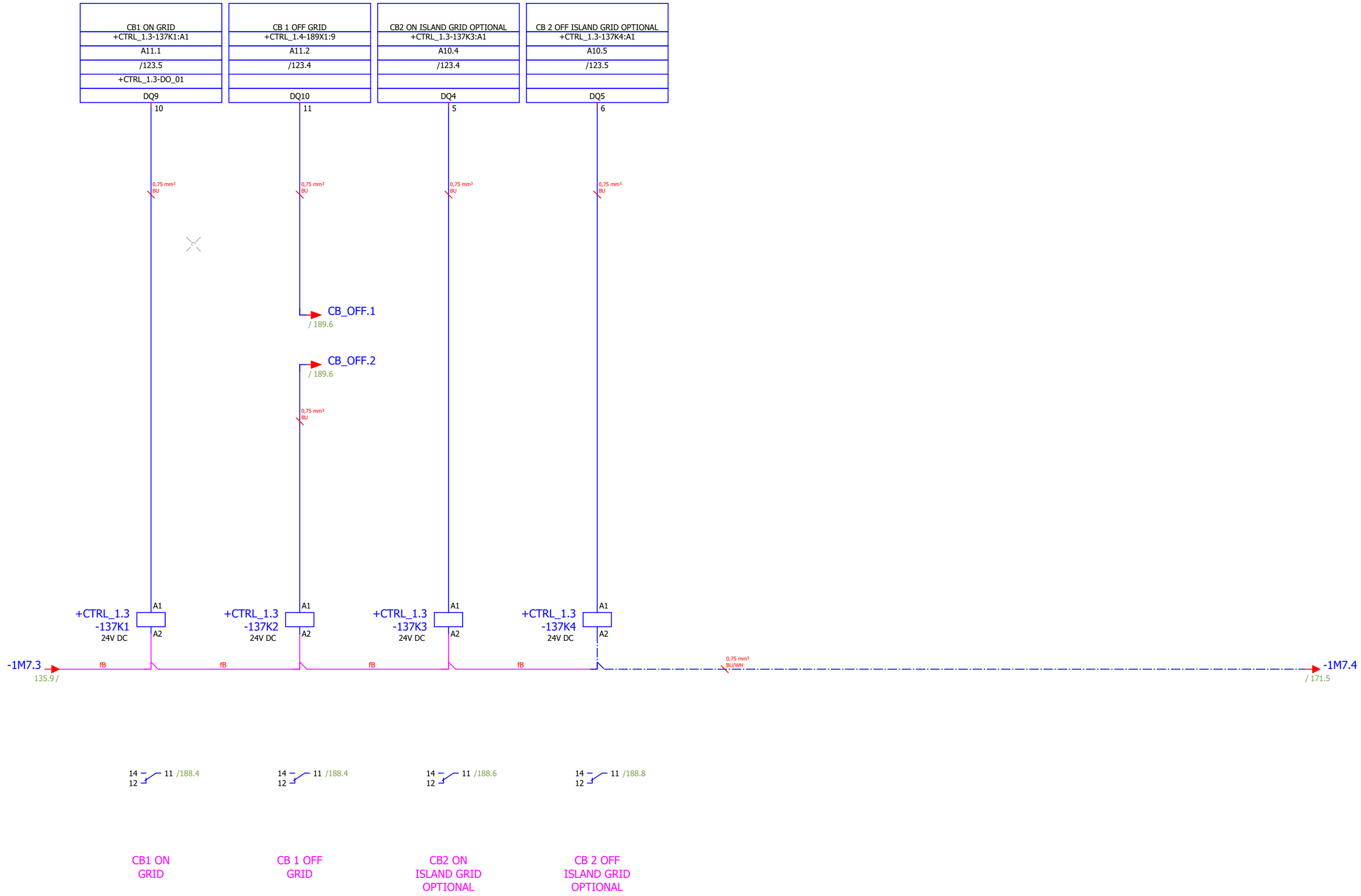


Gas confirmed FGS | Smoke confirmed FGS | PLC fault status SIS | Thermal runaway SIS | Spare | Spare | phase in sync | Shut-down to BESS | Shut-down to BESS | incoming CB is openincoming CB is open | cmd island mode | cmd island mode

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Editor	Freqcon_DG			Statron	FREQCON	OUTPUTS COMMUNICATION	20241105_V1.2	= UNIT_01 Converter Container 1
Date	12.09.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets page: 136
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0	1	2	3	4	5	6	7	8	9



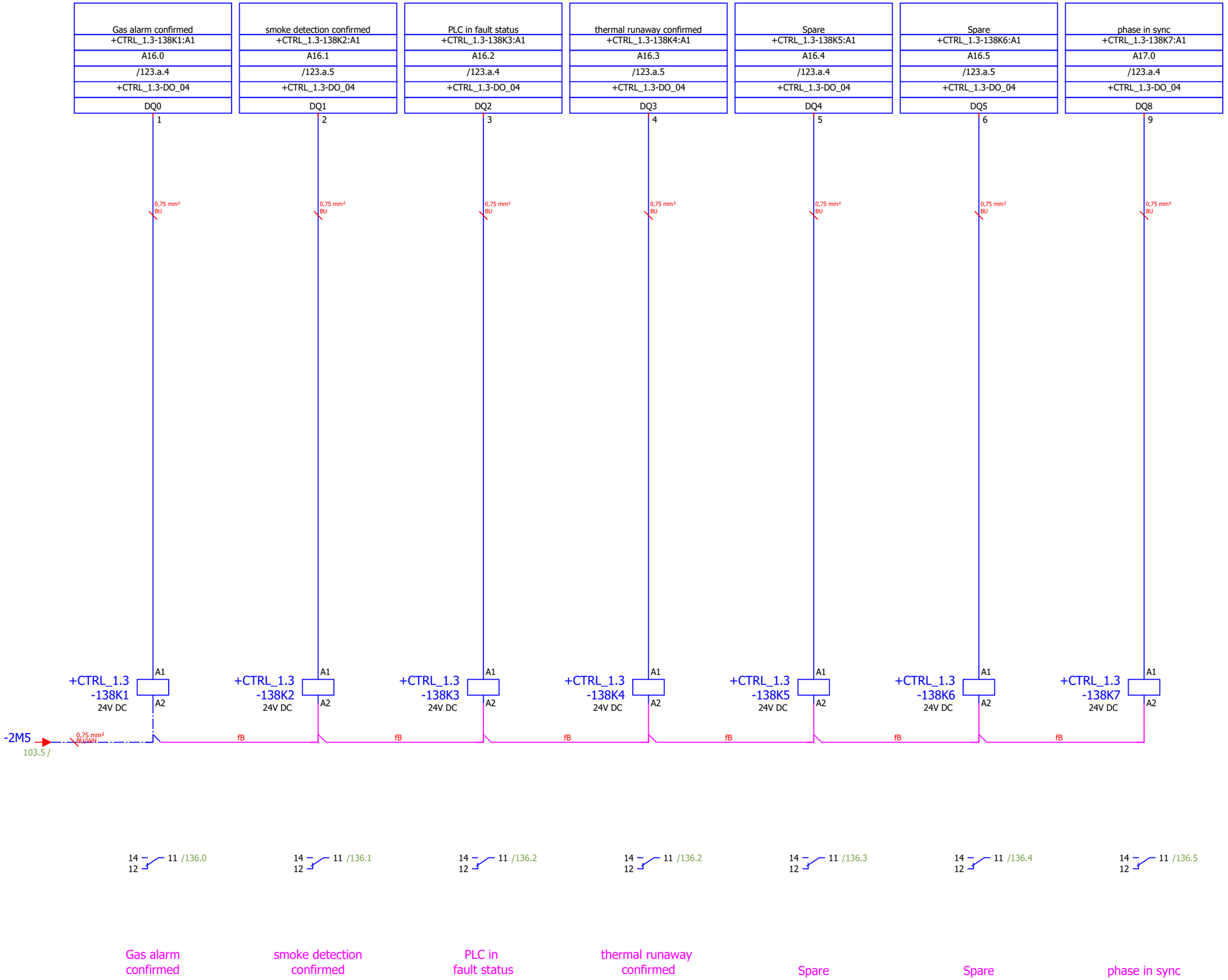
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Editor	Freqcon_JD			Statron	FREQCON	OUTPUTS CIRCUIT BREAKER	20241105_V1.2	= UNIT_01	Converter Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets
Date								+	

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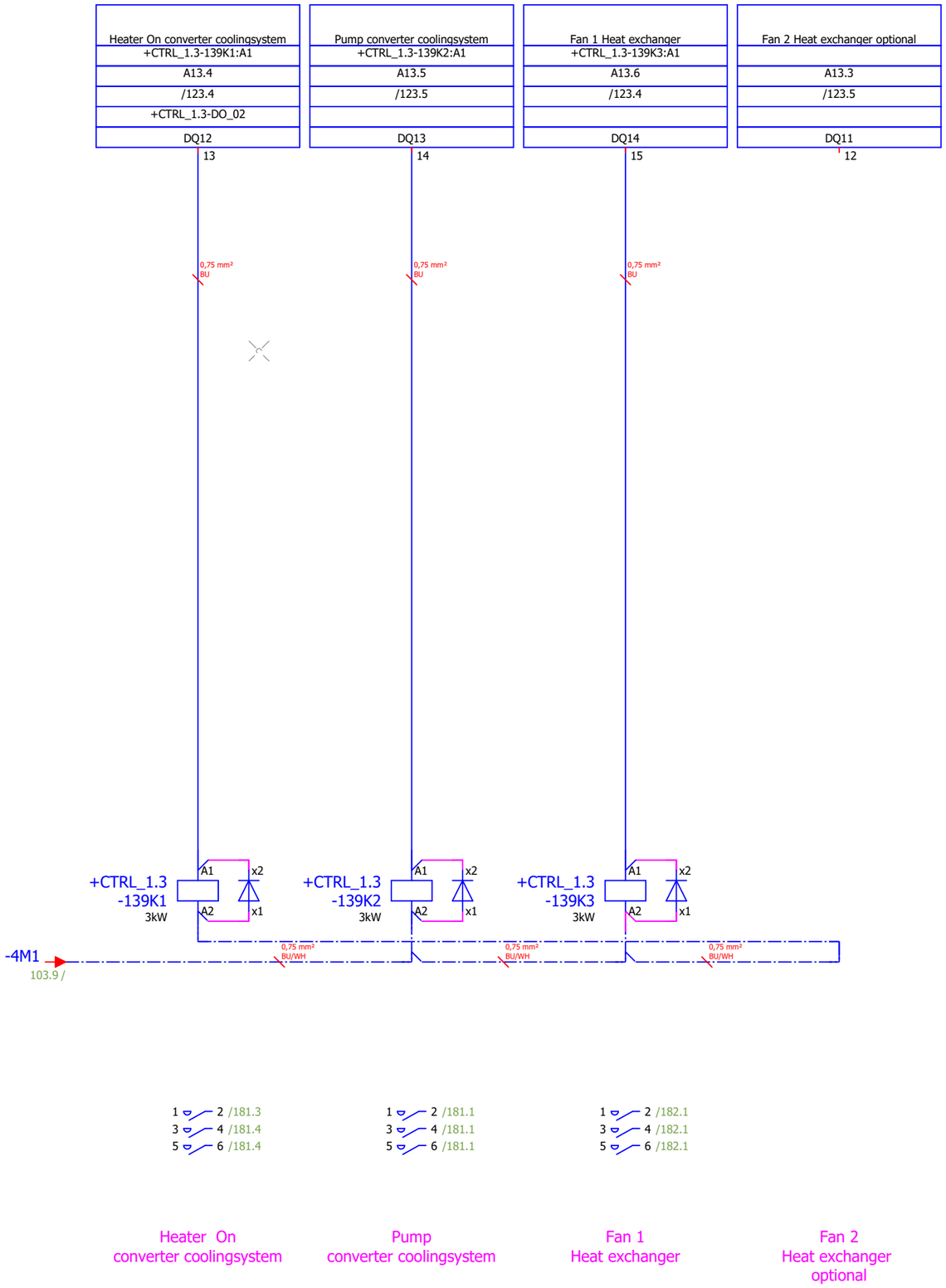
total: 498



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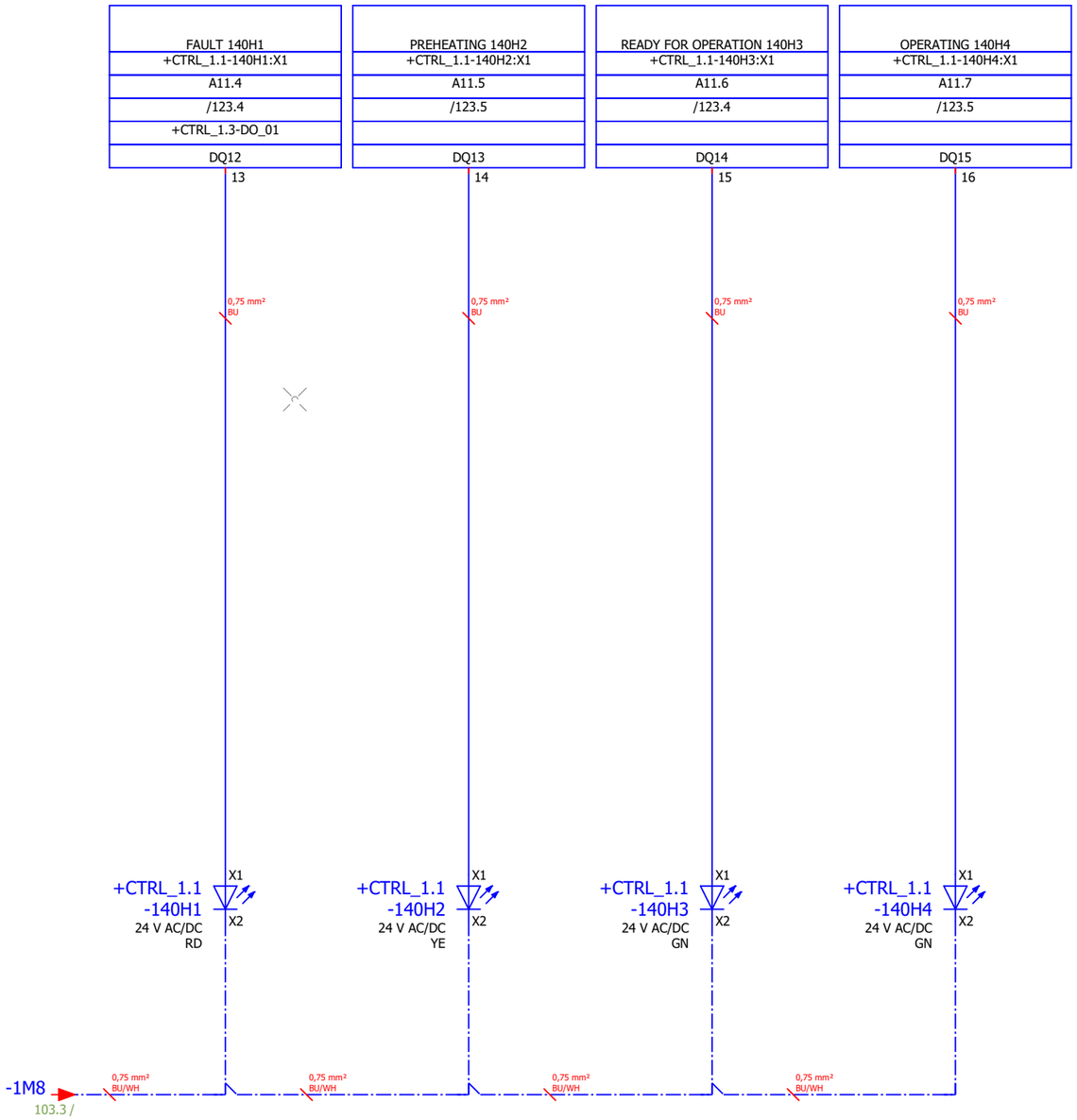
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Date	03.07.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 138
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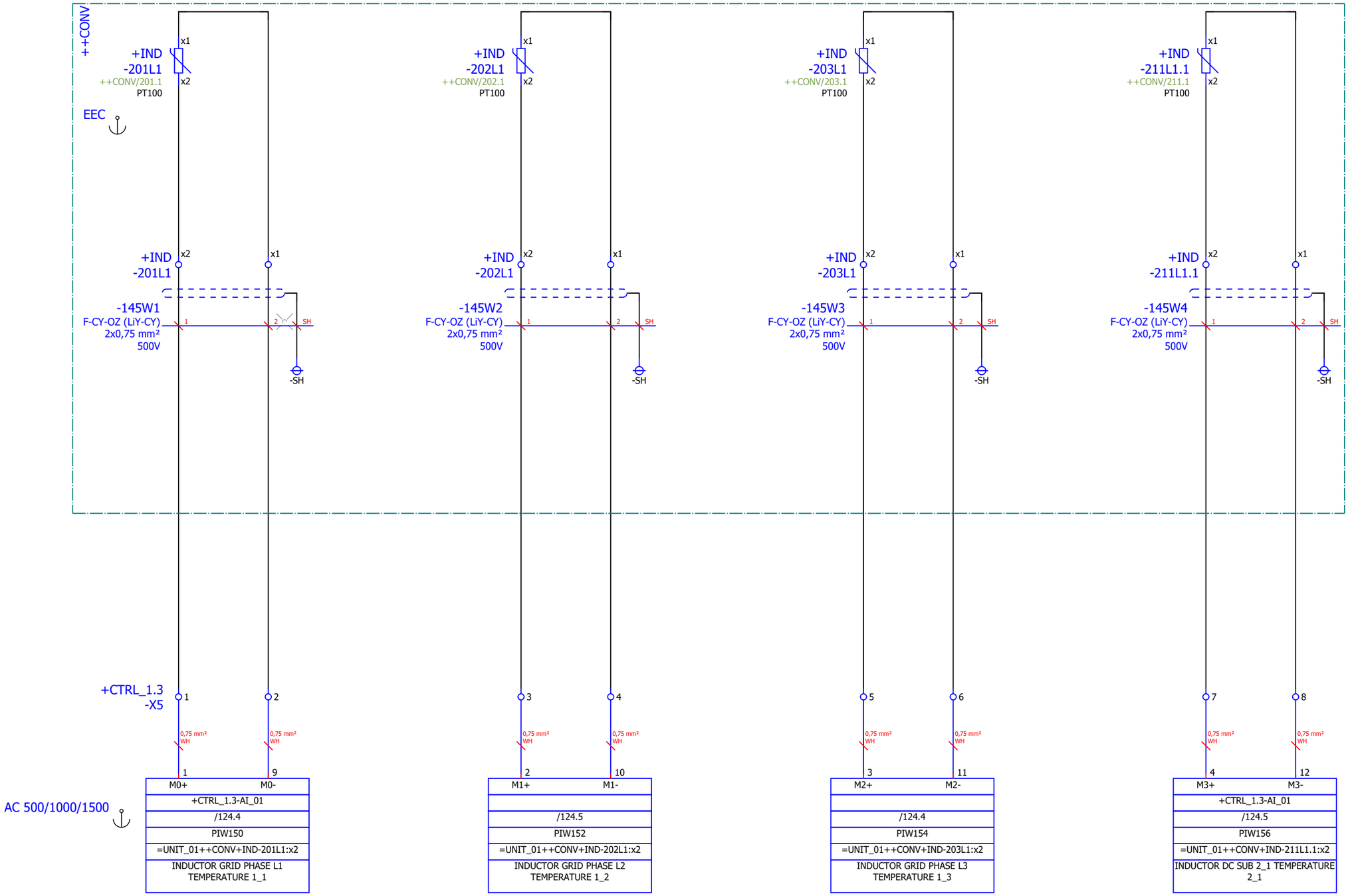
Editor	Freqcon_JD			Statron	FREQCON	OUTPUTS COOLING	20241105_V1.2	= UNIT_01	Converter Container 1
Date	14.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets page: 139
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Editor	Freqcon_JD			Statron	FREQCON	OUTPUTS CONTROL ELEMENTS	20241105_V1.2	= UNIT_01 Converter Container 1
Date	14.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets page: 140
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INDUCTOR GRID PHASE L1 TEMPERATURE 1_1

INDUCTOR GRID PHASE L2 TEMPERATURE 1_2

INDUCTOR GRID PHASE L3 TEMPERATURE 1_3

INDUCTOR DC SUB 2_1 TEMPERATURE 2_1

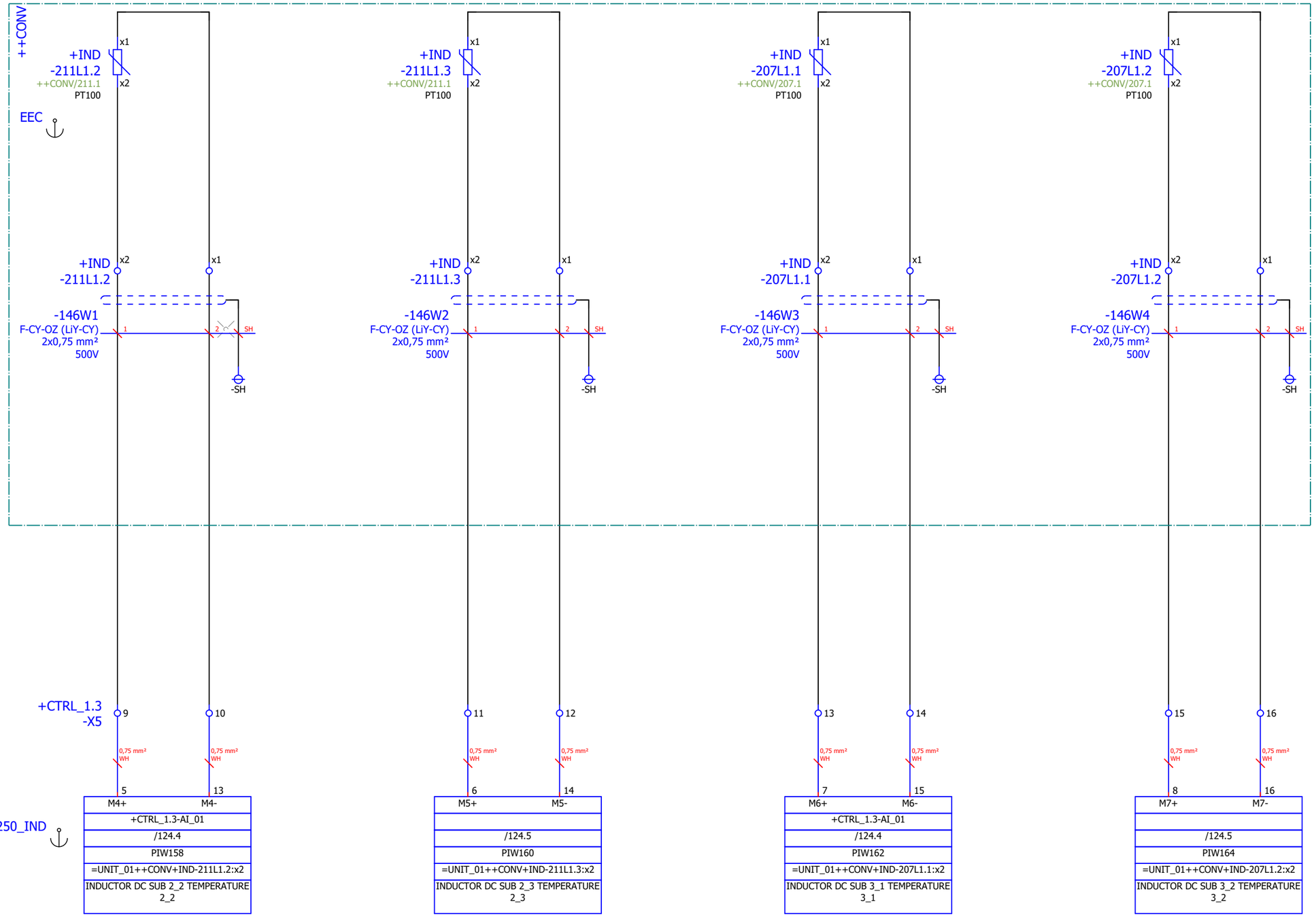
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Editor	Freqcon_JD			Statron	FREQCON	ANALOG INPUTS (TEMPERATURE SUBSYSTEM 1_1 -1_3)	20241105_V1.2	= UNIT_01	Converter Container 1
Date	14.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets
Date								+	

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INDUCTOR
DC SUB 2_2
TEMPERATURE 2_2

INDUCTOR
DC SUB 2_3
TEMPERATURE 2_3

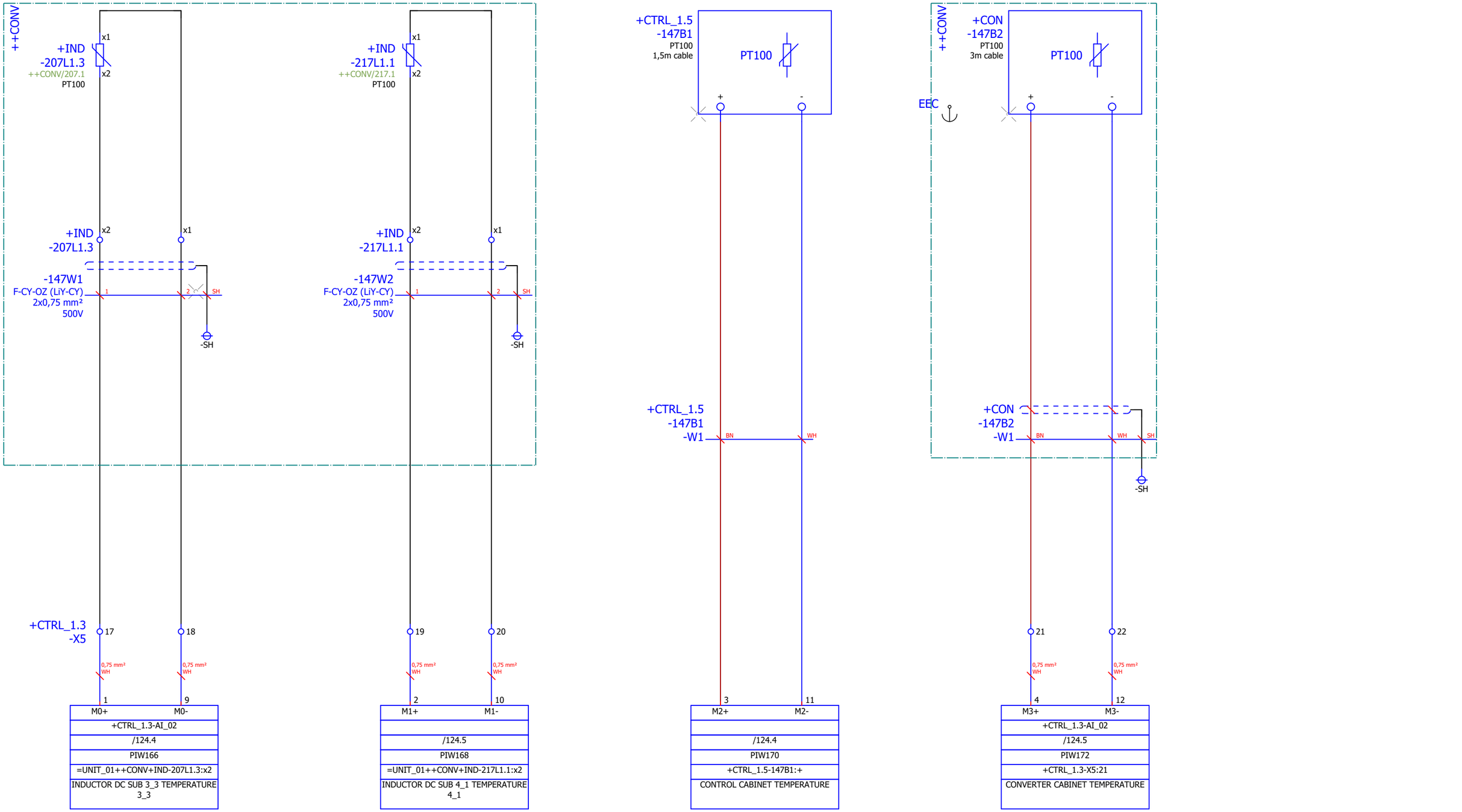
INDUCTOR
DC SUB 3_1
TEMPERATURE 3_1

INDUCTOR
DC SUB 3_2
TEMPERATURE 3_2

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Editor	Freqcon_JD			Statron	FREQCON	ANALOG INPUTS (TEMPERATURE SUBSYSTEM 1_4 -1_6)	20241105_V1.2	= UNIT_01	Converter Container 1	
Date	18.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 146
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INDUCTOR DC SUB 3_3 TEMPERATURE 3_3

INDUCTOR DC SUB 4_1 TEMPERATURE 4_1

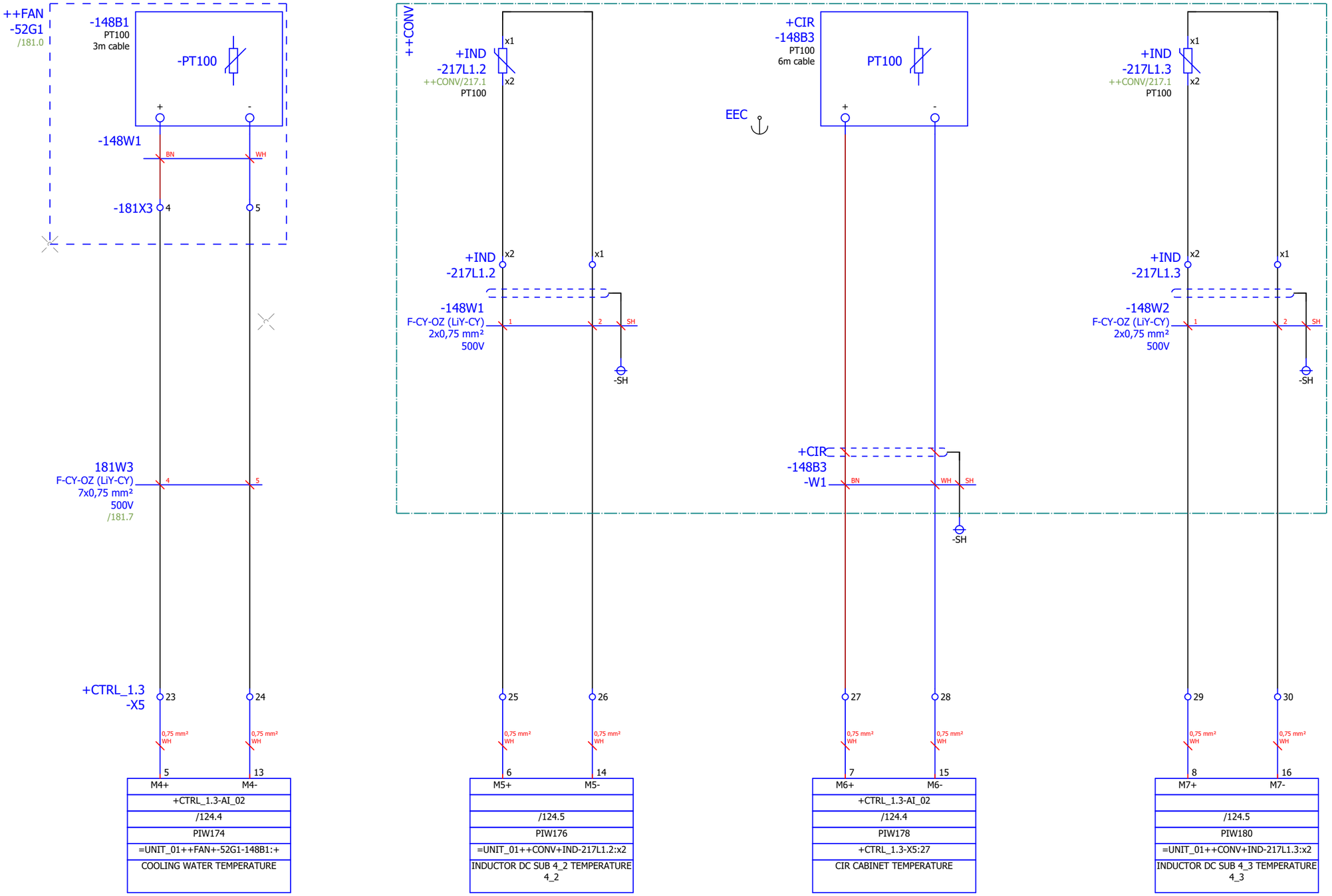
CONTROL CABINET TEMPERATURE

CONVERTER CABINET TEMPERATURE

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Editor	Freqcon_JD			Statron	FREQCON	ANALOG INPUTS CABINET TEMPERATURE	20241105_V1.2	= UNIT_01	Converter Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets page: 147
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COOLING WATER TEMPERATURE

INDUCTOR DC SUB 4_2 TEMPERATURE 4_2

CIR CABINET TEMPERATURE

INDUCTOR DC SUB 4_3 TEMPERATURE 4_3

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-1M11
103.3 /

+CTRL_1.3
-X5.1

fB

1 2

0,75 mm² BU/WH

0,75 mm² WH

1	5	2	6	3	7	4	8	1	5	2	6
U0+	U0-	U1+	U1-	U2+	U2-	U3+	U3-	U0+	U0-	U1+	U1-
+CTRL_1.3-AI_03				+CTRL_1.3-AI_03				+CTRL_1.3-AI_04		+CTRL_1.3-AI_04	
/124.4		/124.5		/124.4		/124.5		/125.4		/125.5	
PIW182		PIW184		PIW186		PIW188		PIW190		PIW192	
+CTRL_1.4-149U1:15		+CTRL_1.4-149U1:16		+CTRL_1.4-149U1:17		+CTRL_1.4-149U1:20		+CTRL_1.4-149U1:19		+CTRL_1.4-149U1:18	
DC_SUBSYSTEM 2_1.1 voltage		DC_SUBSYSTEM 2_2.1 voltage		DC_SUBSYSTEM 2_3.1 voltage		DC_SUBSYSTEM 3_1.1 voltage		DC_SUBSYSTEM 3_2.1 voltage		DC_SUBSYSTEM 3_3.1 voltage	

+CTRL_1.4
-149U1
PXC.2959609

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27

Adapter Sub-D 25 Pin Buchse
Terminalblock 27 Pin

25-POL SUB-D SOCKET

11X3

-149W1
pre-assembled D-Sub cable 1:1
/162.7

HVIO_AN
/ 162.9

DC_SUBSYSTEM 2_1.1 voltage

DC_SUBSYSTEM 2_2.1 voltage

DC_SUBSYSTEM 2_3.1 voltage

DC_SUBSYSTEM 3_1.1 voltage

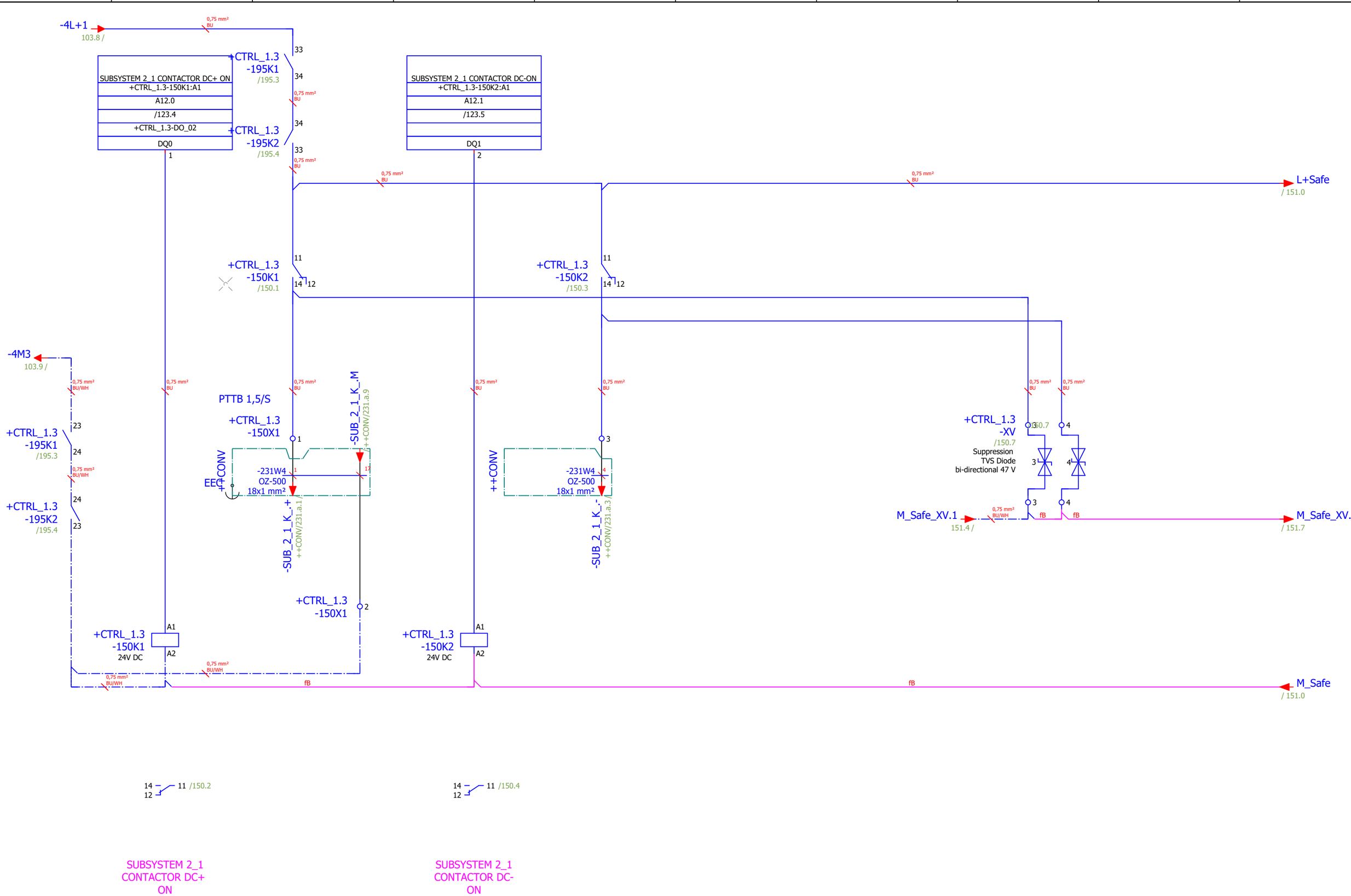
DC_SUBSYSTEM 3_2.1 voltage

DC_SUBSYSTEM 3_3.1 voltage

Voltage measurement

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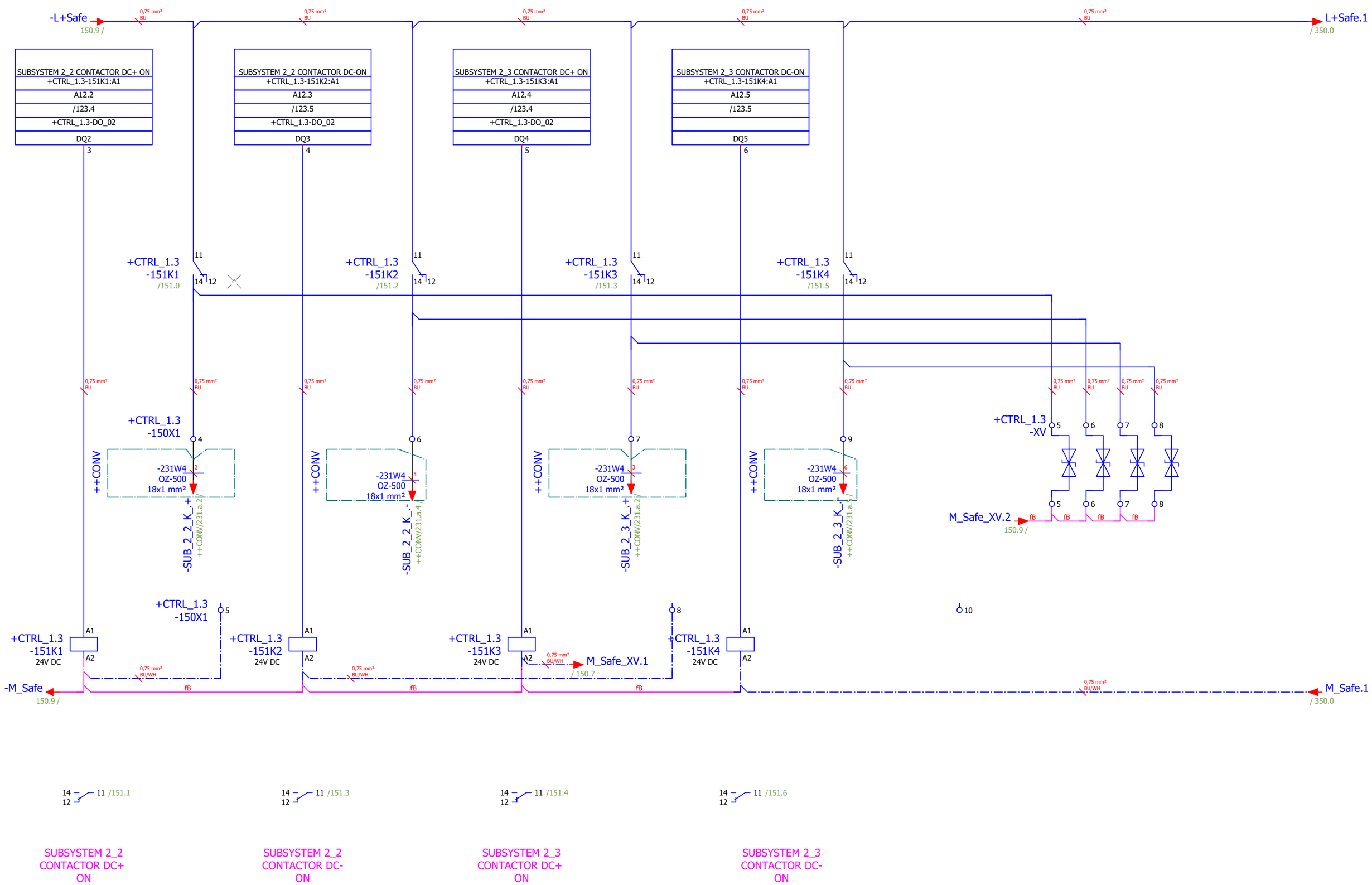
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Editor	Freqcon_JD			Statron	FREQCON	OUTPUTS DC CONTACTORS 2_1	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 150
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14 12 11 /151.1

14 12 11 /151.3

14 12 11 /151.4

14 12 11 /151.6

SUBSYSTEM 2_2 CONTACTOR DC+ ON

SUBSYSTEM 2_2 CONTACTOR DC- ON

SUBSYSTEM 2_3 CONTACTOR DC+ ON

SUBSYSTEM 2_3 CONTACTOR DC- ON

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Editor	Freqcon_JD			Statron	FREQCON	OUTPUTS DC CONTACTORS 2_2, 2_3	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 151
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0 1 2 3 4 5 6 7 8 9

* cable intro seperate UL protrctive tube

-UDC+_PreCharg
1,5 mm² BK
/ 173.3
-UDC-_PreCharg
1,5 mm² BK
/ 173.3

-UL3.HVIO / 189.4
-UL2.HVIO / 189.4
-UL1.HVIO / 189.4

-HVIO_1_N
173.3 /

-HVIO_2_N
/ 173.3

2,5 mm² LBU
2,5 mm² BK
2,5 mm² BK
2,5 mm² BK

+CTRL_2.1
-160U1
FRQ-M00029-1
HVIO 5.0
ISO
N-DC N-AC

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 (AC) UN 16 17 18 19 L3 20 21 22 23 L2 24 25 26 27 L1 28 29 30 31 32 UB 33 34 35 36 DC- 37 38 39 40 DC+ 41 42 44 (DC) UN

HIGH VOLTAGE I/O MODULE V5.0
FREQCON GmbH

25-POL SUB-D
SOCKET
11X3

+ -

-HVIO_1_L+
/ 161.1
-HVIO_1_L-
/ 161.1

-240W7
pre-assembled D-Sub cable 1:1
/440.8

-HVIO_1
/ 440.9

0,75 mm² BU
0,75 mm² BU/WH

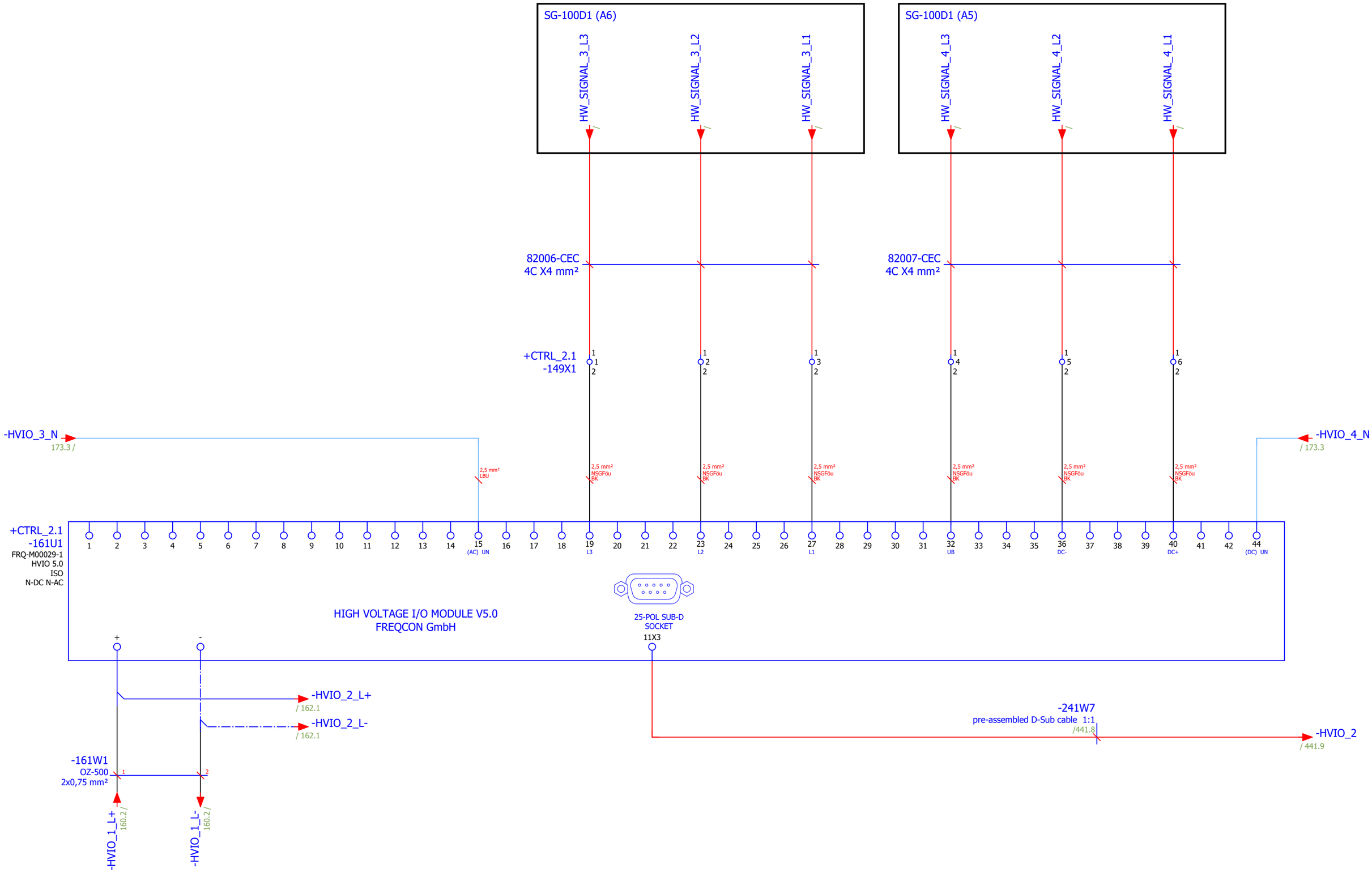
IEC
1L+2 103.2 /
1M10 103.3 /

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Measuring: Grid side voltage / DC-Link

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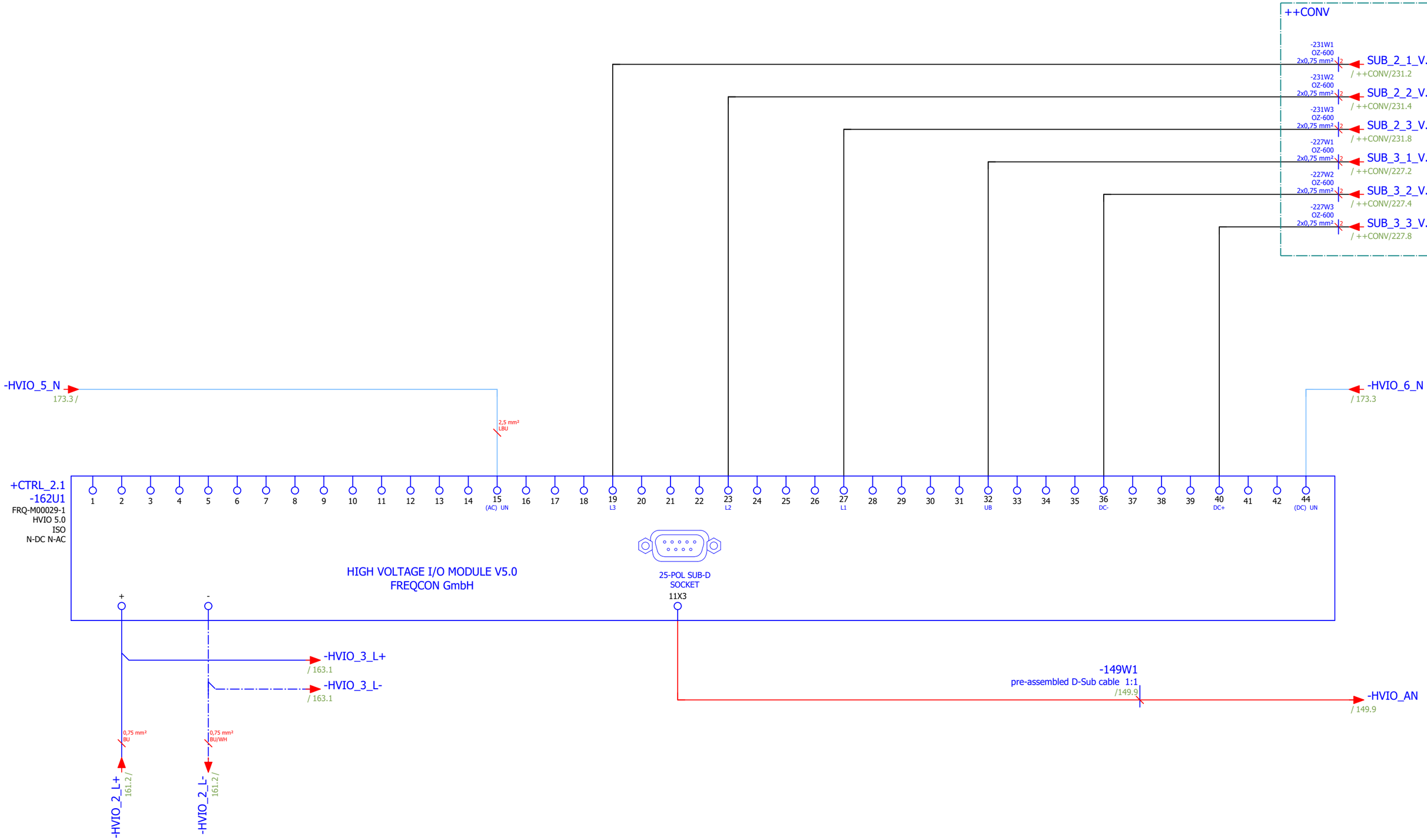
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Date	29.07.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 160
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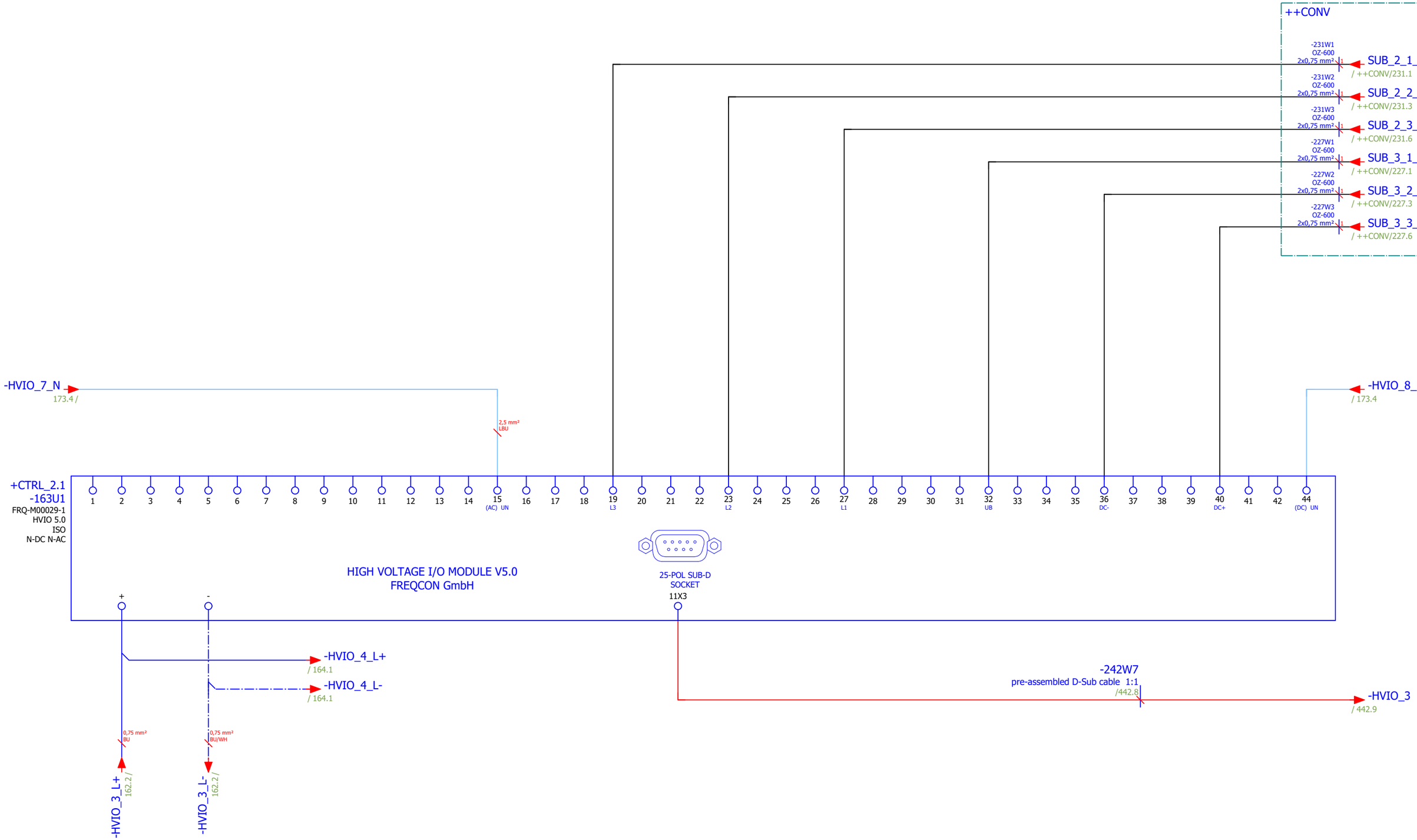
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Date	05.11.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 161
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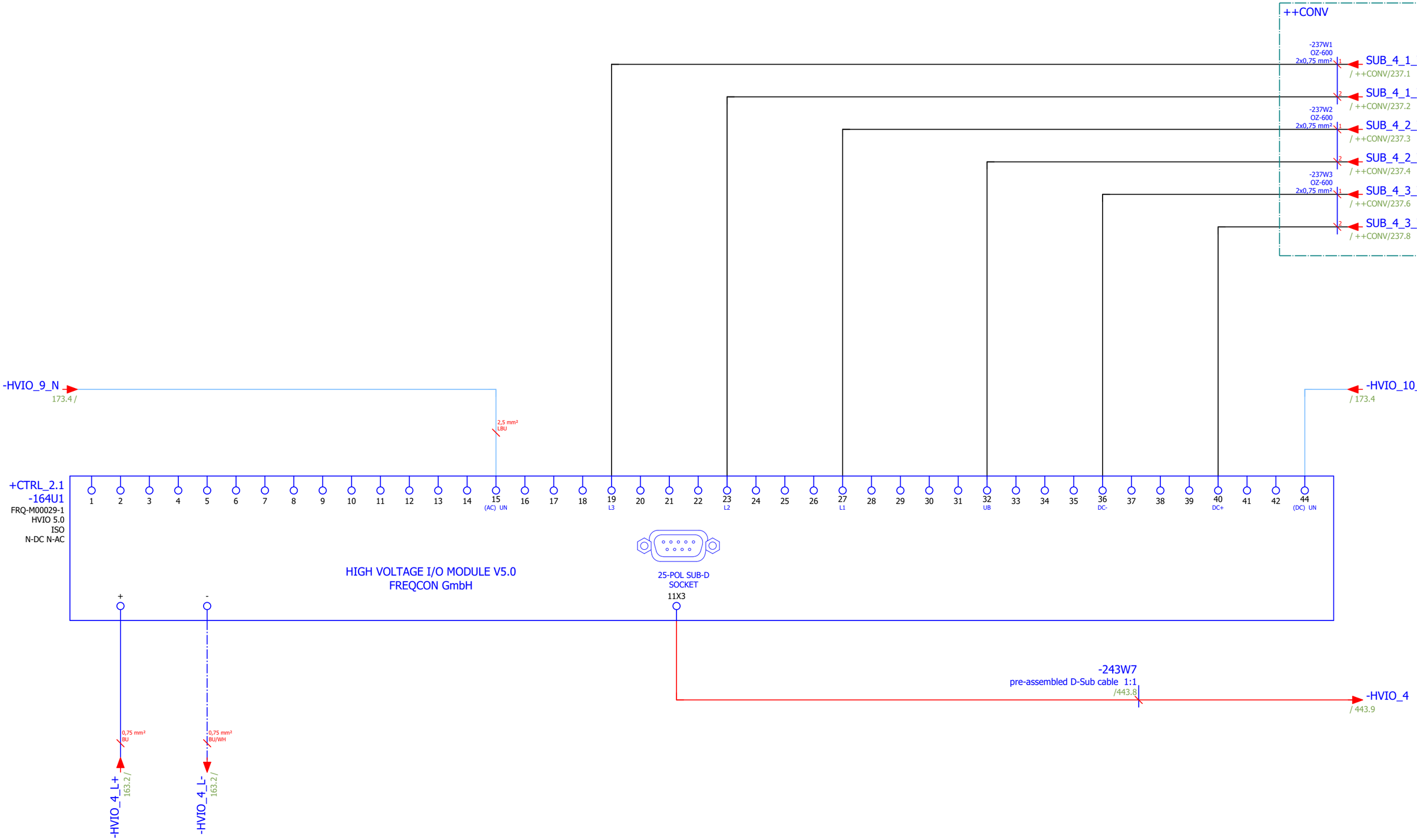
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Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 162
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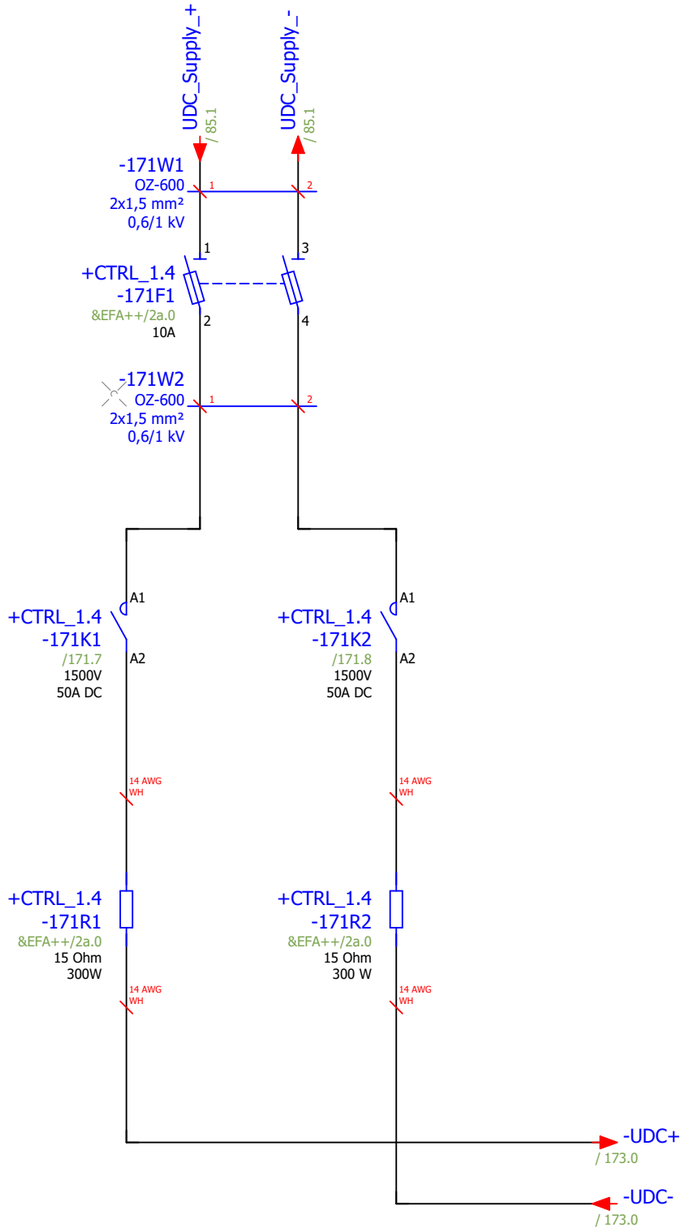
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Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 163
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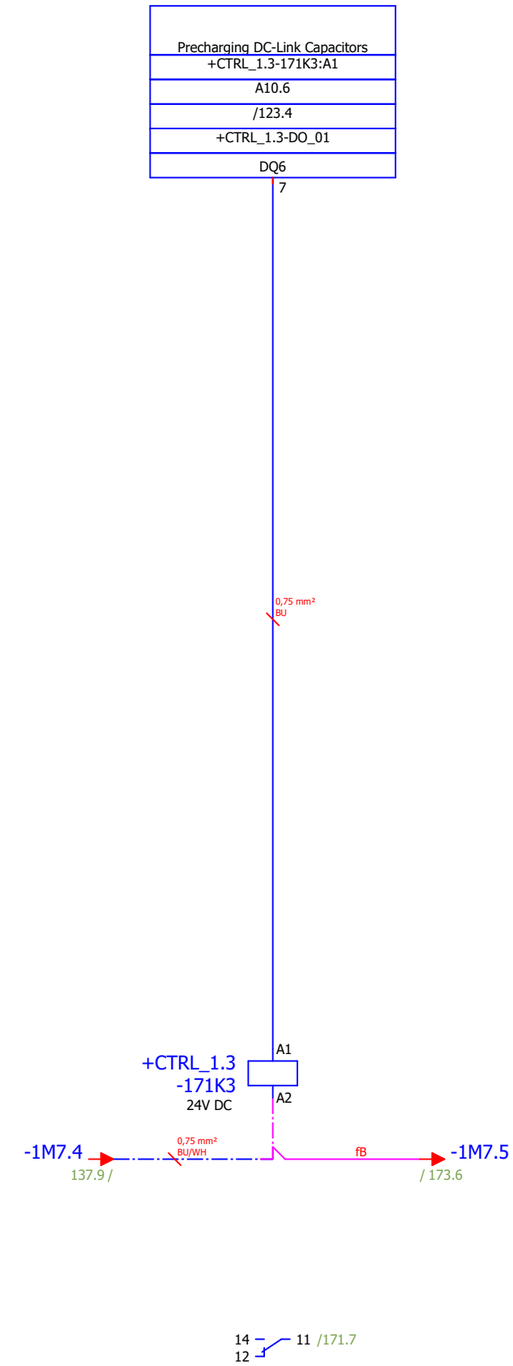
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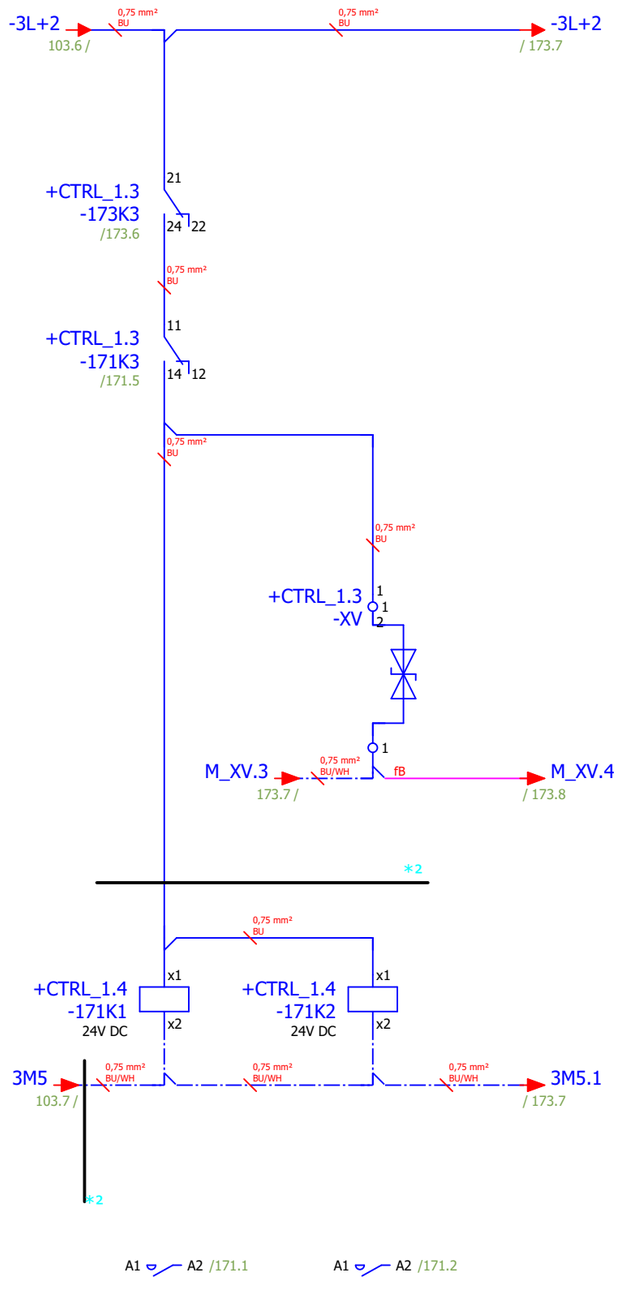
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Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 164
Date								+	total: 498



RESISTORS
FOR PRECHARGING
from Grid or Battery or DC-Link



Precharging
DC-Link Capacitors

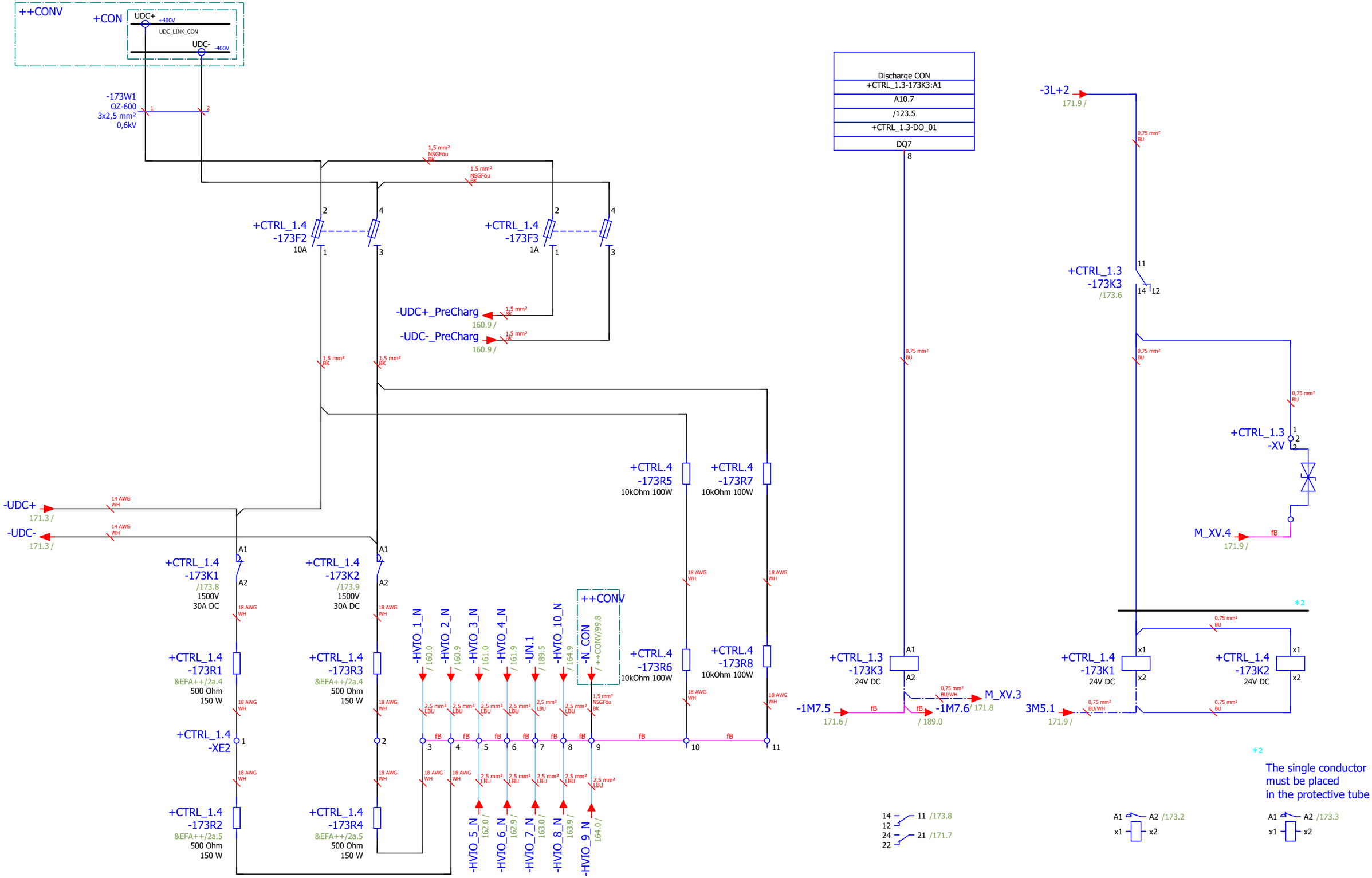


*2 The single conductor must be placed in the protective tube

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next page: 173

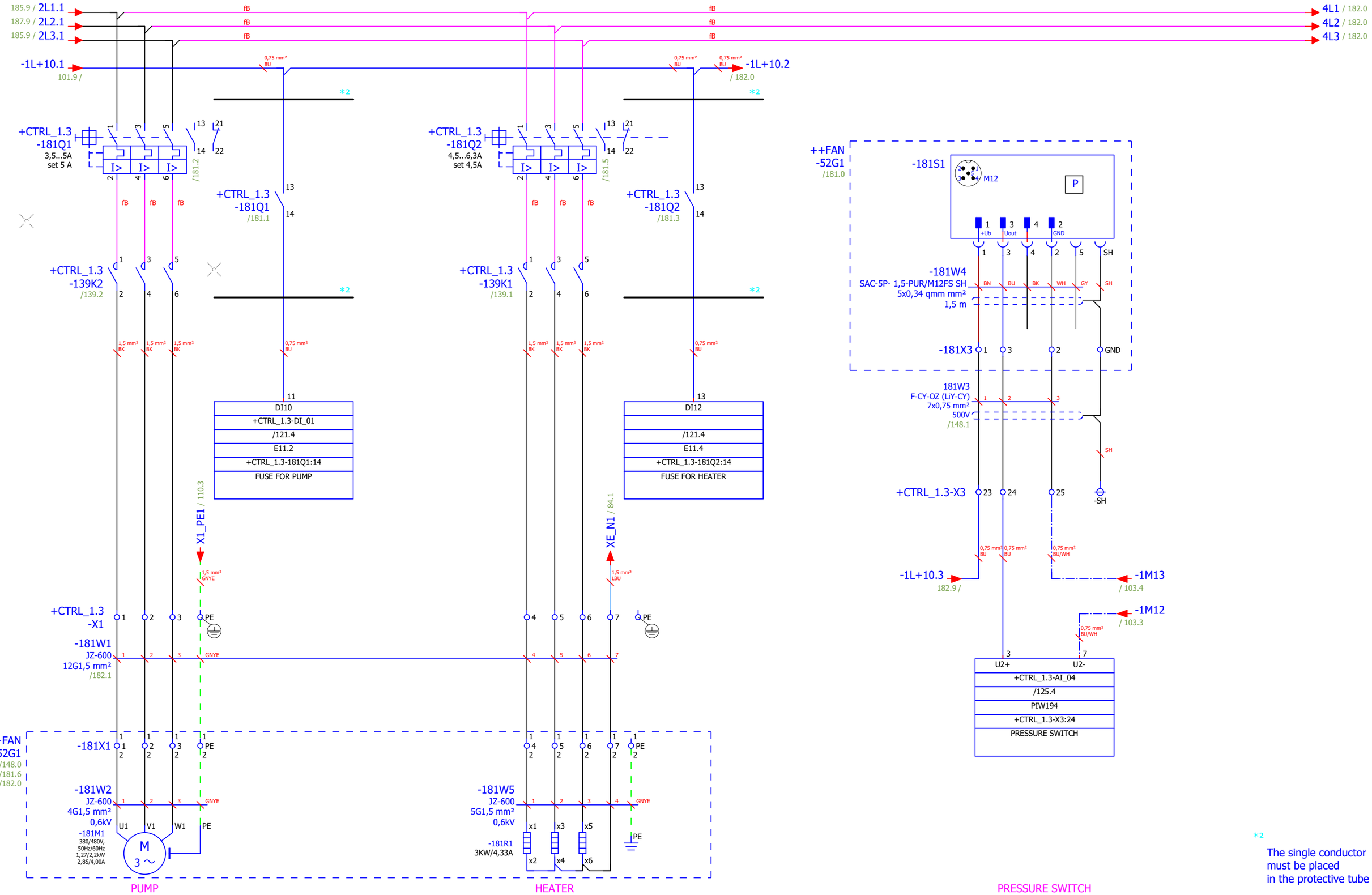
Editor	Freqcon_JD			Statron	FREQCON	PRE-CHARGING UDC	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 171
Date								+	total: 498



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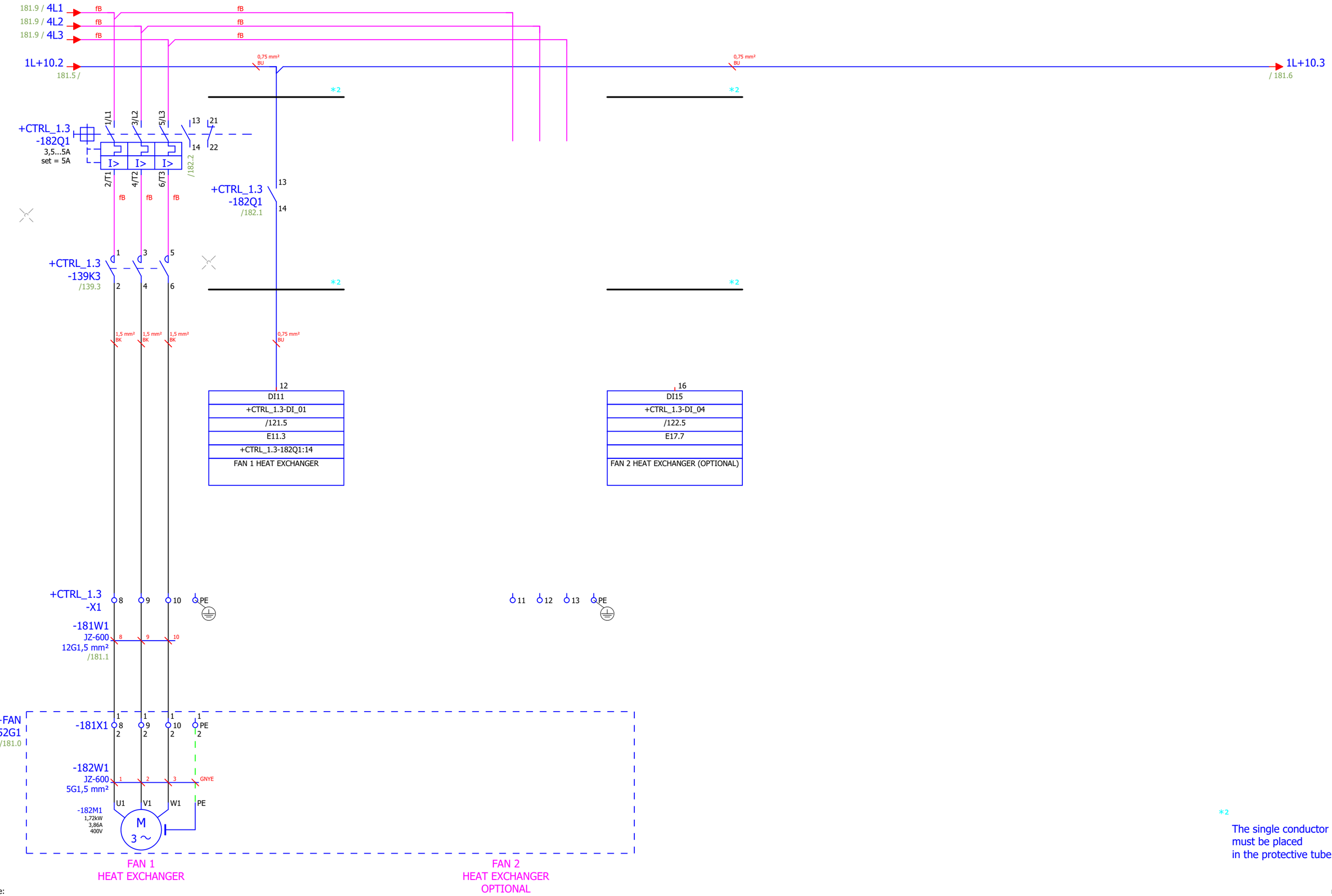
Editor	Freqcon_JD			Statron	FREQCON	DISCHARGE UDC	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 173
Date								+	total: 498



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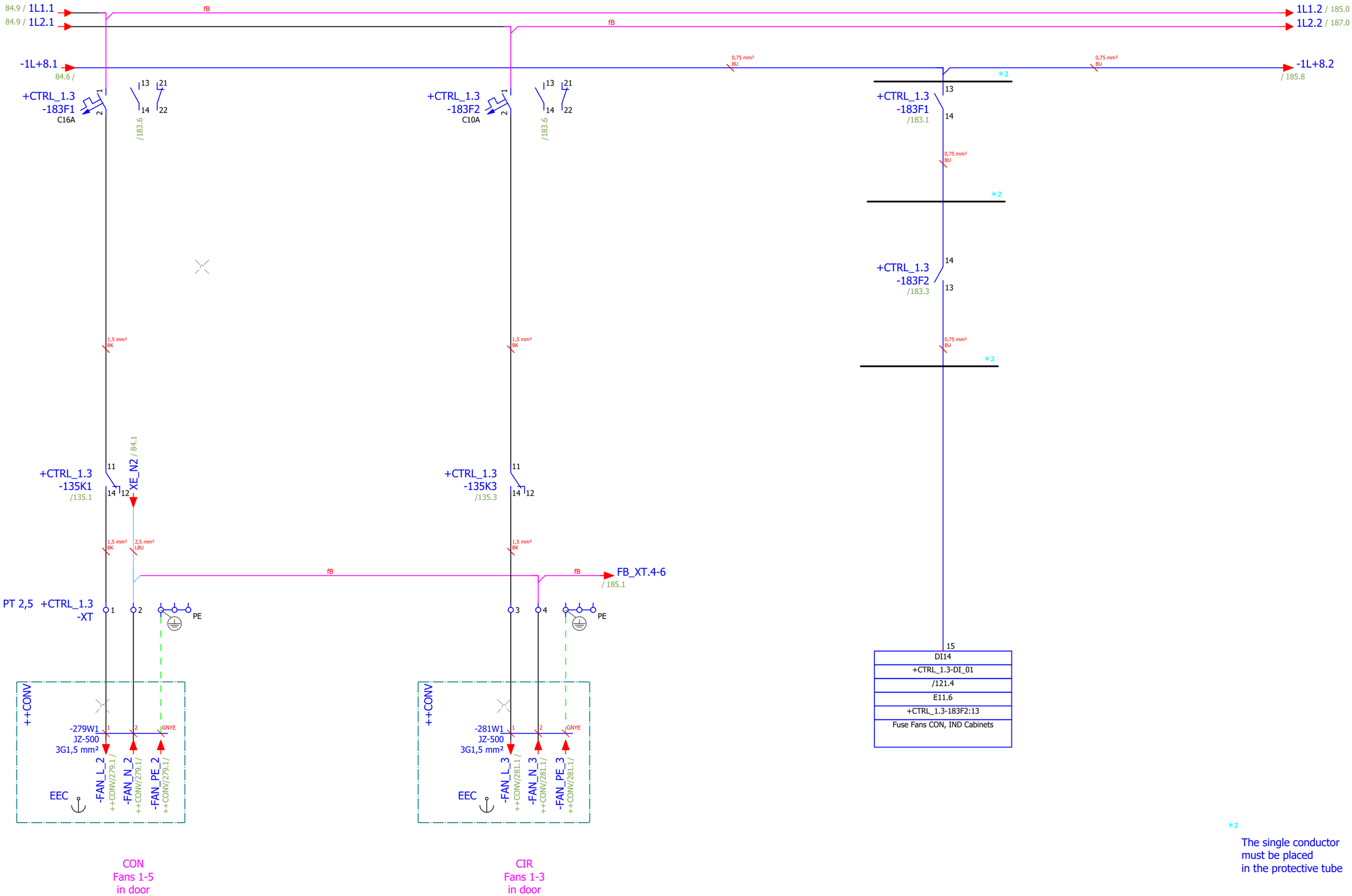
Editor	Freqcon_DG			Statron	FREQCON	WATER SYSTEM	20241105_V1.2	= UNIT_01	Converter Container 1
Date	29.07.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets page: 181
Date								+	total: 498



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Editor	Freqcon_JD			Statron	FREQCON	HEAT EXCHANGER	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 182
Date								+	total: 498

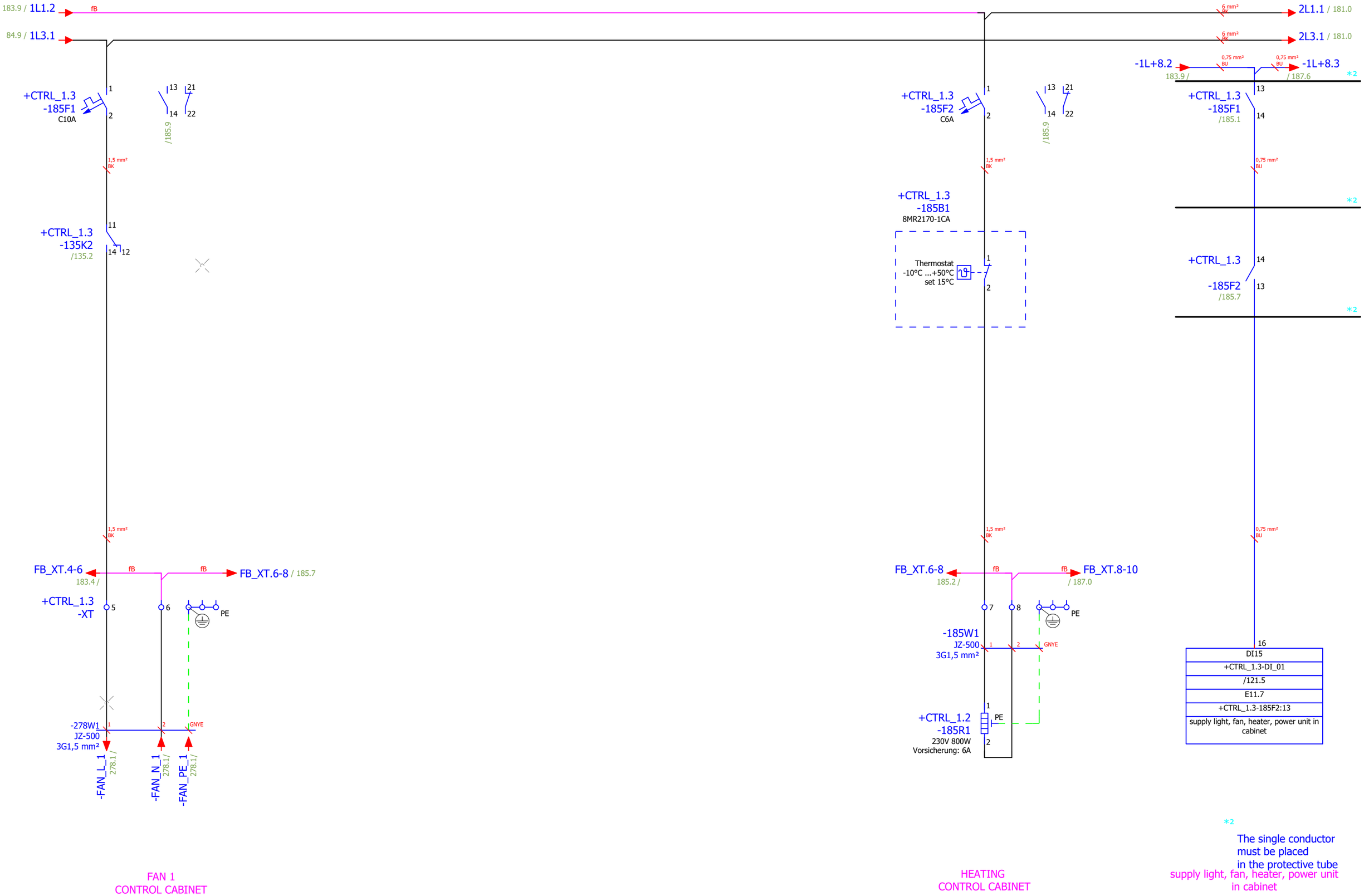


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Editor	Freqcon_DG			Statron	FREQCON	Supply for cabinet fan	20241105_V1.2	= UNIT_01	Converter Container 1
Date	29.07.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets
Date								+	

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total: 498



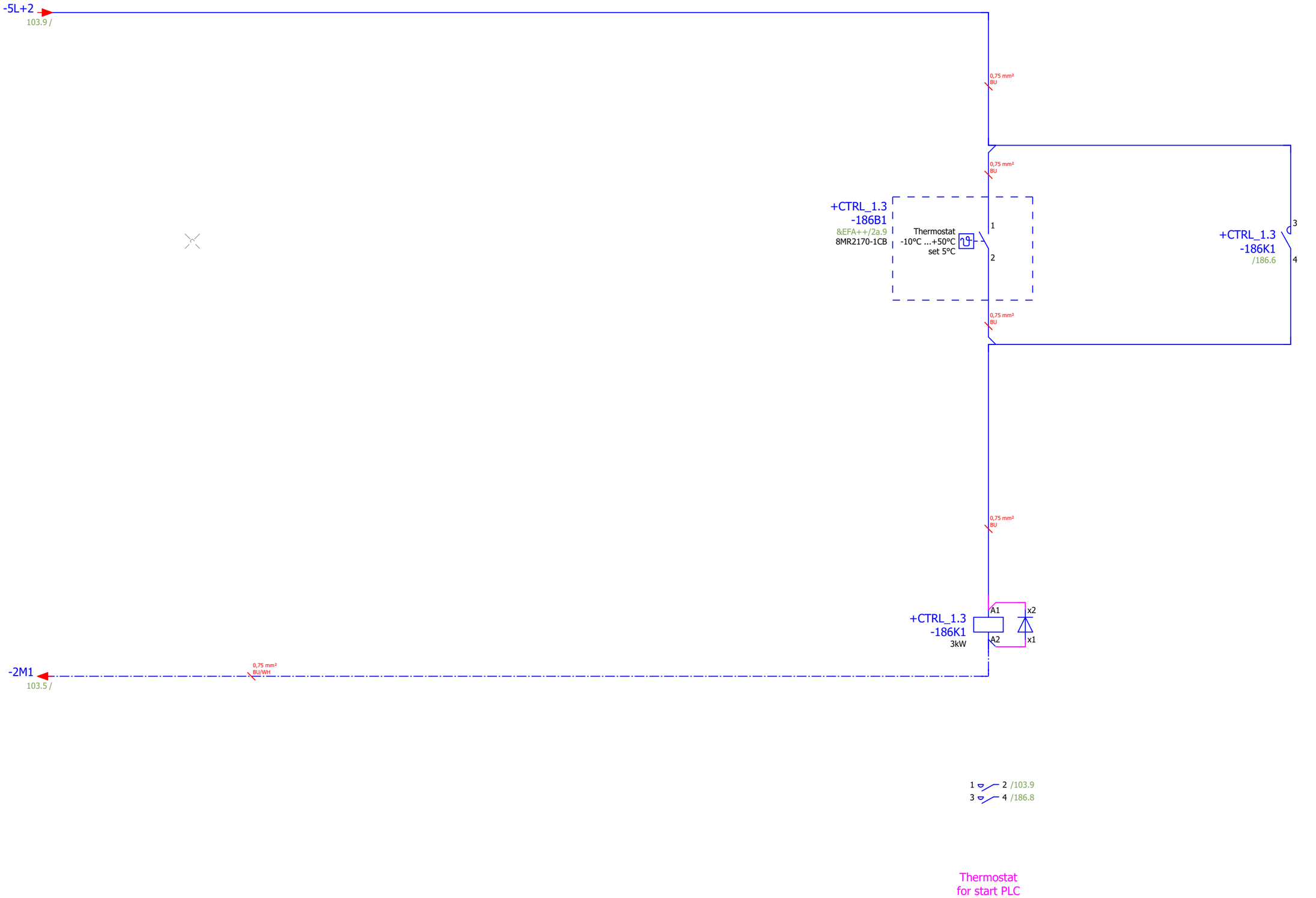
FAN 1
CONTROL CABINET

HEATING
CONTROL CABINET

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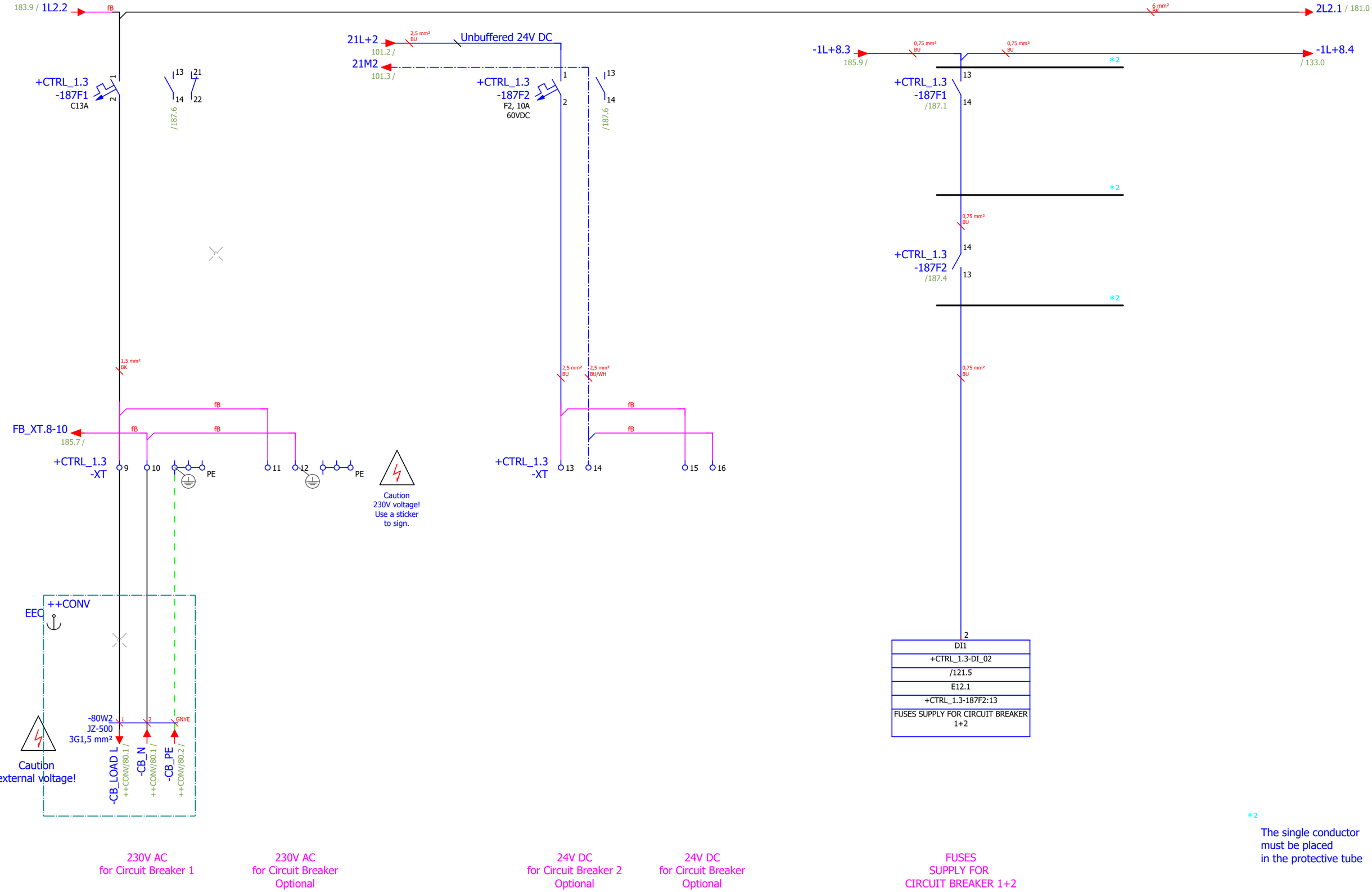
Editor	Freqcon_JD			Statron	FREQCON	FAN / HEATING CONTROL CABINET	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 185
Date								+	total: 498



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185

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187

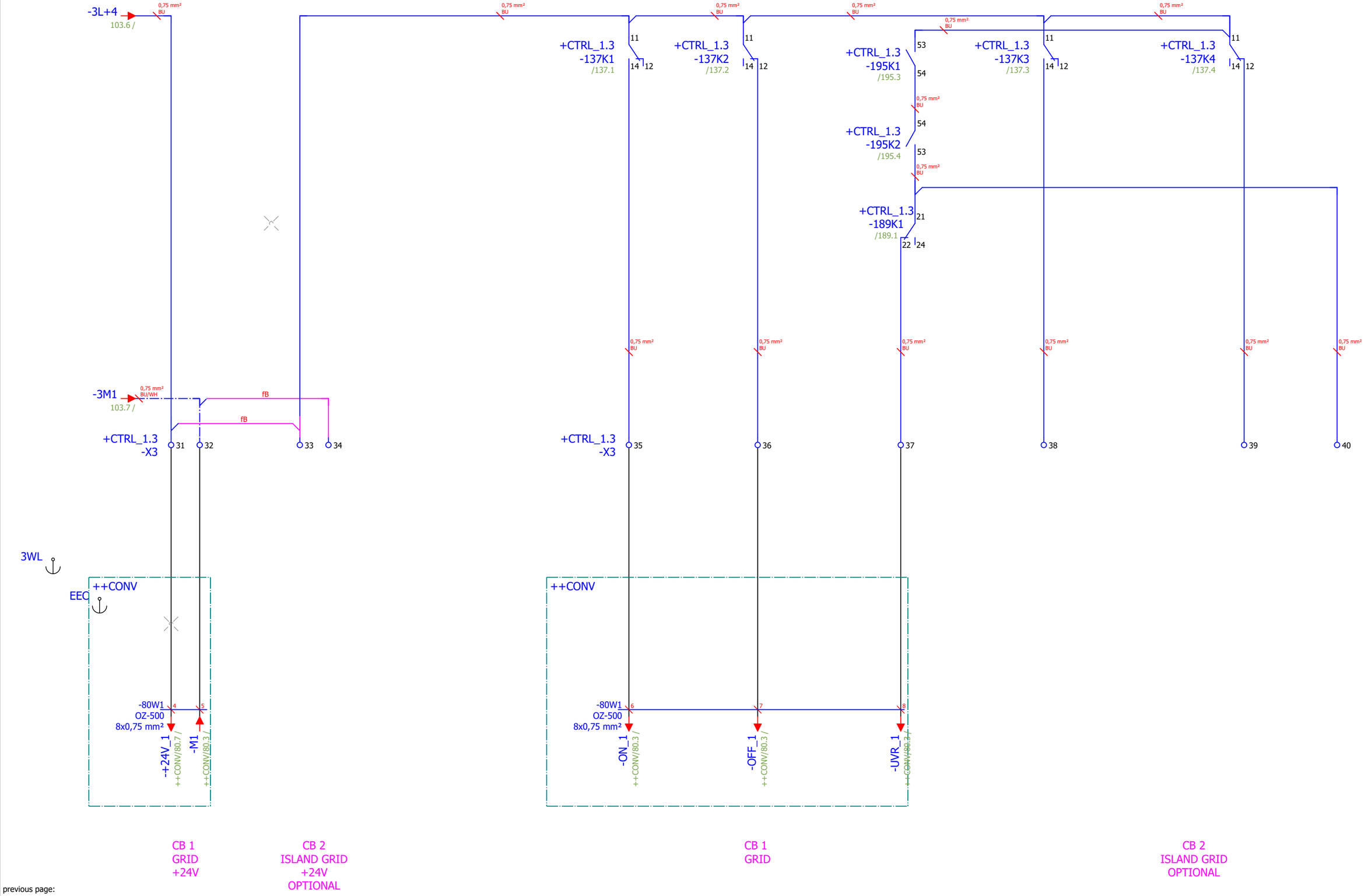
Editor	Freqcon_JD			Statron	FREQCON	THERMOSTAT	20241105_V1.2	= UNIT_01	Converter Container 1	
Date	18.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 186
Date								+		total: 498



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Editor	Freqcon_JD			Statron	FREQCON	24V DC SUPPLY CB	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore				++ CT Control cabinets	page: 187
Date							10354_23A2007	+	total: 498



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Editor	Freqcon_JD			Statron	FREQCON	24V DC SUPPLY CON / CB GRID	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 188
Date								+	total: 498

GRID FAULT
+CTRL_1.3-189K1:A1
A11.3
/123.5
+CTRL_1.3-DO_01
DQ11
12

0,75 mm² BU

+CTRL_1.3
-189K1
24V DC
A1
A2

-1M7.6 fB 0,75 mm² BU/WH -M_(GND)
173.6 / / 189.5

14 11 /189.6
12
24 21 /188.6
22

Voltage inputs
3 phases 620V AC

Grid Circuit Breaker:
if OFF then 24V;
if ON then 0V

Grid OK

-UL1.HVIO / 160.5 — 2,5 mm² BK
-UL2.HVIO / 160.5 — 2,5 mm² BK
-UL3.HVIO / 160.4 — 2,5 mm² BK
-UN.1 / 173.4 — 2,5 mm² LBU
-24V_Signal / 127.4 — 0,75 mm² BU
-M_(GND) / 189.1 — 0,75 mm² BU/WH
+CTRL_1.3 -189K1 /189.1 — 0,75 mm² BU (11 / 12 / 14)
CB_OFF.1 / 137.2 — 0,75 mm² BU

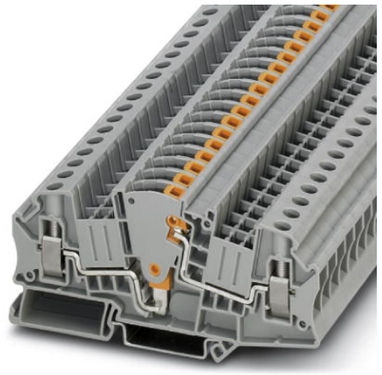
+CTRL_1.4
-189X1
Test disconnect
terminal block
Phoenix Contact
PTME 6

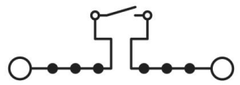
1 2 3 4 5 6 7 8 9

2,5 mm² BK
2,5 mm² BK
2,5 mm² BK
0,75 mm² BU

-HVIO_L1 / 85.1 /
-HVIO_L2 / 85.1 /
-HVIO_L3 / 85.2 /
CB_OFF.2 / 137.2 /

Relais
Circuit Breaker
OFF



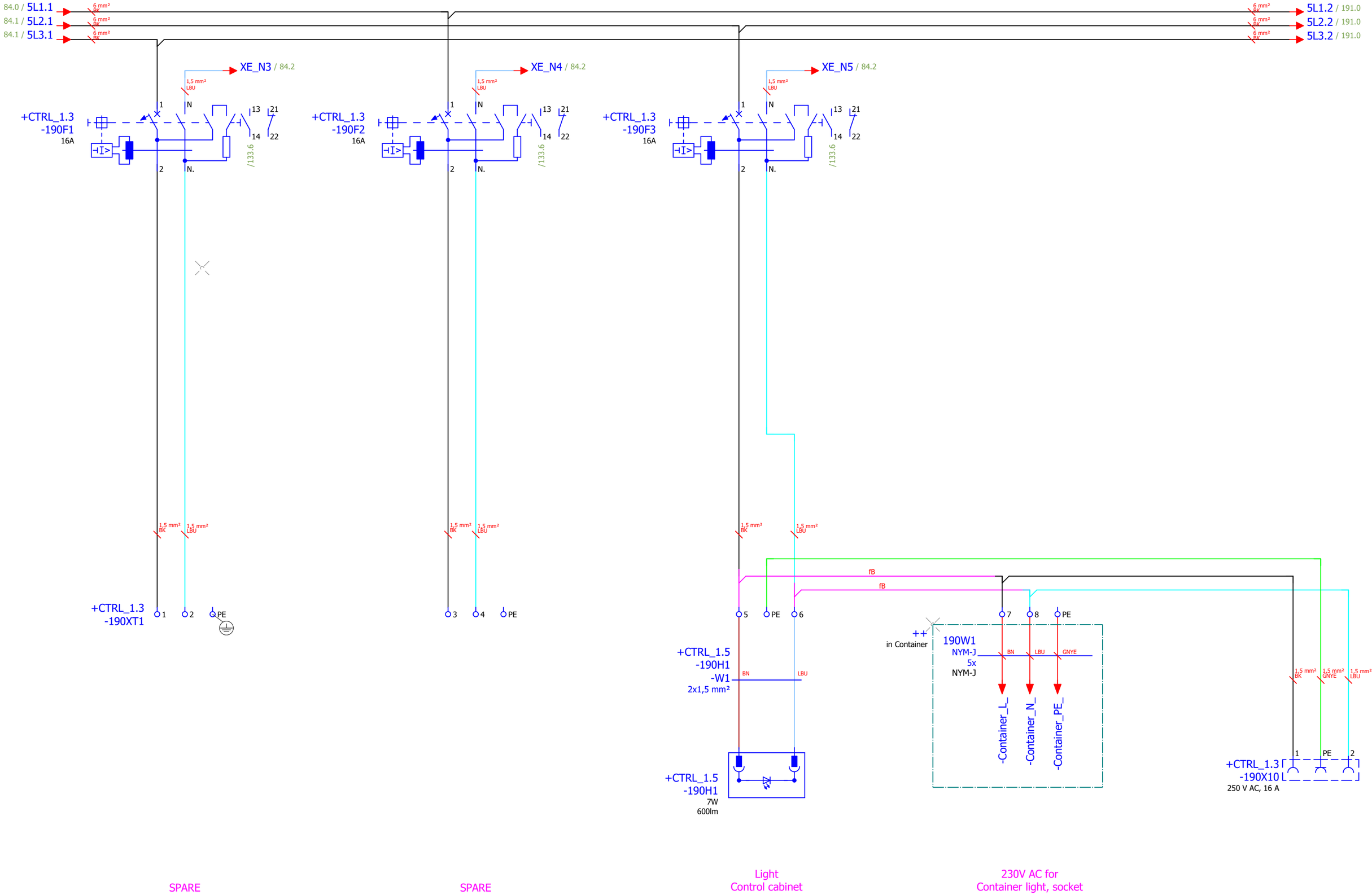


GRID FAULT

Test terminal block for protection tests

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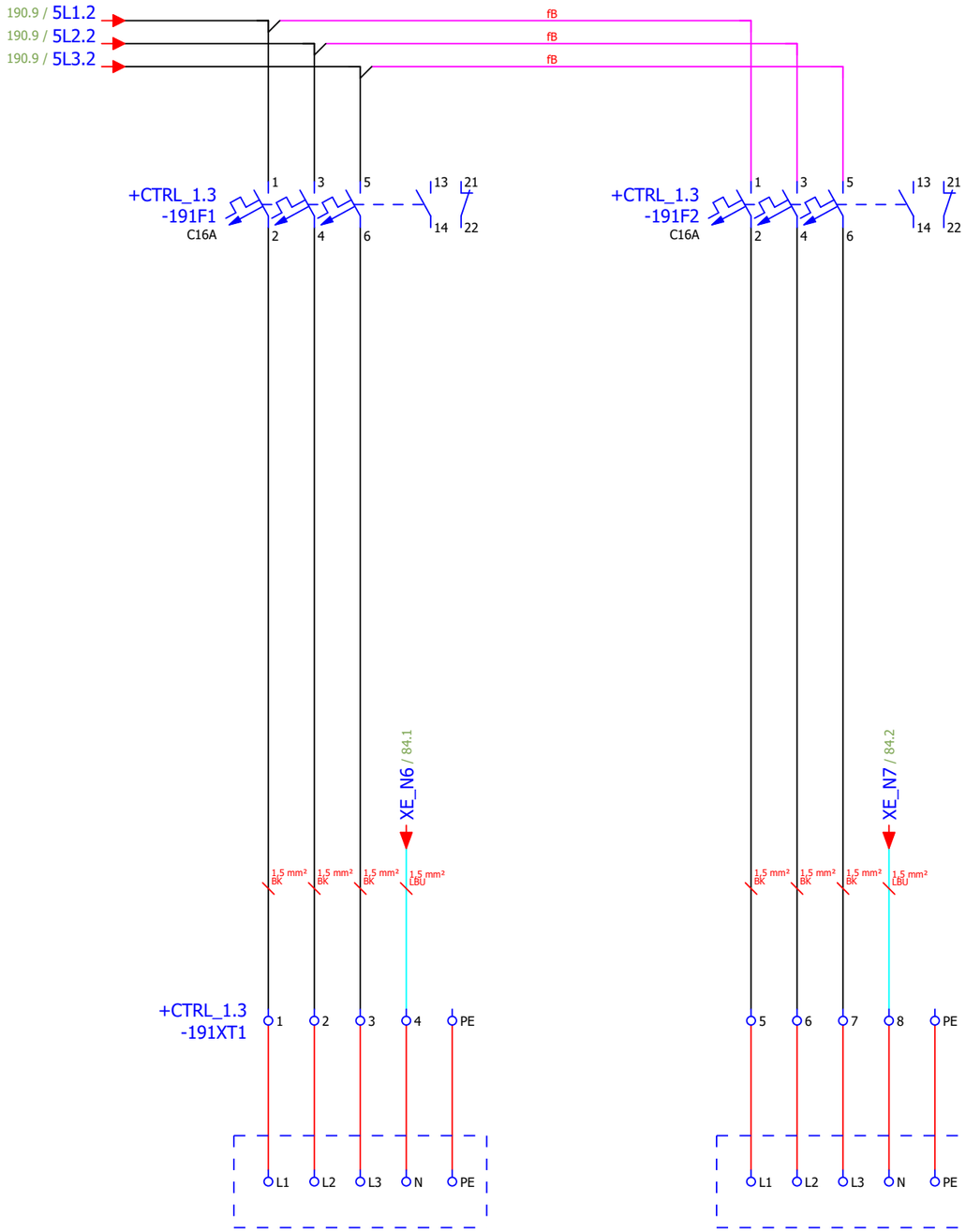
Editor	Freqcon_JD			Statron	FREQCON	TEST TERMINAL BLOCK	20241105_V1.2	= UNIT_01 Converter Container 1
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets page: 189
Date								+ total: 498



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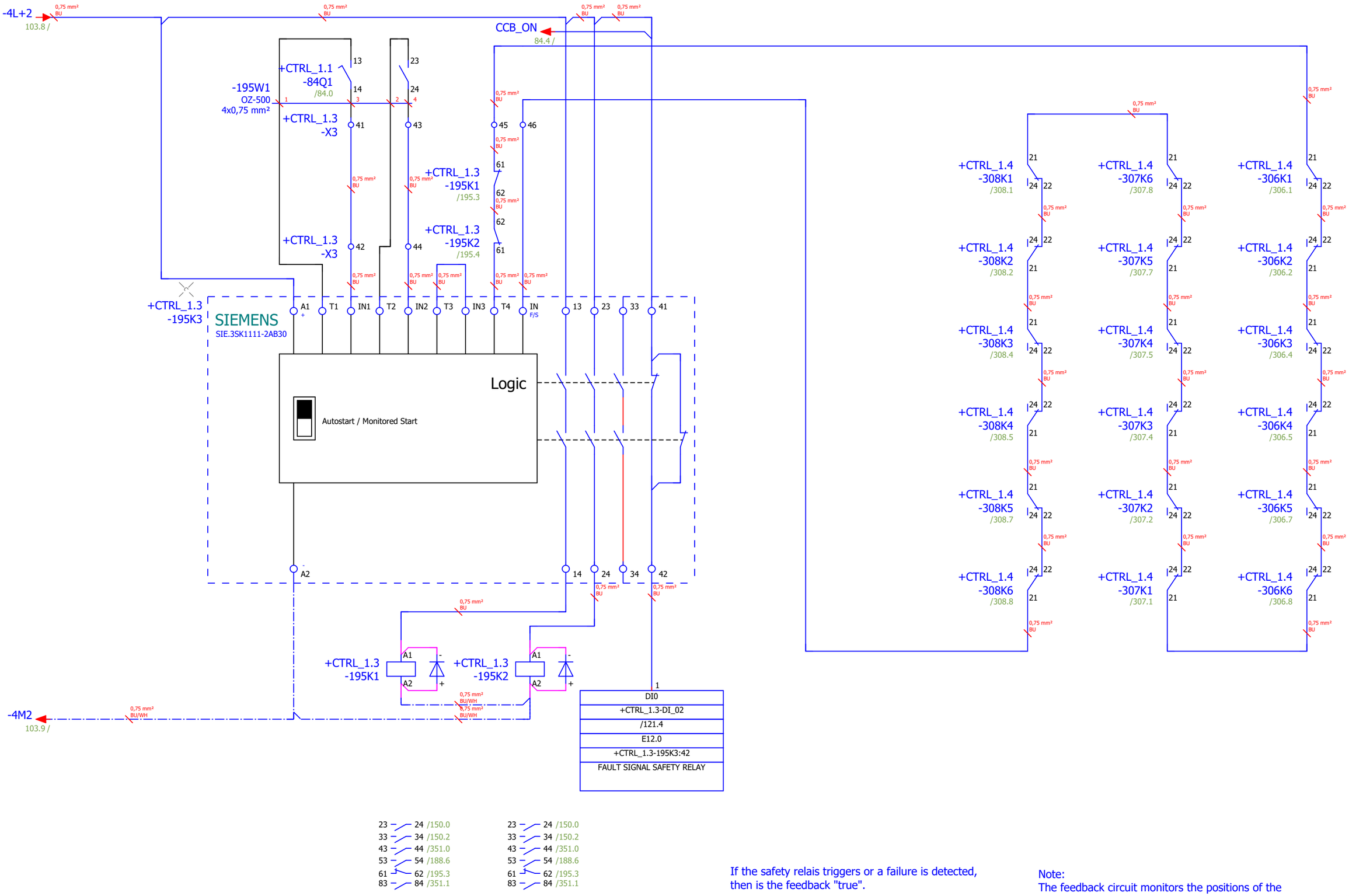
Editor	Freqcon_DG			Statron	FREQCON	CONTAINER COOLING, LIGHT 230V SUPPLY	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	29.07.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 190
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Editor	Freqcon_DG			Statron	FREQCON	CONTAINER COOLING	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	29.07.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 191
Date								+	total: 498



23 — 24 /150.0
33 — 34 /150.2
43 — 44 /351.0
53 — 54 /188.6
61 — 62 /195.3
83 — 84 /351.1

23 — 24 /150.0
33 — 34 /150.2
43 — 44 /351.0
53 — 54 /188.6
61 — 62 /195.3
83 — 84 /351.1

SHUTDOWN CIRCUIT BREAKERS / DC CONTACTORS

FAULT SIGNAL SAFETY RELAY

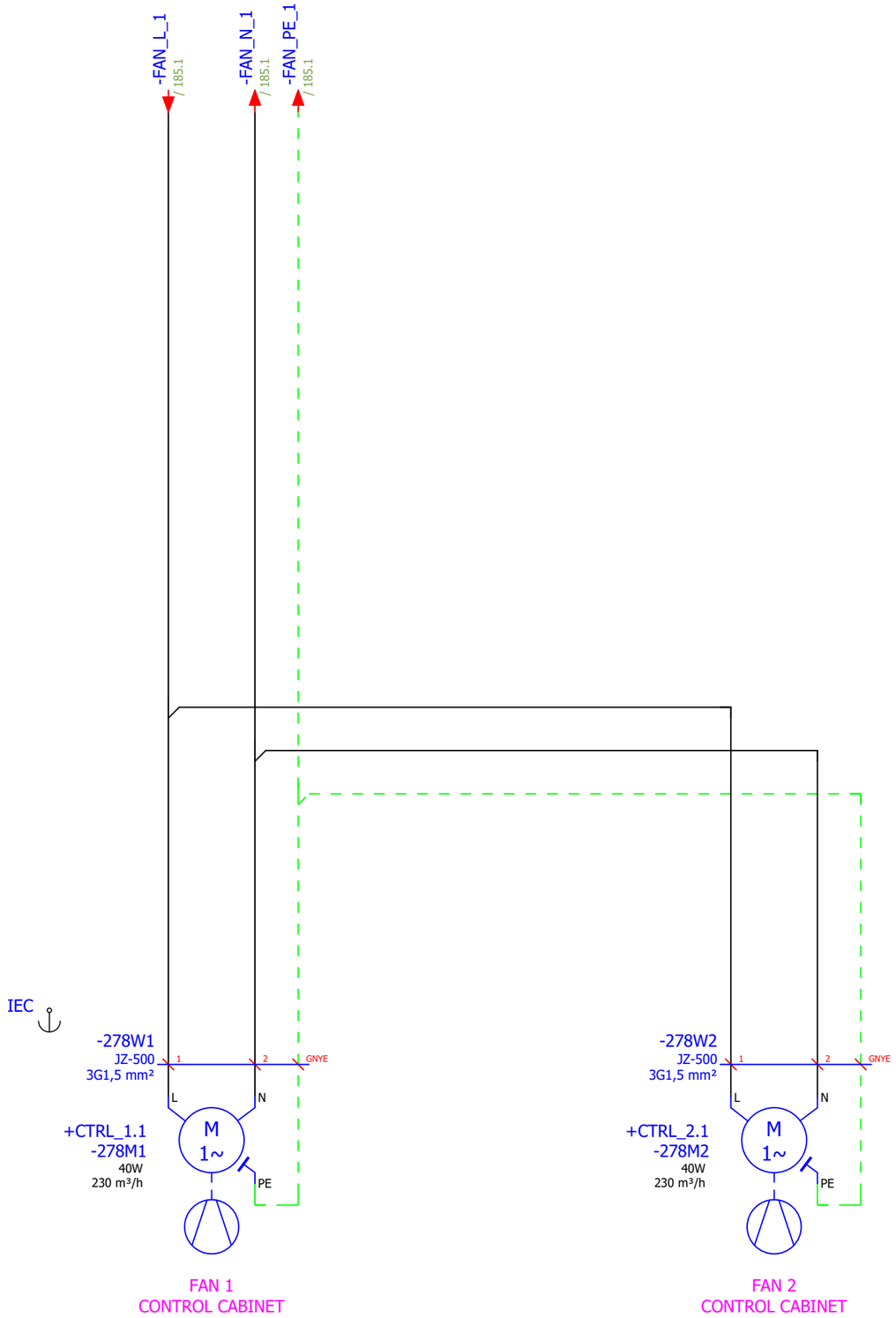
If the safety relais triggers or a failure is detected, then is the feedback "true".

Note:
The feedback circuit monitors the positions of the positive-guided NC contacts on the contactors 195K1 and 195K2. If one of their contacts latsches, then it is not possible to switch the contactors back on.

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Editor	Freqcon_DG			Statron	FREQCON	SHUTDOWN CIRCUIT BREAKERS, DC CONTACTORS	20241105_V1.2	= UNIT_01 Converter Container 1
Date	29.07.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets page: 195
Date								+ total: 498



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Editor	Freqcon_DG			Statron	FREQCON	CONTROL CABINET CLIMATE	20241105_V1.2	= UNIT_01	Converter Container 1	
Date	29.07.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 278
Date								+		total: 498

EEC

++CONV

306_PIII
DC_PIII_2-1
-231W4
-D2-500
18x1 mm²

SUB_2_1_+ /++CONV/231.a.5
SUB_2_1_- /++CONV/231.a.6
SUB_2_2_+ /++CONV/231.a.6
SUB_2_2_- /++CONV/231.a.7
SUB_2_3_+ /++CONV/231.a.6
SUB_2_3_- /++CONV/231.a.7

7 10 8 11 9 12

+CTRL_1.4 -306K1 24V DC
+CTRL_1.4 -306K2 24V DC
+CTRL_1.4 -306K3 24V DC
+CTRL_1.4 -306K4 24V DC
+CTRL_1.4 -306K5 24V DC
+CTRL_1.4 -306K6 24V DC

A1 A2

-4M6 103.9 /
0,75 mm² BU/WH
fB
-4M6 / 307.0

14 12 11 /129.0 24 22 21 /195.9
14 12 11 /129.1 24 22 21 /195.9
14 12 11 /129.2 24 22 21 /195.9
14 12 11 /129.3 24 22 21 /195.9
14 12 11 /129.4 24 22 21 /195.9
14 12 11 /129.5 24 22 21 /195.9

SUBSYSTEM 2_1_DC +
Contactor K1 is off

SUBSYSTEM 2_1_DC -
Contactor K7 is off

SUBSYSTEM 2_2_DC +
Contactor K2 is off

SUBSYSTEM 2_2_DC -
Contactor K8 is off

SUBSYSTEM 2_3_DC +
Contactor K3 is off

SUBSYSTEM 2_3_DC -
Contactor K9 is off

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next page: 307

Editor	Freqcon_JD			Statron	FREQCON	Feedback DC contactors 1_4 - 1_6	20241105_V1.2	= UNIT_01	Converter Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets page: 306
Date								+	total: 498

EEC ++CONV

SUB_3_1_+ /++CONV/227.a.5
SUB_3_1_- /++CONV/227.a.6
SUB_3_2_+ /++CONV/227.a.6
SUB_3_2_- /++CONV/227.a.7
SUB_3_3_+ /++CONV/227.a.6
SUB_3_3_- /++CONV/227.a.7

306_PIII
DC_PIII_3-1
-227W4
D2-500
18x1 mm²

7 10 8 11 9 12

+CTRL_1.4 -307K1 24V DC A1 A2
+CTRL_1.4 -307K2 24V DC A1 A2
+CTRL_1.4 -307K3 24V DC A1 A2
+CTRL_1.4 -307K4 24V DC A1 A2
+CTRL_1.4 -307K5 24V DC A1 A2
+CTRL_1.4 -307K6 24V DC A1 A2

-4M6 306.9 / fB fB fB fB fB fB -4M6 / 308.0

14 12 11 /130.0 24 22 21 /195.8
14 12 11 /130.1 24 22 21 /195.8
14 12 11 /130.2 24 22 21 /195.8
14 12 11 /130.3 24 22 21 /195.8
14 12 11 /130.4 24 22 21 /195.8
14 12 11 /130.5 24 22 21 /195.8

SUBSYSTEM 3_1_DC +
Contactor K1 is off

SUBSYSTEM 3_1_DC -
Contactor K7 is off

SUBSYSTEM 3_2_DC +
Contactor K2 is off

SUBSYSTEM 3_2_DC -
Contactor K8 is off

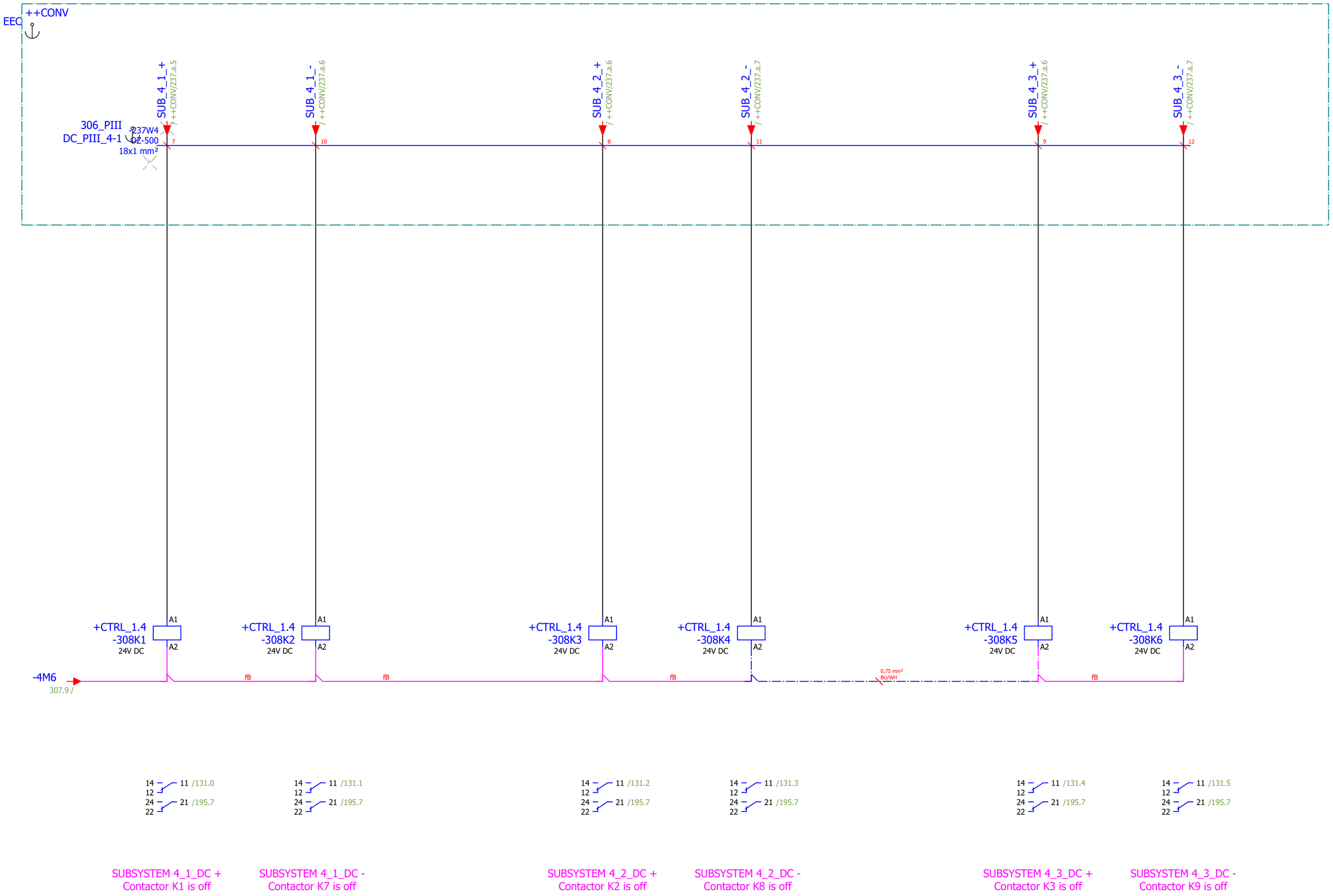
SUBSYSTEM 3_3_DC +
Contactor K3 is off

SUBSYSTEM 3_3_DC -
Contactor K9 is off

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next page: 308

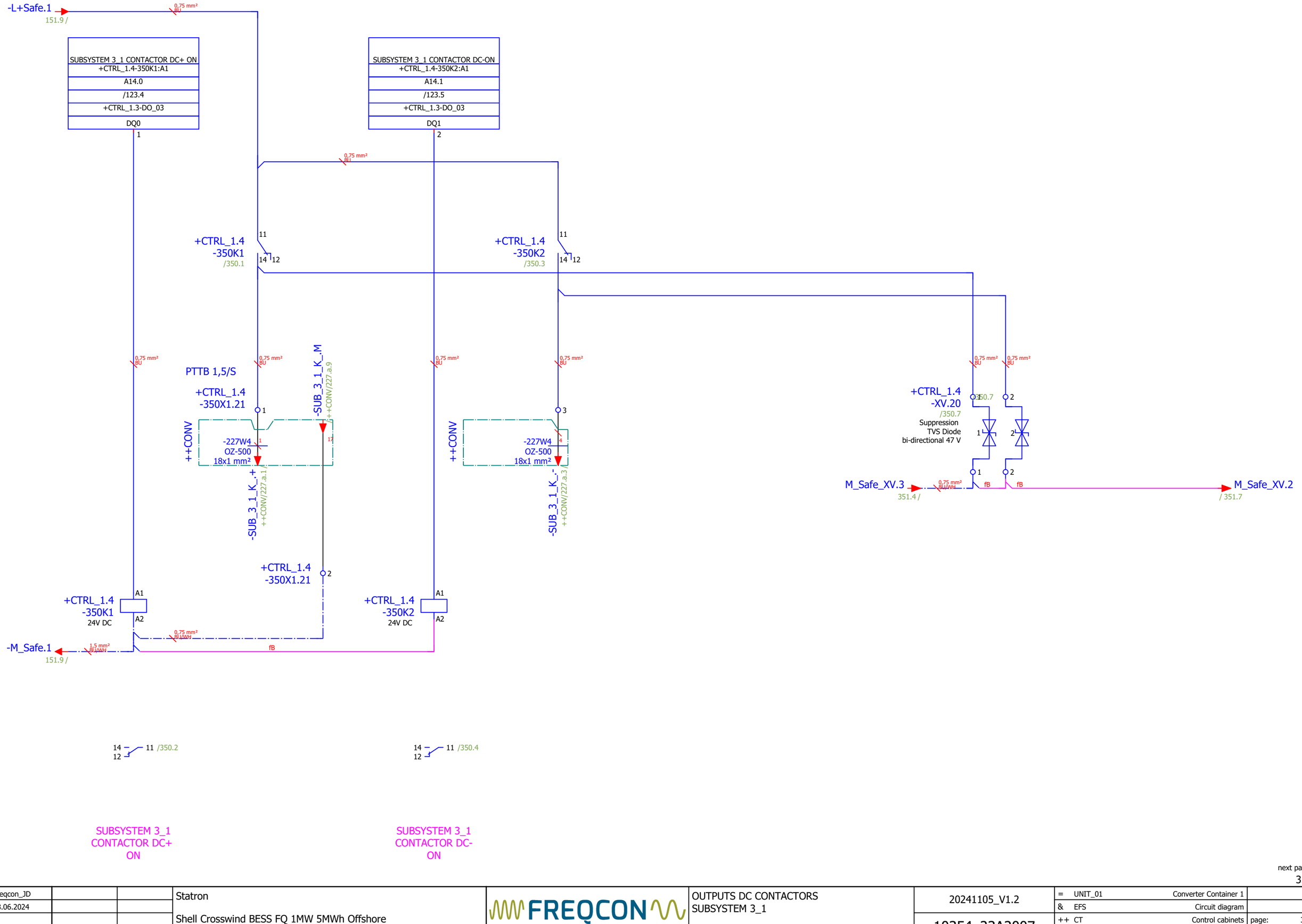
Editor	Freqcon_JD			Statron	FREQCON	Feedback DC contactors 2_1 - 2_3	20241105_V1.2	= UNIT_01	Converter Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets page: 307
Date								+	total: 498



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Editor	Freqcon_DG			Statron	FREQCON	Feedback DC contactors 2_4 - 2_6	20241105_V1.2	= UNIT_01	Converter Container 1
Date	29.07.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets page: 308
Date								+	total: 498



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Editor	Freqcon_JD			Statron	FREQCON	OUTPUTS DC CONTACTORS SUBSYSTEM 3_1	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 350
Date								+	total: 498

-3L+5
103.7 /

0,75 mm² BU

+CTRL_1.3
-195K1
/195.3

83
84

+CTRL_1.3
-195K2
/195.4

84
83

SUBSYSTEM 3_3 CONTACTOR DC+ ON
+CTRL_1.4-351K3:A1
A14.4
/123.4
+CTRL_1.3-DO_03
DQ4
5

SUBSYSTEM 3_3 CONTACTOR DC-ON
+CTRL_1.4-351K4:A1
A14.5
/123.5
DQ5
6

L+Safe.2
/ 352.0

+CTRL_1.4
-351K1
/351.1

+CTRL_1.4
-351K2
/351.2

+CTRL_1.4
-351K3
/351.4

+CTRL_1.4
-351K4
/351.5

11
14
12

-3M4
103.7 /

0,75 mm² BU/WH

+CTRL_1.3
-195K1
/195.3

43
44

+CTRL_1.3
-195K2
/195.4

44
43

+CTRL_1.4
-350X1.21

4
6
7
9

++CONV

-227W4
OZ-500
18x1 mm²

-SUB_3_2_K_+
++CONV/227.a.2/

-SUB_3_2_K_-
++CONV/227.a.4/

-SUB_3_3_K_+
++CONV/227.a.2/

-SUB_3_3_K_-
++CONV/227.a.5/

+CTRL_1.4
-XV.20
/351.7
Suppression
TVS Diode
bi-directional 47 V

3
4
5
6

M_Safe_XV.2
350.9 /

fB

M_Safe_XV.4
/ 352.7

+CTRL_1.4
-350X1.21

5
8
10

+CTRL_1.4
-351K1
24V DC

+CTRL_1.4
-351K2
24V DC

+CTRL_1.4
-351K3
24V DC

+CTRL_1.4
-351K4
24V DC

A1
A2

M_Safe_XV.3
/ 350.7

M_Safe.2
/ 352.0

14 — 11 /351.1
12

14 — 11 /351.3
12

14 — 11 /351.4
12

14 — 11 /351.6
12

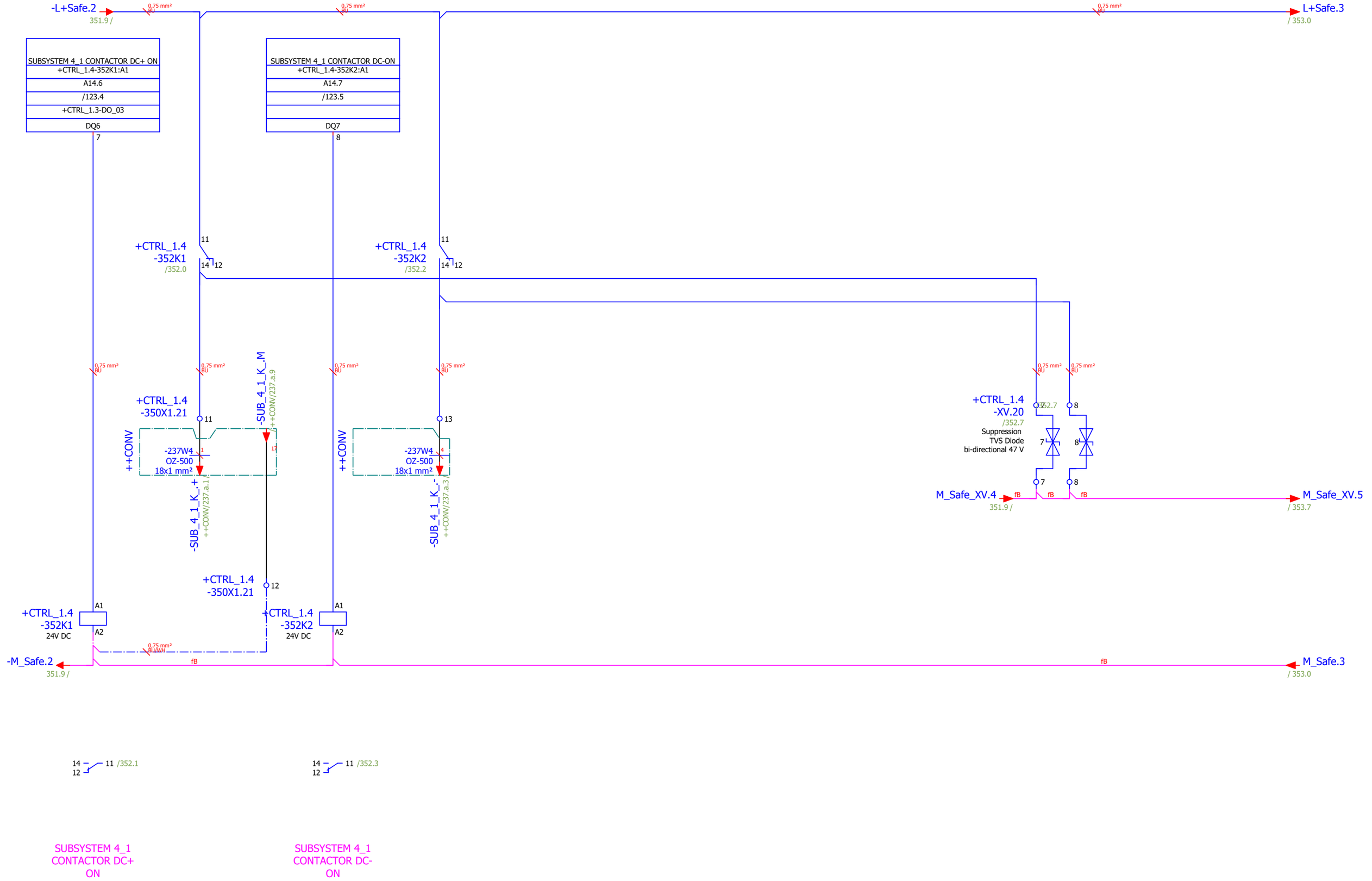
SUBSYSTEM 3_3
CONTACTOR DC+
ON

SUBSYSTEM 3_3
CONTACTOR DC-
ON

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350

next page:
352

Editor	Freqcon_DG			Statron	FREQCON	OUTPUTS DC CONTACTORS SUBSYSTEM 3_2 - 3_3	20241105_V1.2	= UNIT_01 Converter Container 1	
Date	29.07.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 351
Date								+	total: 498



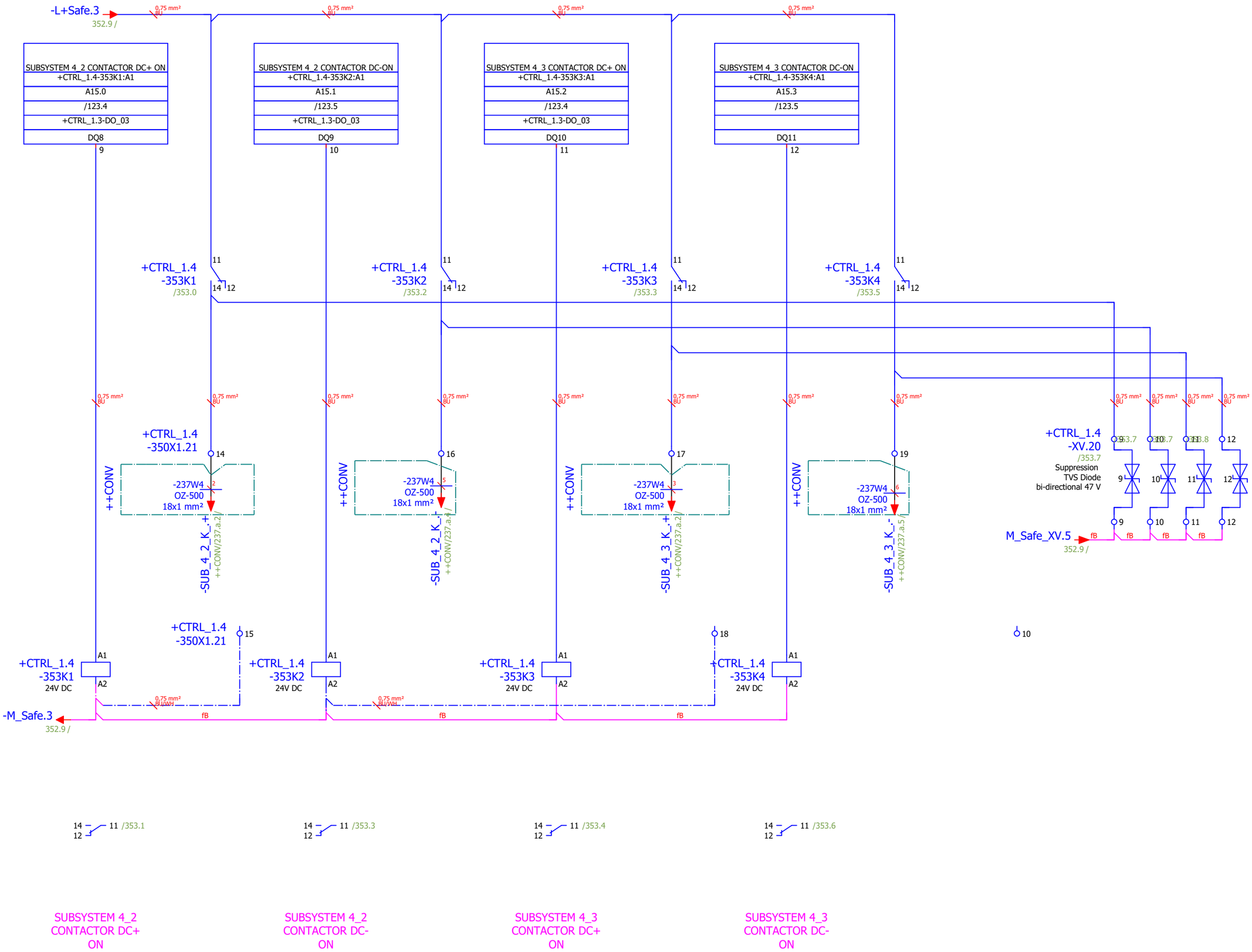
previous page: 351

next page: 353

Editor	Freqcon_DG			Statron	FREQCON	OUTPUTS DC CONTACTORS SUBSYSTEM 4_1	20241105_V1.2	= UNIT_01	Converter Container 1
Date	29.07.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets
Date								+	

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Editor	Freqcon_DG			Statron	FREQCON	OUTPUTS DC CONTACTORS SUBSYSTEM 4_2 - 4_3	20241105_V1.2	= UNIT_01 Converter Container 1
Date	29.07.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets page: 353
Date								+ total: 498

-1L+1
103.2 /
-1M1
103.3 /
-1PE1
103.4 /
240W9
JZ-500
3G0,75 mm²
1 2 GNYE

+CTRL_2.1
-240U1
PIII
IGBT IRT Interface
2.6 V4 cabinet
1 3 4 2
4 3 1 2
Ansicht
Stiftleiste
24 VDC

M12 System-
steckverbinder

Ansicht
Buchsenleiste

240W10
2YY (ST) CY
2x2x0,64 mm²
/110.1
-P320-FPPU1
110.0 /
P1
3 4 (IN) 2 1

240W11
2YY (ST) CY
2x2x0,64 mm²
/441.1
-FPPU1-FPPU2
441.0 /
P2
3 4 (OUT) 2 1

M12 System-
steckverbinder

Arc Detect
3 4 2 1

M6 Bolzen
-PE

PE
19

4 3 1 2
Stecker A-Codiert

PIII_1

Converter Control Interface
Type: PIII IGBT IRT Interface 2.6 V4
FRQ 504890

CHOPPER
HVIO
IGBT6
IGBT5
25-POL SUB-D SOCKET
X8 X7 X6 X5

PIII_1

IGBT1 X1
IGBT2 X2
IGBT3 X3
IGBT4 X4
25-POL SUB-D SOCKET

++CONV

240W1
pre-assembled D-Sub cable 1:1
-_IGBT1.1
/ ++CONV/201.3

240W2
pre-assembled D-Sub cable 1:1
-_IGBT1.2
/ ++CONV/202.3

240W3
pre-assembled D-Sub cable 1:1
-_IGBT1.3
/ ++CONV/203.3

IEC

PIII_1

PIII_Version
2_6_V_4

-240W7
pre-assembled D-Sub cable 1:1
/160.7
-HVIO_1
/ 160.9

Signal	Colour	M12 Plug	M12 Plug
TD+	yellow	1	1
TD-	orange	3	3
RD+	white	2	2
RD-	blue	4	4

Connection PIII -- P320

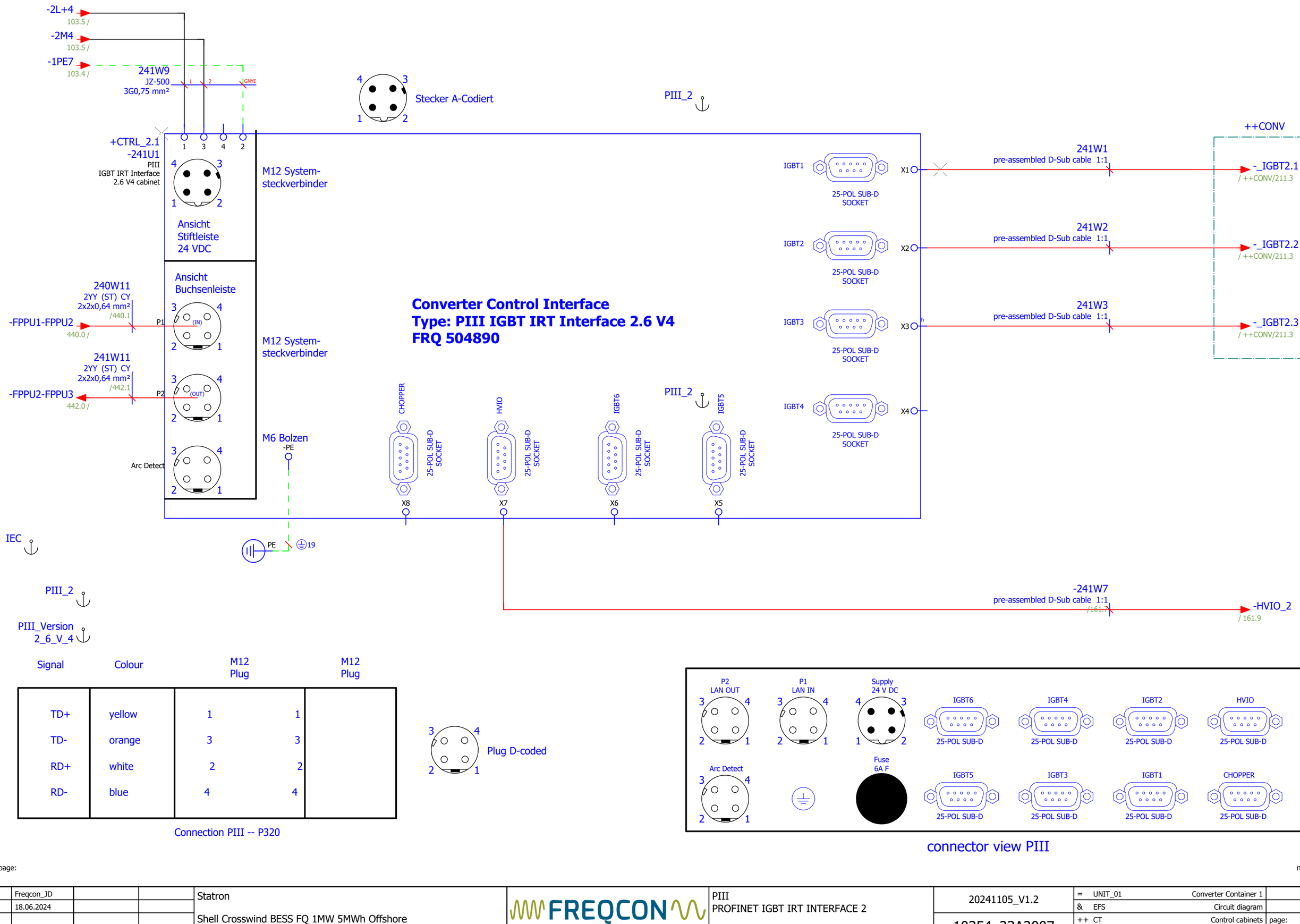
3 4 2 1
Plug D-coded

P2 LAN OUT
P1 LAN IN
Supply 24 V DC
Arc Detect
Fuse 6A F
IGBT6 IGBT4 IGBT2 HVIO
IGBT5 IGBT3 IGBT1 CHOPPER
25-POL SUB-D

connector view PIII

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next page: 441

Editor	Freqcon_JD			Statron	FREQCON	PIII PROFINET IGBT IRT INTERFACE 1	20241105_V1.2	= UNIT_01	Converter Container 1	
Date	18.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 440
Date								+		total: 498



Signal	Colour	M12 Plug	M12 Plug
TD+	yellow	1	1
TD-	orange	3	3
RD+	white	2	2
RD-	blue	4	4

Connection PIII -- P320

Plug D-coded

connector view PIII

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next page: 442

Editor	Freqcon_JD			Statron	FREQCON	PIII PROFINET IGBT IRT INTERFACE 2	20241105_V1.2	= UNIT_01 Converter Container 1
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets page: 441
Date								+ total: 498

-2L+2
103.4 /
-2M2
103.5 /
-1PE5
103.4 /
242W9
JZ-500
3G0,75 mm²
1 2 GNYE

+CTRL_2.1
-242U1
PIII
IGBT IRT Interface
2.6 V4 cabinet
1 3 4 2
Ansicht
Stiftleiste
24 VDC

Stecker A-Codiert

PIII_3

M12 System-
steckverbinder

Ansicht
Buchsenleiste

241W11
2YY (ST) CY
2x2x0,64 mm²
/441.1
-FPPU2-FPPU3
441.0 /
P1 (IN)

242W11
2YY (ST) CY
2x2x0,64 mm²
/443.1
-FPPU3-FPPU4
443.0 /
P2 (OUT)

M12 System-
steckverbinder

Arc Detect

M6 Bolzen
-PE

PE
19

IEC

PIII_3

PIII_Version
2_6_V_4

Converter Control Interface
Type: PIII IGBT IRT Interface 2.6 V4
FRQ 504890

PIII_2

CHOPPER
HVIO
IGBT6
IGBT5
25-POL SUB-D SOCKET
X8 X7 X6 X5

IGBT1 X1
IGBT2 X2
IGBT3 X3
IGBT4 X4
25-POL SUB-D SOCKET

++CONV

242W1
pre-assembled D-Sub cable 1:1
-_IGBT3.1
/ ++CONV/207.3

242W2
pre-assembled D-Sub cable 1:1
-_IGBT3.2
/ ++CONV/207.3

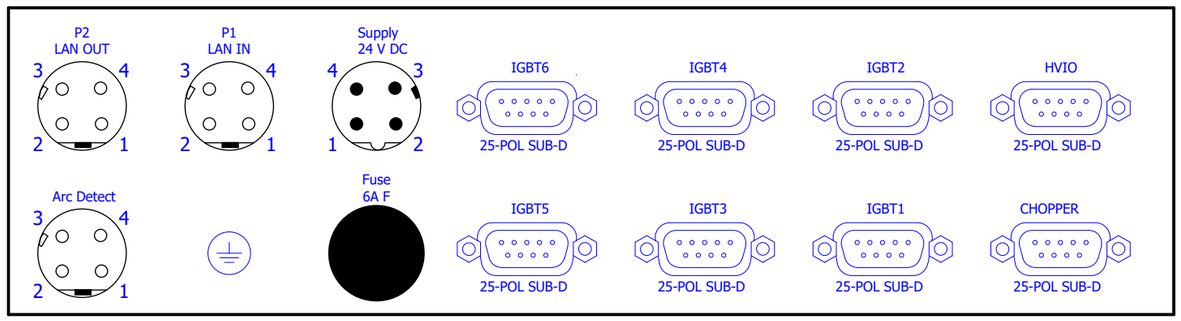
242W3
pre-assembled D-Sub cable 1:1
-_IGBT3.3
/ ++CONV/207.3

-242W7
pre-assembled D-Sub cable 1:1
/163.7
-HVIO_3
/ 163.9

Signal	Colour	M12 Plug	M12 Plug
TD+	yellow	1	1
TD-	orange	3	3
RD+	white	2	2
RD-	blue	4	4

Connection PIII -- P320

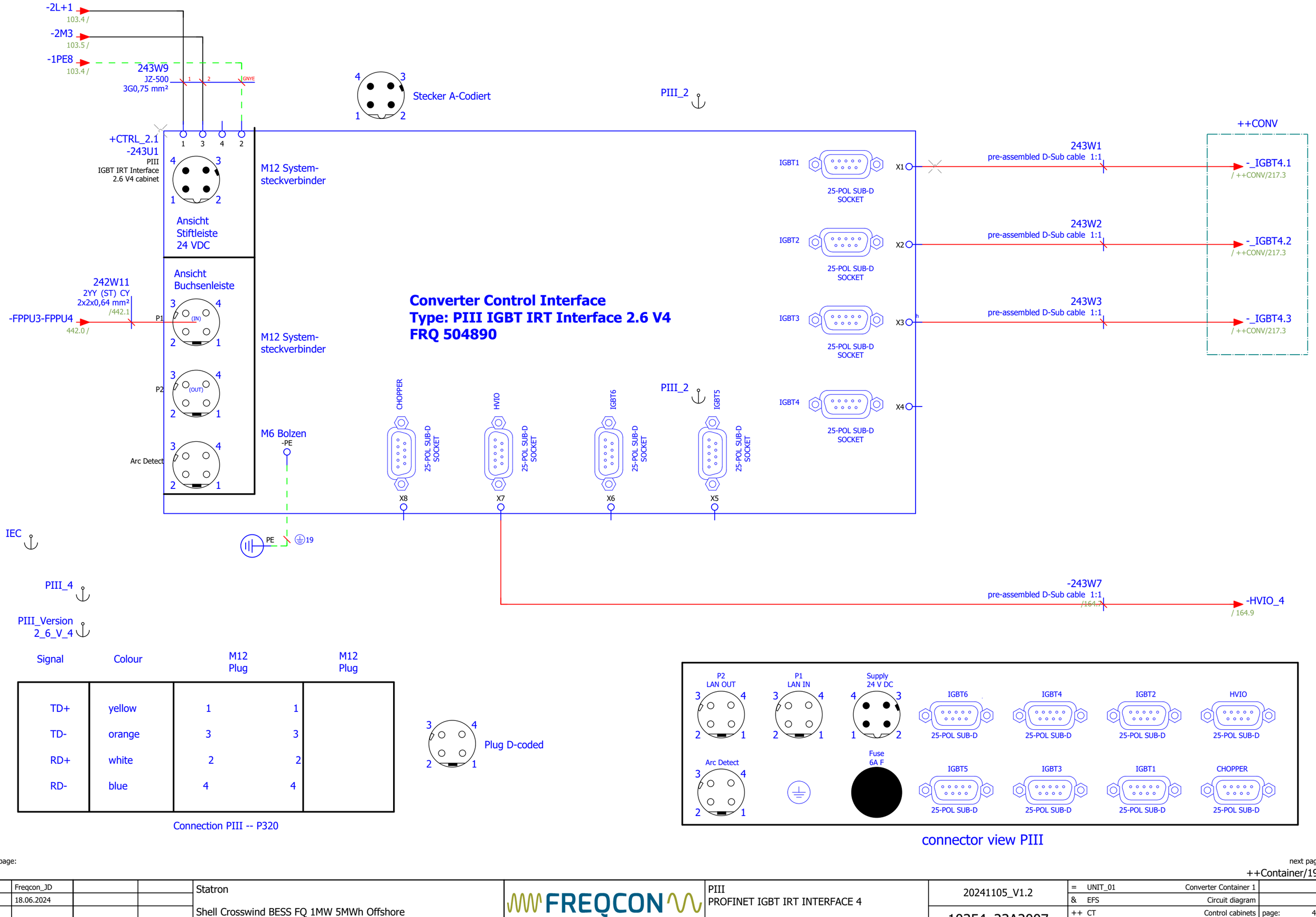
Plug D-coded



connector view PIII

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Editor	Freqcon_JD			Statron	FREQCON	PIII PROFINET IGBT IRT INTERFACE 3	20241105_V1.2	= UNIT_01	Converter Container 1	
Date	18.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 442
Date								+		total: 498



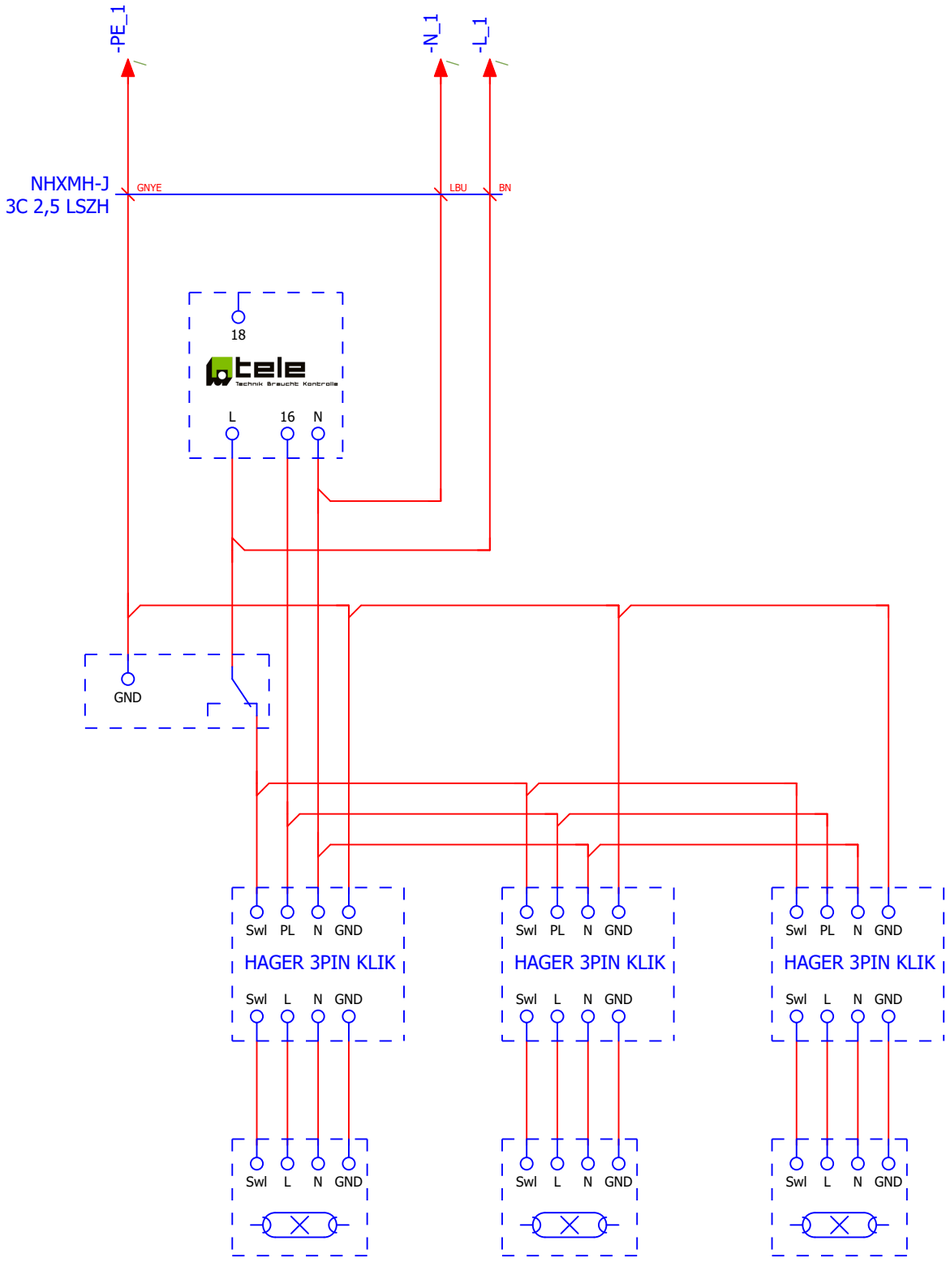
Signal	Colour	M12 Plug	M12 Plug
TD+	yellow	1	1
TD-	orange	3	3
RD+	white	2	2
RD-	blue	4	4

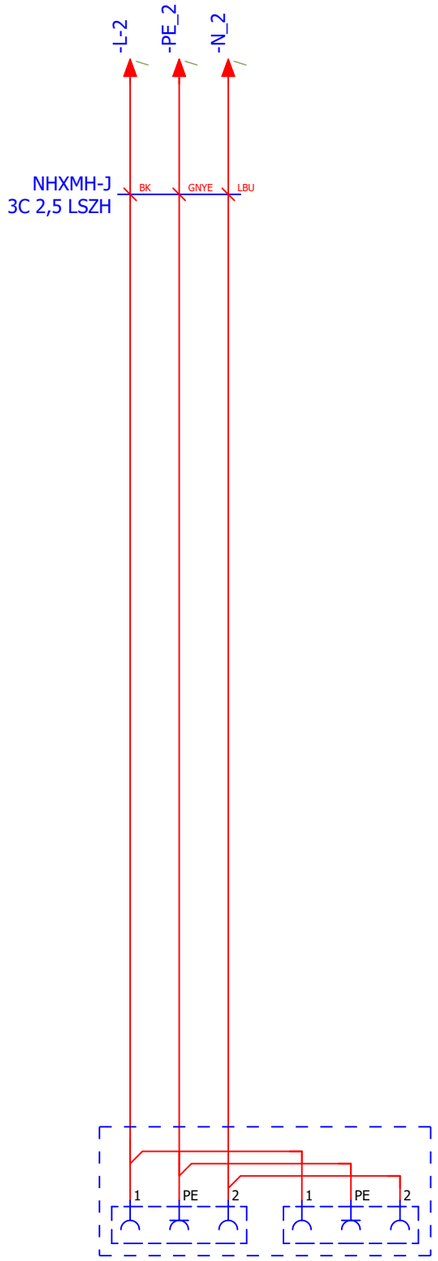
Connection PIII -- P320

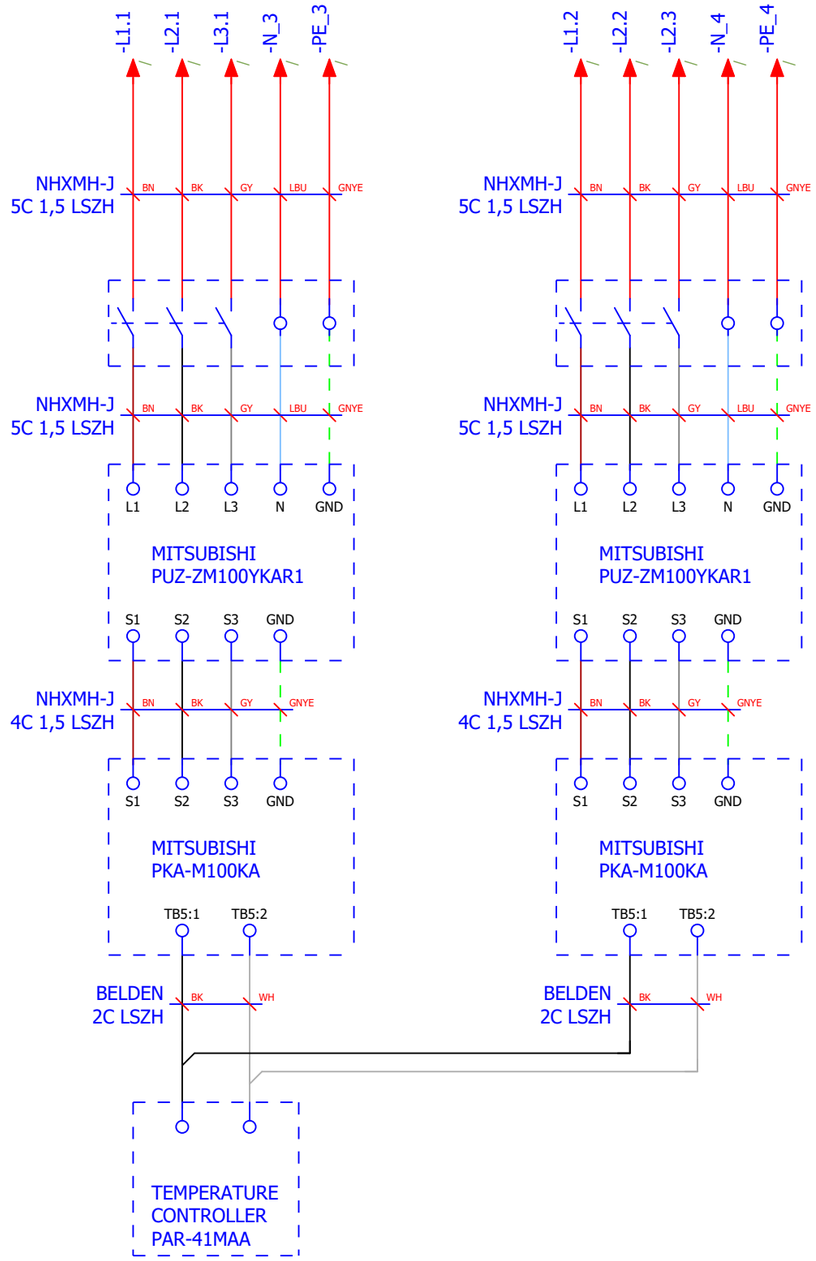
connector view PIII

previous page: 442
next page: ++Container/190

Editor	Freqcon_JD			Statron	FREQCON	PIII PROFINET IGBT IRT INTERFACE 4	20241105_V1.2	= UNIT_01 Converter Container 1
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets page: 443
Date								+ total: 498







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++CT/443

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&EPC++TRA/1

Editor	Freqcon_JD			Statron	FREQCON	CONTAINER INSTALLATION	20241105_V1.2	= UNIT_01	Converter Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container	page: 190
Date								+	total: 498

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FREQCON

Customer:	Statron
Project:	Shell Crosswind BESS FQ 1MW 5MWh Offshore
Type:	BESS MSC-1000-620-8
Product	BATTERY CONTAINER 1
Circuit diagram No:	10354_23A2007 20241105_V1.2
Producer (company):	Freqcon GmbH 53406 ASC 53409
Project:	Shell Crosswind BESS FQ 1MW 5MWh Offshore
Type:	BESS MSC-1000-620-8
Project manager:	Freqcon_CP

created on: 17.09.2019
edited on: 05.11.2024 edited by: Freqcon_DG total pages: 498

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	2	INDEX	05.11.2024	Freqcon_DG
	3	INDEX	05.11.2024	Freqcon_DG
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	5	INDEX	05.11.2024	Freqcon_DG
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	6a	Specification Earthing	14.06.2024	Freqcon_JD
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	292	BATTERY CABINETS 6-8	18.06.2024	Freqcon_JD
	293	BATTERY CABINETS 9-11	18.06.2024	Freqcon_JD
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&EFS ++ASC		Circuit diagram auxillary cabinet		
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	4	PARTS LIST	05.11.2024	Freqcon_DG
	5	PARTS LIST	05.11.2024	Freqcon_DG
	6	PARTS LIST	05.11.2024	Freqcon_DG
	7	PARTS LIST	05.11.2024	Freqcon_DG
&EPA ++Container		Summarized part list		
	1	SUMMARIZED PARTS LIST	05.11.2024	Freqcon_DG
&EPA ++ASC		Summarized part list auxillary cabinet		
	1	SUMMARIZED PARTS LIST	05.11.2024	Freqcon_DG
	2	SUMMARIZED PARTS LIST	05.11.2024	Freqcon_DG

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	1	CABEL LIST	05.11.2024	Freqcon_DG
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	5	CABEL LIST	05.11.2024	Freqcon_DG
	6	CABEL LIST	05.11.2024	Freqcon_DG
	7	CABEL LIST	05.11.2024	Freqcon_DG
	8	CABEL LIST	05.11.2024	Freqcon_DG
	9	CABEL LIST	05.11.2024	Freqcon_DG
	10	CABEL LIST	05.11.2024	Freqcon_DG
&EMZ ++ASC		Terminals auxillary cabinet		
	1000	Klemmenleistenübersicht : =UNIT_02++ASC+-X5.1 - =UNIT_02++ASC+-690XT1	05.11.2024	Freqcon_DG
	2000	Klemmenplan =UNIT_02++ASC+-X5.1	05.11.2024	Freqcon_DG
	2001	Klemmenplan =UNIT_02++ASC+-X5.2	05.11.2024	Freqcon_DG

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	2005	Klemmenplan =UNIT_02++ASC+-XDC2	05.11.2024	Freqcon_DG
	2006	Klemmenplan =UNIT_02++ASC+-XES	05.11.2024	Freqcon_DG
	2007	Klemmenplan =UNIT_02++ASC+-369XT	05.11.2024	Freqcon_DG
	2008	Klemmenplan =UNIT_02++ASC+-369XT	05.11.2024	Freqcon_DG
	2009	Klemmenplan =UNIT_02++ASC+-369XT	05.11.2024	Freqcon_DG
	2010	Klemmenplan =UNIT_02++ASC+-369XT	05.11.2024	Freqcon_DG
	2011	Klemmenplan =UNIT_02++ASC+-369XT	05.11.2024	Freqcon_DG
	2012	Klemmenplan =UNIT_02++ASC+-369XT	05.11.2024	Freqcon_DG
	2013	Klemmenplan =UNIT_02++ASC+-369XT	05.11.2024	Freqcon_DG
	2014	Klemmenplan =UNIT_02++ASC+-369XT	05.11.2024	Freqcon_DG
	2015	Klemmenplan =UNIT_02++ASC+-369XT	05.11.2024	Freqcon_DG
	2016	Klemmenplan =UNIT_02++ASC+-369XT	05.11.2024	Freqcon_DG
	2017	Klemmenplan =UNIT_02++ASC+-369XT	05.11.2024	Freqcon_DG
	2018	Klemmenplan =UNIT_02++ASC+-369XT	05.11.2024	Freqcon_DG
	2019	Klemmenplan =UNIT_02++ASC+-687XT1	05.11.2024	Freqcon_DG
	2020	Klemmenplan =UNIT_02++ASC+-687XT1	05.11.2024	Freqcon_DG
	2021	Klemmenplan =UNIT_02++ASC+-687XT1	05.11.2024	Freqcon_DG
	2022	Klemmenplan =UNIT_02++ASC+-687XT1	05.11.2024	Freqcon_DG
	2023	Klemmenplan =UNIT_02++ASC+-687XT1	05.11.2024	Freqcon_DG
	2024	Klemmenplan =UNIT_02++ASC+-687XT1	05.11.2024	Freqcon_DG
	2025	Klemmenplan =UNIT_02++ASC+-687XT1	05.11.2024	Freqcon_DG
	2026	Klemmenplan =UNIT_02++ASC+-687XT1	05.11.2024	Freqcon_DG
	2027	Klemmenplan =UNIT_02++ASC+-687XT1	05.11.2024	Freqcon_DG
	2028	Klemmenplan =UNIT_02++ASC+-687XT1	05.11.2024	Freqcon_DG

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FREQCON_INHALT_04_de_en

Assignment	Page	Page description	Date	Edited by
&EMZ ++ASC		Terminals auxillary cabinet		
	2029	Klemmenplan =UNIT_02++ASC+-687XT1	05.11.2024	Freqcon_DG
	2030	Klemmenplan =UNIT_02++ASC+-690XT1	05.11.2024	Freqcon_DG
	2031	Klemmenplan =UNIT_02++ASC+-690XT1	05.11.2024	Freqcon_DG
	2032	Klemmenplan =UNIT_02++ASC+-690XT1	05.11.2024	Freqcon_DG
	2033	Klemmenplan =UNIT_02++ASC+-690XT1	05.11.2024	Freqcon_DG
	2034	Klemmenplan =UNIT_02++ASC+-690XT1	05.11.2024	Freqcon_DG

SPECIFICATION

TERMINAL STRIP

-XE1	MAIN POWER SUPPLY 600V AC
-XE2	DC POWER SUPPLY 1000V DC
-XE	MAIN POWER SUPPLY 400V AC
-X1	MAIN POWER 400V/230V AC
-X2	LIGHT CABINET 230V AC
-X3	CONTROL VOLTAGE 24V DC
-14X1	CONTROL VOLTAGE 24V DC (TO DC CONTACTORS)
-X5	LOW-VOLTAGE SIGNALS
-XDC0	24V DC POWER SUPPLY
-XDC1-4	CONTROL VOLTAGE 24V DC (UPS)
-XT	TRANSFER TERMINAL BLOCK 24V DC / 230V AC

WIRING COLOR

L1 / L2 / L3	=	BLACK
N	=	LIGHT BLUE (IEC) / GREY (UL)
PE	=	YELLOW-GREEN
EXTERNAL VOLTAGE	=	ORANGE
CONTROL VOLTAGE 24 V DC	=	DARK BLUE
ANALOG SIGNALS	=	WHITE

PLACE

+CTRL	=	Control cabinet
+CON	=	Converter cabinet
+IND	=	Inductor cabinet
+CIR	=	Circuit breaker cabinet
+COSY	=	Cooling System
+FAN	=	External fan

previous page: &EAB/6

next page: 6a

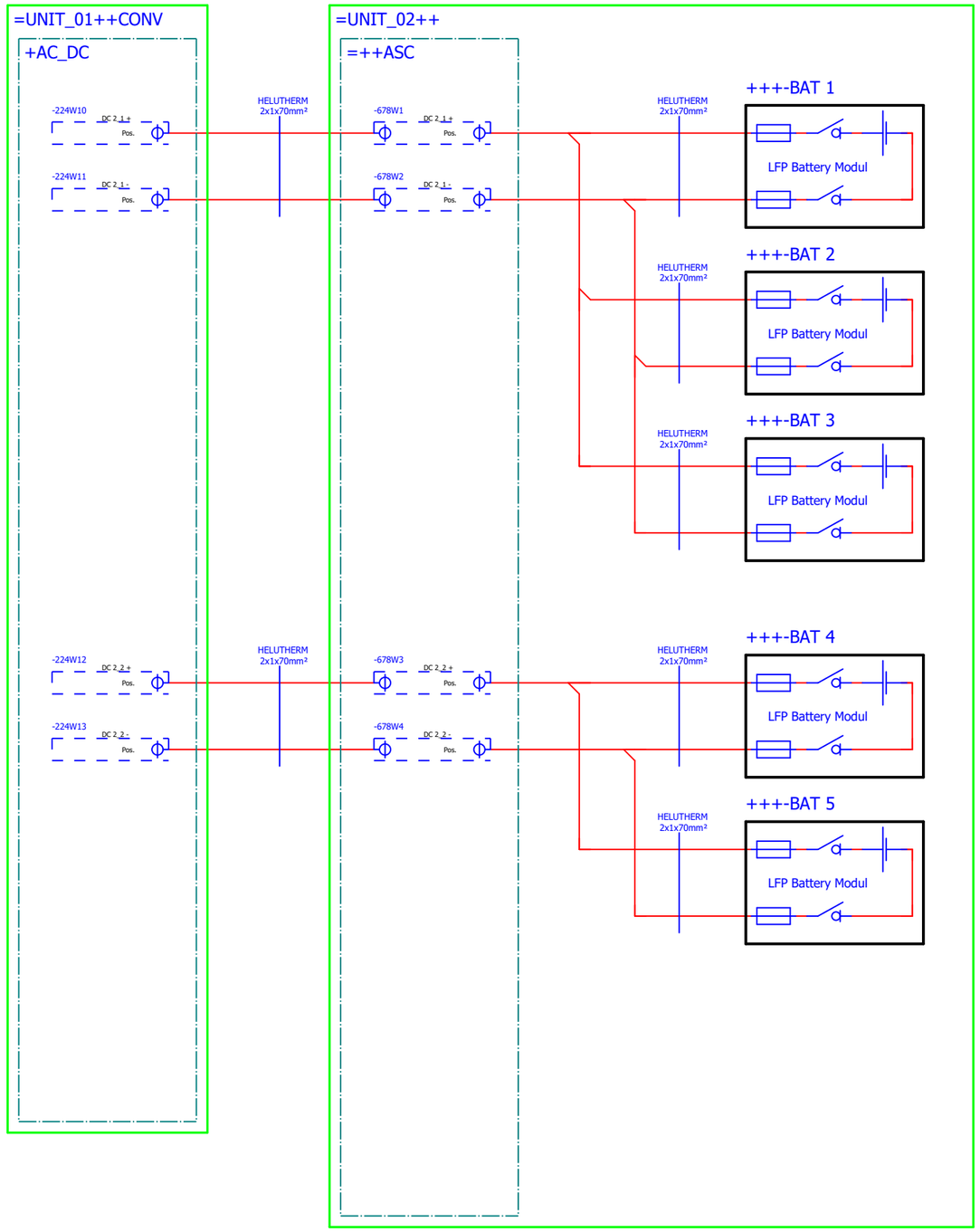
SPECIFICATION of grounding

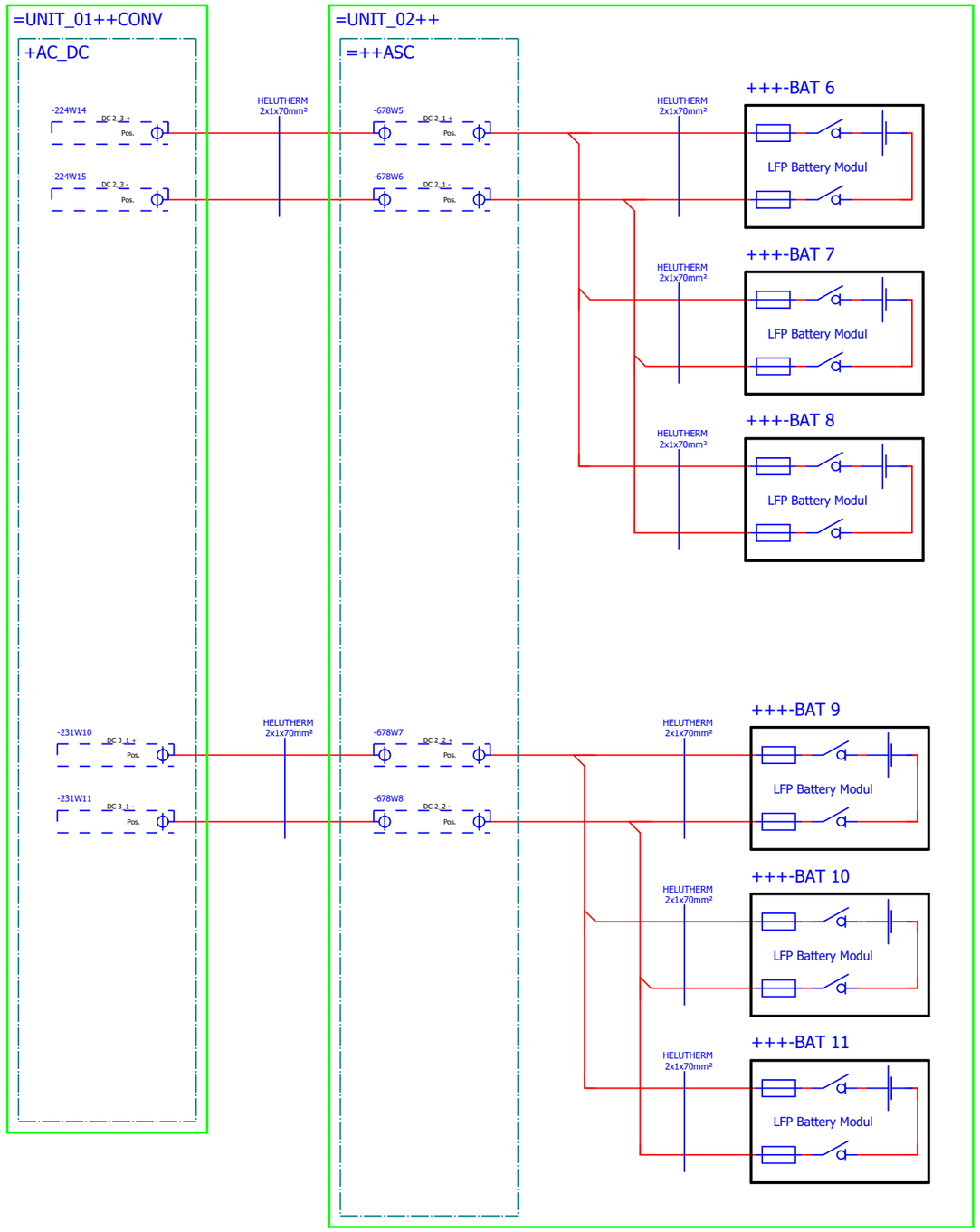
	from frame to			
1	**roof & side walls & doors**	**EVD_1**	**Flachband**	**2x25 mm²**
2	**frame**	**EVD_2**	**Flachband**	**2x25 mm²**
3	**base**	**EVD_3**	**Flachband**	**2x25 mm²**
4	**Mounting plate & partitions**	**EVD_4**	**H07-V-K**	**2x25 mm²**
5	**inductors**	**EVD_5**	**H07-V-k**	**2x25 mm²**
6	**Powerstack**	**EVD_6**	**H07-V-K**	**2x25 mm²**
7	**DC Switch & Fuse**	**EVD_7**	**H07-V-K**	**2x25 mm²**
8	**AC Filter**	**EVD_8**	**H07-V-K**	**2x25 mm²**
9	**circuit-breaker**	**EVD_9**	**H07-V-K**	**2x25 mm²**
10	**Freqcon_Fast_Disconektor**	**EVD_10**	**H07-V-K**	**2x25 mm²**
11	**Freqcon_Rectifier_Modul**	**EVD_11**	**H07-V-K**	**2x25 mm²**
12	**capacitor banks**	**EVD_12**	**H07-V-K**	**2x25 mm²**
13	**water distributor**	**EVD_13**	**H07-V-K**	**2x25 mm²**
14	**SPARE**	**EVD_14**	**H07-V-K**	**2x25 mm²**
15	**SPARE**	**EVD_15**	**H07-V-K**	**2x25 mm²**
16	**SPARE**	**EVD_16**	**H07-V-K**	**2x25 mm²**
17	**SPARE**	**EVD_17**	**H07-V-K**	**2x25 mm²**
18	**SPARE**	**EVD_18**	**H07-V-K**	**2x25 mm²**
	from door to			
19	**PROFINET IRT IGBT Interface**	**EVD_19**	**H07-V-K**	**1,5 mm²**
20	**HMI**	**EVD_20**	**H07-V-K**	**1,5 mm²**
21	**SPARE**	**EVD_21**	**H07-V-K**	**??? mm²**
22	**SPARE**	**EVD_22**	**H07-V-K**	**??? mm²**

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next page: &EFA/1a

Single line diagram





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&EAC/6a

next page:
2a

Editor	Freqcon_JD			Statron	FREQCON	SYSTEMS OVERVIEW	20241105_V1.2	= UNIT_02 Battery Container 1
Date	18.06.2024	Norm						& EFA Single line diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ page: 1a
Date								+ total: 498

0	1	2	3	4	5	6	7	8	9

Single line diagram

Control circuit

++ASC

400V

-XES

-684F3 &EFS++ASC/684.2 C32A

-684F1 &EFS++ASC/684.0 C32A

-684F2 &EFS++ASC/684.5 TYP 1 + 2 SPD

-601F1 &EFS++ASC/601.1 TYP 1 + 2 SPD

-684F4 &EFS++ASC/685.0 C32A

-684F5 &EFS++ASC/685.5 TYP 1 + 2 SPD

-691F1 &EFS++ASC/691.1 C6A

-691F2 &EFS++ASC/691.3 C6A

-691F3 &EFS++ASC/691.4 C6A

-690F1 &EFS++ASC/690.1 16A

-690F3 &EFS++ASC/690.5 C6A

-690F4 &EFS++ASC/690.7 C6A

-690F5 &EFS++ASC/690.8 C6A

-691F4 &EFS++ASC/691.5 C16A

-690F2 &EFS++ASC/690.3 16A

-101Q1

-687F1 &EFS++ASC/687.1 C16A

-687F2 &EFS++ASC/687.3 C16A

-687F3 &EFS++ASC/687.4 C16A

-687F4 &EFS++ASC/687.5 C16A

-687F5 &EFS++ASC/687.7 C16A

-636K1 &EFS++ASC/636.1

-636K2 &EFS++ASC/636.2

-636K3 &EFS++ASC/636.4

M 1~

1/N/PE

1/N/PE

1/N/PE

1/N/PE 1/N/PE

20 A

Battery cabinet 1

Battery cabinet 2

Battery cabinet 3

Battery cabinet 4

Battery cabinet 5

-687F6 &EFS++ASC/687.8 C16A

-688F1 &EFS++ASC/688.1 C16A

-688F2 &EFS++ASC/688.2 C16A

-688F3 &EFS++ASC/688.4 C16A

-688F4 &EFS++ASC/688.5 C16A

-688F5 &EFS++ASC/688.7 C16A

Battery cabinet 6

Battery cabinet 7

Battery cabinet 8

Battery cabinet 9

Battery cabinet 10

Battery cabinet 11

Exhaust Unit / shut-off flap Bat 1-4

Exhaust Unit / shut-off flap Bat 5-8

Exhaust Unit / shut-off flap Bat 9-11

Container Internal Lighting

crane 1

crane 2

crane 3

Cooling Units

Container Sockets

Power Supply

previous page: 1a

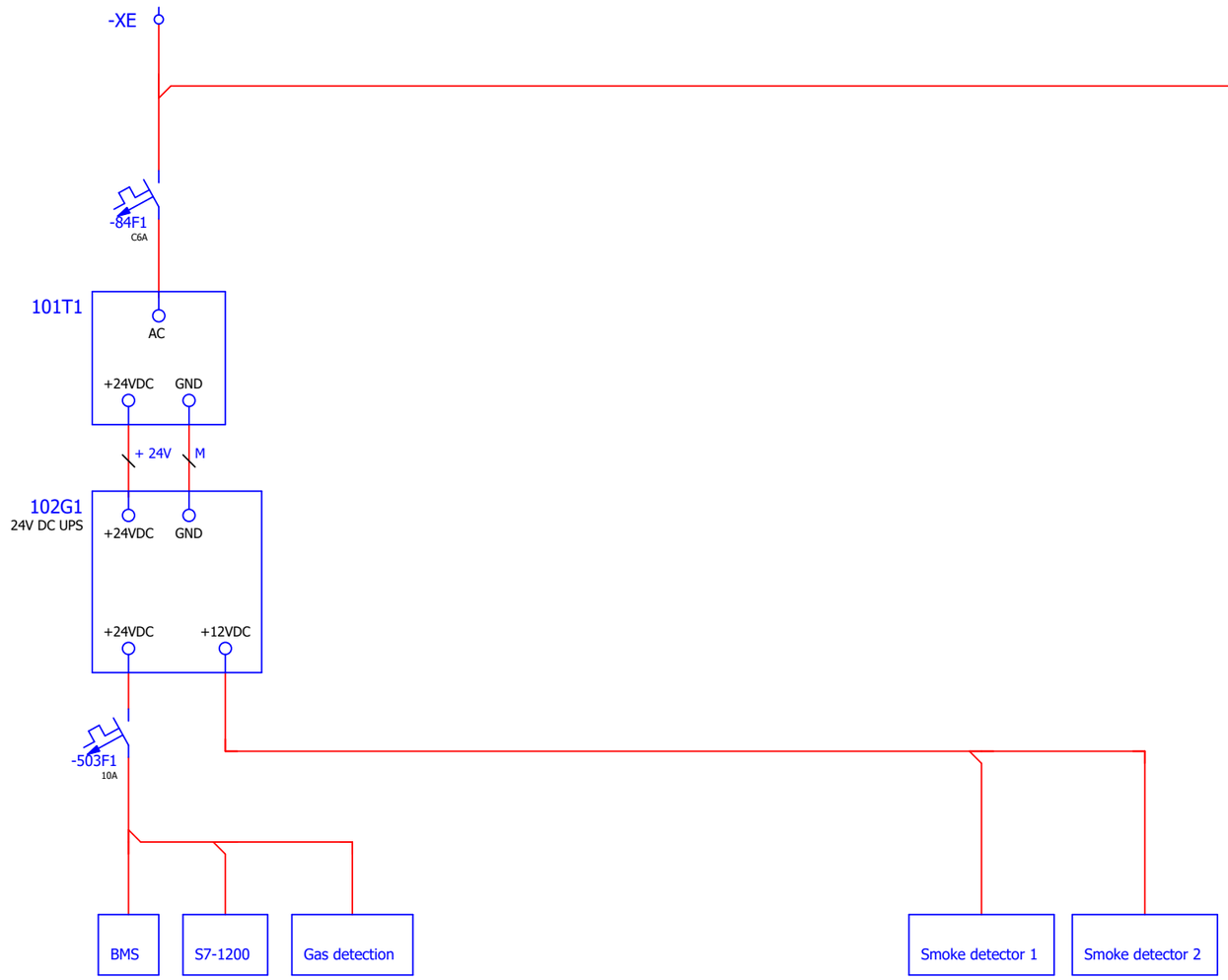
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Editor	Freqcon_DG			Statron	FREQCON	SYSTEMS OVERVIEW	20241105_V1.2	= UNIT_02 Battery Container 1	
Date	05.11.2024	Norm						& EFA Single line diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++	page: 2a
Date								+	total: 498

Single line diagram

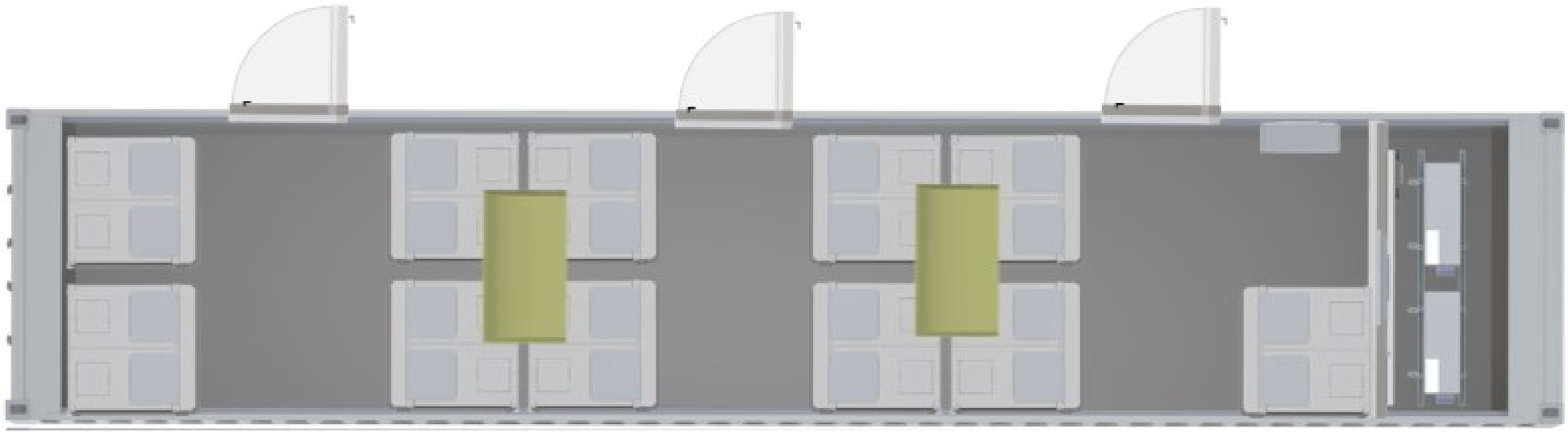
Control circuit

Battery Cabinet



Editor	Freqcon_JD			Statron	FREQCON	SYSTEMS OVERVIEW	20241105_V1.2	= UNIT_02	Battery Container 1
Date	18.06.2024	Norm						& EFA	Single line diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++	page: 3a
Date								+	total: 498

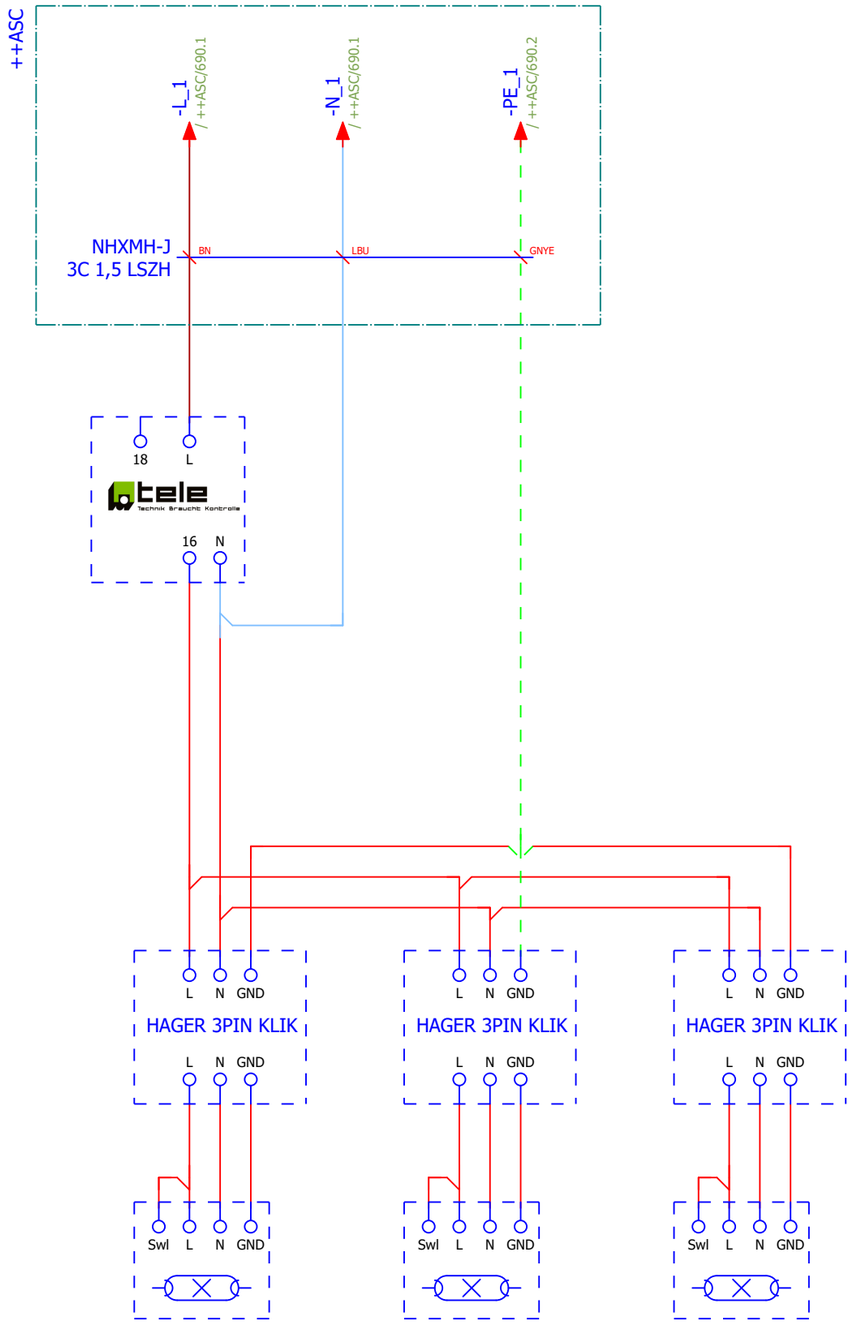
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previous page:
&EFA/3a

next page:
&EFS++Container/190

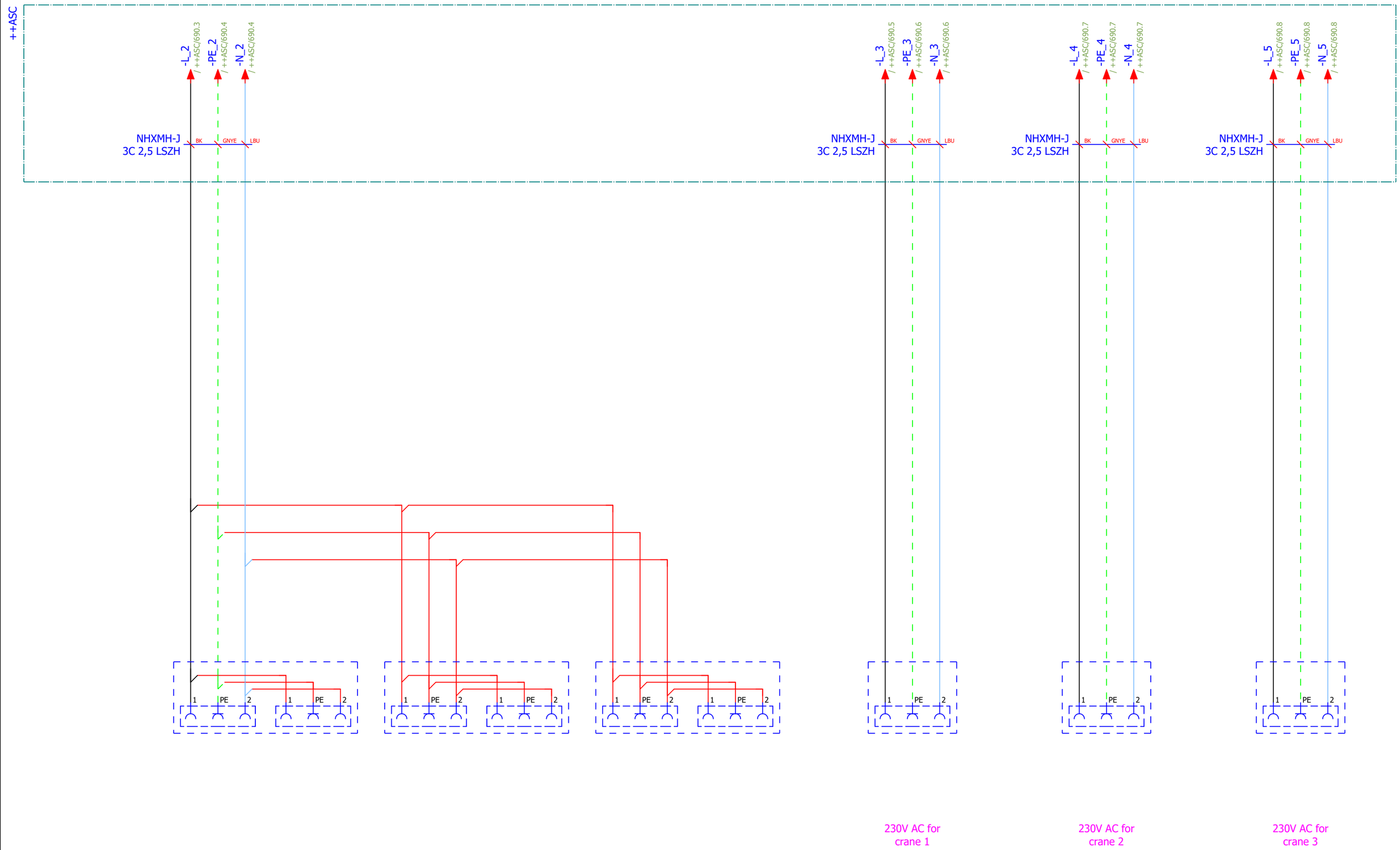
Editor	Freqcon_JD			Statron	FREQCON	Container overview	20241105_V1.2	= UNIT_02 Battery Container 1	
Date	14.06.2024	Norm						& ELU Cabinet Overview	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++	page: 5a
Date								+	total: 498



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&ELU++/5a

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Editor	Freqcon_JD			Statron	FREQCON	CONTAINER INSTALLATION	20241105_V1.2	= UNIT_02 Battery Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container	page: 190
Date								+	total: 498



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next page: 192

Editor	Freqcon_JD			Statron	FREQCON	CONTAINER INSTALLATION	20241105_V1.2	= UNIT_02 Battery Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container	page: 191
Date								+	total: 498

++ASC

-L_6 / ++ASC/691.1
-N_6 / ++ASC/691.1
-PE_6 / ++ASC/691.2

NHXMH-J
3C 1,5 LSZH
BK LBU GNYE

L N GND
13A fused
Spur K983ALM
L N GND

1 2
M
1~
PE

BELDEN 9842
LSZH
WH BU WH BU

Junction Box
next to fan motor

230V AC for
Exhaust Unit
Battery cabinets 1-4

-L_6 / ++ASC/691.1
-N_6 / ++ASC/691.1
-PE_6 / ++ASC/691.2

L N GND
13A fused
Spur K983ALM
L N GND

1 2
M
1~
PE

230V AC for
shut-off flap
Battery cabinets 1-4

-L_7 / ++ASC/691.3
-N_7 / ++ASC/691.3
-PE_7 / ++ASC/691.3

NHXMH-J
3C 1,5 LSZH
BK LBU GNYE

L N GND
13A fused
Spur K983ALM
L N GND

1 2
M
1~
PE

BELDEN 9842
LSZH
WH BU WH BU

Junction Box
next to fan motor

230V AC for
Exhaust Unit
Battery cabinets 5-8

-L_7 / ++ASC/691.3
-N_7 / ++ASC/691.3
-PE_7 / ++ASC/691.3

L N GND
13A fused
Spur K983ALM
L N GND

1 2
M
1~
PE

230V AC for
shut-off flap
Battery cabinets 5-8

-L_8 / ++ASC/691.4
-N_8 / ++ASC/691.4
-PE_8 / ++ASC/691.4

NHXMH-J
3C 1,5 LSZH
BK LBU GNYE

L N GND
13A fused
Spur K983ALM
L N GND

1 2
M
1~
PE

BELDEN 9842
LSZH
WH BU WH BU

Junction Box
next to fan motor

230V AC for
Exhaust Unit
Battery cabinets 9-11

-L_8 / ++ASC/691.4
-N_8 / ++ASC/691.4
-PE_8 / ++ASC/691.4

L N GND
13A fused
Spur K983ALM
L N GND

1 2
M
1~
PE

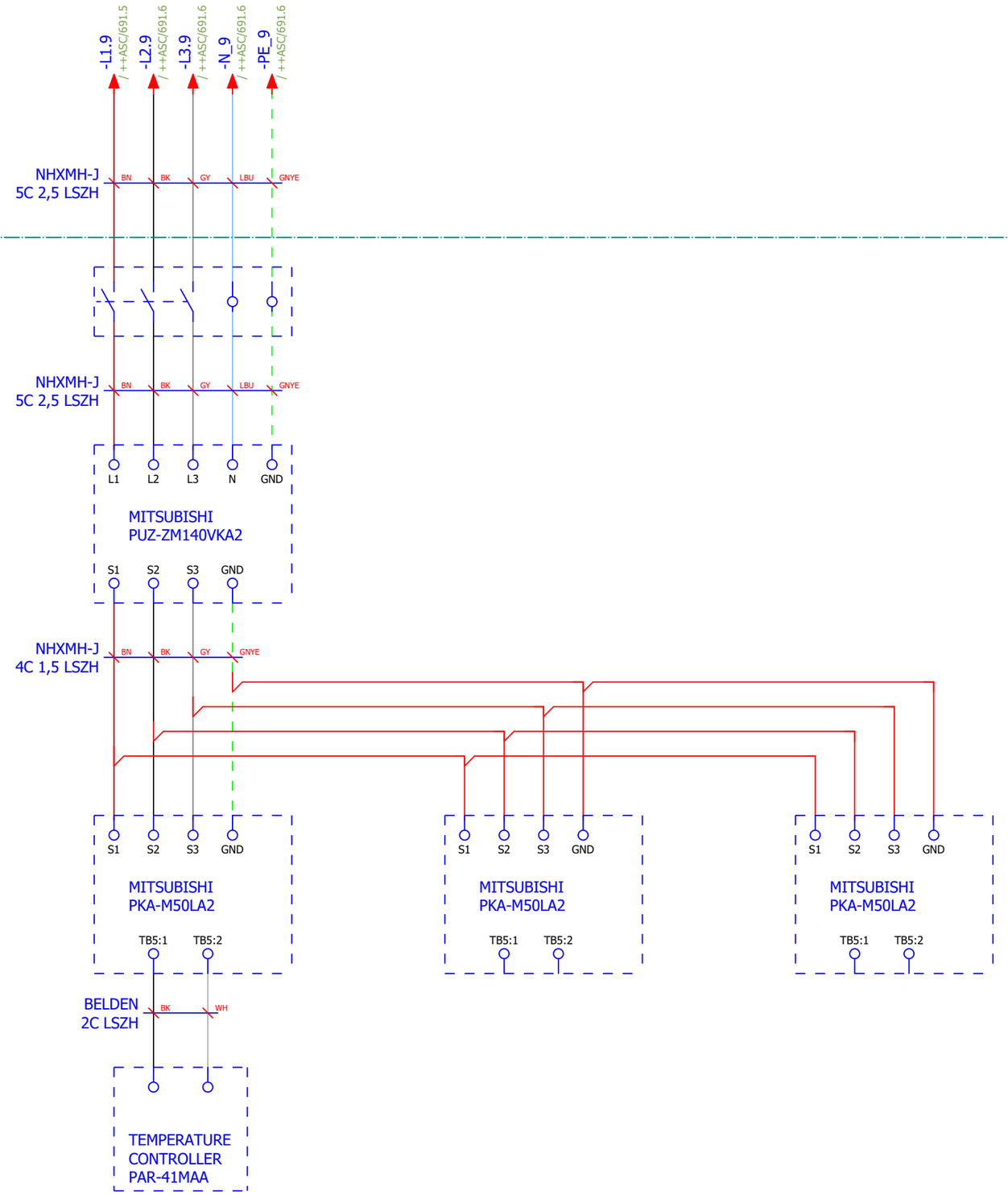
230V AC for
shut-off flap
Battery cabinets 9-11

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191

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193

Editor	Freqcon_JD			Statron	FREQCON	CONTAINER INSTALLATION	20241105_V1.2	= UNIT_02	Battery Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container	page: 192
Date								+	total: 498

++ASC

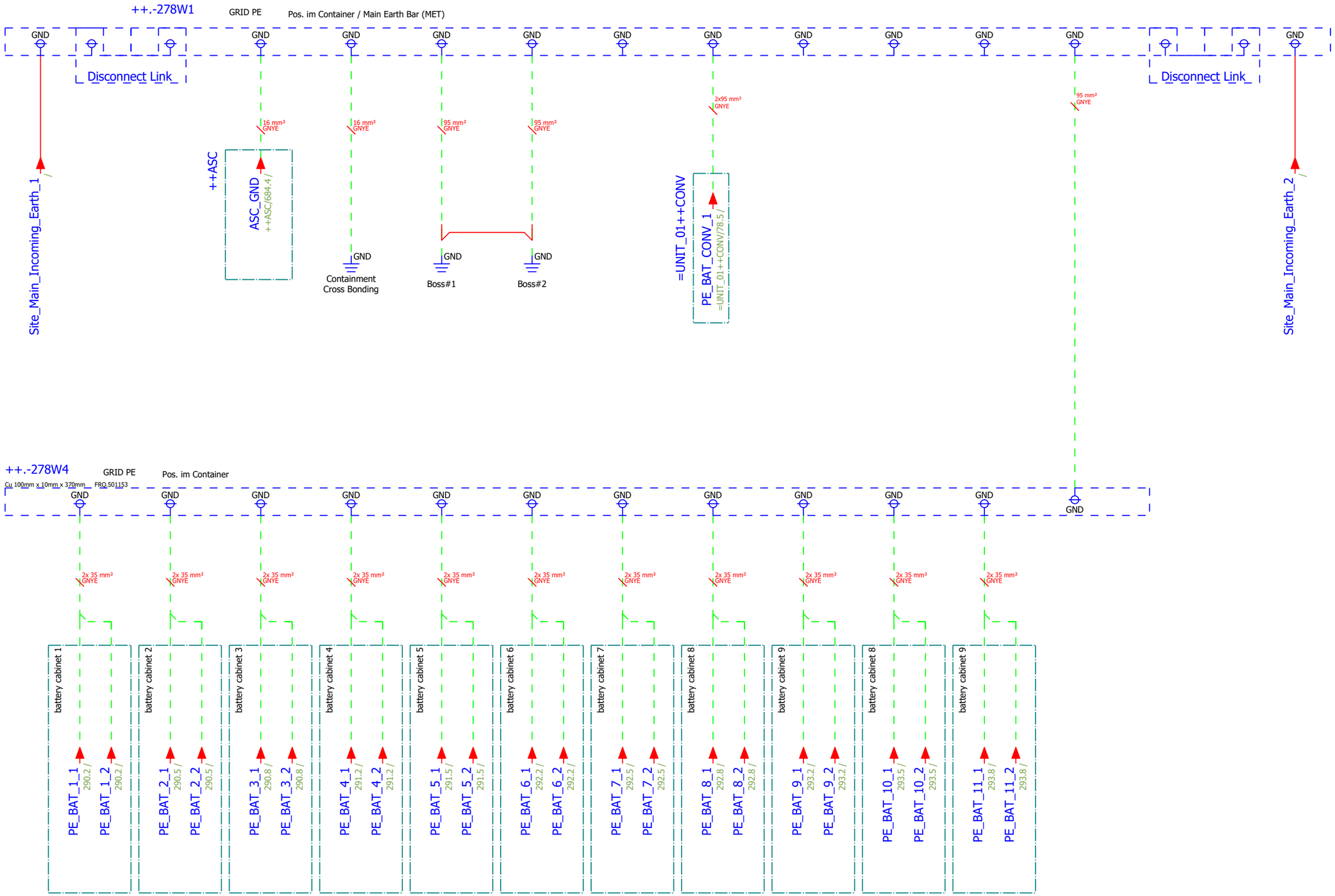


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Editor	Freqcon_JD			Statron	FREQCON	CONTAINER INSTALLATION	20241105_V1.2	= UNIT_02 Battery Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container	page: 193
Date								+	total: 498

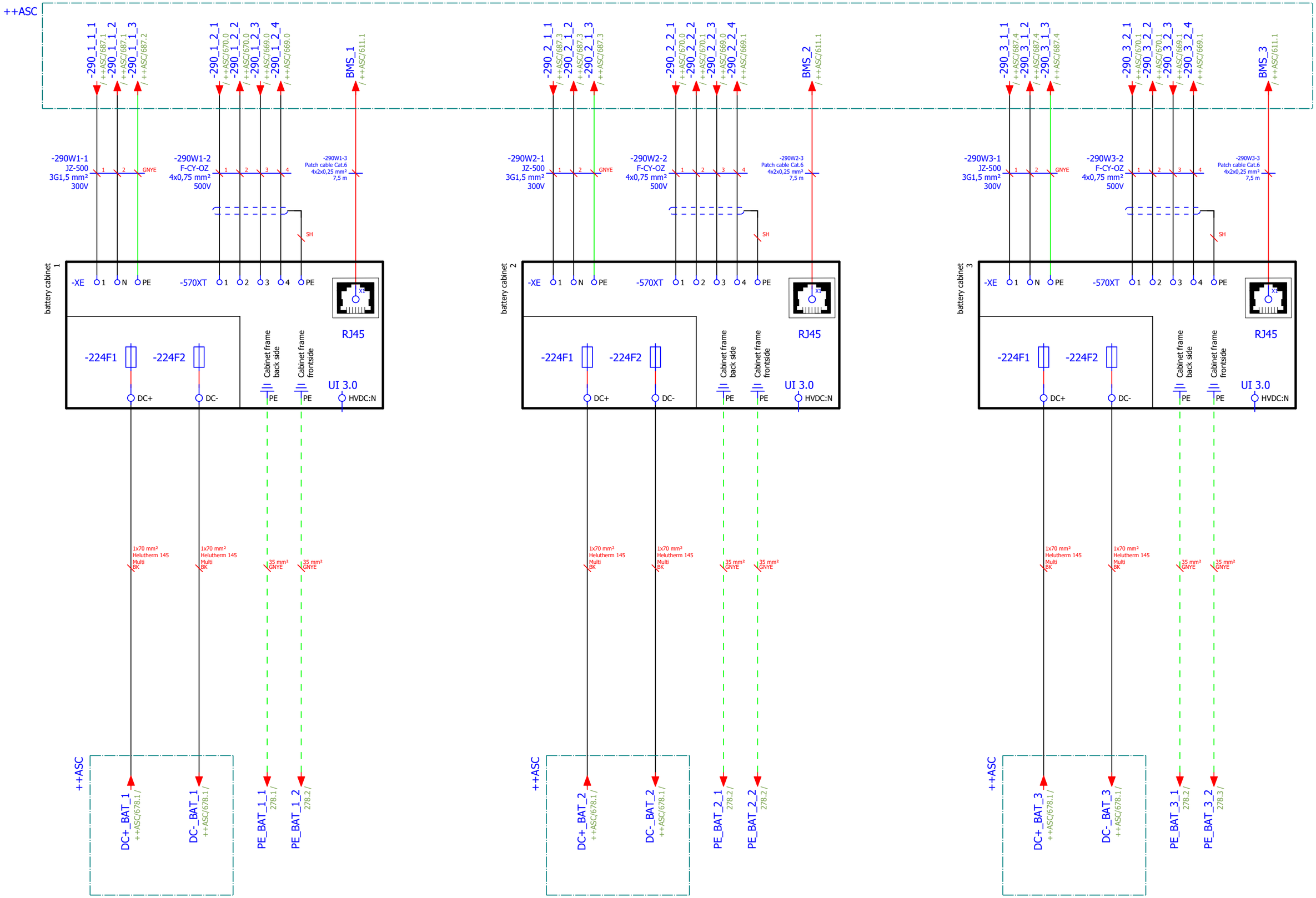
Busbars PE



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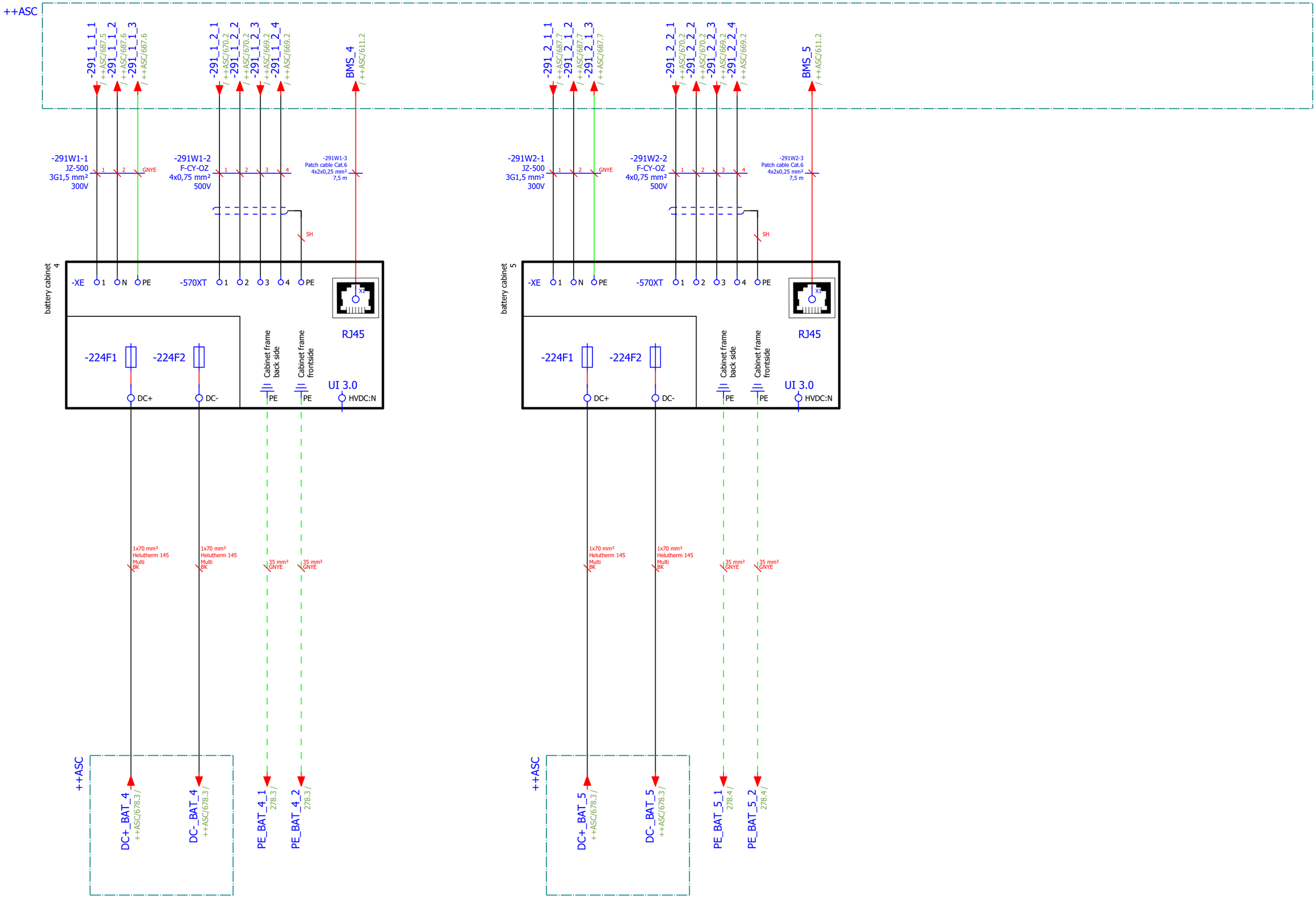
Editor	Freqcon_DG			Statron	FREQCON	EARTHING CONTAINER	20241105_V1.2	= UNIT_02 Battery Container 1	
Date	08.10.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container	page: 278
Date								+	total: 498



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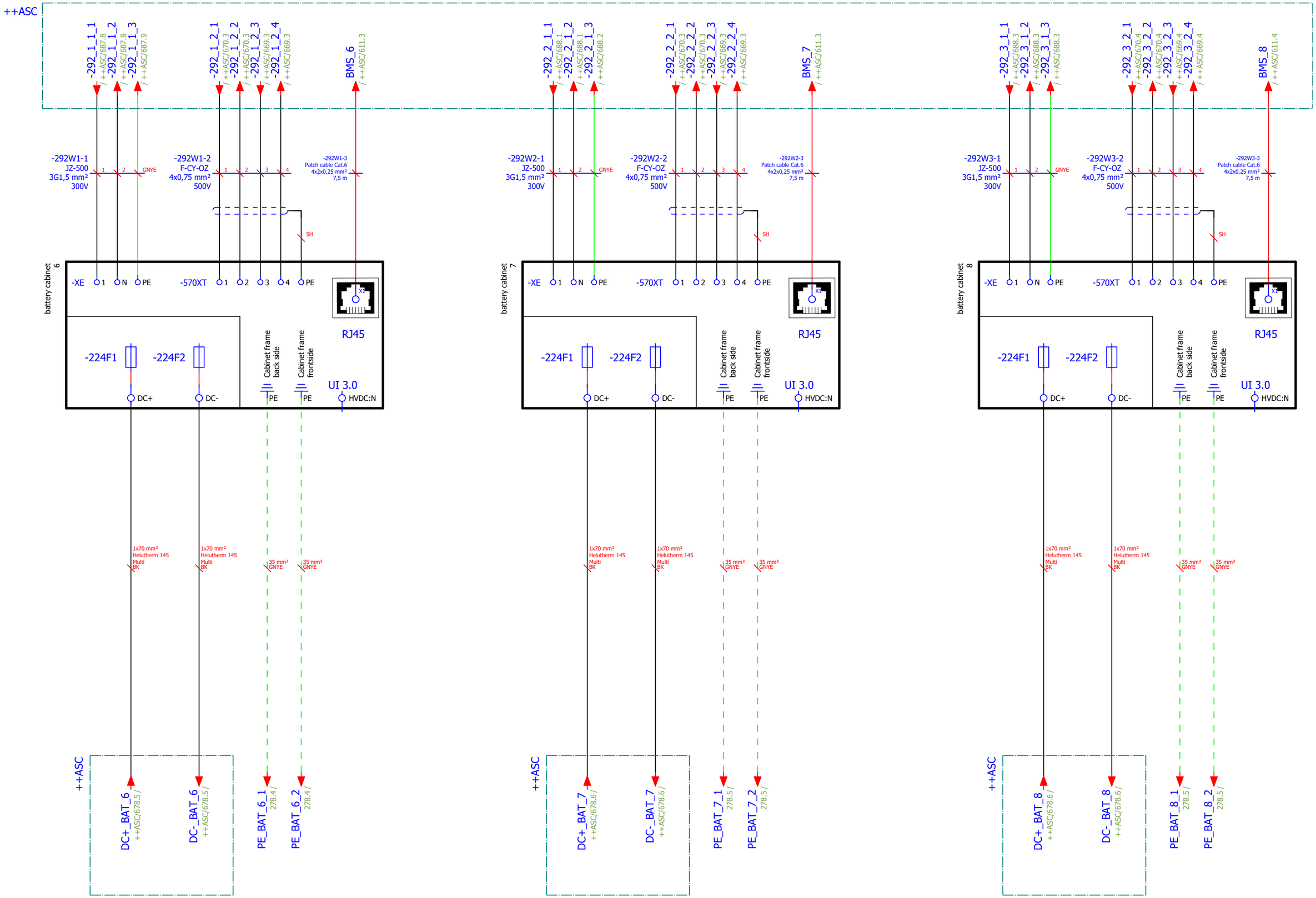
Editor	Freqcon_JD			Statron	FREQCON	BATTERY CABINETS 1-3	20241105_V1.2	= UNIT_02	Battery Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container	page: 290
Date								+	total: 498



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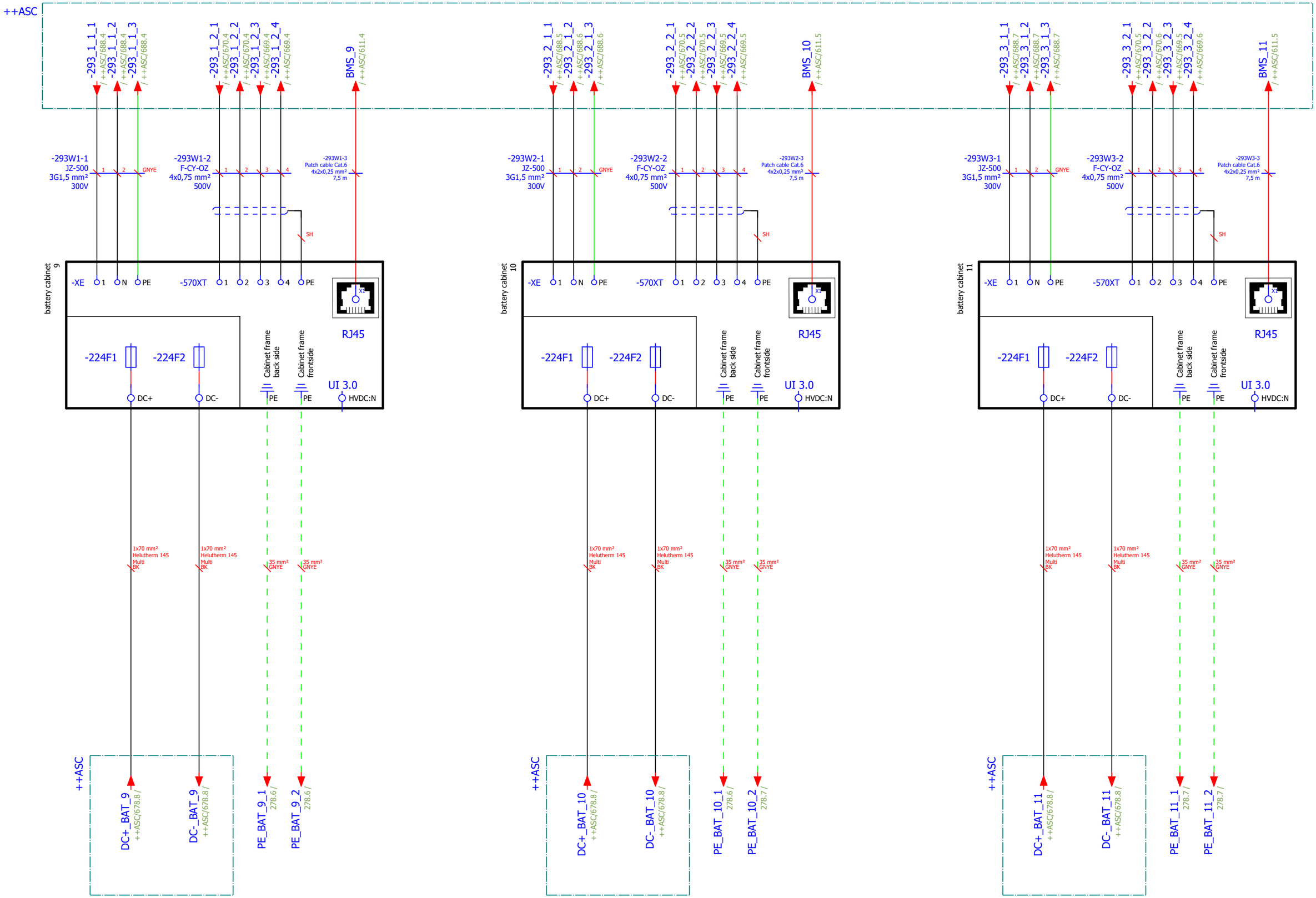
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Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container	page: 291
Date								+	total: 498



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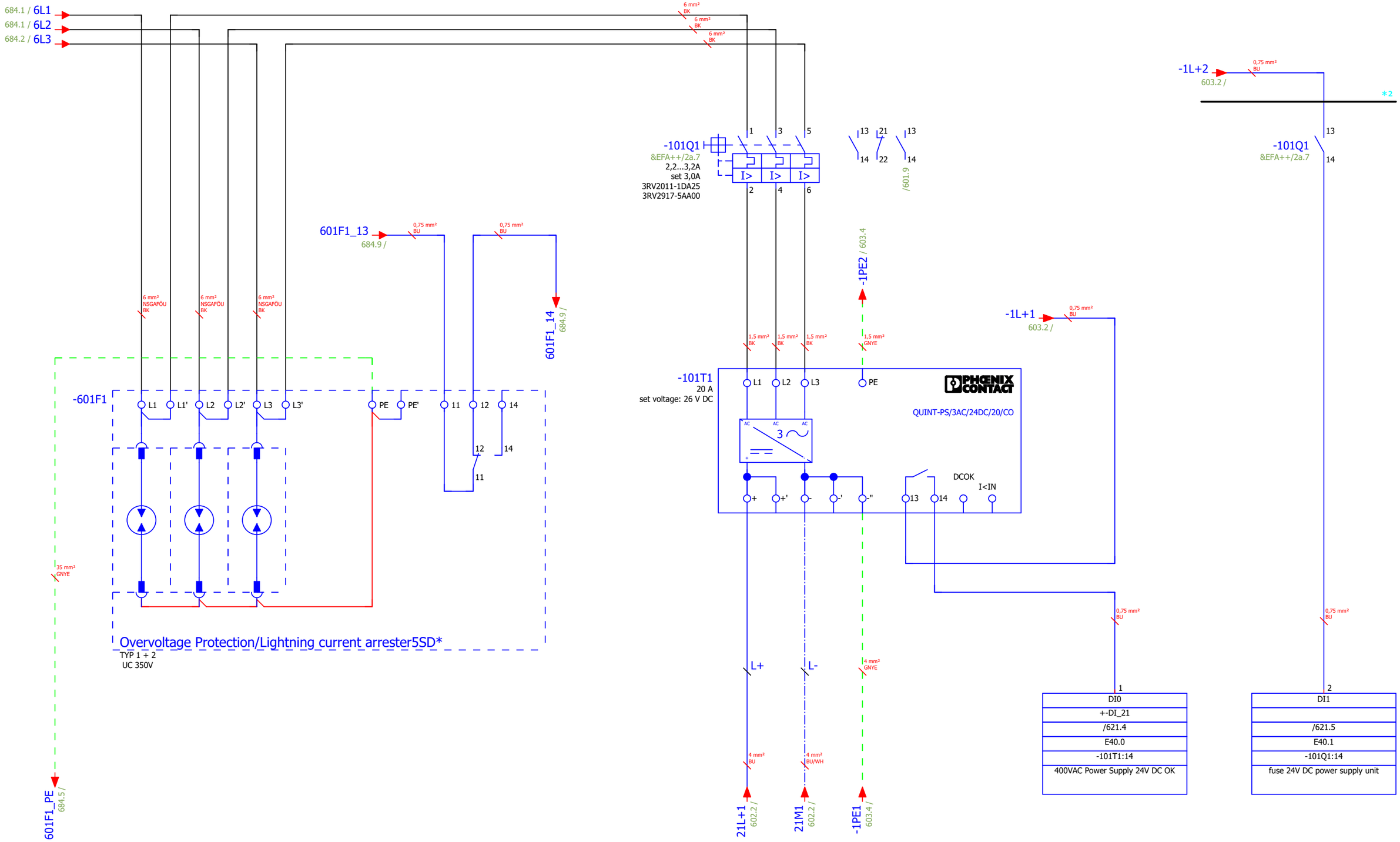
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Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container page: 292
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++ASC/601

Editor	Freqcon_JD			Statron	FREQCON	BATTERY CABINETS 9-11	20241105_V1.2	= UNIT_02 Battery Container 1
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container page: 293
Date								+ total: 498



400VAC Power Supply 24V DC OK

fuse 24V DC power supply unit

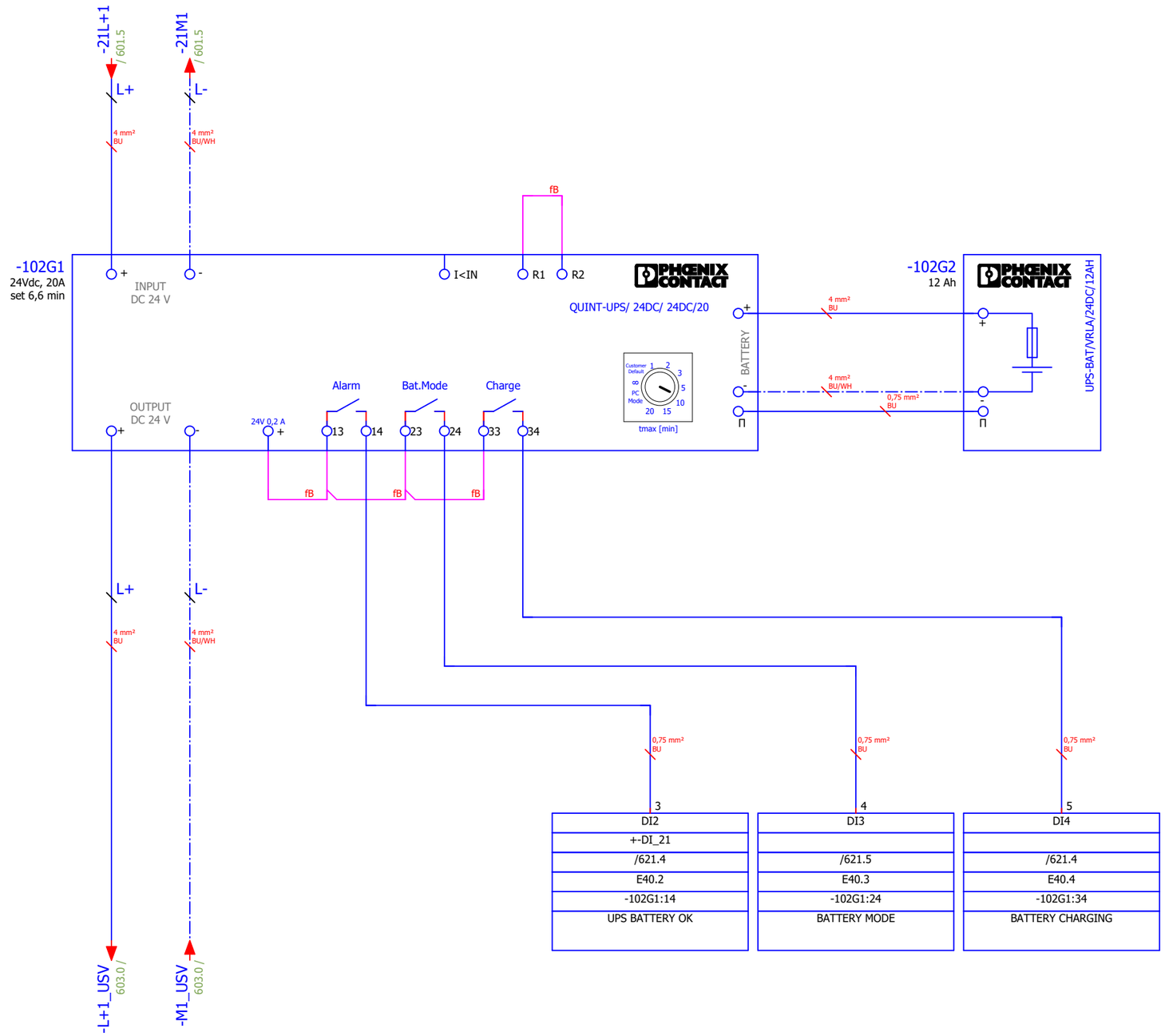
previous page:
++Container/293

Power supply unit from 400V AC

next page:
602

Editor	Freqcon_DG			Statron	FREQCON	CONTROL VOLTAGE POWER SUPPLY UNIT	20241105_V1.2	= UNIT_02	Battery Container 1
Date	05.11.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet
Date								+	

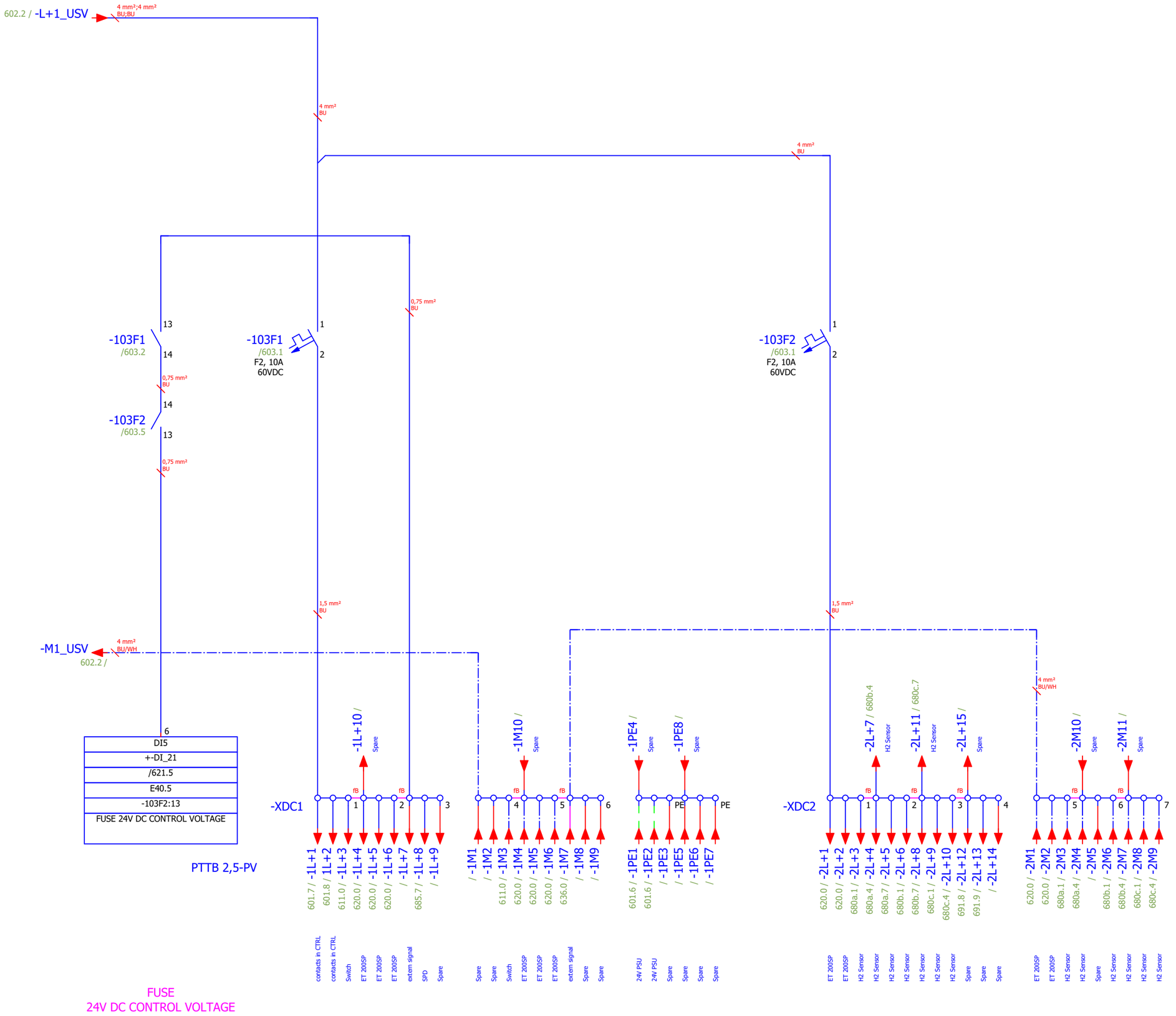
page: 601
total: 498



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601

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603

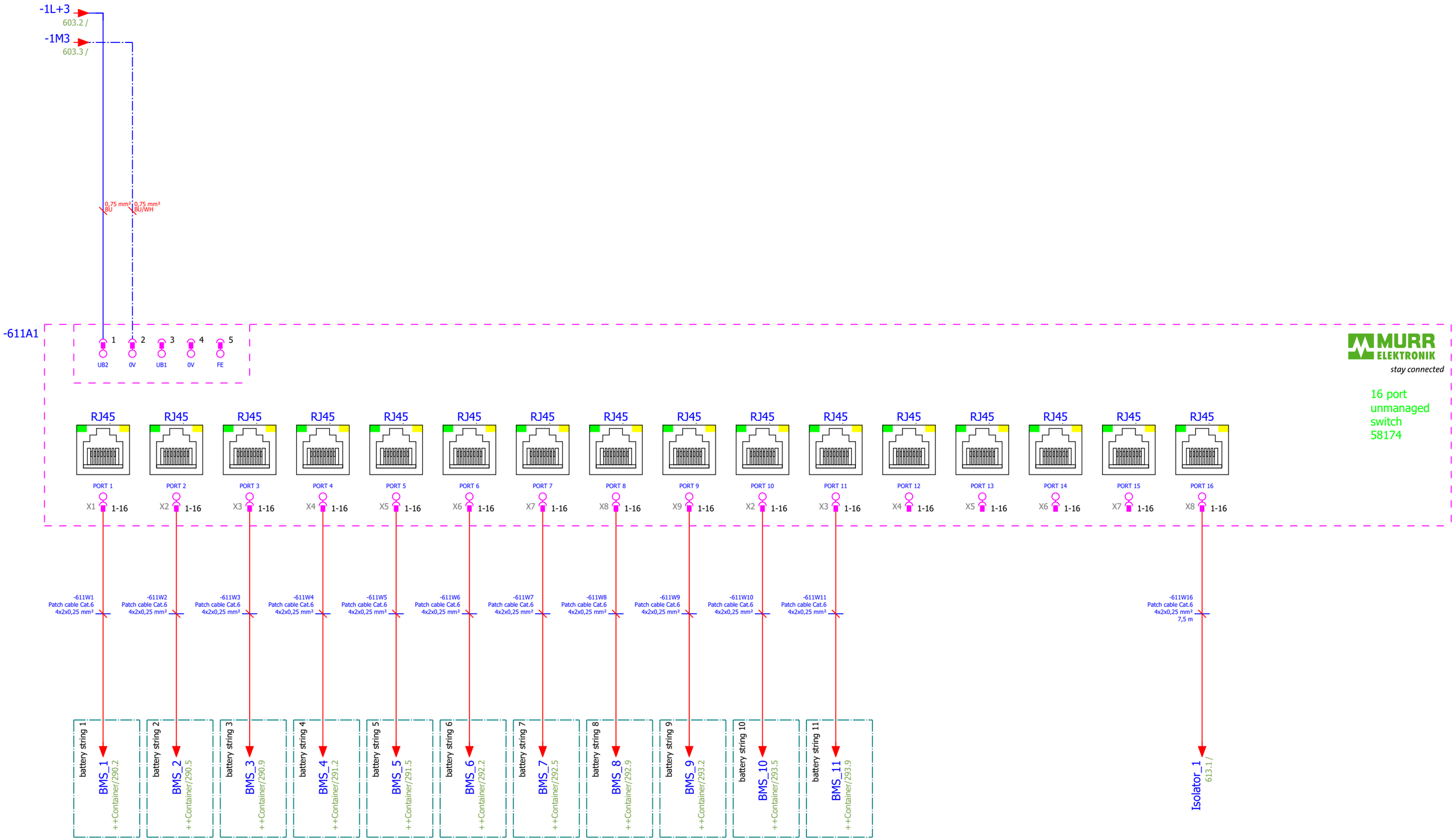
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Date	05.11.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet — page: 602
Date								+ — total: 498



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602

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611

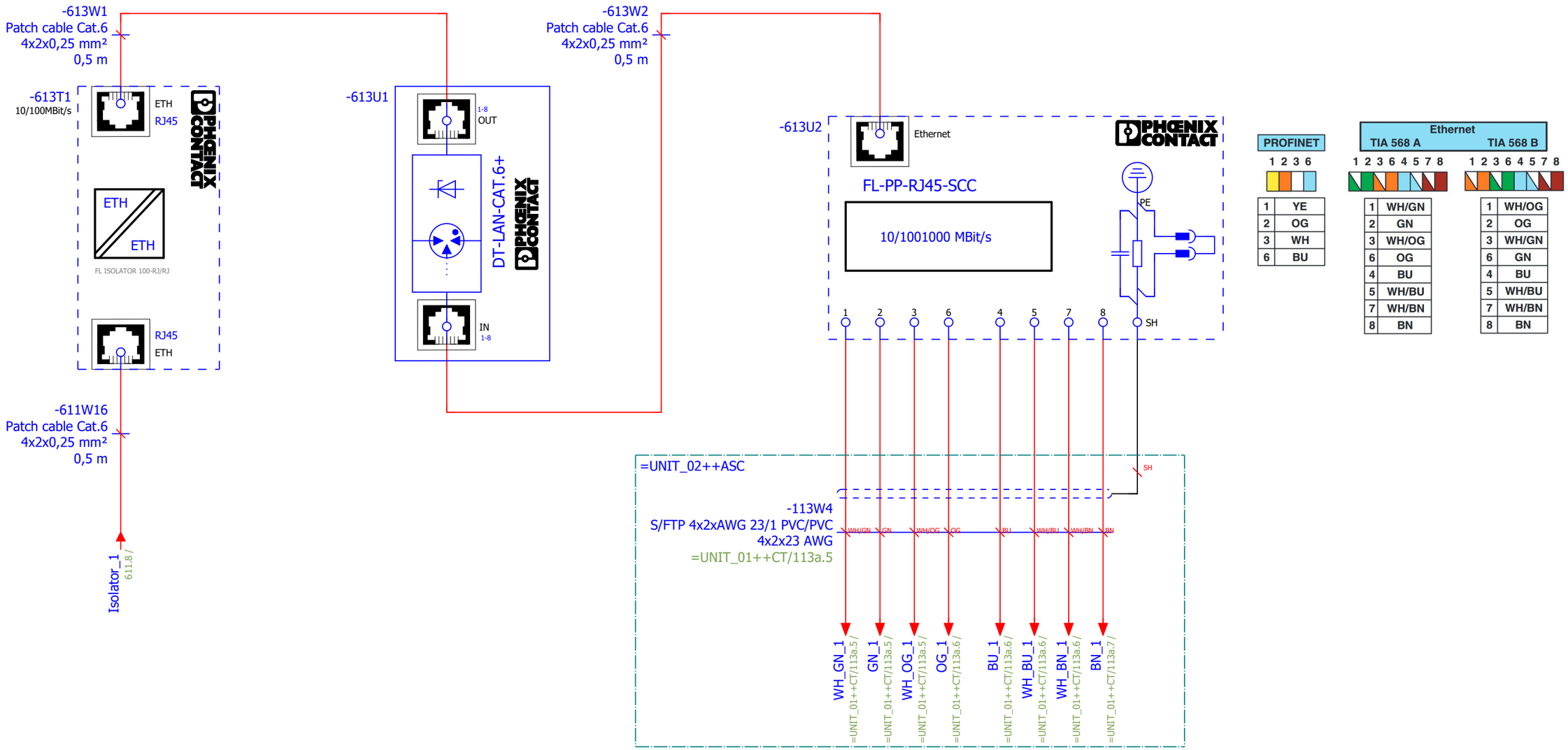
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Date	05.11.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxiliary cabinet	page: 603
Date								+	total: 498



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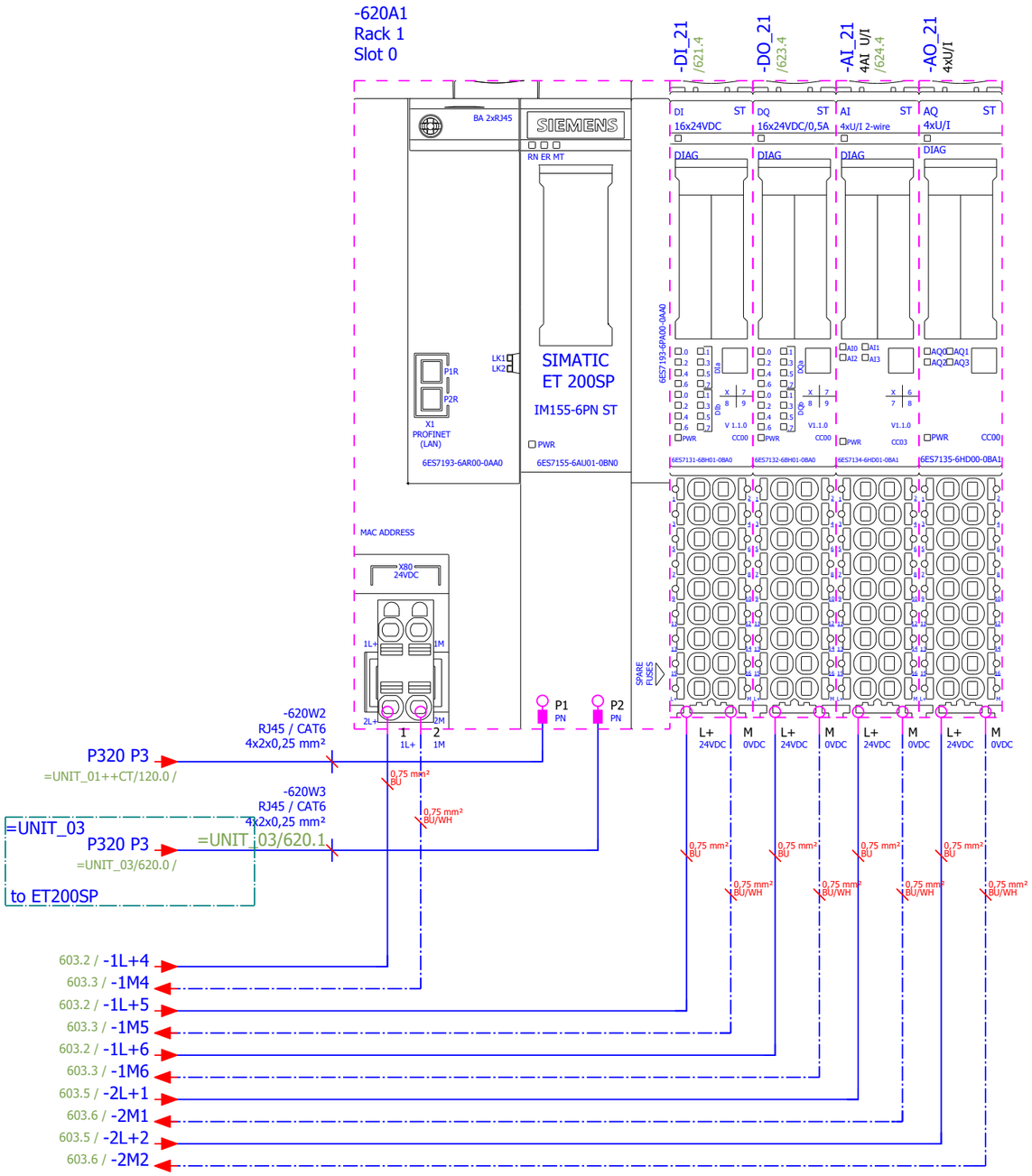
Editor	Freqcon_JD			Statron	FREQCON	ETHERNET SWITCH	20241105_V1.2	= UNIT_02 Battery Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 611
Date								+	total: 498



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Editor	Freqcon_JD			Statron	FREQCON	ETHERNET / PROFINET ISOLATOR	20241105_V1.2	= UNIT_02 Battery Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 613
Date								+	total: 498



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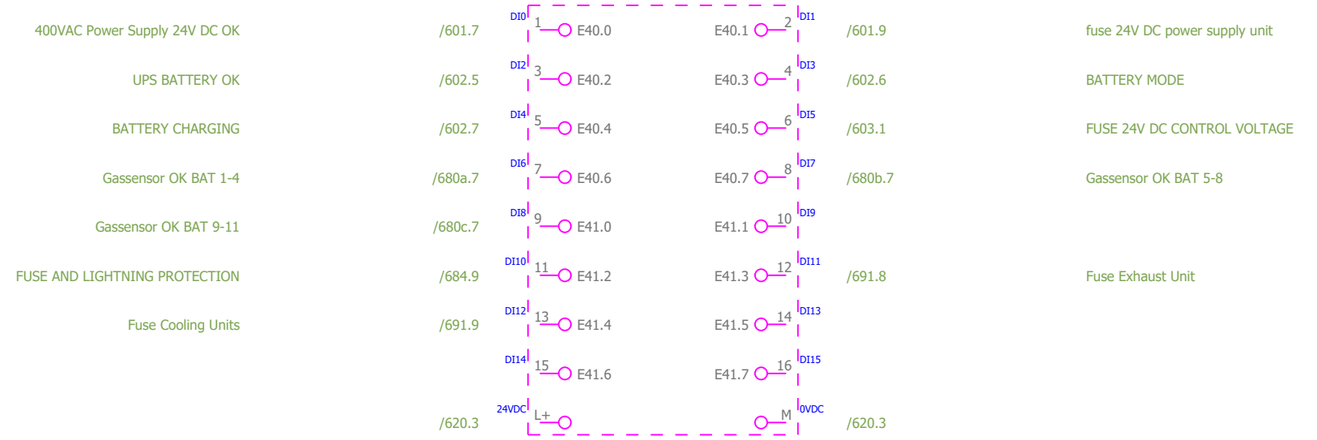
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Date	20.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet
Date								+	

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total: 498

0	1	2	3	4	5	6	7	8	9

-DI_21

/620.3



400VAC Power Supply 24V DC OK	/601.7				/601.9	fuse 24V DC power supply unit
UPS BATTERY OK	/602.5				/602.6	BATTERY MODE
BATTERY CHARGING	/602.7				/603.1	FUSE 24V DC CONTROL VOLTAGE
Gassensor OK BAT 1-4	/680a.7				/680b.7	Gassensor OK BAT 5-8
Gassensor OK BAT 9-11	/680c.7					
FUSE AND LIGHTNING PROTECTION	/684.9				/691.8	Fuse Exhaust Unit
Fuse Cooling Units	/691.9					
	/620.3				/620.3	

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Editor	Freqcon_JD			Statron	FREQCON	ET200SP DIGITAL INPUTS DI_21 + DI_22	20241105_V1.2	= UNIT_02	Battery Container 1
Date	14.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet
Date								+	

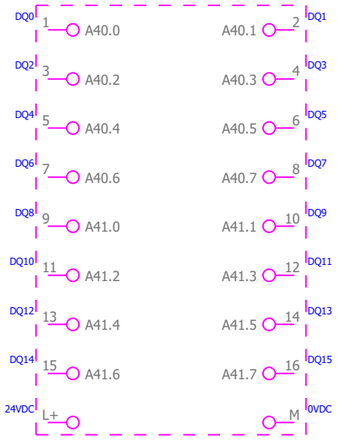
page: 621

total: 498

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-DO_21

/620.3



230V AC for Exhaust Unit / shut-off flap Battery cabinets 1-4 /636.1

230V AC for Exhaust Unit / shut-off flap Battery cabinets 9-11 /636.4

/620.3

/636.2 230V AC for Exhaust Unit / shut-off flap Battery cabinets 5-8

/620.3

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Editor	Freqcon_JD			Statron	FREQCON	ET200SP DIGITAL OUTPUTS DO_21	20241105_V1.2	= UNIT_02	Battery Container 1
Date	14.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet
Date								+	

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-AI_21

/620.3



gas concentration BAT 1-4 /680a.2

gas concentration BAT 9-11 /680c.2

gas concentration BAT 1-4 /680a.2

gas concentration BAT 9-11 /680c.2

/620.3

gas concentration BAT 5-8 /680b.2

gas concentration BAT 5-8 /680b.2

/620.4

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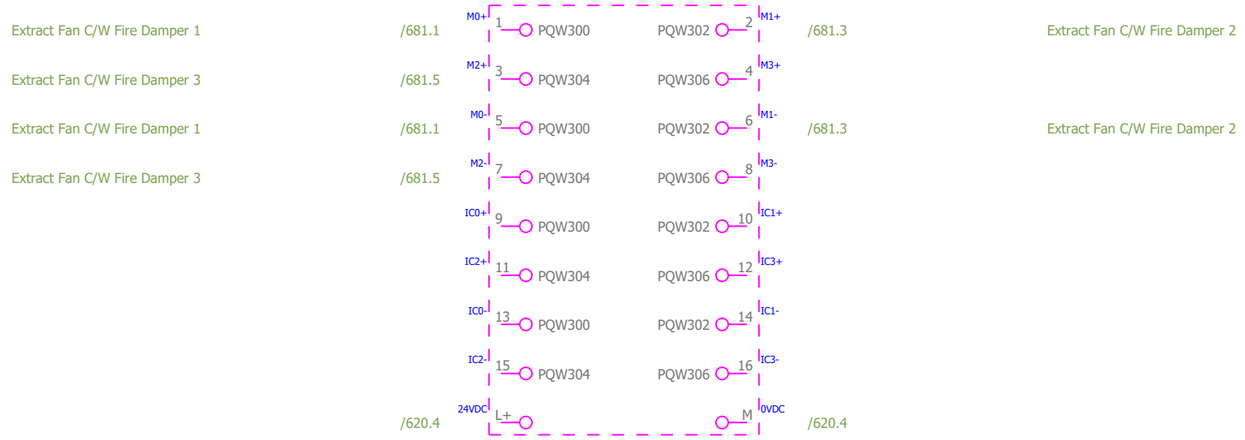
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Editor	Freqcon_JD			Statron	FREQCON	ET200SP ANALOG INPUTS AI_21	20241105_V1.2	= UNIT_02 Battery Container 1
Date	14.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet page: 624
Date								+ total: 498

0	1	2	3	4	5	6	7	8	9

-AO_21

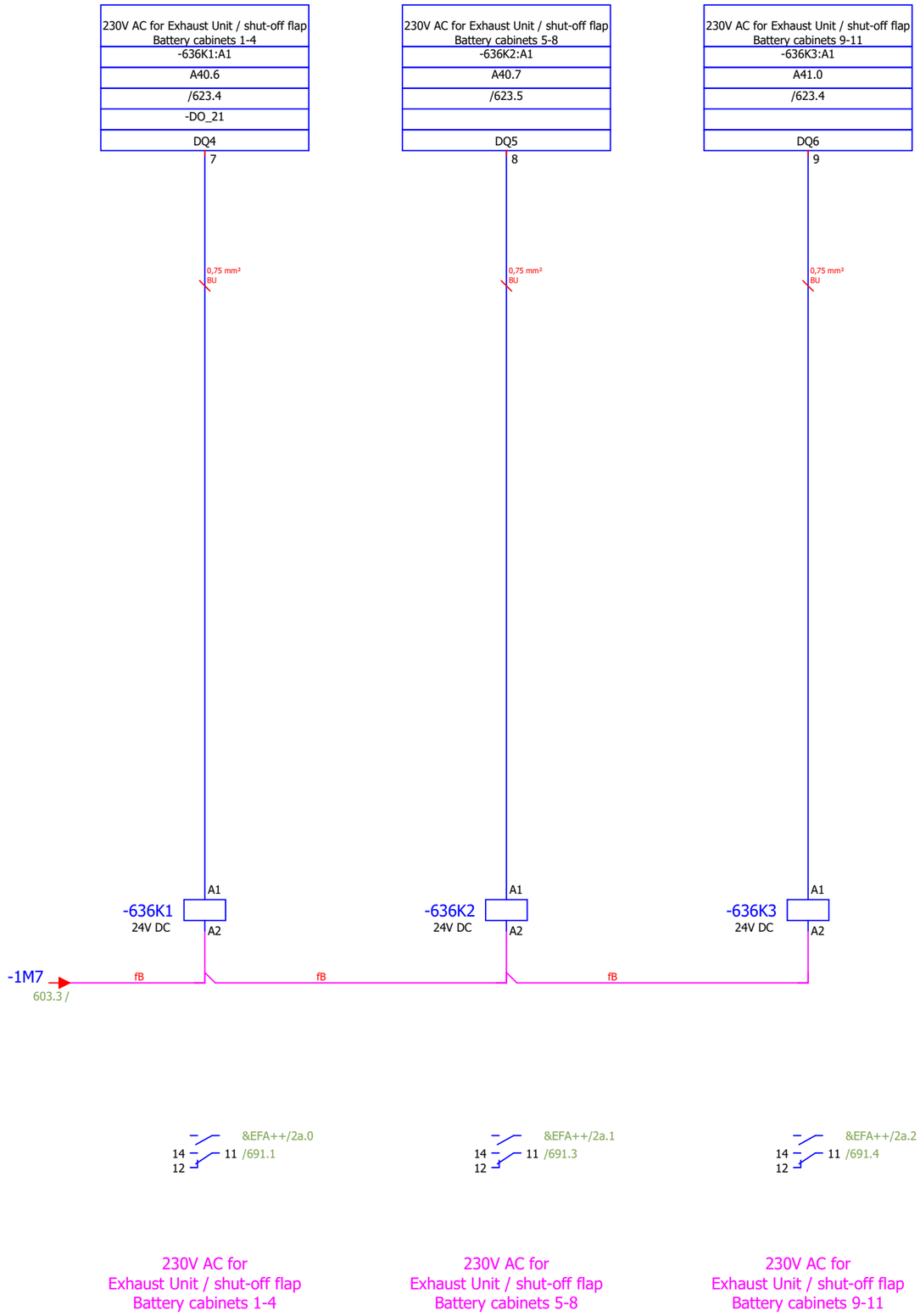
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Editor	Freqcon_JD			Statron	FREQCON	ET200SP ANALOG OUTPUTS AO_21	20241105_V1.2	= UNIT_02 Battery Container 1	
Date	14.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 625
Date								+	total: 498

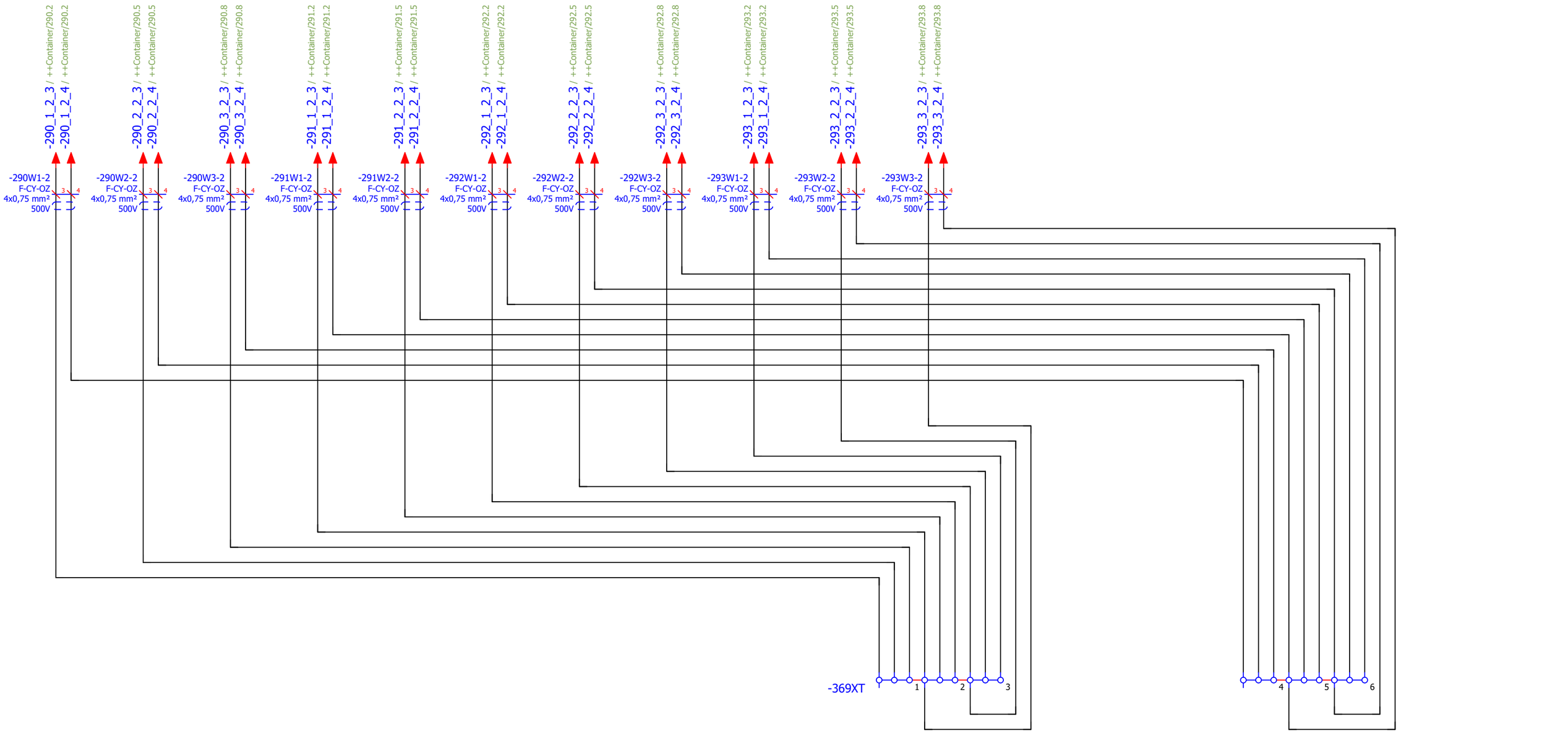


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Editor	Freqcon_JD			Statron	FREQCON	OUTPUTS FIRE DAMPER	20241105_V1.2	= UNIT_02	Battery Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet
Date								+	

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total: 498



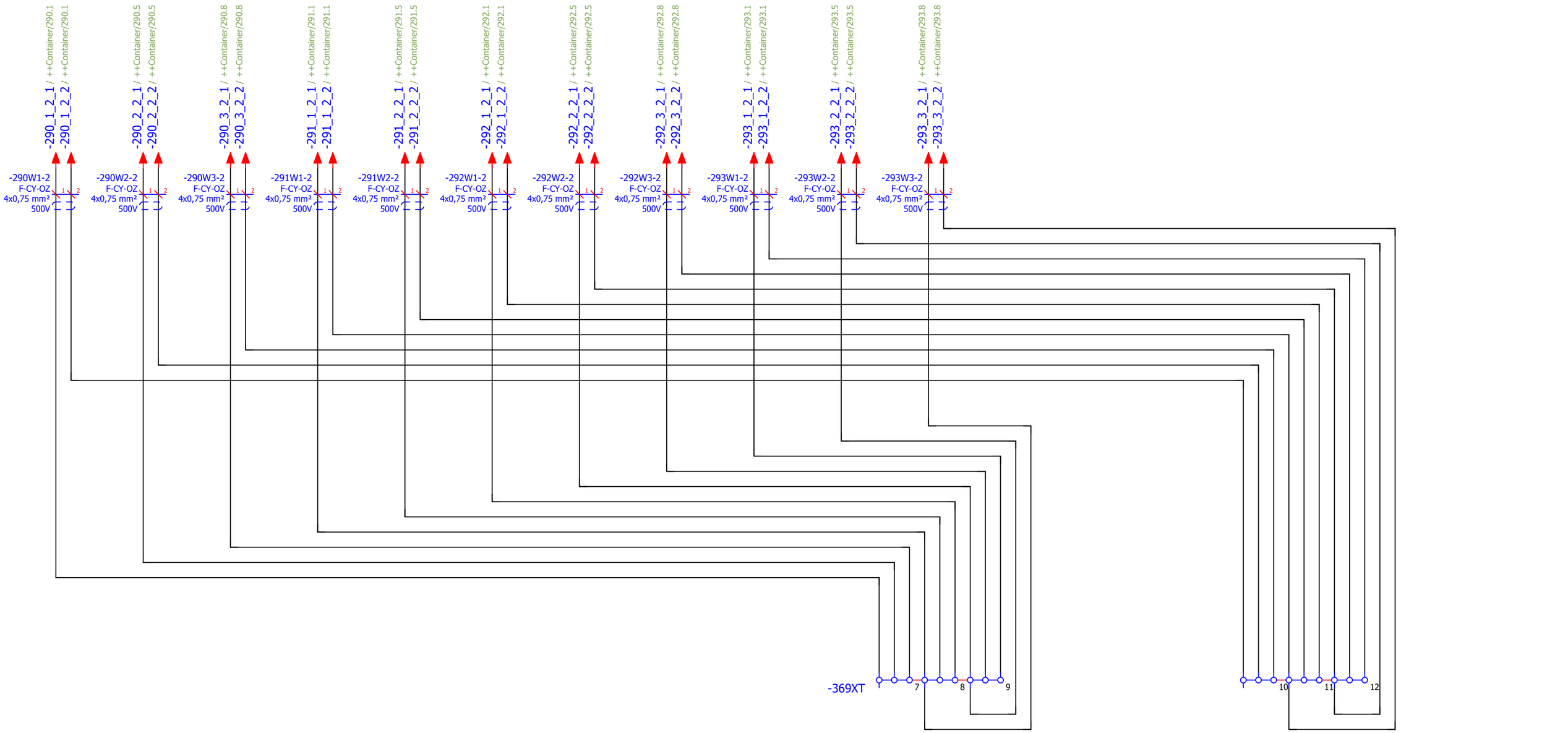
battery cabinet smoke detector
potential-free contacts
customer

battery cabinet smoke detector
potential-free contacts
customer

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Editor	Freqcon_JD			Statron	FREQCON	SMOKE POTENTIAL-FREE CONTACTS	20241105_V1.2	= UNIT_02	Battery Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet
Date								+	



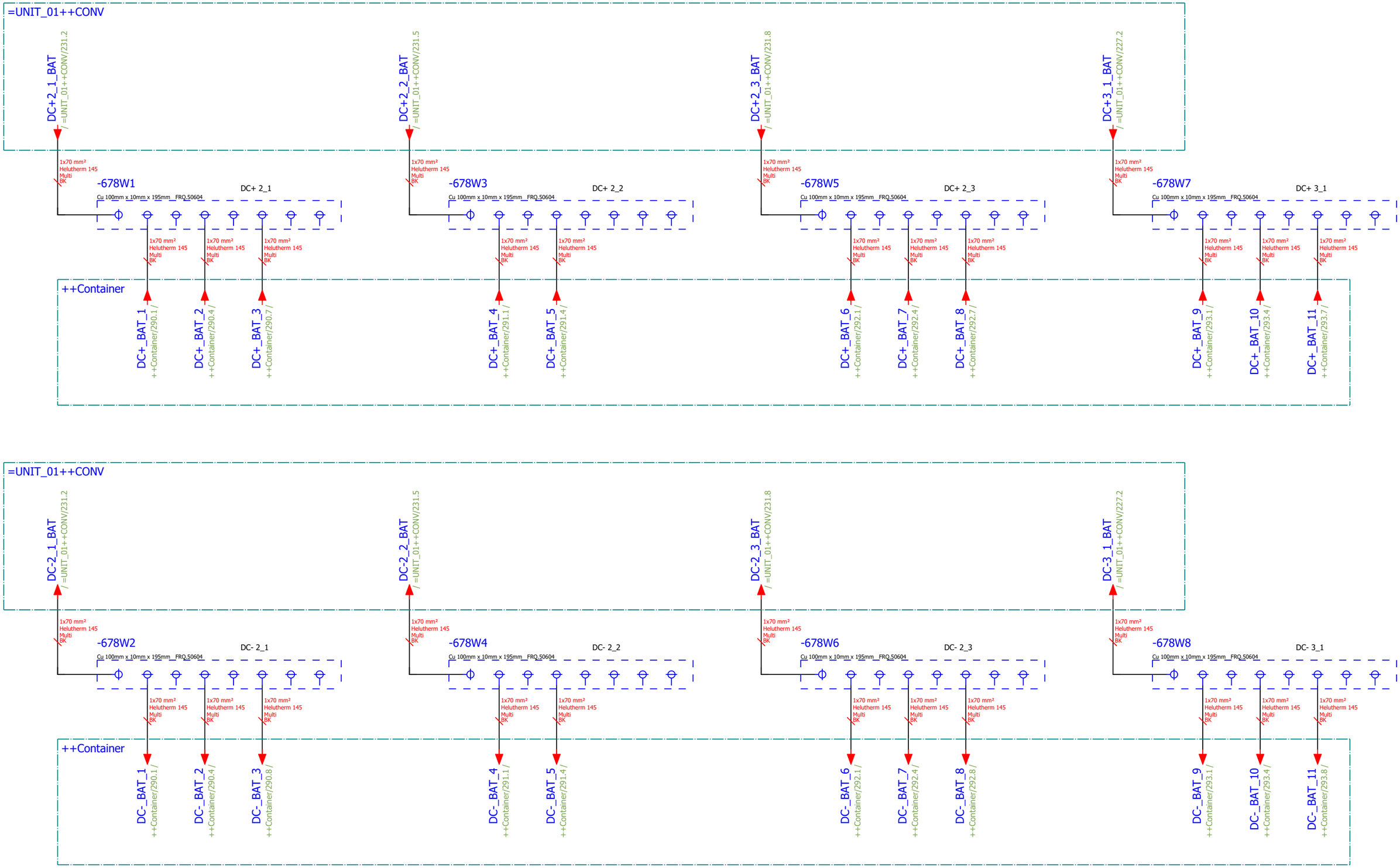
battery cabinet gas
potential-free contacts
customer

battery cabinet gas
potential-free contacts
customer

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669

next page:
678

Editor	Freqcon_JD			Statron	FREQCON	GAS POTENTIAL-FREE CONTACTS	20241105_V1.2	= UNIT_02 Battery Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 670
Date								+	total: 498



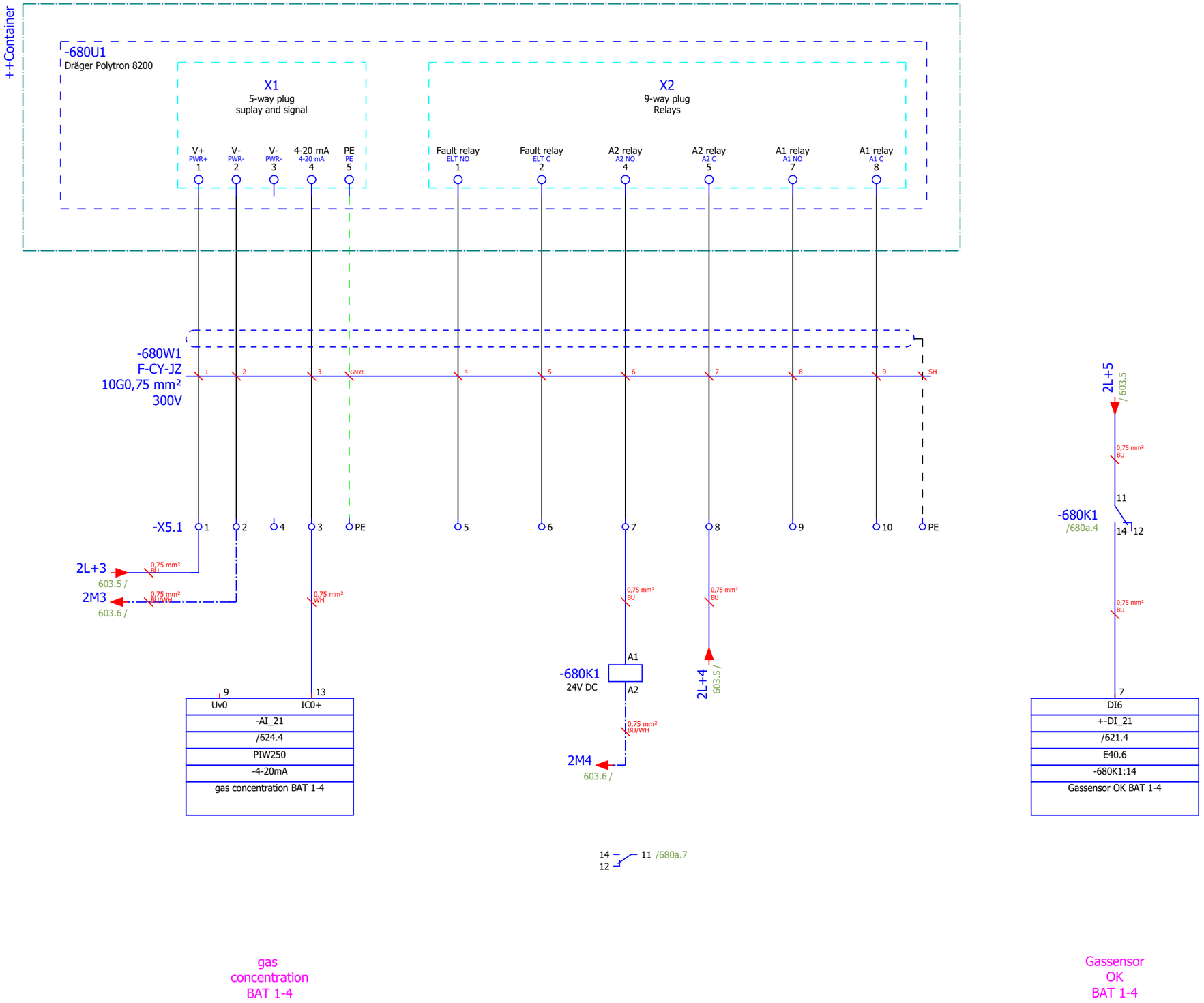
previous page: 670

next page: 680a

Editor	Freqcon_JD			Statron	FREQCON	DC BATTERY CABINETS	20241105_V1.2	= UNIT_02	Battery Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet
Date								+	

page: 678

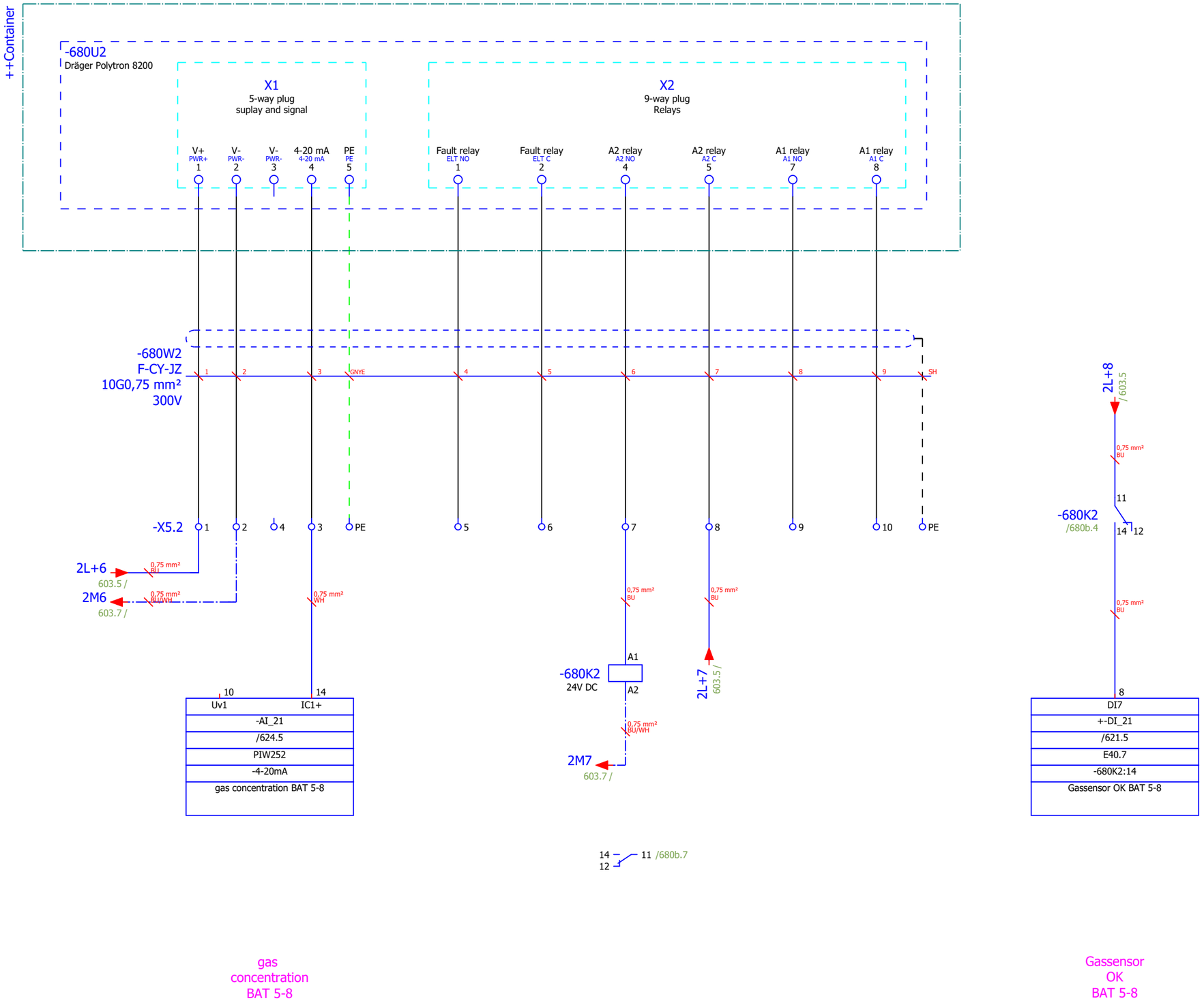
total: 498



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next page: 680b

Editor	Freqcon_JD			Statron	FREQCON	STATIONARY GAS DETECTOR BAT 1-4	20241105_V1.2	= UNIT_02 Battery Container 1	
Date	14.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 680a
Date								+	total: 498



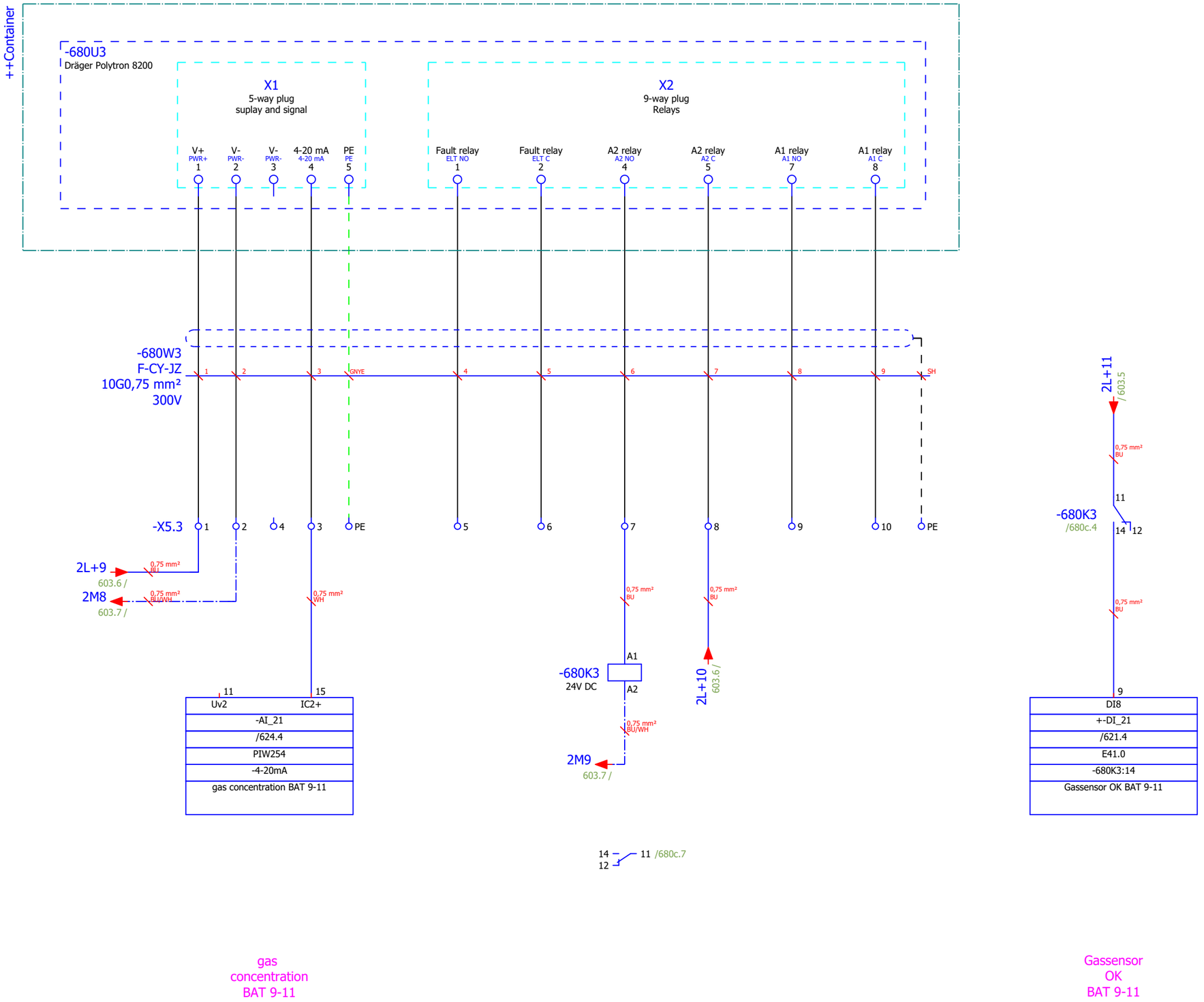
gas concentration BAT 5-8

Gassensor OK BAT 5-8

previous page: 680a

next page: 680c

Editor	Freqcon_JD			Statron	FREQCON	STATIONARY GAS DETECTOR BAT 5-8	20241105_V1.2	= UNIT_02 Battery Container 1
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet — page: 680b
Date								+ — total: 498



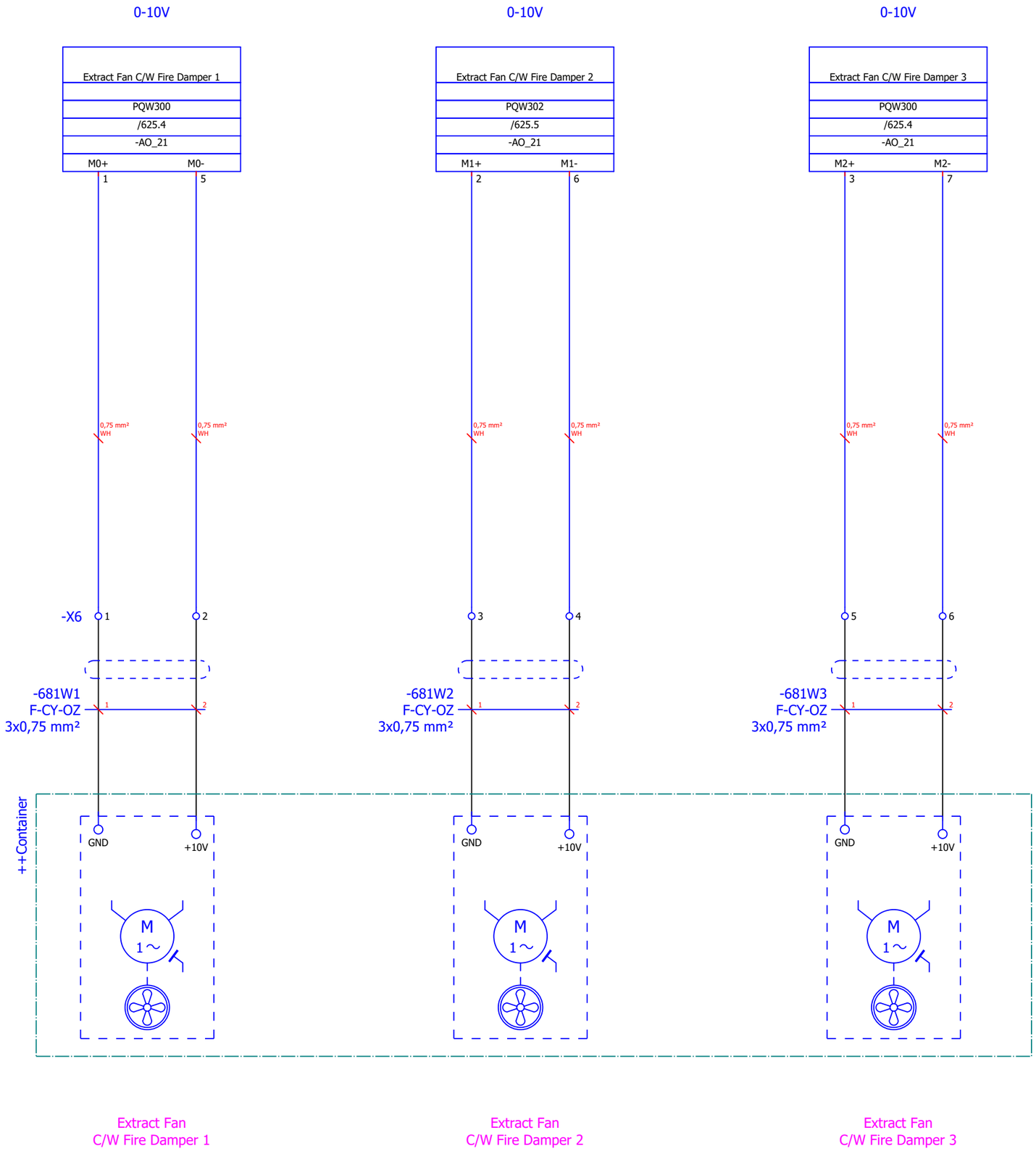
gas concentration BAT 9-11

Gassensor OK BAT 9-11

previous page: 680b

next page: 681

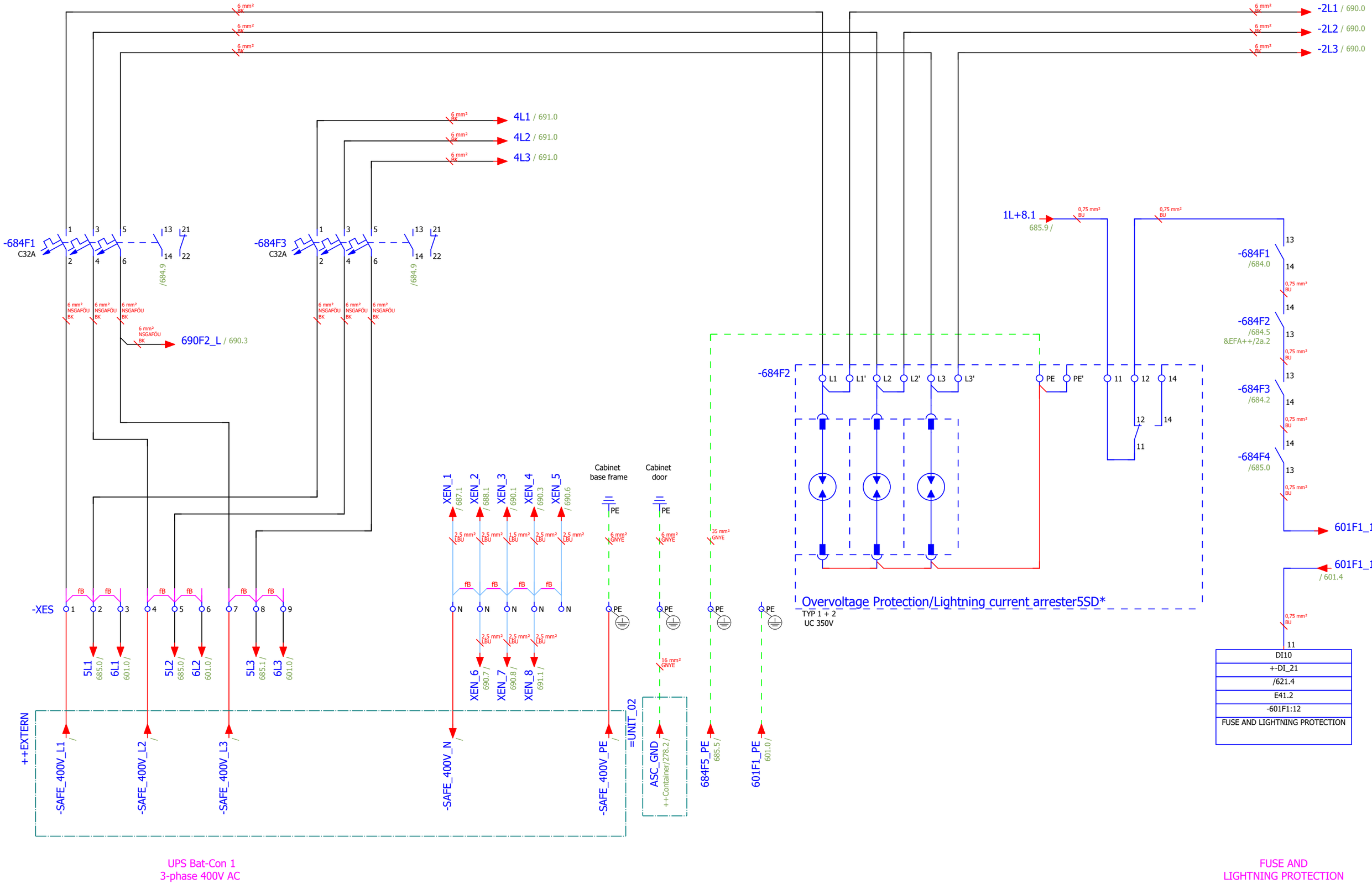
Editor	Freqcon_JD			Statron	FREQCON	STATIONARY GAS DETECTOR BAT 9-11	20241105_V1.2	= UNIT_02 Battery Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 680c
Date								+	total: 498



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680c

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Editor	Freqcon_JD			Statron	FREQCON	EXTRACT FAN FIRE DAMPER	20241105_V1.2	= UNIT_02 Battery Container 1	
Date	14.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 681
Date								+	total: 498



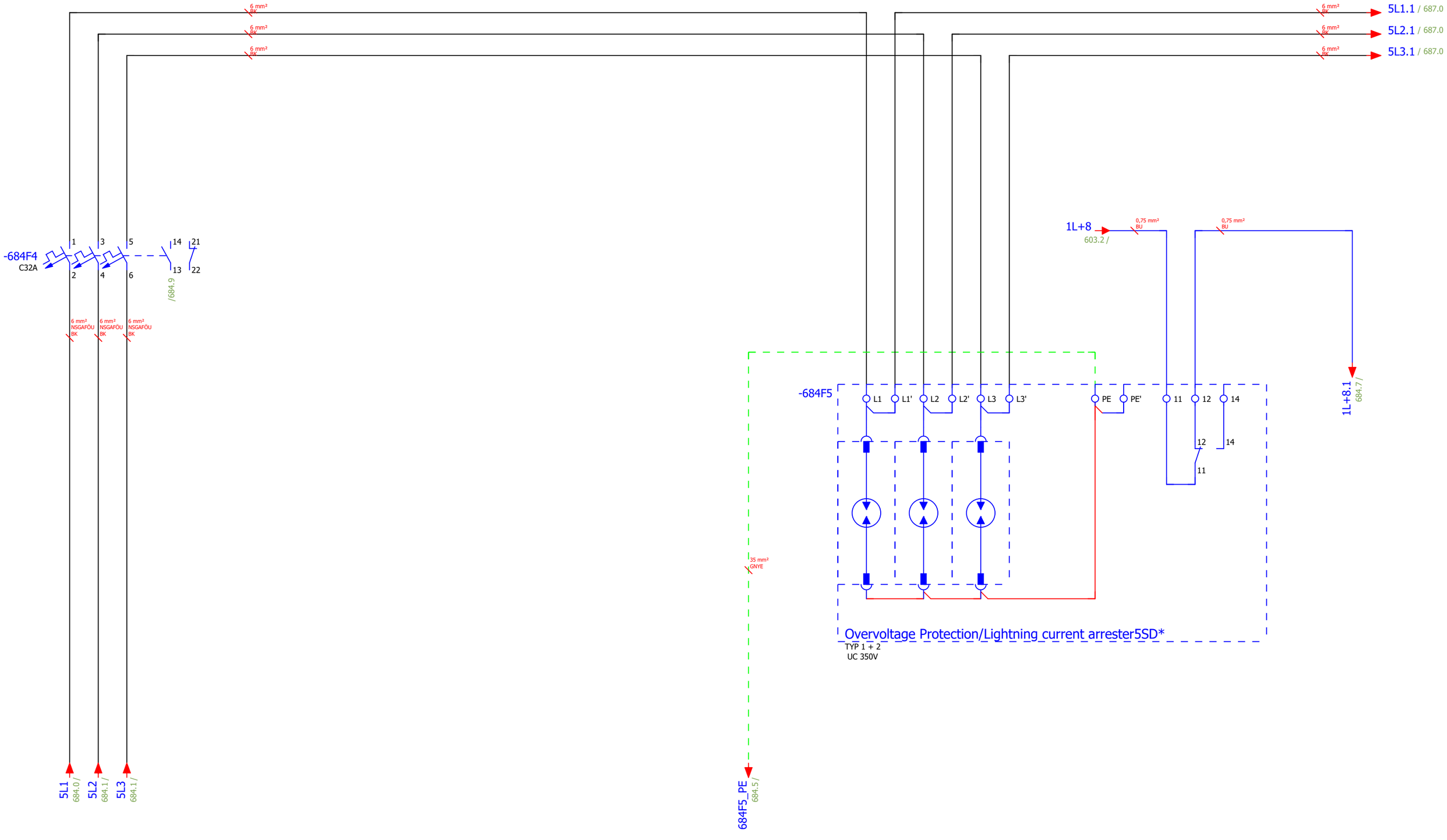
previous page: 681

next page: 685

Editor	Freqcon_DG			Statron	FREQCON	AUXILIARY SUPPLY 400V AC	20241105_V1.2	= UNIT_02	Battery Container 1
Date	05.11.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet
Date								+	

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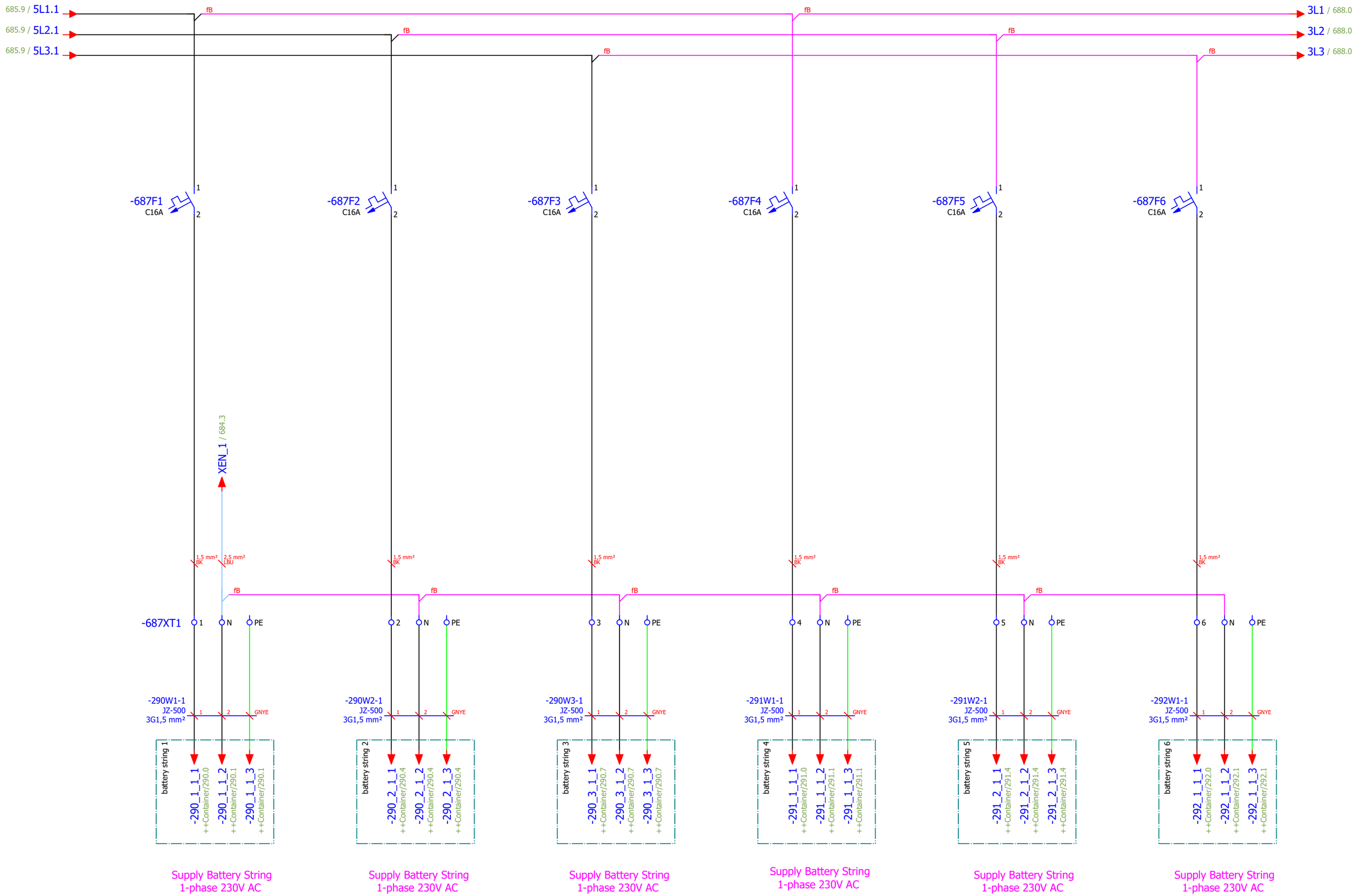
total: 498



FUSE AND
LIGHTNING PROTECTION

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next page: 687

Editor	Freqcon_DG			Statron	FREQCON	AUXILIARY SUPPLY 400V AC	20241105_V1.2	= UNIT_02 Battery Container 1	
Date	05.11.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 685
Date								+	total: 498



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Editor	Freqcon_DG			Statron		AUXILIARY SUPPLY 400V / 230V AC DISTRIBUTION	20241105_V1.2	= UNIT_02 Battery Container 1	
Date	08.10.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 687
Date								+	total: 498

687.9 / 3L1
687.9 / 3L2
687.9 / 3L3

-688F1 C16A
-688F2 C16A
-688F3 C16A
-688F4 C16A
-688F5 C16A

XEN_2 / 684.3

-687XT1 7 N PE
-687XT1 8 N PE
-687XT1 9 N PE
-687XT1 10 N PE
-687XT1 11 N PE

-292W2-1 JZ-500 3G1,5 mm²
-292W3-1 JZ-500 3G1,5 mm²
-293W1-1 JZ-500 3G1,5 mm²
-293W2-1 JZ-500 3G1,5 mm²
-293W3-1 JZ-500 3G1,5 mm²

battery string 7
-292_2_1_1 ++Container/292.4
-292_2_1_2 ++Container/292.4
-292_2_1_3 ++Container/292.4

battery string 8
-292_3_1_1 ++Container/292.7
-292_3_1_2 ++Container/292.7
-292_3_1_3 ++Container/292.7

battery string 9
-293_1_1_1 ++Container/293.0
-293_1_1_2 ++Container/293.1
-293_1_1_3 ++Container/293.1

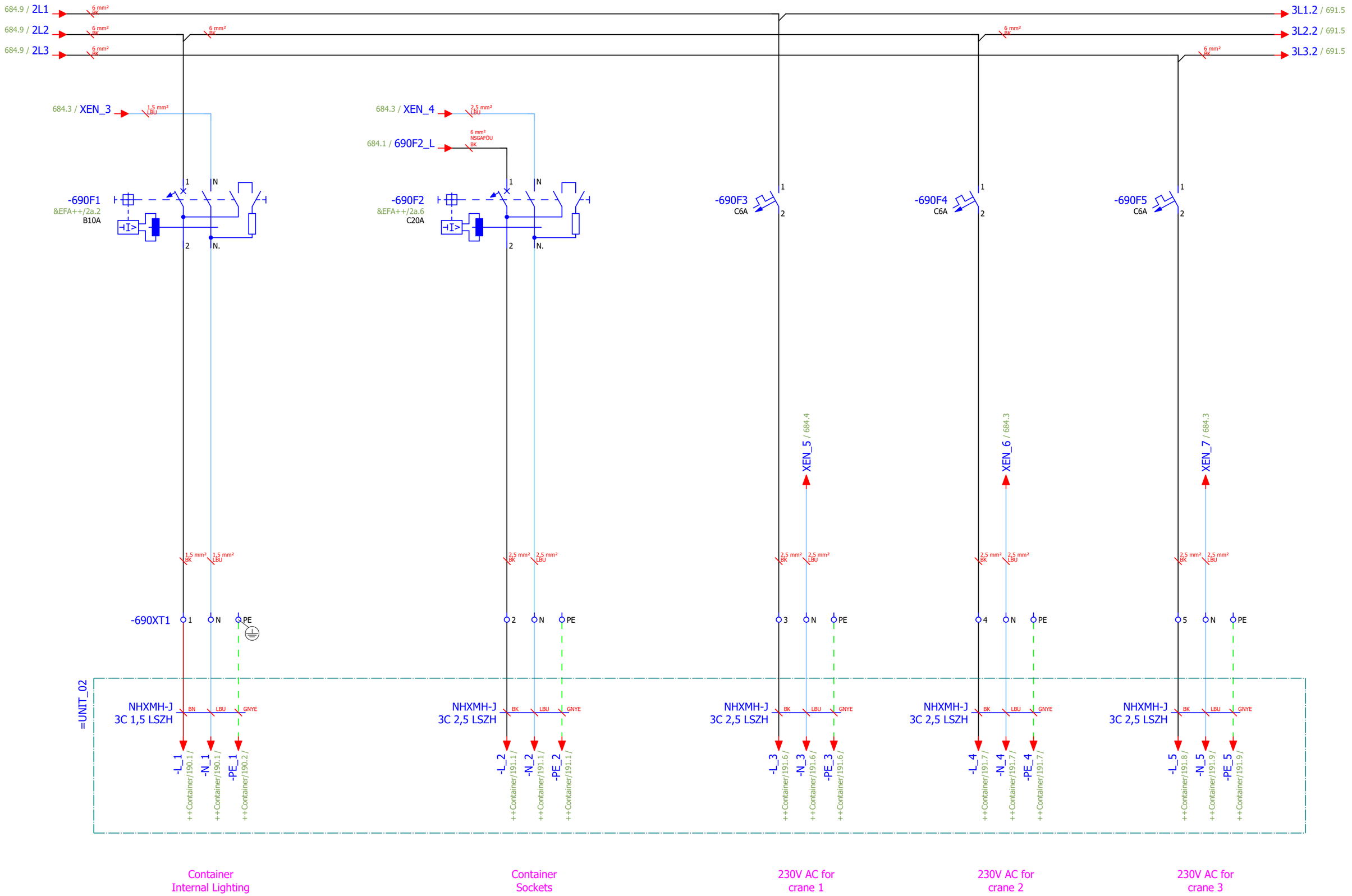
battery string 10
-293_2_1_1 ++Container/293.4
-293_2_1_2 ++Container/293.4
-293_2_1_3 ++Container/293.4

battery string 11
-293_3_1_1 ++Container/293.7
-293_3_1_2 ++Container/293.7
-293_3_1_3 ++Container/293.7

Supply Battery String 1-phase 230V AC
Supply Battery String 1-phase 230V AC
Supply Battery String 1-phase 230V AC
Supply Battery String 1-phase 230V AC
Supply Battery String 1-phase 230V AC

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next page: 690

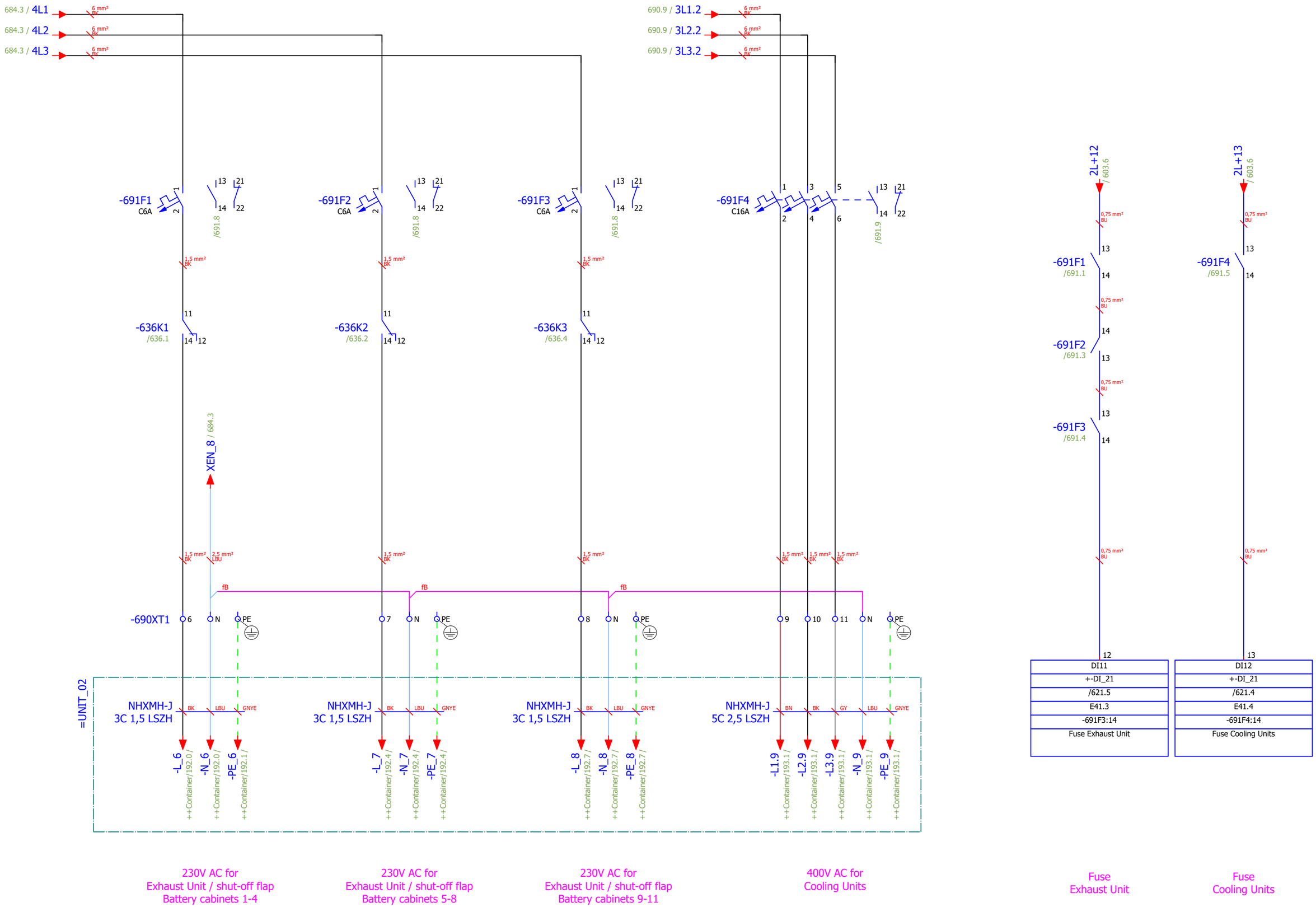
Editor	Freqcon_DG			Statron	FREQCON	AUXILIARY SUPPLY 400V / 230V AC DISTRIBUTION	20241105_V1.2	= UNIT_02 Battery Container 1	
Date	08.10.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 688
Date								+	total: 498



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Editor	Freqcon_DG			Statron	FREQCON	CONTAINER COOLING / LIGHTNING	20241105_V1.2	= UNIT_02	Battery Container 1	
Date	29.10.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet	page: 690
Date								+		total: 498



230V AC for
Exhaust Unit / shut-off flap
Battery cabinets 1-4

230V AC for
Exhaust Unit / shut-off flap
Battery cabinets 5-8

230V AC for
Exhaust Unit / shut-off flap
Battery cabinets 9-11

400V AC for
Cooling Units

Fuse
Exhaust Unit

Fuse
Cooling Units

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next page: &EPC++Container/1

Editor	Freqcon_DG			Statron	FREQCON	CONTAINER COOLING / LIGHTNING	20241105_V1.2	= UNIT_02	Battery Container 1	
Date	05.11.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet	page: 691
Date								+		total: 498

SPECIFICATION

TERMINAL STRIP

-XE1	MAIN POWER SUPPLY 600V AC
-XE2	DC POWER SUPPLY 1000V DC
-XE	MAIN POWER SUPPLY 400V AC
-X1	MAIN POWER 400V/230V AC
-X2	LIGHT CABINET 230V AC
-X3	CONTROL VOLTAGE 24V DC
-14X1	CONTROL VOLTAGE 24V DC (TO DC CONTACTORS)
-X5	LOW-VOLTAGE SIGNALS
-XDC0	24V DC POWER SUPPLY
-XDC1-4	CONTROL VOLTAGE 24V DC (UPS)
-XT	TRANSFER TERMINAL BLOCK 24V DC / 230V AC

WIRING COLOR

L1 / L2 / L3	=	BLACK
N	=	LIGHT BLUE (IEC) / GREY (UL)
PE	=	YELLOW-GREEN
EXTERNAL VOLTAGE	=	ORANGE
CONTROL VOLTAGE 24 V DC	=	DARK BLUE
ANALOG SIGNALS	=	WHITE

PLACE

+CTRL	=	Control cabinet
+CON	=	Converter cabinet
+IND	=	Inductor cabinet
+CIR	=	Circuit breaker cabinet
+COSY	=	Cooling System
+FAN	=	External fan

previous page: &EAB/6

next page: 6a

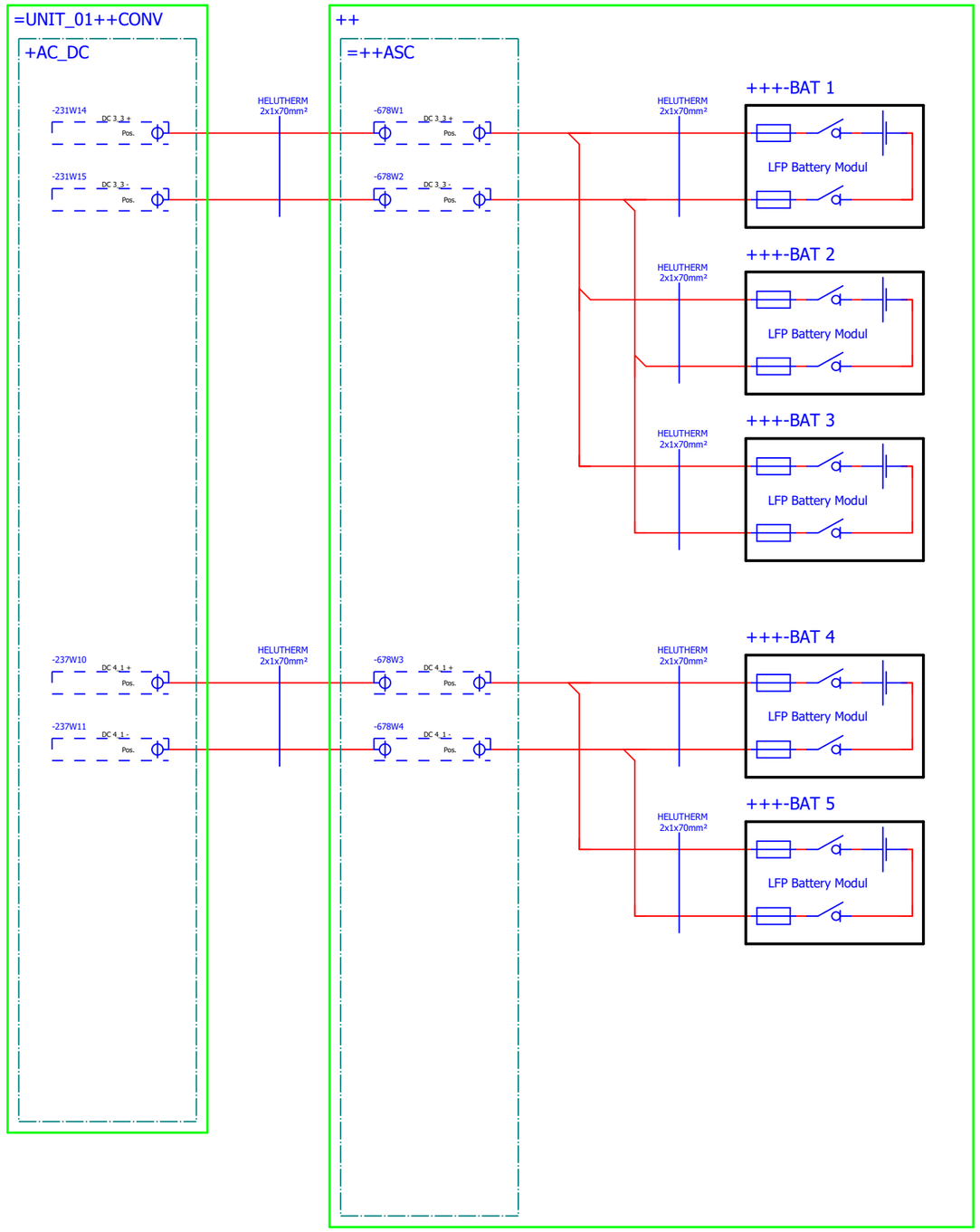
SPECIFICATION of grounding

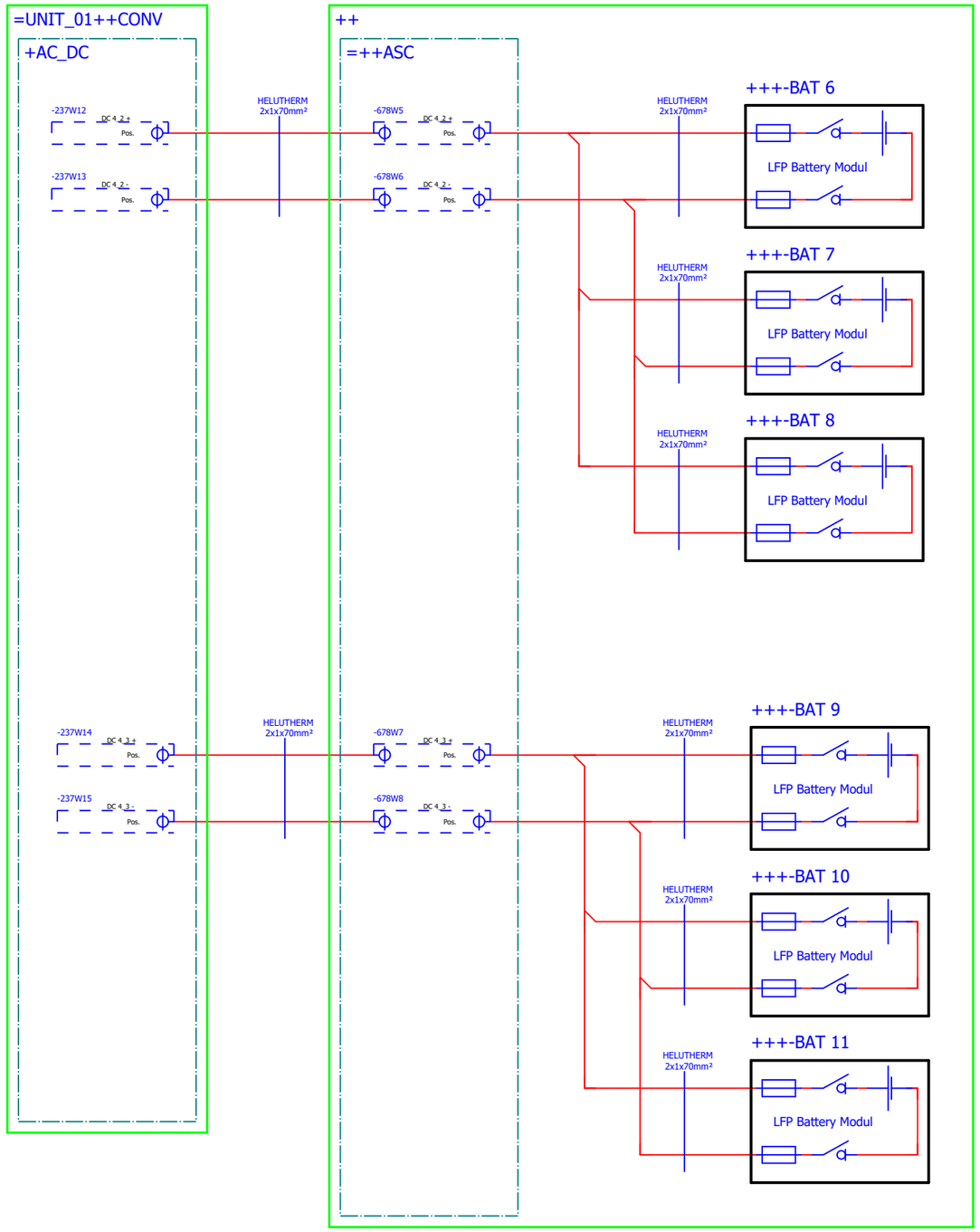
	from frame to			
1	**roof & side walls & doors**	**EVD_1**	**Flachband**	**2x25 mm²**
2	**frame**	**EVD_2**	**Flachband**	**2x25 mm²**
3	**base**	**EVD_3**	**Flachband**	**2x25 mm²**
4	**Mounting plate & partitions**	**EVD_4**	**H07-V-K**	**2x25 mm²**
5	**inductors**	**EVD_5**	**H07-V-k**	**2x25 mm²**
6	**Powerstack**	**EVD_6**	**H07-V-K**	**2x25 mm²**
7	**DC Switch & Fuse**	**EVD_7**	**H07-V-K**	**2x25 mm²**
8	**AC Filter**	**EVD_8**	**H07-V-K**	**2x25 mm²**
9	**circuit-breaker**	**EVD_9**	**H07-V-K**	**2x25 mm²**
10	**Freqcon_Fast_Disconektor**	**EVD_10**	**H07-V-K**	**2x25 mm²**
11	**Freqcon_Rectifier_Modul**	**EVD_11**	**H07-V-K**	**2x25 mm²**
12	**capacitor banks**	**EVD_12**	**H07-V-K**	**2x25 mm²**
13	**water distributor**	**EVD_13**	**H07-V-K**	**2x25 mm²**
14	**SPARE**	**EVD_14**	**H07-V-K**	**2x25 mm²**
15	**SPARE**	**EVD_15**	**H07-V-K**	**2x25 mm²**
16	**SPARE**	**EVD_16**	**H07-V-K**	**2x25 mm²**
17	**SPARE**	**EVD_17**	**H07-V-K**	**2x25 mm²**
18	**SPARE**	**EVD_18**	**H07-V-K**	**2x25 mm²**
	from door to			
19	**PROFINET IRT IGBT Interface**	**EVD_19**	**H07-V-K**	**1,5 mm²**
20	**HMI**	**EVD_20**	**H07-V-K**	**1,5 mm²**
21	**SPARE**	**EVD_21**	**H07-V-K**	**??? mm²**
22	**SPARE**	**EVD_22**	**H07-V-K**	**??? mm²**

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next page: &EFA/1a

Single line diagram





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&EAC/6a

next page:
2a

Editor	Freqcon_JD			Statron	FREQCON	SYSTEMS OVERVIEW	20241105_V1.2	= UNIT_03 Battery Container 2
Date	18.06.2024	Norm						& EFA Single line diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ page: 1a
Date								+ total: 498

Single line diagram

Control circuit

++ASC

400V

-XES

-684F3 &EFS++ASC/684.2 C32A

-684F1 &EFS++ASC/684.0 C32A

-684F2 &EFS++ASC/684.5 TYP 1 + 2 SPD

-601F1 &EFS++ASC/601.1 TYP 1 + 2 SPD

-684F4 &EFS++ASC/685.0 C32A

-684F5 &EFS++ASC/685.5 TYP 1 + 2 SPD

-691F1 &EFS++ASC/691.1 C6A

-691F2 &EFS++ASC/691.3 C6A

-691F3 &EFS++ASC/691.4 C6A

-690F1 &EFS++ASC/690.1 16A

-690F3 &EFS++ASC/690.5 C6A

-690F4 &EFS++ASC/690.7 C6A

-690F5 &EFS++ASC/690.8 C6A

-691F4 &EFS++ASC/691.5 C16A

-690F2 &EFS++ASC/690.3 16A

-101Q1

-687F1 &EFS++ASC/687.1 C16A

-687F2 &EFS++ASC/687.3 C16A

-687F3 &EFS++ASC/687.4 C16A

-687F4 &EFS++ASC/687.5 C16A

-687F5 &EFS++ASC/687.7 C16A

-636K1 &EFS++ASC/636.1

-636K2 &EFS++ASC/636.2

-636K3 &EFS++ASC/636.4

M 1~

1/N/PE

1/N/PE

1/N/PE

1/N/PE 1/N/PE

20 A

Battery cabinet 1

Battery cabinet 2

Battery cabinet 3

Battery cabinet 4

Battery cabinet 5

-687F6 &EFS++ASC/687.8 C16A

-688F1 &EFS++ASC/688.1 C16A

-688F2 &EFS++ASC/688.2 C16A

-688F3 &EFS++ASC/688.4 C16A

-688F4 &EFS++ASC/688.5 C16A

-688F5 &EFS++ASC/688.7 C16A

Battery cabinet 6

Battery cabinet 7

Battery cabinet 8

Battery cabinet 9

Battery cabinet 10

Battery cabinet 11

Exhaust Unit / shut-off flap Bat 1-4

Exhaust Unit / shut-off flap Bat 5-8

Exhaust Unit / shut-off flap Bat 9-11

Container Internal Lighting

crane 1

crane 2

crane 3

Cooling Units

Container Sockets

Power Supply

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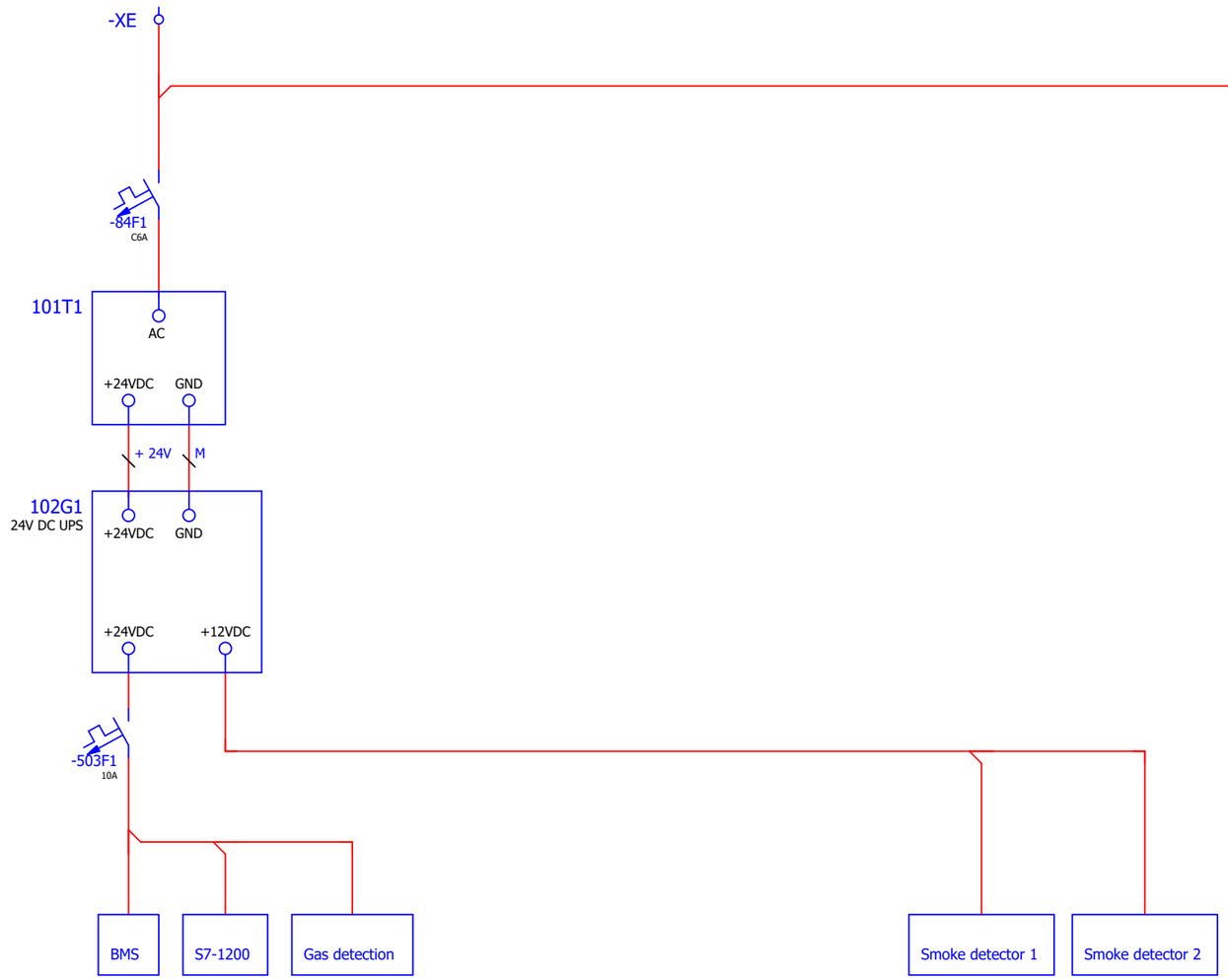
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Editor	Freqcon_DG			Statron	FREQCON	SYSTEMS OVERVIEW	20241105_V1.2	= UNIT_03 Battery Container 2
Date	05.11.2024	Norm						& EFA Single line diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ page: 2a
Date								+ total: 498

Single line diagram

Control circuit

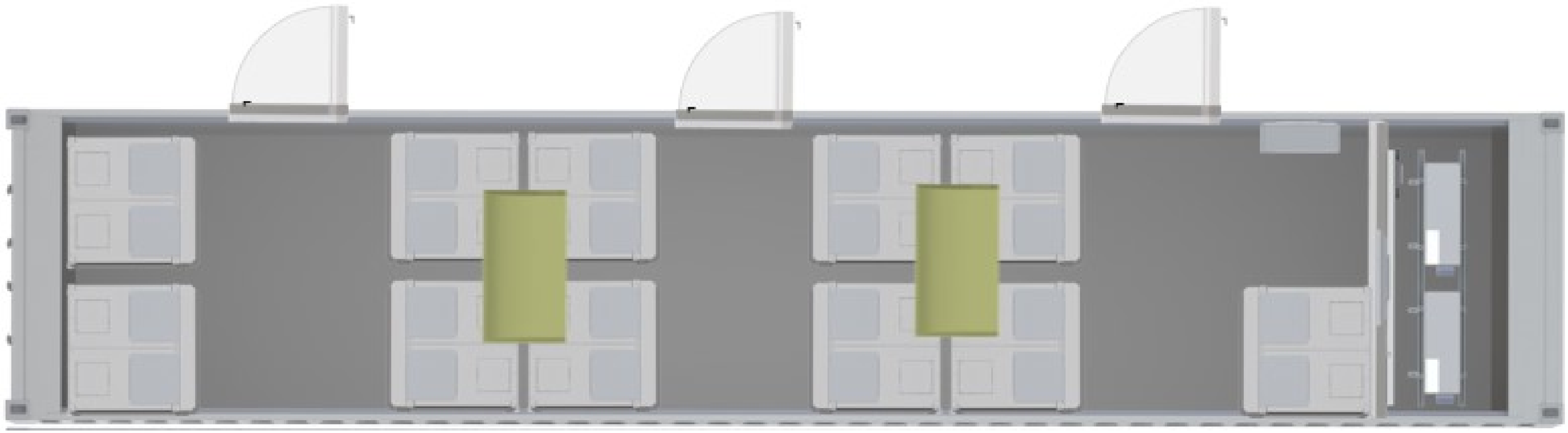
Battery Cabinet



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2a

next page:
&ELU/5a

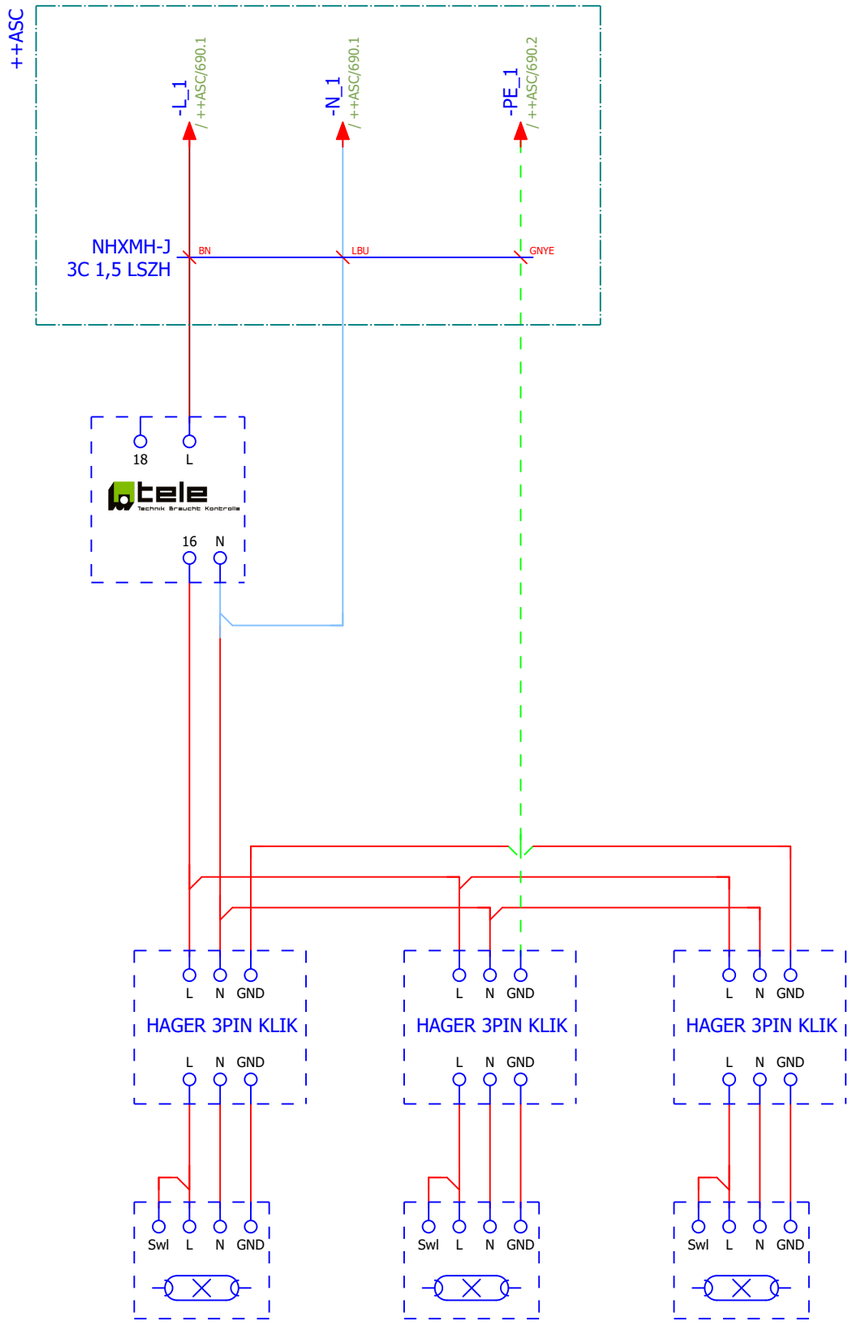
0	1	2	3	4	5	6	7	8	9



previous page:
&EFA/3a

next page:
&EFS++Container/190

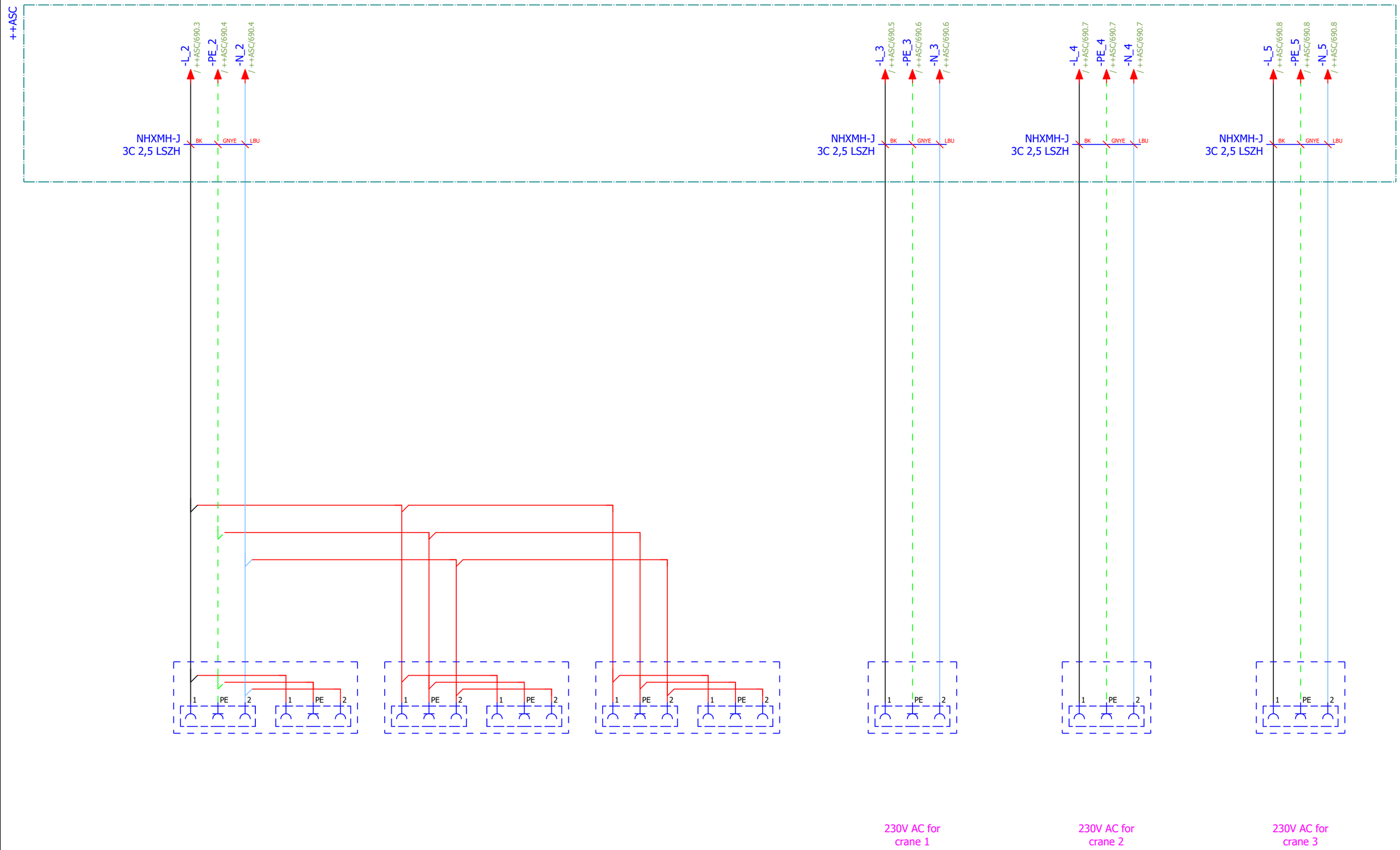
Editor	Freqcon_JD			Statron	FREQCON	Container overview	20241105_V1.2	= UNIT_03 Battery Container 2	
Date	14.06.2024	Norm						& ELU Cabinet Overview	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++	page: 5a
Date								+	total: 498



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&ELU++/5a

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Editor	Freqcon_JD			Statron	FREQCON	CONTAINER INSTALLATION	20241105_V1.2	= UNIT_03 Battery Container 2	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container	page: 190
Date								+	total: 498



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Editor	Freqcon_JD			Statron	FREQCON	CONTAINER INSTALLATION	20241105_V1.2	= UNIT_03 Battery Container 2	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container	page: 191
Date								+	total: 498

++ASC

-L_6 / ++ASC/691.1
-N_6 / ++ASC/691.1
-PE_6 / ++ASC/691.2

NHXMH-J
3C 1,5 LSZH
BK LBU GNYE

L N GND
13A fused
Spur K983ALM
L N GND

1 2
M
1~
PE

BELDEN 9842
LSZH
WH BU WH BU

Junction Box
next to fan motor

230V AC for
Exhaust Unit
Battery cabinets 1-4

-L_6 / ++ASC/691.1
-N_6 / ++ASC/691.1
-PE_6 / ++ASC/691.2

L N GND
13A fused
Spur K983ALM
L N GND

1 2
M
1~
PE

230V AC for
shut-off flap
Battery cabinets 1-4

-L_7 / ++ASC/691.3
-N_7 / ++ASC/691.3
-PE_7 / ++ASC/691.3

NHXMH-J
3C 1,5 LSZH
BK LBU GNYE

L N GND
13A fused
Spur K983ALM
L N GND

1 2
M
1~
PE

BELDEN 9842
LSZH
WH BU WH BU

Junction Box
next to fan motor

230V AC for
Exhaust Unit
Battery cabinets 5-8

-L_7 / ++ASC/691.3
-N_7 / ++ASC/691.3
-PE_7 / ++ASC/691.3

L N GND
13A fused
Spur K983ALM
L N GND

1 2
M
1~
PE

230V AC for
shut-off flap
Battery cabinets 5-8

-L_8 / ++ASC/691.4
-N_8 / ++ASC/691.4
-PE_8 / ++ASC/691.4

NHXMH-J
3C 1,5 LSZH
BK LBU GNYE

L N GND
13A fused
Spur K983ALM
L N GND

1 2
M
1~
PE

BELDEN 9842
LSZH
WH BU WH BU

Junction Box
next to fan motor

230V AC for
Exhaust Unit
Battery cabinets 9-11

-L_8 / ++ASC/691.4
-N_8 / ++ASC/691.4
-PE_8 / ++ASC/691.4

L N GND
13A fused
Spur K983ALM
L N GND

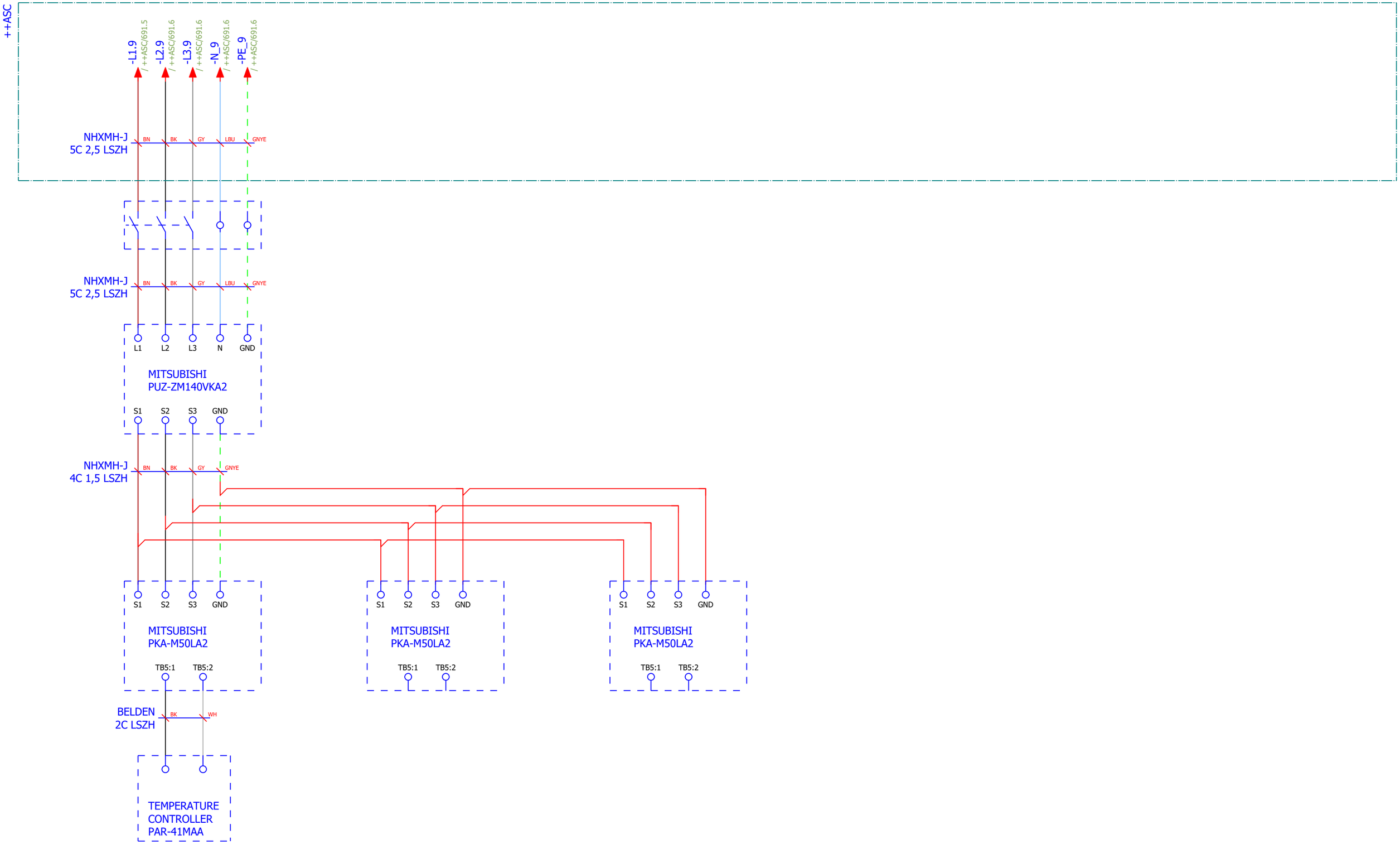
1 2
M
1~
PE

230V AC for
shut-off flap
Battery cabinets 9-11

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191

next page:
193

Editor	Freqcon_JD			Statron	FREQCON	CONTAINER INSTALLATION	20241105_V1.2	= UNIT_03	Battery Container 2
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container	page: 192
Date								+	total: 498

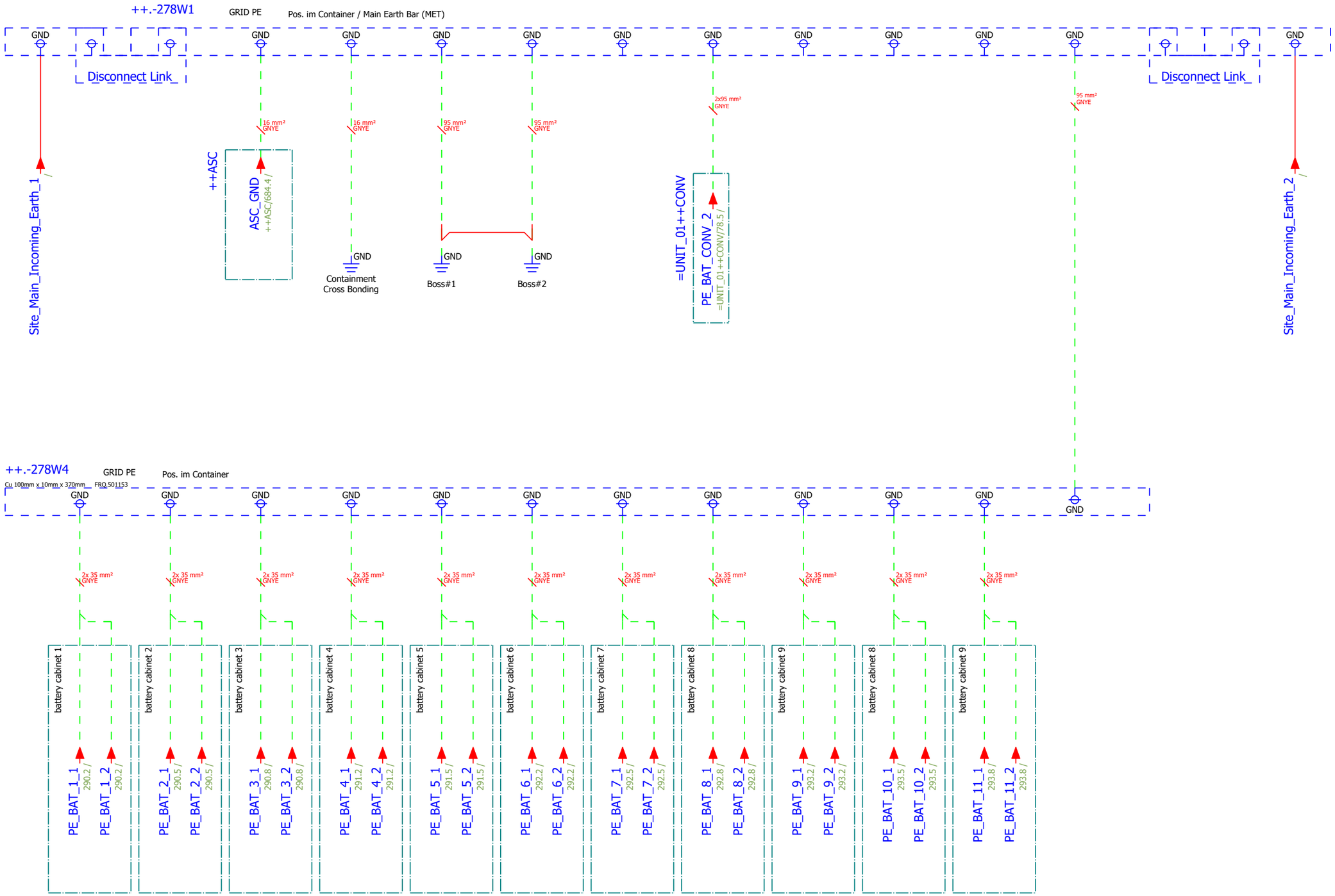


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Editor	Freqcon_JD			Statron	FREQCON	CONTAINER INSTALLATION	20241105_V1.2	= UNIT_03 Battery Container 2	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container	page: 193
Date								+	total: 498

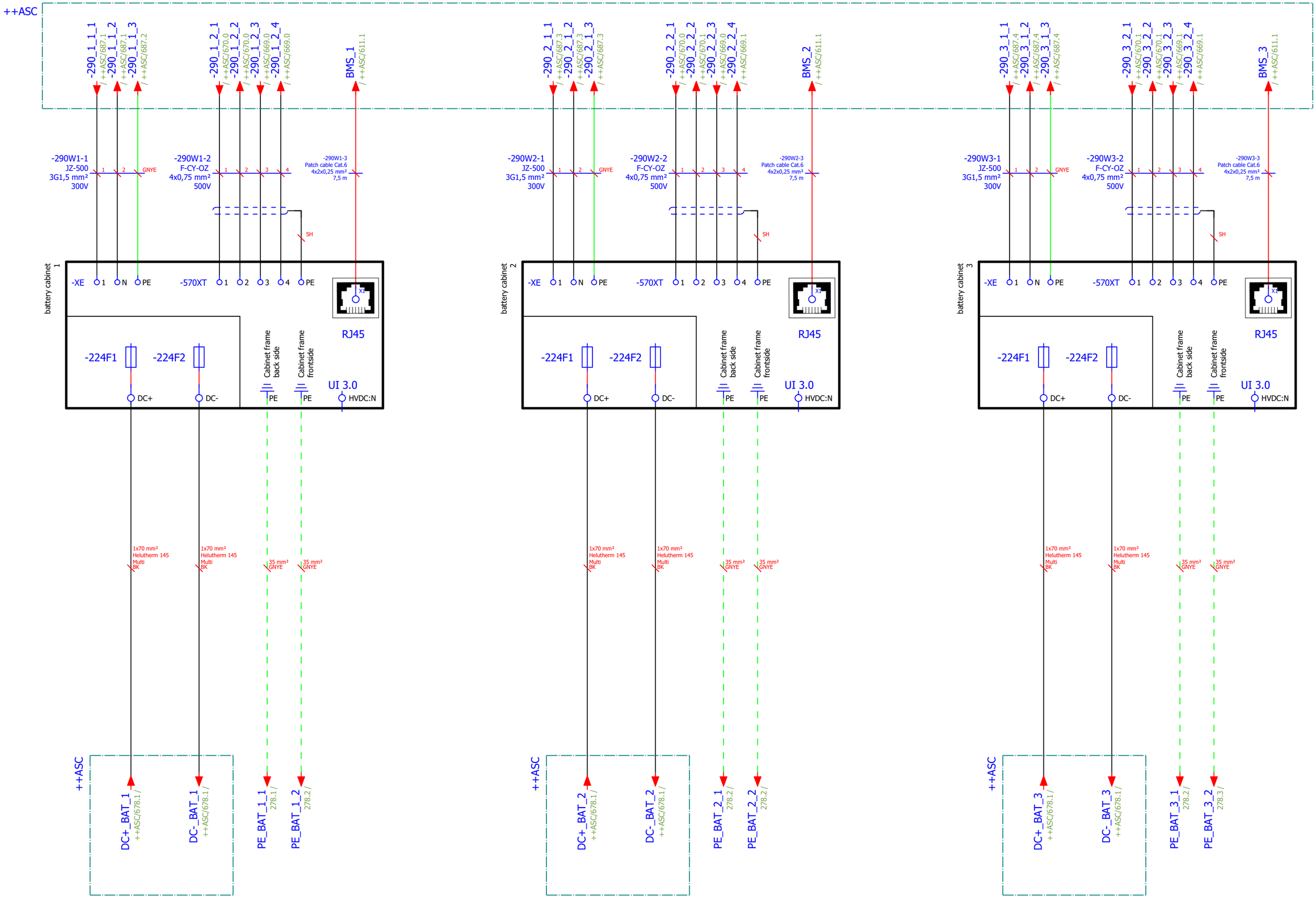
Busbars PE



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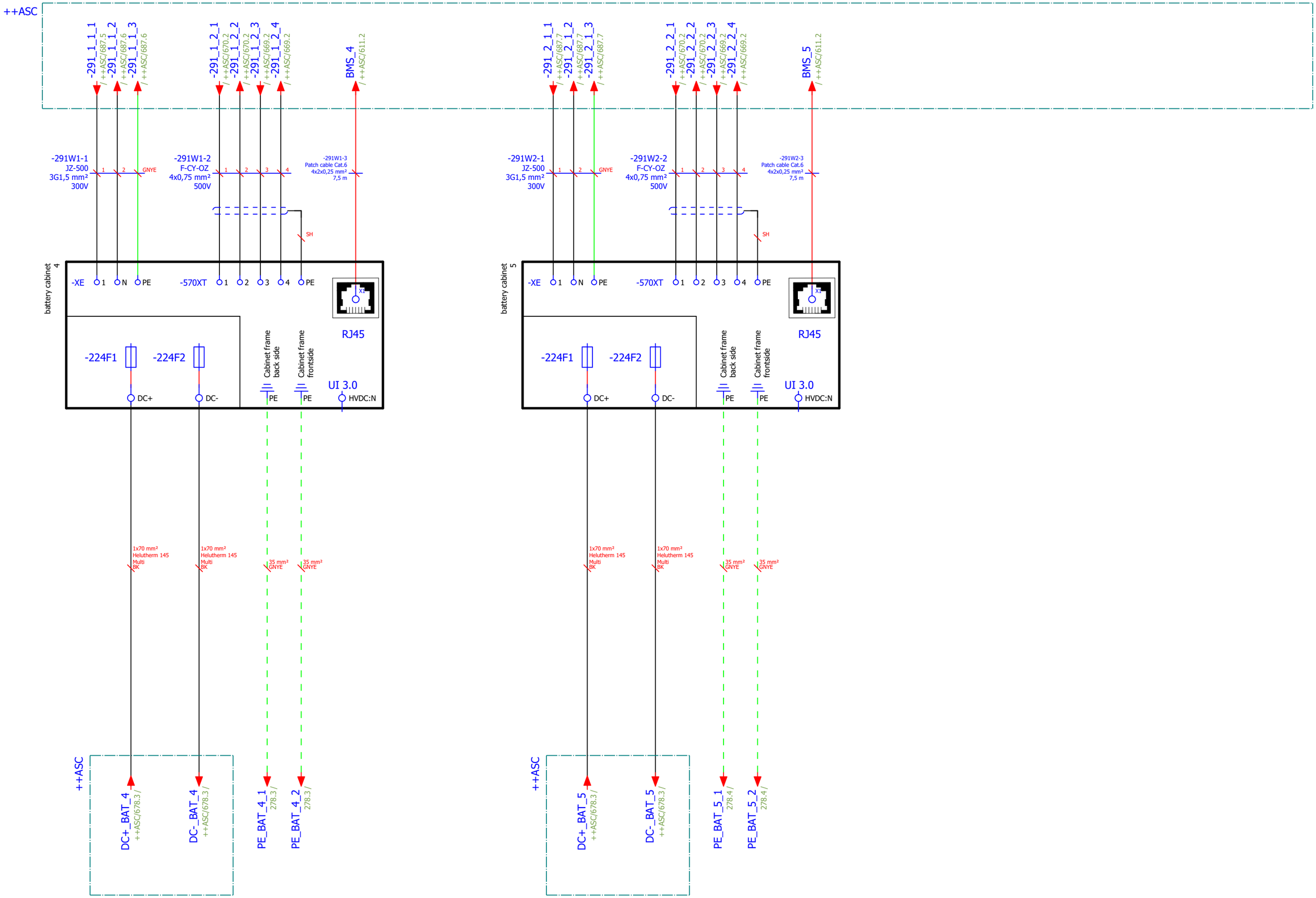
Editor	Freqcon_JD			Statron	FREQCON	EARTHING CONTAINER	20241105_V1.2	= UNIT_03 Battery Container 2	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container	page: 278
Date								+	total: 498



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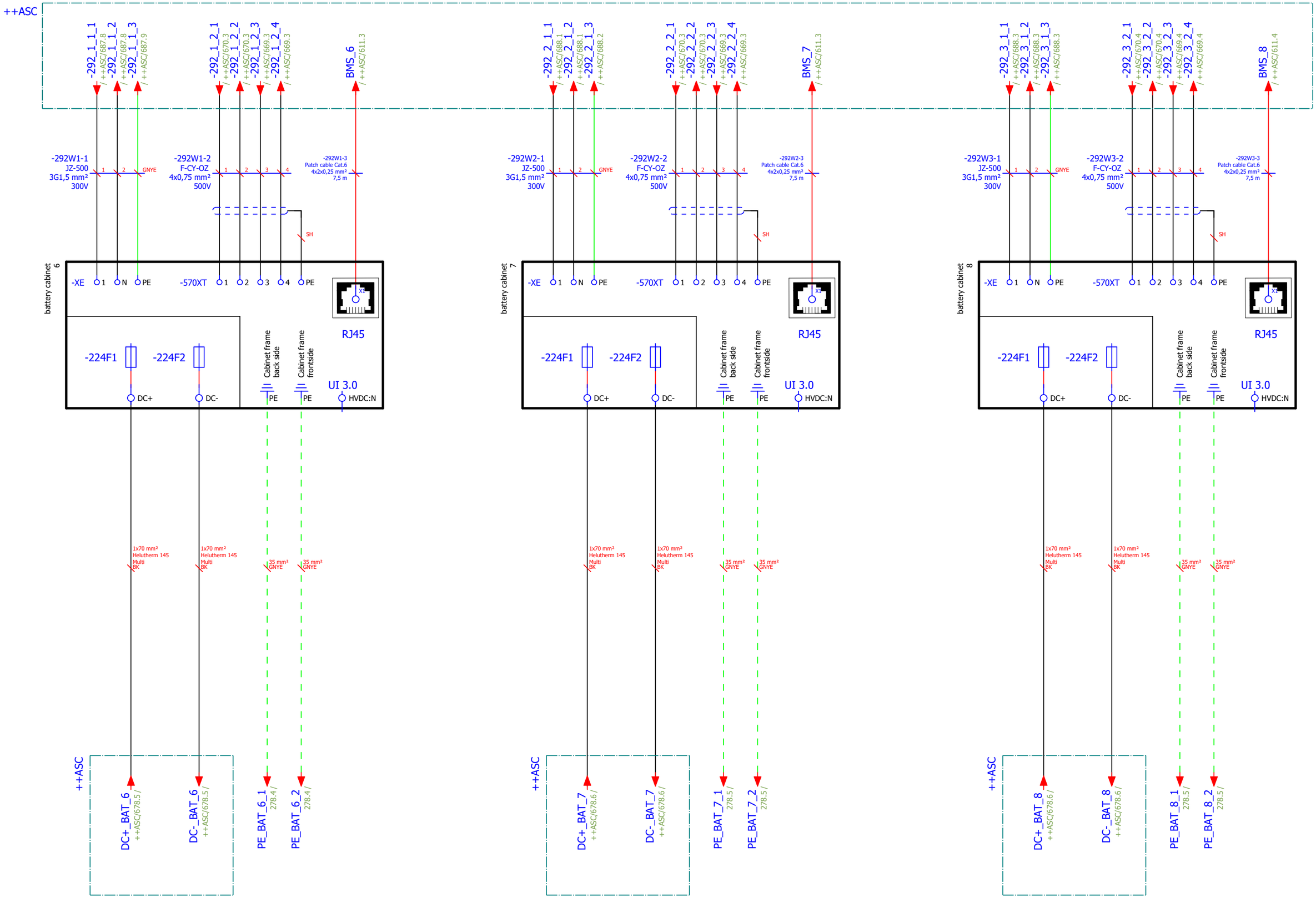
Editor	Freqcon_JD			Statron	FREQCON	BATTERY CABINETS 1-3	20241105_V1.2	= UNIT_03	Battery Container 2
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container	page: 290
Date								+	total: 498



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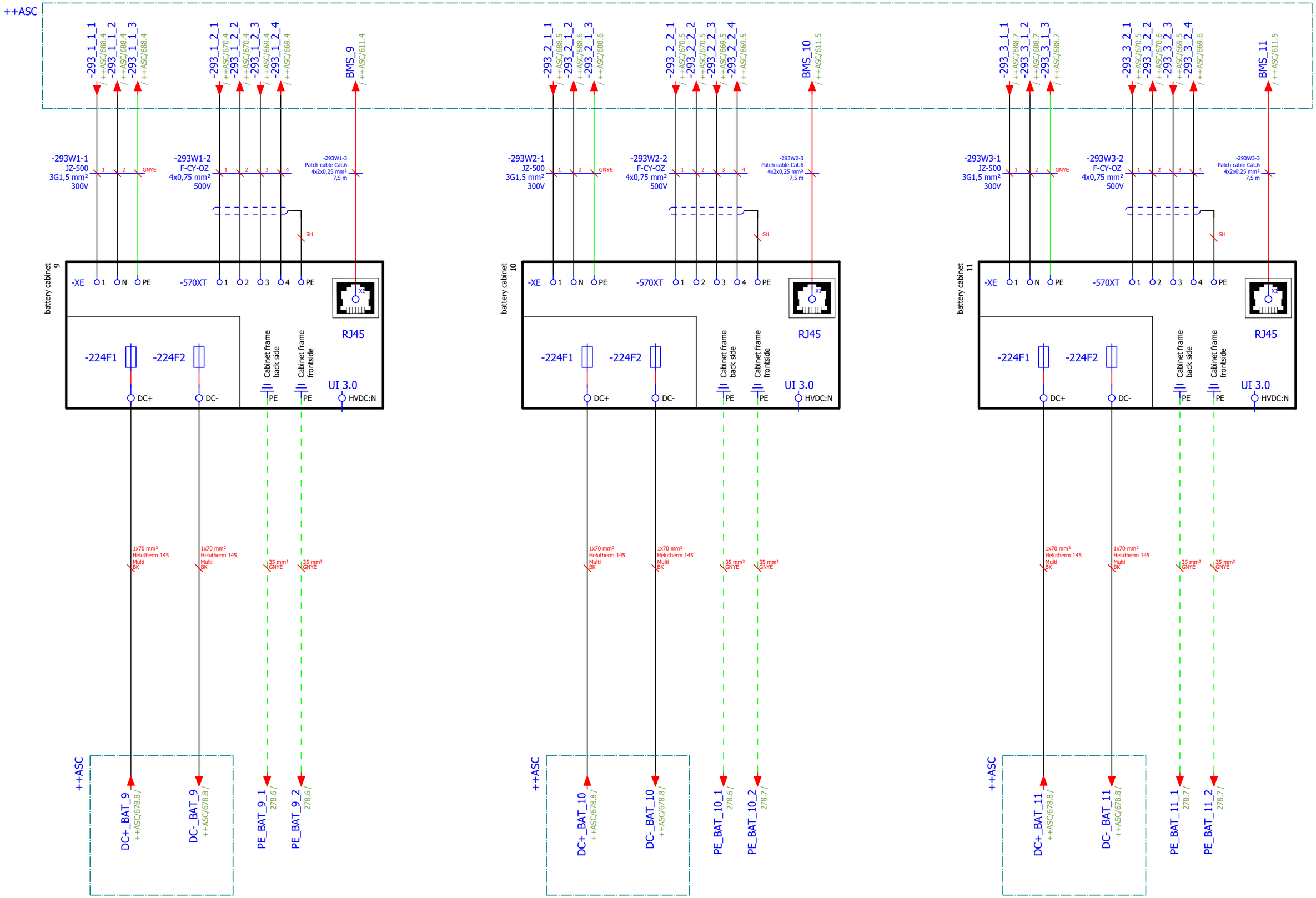
Editor	Freqcon_JD			Statron	FREQCON	BATTERY CABINETS 4+5	20241105_V1.2	= UNIT_03 Battery Container 2	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container	page: 291
Date								+	total: 498



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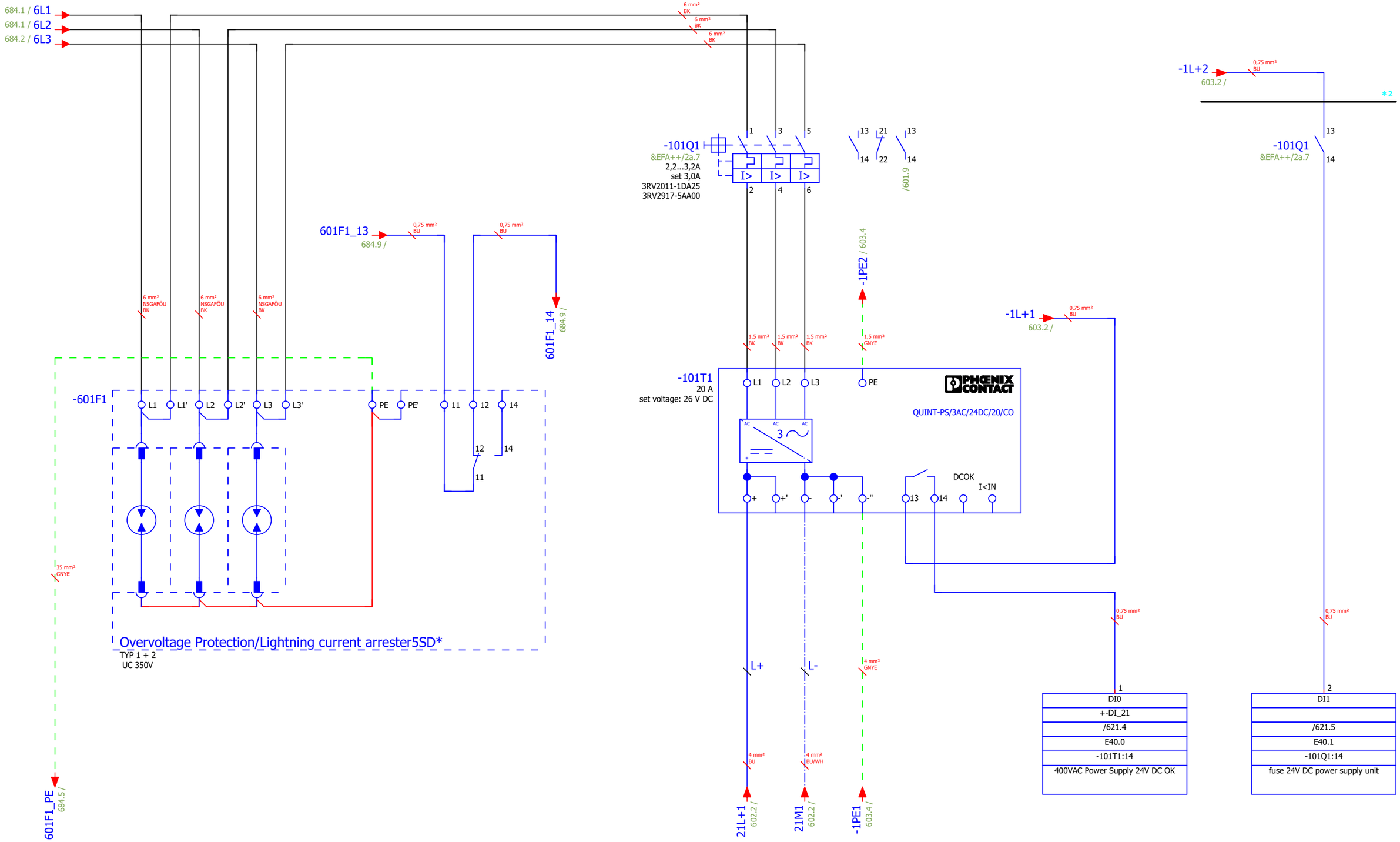
Editor	Freqcon_JD			Statron	FREQCON	BATTERY CABINETS 6-8	20241105_V1.2	= UNIT_03 Battery Container 2	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container	page: 292
Date								+	total: 498



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Editor	Freqcon_JD			Statron	FREQCON	BATTERY CABINETS 9-11	20241105_V1.2	= UNIT_03 Battery Container 2
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container page: 293
Date								+ total: 498



400VAC
Power Supply
24V DC OK

fuse
24V DC power supply unit

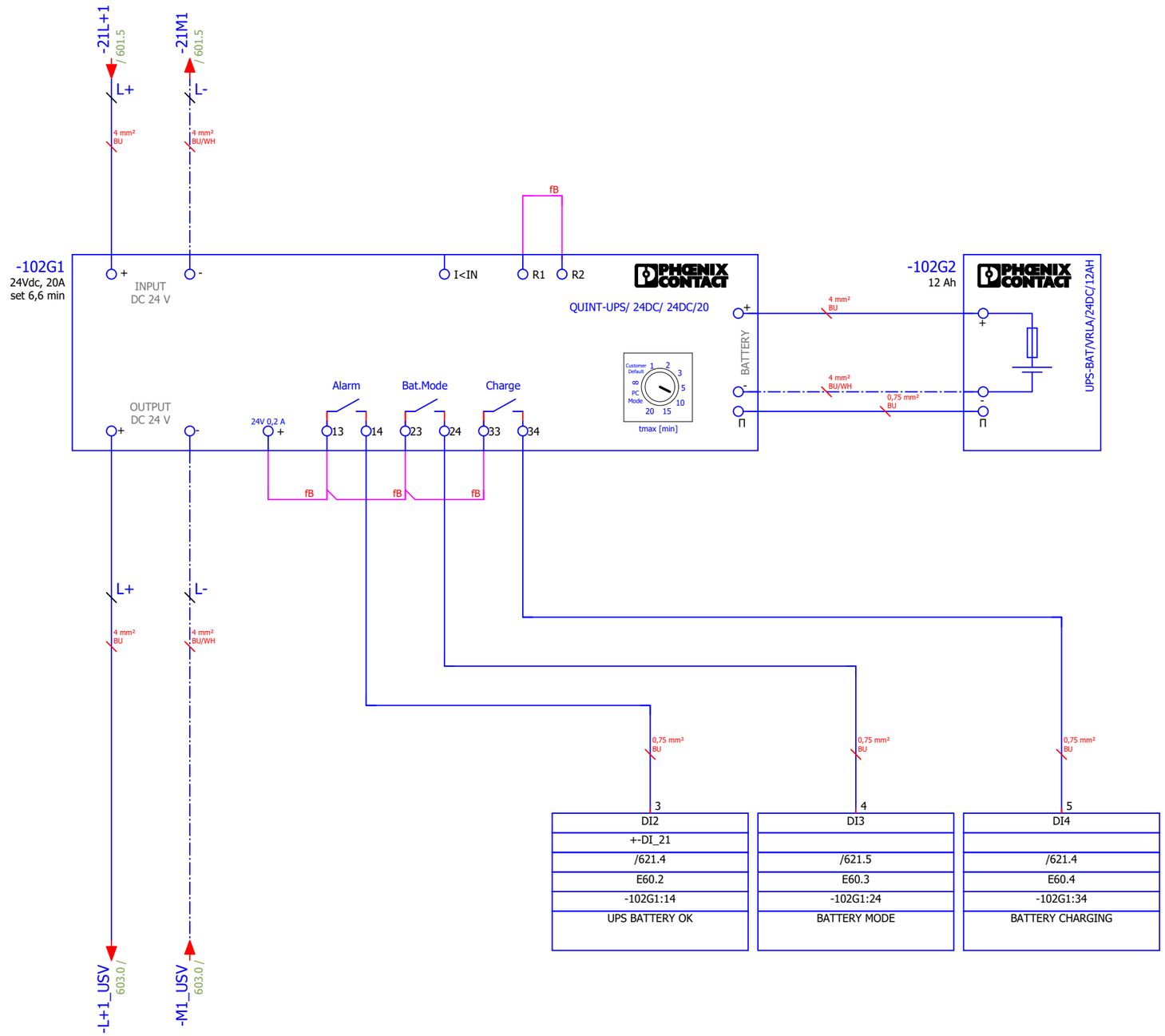
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++Container/293

Power supply unit from 400V AC

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Editor	Freqcon_DG			Statron	FREQCON	CONTROL VOLTAGE POWER SUPPLY UNIT	20241105_V1.2	= UNIT_03 Battery Container 2
Date	05.11.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet
Date								+

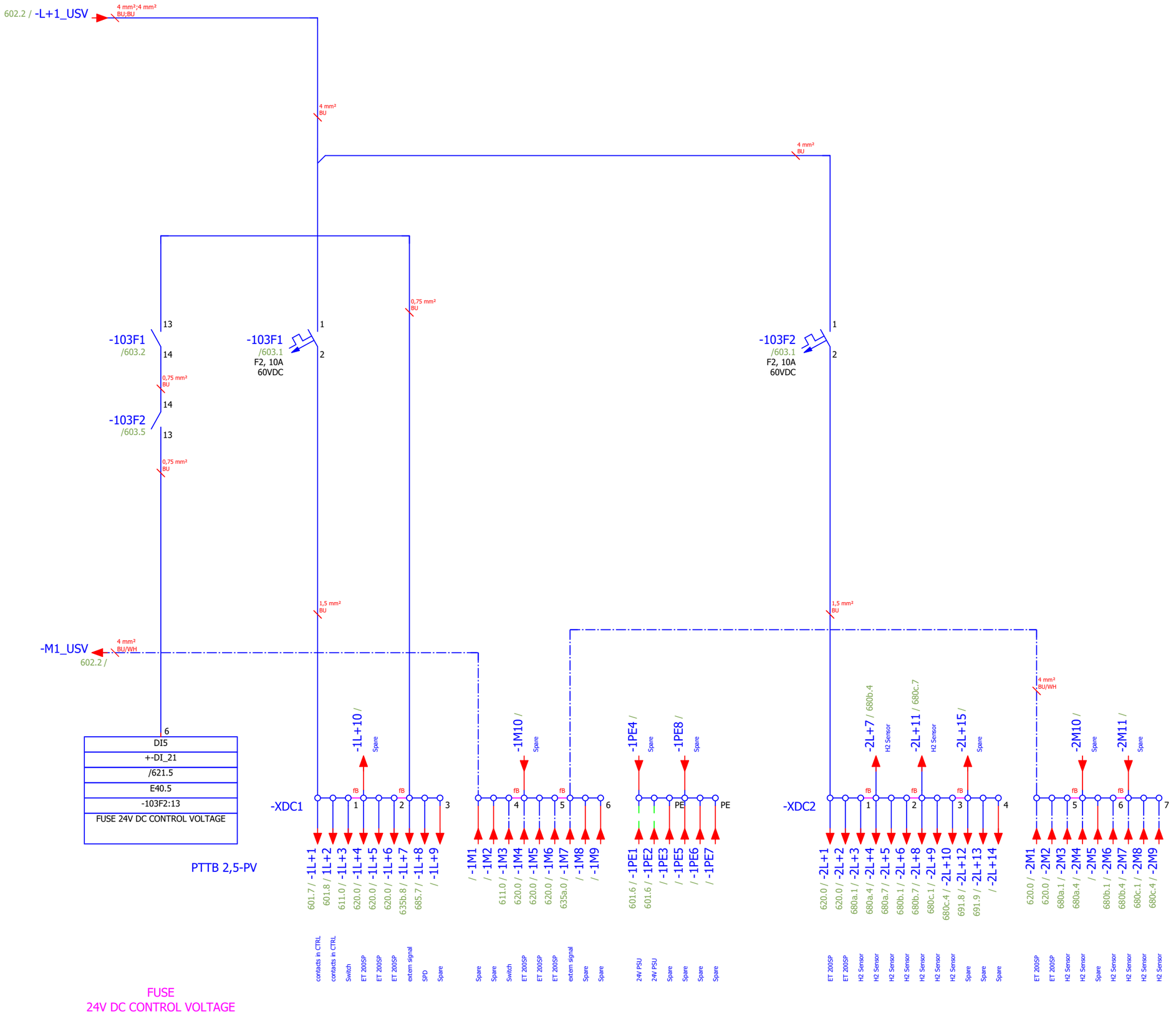
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total: 498



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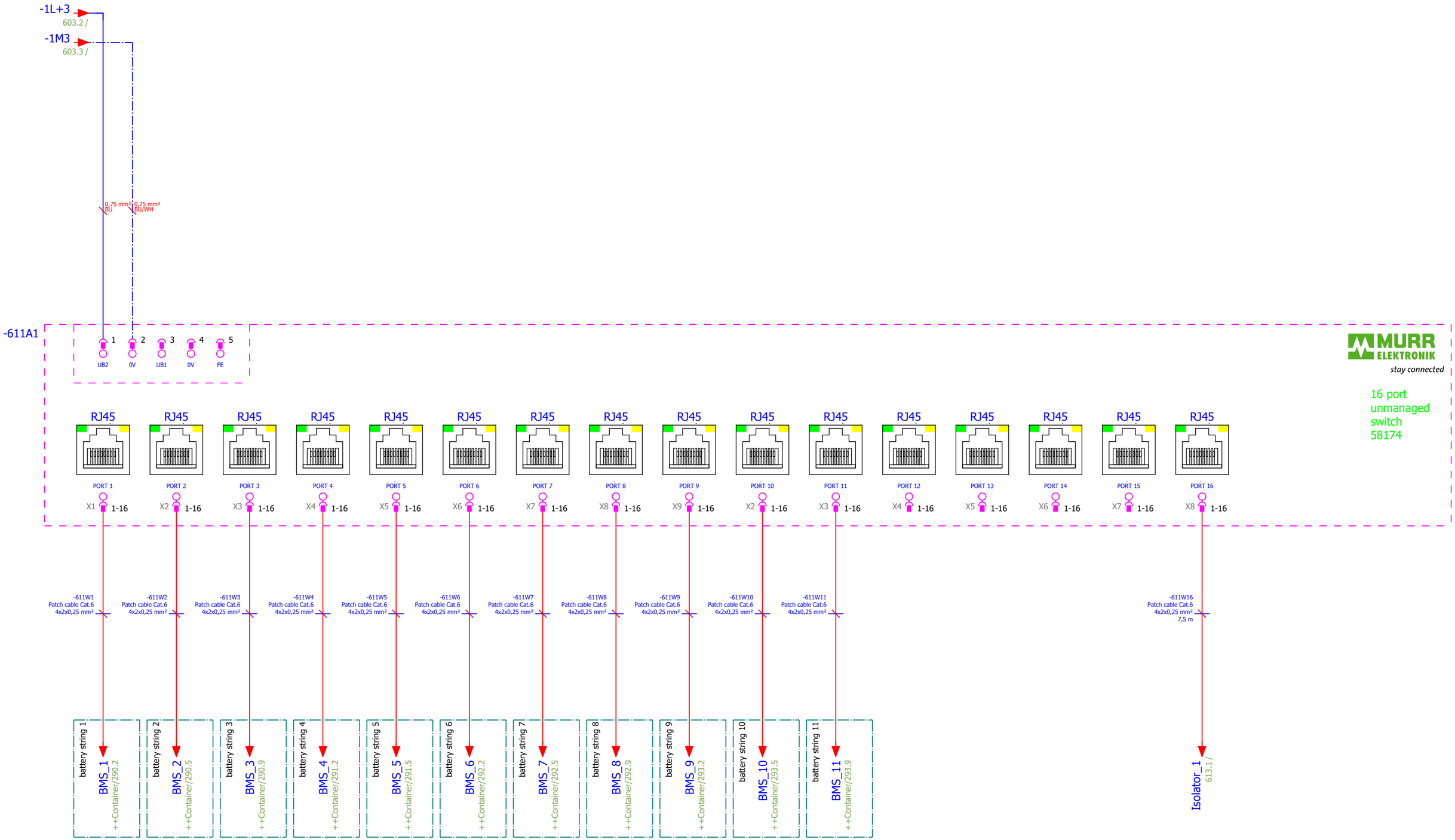
Editor	Freqcon_JD			Statron	FREQCON	CONTROL VOLTAGE UPS	20241105_V1.2	= UNIT_03 Battery Container 2	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 602
Date								+	total: 498



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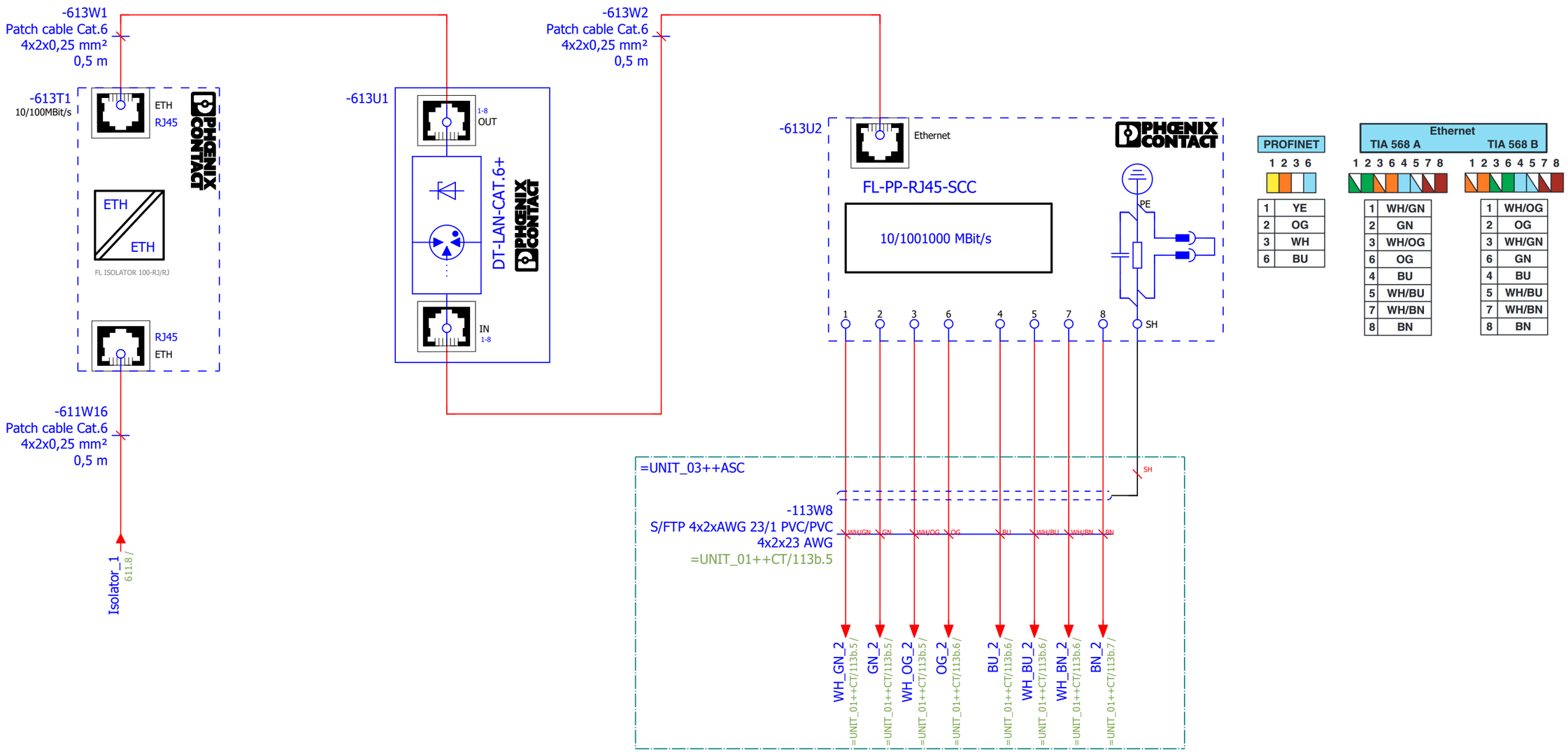
Editor	Freqcon_DG			Statron	FREQCON	CONTROL VOLTAGE FUSE	20241105_V1.2	= UNIT_03 Battery Container 2	
Date	10.10.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxiliary cabinet	page: 603
Date								+	total: 498



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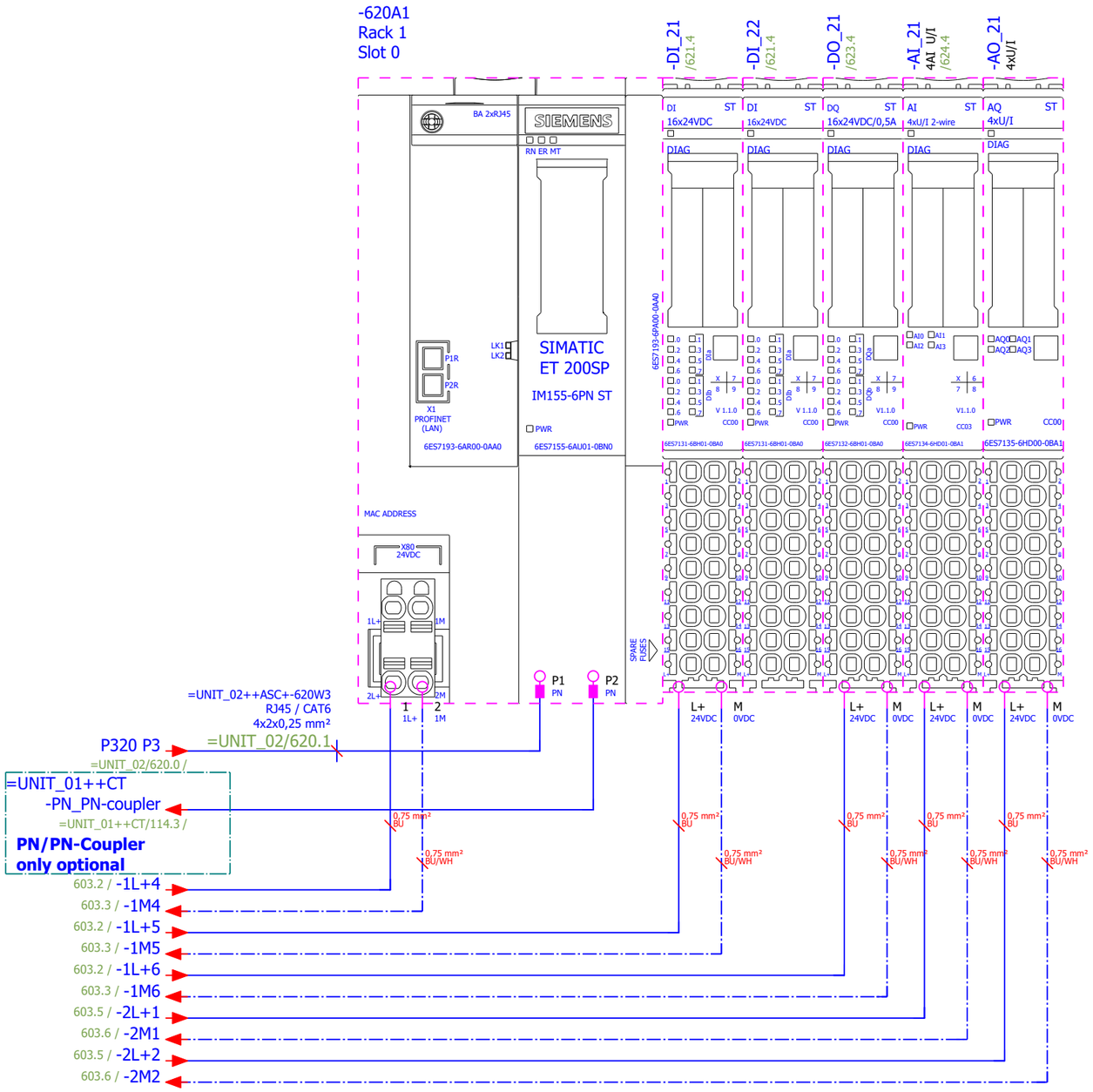
Editor	Freqcon_JD			Statron	FREQCON	ETHERNET SWITCH	20241105_V1.2	= UNIT_03 Battery Container 2	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 611
Date								+	total: 498



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Editor	Freqcon_JD			Statron	FREQCON	ETHERNET / PROFINET ISOLATOR	20241105_V1.2	= UNIT_03 Battery Container 2	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 613
Date								+	total: 498



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Editor	Freqcon_JD			Statron	FREQCON	ET200 24V DC ASC	20241105_V1.2	= UNIT_03	Battery Container 2
Date	02.07.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet
Date								+	

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-DI_21

/620.3

400VAC Power Supply 24V DC OK	/601.7	DI0	1	E60.0	E60.1	2	DI1	/601.9	fuse 24V DC power supply unit
UPS BATTERY OK	/602.5	DI2	3	E60.2	E60.3	4	DI3	/602.6	BATTERY MODE
BATTERY CHARGING	/602.7	DI4	5	E60.4	E60.5	6	DI5	/603.1	FUSE 24V DC CONTROL VOLTAGE
Gassensor OK BAT 1-4	/680a.7	DI6	7	E60.6	E60.7	8	DI7	/680b.7	Gassensor OK BAT 5-8
Gassensor OK BAT 9-11	/680c.7	DI8	9	E61.0	E61.1	10	DI9	/635b.8	Shut-down to BESS
FUSE AND LIGHTNING PROTECTION	/684.9	DI10	11	E61.2	E61.3	12	DI11	/691.8	Fuse Exhaust Unit
Fuse Cooling Units	/691.9	DI12	13	E61.4	E61.5	14	DI13		
		DI14	15	E61.6	E61.7	16	DI15		
	/620.3	24VDC	L+			M	0VDC	/620.3	

-DI_22

/620.3

DI0	1	E60.0	E60.1	2	DI1
DI2	3	E60.2	E60.3	4	DI3
DI4	5	E60.4	E60.5	6	DI5
DI6	7	E60.6	E60.7	8	DI7
DI8	9	E61.0	E61.1	10	DI9
DI10	11	E61.2	E61.3	12	DI11
DI12	13	E61.4	E61.5	14	DI13
DI14	15	E61.6	E61.7	16	DI15
24VDC	L+			M	0VDC

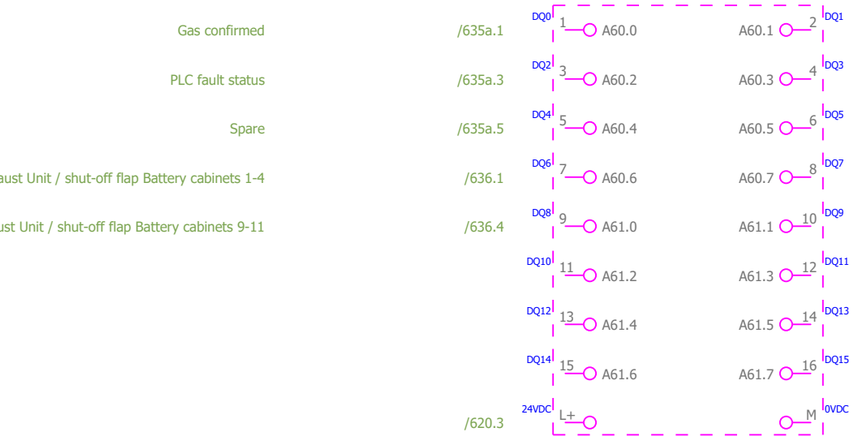
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0	1	2	3	4	5	6	7	8	9

-DO_21

/620.3



Gas confirmed	/635a.1	/635a.2	Smoke confirmed
PLC fault status	/635a.3	/635a.4	Thermal runaway
Spare	/635a.5	/635a.6	Spare
230V AC for Exhaust Unit / shut-off flap Battery cabinets 1-4	/636.1	/636.2	230V AC for Exhaust Unit / shut-off flap Battery cabinets 5-8
230V AC for Exhaust Unit / shut-off flap Battery cabinets 9-11	/636.4		
	/620.3	/620.4	

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Editor	Freqcon_JD			Statron	FREQCON	ET200SP DIGITAL OUTPUTS DO_21	20241105_V1.2	= UNIT_03 Battery Container 2	
Date	14.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 623
Date								+	total: 498

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/620.4



gas concentration BAT 1-4 /680a.2

gas concentration BAT 9-11 /680c.2

gas concentration BAT 1-4 /680a.2

gas concentration BAT 9-11 /680c.2

/620.4

/680b.2 gas concentration BAT 5-8

/680b.2 gas concentration BAT 5-8

/620.4

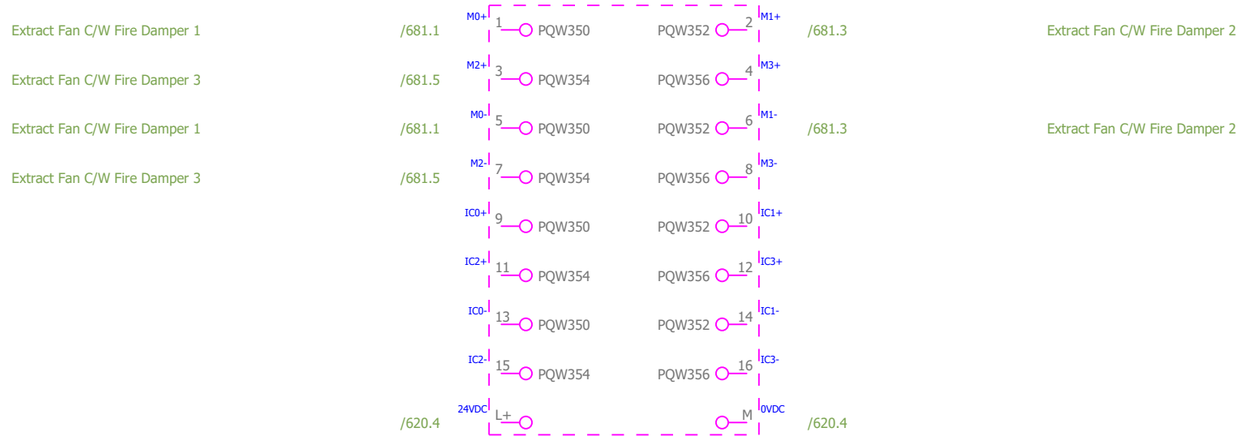
previous page: 623

next page: 625

Editor	Freqcon_JD			Statron	FREQCON	ET200SP ANALOG INPUTS AI_21	20241105_V1.2	= UNIT_03 Battery Container 2	
Date	14.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 624
Date								+	total: 498

-AO_21

/620.4



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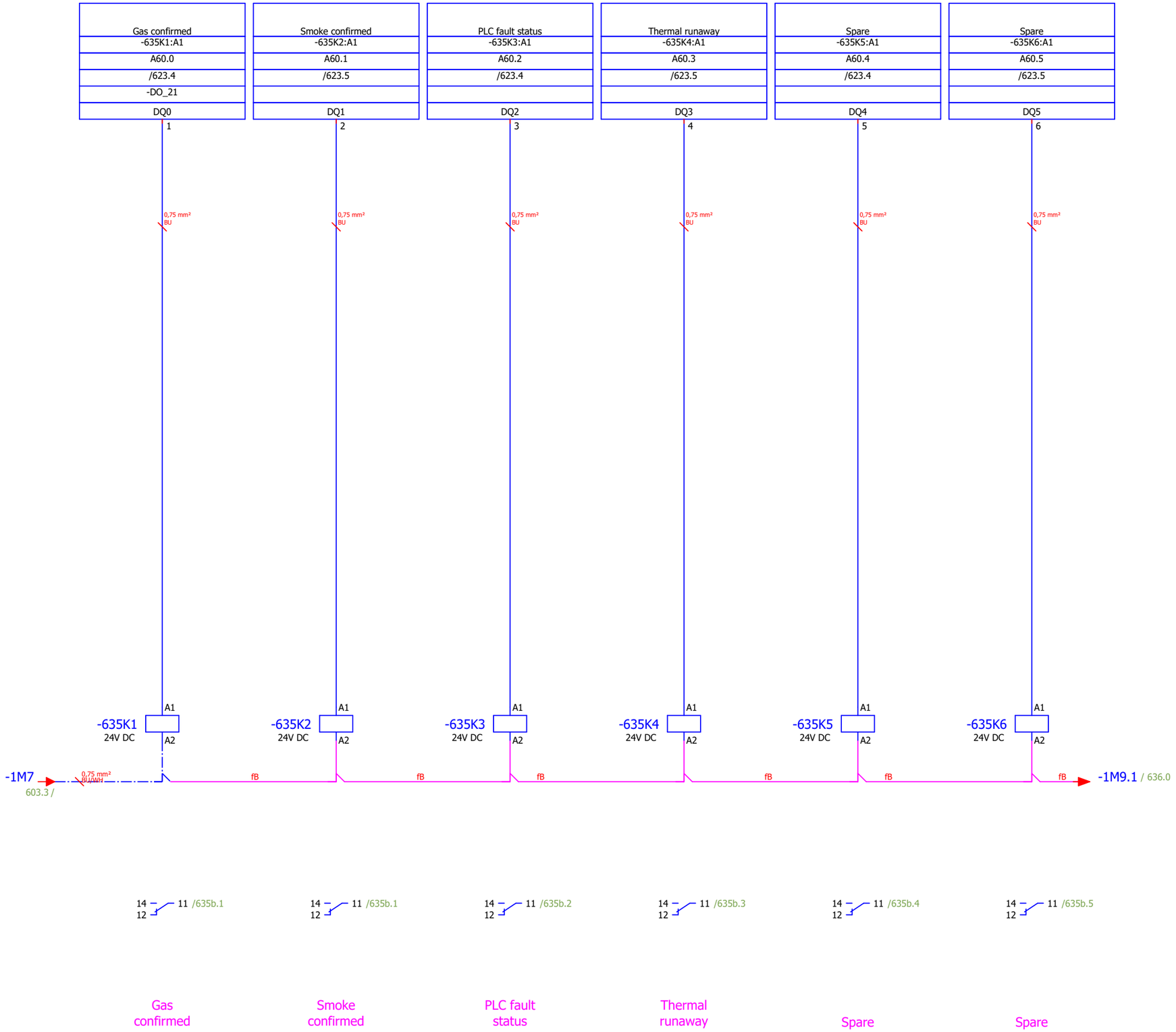
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Editor	Freqcon_JD			Statron	FREQCON	ET200SP ANALOG OUTPUTS AO_21	20241105_V1.2	= UNIT_03	Battery Container 2
Date	14.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet
Date								+	

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0	1	2	3	4	5	6	7	8	9



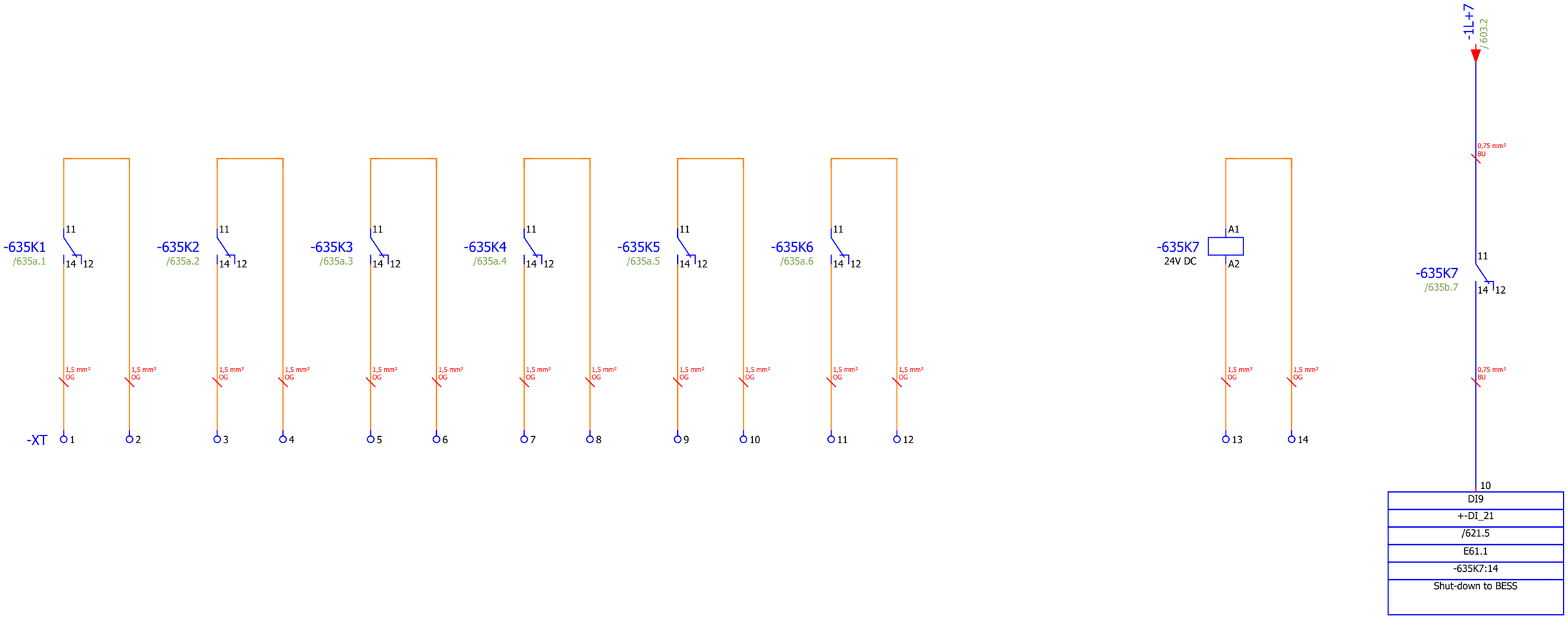
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Editor	Freqcon_JD			Statron	FREQCON	OUTPUTS COMMUNICATION	20241105_V1.2	= UNIT_03	Battery Container 2
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet
Date								+	

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Gas confirmed FGS

Smoke confirmed FGS

PLC fault status SIS

Thermal runaway SIS

Spare

Spare

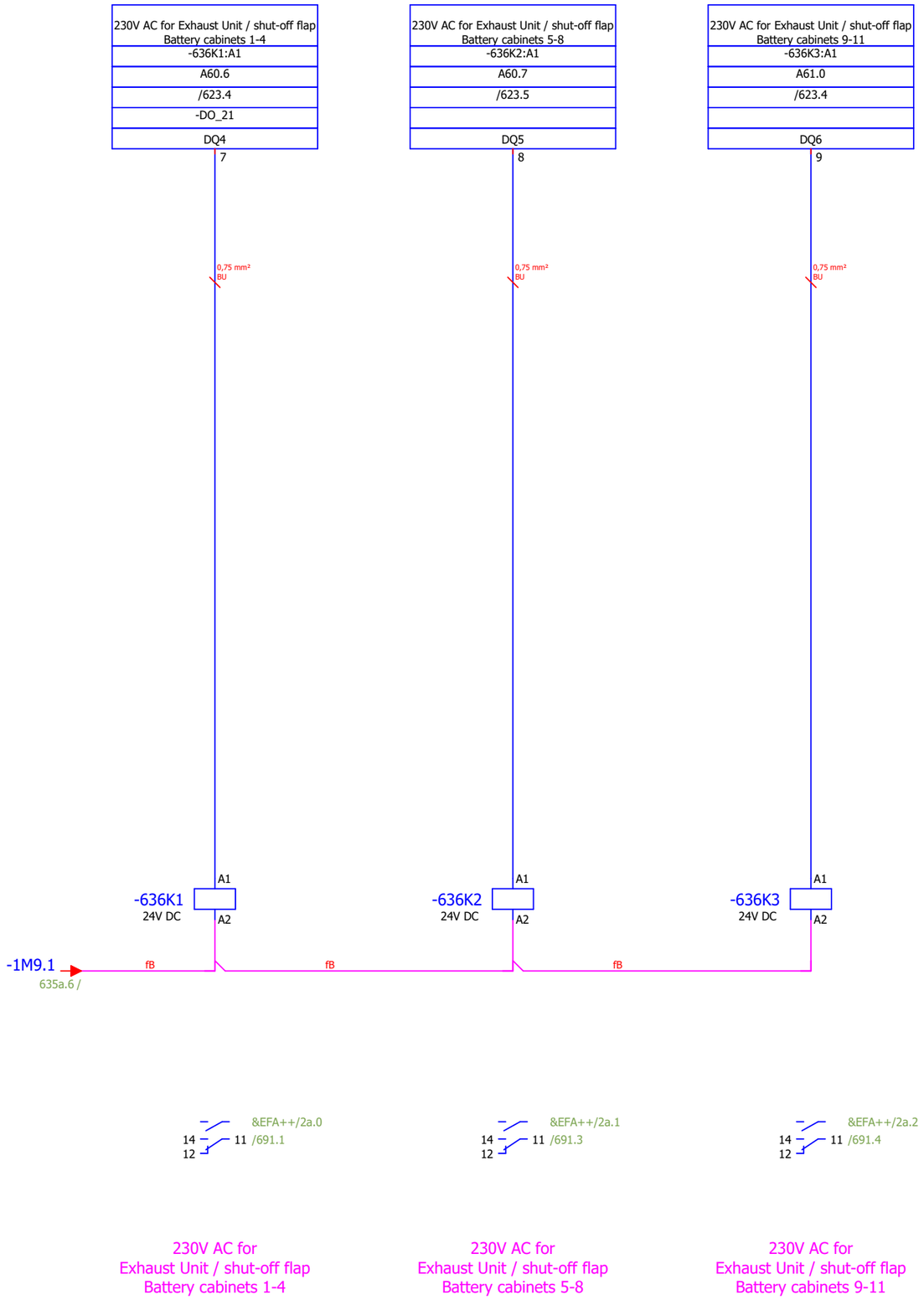
Shut-down to BESS

Shut-down to BESS

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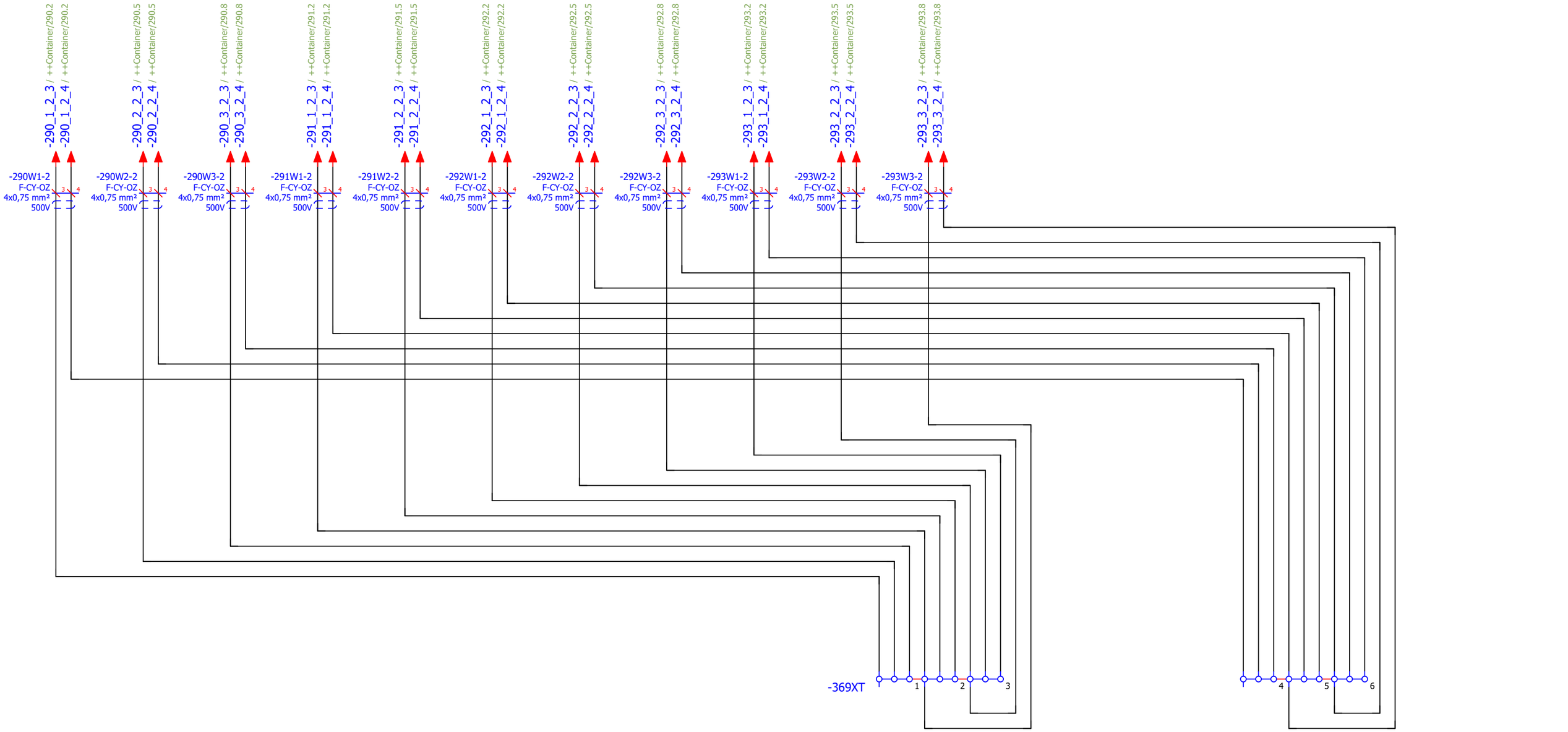
Editor	Freqcon_JD			Statron	FREQCON	OUTPUTS COMMUNICATION	20241105_V1.2	= UNIT_03	Battery Container 2	
Date	18.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet	page: 635b
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Editor	Freqcon_JD			Statron	FREQCON	OUTPUTS FIRE DAMPER	20241105_V1.2	= UNIT_03 Battery Container 2	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 636
Date								+	total: 498



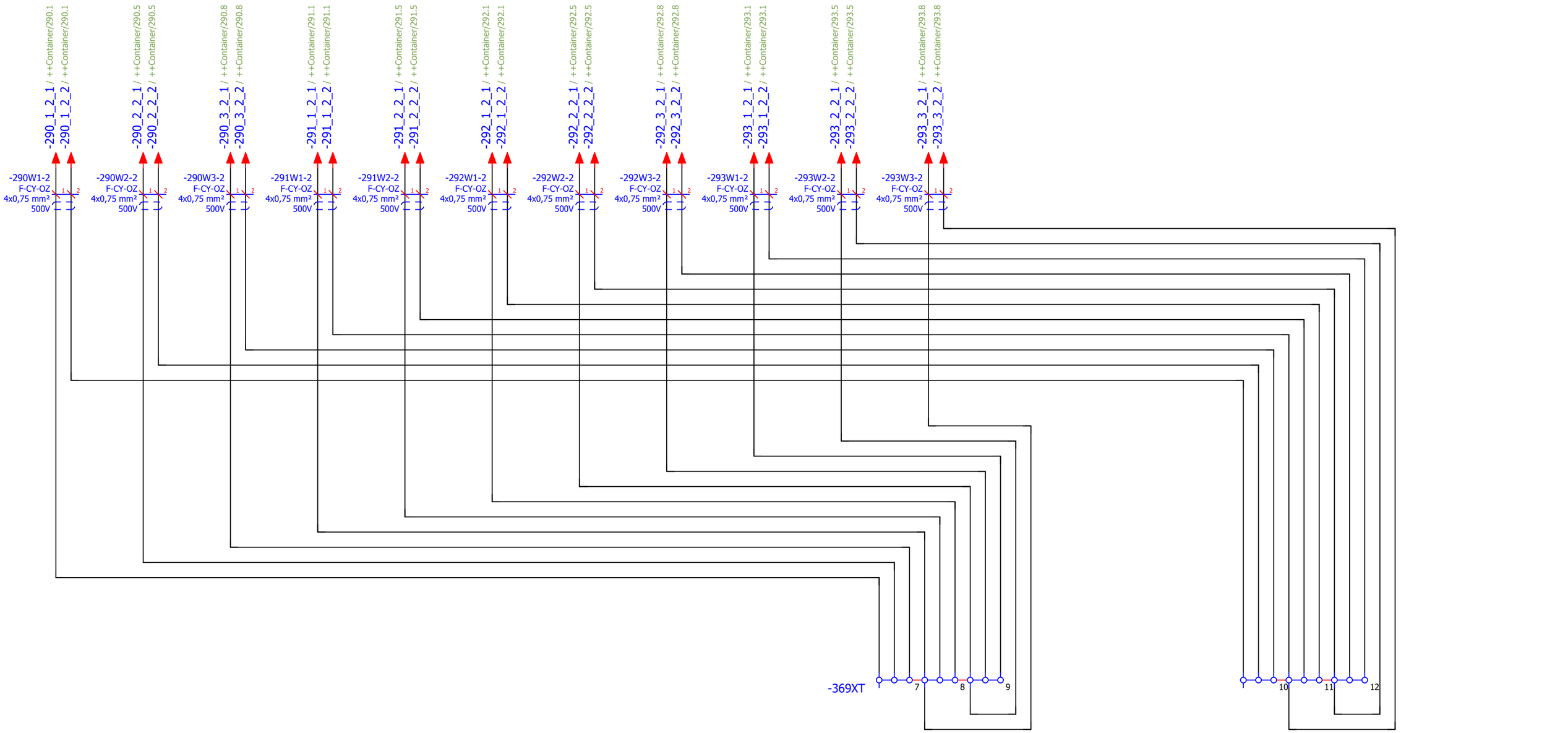
battery cabinet smoke detector
potential-free contacts
customer

battery cabinet smoke detector
potential-free contacts
customer

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Editor	Freqcon_JD			Statron	FREQCON	SMOKE POTENTIAL-FREE CONTACTS	20241105_V1.2	= UNIT_03 Battery Container 2	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 669
Date								+	total: 498



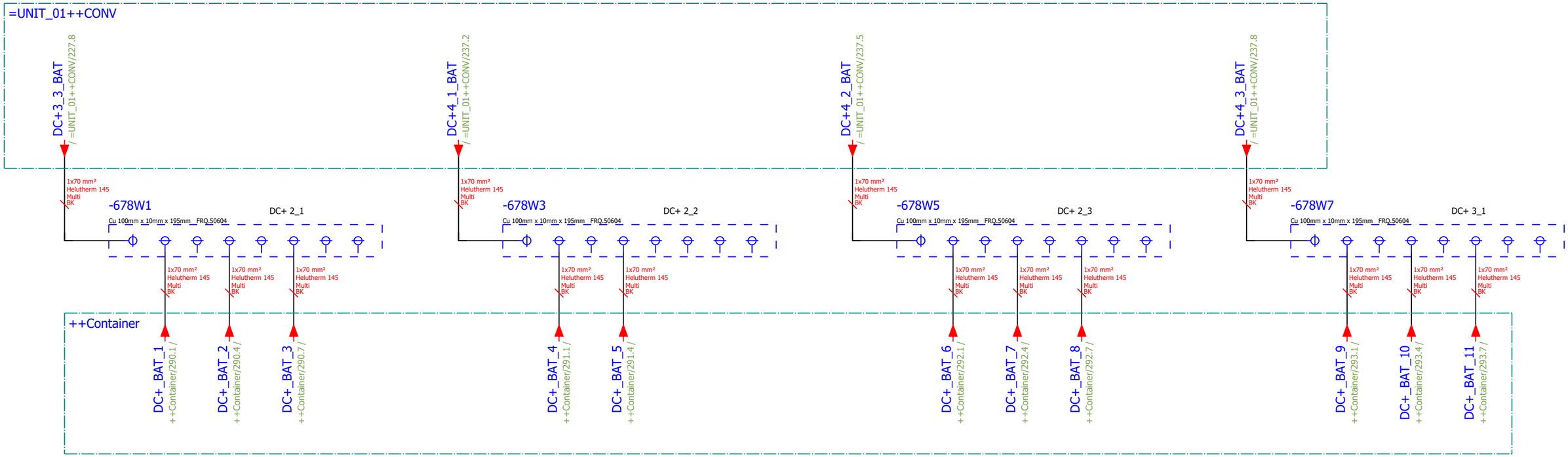
battery cabinet gas
potential-free contacts
customer

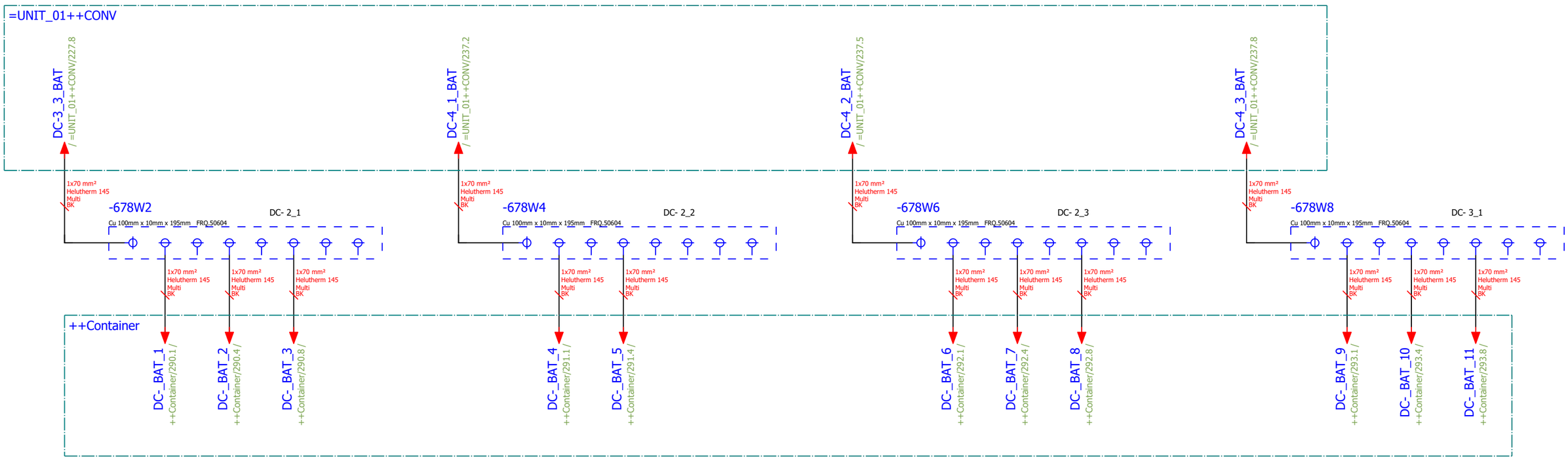
battery cabinet gas
potential-free contacts
customer

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Editor	Freqcon_JD			Statron	FREQCON	GAS POTENTIAL-FREE CONTACTS	20241105_V1.2	= UNIT_03 Battery Container 2	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 670
Date								+	total: 498



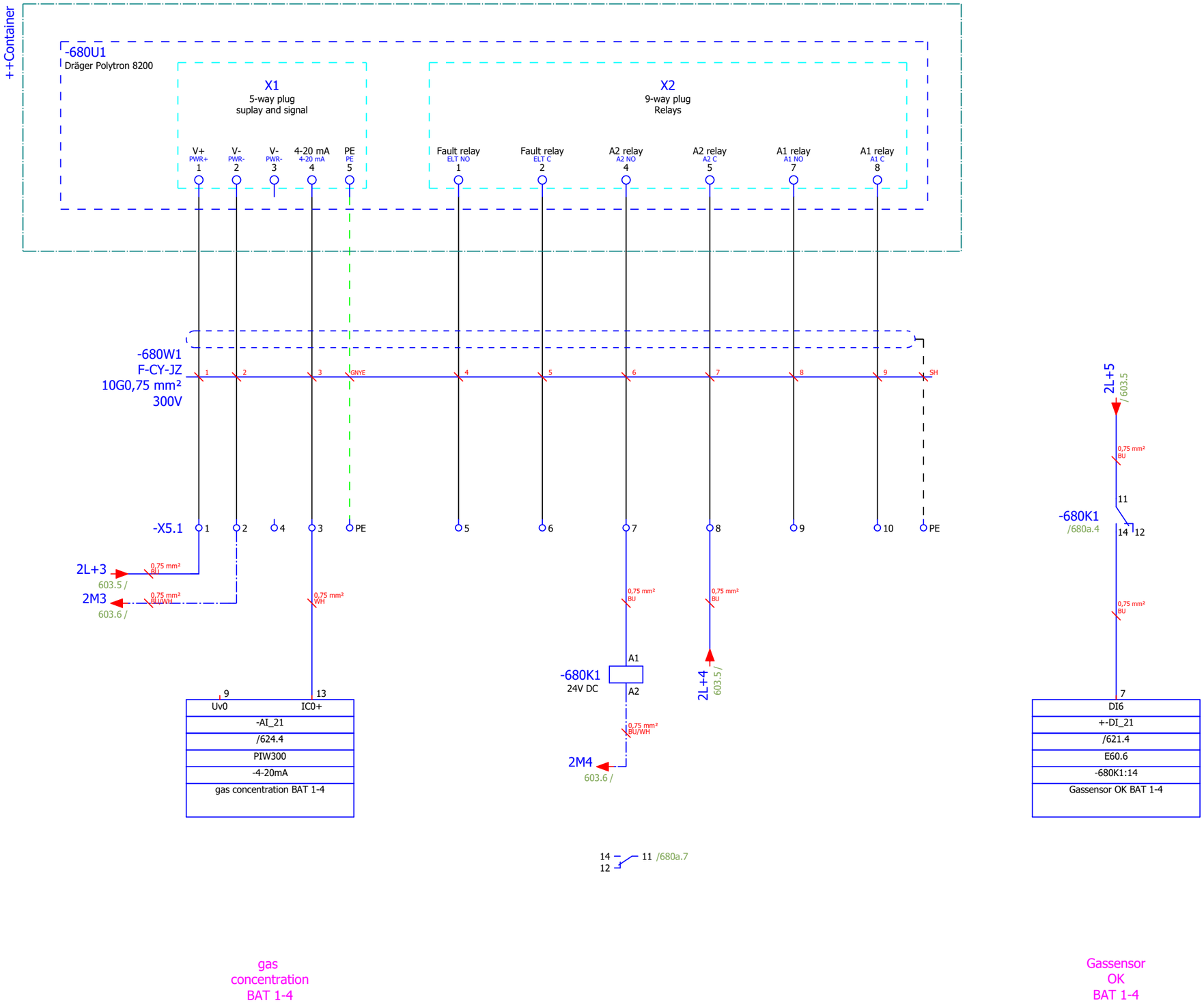


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Editor	Freqcon_JD			Statron	FREQCON	DC BATTERY CABINETS	20241105_V1.2	= UNIT_03	Battery Container 2
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet
Date								+	

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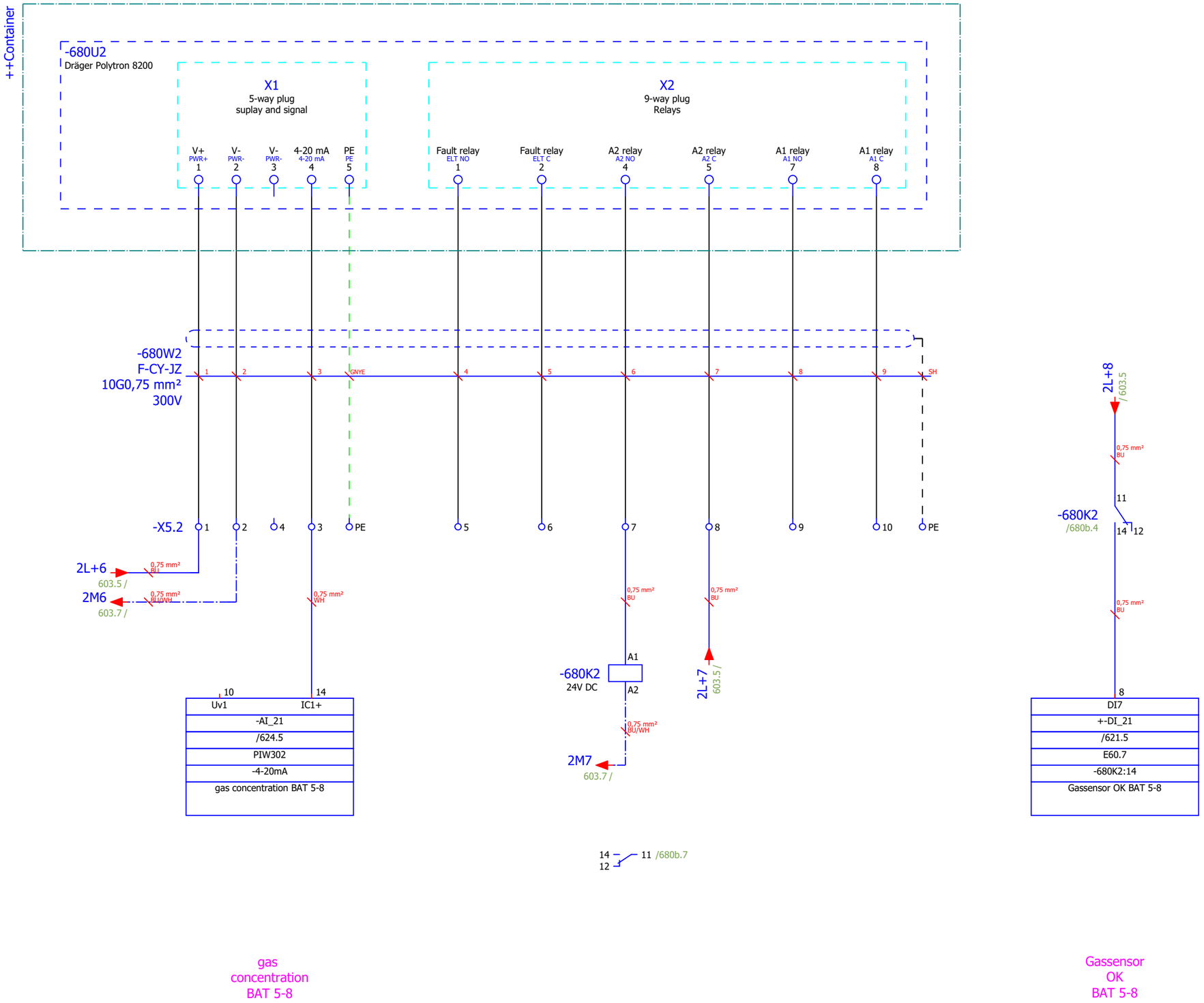
gas concentration BAT 1-4

Gassensor OK BAT 1-4

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Editor	Freqcon_JD			Statron	FREQCON	STATIONARY GAS DETECTOR BAT 1-4	20241105_V1.2	= UNIT_03 Battery Container 2	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 680a
Date								+	total: 498



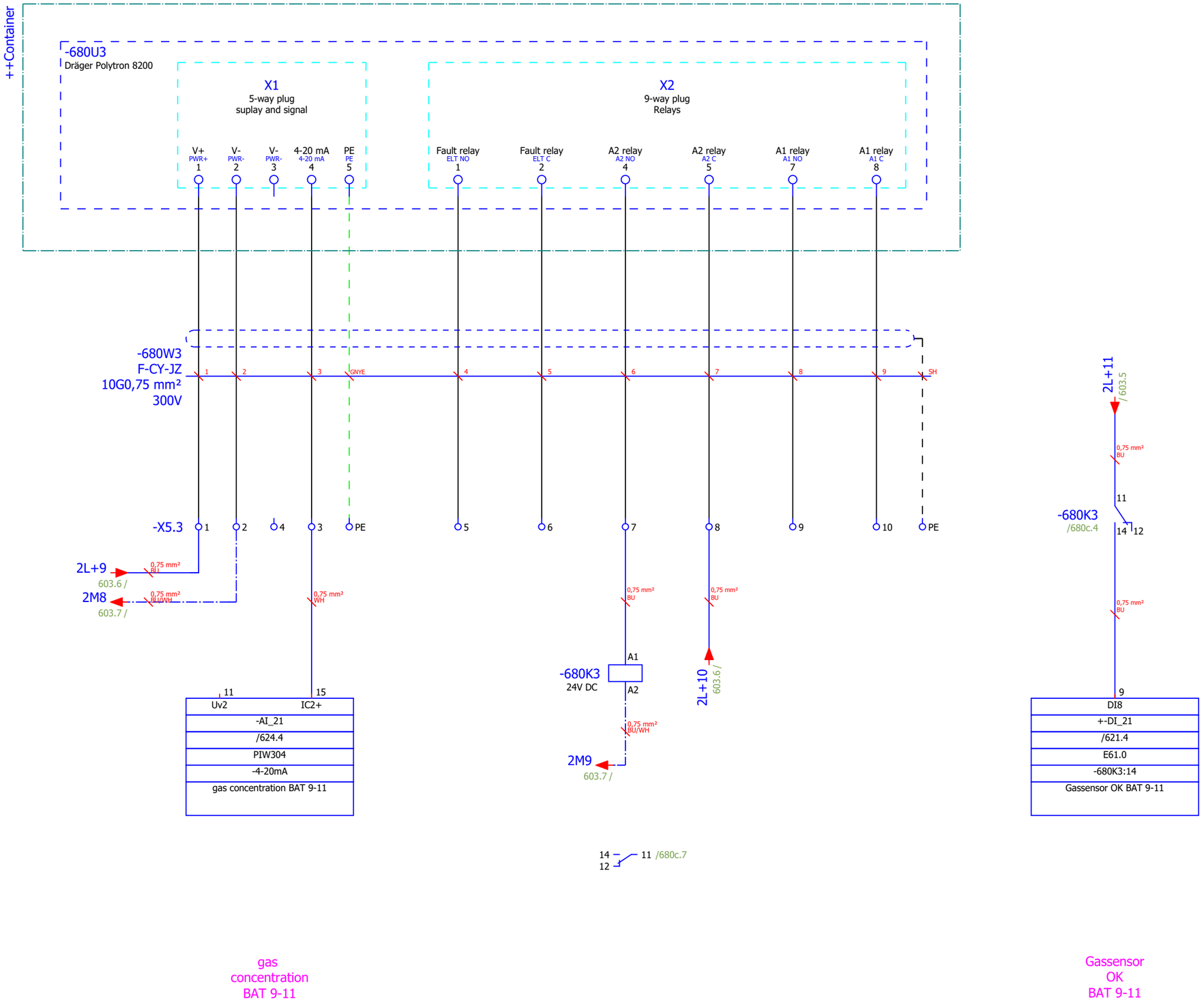
gas concentration BAT 5-8

Gassensor OK BAT 5-8

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Editor	Freqcon_JD			Statron	FREQCON	STATIONARY GAS DETECTOR BAT 5-8	20241105_V1.2	= UNIT_03 Battery Container 2
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet — page: 680b
Date								+ — total: 498



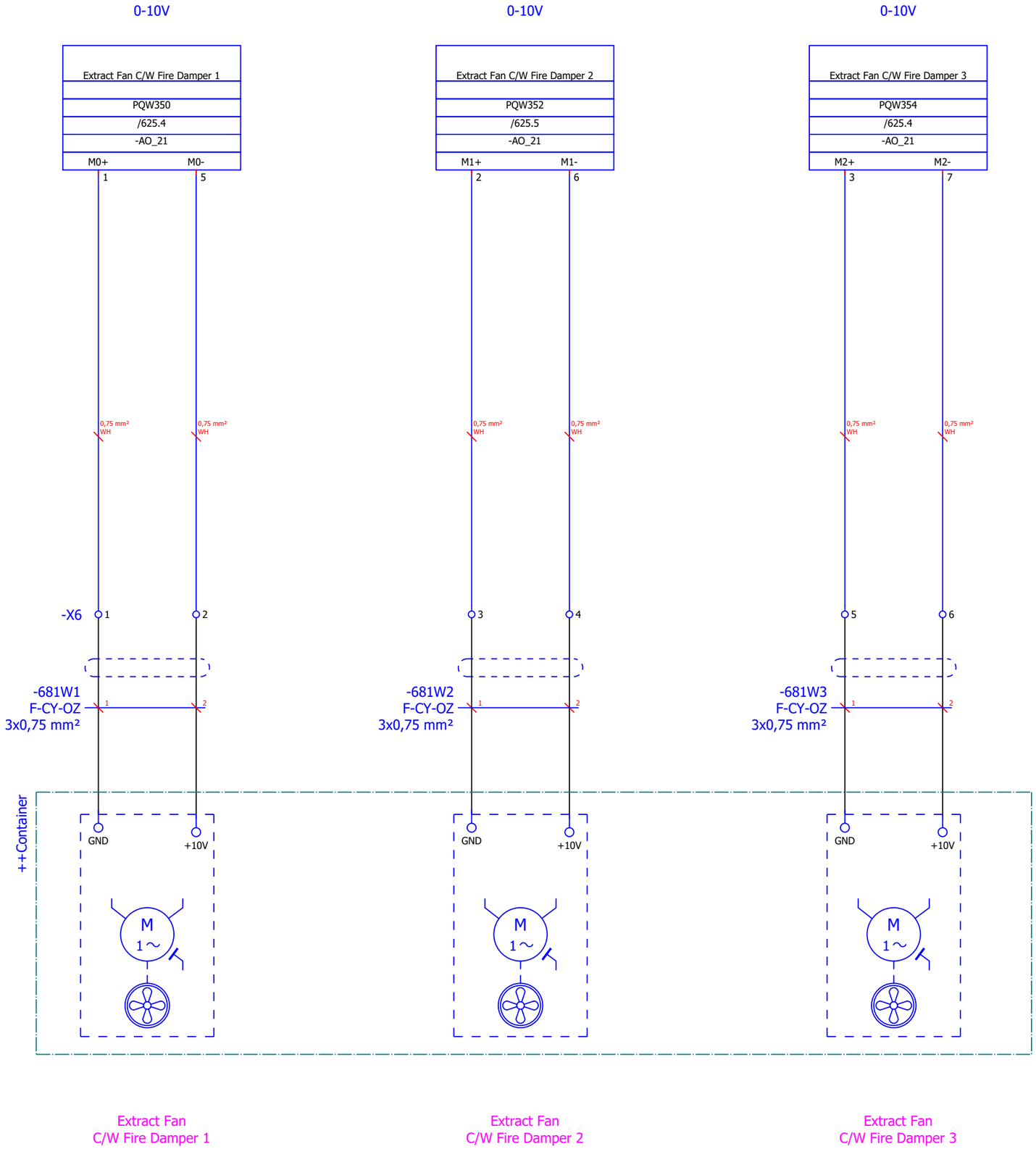
gas concentration BAT 9-11

Gassensor OK BAT 9-11

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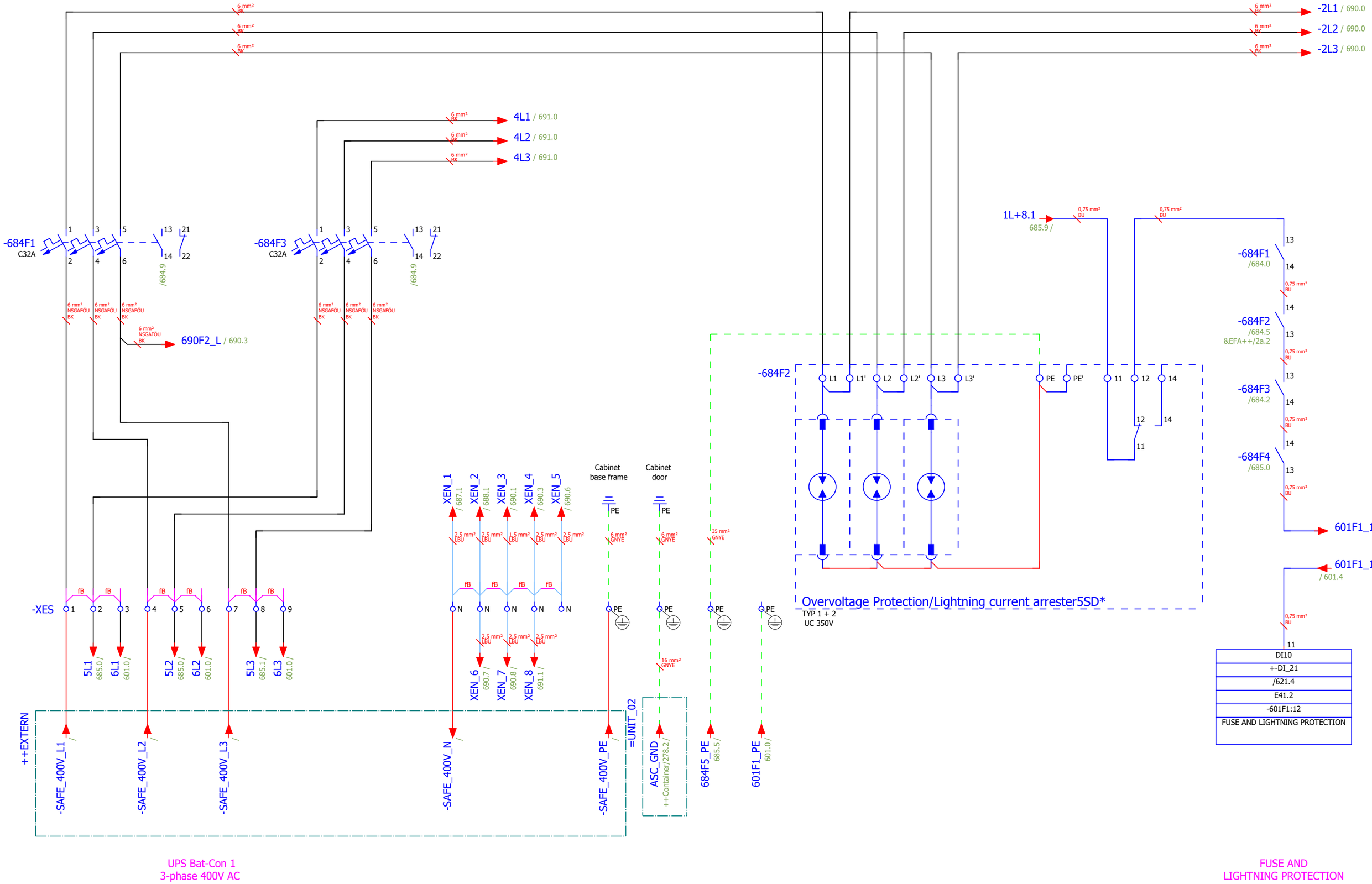
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Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 680c
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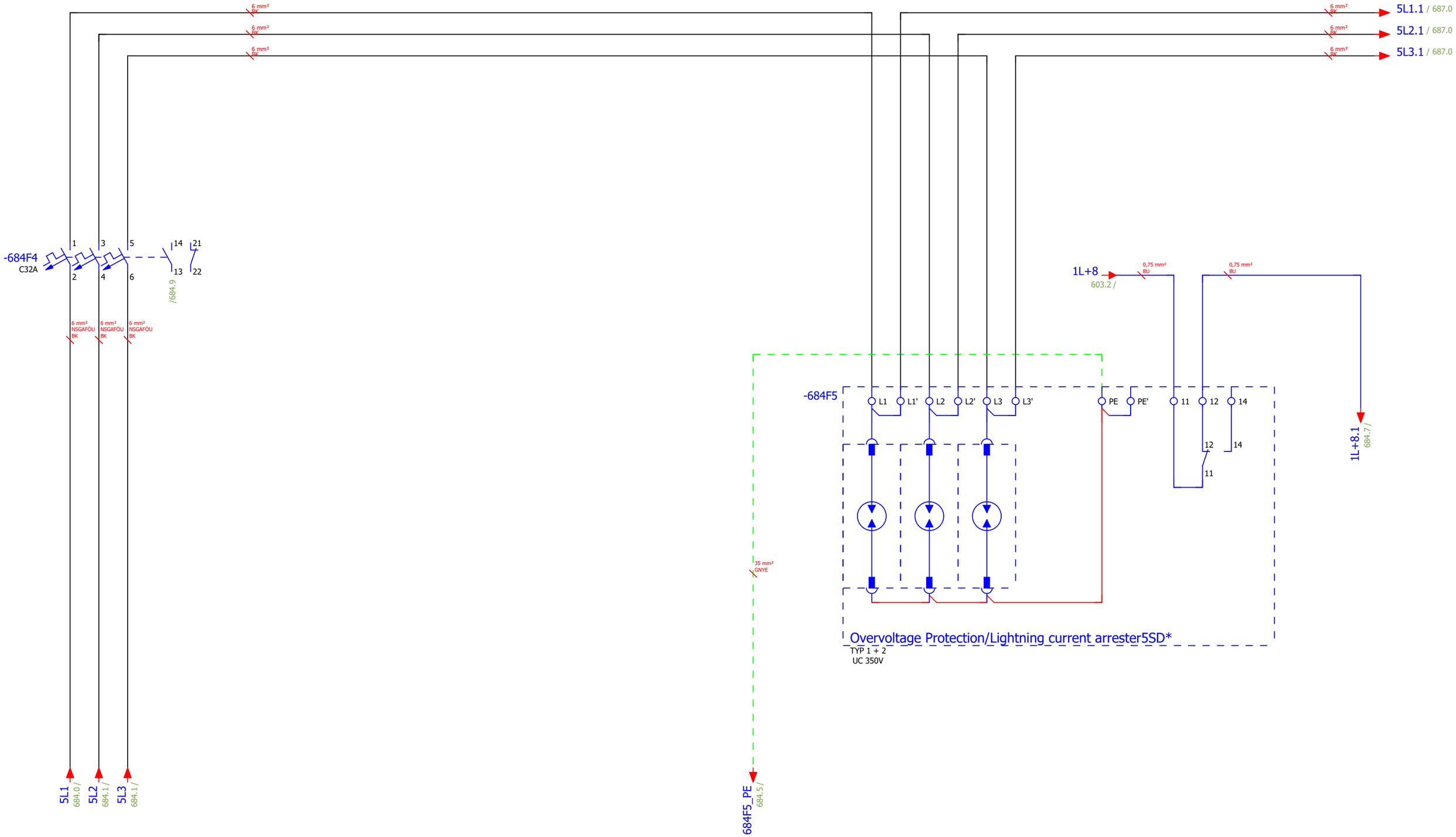
Editor	Freqcon_JD			Statron	FREQCON	EXTRACT FAN FIRE DAMPER	20241105_V1.2	= UNIT_03 Battery Container 2	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 681
Date								+	total: 498



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Editor	Freqcon_DG			Statron	FREQCON	AUXILIARY SUPPLY 400V AC	20241105_V1.2	= UNIT_03 Battery Container 2	
Date	05.11.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 684
Date								+	total: 498

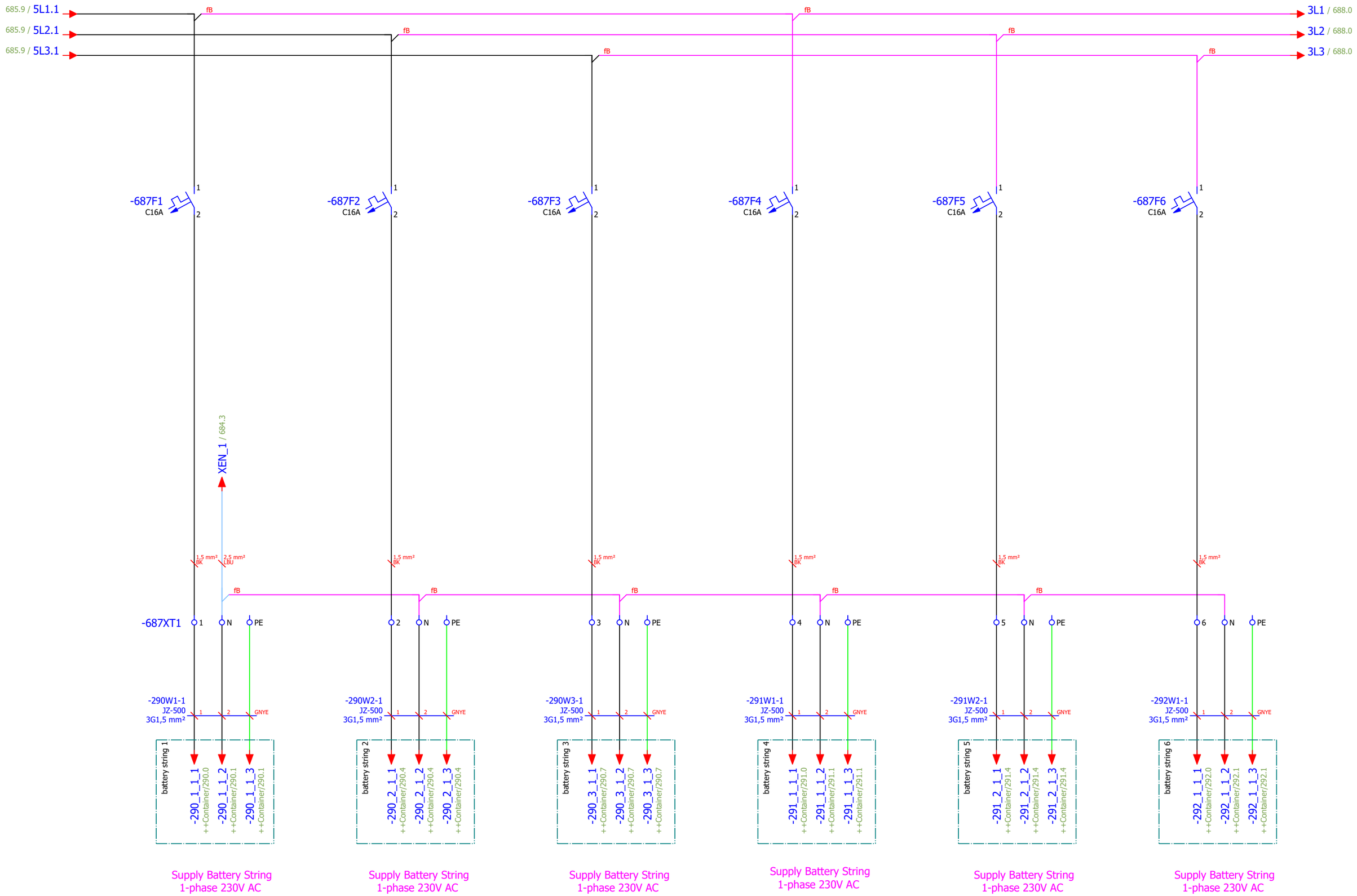


FUSE AND
LIGHTNING PROTECTION

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next page: 687

Editor	Freqcon_DG			Statron	FREQCON	AUXILIARY SUPPLY 400V AC	20241105_V1.2	= UNIT_03 Battery Container 2	
Date	08.10.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 685
Date								+	total: 498



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next page: 688

Editor	Freqcon_DG			Statron	FREQCON	AUXILIARY SUPPLY 400V / 230V AC DISTRIBUTION	20241105_V1.2	= UNIT_03 Battery Container 2	
Date	08.10.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 687
Date								+	total: 498

687.9 / 3L1
687.9 / 3L2
687.9 / 3L3

fB

-688F1 C16A
-688F2 C16A
-688F3 C16A
-688F4 C16A
-688F5 C16A

XEN_2 / 684.3

1,5 mm² BK
2,5 mm² LBU

-687XT1 7 N PE
-687XT1 8 N PE
-687XT1 9 N PE
-687XT1 10 N PE
-687XT1 11 N PE

-292W2-1 JZ-500 3G1,5 mm²
-292W3-1 JZ-500 3G1,5 mm²
-293W1-1 JZ-500 3G1,5 mm²
-293W2-1 JZ-500 3G1,5 mm²
-293W3-1 JZ-500 3G1,5 mm²

1 2 GNYE

battery string 7
-292_2_1_1 ++Container/292.4
-292_2_1_2 ++Container/292.4
-292_2_1_3 ++Container/292.4

battery string 8
-292_3_1_1 ++Container/292.7
-292_3_1_2 ++Container/292.7
-292_3_1_3 ++Container/292.7

battery string 9
-293_1_1_1 ++Container/293.0
-293_1_1_2 ++Container/293.1
-293_1_1_3 ++Container/293.1

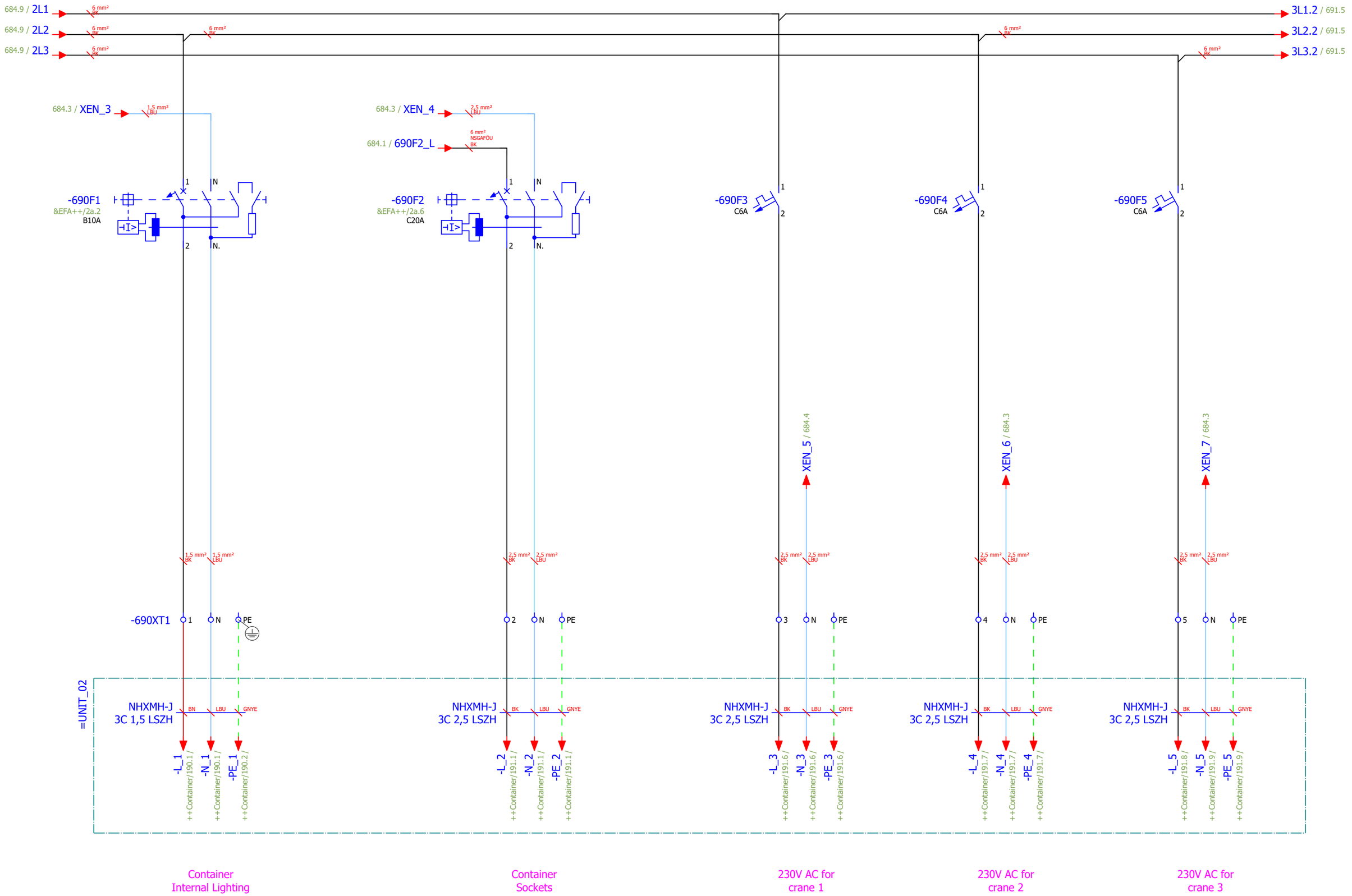
battery string 10
-293_2_1_1 ++Container/293.4
-293_2_1_2 ++Container/293.4
-293_2_1_3 ++Container/293.4

battery string 11
-293_3_1_1 ++Container/293.7
-293_3_1_2 ++Container/293.7
-293_3_1_3 ++Container/293.7

Supply Battery String 1-phase 230V AC

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next page: 690

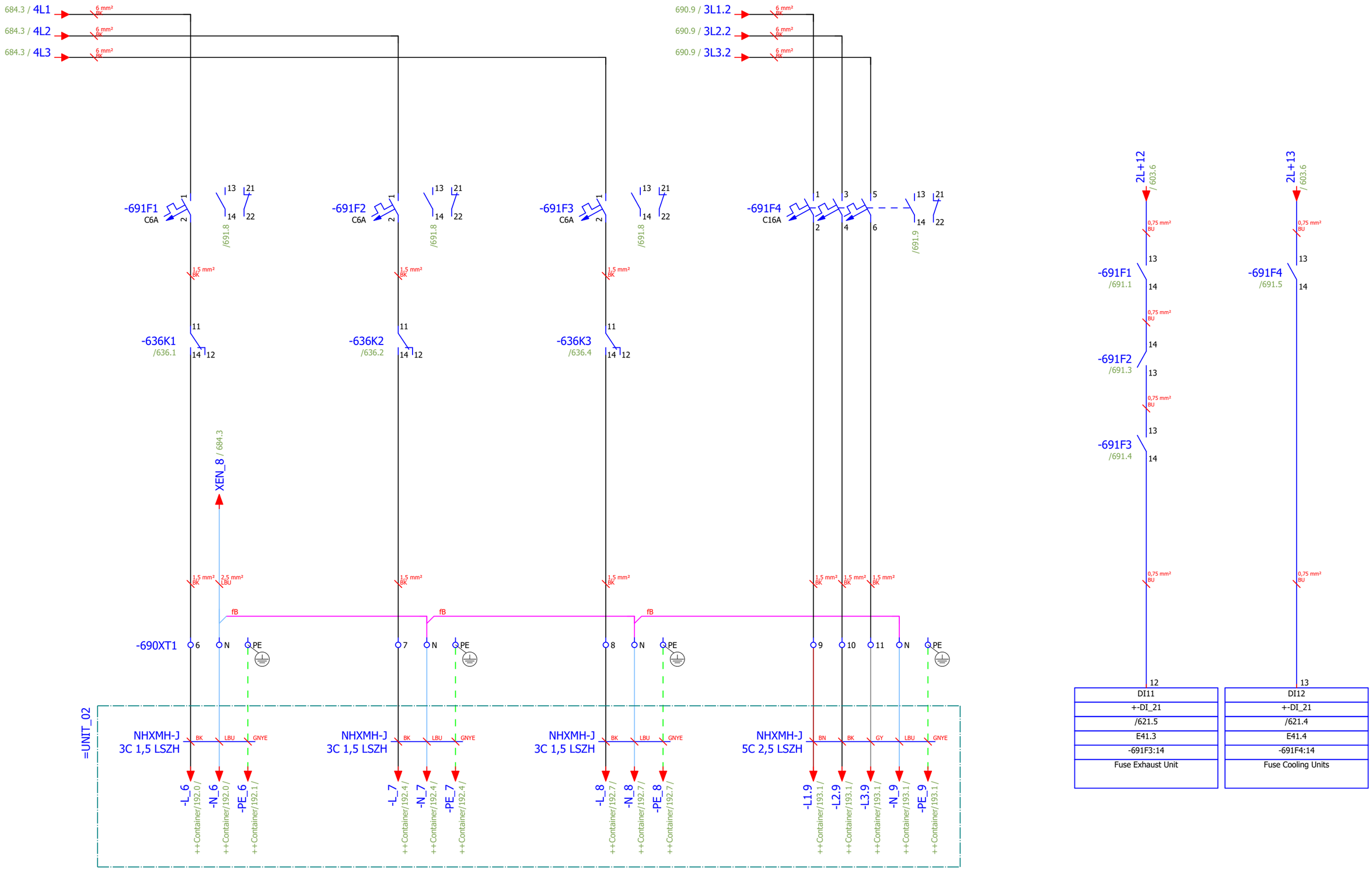
Editor	Freqcon_DG			Statron	FREQCON	AUXILIARY SUPPLY 400V / 230V AC DISTRIBUTION	20241105_V1.2	= UNIT_03 Battery Container 2	
Date	08.10.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 688
Date								+	total: 498



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next page: 691

Editor	Freqcon_DG			Statron	FREQCON	CONTAINER COOLING / LIGHTNING	20241105_V1.2	= UNIT_03 Battery Container 2	
Date	29.10.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 690
Date								+	total: 498



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next page: &EPC++Container/1

Editor	Freqcon_DG			Statron	FREQCON	CONTAINER COOLING / LIGHTNING	20241105_V1.2	= UNIT_03	Battery Container 2	
Date	05.11.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet	page: 691
Date								+		total: 498

Freqcon GmbH

Bürgerwiesenweg 5
D-27336 Rethem
+49 5165 291760-0
info@freqcon.com

Kunde:

Projekt: BESS Batterieschrank Steuerungseinheit 28 Module

Typ: BESS

Schaltplan Nr .: Freqcon 20240604_V0.62

Hersteller (Firma): Freqcon GmbH 53001

Projekt: BESS Batterieschrank Steuerungseinheit 28 Module

Typ: BESS

Projektleiter: Freqcon

erstellt am: 23.06.2021

bearbeitet am: 04.06.2024 bearbeitet von: Freqcon_DG Gesamtseitenzahl: 38

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	1	Verzeichnis	04.06.2024	Freqcon_DG
	2	Verzeichnis	29.05.2024	Freqcon_DG
&EAC		Erläuternde Dokumente		
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	546	ANALOGE EINGÄNGE	01.03.2024	Freqcon_DG
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	1	Artikelstückliste	26.04.2024	Freqcon_DG
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	5	Artikelstückliste	26.04.2024	Freqcon_DG
	6	Artikelstückliste	26.04.2024	Freqcon_DG
	7	Artikelstückliste	26.04.2024	Freqcon_DG
&EPA ++BESS.STR		Artikelsummenstückliste Batterieschrank x		
	1	Artikelsummenstückliste	29.05.2024	Freqcon_DG
	2	Artikelsummenstückliste	29.05.2024	Freqcon_DG

SPEZIFIKATION

KLEMMLEISTE

-XE1	Hauptstromversorgung 600V AC
-XE2	Gleichstromversorgung 1000V DC
-XE	Hauptstromversorgung 400V AC
-X1	Hauptsteuerstromkreis 400V/230V AC
-X2	Beleuchtung Schaltschrank 230V AC
-X3	Steuerspannung 24V DC
-14X1	Steuerspannung 24V DC (zu DC Schützen)
-X5	Kleinspannungssignale
-XDC0	24V DC Gleichstromversorgung
-XDC1-4	Steuerspannung 24V DC (USV)
-XT	Transfer Klemmenblock 24V DC / 230V AC

VERDRAHTUNGSFARBE

L1 / L2 / L3	=	schwarz
N	=	hell blau
PE	=	grün-gelb
Externe Spannung	=	orange
Steuerspannung 24 V DC	=	dunkel blau
Analoge Signale	=	weiß

ORT

+CTRL	=	Steuerschrank
+CON	=	Umrichterschrank
+IND	=	Drosselschrank
+CIR	=	Leistungsschalterschrank
+COSY	=	Kühlsystem
+FAN	=	Externer Lüfter

SPEZIFIKATION von Erdung

von Rahmengestell auf

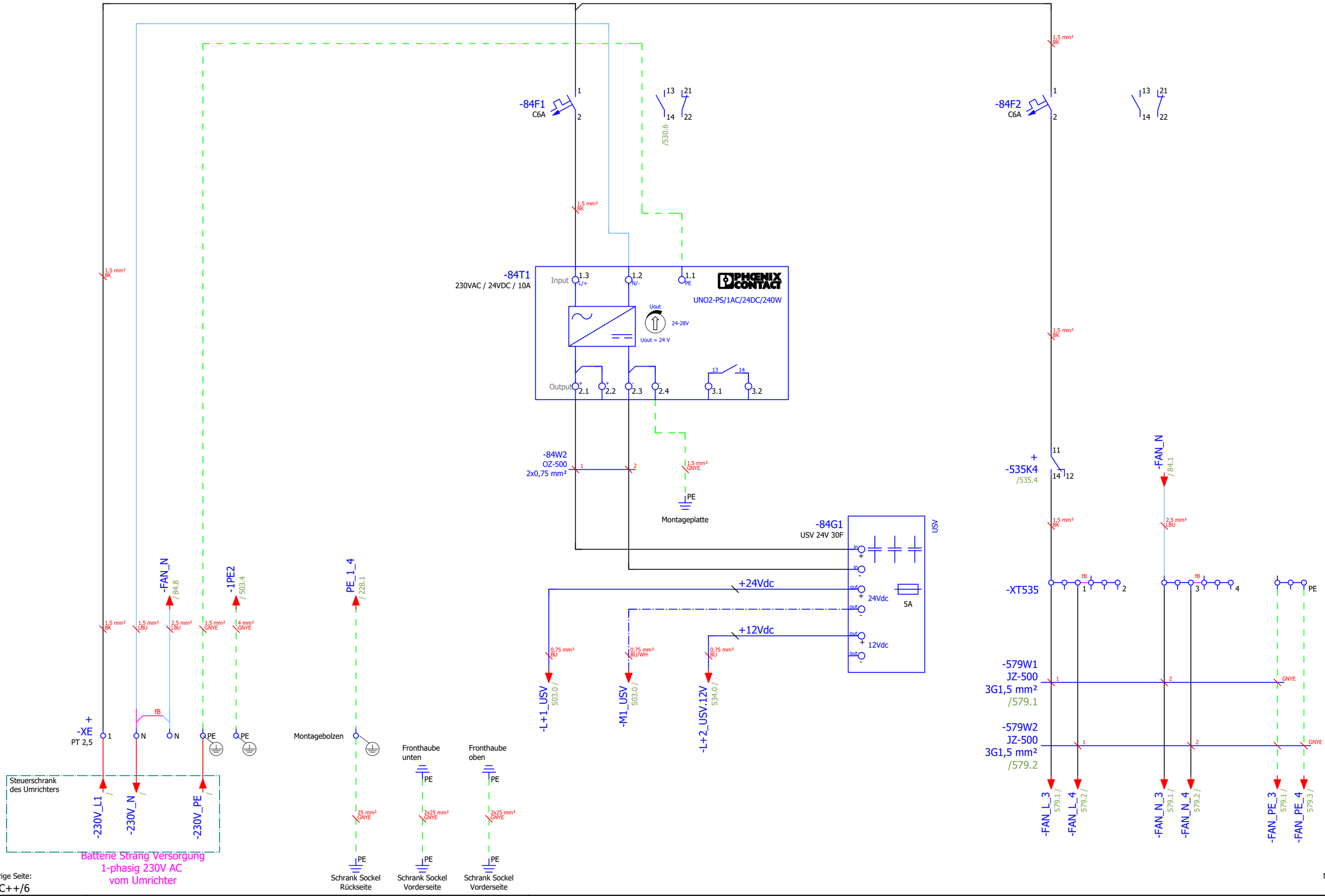
1	Dach & Seitenwände & Türen	EVD_1	Flachband	2x25 mm²
2	Rahmengestell	EVD_2	Flachband	2x25 mm²
3	Sockel	EVD_3	Flachband	2x25 mm²
4	Montageplatte & Trennwände	EVD_4	H07-V-K	2x25 mm²
5	Drosseln	EVD_5	H07-V-k	2x25 mm²
6	Powerstack	EVD_6	H07-V-K	2x25 mm²
7	DC-Schalter & Sicherung	EVD_7	H07-V-K	2x25 mm²
8	AC Filter	EVD_8	H07-V-K	2x25 mm²
9	Leistungschalter	EVD_9	H07-V-K	2x25 mm²
10	FFDC	EVD_10	H07-V-K	2x25 mm²
11	FRM	EVD_11	H07-V-K	2x25 mm²
12	kondensatorbank	EVD_12	H07-V-K	2x25 mm²
13	Waaserverteiler	EVD_13	H07-V-K	2x25 mm²
14	Reserve	EVD_14	H07-V-K	2x25 mm²
15	Reserve	EVD_15	H07-V-K	2x25 mm²
16	Reserve	EVD_16	H07-V-K	2x25 mm²
17	Reserve	EVD_17	H07-V-K	2x25 mm²
18	Reserve	EVD_18	H07-V-K	2x25 mm²

von Tür auf

19	PIII	EVD_19	H07-V-K	1,5 mm²
20	Bildschirm	EVD_20	H07-V-K	1,5 mm²
21	Reserve	EVD_21	H07-V-K	??? mm²
22	Reserve	EVD_22	H07-V-K	??? mm²

vorherige Seite: 3

Nächste Seite: &EFS++BESS.STR/84

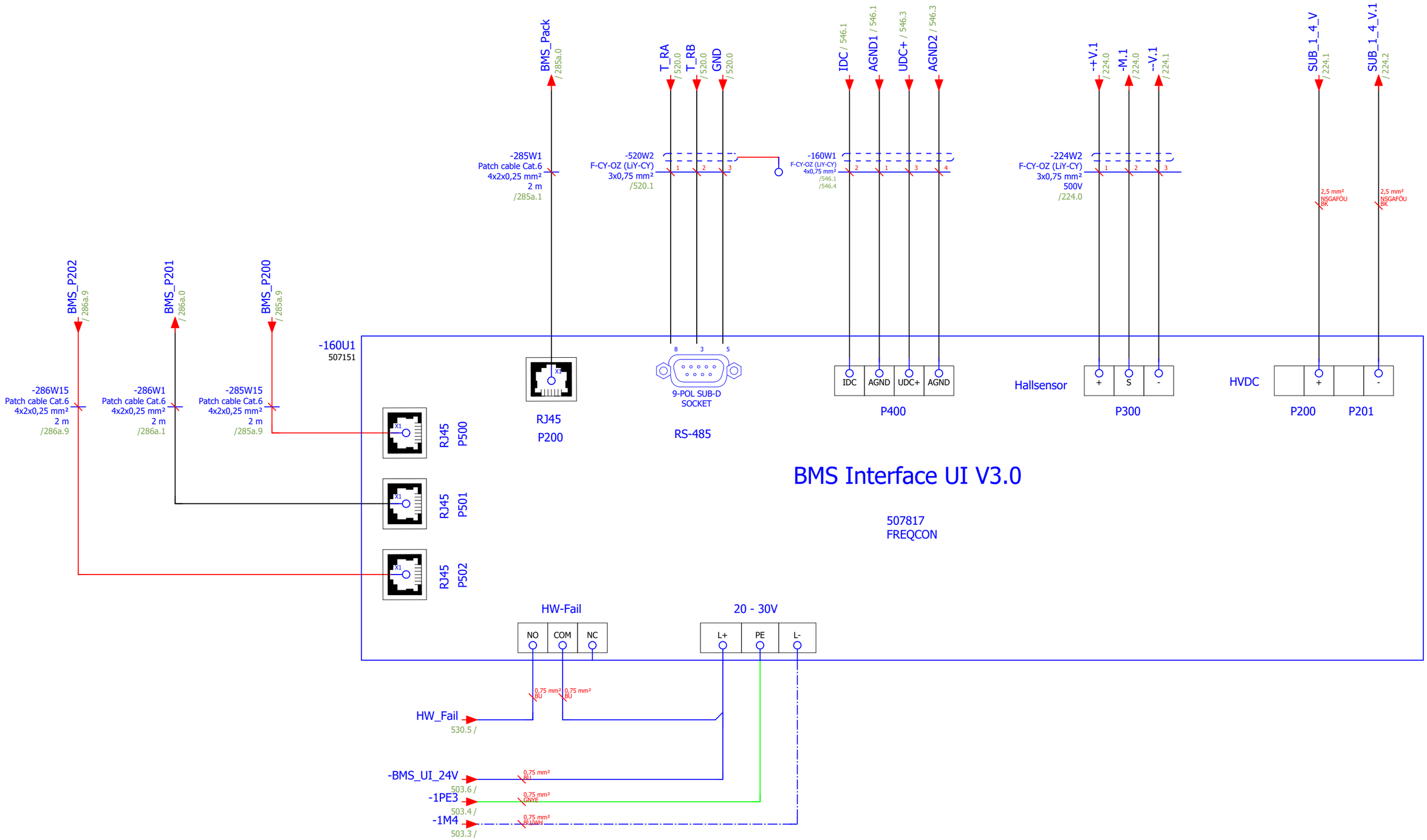


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Nächste Seite:
160

Zeichner	Freqcon_DG			BESS Batterieschrank Steuerungseinheit 28 Module		EINSPEISUNG	20240604_V0.62	=
Datum	04.06.2024							& EFS Schaltplan
Geprüft von	Freqcon_DG						Freqcon	++ BESS.STR Batterieschrank x
Datum	01.12.2021							+

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gesamt: 38



vorherige Seite:
84

Nächste Seite:
224

Zeichner	Freqcon_DG			BESS Batterieschrank Steuerungseinheit 28 Module	FREQCON	BMS SCHNITTSTELLE	20240604_V0.62	=
Datum	21.03.2024							& EFS Schaltplan
Geprüft von	Freqcon_DG						Freqcon	++ BESS.STR Batterieschrank x
Datum	01.12.2021							+

Seite: 160
gesamt: 38

zum Batterie Strang

-++V.1 /160.7
-M.1 /160.7
--V.1 /160.7
SUB_1_4_V /160.8
SUB_1_4_DC+ /285.0
SUB_1_4_DC- /286.9
SUB_1_4_V.1 /160.9

-224W2
F-CY-OZ (LiY-CY)
3x0,75 mm²
500V
/160.7
1 2 3 SH
-SH

2,5 mm² NSGAFÖU BK
1x70 mm² Heltherm 145 Multi BK
2,5 mm² NSGAFÖU BK

-224Q1
1 3 5
2 4 6

V+
M
V
-224V1
450A
0,09A

1x70 mm² Heltherm 145 Multi BK
1x70 mm² Heltherm 145 Multi BK

-224K1
/224.4
1500V
500A
1 2

-224K7
/224.5
1500V
500A
1 2

1x70 mm² NSGAFÖU BK
1x70 mm² NSGAFÖU BK

DC+1_4.1 / 228.1
DC-1_4.1 / 228.1

-224F1
/224.8
1250V
400A
1KN/110
HLS

-224F2
/224.8
1250V
400A
1KN/110
HLS

DC + 1x70 mm² Heltherm 145 Multi BK
DC - 1x70 mm² Heltherm 145 Multi BK

Umrichter ++CONV
SUB 1_4 +
SUB 1_4 -

-SUB_1_4_K_.+ /550.2
-SUB_1_4_K_.- /550.4

0,75 mm² BU
DC+
DC-

-224K1
24V DC
C310A /
500A
A1 A2

-224K7
24V DC
C310A /
500A
A1 A2

0,75 mm² BU/WH

1 2 /224.1
14 11 /224.7
12

1 2 /224.2
14 11 /224.7
12

SUB_1_4_+ /530.2
SUB_1_4_- /530.3
SUB_1_4_F1_F2 /530.4
-SUB_1_4_L+ /530.4
-SUB_1_4_K_.M /550.2

0,75 mm² BU
0,75 mm² BU/WH

-224K1
/224.4
S880
12 14
11

-224K7
/224.5
S880
12 14
11

-224F1
/224.1
2 4
1

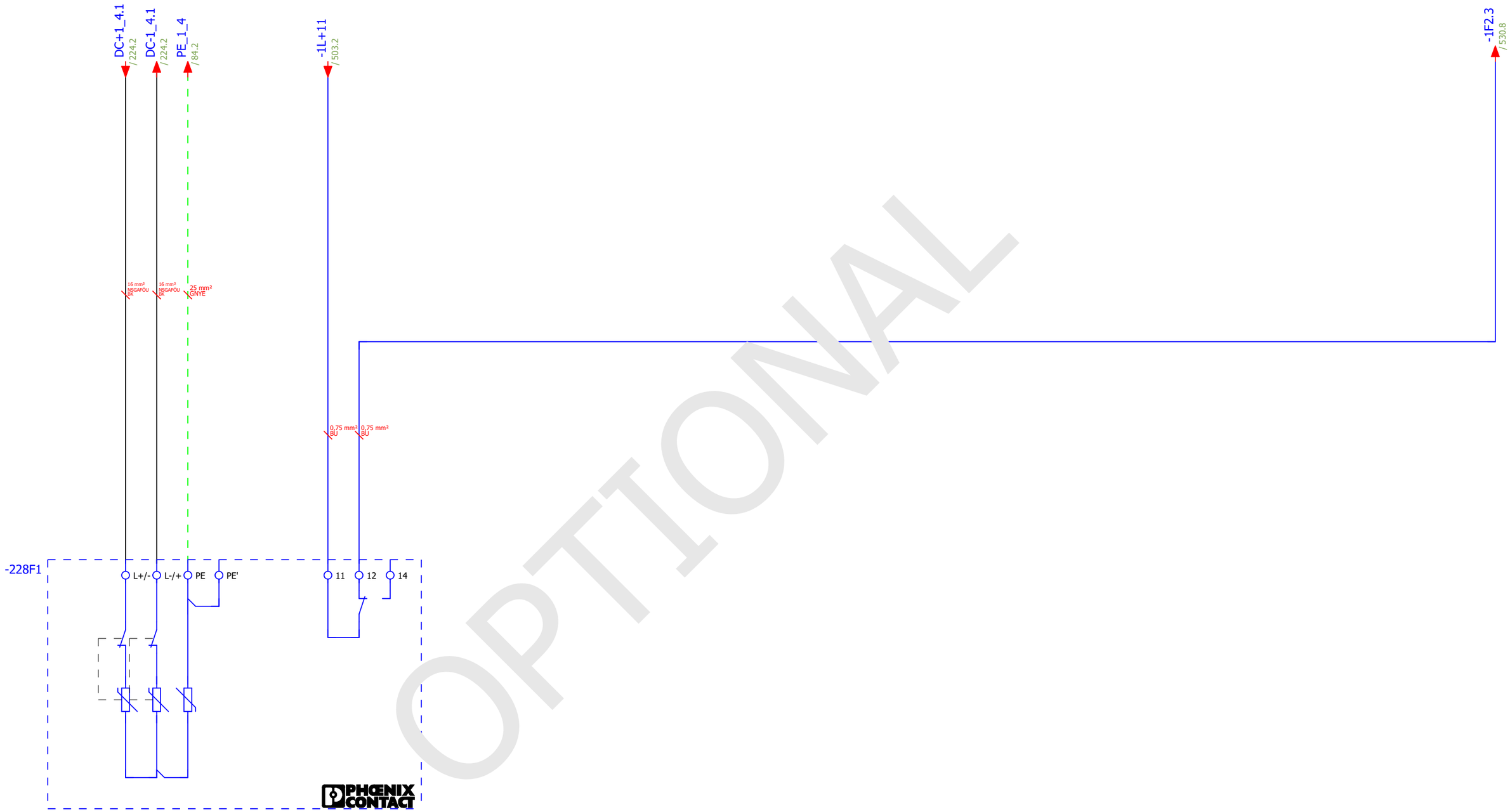
-224F2
/224.2
2 4
1

vorherige Seite:
160

Nächste Seite:
228

Zeichner	Freqcon_DG			BESS Batterieschrank Steuerungseinheit 28 Module		FREQCON	DC SICHERUNGEN UND SCHÜTZE BATTERIE STRANG	20240604_V0.62	=
Datum	01.03.2024								& EFS Schaltplan
Geprüft von	Freqcon_DG							Freqcon	++ BESS.STR Batterieschrank x
Datum	01.12.2021								+

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gesamt: 38



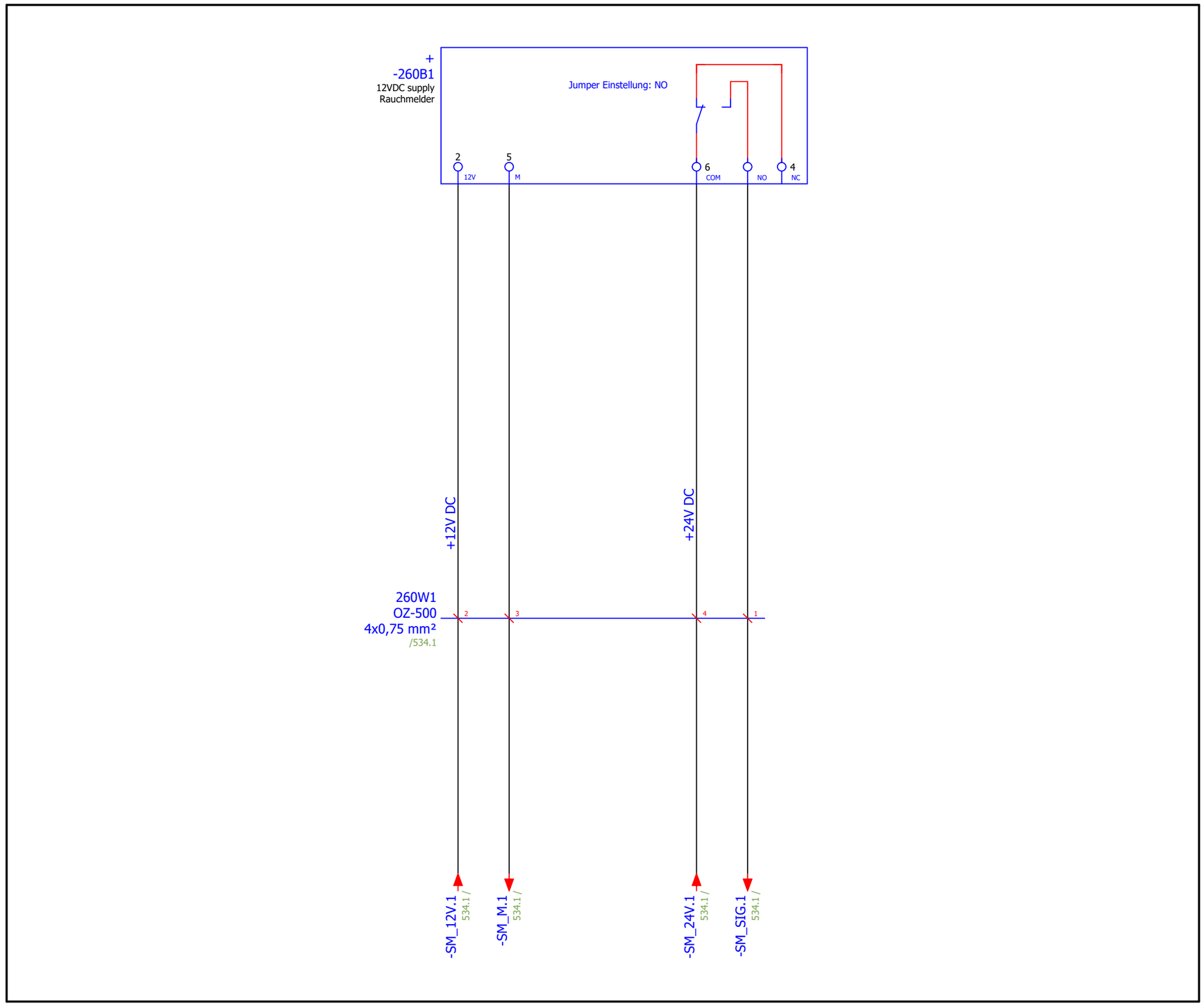
DC ÜBERSPANNUNGSCHUTZ
BATTERIE STRANG

OPTIONAL

Zeichner	Freqcon_DG			BESS Batterieschrank Steuerungseinheit 28 Module		FREQCON	DC ÜBERSPANNUNGSCHUTZ	20240604_V0.62	=
Datum	20.11.2023								& EFS Schaltplan
Geprüft von	Freqcon_DG							Freqcon	++ BESS.STR Batterieschrank x
Datum	01.12.2021								+

Seite: 228
gesamt: 38

Jumper Einstellung ändern auf: NO
31.03.2021 hk

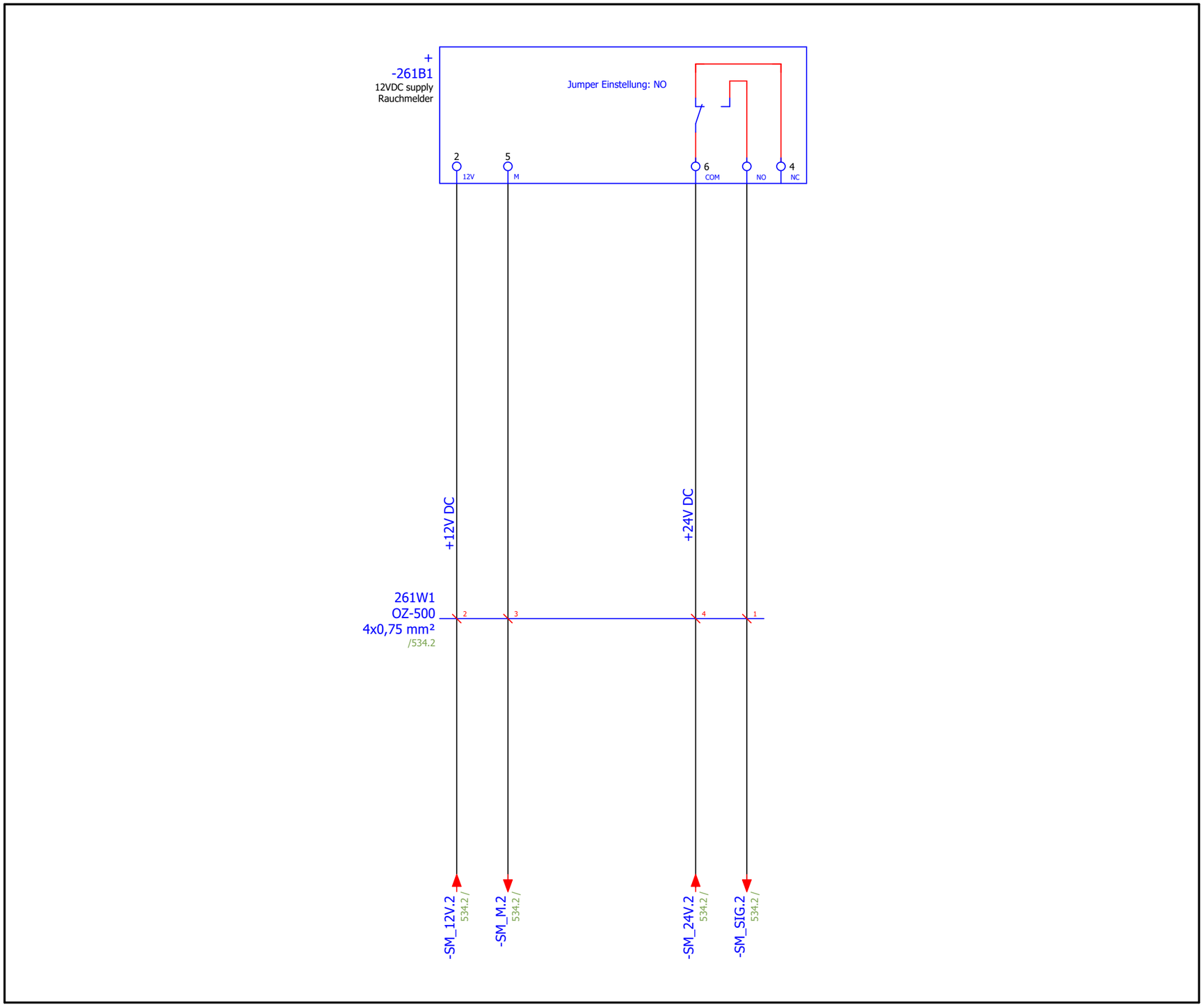


RAUCHMELDER 1

vorherige Seite: 228
Nächste Seite: 261

Zeichner	Freqcon_DG			BESS Batterieschrank Steuerungseinheit 28 Modules	FREQCON	RAUCHMELDER 1	20240604_V0.62	=	
Datum	29.03.2022							& EFS Schaltplan	
Geprüft von	Freqcon_DG						Freqcon	++ BESS.STR Batterieschrank x	Seite: 260
Datum	01.12.2021							+	gesamt: 38

Jumper Einstellung ändern auf: NO
31.03.2021 hk



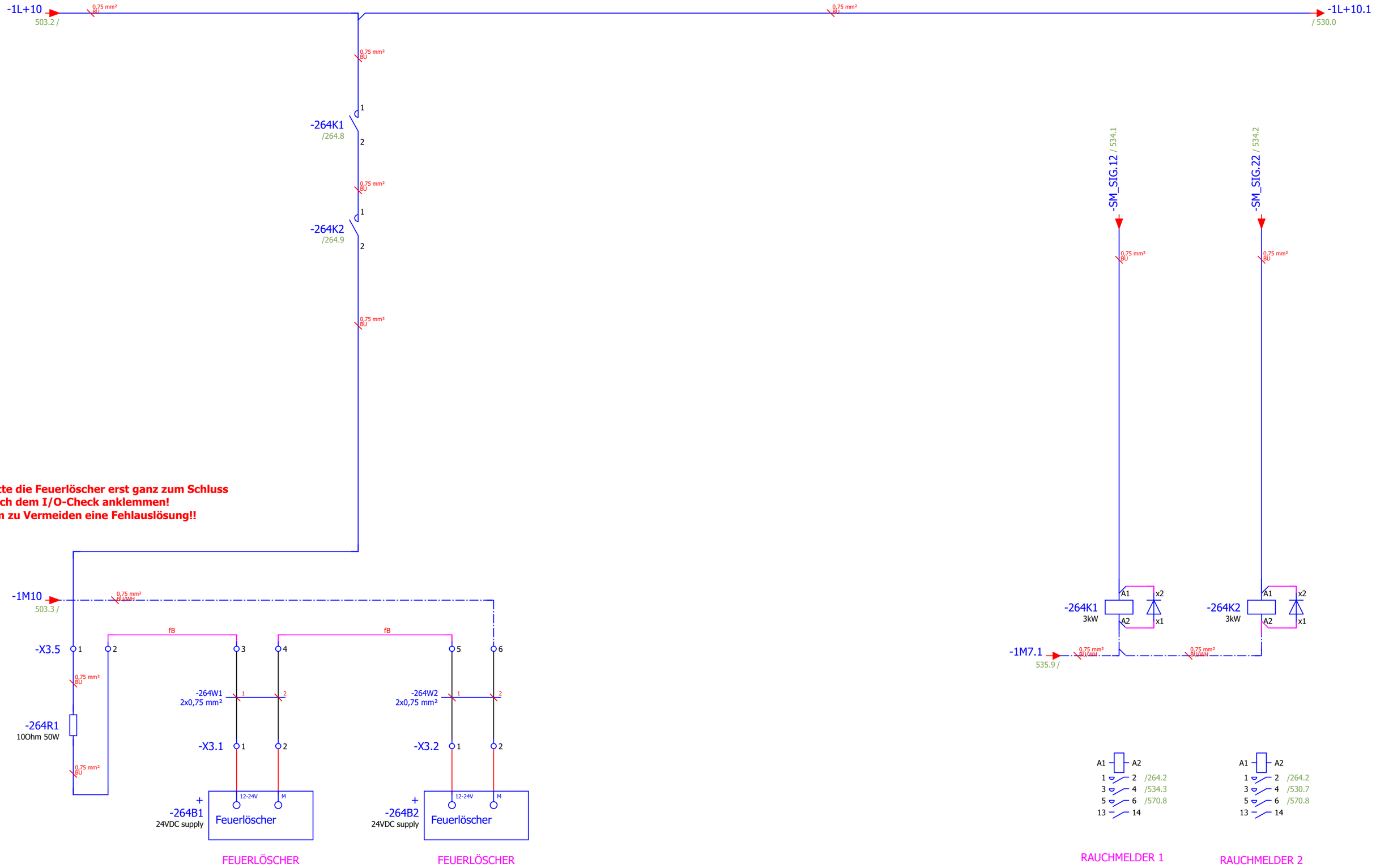
RAUCHMELDER 2

vorherige Seite:
260

Nächste Seite:
264

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Datum	29.03.2022								& EFS Schaltplan
Geprüft von	Freqcon_DG							Freqcon	++ BESS.STR Batterieschrank x
Datum	01.12.2021								+

Seite: 261
gesamt: 38

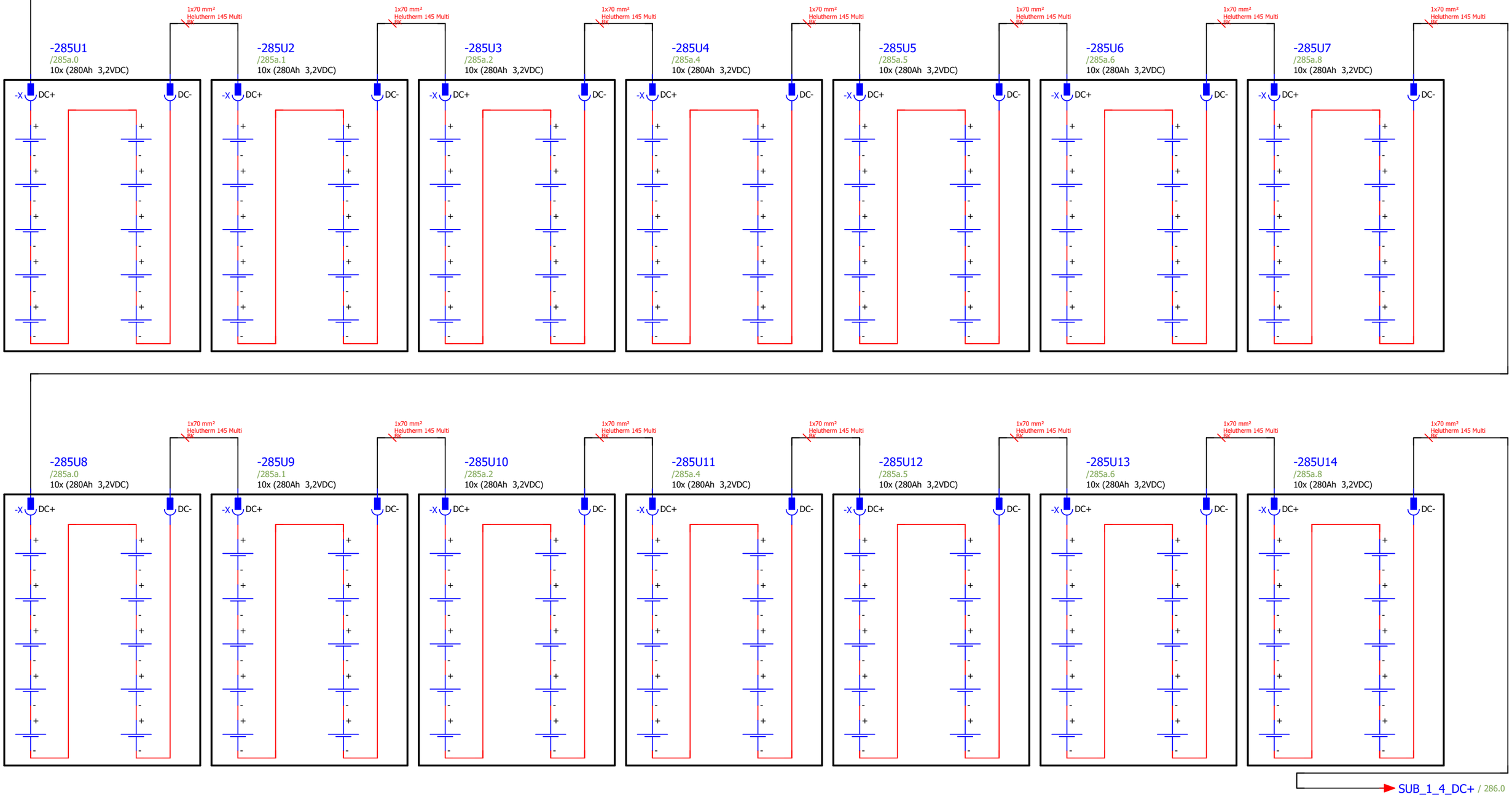


vorherige Seite: 261

Nächste Seite: 285

Zeichner	Freqcon_DG			BESS Batterieschrank Steuerungseinheit 28 Module	FREQCON	FEUERLÖSCHSYSTEM	20240604_V0.62	=	
Datum	19.03.2024							& EFS Schaltplan	
Geprüft von	Freqcon_DG						Freqcon	++ BESS.STR Batterieschrank x	Seite: 264
Datum	01.12.2021							+	gesamt: 38

SUB_1_4_DC+ 1x70 mm² Helutherm 145 Multi BK
224.1 /

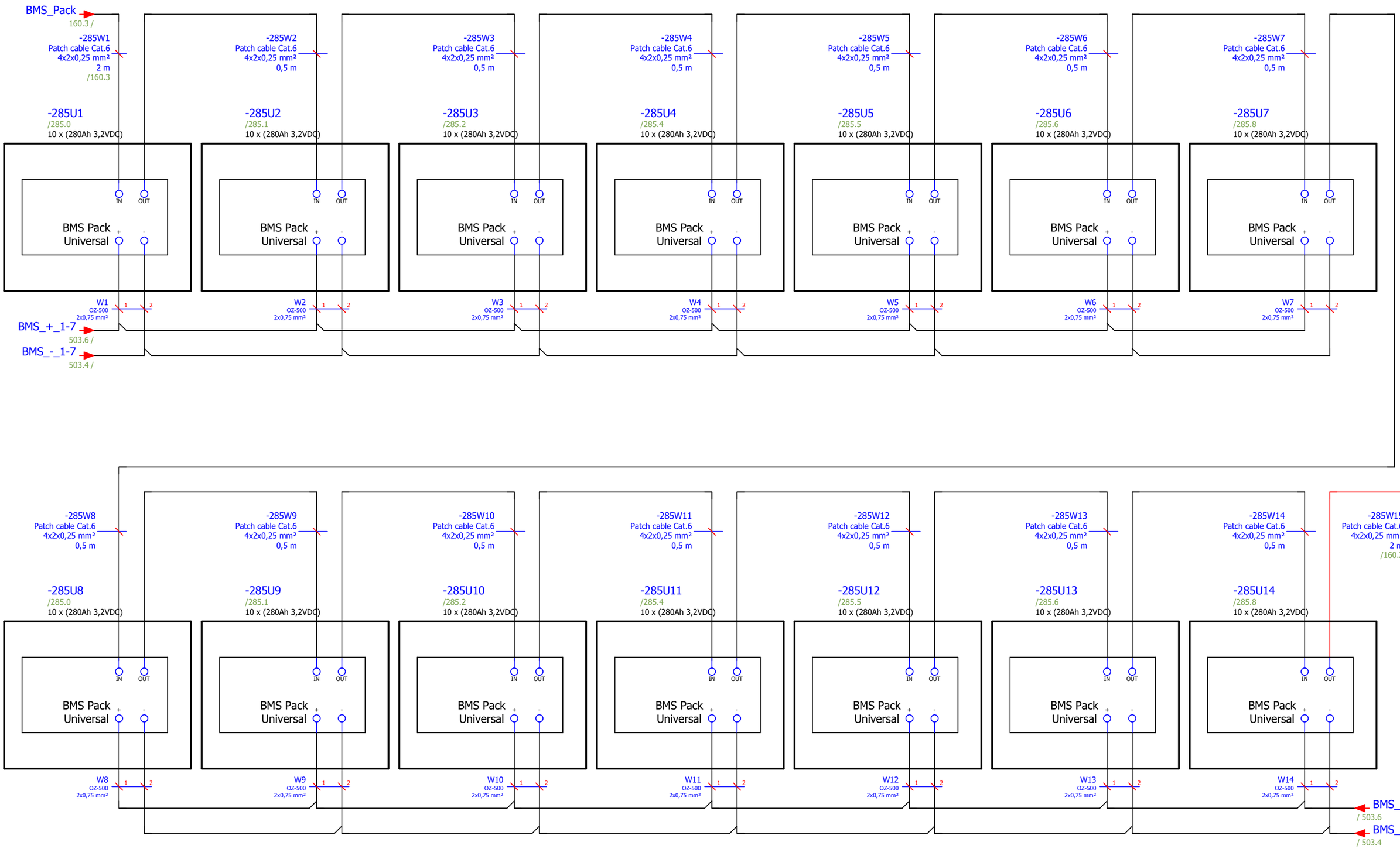


SUB_1_4_DC+ / 286.0

vorherige Seite: 264

Nächste Seite: 285a

Zeichner	Freqcon_DG			BESS Batterieschrank Steuerungseinheit 28 Module		BATTERIE STRANG	20240604_V0.62	=
Datum	20.11.2023							& EFS Schaltplan
Geprüft von	Freqcon_DG						Freqcon	++ BESS.STR Batterieschrank x
Datum	01.12.2021							+



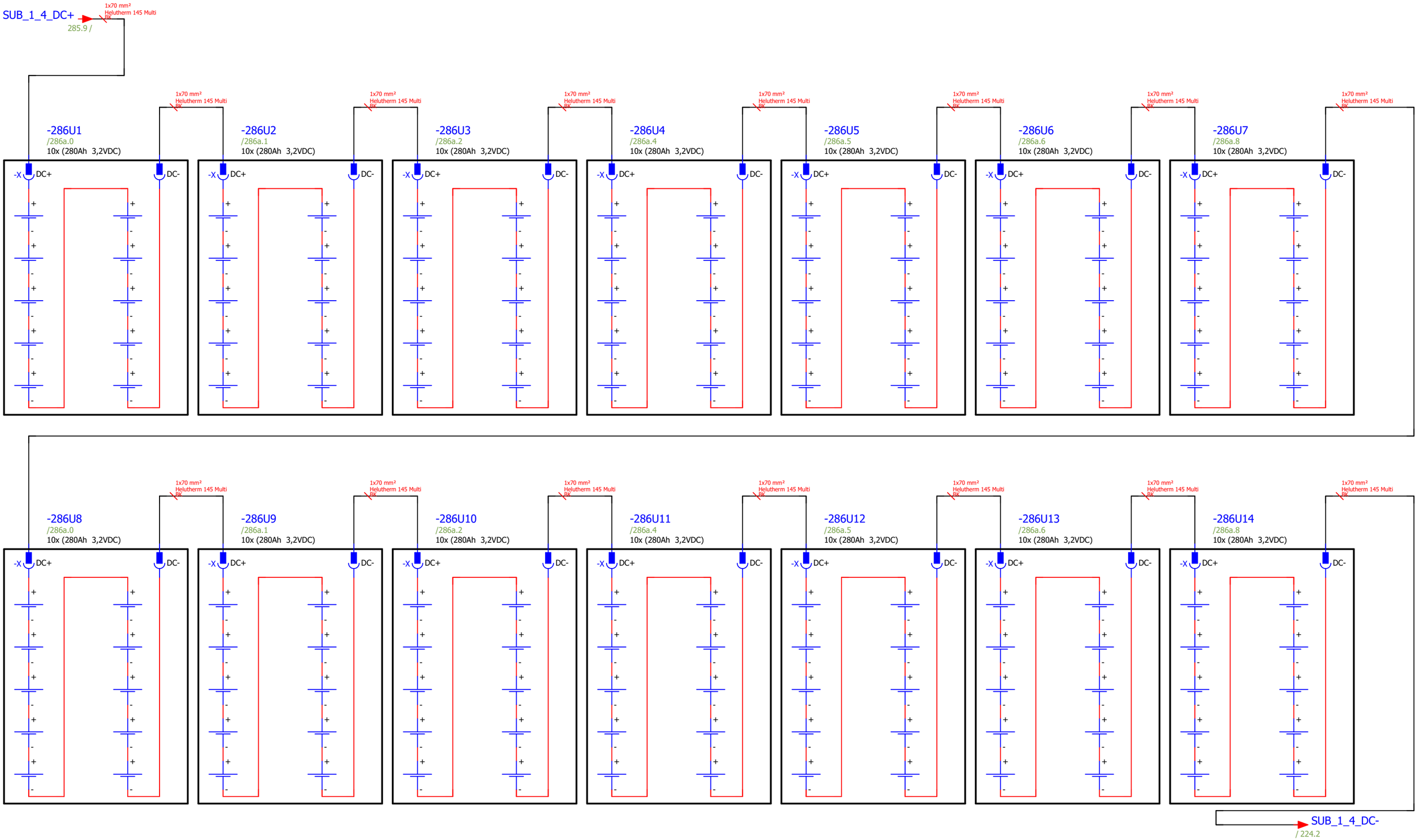
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285

Nächste Seite:
286

Zeichner	Freqcon_DG			BESS Batterieschrank Steuerungseinheit 28 Module	FREQCON	BATTERIE STRANG BMS	20240604_V0.62	=
Datum	19.03.2024							& EFS Schaltplan
Geprüft von	Freqcon_DG						Freqcon	++ BESS.STR Batterieschrank x
Datum	01.12.2021							+

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gesamt: 38

0	1	2	3	4	5	6	7	8	9

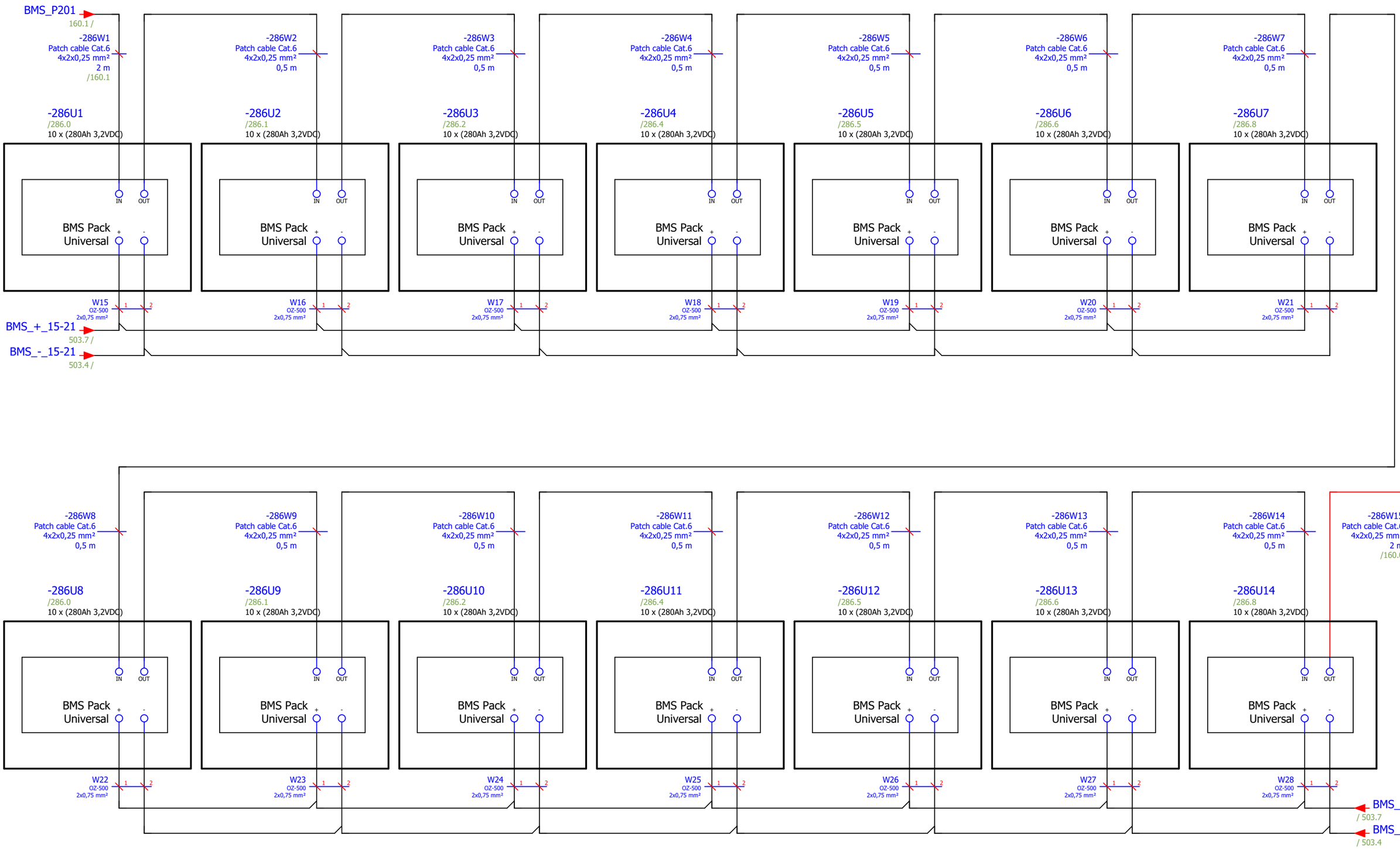


vorherige Seite:
285a

Nächste Seite:
286a

Zeichner	Freqcon_DG			BESS Batterieschrank Steuerungseinheit 28 Module		FREQCON	BATTERIE STRANG	20240604_V0.62	=
Datum	20.11.2023								& EFS Schaltplan
Geprüft von	Freqcon_DG							Freqcon	++ BESS.STR Batterieschrank x
Datum	01.12.2021								+

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gesamt: 38

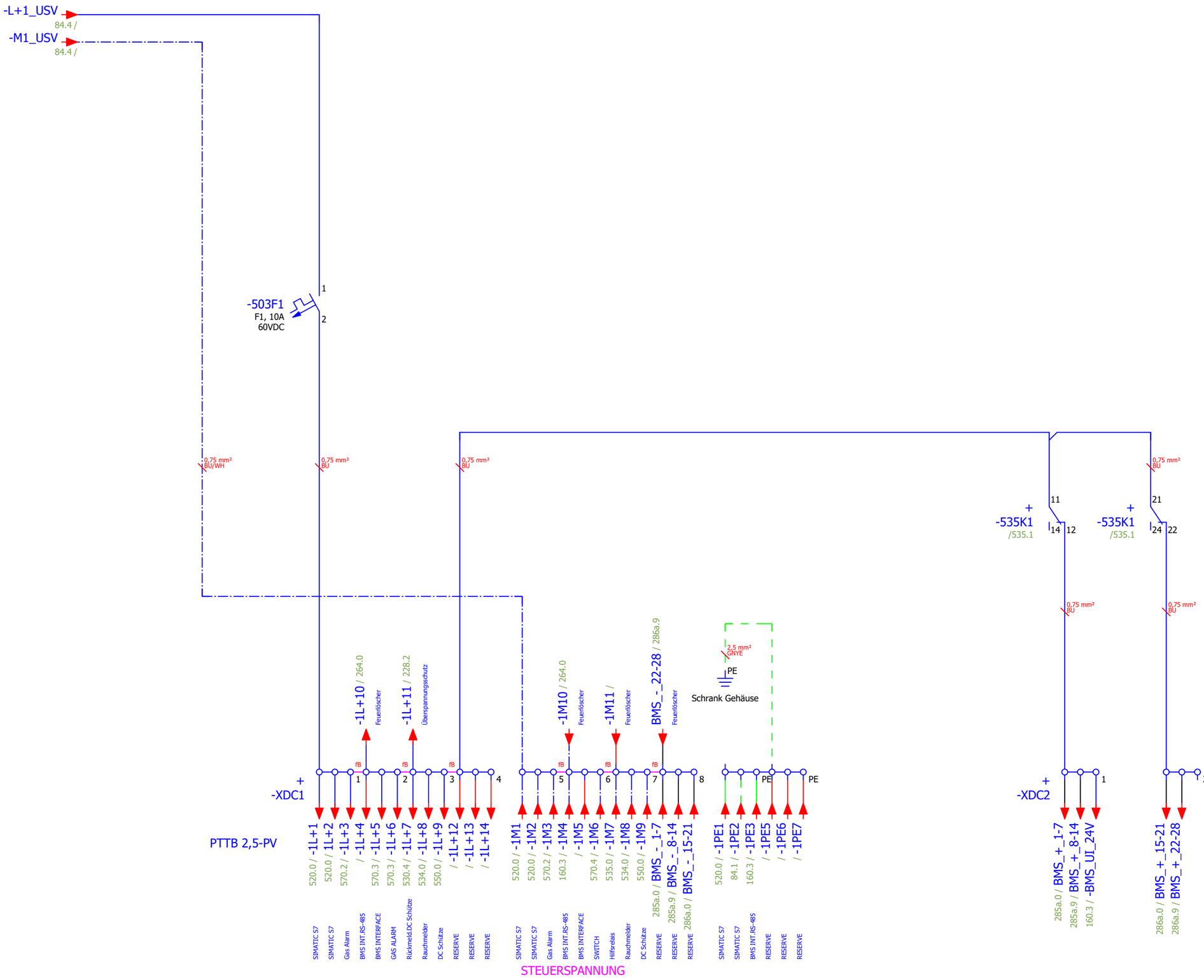


vorherige Seite:
286

Nächste Seite:
503

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Datum	19.03.2024							& EFS Schaltplan
Geprüft von	Freqcon_DG						Freqcon	++ BESS.STR Batterieschrank x
Datum	01.12.2021							+

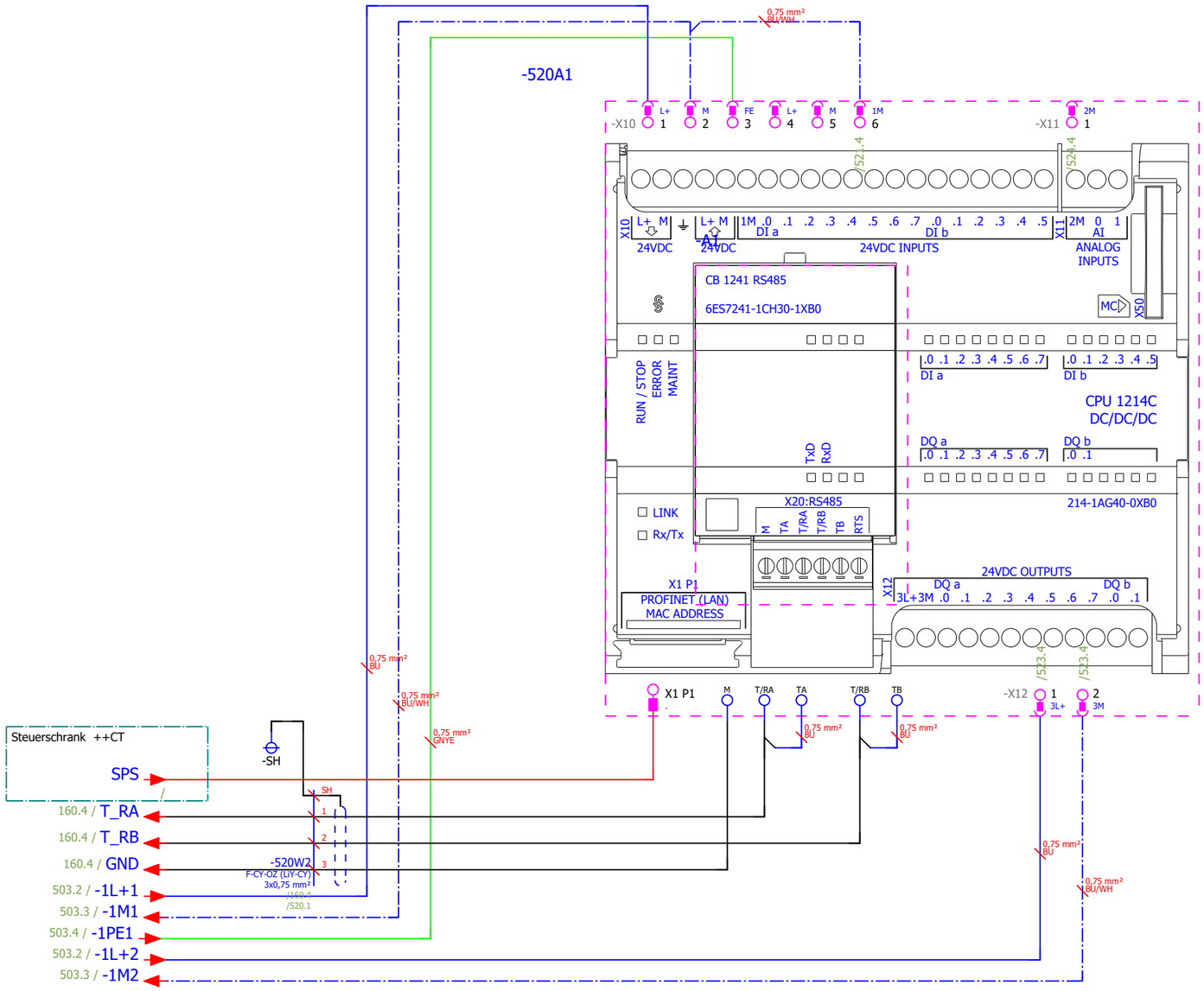
Seite: 286a
gesamt: 38



vorherige Seite:
286a

Nächste Seite:
520

Zeichner	Freqcon_DG			BESS Batterieschrank Steuerungseinheit 28 Module		FREQCON	STEUERSPANNUNG	20240604_V0.62	=
Datum	21.03.2024								& EFS Schaltplan
Geprüft von	Freqcon_DG							Freqcon	++ BESS.STR Batterieschrank x
Datum	01.12.2021								+ Seite: 503 gesamt: 38



vorherige Seite:
503

Nächste Seite:
521

Zeichner	Freqcon_DG			BESS Batterieschrank Steuerungseinheit 28 Module		FREQCON	SIMATIC S7-1200 24V DC	20240604_V0.62	=
Datum	19.03.2024								& EFS Schaltplan
Geprüft von	Freqcon_DG							Freqcon	++ BESS.STR Batterieschrank x
Datum	01.12.2021								+

Seite: 520
gesamt: 38

-520A1
/520.2

		/520.4	-X10:6		
			1M		
SICHERUNG 24V DC (nicht verwendet)		/531.4	-X10:7	DI a.0	IX.0
Rauchmelder 1	-264K1:4	/534.1	-X10:8	DI a.1	IX.1
HW AUSSCHALTUNG DC SCHÜTZE (nicht verwendet)		/531.3	-X10:9	DI a.2	IX.2
ÜBERSTROMMELDUNG BMS INTERFACE BATTERIE STRANG		/530.1	-X10:10	DI a.3	IX.3
BATTERIE STRANG DC+ Schütz K1 ist an	-224K1:14	/530.2	-X10:11	DI a.4	IX.4
BATTERIE STRANG DC- Schütz K7 ist an	-224K7:14	/530.3	-X10:12	DI a.5	IX.5
BATTERIE STRANG DC SICHERUNG OK	-224F1:2	/530.4	-X10:13	DI a.6	IX.6
HW Fail BMS Interface RS-485	-160U1:NO	/530.5	-X10:14	DI a.7	IX.7
SICHERUNG 230V AC EINSPEISUNG	-84F1:14	/530.6	-X10:15	DI b.0	IX+1.0
Rauchmelder 2	-264K2:4	/530.7	-X10:16	DI b.1	IX+1.1
ÜBERSPANNUNGSCHUTZ	-228F1:12	/530.8	-X10:17	DI b.2	IX+1.2
GAS ALARM	-XDC1:6	/570.5	-X10:18	DI b.3	IX+1.3
SICHERUNG GAS ALARM	-570B1:5	/570.2	-X10:19	DI b.4	IX+1.4
			-X10:20	DI b.5	IX+1.5

vorherige Seite:
520

Nächste Seite:
523

Zeichner	Freqcon_DG			BESS Batterieschrank Steuerungseinheit 28 Module	FREQCON	S7 - 1200 DIGITALE EINGÄNGE	20240604_V0.62	=
Datum	20.11.2023							& EFS Schaltplan
Geprüft von	Freqcon_DG						Freqcon	++ BESS.STR Batterieschrank x
Datum	01.12.2021							+

Seite: 521
gesamt: 38

0	1	2	3	4	5	6	7	8	9

-520A1
/520.2

		/520.4	-X12:1 3L+		
		/520.5	-X12:2 3M		
RESET BMS INTERFACE BATTERIE STRANG	-535K1:A1	/535.1	-X12:3 DQ a.0	QX.0	
RESERVE		/535.2	-X12:4 DQ a.1	QX.1	
RESERVE		/535.3	-X12:5 DQ a.2	QX.2	
LÜFTER SCHALTSCHRANK	-535K4:A1	/535.4	-X12:6 DQ a.3	QX.3	
SICHERHEITSKETTE (nicht verwendet)		/535.5	-X12:7 DQ a.4	QX.4	
RESERVE		/535.6	-X12:8 DQ a.5	QX.5	
BATTERIE STRANG SCHÜTZ DC+ EIN	-550K1:A1	/550.1	-X12:9 DQ a.6	QX.6	
BATTERIE STRANG SCHÜTZ DC-EIN	-550K2:A1	/550.3	-X12:10 DQ a.7	QX.7	
RESERVE		/535.7	-X12:11 DQ b.0	QX+1.0	
RESERVE		/535.8	-X12:12 DQ b.1	QX+1.1	

vorherige Seite:
521

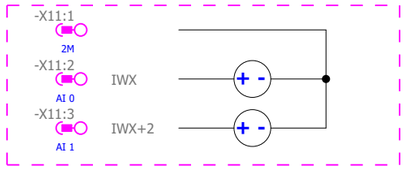
Nächste Seite:
524

Zeichner	Freqcon_DG			BESS Batterieschrank Steuerungseinheit 28 Module		FREQCON	S7 - 1200 DIGITALE AUSGÄNGE	20240604_V0.62	=
Datum	29.03.2022								& EFS Schaltplan
Geprüft von	Freqcon_DG							Freqcon	++ BESS.STR Batterieschrank x
Datum	01.12.2021								+

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gesamt: 38

-520A1
/520.2

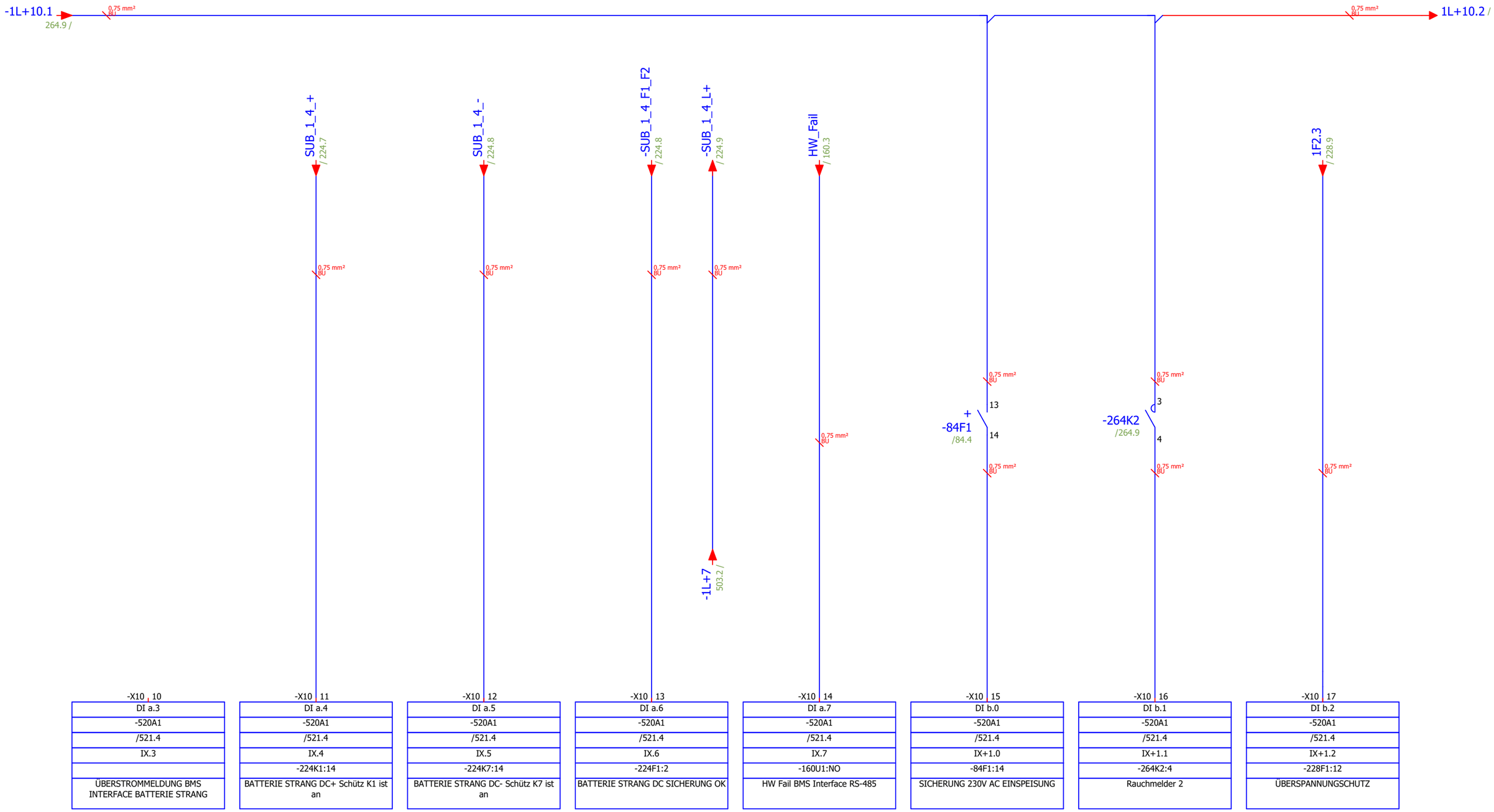
		/520.5	-X11:1	
			2M	
STROMMESSUNG BATTERIE STRANG (0V 10V Signal)	-160U1:IDC	/546.1	-X11:2	IWX
			AI 0	
SPANNUNGSMESSUNG BATTERIE STRANG (0V ... 10V Signal)	-160U1:UDC+	/546.3	-X11:3	IWX+2
			AI 1	



vorherige Seite: 523

Nächste Seite: 530

0	1	2	3	4	5	6	7	8	9



ÜBERSTROMMELDUNG BMS INTERFACE BATTERIE STRANG

BATTERIE STRANG DC+ Schütz K1 ist an

BATTERIE STRANG DC- Schütz K7 ist an

BATTERIE STRANG DC SICHERUNG OK

HW Fail BMS Interface RS-485

SICHERUNG 230V AC EINSPEISUNG

Rauchmelder 2

ÜBERSPANNUNGSCHUTZ

vorherige Seite: 524

Nächste Seite: 531

Zeichner	Freqcon_DG			BESS Batterieschrank Steuerungseinheit 28 Module		FREQCON	DIGITALE EINGÄNGE	20240604_V0.62	=
Datum	01.03.2024								& EFS Schaltplan
Geprüft von	Freqcon_DG							Freqcon	++ BESS.STR Batterieschrank x
Datum	01.12.2021								+

Seite: 530

gesamt: 38

0	1	2	3	4	5	6	7	8	9

-X10 : 9

DI a.2
-520A1
/521.4
IX.2
HW AUSSCHALTUNG DC SCHÜTZE (nicht verwendet)

-X10 : 7

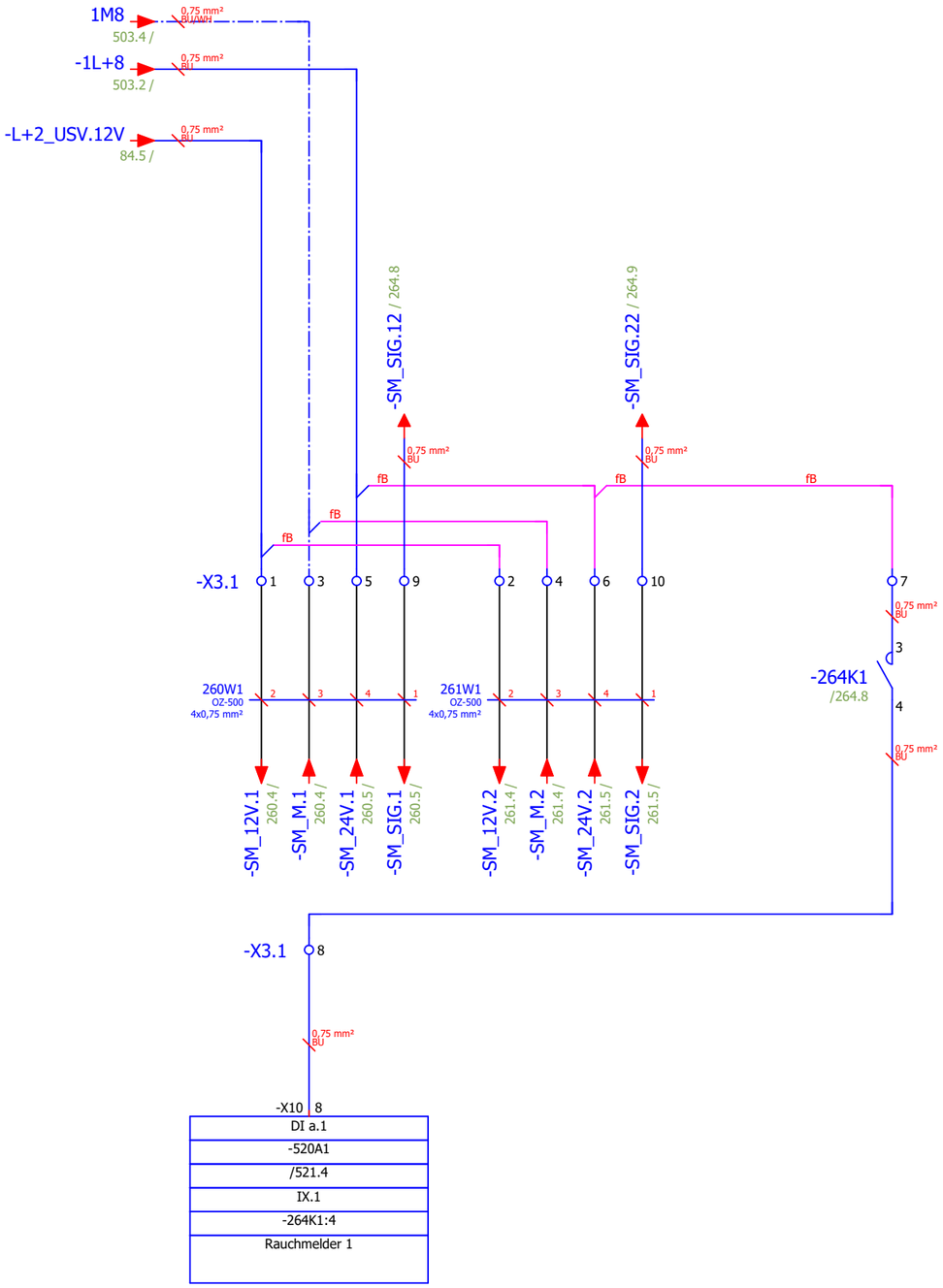
DI a.0
-520A1
/521.4
IX.0
SICHERUNG 24V DC (nicht verwendet)

HW AUSSCHALTUNG DC SCHÜTZE (nicht verwendet)

SICHERUNG 24V DC (nicht verwendet)

vorherige Seite: 530

Nächste Seite: 534



Rauchmelder 1

vorherige Seite:
531

Nächste Seite:
535

Zeichner	Freqcon_DG			BESS Batterieschrank Steuerungseinheit 28 Module		FREQCON	DIGITALE EINGÄNGE RAUCHMELDER	20240604_V0.62	=
Datum	19.03.2024								& EFS Schaltplan
Geprüft von	Freqcon_DG							Freqcon	++ BESS.STR Batterieschrank x
Datum	01.12.2021								+

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gesamt: 38

0	1	2	3	4	5	6	7	8	9

RESET BMS INTERFACE BATTERIE STRANG	RESERVE	RESERVE	LÜFTER SCHALTSCHRANK	SICHERHEITSKETTE (nicht verwendet)	RESERVE	RESERVE	RESERVE
-535K1:A1			-535K4:A1				
QX.0	QX.1	QX.2	QX.3	QX.4	QX.5	QX+1.0	QX+1.1
/523.4	/523.4	/523.4	/523.4	/523.4	/523.4	/523.4	/523.4
-520A1	-520A1	-520A1	-520A1	-520A1	-520A1	-520A1	-520A1
DQ a.0	DQ a.1	DQ a.2	DQ a.3	DQ a.4	DQ a.5	DQ b.0	DQ b.1
-X12 3	-X12 4	-X12 5	-X12 6	-X12 7	-X12 8	-X12 11	-X12 12

0,75 mm² BU

0,75 mm² BU

+ -535K1 24V DC A1 A2

+ -535K4 24V DC A1 A2

-1M7 503.3 /

0,75 mm² BU/WH

fB

0,75 mm² BU/WH

-1M7.1 / 264.7

14 12 11 /503.6

24 22 21 /503.7

14 12 11 /84.7

RESET BMS INTERFACE BATTERIE STRANG

RESERVE

RESERVE

LÜFTER SCHALTSCHRANK

SICHERHEITSKETTE (nicht verwendet)

RESERVE

RESERVE

RESERVE

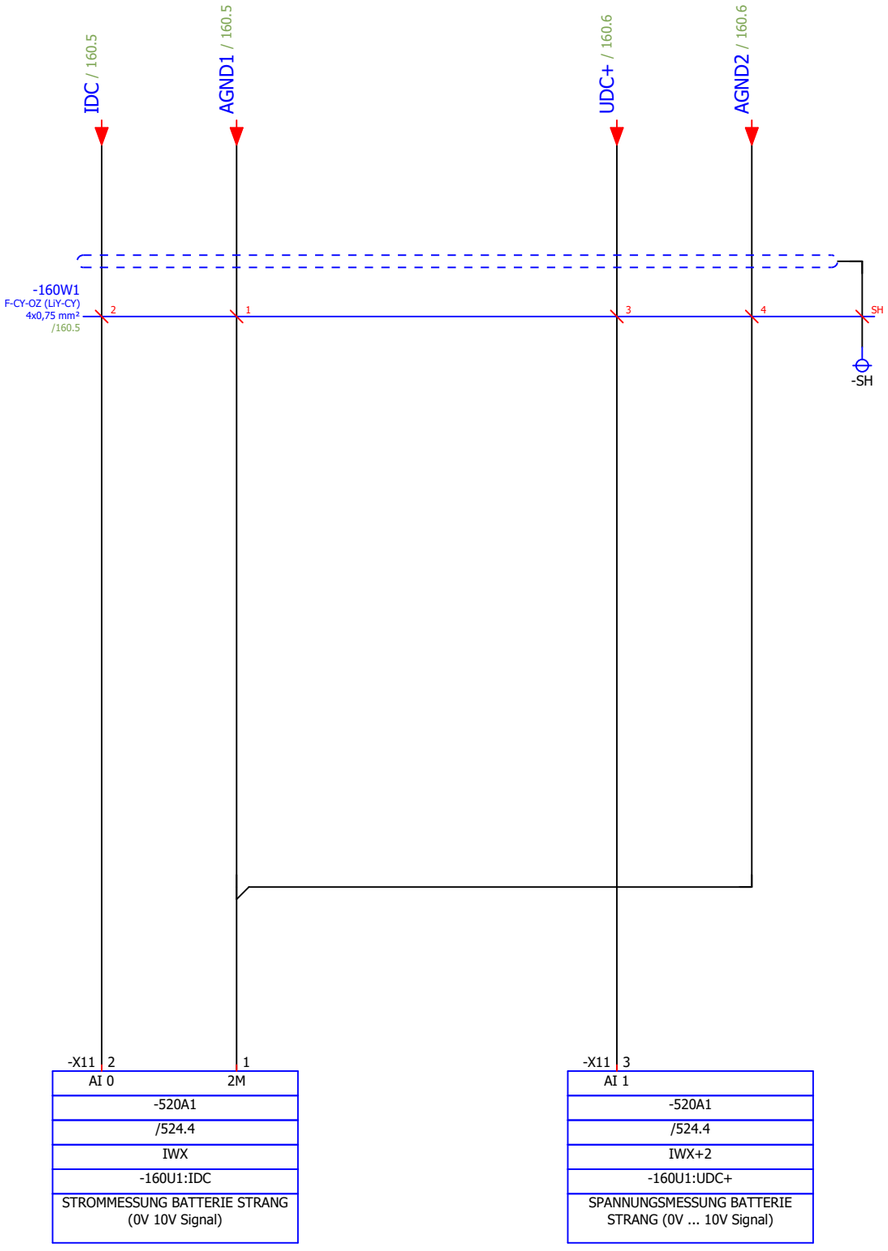
vorherige Seite: 534

Nächste Seite: 546

Zeichner	Freqcon_DG			BESS Batterieschrank Steuerungseinheit 28 Module		FREQCON	AUSGÄNGE	20240604_V0.62	=
Datum	19.03.2024								& EFS Schaltplan
Geprüft von	Freqcon_DG							Freqcon	++ BESS.STR Batterieschrank x
Datum	01.12.2021								+

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gesamt: 38



STROMMESSUNG
BATTERIE STRANG
(0V 10V Signal)

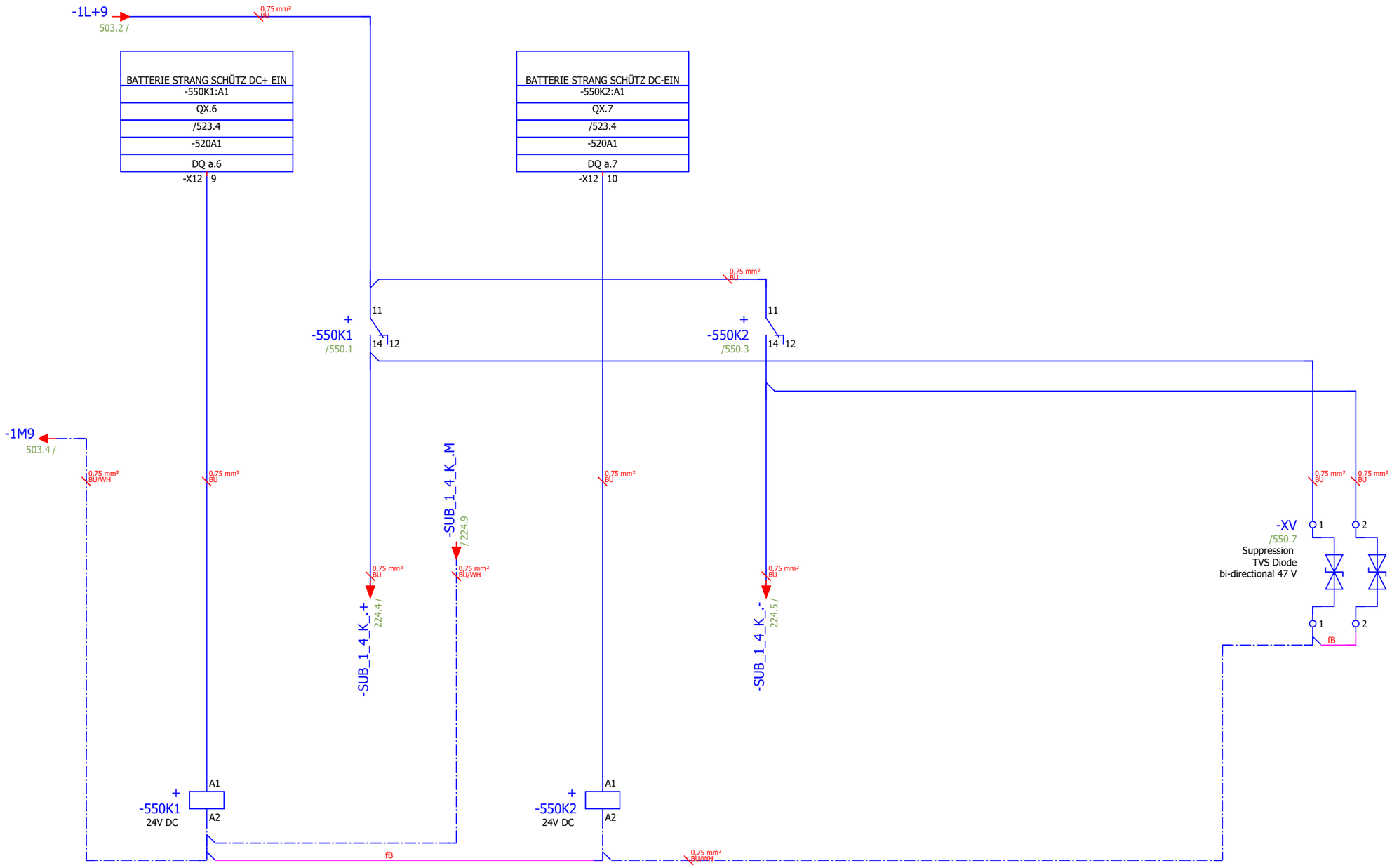
SPANNUNGSMESSUNG
BATTERIE STRANG
(0V ... 10V Signal)

vorherige Seite:
535

Nächste Seite:
550

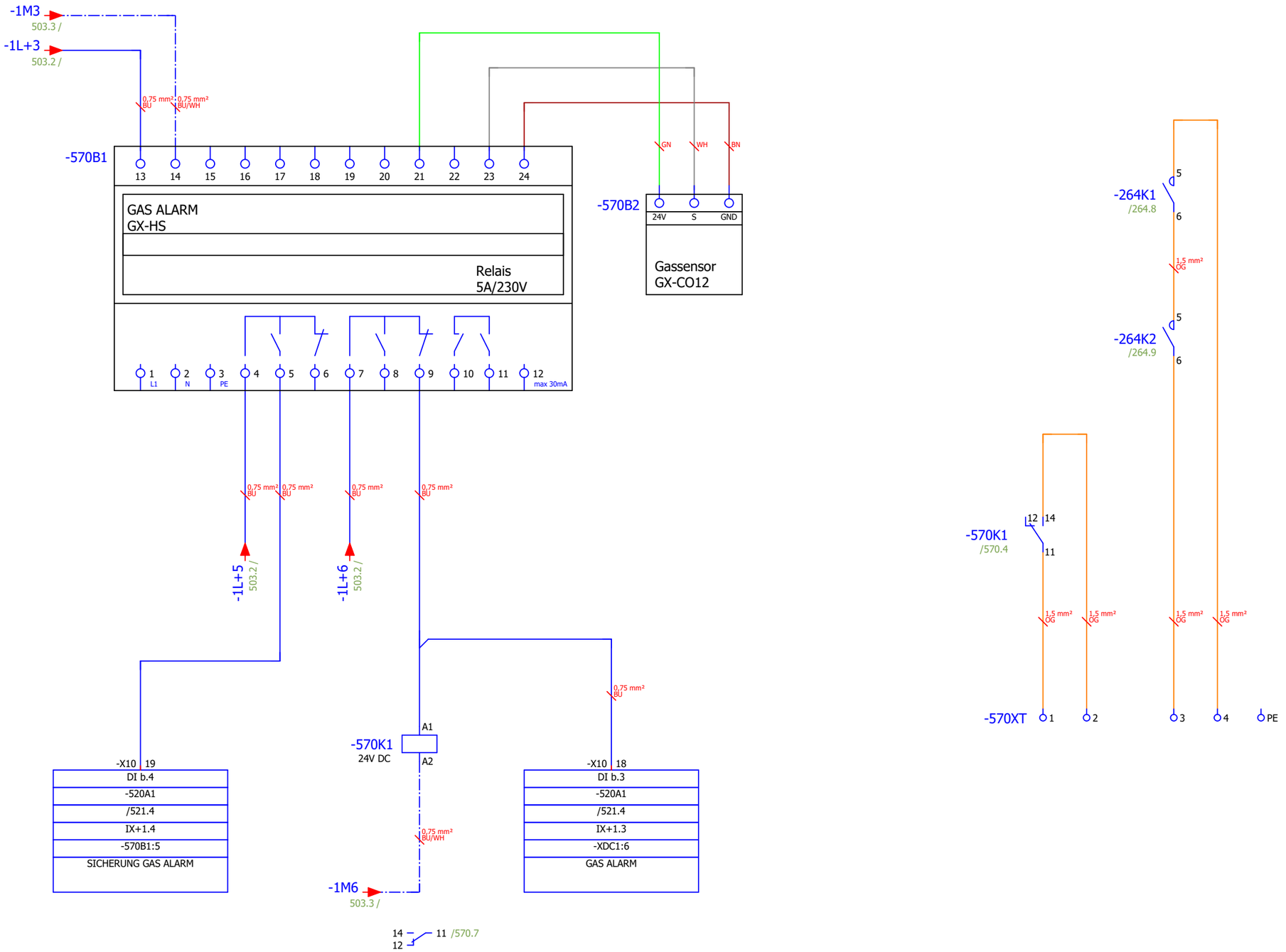
Zeichner	Freqcon_DG			BESS Batterieschrank Steuerungseinheit 28 Module		FREQCON	ANALOGE EINGÄNGE	20240604_V0.62	=
Datum	01.03.2024								& EFS Schaltplan
Geprüft von	Freqcon_DG							Freqcon	++ BESS.STR Batterieschrank x
Datum	01.12.2021								+

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gesamt: 38



vorherige Seite: 546
Nächste Seite: 570

Zeichner	Freqcon_DG			BESS Batterieschrank Steuerungseinheit 28 Module		AUSGÄNGE DC SCHÜTZE	20240604_V0.62	=	
Datum	19.03.2024							& EFS Schaltplan	
Geprüft von	Freqcon_DG						Freqcon	++ BESS.STR Batterieschrank x	Seite: 550
Datum	01.12.2021							+	gesamt: 38



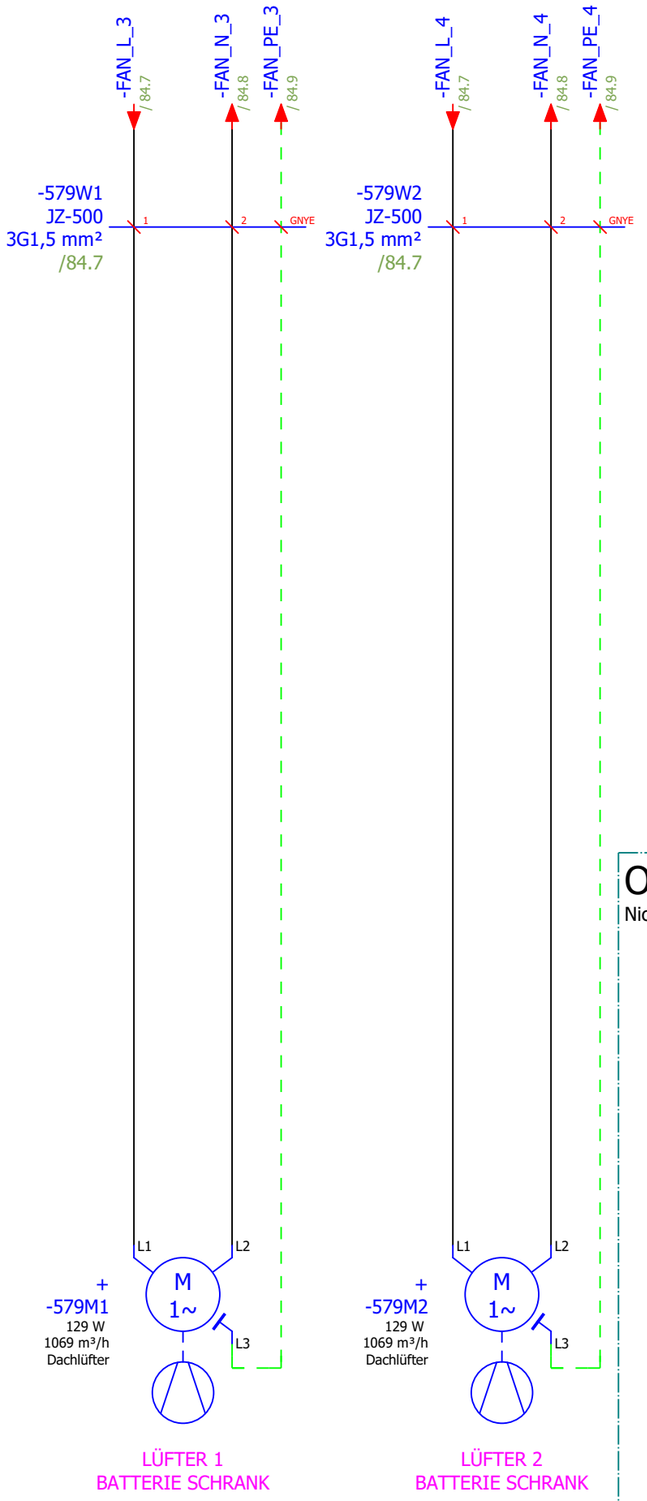
SICHERUNG
GAS ALARM

GAS ALARM

vorherige Seite:
550

Nächste Seite:
579

Zeichner	Freqcon_DG			BESS Batterieschrank Steuerungseinheit 28 Module	FREQCON	GAS DETEKTION	20240604_V0.62	=
Datum	29.05.2024							& EFS Schaltplan
Geprüft von	Freqcon_DG						Freqcon	++ BESS.STR Batterieschrank x Seite: 570
Datum	01.12.2021							+ gesamt: 38



Caution
external voltage!

vorherige Seite:
570

Nächste Seite:
&EPC/1

Zeichner	Freqcon_DG			BESS Batterieschrank Steuerungseinheit 28 Module	FREQCON	BATTERIESCHRANK BELÜFTUNG	20240604_V0.62	=
Datum	20.11.2023							& EFS Schaltplan
Geprüft von	Freqcon_DG						Freqcon	++ BESS.STR Batterieschrank x
Datum	01.12.2021							+ Seite: 579 gesamt: 38

Artikelstückliste

Freqcon-mit_FRQ-Nr_ABAS_de_en

BMK Schaltplan / Position	Menge	Bezeichnung	Bestellnummer	Hersteller / Lieferant	Freqcon ERP Nr.	unter-geordnetes Teil
-2-Pol Stecker &EFS/285a.1	28	Leiterplattensteckverbinder - MSTB 2,5/ 2-ST	1754449	Phoenix Contact	501120	
-84F1 &EFS/84.4	1	Leitungsschutzschalter 230/400V, 10KA, 1 Pol., C, 6A	5SY4106-7	Siemens	500682	
-84F1 &EFS/84.4	1	Hilfsschalter 1S+1Ö für Leitungsschutzschalter 5SL, 5SY, 5SP	5ST3010	Siemens	500737	
-84F2 &EFS/84.7	1	Leitungsschutzschalter 230/400V, 10KA, 1 Pol., C, 6A	5SY4106-7	Siemens	500682	
-84F2 &EFS/84.7	1	Hilfsschalter 1S+1Ö für Leitungsschutzschalter 5SL, 5SY, 5SP	5ST3010	Siemens	500737	
-84G1 &EFS/84.6	1	USV 24V 30F V1.0	507102	Freqcon GmbH	507102	
-84T1 &EFS/84.4	1	Stromversorgung	1096432	Phoenix Contact	506989	
-160U1 &EFS/160.2	1	BMS Interface UI V3.0	507817	Freqcon GmbH	507817	
-224F1 &EFS/224.1	1	HLS Sicherung 1250V/400A Größe 1KN/110	170M4243	Gemballa Electronics	501537	
-224F1 &EFS/224.1	1	Sicherungshalter Bussmann 1250A, 1400V, CA 110mm, UR 43653	170H3006	Gemballa Electronics	501536	
-224F1 &EFS/224.1	1	Mikroschalter 250V/2A Schalter K1	170H0069	Gemballa Electronics	501455	
-224F2 &EFS/224.2	1	HLS Sicherung 1250V/400A Größe 1KN/110	170M4243	Gemballa Electronics	501537	
-224F2 &EFS/224.2	1	Sicherungshalter Bussmann 1250A, 1400V, CA 110mm, UR 43653	170H3006	Gemballa Electronics	501536	
-224F2 &EFS/224.2	1	Mikroschalter 250V/2A Schalter K1	170H0069	Gemballa Electronics	501455	
-224K1 &EFS/224.4	1	DC Schütz bidirektional C310A/500A 1500V 24VDC	C310A/500	Schaltbau GmbH	505554	
-224K1 &EFS/224.4	1	Hilfsschalter passend für Schütz C310A/500 24I-V1	S880 W1R6 a	Schaltbau GmbH	505662	
-224K1 &EFS/224.4	2	Isolierplatten C310-TP für C310	1-3614-351856	Schaltbau GmbH	10062	
-224K7 &EFS/224.5	1	DC Schütz bidirektional C310A/500A 1500V 24VDC	C310A/500	Schaltbau GmbH	505554	
-224K7 &EFS/224.5	1	Hilfsschalter passend für Schütz C310A/500 24I-V1	S880 W1R6 a	Schaltbau GmbH	505662	

Artikelstückliste

Freqcon-mit_FRQ-Nr_ABAS_de_en

BMK Schaltplan / Position	Menge	Bezeichnung	Bestellnummer	Hersteller / Lieferant	Freqcon ERP Nr.	unter-geordnetes Teil
-224K7 &EFS/224.5	2	Isolierplatten C310-TP für C310	1-3614-351856	Schaltbau GmbH	10062	
-224Q1 &EFS/224.1	1	Sicherungslasttrennschalter 3NP1	3NP1133-1CA10	Siemens	502062	
-224Q1 &EFS/224.1	2	NH-Trennmesser Gr. 00 Grifflasche isoliert	3NG1002	Siemens	10272	
-224V1 &EFS/224.1	1	Präziser Hall-Stromsensor 450A / 0,09A Eingang: 0-450A AC / DC; Ausgang: 0-90 mA AC / DC	CYHCS-SH450A	Chen Yang Technologies GmbH & Co. KG	506263	
-224V1 &EFS/224.1	1	Clutch housing, crimping technology 3-pole straight RM2,54	PSK 254/3W	reichelt elektronik GmbH & Co. KG	503021	
-224V1 &EFS/224.1	3	Crimp contacts, for psk 254	PSK-KONTAKTE	reichelt elektronik GmbH & Co. KG	502767	
-228F1 &EFS/228.0	1	Blitzstrom- / Überspannungsableiter 2P 1500VDC	2905640	Phoenix Contact	501130	X
-260B1 &EFS/260.3	1	Optischer Rauchmelder 12V, mit potentialfreiem Alarmrelais	130-60-457	ABUS Security-Center GmbH & Co. KG	500713	
-261B1 &EFS/261.3	1	Optischer Rauchmelder 12V, mit potentialfreiem Alarmrelais	130-60-457	ABUS Security-Center GmbH & Co. KG	500713	
-264K1 &EFS/264.8	1	AC Schütz 3RT2015, 7A, 3KW @AC-3, 400V, S00, 3-pol, 24VDC, 1NO, Federzuganschl, integr. Diode	3RT2015-2FB41	Siemens	501516	
-264K2 &EFS/264.9	1	AC Schütz 3RT2015, 7A, 3KW @AC-3, 400V, S00, 3-pol, 24VDC, 1NO, Federzuganschl, integr. Diode	3RT2015-2FB41	Siemens	501516	
-264R1 &EFS/264.0	1	Widerstand 10R, 1%, 50W, Alu-Gehäuse, WD 50	160078	Widap AG	502981	
-285U1 &EFS/285.0	0					
-285U2 &EFS/285.1	0					
-285U3 &EFS/285.2	0					
-285U4 &EFS/285.4	0					
-285U5 &EFS/285.5	0					
-285U6 &EFS/285.6	0					
-285U7 &EFS/285.8	0					

vorherige Seite: 1

Nächste Seite: 3

Artikelstückliste

Freqcon-mit_FRQ-Nr_ABAS_de_en

BMK Schaltplan / Position	Menge	Bezeichnung	Bestellnummer	Hersteller / Lieferant	Freqcon ERP Nr.	unter-geordnetes Teil
-285U8 &EFS/285.0	0					
-285U9 &EFS/285.1	0					
-285U10 &EFS/285.2	0					
-285U11 &EFS/285.4	0					
-285U12 &EFS/285.5	0					
-285U13 &EFS/285.6	0					
-285U14 &EFS/285.8	0					
-286U1 &EFS/286.0	0					
-286U2 &EFS/286.1	0					
-286U3 &EFS/286.2	0					
-286U4 &EFS/286.4	0					
-286U5 &EFS/286.5	0					
-286U6 &EFS/286.6	0					
-286U7 &EFS/286.8	0					
-286U8 &EFS/286.0	0					
-286U9 &EFS/286.1	0					
-286U10 &EFS/286.2	0					
-286U11 &EFS/286.4	0					
-286U12 &EFS/286.5	0					

vorherige Seite: 2

Nächste Seite: 4

Artikelstückliste

Freqcon-mit_FRQ-Nr_ABAS_de_en

BMK Schaltplan / Position	Menge	Bezeichnung	Bestellnummer	Hersteller / Lieferant	Freqcon ERP Nr.	unter-geordnetes Teil
-286U13 &EFS/286.6	0					
-286U14 &EFS/286.8	0					
-503F1 &EFS/503.2	1	Geräteschutzschalter 230VAC/60VDC, 3kA, 1 Pol., HS, F2, 10A	5SY1710-4	Siemens	10086	
-520A1 &EFS/520.2	1	SIMATIC S7-1200, CPU 1214C, DC/DC/DC, 14DI/10DO/2AI	6ES7214-1AG40-0XB0	Siemens	10194	
-520A1 &EFS/520.2	1	SIMATIC S7 Memory Card, 4 MB	6ES7954-8LC03-0AA0	Siemens	10281	
-520A1-A1 &EFS/520.3	1	SIMATIC S7-1200, COMMUNICATION BOARD CB 1241, RS485	6ES7241-1CH30-1XB0	Siemens	10197	
-535K1 &EFS/535.1	1	Relaismodul RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-535K1 &EFS/535.1	1	Steckbrücke FBS 2-6 BU	3036932	Phoenix Contact	500803	
-535K4 &EFS/535.4	1	Relaismodul RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-535K4 &EFS/535.4	1	Steckbrücke FBS 2-6 BU	3036932	Phoenix Contact	500803	
-550K1 &EFS/550.1	1	Relaismodul RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-550K1 &EFS/550.1	1	Steckbrücke FBS 2-6 BU	3036932	Phoenix Contact	500803	
-550K2 &EFS/550.3	1	Relaismodul RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-550K2 &EFS/550.3	1	Steckbrücke FBS 2-6 BU	3036932	Phoenix Contact	500803	
-570B1 &EFS/570.2	1	Schabus Gas Alarm GX-HS	400200		507217	
-570B2 &EFS/570.5	1	Schabus Gas Sensor GX-CO12	300712		509239	
-570K1 &EFS/570.4	1	Relaismodul RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-570K1 &EFS/570.4	1	Steckbrücke FBS 2-6 BU	3036932	Phoenix Contact	500803	
-570XT &EFS/570.7	4	Durchgangsklemme Push-in PT 2,5	3209510	Phoenix Contact	500583	X

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Nächste Seite: 5

Artikelstückliste

Freqcon-mit_FRQ-Nr_ABAS_de_en

BMK Schaltplan / Position	Menge	Bezeichnung	Bestellnummer	Hersteller / Lieferant	Freqcon ERP Nr.	unter-geordnetes Teil
-570XT &EFS/570.7	2	Abschlussdeckel D-ST 2,5	3030417	Phoenix Contact	500506	
-570XT &EFS/570.7	2	Endhalter CLIPFIX 35-5	3022276	Phoenix Contact	500588	
-570XT &EFS/570.7	1	PE Durchgangsklemme Push-in PT 2,5-PE	3209536	Phoenix Contact	500813	
-579M1 &EFS/579.1	1	Dachlüfter	3140500	Rittal		X
-579M2 &EFS/579.2	1	Dachlüfter	3140500	Rittal		X
-579M3 &EFS/579.3	1	Dachlüfter	3140500	Rittal		X
-579M4 &EFS/579.5	1	Dachlüfter	3140500	Rittal		X
-X3.1 &EFS/534.0	1	Abschlussdeckel D-ST 2,5	3030417	Phoenix Contact	500506	
-X3.1 &EFS/534.0	1	Klemmenleisten-Kennzeichnungsträger KLM 3	0811969	Phoenix Contact	501402	
-X3.1 &EFS/534.0	1	Endhalter CLIPFIX 35-5	3022276	Phoenix Contact	500588	
-X3.1 &EFS/264.2;&EFS/534.1...&EFS/534.3	11	Durchgangsklemme Push-in PT 2,5	3209510	Phoenix Contact	500583	
-X3.1 &EFS/534.1	2	Steckbrücke rot FBS 2-5	3030161	Phoenix Contact	505211	
-X3.1 &EFS/264.2	2	Endhalter CLIPFIX 15	3022263	Phoenix Contact	500935	
-X3.1 &EFS/264.2	2	Mini-Durchgangsklemme, Federzug, MPT 1,5/S	3248100	Phoenix Contact	501024	
-X3.1 &EFS/264.2	1	Abschlussdeckel D-MPT 1,5/S	3248120	Phoenix Contact	500899	
-X3.1 &EFS/534.1	1	Steckbrücke rot FBS 3-5	3030174	Phoenix Contact	503103	
-X3.2 &EFS/264.3	2	Endhalter CLIPFIX 15	3022263	Phoenix Contact	500935	
-X3.2 &EFS/264.3	2	Mini-Durchgangsklemme, Federzug, MPT 1,5/S	3248100	Phoenix Contact	501024	
-X3.2 &EFS/264.3	1	Abschlussdeckel D-MPT 1,5/S	3248120	Phoenix Contact	500899	

Artikelstückliste

Freqcon-mit_FRQ-Nr_ABAS_de_en

BMK Schaltplan / Position	Menge	Bezeichnung	Bestellnummer	Hersteller / Lieferant	Freqcon ERP Nr.	unter-geordnetes Teil
-X3.2 &EFS/264.3	1	Durchgangsklemme Push-in PT 2,5	3209510	Phoenix Contact	500583	
-X3.3 &EFS/264.0	1	Abschlussdeckel D-ST 2,5	3030417	Phoenix Contact	500506	
-X3.3 &EFS/264.0	1	Klemmenleisten-Kennzeichnungsträger KLM 3	0811969	Phoenix Contact	501402	
-X3.3 &EFS/264.0	1	Endhalter CLIPFIX 35-5	3022276	Phoenix Contact	500588	
-X3.5 &EFS/264.0...&EFS/264.3	6	Durchgangsklemme Push-in PT 2,5	3209510	Phoenix Contact	500583	
-XDC1 &EFS/503.1	2	Abschlussdeckel D-PTTB 2,5	3211634	Phoenix Contact	500505	
-XDC1 &EFS/503.1	1	Klemmenleisten-Kennzeichnungsträger KLM 3-L	0814788	Phoenix Contact	500652	
-XDC1 &EFS/503.1	2	Endhalter CLIPFIX 35-5	3022276	Phoenix Contact	500588	
-XDC1 &EFS/503.2...&EFS/503.4	8	Doppelstockklemme Push-in PTTB 2,5-PV	3210583	Phoenix Contact	501385	
-XDC1 &EFS/503.4	2	PE Doppelstockklemme Push-in PTTB 2,5-PE	3210596	Phoenix Contact	501389	
-XDC2 &EFS/503.6;&EFS/503.7	2	Doppelstockklemme Push-in PTTB 2,5-PV	3210583	Phoenix Contact	501385	
-XE &EFS/84.0	1	Abschlussdeckel D-PT 6	3212044	Phoenix Contact	500503	X
-XE &EFS/84.0	1	Klemmenleisten-Kennzeichnungsträger KLM 3	0811969	Phoenix Contact	501402	X
-XE &EFS/84.0	1	Durchgangsklemme Push-in PT 2,5	3209510	Phoenix Contact	500583	
-XE &EFS/84.1	2	Durchgangsklemme Push-in PT 2,5 BU	3209523	Phoenix Contact	500584	
-XE &EFS/84.1	1	Steckbrücke rot FBS 2-5	3030161	Phoenix Contact	505211	
-XE &EFS/84.1	2	PE Durchgangsklemme Push-in PT 2,5-PE	3209536	Phoenix Contact	500813	
-XT535 &EFS/84.7;&EFS/84.8	4	Doppelstockklemme Push-in PTTB 2,5-PV	3210583	Phoenix Contact	501385	X
-XT535 &EFS/84.7	1	Steckbrücke rot FBS 3-5	3030174	Phoenix Contact	503103	X

Artikelstückliste

Freqcon-mit_FRQ-Nr_ABAS_de_en

BMK Schaltplan / Position	Menge	Bezeichnung	Bestellnummer	Hersteller / Lieferant	Freqcon ERP Nr.	unter-geordnetes Teil
-XT535 &EFS/84.8	1	Steckbrücke rot FBS 4-5	3030187	Phoenix Contact	500801	X
-XT535 &EFS/84.9	1	PE Doppelstockklemme Push-in PTTB 2,5-PE	3210596	Phoenix Contact	501389	X
-XV &EFS/550.7	2	Trennklemme Push-in PT 2,5-TG	3210185	Phoenix Contact	500828	
-XV &EFS/550.7	2	Bauelementestecker P-CO	3036796	Phoenix Contact	500533	
-XV &EFS/550.7	2	Unterdrückungs - Diode CB-417, 600W, 47V, -65...+175°C	P6KE47CA	reichelt elektronik GmbH & Co. KG	501574	
-XV &EFS/550.7	1	Abschlussdeckel D-PT 2,5-MT	3211003	Phoenix Contact	503382	

vorherige Seite:
6

Nächste Seite:
&EPA/1

Artikelsummenstückliste

Freqcon_ABAS_de_en

Menge	Bezeichnung	Bestellnummer	Hersteller / Lieferant	Freqcon ERP Nr.
1	Schabus Gas Sensor GX-CO12	300712		509239
1	Schabus Gas Alarm GX-HS	400200		507217
2	Optischer Rauchmelder 12V, mit potentialfreiem Alarmrelais	130-60-457	ABUS Security-Center GmbH & Co. KG	500713
2	Mikroschalter 250V/2A Schalter K1	170H0069	Gemballa Electronics	501455
2	Sicherungshalter Bussmann 1250A, 1400V, CA 110mm, UR 43653	170H3006	Gemballa Electronics	501536
2	HLS Sicherung 1250V/400A Größe 1KN/110	170M4243	Gemballa Electronics	501537
1	Präziser Hall-Stromsensor 450A / 0,09A Eingang: 0-450A AC / DC; Ausgang: 0-90 mA AC / DC	CYHCS-SH450A	Chen Yang Technologies GmbH & Co. KG	506263
1	USV 24V 30F V1.0	507102	Freqcon GmbH	507102
1	BMS Interface UI V3.0	507817	Freqcon GmbH	507817
1	Stromversorgung	1096432	Phoenix Contact	506989
5	Relaismodul RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726
5	Steckbrücke FBS 2-6 BU	3036932	Phoenix Contact	500803
1	Clutch housing, crimping technology 3-pole straight RM2,54	PSK 254/3W	reichelt elektronik GmbH & Co. KG	503021
3	Crimp contacts, for psk 254	PSK-KONTAKTE	reichelt elektronik GmbH & Co. KG	502767
4	Isolierplatten C310-TP für C310	1-3614-351856	Schaltbau GmbH	10062
2	DC Schütz bidirektional C310A/500A 1500V 24VDC	C310A/500	Schaltbau GmbH	505554
2	Hilfsschalter passend für Schütz C310A/500 24I-V1	S880 W1R6 a	Schaltbau GmbH	505662
2	NH-Trennmesser Gr. 00 Grifflasche isoliert	3NG1002	Siemens	10272

Artikelsummenstückliste

Freqcon_ABAS_de_en

Menge	Bezeichnung	Bestellnummer	Hersteller / Lieferant	Freqcon ERP Nr.
1	Sicherungslasttrennschalter 3NP1	3NP1133-1CA10	Siemens	502062
2	AC Schütz 3RT2015, 7A, 3KW @AC-3, 400V, S00, 3-pol, 24VDC, 1NO, Federzuganschl, integr. Diode	3RT2015-2FB41	Siemens	501516
2	Hilfsschalter 1S+1Ö für Leitungsschutzschalter 5SL, 5SY, 5SP	5ST3010	Siemens	500737
1	Geräteschutzschalter 230VAC/60VDC, 3kA, 1 Pol., HS, F2, 10A	5SY1710-4	Siemens	10086
2	Leitungsschutzschalter 230/400V, 10KA, 1 Pol., C, 6A	5SY4106-7	Siemens	500682
1	SIMATIC S7-1200, CPU 1214C, DC/DC/DC, 14DI/10DO/2AI	6ES7214-1AG40-0XB0	Siemens	10194
1	SIMATIC S7-1200, COMMUNICATION BOARD CB 1241, RS485	6ES7241-1CH30-1XB0	Siemens	10197
1	SIMATIC S7 Memory Card, 4 MB	6ES7954-8LC03-0AA0	Siemens	10281
1	Widerstand 10R, 1%, 50W, Alu-Gehäuse, WD 50	160078	Widap AG	502981

CROSSWIND	**123A90 - HOLLANDSE KUST NOORD WIND PARK BLPH Project** **COMMISSIONING DOSSIER INDEX**	ROSETTI MARINO

07 As-Built P&M

STATRON
NON STOP POWER

Battery Energy Storage System (BESS)
BASE LOAD POWER HUB

Statron ref. 331497

Project Code: K559-2254
Purchase Order Number: CW-I-WP4-2022-01

SDRL Code: B01
Sequence Number: 001
Rev: 004
Document number: K559-2254-CWIWP4202201-B01-001
Document description: General Arrangements

Revision	Date	Name	Description
001	20.02.2023	CPA / ADI	First Version
002	12.04.2023	CPA / ADI	Updated according to KBR comments
003	21.01.2025	MMÜ	Second revision
004	28.01.2025	MMÜ	Drawings updated

General Arrangements
B01

for Base Load Power Hub (BLPH) Project

Classification: confidential

Document no.	B01
Document name	General Arrangements
Component / System	BESS
Project code	K559-2254

Version	Date	Name	Description
1.0	2023-03-01	C. Palenzuela	First version
2.0	2023-04-14	C. Palenzuela	Updated several pages according to KBR comments
3.0	2025-01-20	M. Müller	Second revision
4.0	2025-01-28	M. Müller	Drawings updated

Table 1: Version overview

	Date	Name
Editor	2023-04-14	C. Palenzuela
Checked by	2023-04-15	A. Fritz
Approved by	2023-04-15	C. Palenzuela

Table 2: Approval overview

Imprint

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Bürgerwiesenweg 5
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For further information please contact us by phone or send us a mail to **info@freqcon.de**.
You can also visit us on our website **http://www.freqcon.com** to find more information about our products and solutions.

Content

1 Introduction 7
1.1 About this Document 7
1.2 Display Elements 7
1.3 Other Applicable Documents 7
1.4 Generic Terms and Abbreviations Used 7
2 General 8

Identification

Product Version / Document Version

Product version
Prototype

Document release date
January 2025

Doc Code
K559-2254-CWIWP4202201-B01-001

Name and Address of Manufacturer

Manufacturer of the product
FREQCON GmbH
Bürgerwiesenweg 5
D-27336 Rethem, Germany

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Original document

This document is an original document of FREQCON GmbH.

1 Introduction

1.1 About this Document

This document is part of the documentation for the Base Load Power Hub (BLPH) Project (K559-2254). In case of any contradiction resulting by the information or specification given in this document, later documents supersede the information provided in this document.

1.2 Display Elements

Symbol	Meaning
➜	Action with one or several steps for which the sequence is irrelevant.
Step 1 : **Step 2 :**	Action with several steps for which the sequence is relevant.
•	First level of list.
-	Second level of list.

Table 1: Display Elements

1.3 Other Applicable Documents

The following documents are applicable:

Document type	Document Name
General arrangement drawing – Compete system	508261 BESS 1 MW 5.5 MWh 6.6 kV
General arrangement drawing – PCS	53396 PCS Container
General arrangement drawing – BESS 1	53406 BESS Container 1
General arrangement drawing – BESS 2	53412 BESS Container 2

Table 2: Other applicable documents

1.4 Generic Terms and Abbreviations Used

This following list should help you understand some of the abbreviations used in this document.

Generic Term and Abbreviation	Description
BESS	Battery Energy Storage System
BLPH	Base Load Power Hub
PCS	Power Conversion System

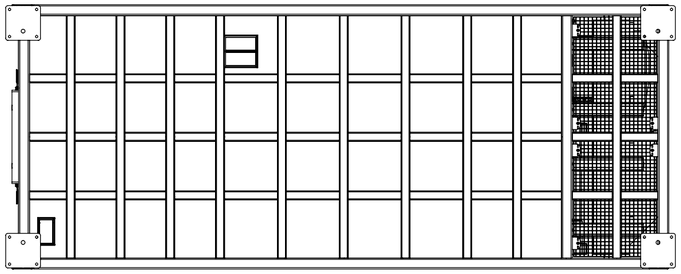
Table 3: Generic terms and abbreviations used

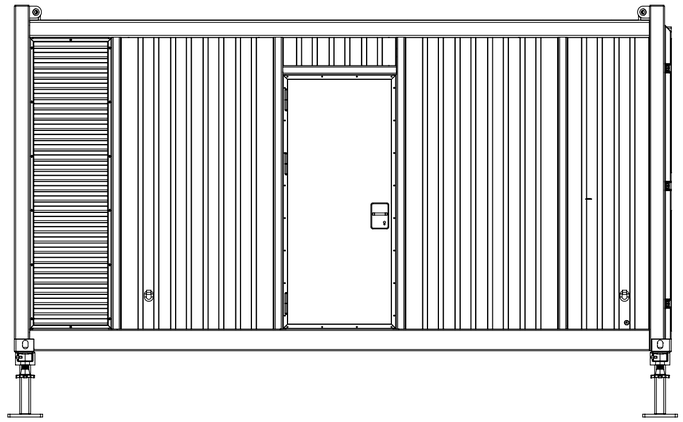
2 General

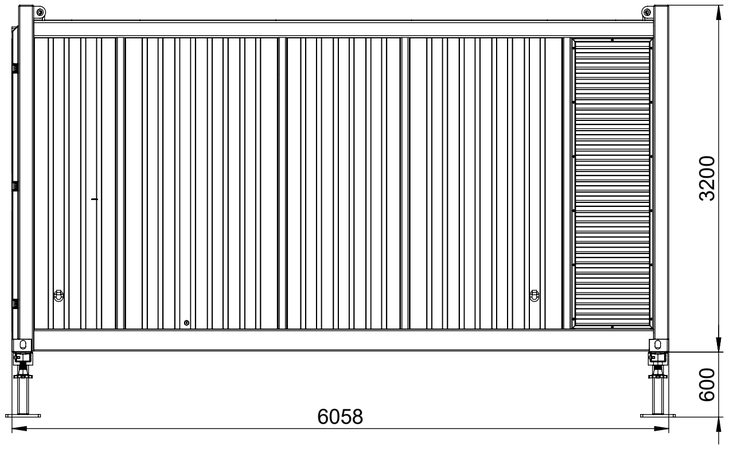
Drawings of the PCS and BESS general arrangements are attached to this document (*see section 1.3 "Other Applicable Documents"*).

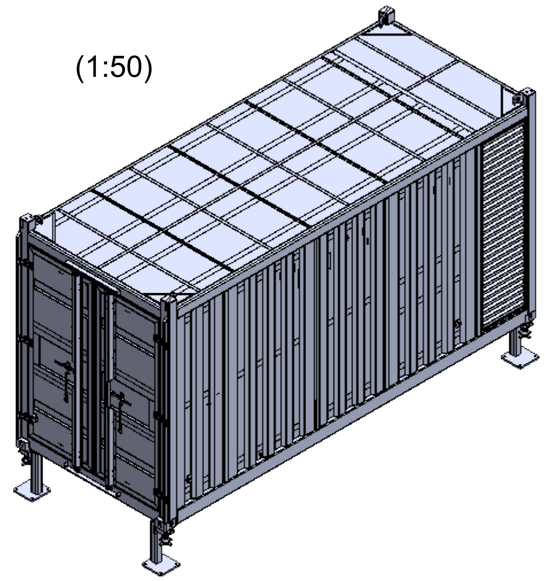
Component	Manufacturer	FRQ part no.	File Name
PCS	FREQCON	53396	53396 PCS Container.pdf
BESS 1		53406	53406 BESS Container 1.pdf
BESS 2		53412	53412 BESS Container 2.pdf
Complete System		508261	508261 BESS 1 MW 5.5 MWh 6.6 kV

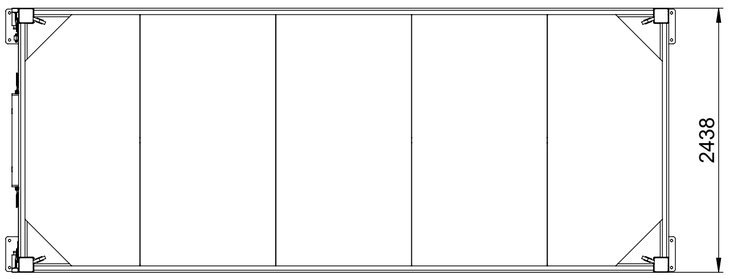
Table 4: Other applicable documents











Rev.:	Änderung (changes):	Datum (Date):	Name:

Allgemeintoleranzen für Längenmaße DIN ISO 2768-mK

Genauigkeitsgrad	Abmaße in mm für Nennmaßbereiche						
	0.5 ... 3	> 3 ... 6	> 6 ... 30	> 30 ... 120	> 120 ... 400	> 400 ... 1000	> 1000 ... 2000
m (mittel)	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2

Oberfläche: - (surface)

Werkstoff (material):

Gewicht (weight): 12199.00 kg

+0,5 -0,5

ISO 13715

	Datum (Date):	Name:
Drawn:	23.02.2023	i. Hirsch
Checked:	21.03.2024	MvD

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Freqcon GmbH
Bürgerwiesenweg 5
D-27336 Rethem
+49 (0) 5165 291760-0

Bezeichnung (description):

Umrichtercontainer

PCS (Converter) Container

Scale: 1:40

Sheet: 1 (A2)

1 of: 5

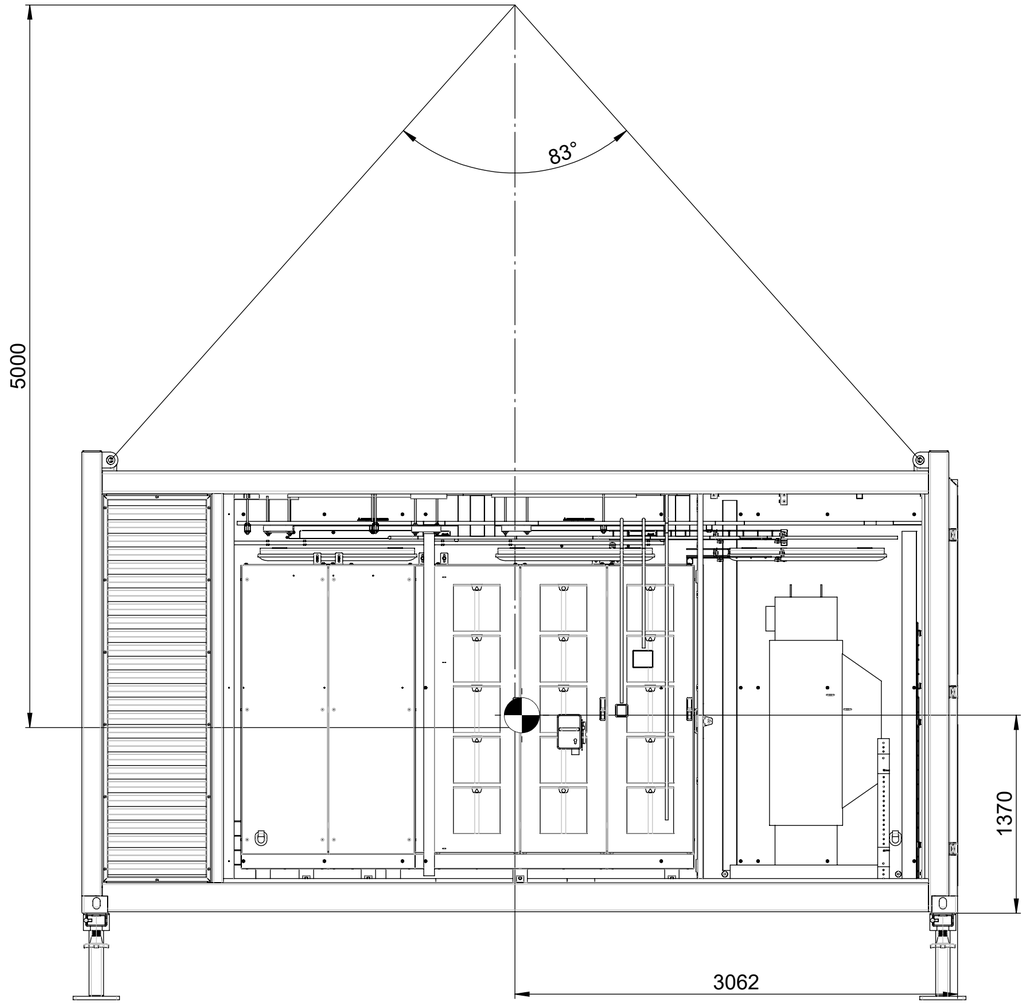
Artikel-Nr. (article number): 53396

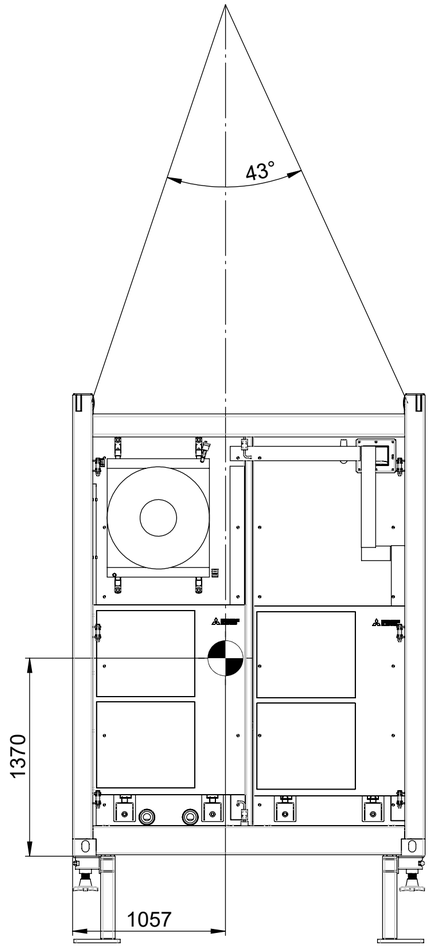
Revision:

alte Zeichnungs-Nr. (old drawing number):

CAD System SolidWorks

Status: Freigegeben





Rev.:	Änderung (changes):	Datum (Date):	Name:

Allgemeintoleranzen für Längenmaße DIN ISO 2768-mK
Abmaße in mm für Nennmaßbereiche

Genauigkeitsgrad	0,5 ... 3	> 3 ... 6	> 6 ... 30	> 30 ... 120	> 120 ... 400	> 400 ... 1000	> 1000 ... 2000
m (mittel)	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2

+0,5 -0,5
ISO 13715

	Datum (Date):	Name:
Drawn:	23.02.2023	i. Hirsch
Checked:	21.03.2024	MvD

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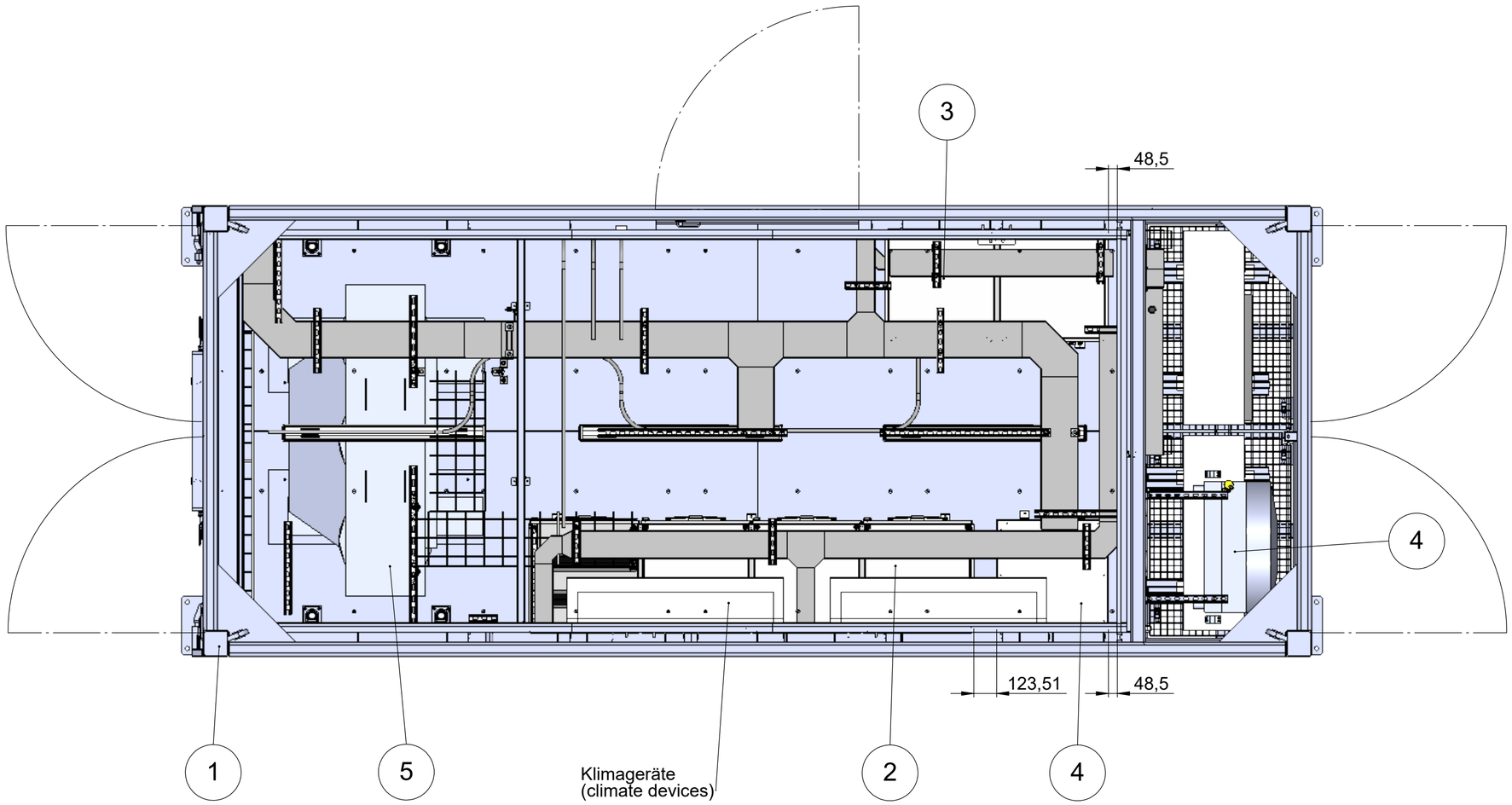
Oberfläche: (surface) -
Werkstoff (material): 12199.00 kg

Bezeichnung (description):
Umrichtercontainer
PCS (Converter) Container

Scale: 1:30
Sheet: 2 (A2)
2 of: 5
Revision:

Artikel-Nr. (article number): 53396
Projekt-Nr. & Kunde (project number & customer):

CAD System SolidWorks | Status: Freigegeben



Pos. Nr.	Menge	**Bezeichnung**	engl. Bezeichnung	Art.-Nr.	**Lieferant**	**Lieferanten Nr.**
1	1	Umrichtercontainer_20ft	PCS Container 20ft	508727	--	--
2	1	Umrichter	Converter System	53399	Freqcon	--
3	1	Steuerschrank1&2	Control Cabinets 1&2	53763	--	--
4	1	Kühlsystem	Cooling System	53405	--	--
5	1	Gießharztransformator 1250kVA	transformer 1250kVA	508464	Powerfullstop	

Rev.:	Änderung (changes):	Datum (Date):	Name:

Allgemeintoleranzen für Längenmaße DIN ISO 2768-mK

Abmaße in mm für Nennmaßbereiche

Genauigkeitsgrad	0,5 ... 3	> 3 ... 6	> 6 ... 30	> 30 ... 120	> 120 ... 400	> 400 ... 1000	> 1000 ... 2000
m (mittel)	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2

Oberfläche: (surface) -

Werkstoff (material): 15899.18 kg

+0,5 -0,5

ISO 13715

	Datum (Date):	Name:
Drawn:	23.02.2023	i. Hirsch
Checked:	21.03.2024	MvD

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Freqcon GmbH
Bürgerwiesenweg 5
D-27336 Rethem
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Bezeichnung (description):

Umrichtercontainer

PCS (Converter) Container

Scale: 1:20

Sheet: 3 (A2)

Artikel-Nr. (article number): 53396

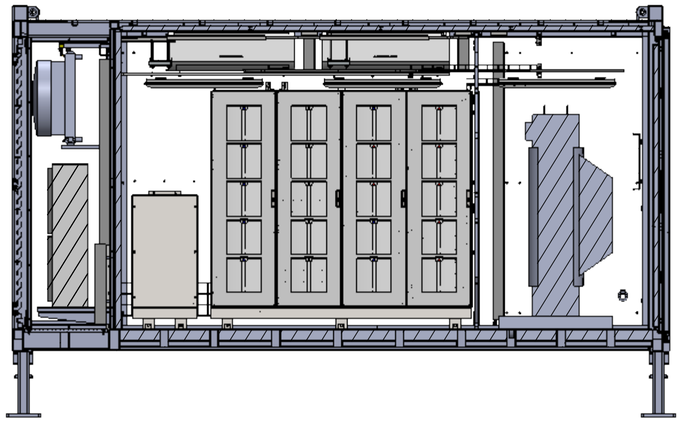
3 of: 5

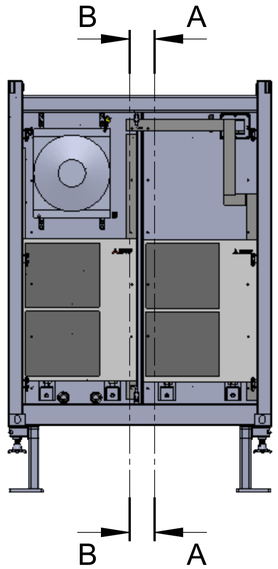
Revision:

Projekt-Nr. & Kunde (project number & customer):

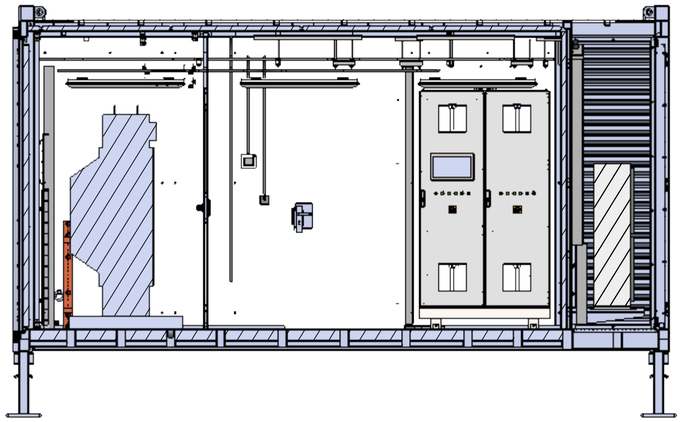
CAD System SolidWorks | Status: Freigegeben

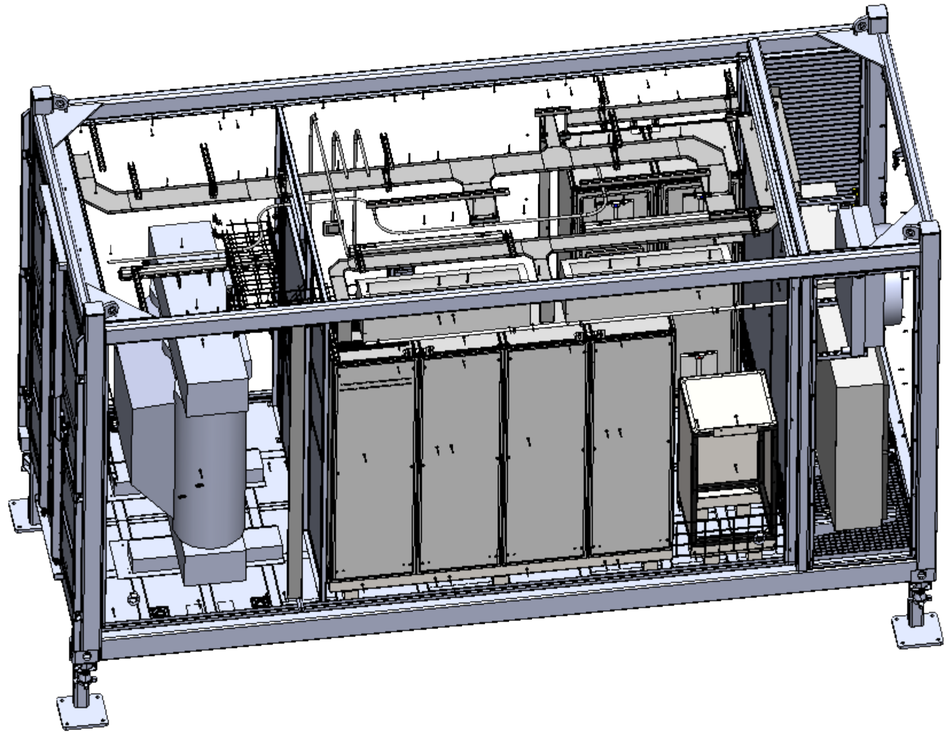
A-A





B-B





Rev.:	Änderung (changes):	Datum (Date):	Name:

Allgemeintoleranzen für Längenmaße DIN ISO 2768-mK

Genauigkeitsgrad	Abmaße in mm für Nennmaßbereiche						
	0.5 ... 3	> 3 ... 6	> 6 ... 30	> 30 ... 120	> 120 ... 400	> 400 ... 1000	> 1000 ... 2000
m (mittel)	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2

Oberfläche: (surface) -

Werkstoff (material): 12199.00 kg

+0,5 -0,5

ISO 13715

	Datum (Date):	Name:
Drawn:	23.02.2023	i. Hirsch
Checked:	21.03.2024	MvD

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Bezeichnung (description):

Umrichtercontainer

PCS (Converter) Container

Scale: 1:40

Sheet: 4 (A2)

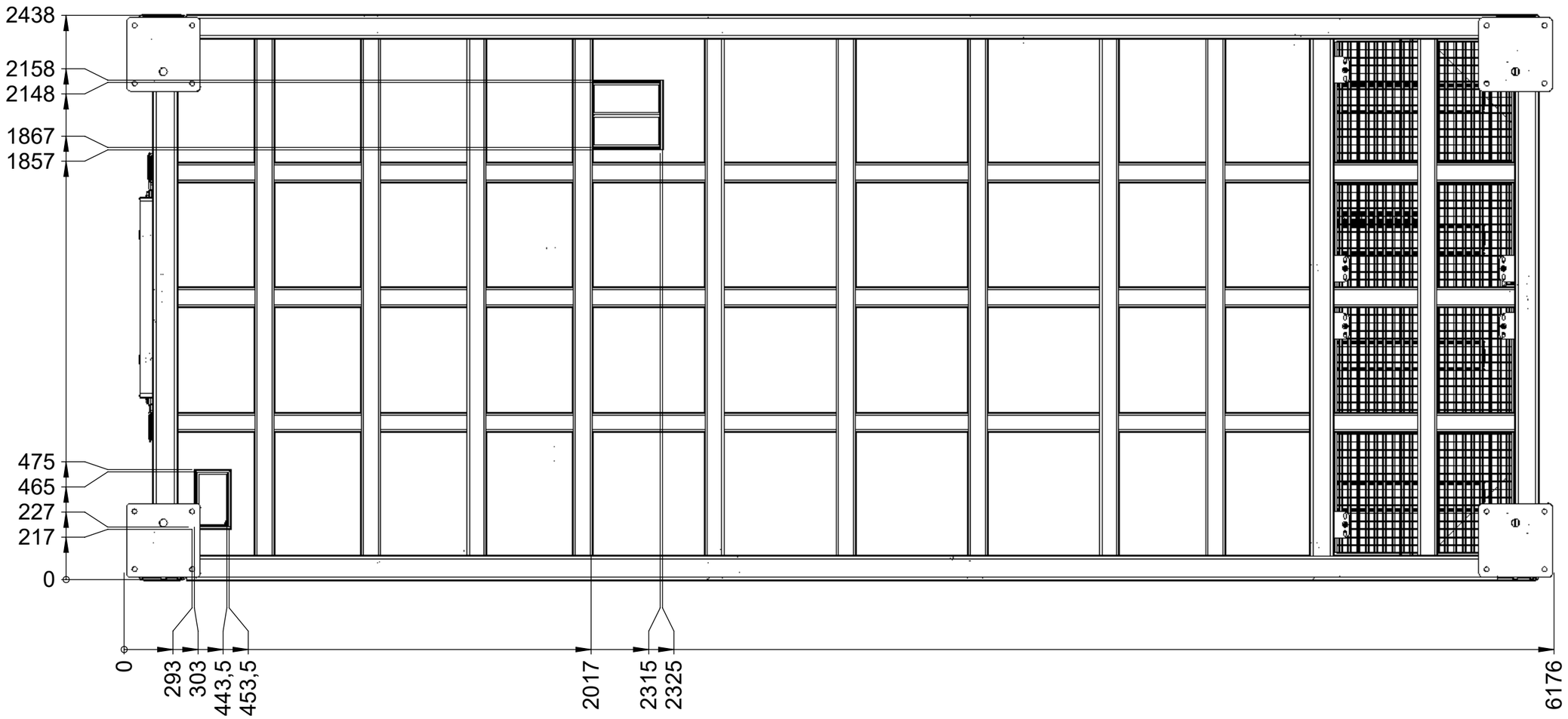
4 of: 5

Artikel-Nr. (article number): 53396

Revision:

Projekt-Nr. & Kunde (project number & customer):

CAD System SolidWorks | Status: Freigegeben



Rev.:	Änderung (changes):	Datum (Date):	Name:

Allgemeintoleranzen für Längenmaße DIN ISO 2768-mK							
Genauigkeitsgrad	Abmaße in mm für Nennmaßbereiche						
	0.5 ... 3	> 3 ... 6	> 6 ... 30	> 30 ... 120	> 120 ... 400	> 400 .. 1000	> 1000 ... 2000
m (mittel)	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2

ISO 13715

	Datum (Date):	Name:
Drawn:	23.02.2023	i. Hirsch
Checked:	21.03.2024	MvD

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Oberfläche: (surface) -

Werkstoff (material):

Gewicht (weight): 5562.00 kg

Bezeichnung (description):

Umrichtercontainer

PCS (Converter) Container

Scale: 1:20

Sheet: 5 (A3)

5 of: 5

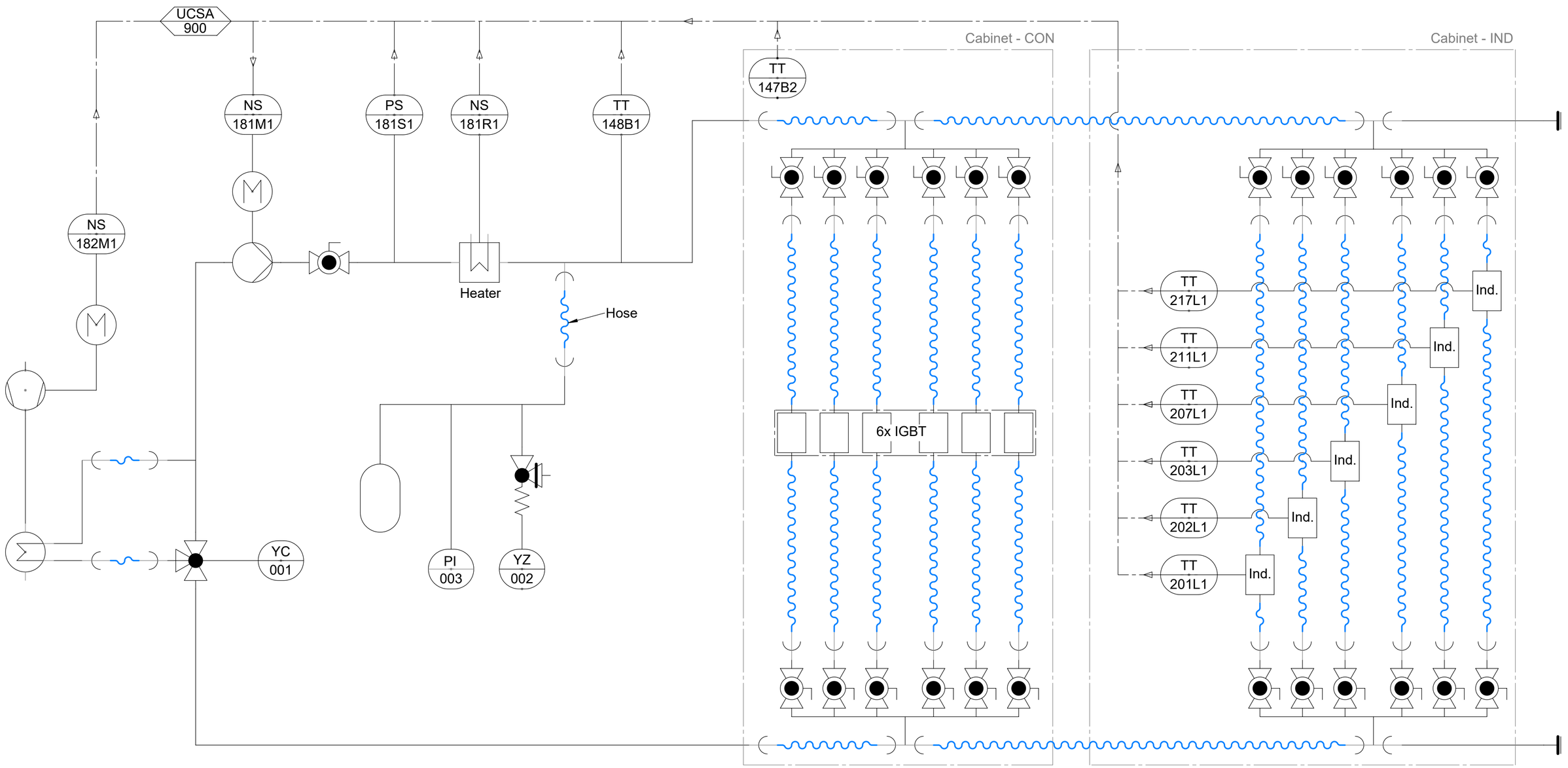
Artikel-Nr. (article number): 53396

Revision:

Projekt-Nr. & Kunde (project number & customer):

CAD System SolidWorks

Status: Freigegeben



Rev.:	Änderung (changes):	Datum (Date):	Name:

Allgemeintoleranzen für Längenmaße DIN ISO 2768-mK

Genauigkeitsgrad	Abmaße in mm für Nennmaßbereiche						
	0.5 ... 3	> 3 ... 6	> 6 ... 30	> 30 ... 120	> 120 ... 400	> 400 ... 1000	> 1000 ... 2000
m (mittel)	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2

+0,5 -0,5
ISO 13715

	Datum (Date):	Name:
Drawn:	28.11.2024	JK
Checked:	28.11.2024	RK

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Oberfläche: (surface)

Werkstoff (material): kg

Bezeichnung (description):

Umrichter R&I-Fließschemata

Scale: 1:1

Sheet: 1 (A2)

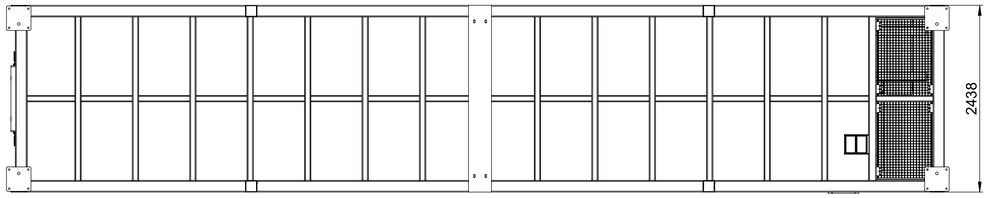
1 of: 1

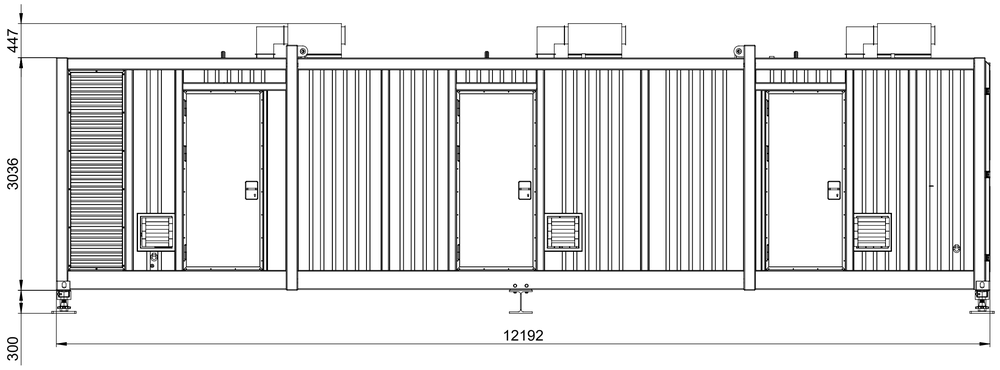
Revision:

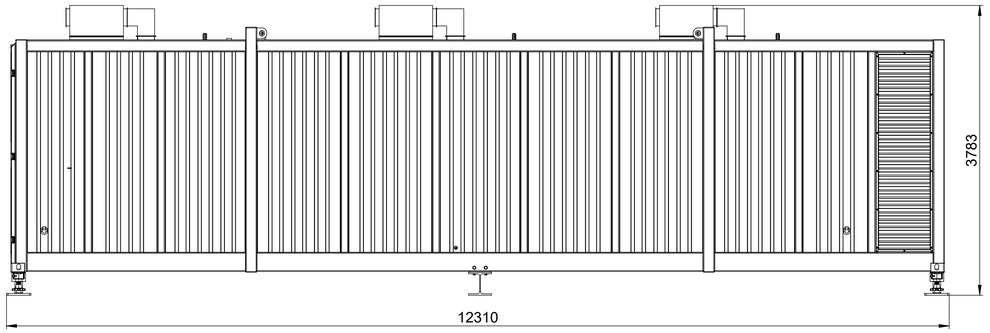
Artikel-Nr. (article number): 53399

Projekt-Nr. & Kunde (project number & customer): 23A2007 Statron Shell

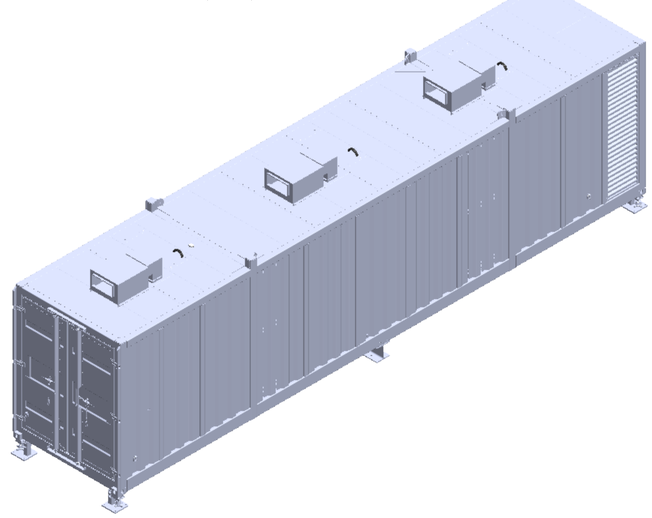
CAD System SolidWorks | Status: Freigegeben

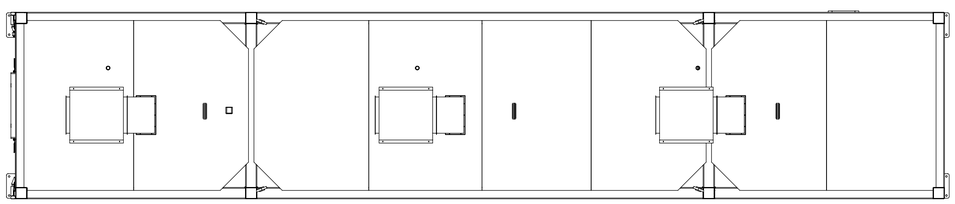




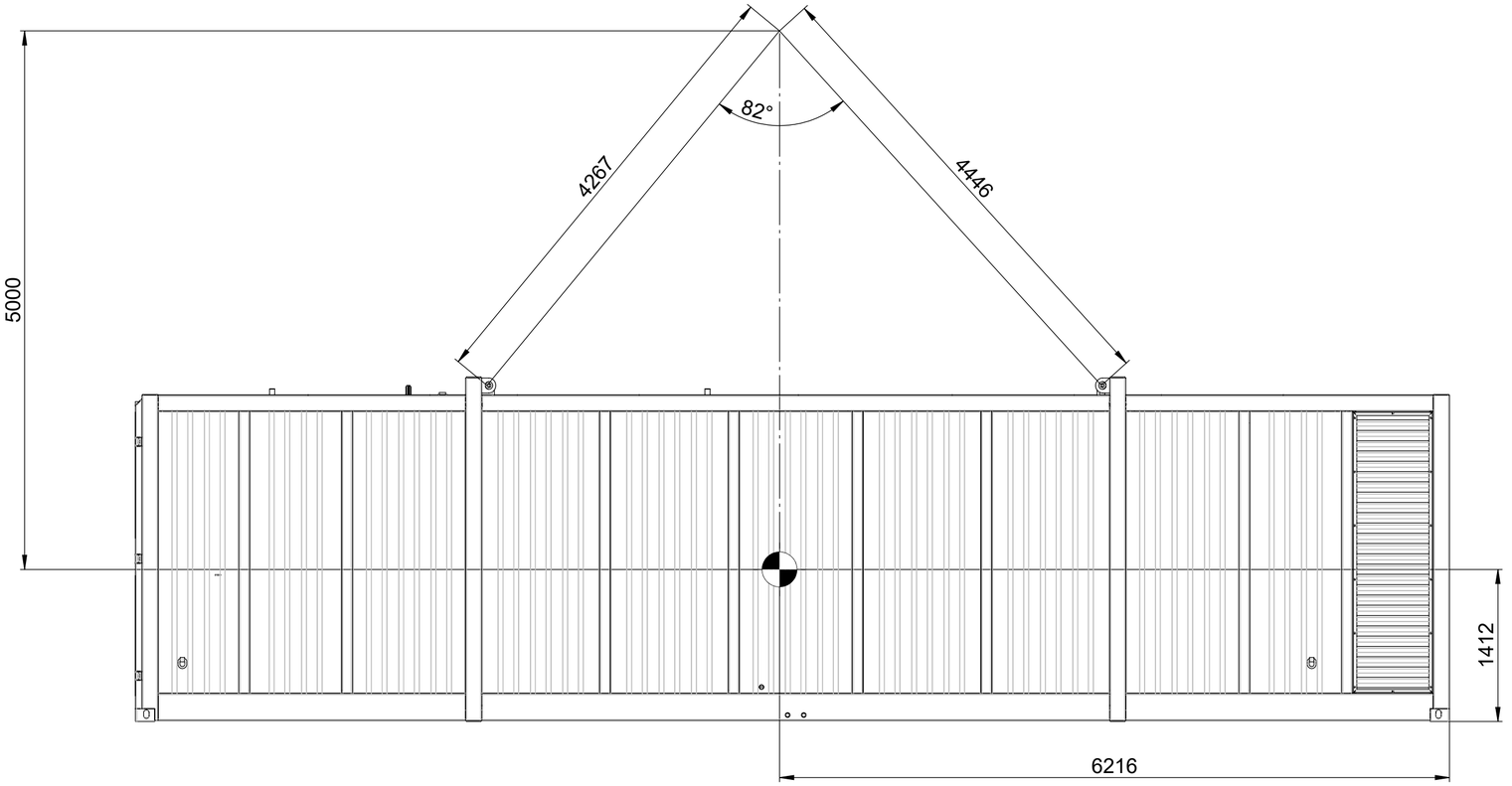


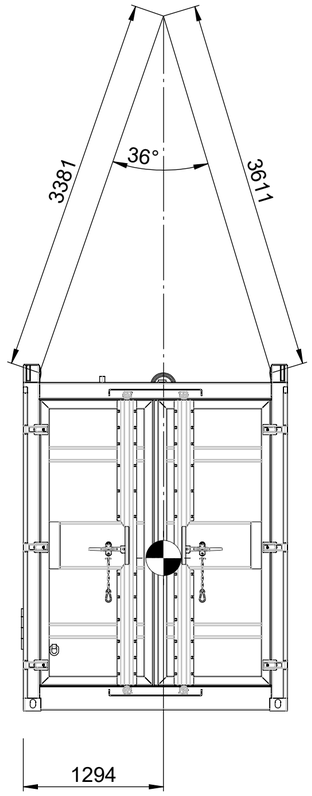
(1:50)





| | | |





Rev.:	Änderung (changes):	Datum (Date):	Name:

Allgemeintoleranzen für Längenmaße DIN ISO 2768-mK							
Genauigkeitsgrad	Abmaße in mm für Nennmaßbereiche						
	0.5 ... 3	> 3 ... 6	> 6 ... 30	> 30 ... 120	> 120 ... 400	> 400 ... 1000	> 1000 ... 2000
m (mittel)	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2

+0,5 -0,5
ISO 13715

	Datum (Date):	Name:
Drawn:	22.02.2023	i. Hirsch
Checked:	30.05.2024	MvD

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Oberfläche: - (surface)

Werkstoff (material): Gewicht (weight): 14250.00 kg

Bezeichnung (description):

Batteriecontainer 1

Battery Container 1

Scale: 1:40

Sheet: 2 (A2)

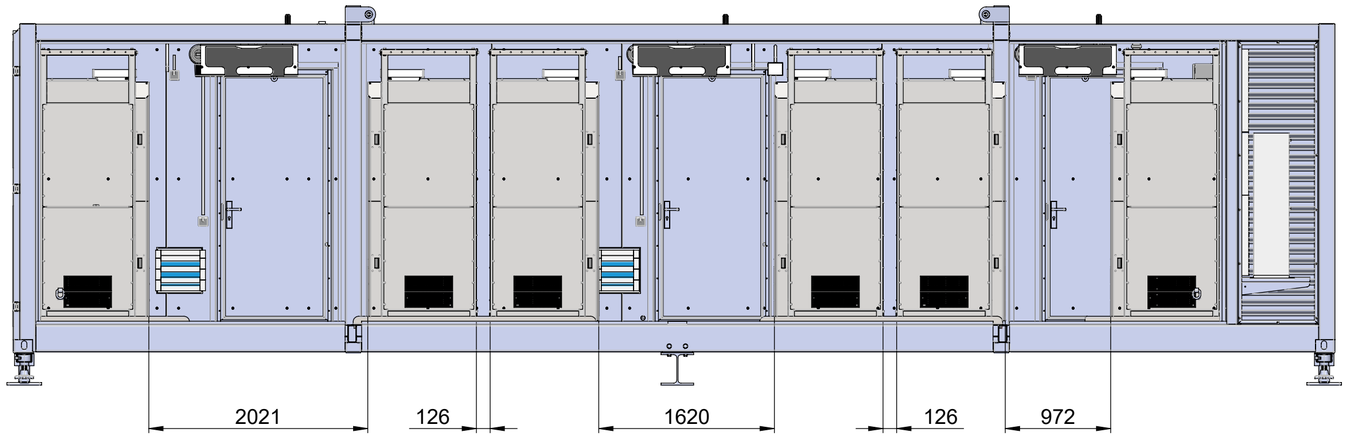
2 of: 5

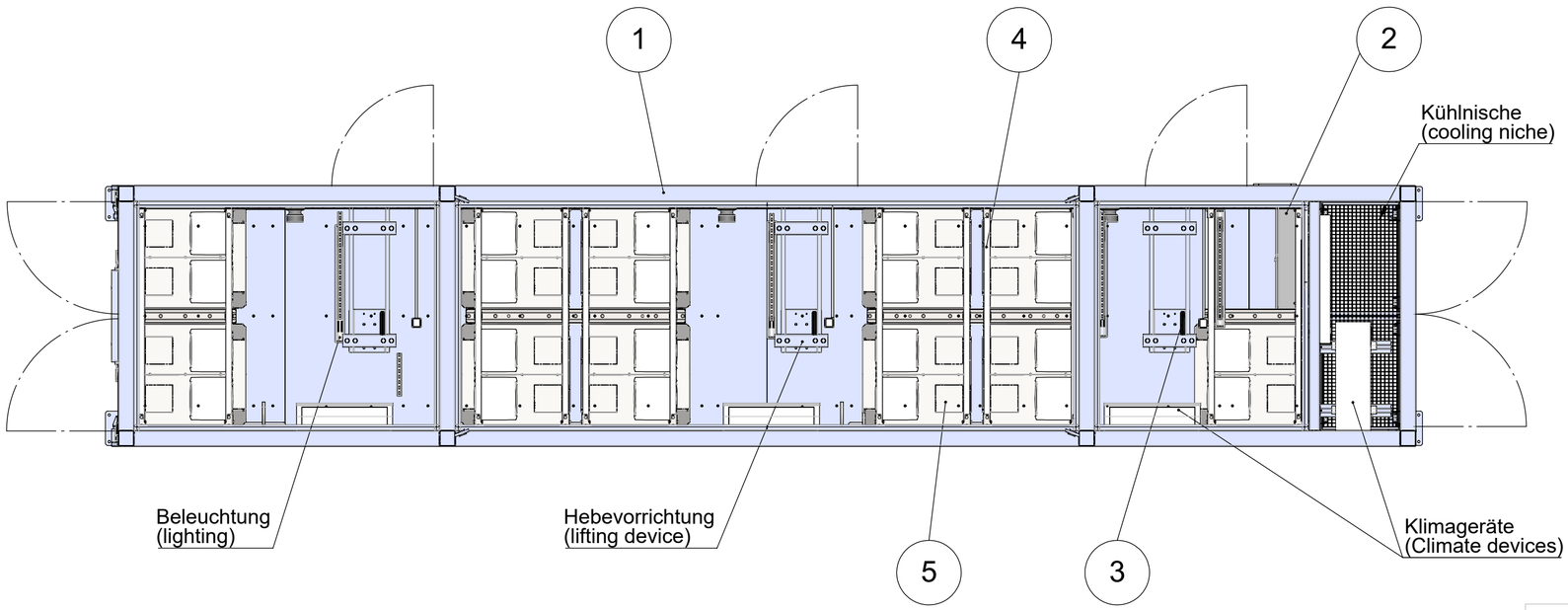
Artikel-Nr. (article number): 53406

Revision:

alte Zeichnungs-Nr. (old drawing number):

CAD System SolidWorks | Status: Freigegeben





Pos. Nr.	Menge	**Bezeichnung**	engl. Bezeichnung	Art.-Nr.	**Lieferant**	**Lieferanten Nr.**
1	1	BESS Container 1 RHS	BESS container 1 RHS	508728	--	--
2	1	Hilfsversorgungsschrank 1	Distribution Cabinet 1	53409	--	--
3	3	Netzanschlussleitung/Verlängerungskabel 3m, Schwar	Mains connection cable/extension cable	54615	Famo	2810377
4	1	Einbaurahmen Verstärkt	Reinforced mounting frame	509198		
5	11	Schrank_verstärkt_mit Einsch._LF280K_28	Reinforced cabinet with slide-in Units_28	54625	--	--

Rev.:	Änderung (changes):	Datum (Date):	Name:

Allgemeintoleranzen für Längenmaße DIN ISO 2768-mK

Genauigkeitsgrad	Abmaße in mm für Nennmaßbereiche						
	0.5 ... 3	> 3 ... 6	> 6 ... 30	> 30 ... 120	> 120 ... 400	> 400 ... 1000	> 1000 ... 2000
m (mittel)	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2

+0,5 -0,5
ISO 13715

	Datum (Date):	Name:
Drawn:	22.02.2023	i. Hirsch
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Oberfläche: (surface) -

Werkstoff (material): 14791.35 kg

Bezeichnung (description):

Batteriecontainer 1

Battery Container 1

Scale: 1:40

Sheet: 3 (A2)

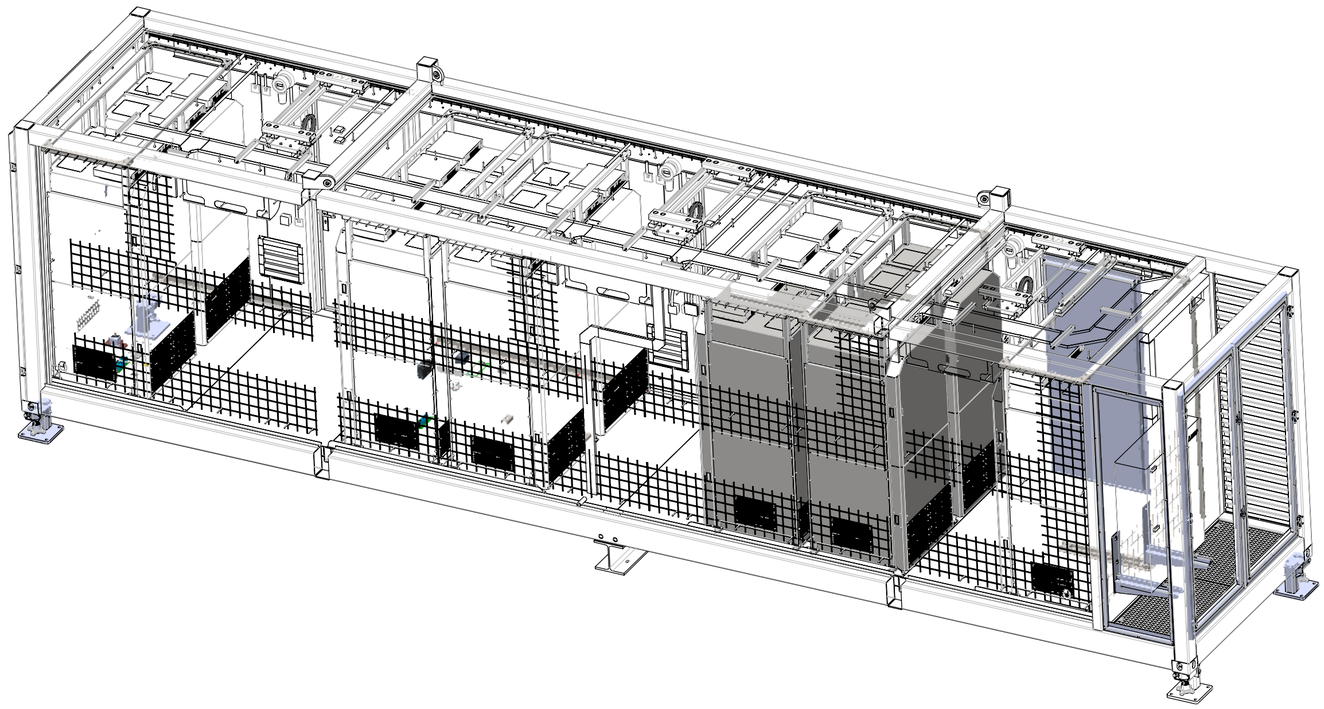
Artikel-Nr. (article number): 53406

3 of: 5

Revision:

Projekt-Nr. & Kunde (project number & customer):

CAD System SolidWorks | Status: Freigegeben



Rev.:	Änderung (changes):	Datum (Date):	Name:

Allgemeintoleranzen für Längenmaße DIN ISO 2768-mK

Genauigkeitsgrad	Abmaße in mm für Nennmaßbereiche						
	0.5 ... 3	> 3 ... 6	> 6 ... 30	> 30 ... 120	> 120 ... 400	> 400 ... 1000	> 1000 ... 2000
m (mittel)	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2

ISO 13715

	Datum (Date):	Name:
Drawn:	22.02.2023	i. Hirsch
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Oberfläche: (surface) -

Werkstoff (material): 35853.00 kg

Bezeichnung (description):

Batteriecontainer 1

Battery Container 1

Scale: 1:40

Sheet: 4 (A2)

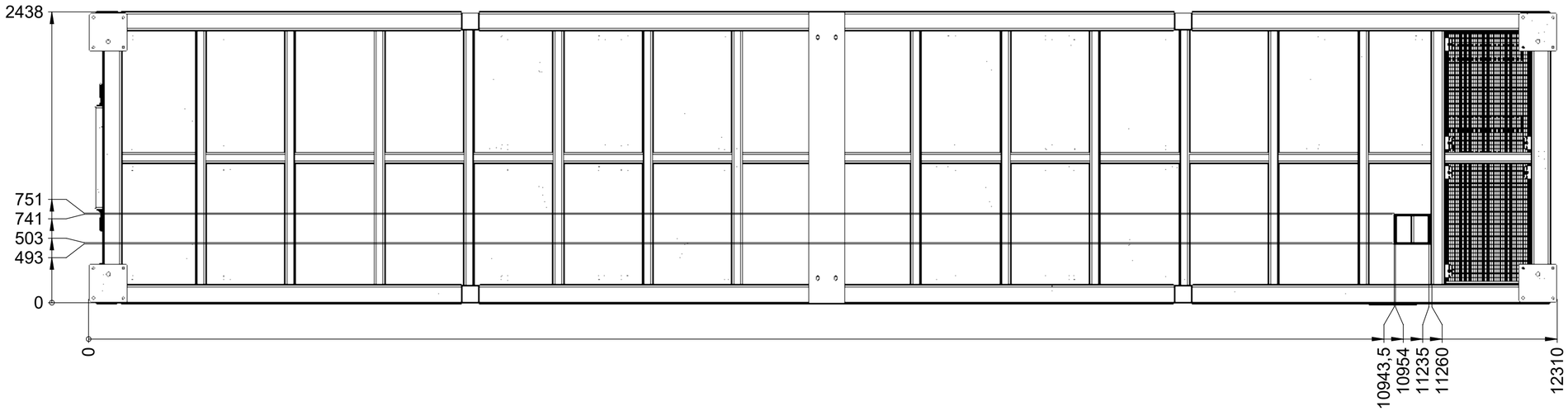
Artikel-Nr. (article number): 53406

4 of: 5

Revision:

Projekt-Nr. & Kunde (project number & customer):

CAD System SolidWorks | Status: Freigegeben



Rev.:	Änderung (changes):	Datum (Date):	Name:

Allgemeintoleranzen für Längenmaße DIN ISO 2768-mK

Genauigkeitsgrad	Abmaße in mm für Nennmaßbereiche						
	0.5 ... 3	> 3 ... 6	> 6 ... 30	> 30 ... 120	> 120 ... 400	> 400 ... 1000	> 1000 ... 2000
m (mittel)	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2

Oberfläche: (surface) -

Werkstoff (material):

Gewicht (weight): 35853.00 kg

+0,5 -0,5

ISO 13715

	Datum (Date):	Name:
Drawn:	22.02.2023	i. Hirsch
Checked:	30.05.2024	MvD

Bezeichnung (description):

Batteriecontainer 1

Battery Container 1

Scale: 1:30

Sheet: 5 (A2)

5 of: 5

Revision:

Artikel-Nr. (article number): 53406

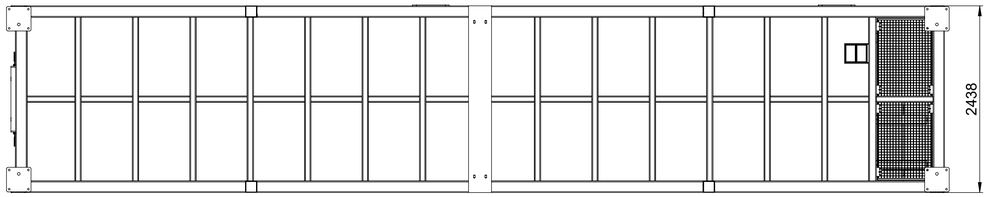
Projekt-Nr. & Kunde (project number & customer):

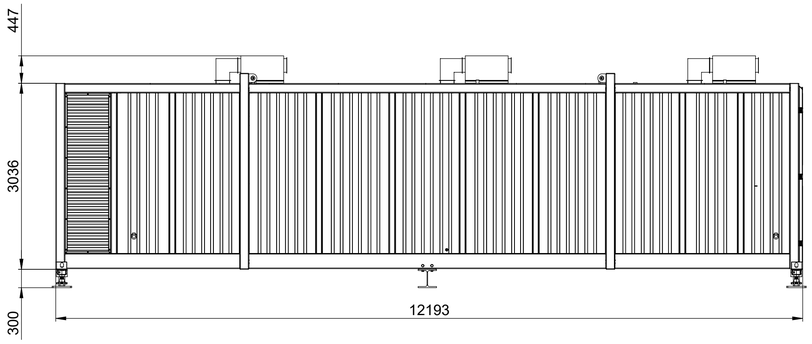
CAD System SolidWorks

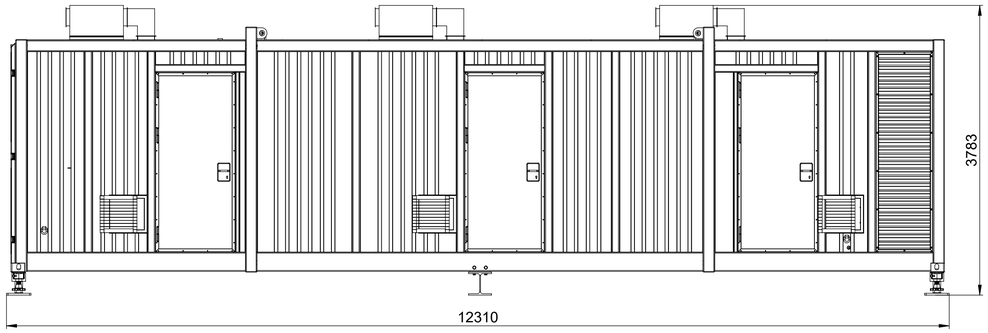
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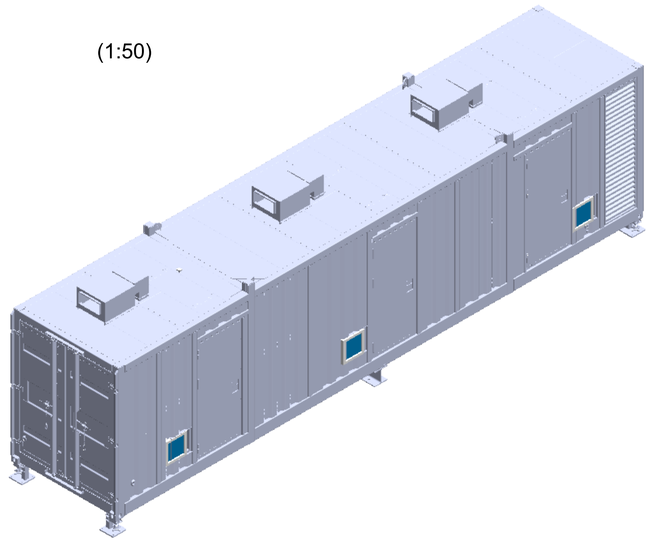
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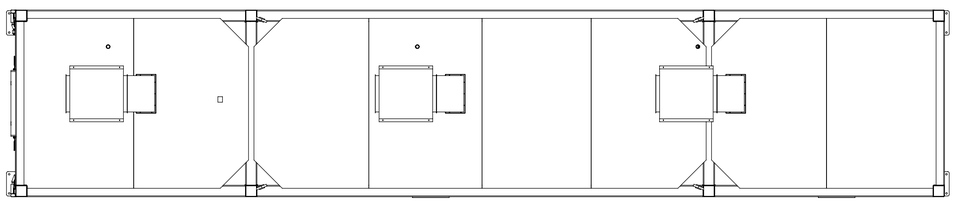




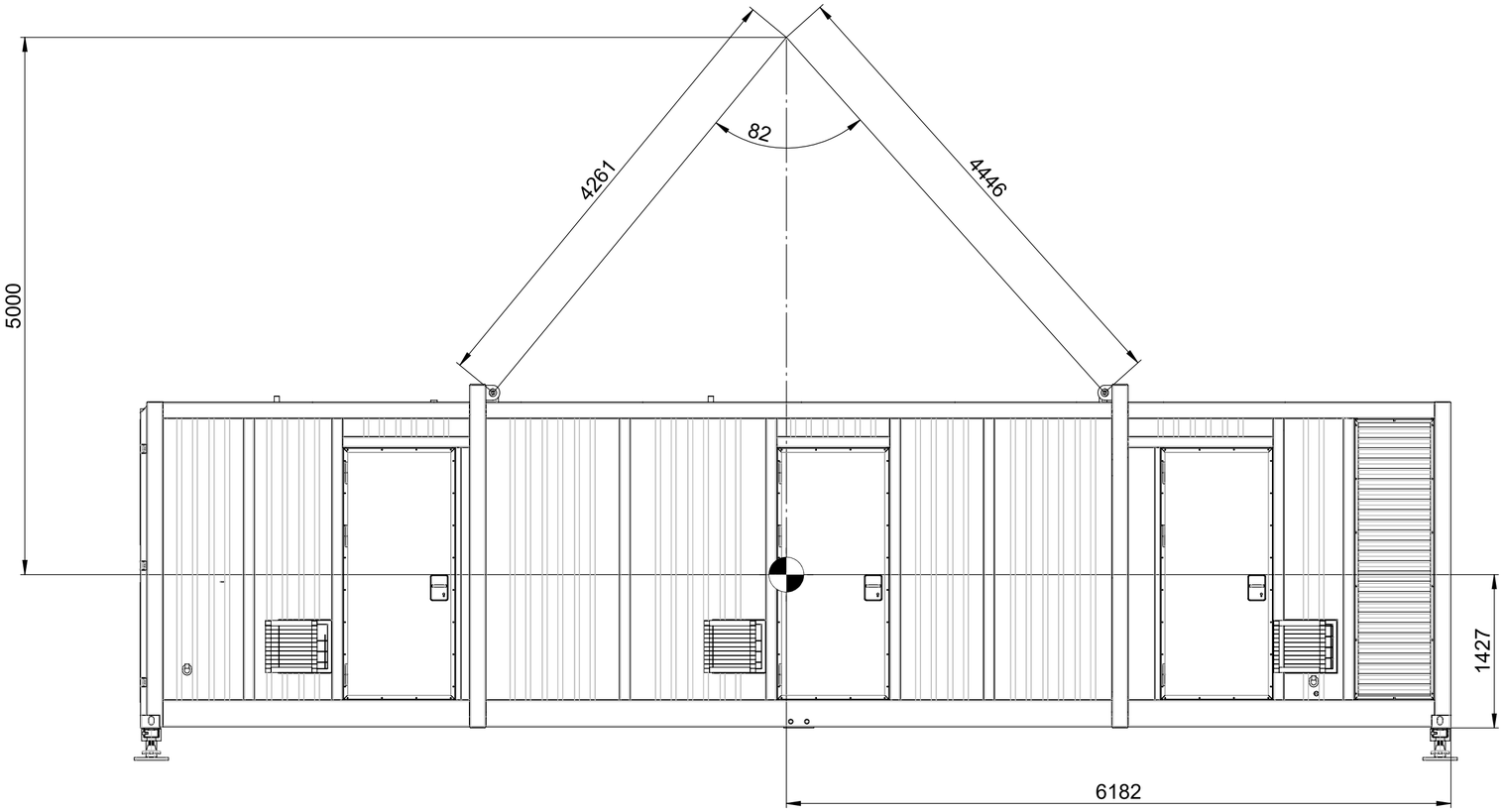


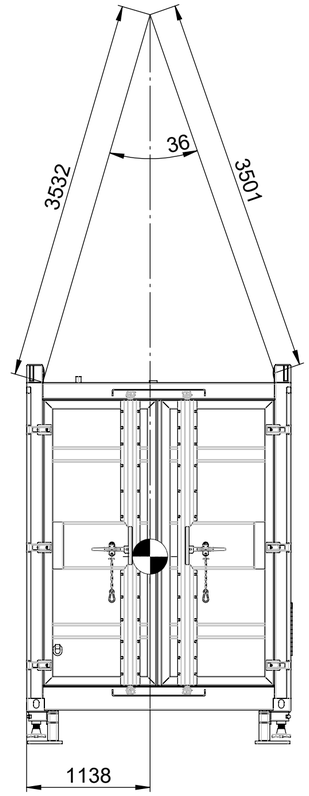
(1:50)





| | | |





Rev.:	Änderung (changes):	Datum (Date):	Name:

Allgemeintoleranzen für Längenmaße DIN ISO 2768-mK

Genauigkeitsgrad	Abmaße in mm für Nennmaßbereiche						
	0.5 ... 3	> 3 ... 6	> 6 ... 30	> 30 ... 120	> 120 ... 400	> 400 ... 1000	> 1000 ... 2000
m (mittel)	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2

+0,5 -0,5
ISO 13715

	Datum (Date):	Name:
Drawn:	17.02.2023	i. Hirsch
Checked:	30.05.2024	MvD

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Oberfläche: (surface) -

Werkstoff (material): 14250.00 kg

Bezeichnung (description):

Batteriecontainer 2

Battery Container 2

Scale: 1:40

Sheet: 2 (A2)

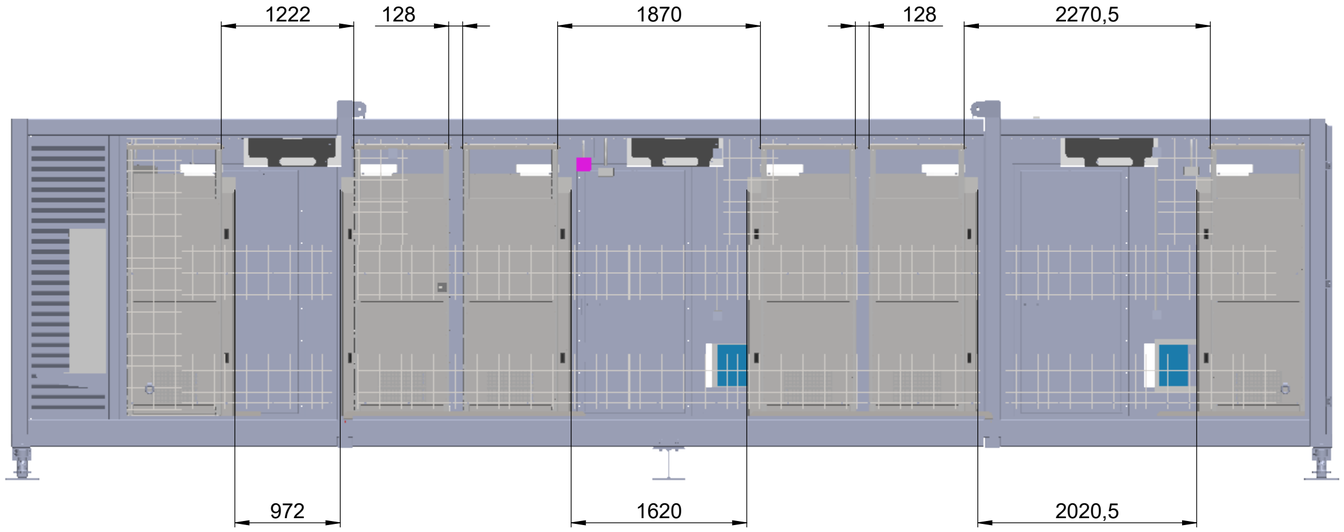
2 of: 5

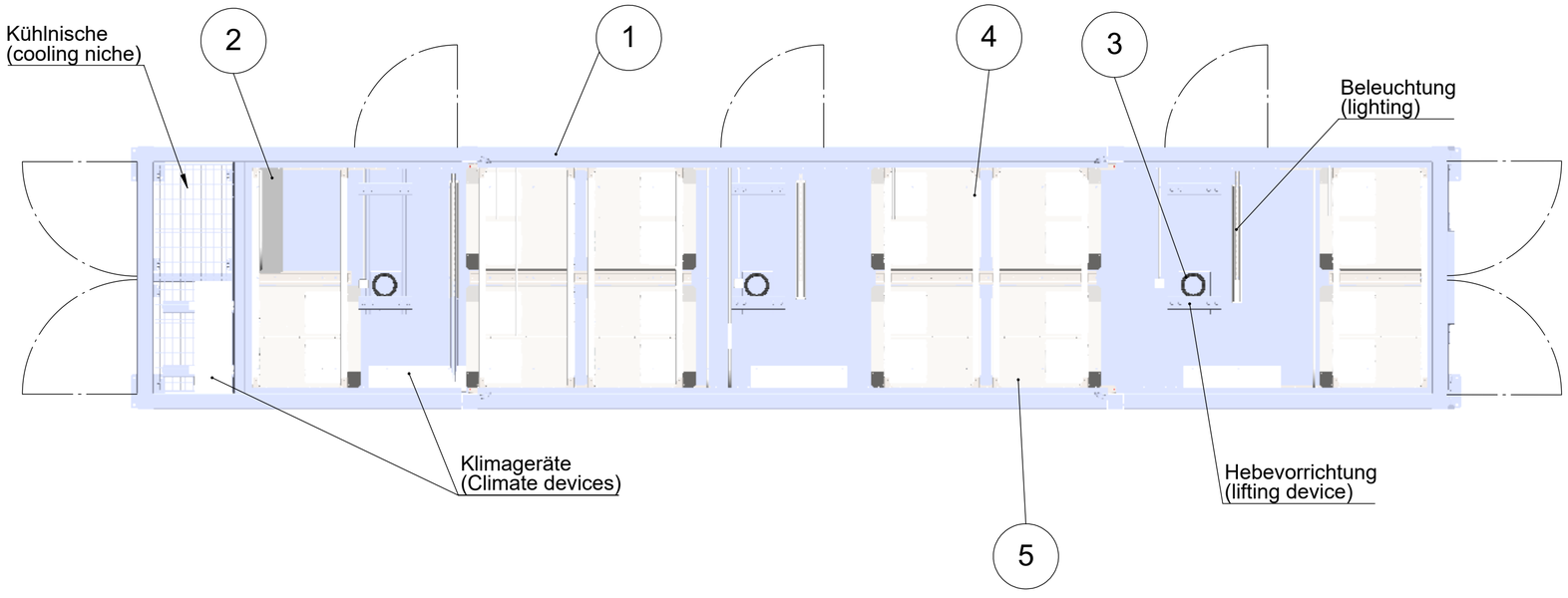
Artikel-Nr. (article number): 53412

Revision:

Projekt-Nr. & Kunde (project number & customer):

CAD System SolidWorks | Status: Freigegeben





Pos. Nr.	Menge	**Bezeichnung**	engl. Bezeichnung	Art.-Nr.	**Lieferant**	**Lieferanten Nr.**
1	1	BESS Container 2 LHS	BESS container 2 LHS	507828	--	--
2	1	Hilfsversorgungsschrank 1	Distribution Cabinet 1	53409	--	--
3	3	Netzanschlussleitung/Verlängerungskabel 3m, Schwar	Mains connection cable/extension cable	54615	Famo	2810377
4	1	Einbaurahmen Verstärkt	Reinforced mounting frame	509198		
5	11	Schrank_verstärkt_mit Einsch._LF280K_28	Reinforced cabinet with slide in Units_28	54625	--	--

Rev.:	Änderung (changes):	Datum (Date):	Name:

Allgemeintoleranzen für Längenmaße DIN ISO 2768-mK

Genauigkeitsgrad	Abmaße in mm für Nennmaßbereiche						
	0.5 ... 3	> 3 ... 6	> 6 ... 30	> 30 ... 120	> 120 ... 400	> 400 ... 1000	> 1000 ... 2000
m (mittel)	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2

+0,5 -0,5
ISO 13715

	Datum (Date):	Name:
Drawn:	17.02.2023	i. Hirsch
Checked:	30.05.2024	MvD

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Oberfläche: (surface) -

Werkstoff (material): 12214.44 kg

Bezeichnung (description):

Batteriecontainer 2

Battery Container 2

Scale: 1:40

Sheet: 3 (A2)

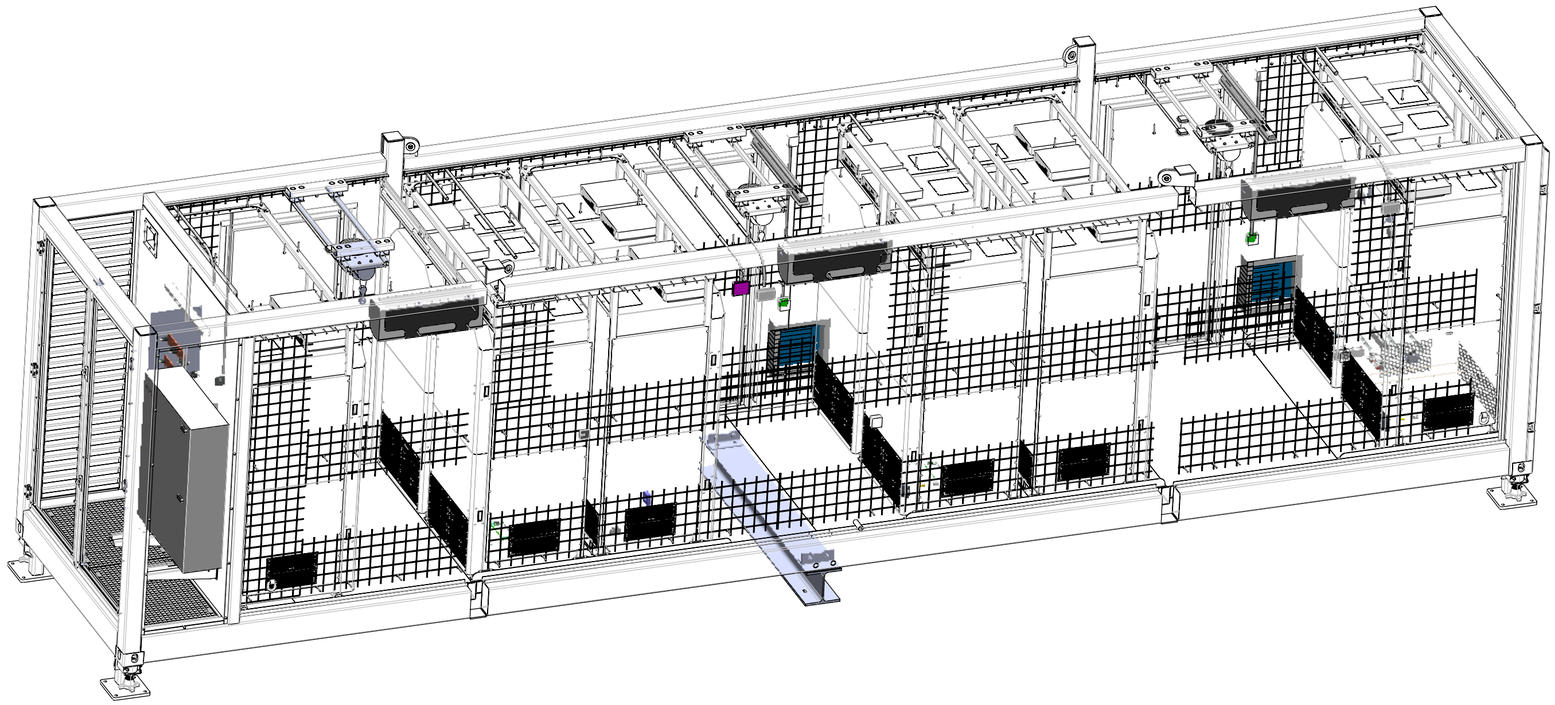
Artikel-Nr. (article number): 53412

3 of: 5

Revision:

Projekt-Nr. & Kunde (project number & customer):

CAD System SolidWorks | Status: Freigegeben



Rev.:	Änderung (changes):	Datum (Date):	Name:

Allgemeintoleranzen für Längenmaße DIN ISO 2768-mK							
Genauigkeitsgrad	Abmaße in mm für Nennmaßbereiche						
	0.5 ... 3	> 3 ... 6	> 6 ... 30	> 30 ... 120	> 120 ... 400	> 400 ... 1000	> 1000 ... 2000
m (mittel)	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2

Oberfläche: (surface) -

Werkstoff (material): 12214.44 kg

+0,5 -0,5

ISO 13715

	Datum (Date):	Name:
Drawn:	17.02.2023	i. Hirsch
Checked:	30.05.2024	MvD

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Bezeichnung (description):

Batteriecontainer 2

Battery Container 2

Scale: 1:35

Sheet: 4 (A2)

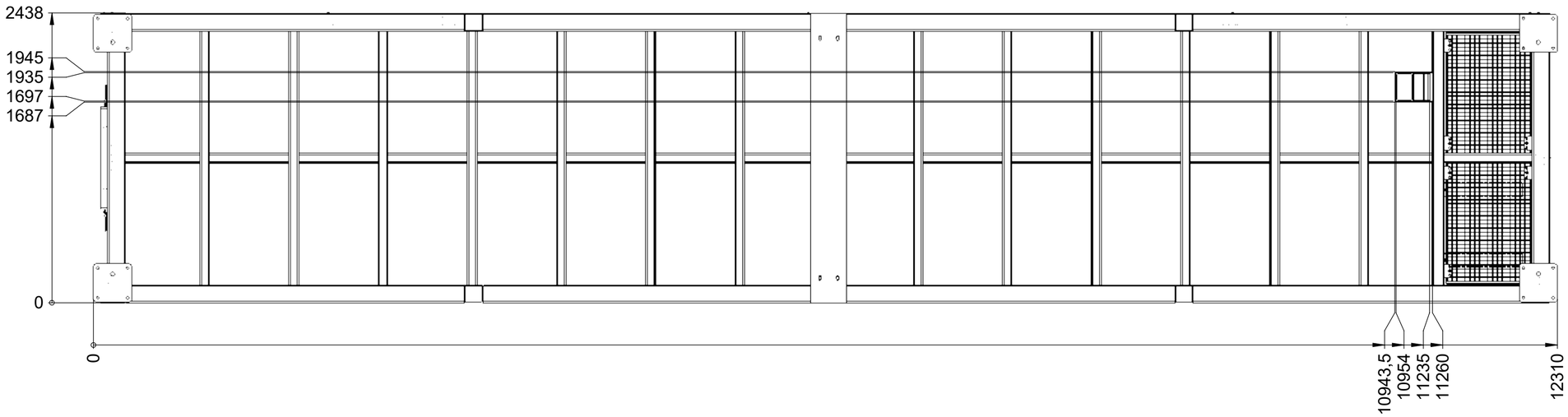
4 of: 5

Artikel-Nr. (article number): 53412

Revision:

Projekt-Nr. & Kunde (project number & customer):

CAD System SolidWorks | Status: Freigegeben



Rev.:	Änderung (changes):	Datum (Date):	Name:

Allgemeintoleranzen für Längenmaße DIN ISO 2768-mK

Genauigkeitsgrad	Abmaße in mm für Nennmaßbereiche						
	0.5 ... 3	> 3 ... 6	> 6 ... 30	> 30 ... 120	> 120 ... 400	> 400 ... 1000	> 1000 ... 2000
m (mittel)	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2

Oberfläche: (surface) -

Werkstoff (material):

Gewicht (weight): 7339.14 kg

+0,5 -0,5

ISO 13715

	Datum (Date):	Name:
Drawn:	17.02.2023	i. Hirsch
Checked:	30.05.2024	MvD

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Bezeichnung (description):

Batteriecontainer 2

Battery Container 2

Scale: 1:30

Sheet: 5 (A2)

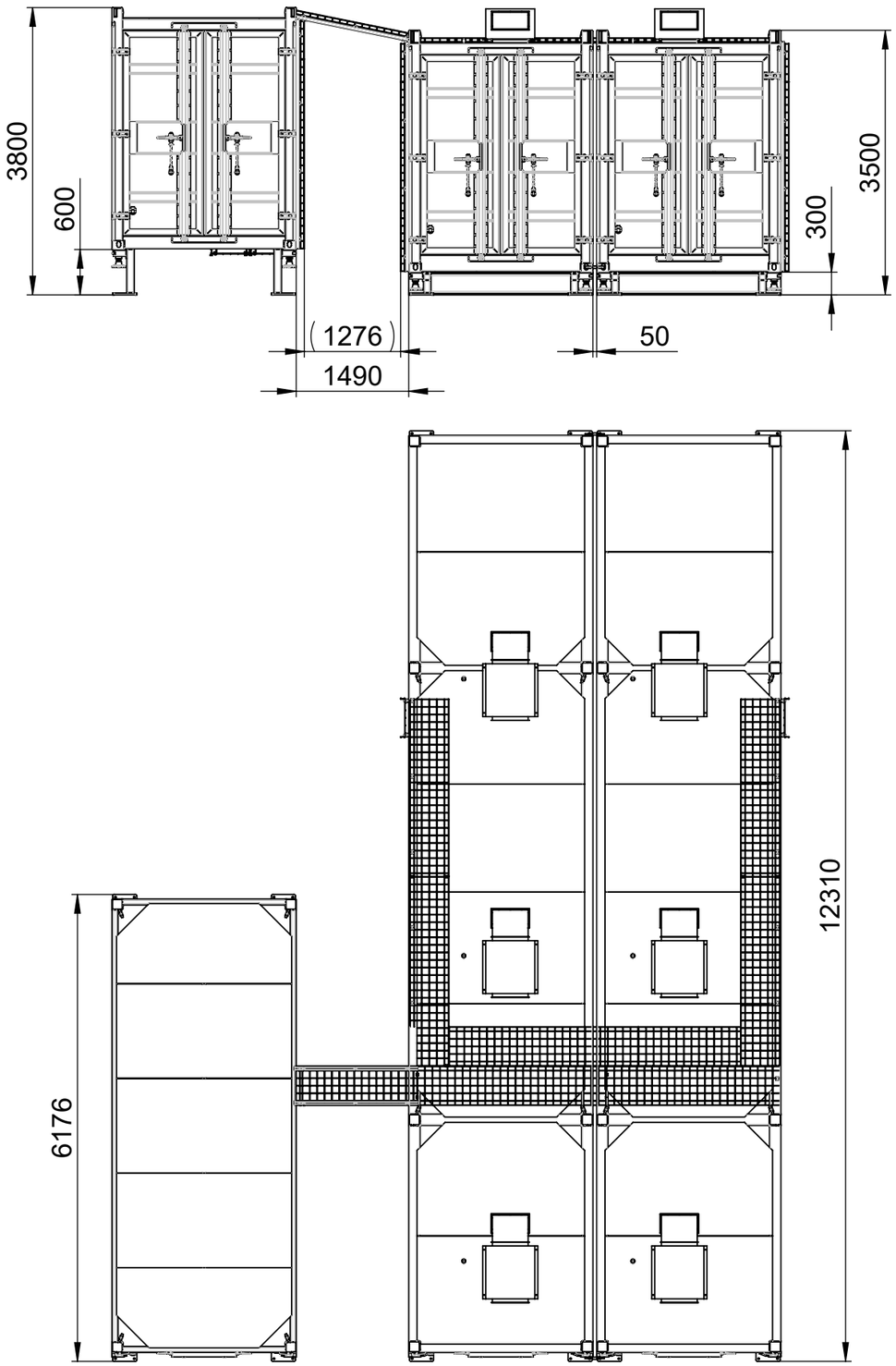
5 of: 5

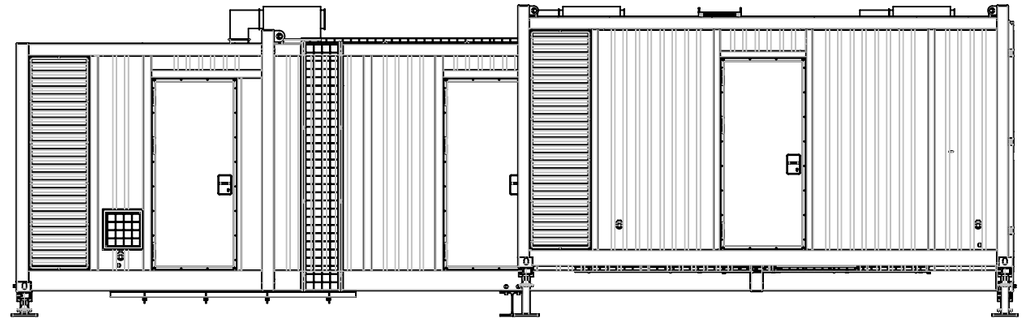
Artikel-Nr. (article number): 53412

Revision:

Projekt-Nr. & Kunde (project number & customer):

CAD System SolidWorks | Status: Freigegeben





Rev.:	Änderung (changes):	Datum (Date):	Name:

Allgemeintoleranzen für Längenmaße DIN ISO 2768-mK

Genauigkeitsgrad	Abmaße in mm für Nennmaßbereiche						
	0.5 ... 3	> 3 ... 6	> 6 ... 30	> 30 ... 120	> 120 ... 400	> 400 .. 1000	> 1000 ... 2000
m (mittel)	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2

+0,5 -0,5
ISO 13715

	Datum (Date):	Name:
Drawn:	27.06.2024	MvD
Checked:	23.01.2025	RK

Oberfläche: (surface) -

Werkstoff (material): 23553.52 kg

Bezeichnung (description): complet system

Scale: 1:75

Sheet: 1 (A3)

1 of: 1

Revision:

Artikel-Nr. (article number): 23A2007

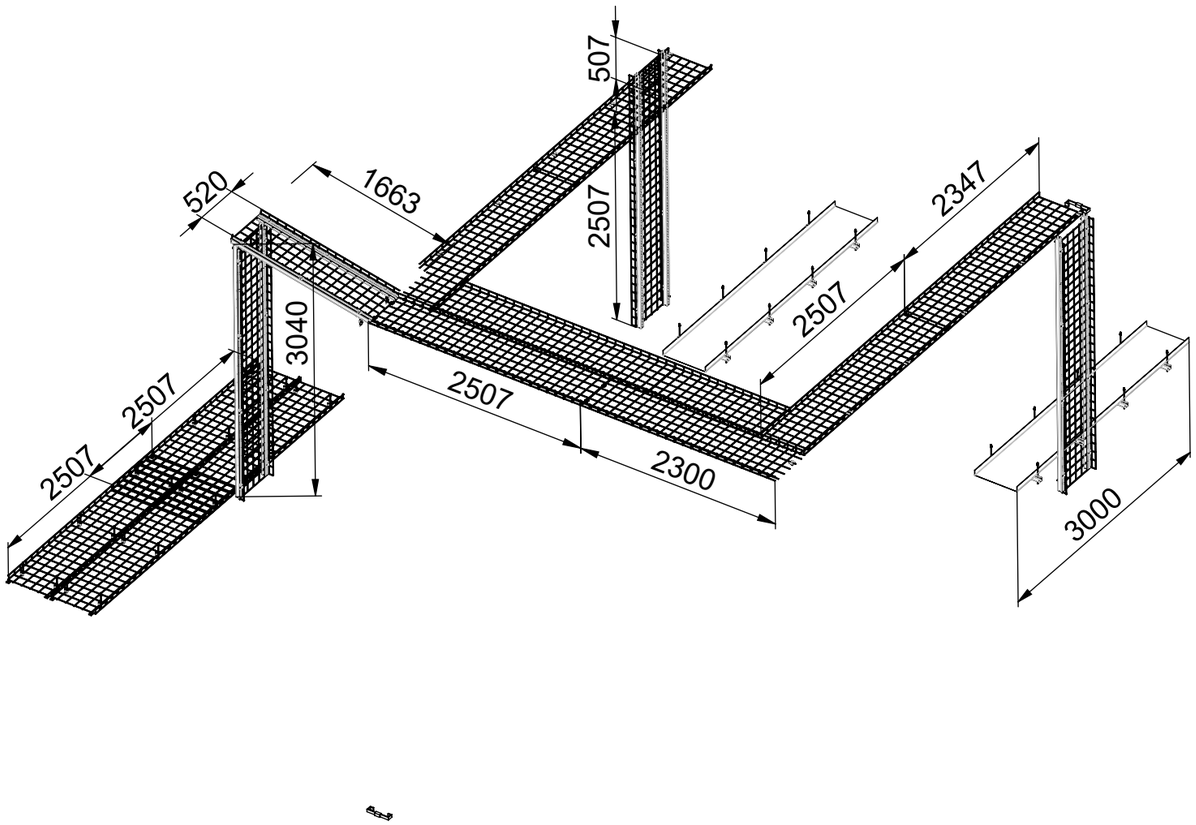
Projekt-Nr. & Kunde (project number & customer):

CAD System SolidWorks

Status: Freigegeben

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Pos. Nr.	Menge	**Bezeichnung**	Art.-Nr.	**Lieferant**	**Lieferanten Nr.**
1	25	V2A_ Gitterrinne GKX 520x60x2507	54848	Pflitsch	GKX 520x60 V2A
6	6	MS 41-41 VA	54532	Sikla	195796
8	80	Blindnietmutter M10 Flachkopf (0,7-3,5)	505856	Böllhoff	23307100235
9	60	Sperrkantscheibe - Form M - M10	503802	--	--
10	60	Zylinderschraube mit ISK ISO 4762 - M10 x 20 - 8.8 - St.	500865	--	--
11	15	Gewindeplatte VA NT CC41 M10	54544	Sikla	199312
12	6	Befestigungswinkel	54546		
13	50	Sechskantmutter ISO 4032 - M10 - 8	503711	--	--
14	20	Gewindehaken GH	54547	Sikla	101602
15	4	Befestigungswinkel	54549		
16	50	Gewindeplatte CC41-M8	54550	Sikla	195305
17	47	V4A Gitterkanal Verbindungslasche X1	52531	Pflitsch	GK L X1 V4A
18	47	Sperrkantscheibe - Form M - M8	503801	--	--
19	47	Zylinderschraube mit ISK ISO 4762 - M8 x 30 - 8.8 - St.	503670	--	--
20	30	Gitterkanal VerbindungslascheX2	52505	Pflitsch	GK L X2
21	2	Bridge Fitting CL1/50	53388	Plomben.de	TS20003-001
22	16	threaded rod / Gewindestange	---		
23	8	MS 41-41 VA-600	54717	Sikla	195796
24	2	Kabelrinne RKS Magic 60A4	509409	Obo	6047422
25	16	Sperrkantscheibe - Form B - M8	505744	--	--
26	16	Blindnietmutter M8 KSGRSO (e=3,0-4,5)	505060	Böllhoff	34367080045
27	1	V2A_ Gitterrinne GKX 520x60	54848	Pflitsch	GKX 520x60 V2A

Rev.:	Änderung (changes):	Datum (Date):	Name:

Allgemeintoleranzen für Längenmaße DIN ISO 2768-mK

Genauigkeitsgrad	Abmaße in mm für Nennmaßbereiche						
	0.5 ... 3	> 3 ... 6	> 6 ... 30	> 30 ... 120	> 120 ... 400	> 400 .. 1000	> 1000 ... 2000
m (mittel)	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2

Oberfläche: (surface) -

Werkstoff (material): 491.43 kg

ISO 13715

	Datum (Date):	Name:
Drawn:	03.07.2024	MvD
Checked:	23.01.2025	RK

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Bezeichnung (description):

Cable trays

Scale: 1:60

Sheet: 1 (A3)

1 of: 4

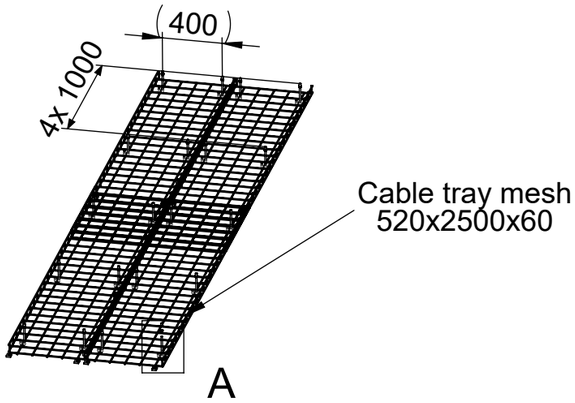
Revision:

Artikel-Nr. (article number): 54543

Projekt-Nr. & Kunde (project number & customer): 23A2007 Statron

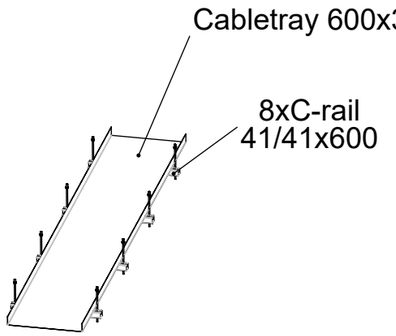
CAD System SolidWorks

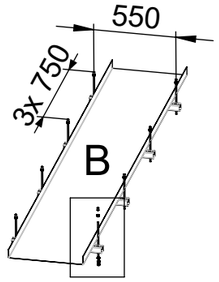
Status: Freigegeben



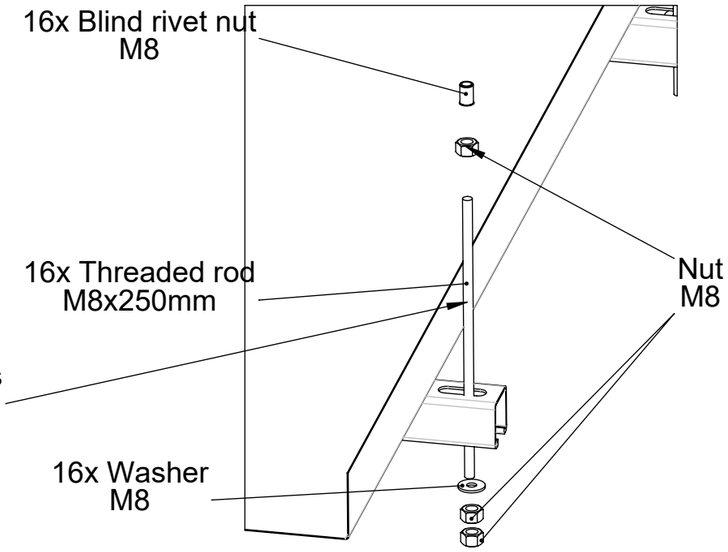
A

A (1:5)

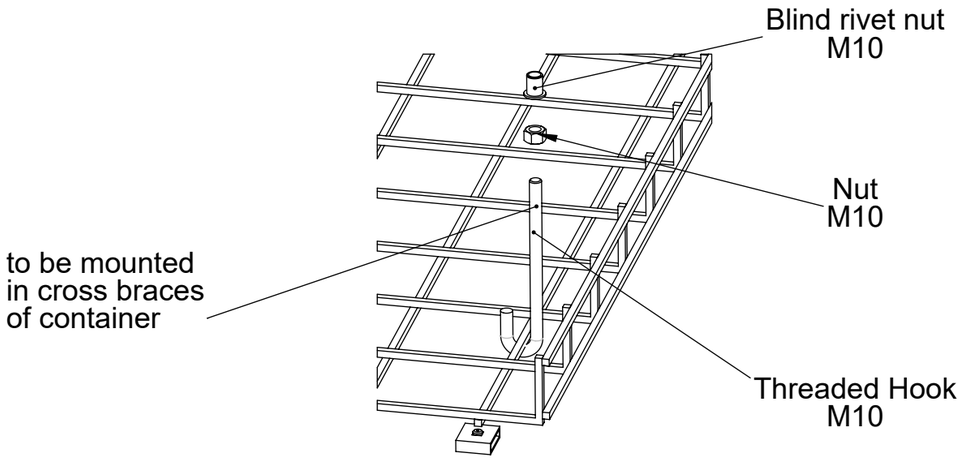




B (1:5)



Torque for all M8:
20Nm



Torque for all M10:
35Nm

Rev.:	Änderung (changes):	Datum (Date):	Name:

Allgemeintoleranzen für Längenmaße DIN ISO 2768-mK							
Genauig-keitsgrad	Abmaße in mm für Nennmaßbereiche						
	0.5 ... 3	> 3 ... 6	> 6 ... 30	> 30 ... 120	> 120 ... 400	> 400 .. 1000	> 1000 ... 2000
m (mittel)	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2

Oberfläche: (surface) -

Werkstoff (material): 232.02 kg

+0,5 -0,5 ISO 13715

	Datum (Date):	Name:
Drawn:	03.07.2024	MvD
Checked:	23.01.2025	RK

Bezeichnung (description): Cable trays

Scale: 1:40

Sheet: 2 (A3)

2 of: 4

Revision:

Artikel-Nr. (article number): 54543

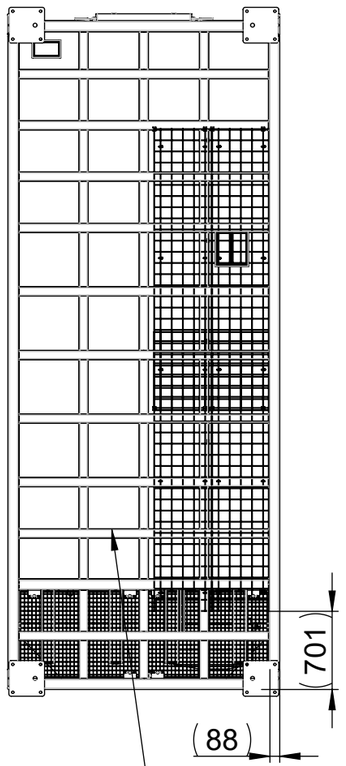
Projekt-Nr. & Kunde (project number & customer): 23A2007 Statron

CAD System SolidWorks

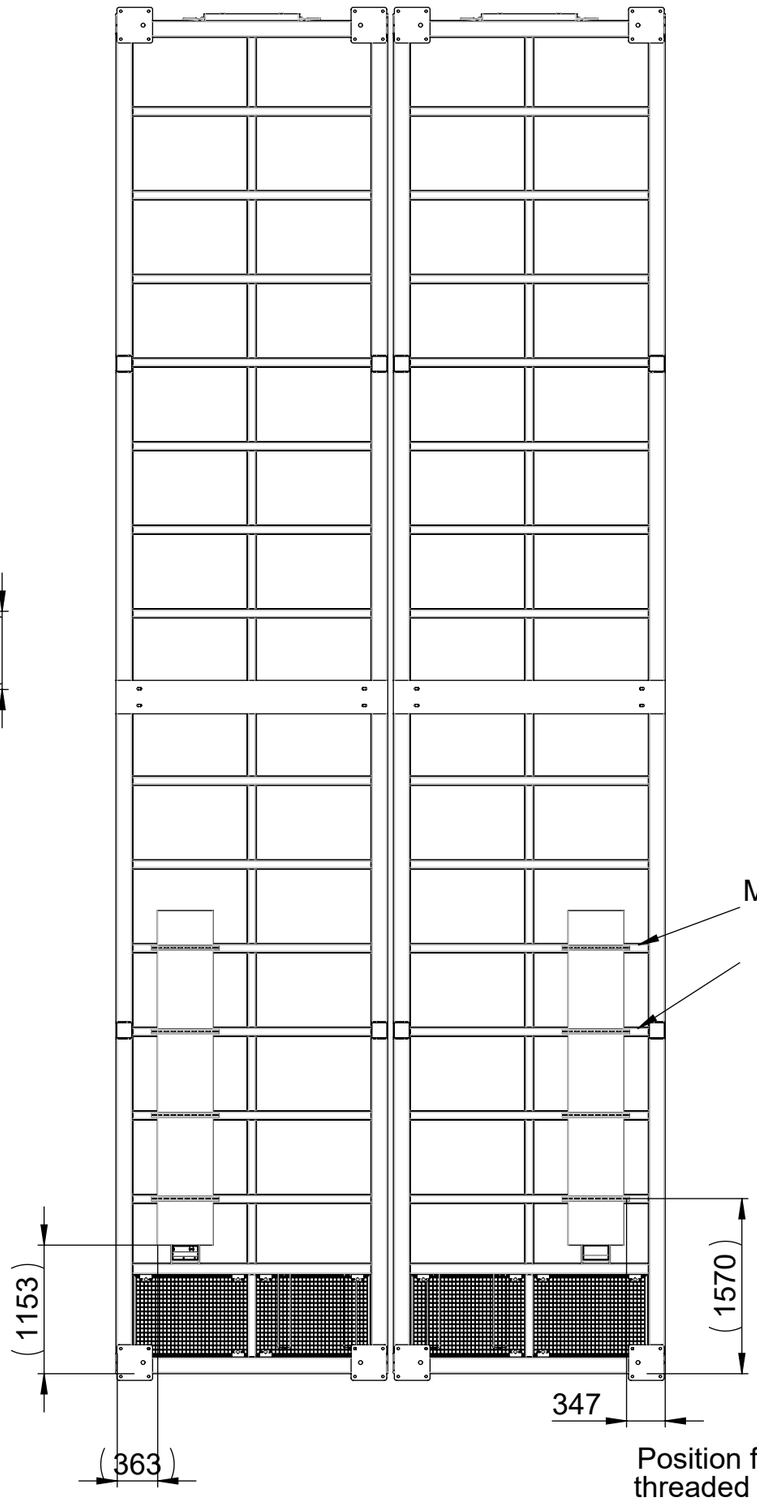
Status: Freigegeben

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Drill holes for
M10 blind rivet nuts
in cross brace
Ø13mm



Drill holes for
M8 blind rivet nuts
in cross brace
Ø11mm

Position first
threaded rod

Rev.:	Änderung (changes):	Datum (Date):	Name:

Allgemeintoleranzen für Längenmaße DIN ISO 2768-mK

Genauigkeitsgrad	Abmaße in mm für Nennmaßbereiche						
	0.5 ... 3	> 3 ... 6	> 6 ... 30	> 30 ... 120	> 120 ... 400	> 400 .. 1000	> 1000 ... 2000
m (mittel)	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2

+0,5 -0,5

ISO 13715

	Datum (Date):	Name:
Drawn:	03.07.2024	MvD
Checked:	23.01.2025	RK

Oberfläche:
(surface) -

Werkstoff (material):

29931.12 kg

Bezeichnung (description):

complet system

Scale: 1:40

Sheet: 3 (A3)

3 of: 4

Revision:

Artikel-Nr. (article number):
23A2007

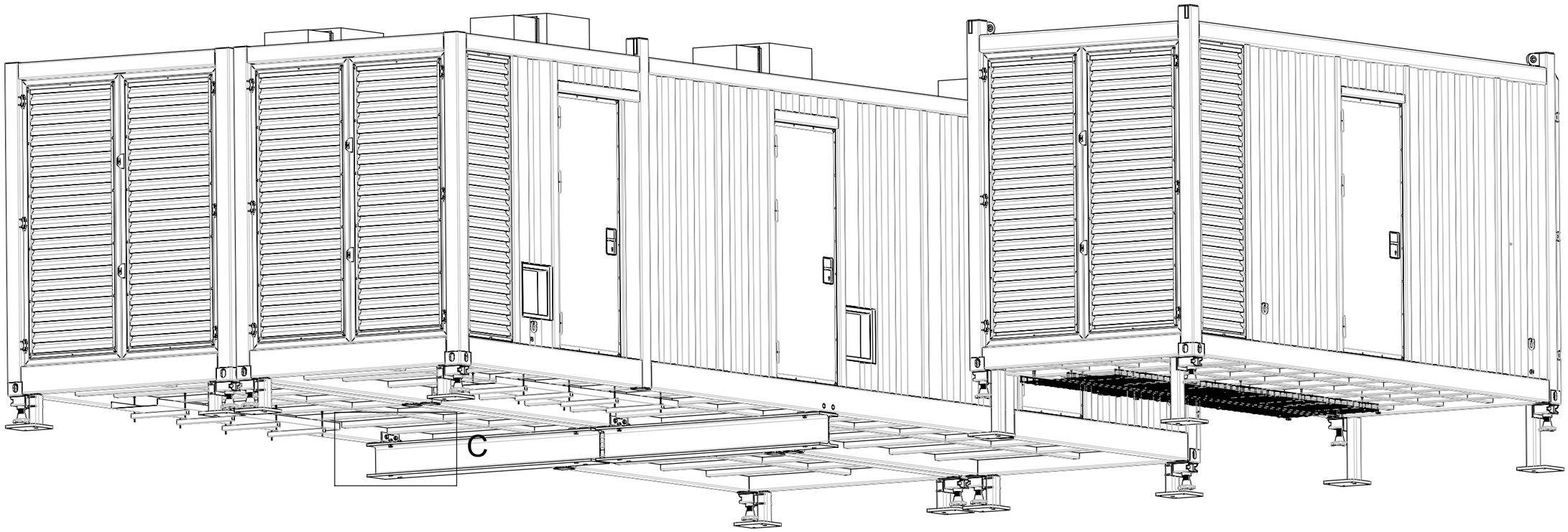
Projekt-Nr. & Kunde (project number & customer):

CAD System SolidWorks

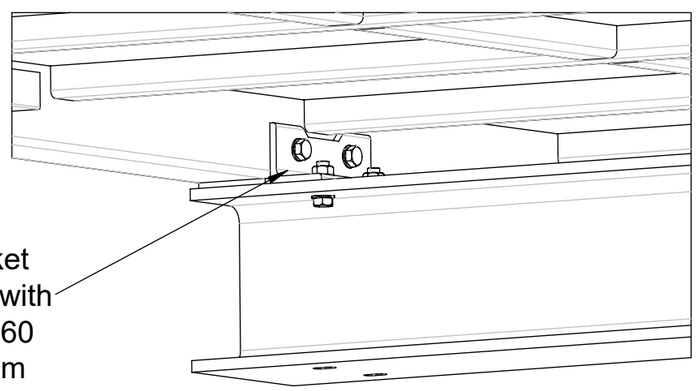
Status: Freigegeben

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C (1:10)



Rev.:	Änderung (changes):	Datum (Date):	Name:

Allgemeintoleranzen für Längenmaße DIN ISO 2768-mK

Genauigkeitsgrad	Abmaße in mm für Nennmaßbereiche						
	0.5 ... 3	> 3 ... 6	> 6 ... 30	> 30 ... 120	> 120 ... 400	> 400 .. 1000	> 1000 ... 2000
m (mittel)	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2

+0,5 -0,5

ISO 13715

	Datum (Date):	Name:
Drawn:	03.07.2024	MvD
Checked:	23.01.2025	RK

Oberfläche: (surface) -

Werkstoff (material): 29931.12 kg

Bezeichnung (description): complet system

Scale: 1:40

Sheet: 4 (A3)

4 of: 4

Revision:

Artikel-Nr. (article number): 23A2007

Projekt-Nr. & Kunde (project number & customer):

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08 Vendor SoW

09 Supporting Documents

SIEMENS

Leistungsschalter
Circuit breaker

SENTRON WL

Siemens AG, Siemensstr. 10 D-93055 Regensburg

Bedienungsanleitung / Operating Instructions **Bestell-Nr. / Order No.: 3ZX1812-0WL00-0AN4**

GEFAHR

Gefährliche elektrische Spannung!

Kann Tod, schwere Personenschäden sowie Schäden an Geräten und Ausrüstung bewirken.

Vor dem Arbeiten an diesem Gerät, Anlage unbedingt spannungsfrei schalten.
Gefahr bei gespanntem Federspeicher!
Federspeicher entspannen.



DANGER

Hazardous voltage!

Will cause death, serious personal injury, or equipment damage.

Disconnect power before working on this equipment.

Danger if spring is charged!
Discharge spring.



0.1 Symbole

0.1 Symbols

	Warnhinweis	Warning
	Warnung vor gefährlicher, elektrischer Spannung	Warning, electricity
	elektrische Gefährdung	Electrical Shock Hazard
	Vor Arbeiten freischalten	Switch off before beginning work
	Warnung Kopfschutz tragen	Warning, wear safety helmet
	Warnung vor Handverletzungen	Warning, crushing hazard: hand
	autorisierte Elektrofachkraft	authorized electrician
	Elektrostatisch gefährdetes Gerät	Electrostatic sensitive device
	CE-Zeichen	CE identification
	Sichtprüfung	Visual examination
	Haken	hook
	Schrauben- /Steckschlüssel mit Schlüsselweite	wrench with size in mm
	Schlitzschraubendreher	Slotted-type screwdriver
	Kreuzschlitzschraubendreher Philips (PH), PoziDriv (PZ)	Cruciform screwdriver Philips (PH), PoziDriv (PZ)
	Torx-Schraubendreher (T)	Torx screwdriver (T)
	Innensechskant-Schraubendreher	Hexagon socket screwdriver
 **10 Nm**	Anzugsdrehmoment	Tightening torque 1 Nm = 0.74 ft lbf
	Kabelbinder	Cable tie
	Handschriftlich ergänzen	Add in writing
	Erster Schritt einer Handlungsabfolge	First step of action sequence
BK / BN / BU / GN / GY	Farbcodierung nach DIN IEC 60757 Schwarz / Braun / Blau / Grün / Grau	Color code for wires according to DIN IEC 60757 Black / Brown / Blue / Green / Gray

0.2 Warnhinweise

0.2 Safety instructions

Betriebsanleitung *Operating Instructions* *Instructions de service* *Instructivo* *Istruzioni operative*
Instruções de Serviço *İşletme kılavuzu* *Руководство по эксплуатации* *Instrukcja obsługi* 使用说明

DE		GEFAHR	**Gefährliche Spannung. Lebensgefahr oder schwere Verletzungsgefahr.** Vor Beginn der Arbeiten Anlage und Gerät spannungsfrei schalten. Die Installations- und Wartungsarbeiten an diesem Gerät dürfen nur von einer autorisierten Elektrofachkraft ausgeführt werden.
EN		DANGER	**Hazardous voltage. Will cause death or serious injury.** Turn off and lock out all power supplying this device before working on this device. Installation and maintenance work on this device may only be carried out by an authorized electrician.
FR		DANGER	**Tension électrique. Danger de mort ou risque de blessures graves.** Mettre hors tension avant d'intervenir sur l'appareil. Les travaux d'installation et d'entretien de cet appareil doivent uniquement être réalisés par une personne qualifiée en électricité.
ES		PELIGRO	**Tensión peligrosa. Puede causar la muerte o lesiones graves.** Desconectar la alimentación eléctrica antes de trabajar en el equipo. Las tareas de instalación y mantenimiento de este equipo solo puede llevarlas a cabo un un electricista autorizado.
IT		PERICOLO	**Tensione pericolosa. Può provocare morte o lesioni gravi.** Scollegare l'alimentazione prima di eseguire interventi sull'apparecchiatura. L'installazione e la manutenzione di questo apparecchio devono essere effettuati solo da un elettrotecnico autorizzato.
PT		PERIGO	**Tensão perigosa.Perigo de morte ou ferimentos graves.** Desligue a alimentação elétrica e proteja contra o religamento, antes de iniciar o trabalho no equipamento. Os trabalhos de instalação e manutenção neste equipamento somente podem ser realizados for eletricistas autorizados.
TR		TEHLİKE	**Tehlikeli gerilim. Ölüm tehlikesi veya ağır yaralanma tehlikesi.** Çalışmalara başlamadan önce, sistemin ve cihazın gerilim beslemesini kapatınız. Bu cihazın montajı ve bakımı yalnız yetkili bir elektrik teknisyeni tarafından yapılmalıdır.
РУ		ОПАСНО	**Опасное напряжение. Опасность для жизни или возможность тяжелых травм.** Перед началом работ отключить подачу питания к установке и к устройству. Работы по монтажу и техническому обслуживанию данного устройства должны производиться уполномоченным специалистом по электротехнике.
PL		ZAGROŻENIE	**Niebezpieczne napięcie. Niebezpieczeństwo poważnych obrażeń lub utraty życia.** Przed rozpoczęciem prac wyłączyć zasilanie instalacji i urządzenia energią elektryczną. Prace instalacyjne i konserwacyjne na tym urządzeniu może przeprowadzać wyłącznie posiadający odpowiednie kwalifikacje elektryk.
中文		危险	**危险电压。可能导致生命危险或重伤危险。** 操作设备时必须确保切断电源。该设备的安装和维护工作仅能由具备专业资格的 电工完成。
DA		FARE	**Farlig spænding. Livsfare eller risiko for slemme kvæstelser.** Inden arbejdet påbegyndes skal anlægget og enheden gøres spændingsfri. Installationer og vedligeholdelser på dette apparat må kun gennemføres af en autoriseret elektriker.
FI		VAARA	**Vaarallinen jännite. Vakava loukkaantumisvaara tai hengenvaara.** Laite ja laitteisto on kytkettävä jännitteettömiksi ennen töiden aloittamista. Tämän laitteen asennus-ja huoltotöitä saa suorittaa ainoastaan valtuutettu sähköteknikko.
ET		OHT	**Ohtlik pinge. Oht elule või raskete vigastuste oht.** Enne tööde algust tuleb süsteemi ja seadme pinge välja lülitada. Seadme paigaldus- ja hooldustöid võib teha ainult atesteeritud elektrik.
BG		ОПАСНОСТ	**Опасно напрежение. Опасност за живота или опасност от тежки телесни повреди.** Преди започване на работа изключете захранването на инсталацията или устройството. Монтажът и техническото обслужване на това устройство се извършват единствено от оторизиран електротехник.
HR		OPASNOST	**Opasni napon. Opasnost po život ili opasnost od teških ozljeda.** Prije početka radova postrojenje i uređaj spojiti bez napona. Radove instalacije i održavanja na uređaju smije izvoditi samo ovlašteno stručno elektrotehničko osoblje.

EL	   	ΚΙΝΔΥΝΟΣ	**Επικίνδυνη τάση. Κίνδυνος για τη ζωή ή σοβαρού τραυματισμού.** Πριν από την έναρξη των εργασιών απομονώνετε την εγκατάσταση και τη συσκευή από την παροχή τάσης. Οι εργασίες εγκατάστασης και συντήρησης αυτής της συσκευής πρέπει να πραγματοποιούνται μόνο από εξουσιοδοτημένο ηλεκτρολόγο.
GA		CONTÚIRT	**Voltas contúirteach. Baol go bhfaighfear bás nó tromghortú.** Múch agus dícheangail gach foinse cumhachta a sholáthraíonn an gaireas seo sula ndéanfar obair air. Is ag leictreoir údaraithe amháin atá cead an gléas a shuiteáil agus obair chothabhála a dhéanamh air.
LV		BĪSTAMI	**Bīstams spriegums. Letālu seku vai smagu traumu riski.** Pirms uzsākt darbu, atslēdziet iekārtu un ierīci no barošanas. Šīs ierīces uzstādīšanu un tehniskās apkopes darbus drīkst veikt vienīgi pilnvarots elektriķis.
LT		PAVOJUS	**Pavojinga įtampa. Pavojus gyvybei arba sunkaus susižalojimo pavojus.** Prieš darbų pradžią atjunkite sistemos ir prietaiso įtampą. Šio įrenginio įrengimo ir techninės priežiūros darbus leidžiama atlikti tik įgaliotam elektrikui.
MT		PERIKLU	**Vultaġġ perikoluż. Riskju ta' mewt jew korriment serju.** Itfi u sakkar il-provvista kollha tad-dawl li tkun qed tforni d-dawl lil dan it-tagħmir qabel ma taħdem fuq dan it-tagħmir. Ix-xogħlijiet ta' installazzjoni u manutenzjoni fuq dan it-tagħmir jistgħu jitwettqu biss minn elettriċista awtorizzat.
NL		GEVAAR	**Gevaarlijke spanning. Levensgevaar of gevaar voor ernstig letsel.** Schakel vóór aanvang van de werkzaamheden installatie en apparaat spanningsvrij. De installatie- en onderhoudswerken aan dit toestel mogen enkel door een geautorisseerde elektricien uitgevoerd worden.
RO		PERICOL	**Tensiune periculoasă. Pericol de moarte sau de accidentări grave.** Înaintea începerii lucrărilor, deconectați instalația și aparatul de la tensiune. Lucrările de instalare și întreținere pentru acest dispozitiv pot fi efectuate doar de către un electrician autorizat.
SV		FARA	**Farlig spänning. Livsfara eller risk för allvarliga personskador.** Koppla anläggningen och apparaten spänningsfri innan du påbörjar arbetena. Installation och underhåll av denna apparat får endast utföras av en behörig elektriker.
SK		NEBEZ-PEČENSTVO	**Nebezpečné napätie. Nebezpečenstvo ohrozenia života alebo vzniku ťažkých zranení.** Pred začatím prác zariadenie a prístroj odpojte od napätia. Inštalačné a údržbárske práce na tomto prístroji môže vykonávať výlučne autorizovaný elektrikár.
SL		NEVARN-OST	**Nevarna napetost. Nevarnost za življenje ali nevarnost hudih poškodb.** Pred začetkom dela je treba pri napravi in aparatu odklopiti napajanje. Inštalacijska in vzdrževalna dela na tej napravi sme izvesti samo pooblaščen električar.“
CS		NEBEZPEČÍ	**Nebezpečné napětí. Nebezpečí smrtelného nebo těžkého úrazu.** Před zahájením prací odpojte zařízení a modul od napětí. Instalační a údržbářské práce smí na tomto přístroji provádět pouze kvalifikovaný elektrikář.“
HU		VESZÉLY	**Veszélyes feszültség. Életveszély vagy súlyos sérülésveszély.** A munkák megkezdése előtt végezze el a berendezés vagy készülék feszültség-mentesítését. Ezen az eszközön a telepítéssel és a karbantartással kapcsolatos feladatokat kizárólag megfelelő felhatalmazással rendelkező villamossági szakember végezheti.

0.3 Securityhinweise

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http://www.siemens.com/industrialsecurity

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https://support.industry.siemens.com

0.3 Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, solutions, machines, equipment and/or networks. They are important components in a holistic industrial security concept. With this in mind, Siemens' products and solutions undergo continuous development. Siemens recommends strongly that you regularly check for product updates.

For the secure operation of Siemens products and solutions, it is necessary to take suitable preventive action (e.g. cell protection concept) and integrate each component into a holistic, state-of-the-art industrial security concept. Third-party products that may be in use should also be considered. For more information about industrial security, visit:
http://www.siemens.com/industrialsecurity

To stay informed about product updates as they occur, sign up for a product-specific newsletter. For more information, visit
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0.4 Hinweis zum Umfang der Anleitung

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0.4 Note regarding the manuals scope

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VORSICHT		**CAUTION**
Zum Schutz der elektrostatisch gefährdeten Bauelemente (EGB) ist der Schalter, anzuschließende Geräte und das Bedienpersonal auf das gleiche Potenzial zu bringen.		To protect the electrostatic sensitive devices (ESD) the circuit breaker, equipment to be connected, and also operating personnel, need to be at the same potential.

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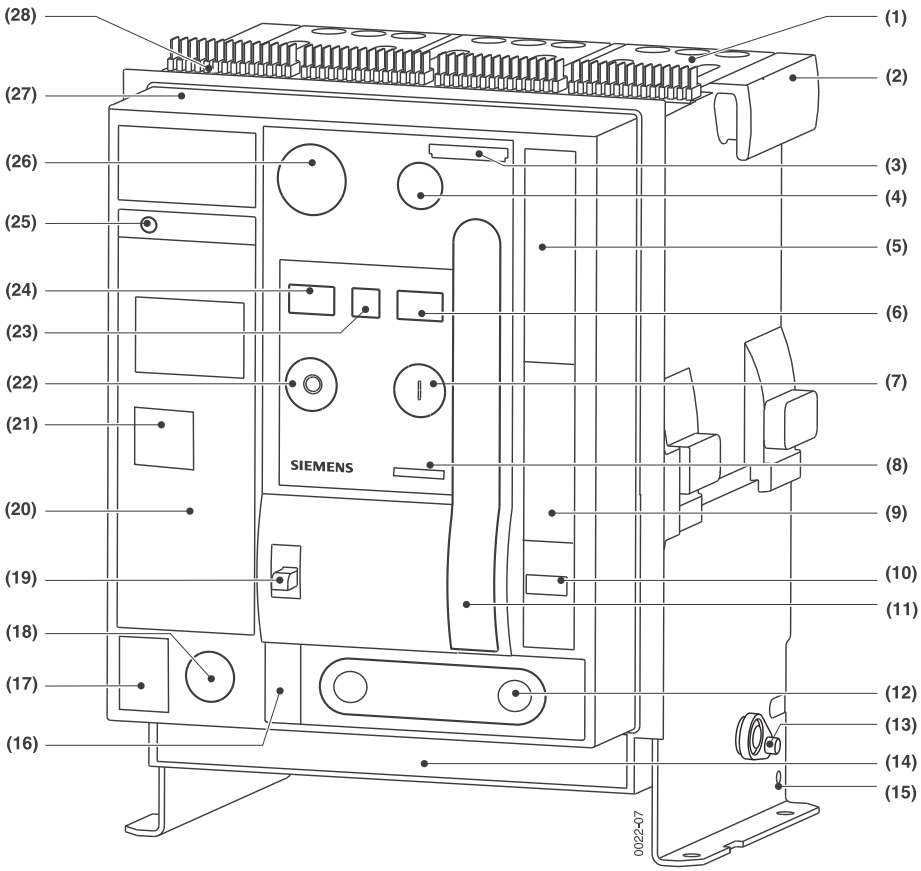
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1 Aufbau

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(2) Tragegriff
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(27) Bedienpult
(28) Messerleiste für Hilfsstromanschlüsse (ausstattungsabhängig)

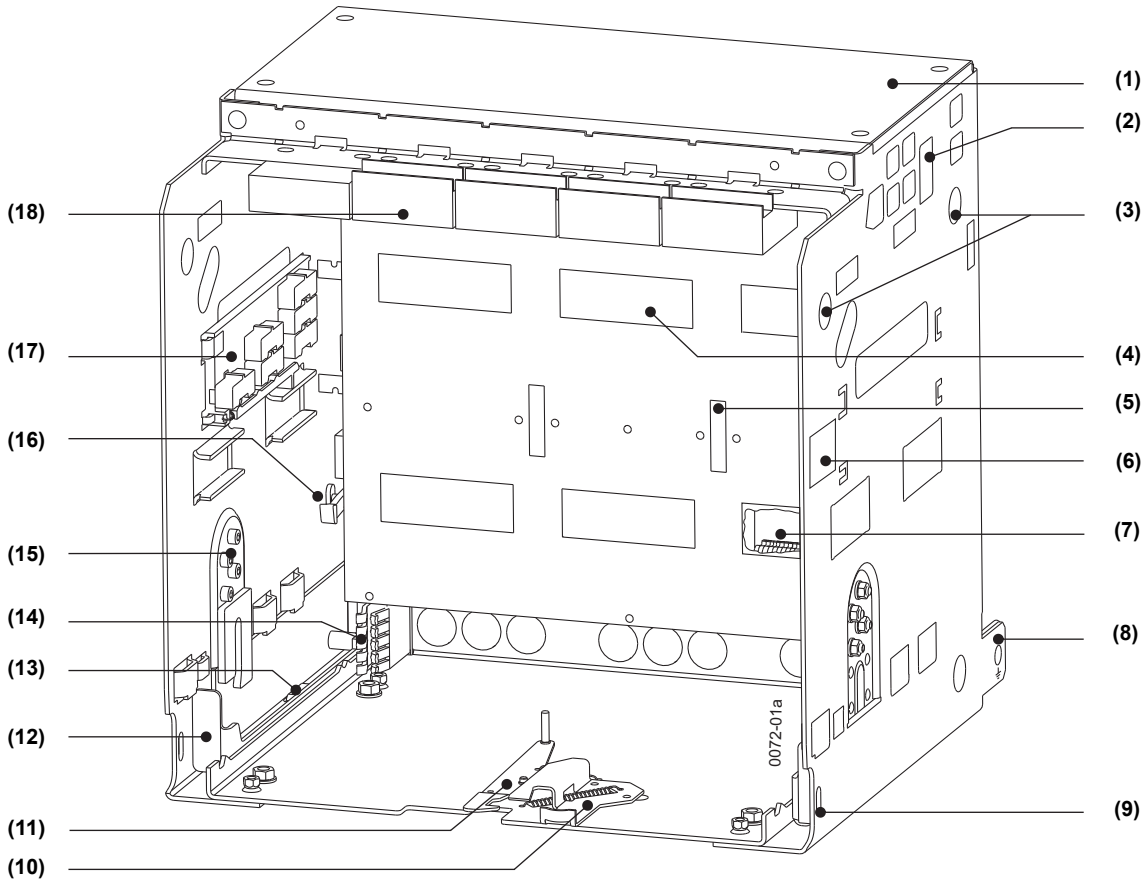
1 Design

1.1 Circuit breaker

(1) Arc chute → (page 24-5)
(2) Carrying handle
(3) Identification tags
(4) Motor disconnect switch (option) → (page 13-3) **or** “Electrical ON” (option) → (page 11-4)
(5) Type label circuit breaker → (page 2-1)
(6) Stored-energy indicator → (page 6-6)
(7) “Mechanical ON” button
(8) Max. rating current value
(9) Racking pictogram
(10) Make-break operations counter (option)
(11) Spring charging lever → (page 6-4)
(12) Racking handle
(13) Racking shaft
(14) Option label → (page 2-1)
(15) Earthing terminal → (page 5-22)
(16) Position indicator → (page 6-2)
(17) Table for ground-fault protection → (page 9-28)
(18) Safety lock for racking handle (option)
(19) Mechanical release of racking handle (option)
(20) Overcurrent release → (page 9-1)
(21) Rating plug
(22) “Mechanical OFF” button **or** “EMERGENCY OFF” mushroom button (option)
(23) Ready-to-close indicator → (page 6-6)
(24) Breaker ON / OFF indicator → (page 6-6)
(25) Tripped indicator (Reset button) → (page 6-8)
(26) Locking device “OFF” (option)
(27) Front panel
(28) Receptacle for auxiliary contacts **(**according to equipment)

1.2 Einschubrahmen

1.2 Guide frame



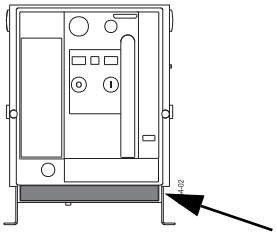
(1) Lichtbogenkammerabdeckung (Option)
(2) Ausblasöffnungen
(3) Öffnung für Kranhaken → (Seite 4-2)
(4) Shutter (Option)
(5) Abschließvorrichtung Shutter (Option)
(6) Typschild Einschubrahmen → (Seite 2-2)
(7) Trennkontakte
(8) Erdungsanschluss ∅ 14 mm → (Seite 5-22)
(9) Abschließvorrichtung Verfahrschiene
(10) Sperrvorrichtung gegen Verfahren bei geöffneter Schaltschranktür (Option)
(11) Türverriegelung Einschubrahmen (Option)
(12) Verfahrschiene
(13) werkseitige Bemessungsnennstromkodierung
(14) Schleifkontakt Schaltererdung (Option)
(15) Ausstattungsabhängige Kodierung (Option)
(16) Shutterbetätiger (Option)
(17) Positionsmeldeschalter (Option)
(18) Schleifkontaktmodul Hilfsleiter (Anzahl ausstattungsabhängig)

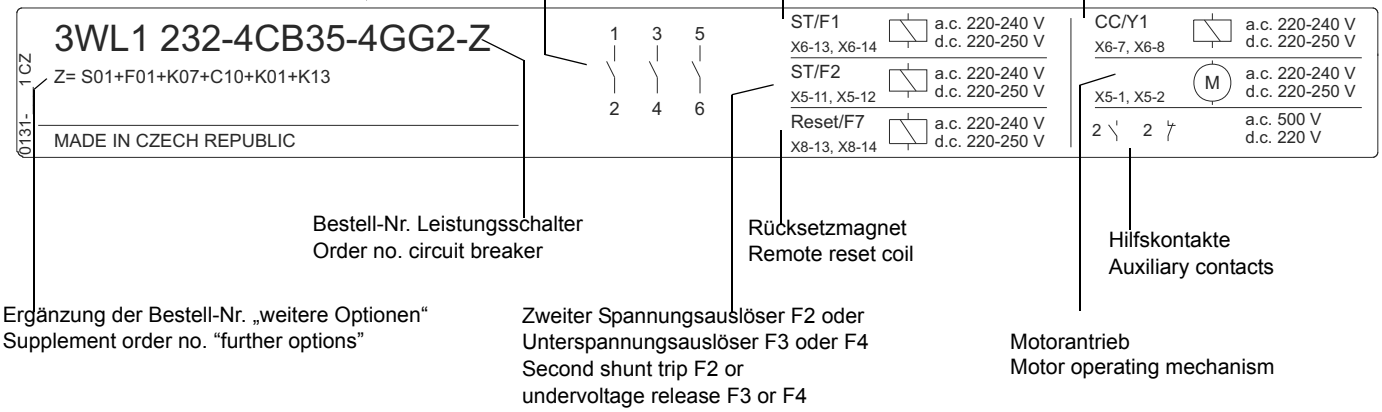
(1) Arc chute cover (option)
(2) Arcing openings
(3) Hole for crane hook → (page 4-2)
(4) Shutter (option)
(5) Locking device shutter (option)
(6) Type label guide frame → (page 2-2)
(7) Disconnecting contacts
(8) Earthing terminal ∅ 14 mm → (page 5-22)
(9) Locking device guide rail
(10) Locking device to prevent racking with cubicle door open (option)
(11) Door interlocking guide frame (option)
(12) Guide rail
(13) Ampere rating coding by factory
(14) Sliding contact for circuit breaker earthing (option)
(15) Option-related coding (option)
(16) Shutter operating device (option)
(17) Position signalling switch (option)
(18) Auxiliary disconnects (quantity according to equipment)

2 Schilder

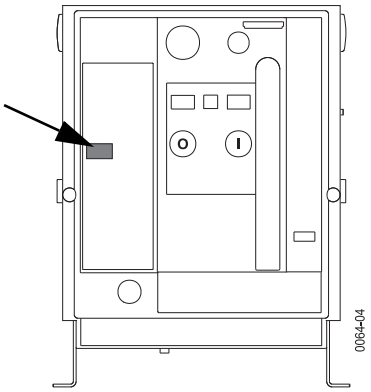
2.1 Ausstattungsschild Leistungsschalter

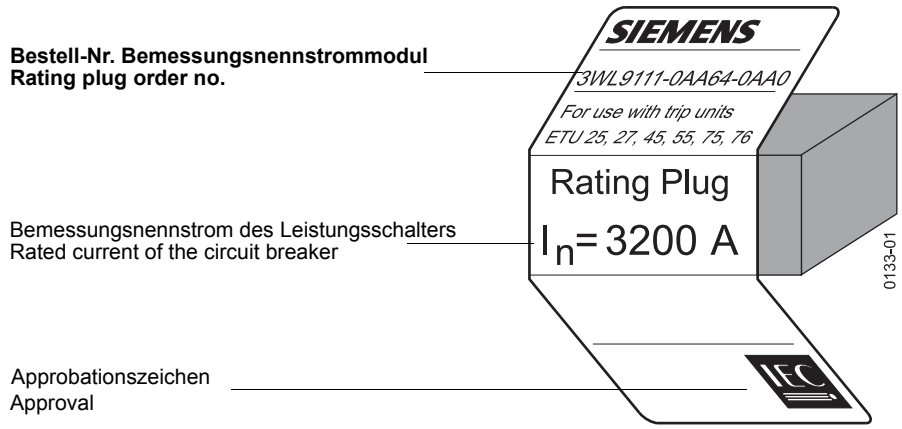
(Mit Anschlussbezeichnungen)





2.2 Schild Bemessungsnennstrommodul





2 Labels

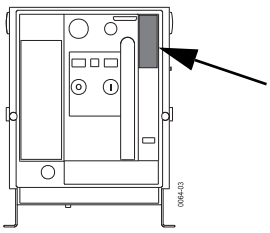
2.1 Circuit breaker options label

(With terminal designations)

2.2 Rating plug label

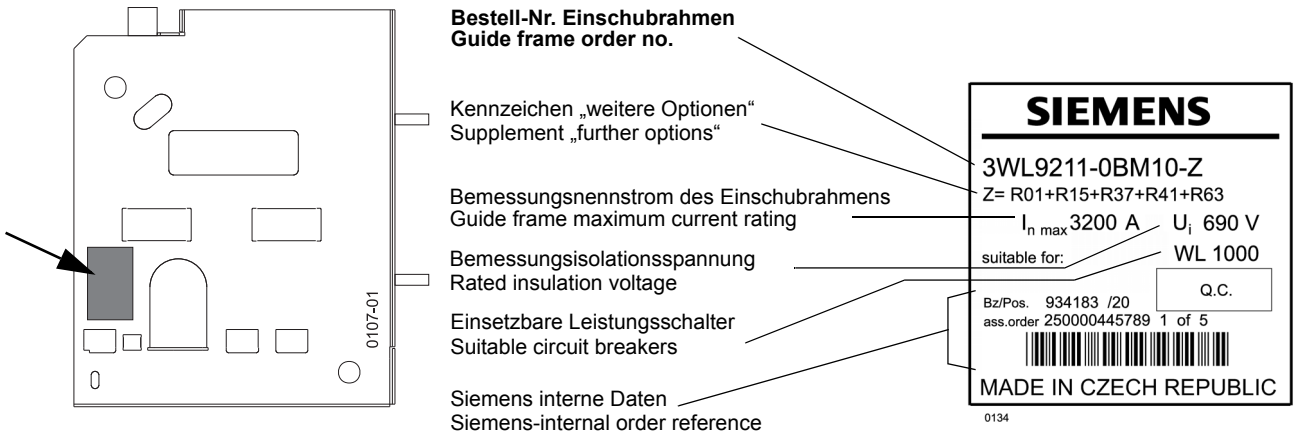
2.3 Typschild Leistungsschalter

2.3 Type label circuit breaker



2.4 Typschild Einschubrahmen

2.4 Type label guide frame



3 Normen, Bestimmungen

3 Standard specifications

GEFAHR		WARNING
Gefährliche Spannung! **Verursacht Tod, ernste Verletzungen oder Zerstörung von Material / Eigentum.** Nur qualifiziertes Personal darf an dem Gerät arbeiten, welches mit den Warn-, Sicherheitshinweisen und Wartungsvorschriften vertraut gemacht wurde. Die erfolgreiche und sichere Funktion dieses Gerätes hängt von ordentlicher Bedienung, Installation, Behandlung und Wartung ab.	  	**Hazardous voltage!** **Will cause death, serious personal injury, or equipment/ property damage.** Only qualified personnel should work on this equipment, after becoming thoroughly familiar with all warnings, safety notices, and maintenance procedures contained herein and on the devices. Successful and safe operation of this equipment is dependant on proper handling, installation, operation and maintenance.

Qualifiziertes Personal		Qualified Person
im Sinne dieser Bedienungsanleitung bzw. der Warnhinweise auf dem Produkt selbst sind Personen, die mit Aufstellung, Montage, Inbetriebsetzung und Betrieb des Produktes vertraut sind und über die ihrer Tätigkeit entsprechenden Qualifikationen verfügen, wie z. B.: **a) Ausbildung oder Unterweisung bzw. Berechtigung, Stromkreise und Geräte / Systeme gemäß den Standards der Sicherheitstechnik ein- und auszuschalten, zu erden und zu kennzeichnen.** **b) Ausbildung oder Unterweisung gemäß den Standards der Sicherheitstechnik in Pflege und Gebrauch angemessener Sicherheitsausrüstung.** **c) Schulung in Erster Hilfe.**		**For the purpose of this instruction manual and product labels, a "qualified person" is one who is familiar with the installation, construction and operation of the equipment and the hazards involved and who, in addition, has the following qualifications:** **a) Is trained and authorized to energize, de-energize, clear, earth and tag circuits and equipment in accordance with established safety practices.** **b) Is trained in the proper care and use of protective equipment in accordance with established safety practices.** **c) Is trained in rendering first aid.**

Umgebungsbedingungen

Die Leistungsschalter sind für den Betrieb in geschlossenen Räumen bestimmt, in denen keine durch Staubentwicklung und ätzende Dämpfe oder Gase erschwerten Betriebsbedingungen vorliegen. Für staubige oder feuchte Räume sind entsprechende Kapselungen vorzusehen.

Ambient Conditions

The circuit breakers are suited for operation in enclosed spaces not subject to operating conditions aggravated by dust, corrosive vapors or gases. Breakers to be installed in dusty or damp locations must be appropriately enclosed.

3.1 Normen

Der Leistungsschalter entspricht den Normen:

- IEC 60947-2 / EN 60947-2

3.1 Standards

The circuit breaker is in conformity with the standards:

- IEC 60947-2 / EN 60947-2

4 Transport

4.1 Überseeverpackung

Feuchtigkeitsanzeigeschild überprüfen Check humidity indicator		Weitere Lagerung Further storage
Rosa Pink	Blau Blue	Trockenmittel erneuern oder trocknen Kunststofffolie dicht verschweißen Verpackung regelmäßig überprüfen Renew or dry desiccant Reseal the plastic sheeting Check packing from time to time
Dichteverpackung unwirksam Schalter auf Korrosionsschäden prüfen Schäden dem Transportunternehmen melden Sealed packing defective Inspect for corrosion Notify damages to forwarding agent	Gut Good	

4.2 Auspacken

Schalter auspacken und auf Transportschäden untersuchen.

Bei späterem Einbau von Schalter oder Einschubrahmen: Lagerung und Weiterversand nur in der Originalverpackung.

4 Transport

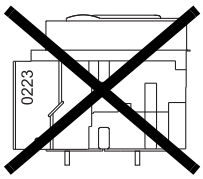
4.1 Overseas packing

Feuchtigkeitsanzeigeschild überprüfen Check humidity indicator		Weitere Lagerung Further storage
Rosa Pink	Blau Blue	Trockenmittel erneuern oder trocknen Kunststofffolie dicht verschweißen Verpackung regelmäßig überprüfen Renew or dry desiccant Reseal the plastic sheeting Check packing from time to time
Dichteverpackung unwirksam Schalter auf Korrosionsschäden prüfen Schäden dem Transportunternehmen melden Sealed packing defective Inspect for corrosion Notify damages to forwarding agent	Gut Good	

4.2 Unpacking

Unpack the circuit breaker and inspect it for damage.

In case of later installation of the circuit breaker or guide frame: they may only be stored and redispatched in the original packing.



VORSICHT	CAUTION
Schalter nicht auf die Rückseite legen!	Do not place circuit breaker on its rear side!

4.3 Transport mit Kran

GEFAHR

Schweres Gerät.

Falsches Kranen kann Tod, schwere Personenschäden sowie Schäden an Geräten und Ausrüstung bewirken.

Niemals einen Leistungsschalter, Kurzschließ-, Erdungs- und Überbrückungseinschub oder Einschubrahmen über Personen heben. Bedienungshinweise zum Kranen beachten. Nur OSHA/NIOSH geprüftes Krangeschirr verwenden. Benutze persönliche Schutzausrüstung beim Heben oder Bewegen von Leistungsschaltern und Einschubrahmen.



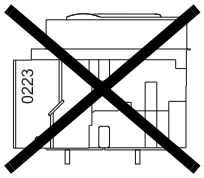
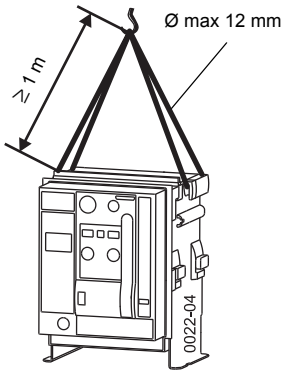
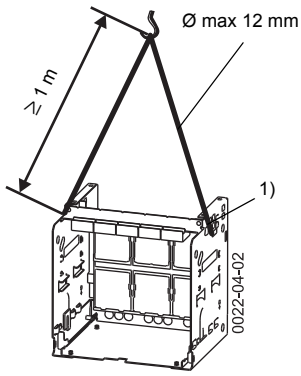
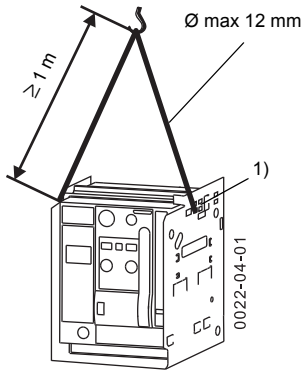
4.3 Lifting by crane

DANGER

Heavy Equipment.

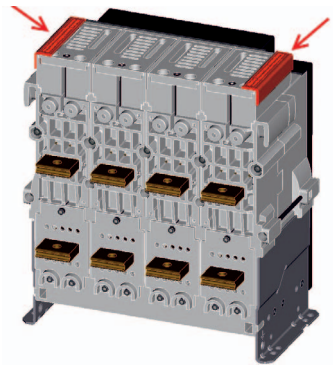
Improper lifting will cause death, serious personal injury, or equipment/property damage.

Never lift a circuit breaker, short-circuit, earthing and jumpering device or guide frame above personnel. Follow instructions for use of lifting bar assembly.
Use OSHA/NIOSH approved rigging equipment and personal protection equipment for lifting/moving the circuit breakers and guide frames.

Vorsicht **Caution** Nicht auf die Rückseite legen! Do not place breaker on its rear side! 	**Schalter** **Breaker** 	**Einschubrahmen** **Guide frame** 	**Schalter + Einschubrahmen** **Breaker + Guide frame** 
Baugröße / Polzahl **Frame size / No. of poles**	**Gewicht** **Weight**		
I / 3	max. 47 kg	max. 27 kg	max. 76 kg
I / 4	max. 55 kg	max. 32 kg	max. 91 kg
II / 3	max. 85 kg	max. 54 kg	max. 123 kg
II / 4	max. 103 kg	max. 65 kg	max. 148 kg
III / 3	max. 90 kg	max. 70 kg	max. 166 kg
III / 4	max. 108 kg	max. 119 kg	max. 227 kg

[1] Seil oberhalb des Aufklebers einhängen

Schutz für Transportarbeiten.
Nur für Baugröße I mit hohen Lichtbogenkammern!



[1] Hook cable above the label

Protection for transport work.
For frame size I with high arc chutes only!



Achtung: Vor Inbetriebnahme entfernen
Nur für Anheben des Leistungsschalters / Bitte gut aufbewahren

Attention: Remove before commissioning
Use only for lifting the circuit breaker / Please keep it safe

5 Montage

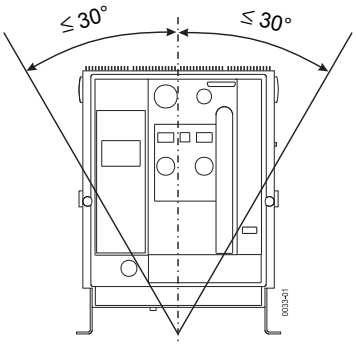
WARNUNG
Sicherer Betrieb des Schalters setzt voraus, dass er von qualifiziertem Personal sachgemäß unter Beachtung der Warnhinweise dieser Bedienungsanleitung montiert und in Betrieb gesetzt wird. Insbesondere sind sowohl die allgemeinen Errichtungs- und Sicherheitsvorschriften zu Arbeiten an Starkstromanlagen (z.B. DIN VDE) als auch die den fachgerechten Einsatz von Hebeeinrichtungen und Werkzeugen und die Benutzung persönlicher Schutzausstattungen (Schutzbrillen u.ä.) betreffenden Vorschriften zu beachten. Bei Nichtbeachtung können Tod, schwere Körperverletzung oder erheblicher Sachschaden die Folge sein.

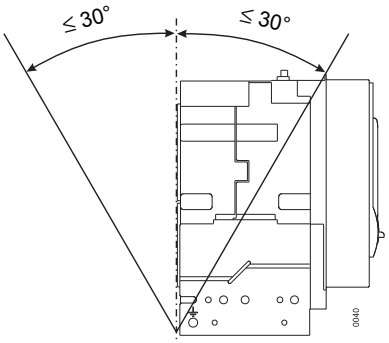
GEFAHR
Schweres Gerät. **Falsches Kranen kann Tod, schwere Personenschäden sowie Schäden an Geräten und Ausrüstung bewirken.** Niemals einen Leistungsschalter, Kurzschließ-, Erdungs- und Überbrückungseinschub oder Einschubrahmen über Personen heben. Bedienungshinweise zum Kranen beachten. Nur OSHA / NIOSH geprüftes Krangeschirr verwenden. Benutze persönliche Schutzausrüstung beim Heben oder Bewegen von Leistungsschaltern und Einschubrahmen.

5.1 Einbau

5.1.1 Einbaulage

WARNUNG
Wenn ein Schalter geneigt montiert ist, kann er auf den Schienen herausrutschen, wenn er in der Trennposition ist.





5 Installation

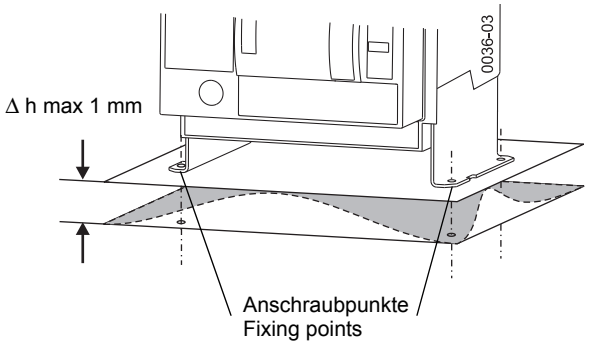
WARNING
Safe operation is dependent upon proper handling and installation by qualified personnel under observance of all warnings contained in this instruction manual. In particular the general erection and safety regulations (e.g. DIN VDE, IEC) and regulations regarding the correct use of hoisting gear and tools and of personal protective gear (safety goggles and the like) shall be observed. Non-observance can result in death, severe personal injury or substantial property damage.

DANGER
Heavy Equipment. **Improper lifting will cause death, serious personal injury, or equipment / property damage.** Never lift a circuit breaker, short-circuit, earthing and jumpering device or guide frame above personnel. Follow instructions for use of lifting bar assembly. Use OSHA / NIOSH approved rigging equipment and personal protection equipment for lifting / moving the circuit breakers and guide frames.

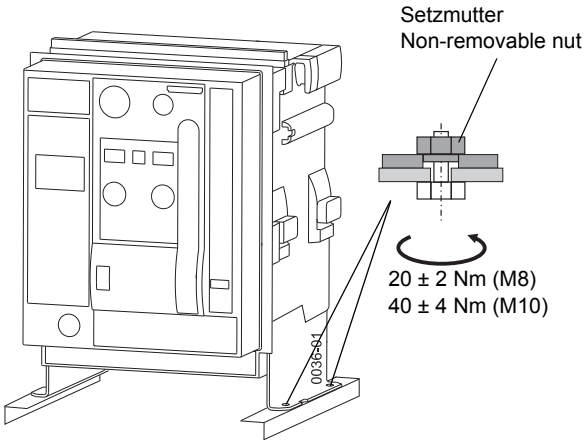
5.1 Mounting

5.1.1 Mounting position

WARNING
Breaker mounted tilted towards the frontside: Breaker may slide out on rails, when racked in disconnect position.



5.1.2 Einbau auf waagerechter Ebene

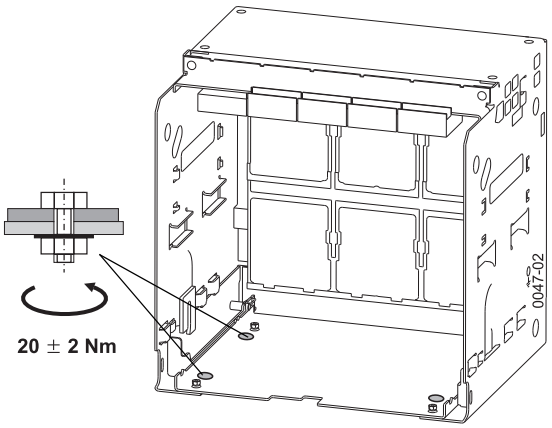


BG I + BG II / FS I + FS II
4 Schrauben M8-8.8
4 bolts M8-8.8

BG III / FS III
4 Schrauben M10-8.8
4 bolts M10-8.8

Werden in Schaltschränken **ohne** Fachböden mehrere Einschubschalter übereinander angeordnet, empfehlen wir Lichtbogenkammerabdeckungen zu verwenden.

5.1.2 Mounting on horizontal surface



4 Schrauben M8-8.8 + Muttern + Spannscheiben
4 bolts M8-8.8 + nuts + conical spring washers

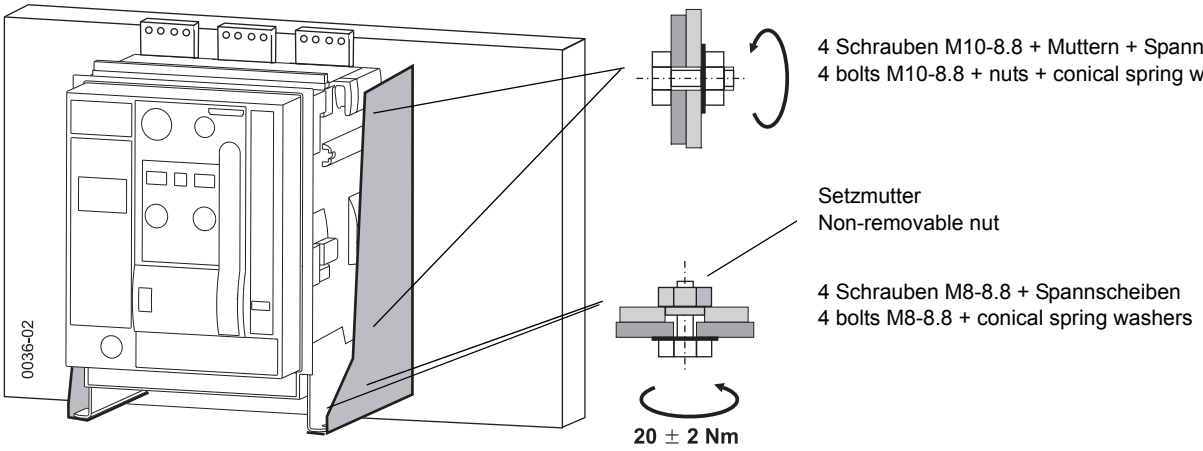
If several draw-out circuit breakers are arranged one above the other in cubicles **without** compartment bases we recommend to use arc chute covers.

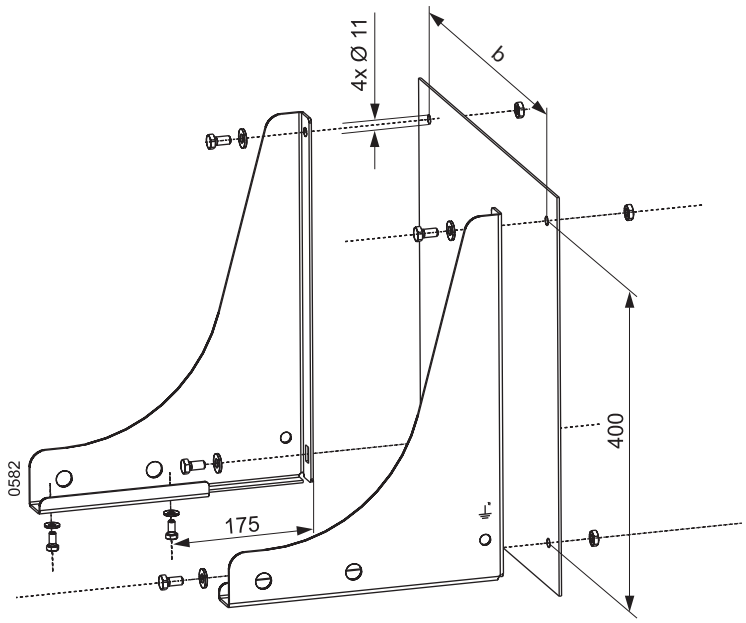
5.1.3 Einbau an senkrechter Ebene mit Tragwinkel

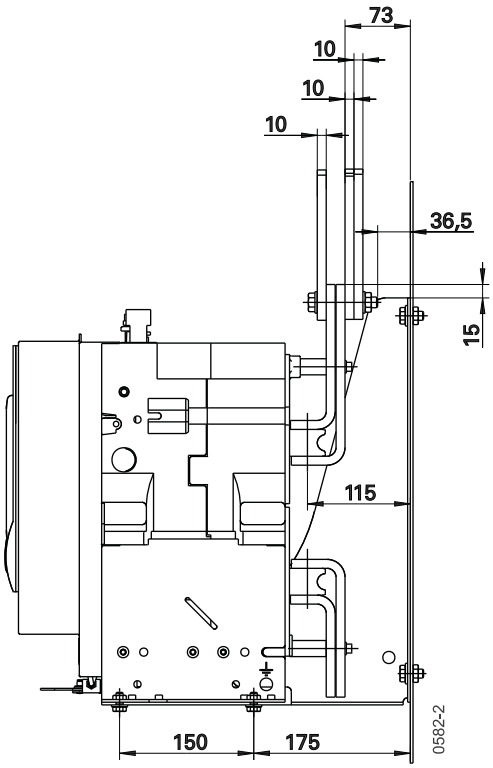
Nur für Festeinbauschalter der Baugrößen I und II.

5.1.3 Mounting to vertical surface with mounting angles

For fixed-mounted breaker frame size I and II only







Darstellung für Baugröße II mit Frontanschluss
Representation for frame size II with front connection

Schalter / Breaker		**b** [mm]
BG I / FS I	3 pol 4 pol	300 390
BG II / FS II	3 pol 4 pol	440 570

	Bestellnummer **Order number**
Tragwinkel Bracket angle	3WL9111-0BB50-0AA0

5.2 Anschluss-Schienen

WARNUNG

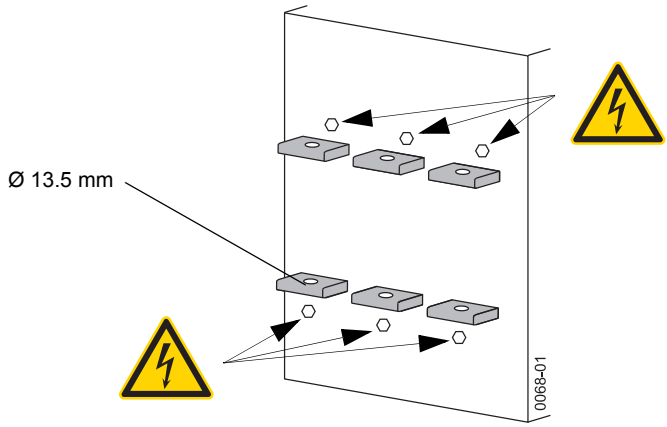
Achtung, die Befestigungsschrauben oberhalb und unterhalb der Anschlussschienen auf der Rückseite des Einschubrahmens sind spannungsführend!

Baugrößen / Maßbilder → (Seite 7-1)

Die Hauptleiter-Mindestquerschnitte der anlagenseitigen Anschluss-Schienen sind in IEC 60947 und Katalog LV 10 angegeben.

5.2.1 Horizontalanschluss

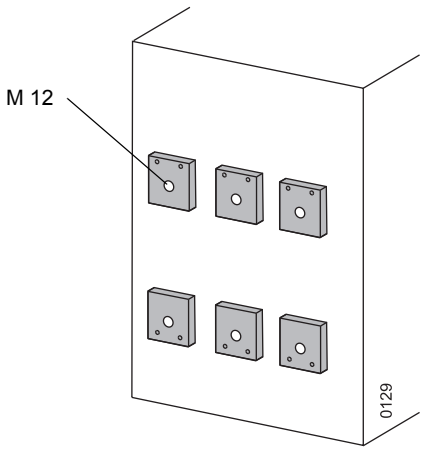
Der Horizontalanschluss ist Standardanschluss für Festeinbau-schalter und Einschubrahmen.



Nur für Einschubrahmen:

→ Einbau des Horizontalanschlusses beim Umrüsten (Seite 5-9)

5.2.2 Flanschanschluss (nur Einschubrahmen)



Der Einbau der Flanschanschlüsse erfolgt wie der Einbau der Vertikal- und Horizontalanschlüsse → (Seite 5-9).

5.2 Connecting bars

WARNING

Attention, the fastening screws above and below the connection bars on the back of the guide frame are voltage-carrying!

Frame sizes / dimension drawings → (page 7-1)

The minimum dimensions for bus bar connections are given in IEC 60947 und Katalog LV 10.

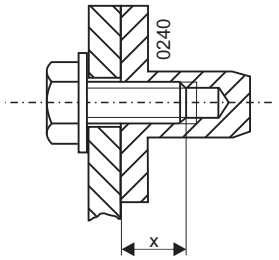
5.2.1 Horizontal connection

The horizontal connection is the standard connection for fixed-mounted circuit breakers and guide frames.

For guide frames only:

→ Installing horizontal connection for retrofitting (page 5-9)

5.2.2 Flange connection (guide frame only)



70 ± 4 Nm

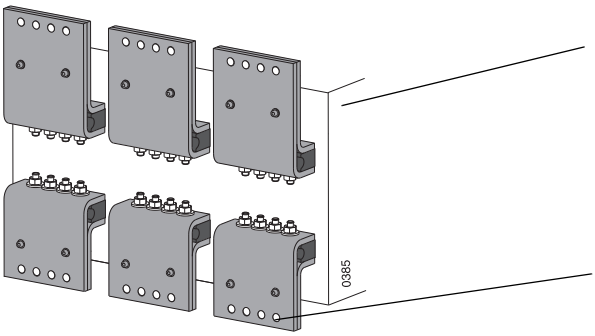
Einschraubtiefe / Screw-in depth:
x = 18–24 mm
= 45/64“ - 15/32“

The flanged connections are installed in the same way as the vertical and horizontal connections → (page 5-9)

5.2.3 Frontanschluss

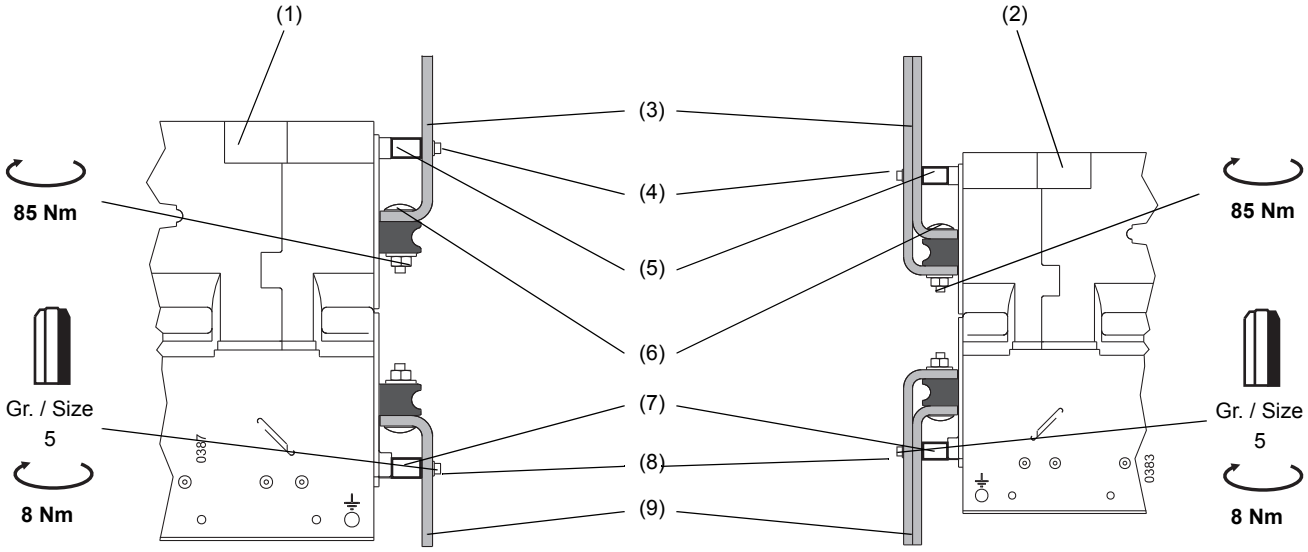
Festeinbauschalter

Ausführung der Anschluss-Schienen:



(1) Standardausführung
(2) Ausführung nach DIN 43673 (Doppellochreihe)
(3) Bohrungen Ø 13,5

Befestigung der Anschluss-Schienen:

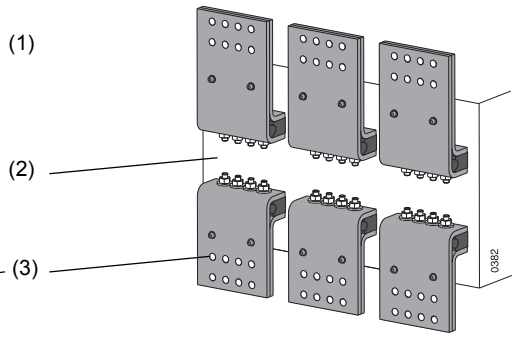


(1) Für Baugröße:
I ≤ 1000 A und
II ≤ 2000 A
(2) Für Baugröße:
I 1250 A - 2000 A, Schaltvermögen H
II 2500 A, 3200 A
III 4000 A
(3) Lange Anschluss-Schiene
(4) Kurze Innensechskantschraube ISO 4762 M6 mit Spannscheibe
(5) Kurze Distanzhülse
(6) Schlossschraube DIN 603 M12 mit Spannscheibe und Mutter
(7) Lange Distanzhülse
(8) Lange Innensechskantschraube ISO 4762 M6 mit Spannscheibe
(9) Kurze Anschluss-Schiene

5.2.3 Front connection

Fixed-mounted breaker

Two variations are offered:



(1) Standard version
(2) Version according to DIN 43673 (double hole row)
(3) Holes Ø 13.5

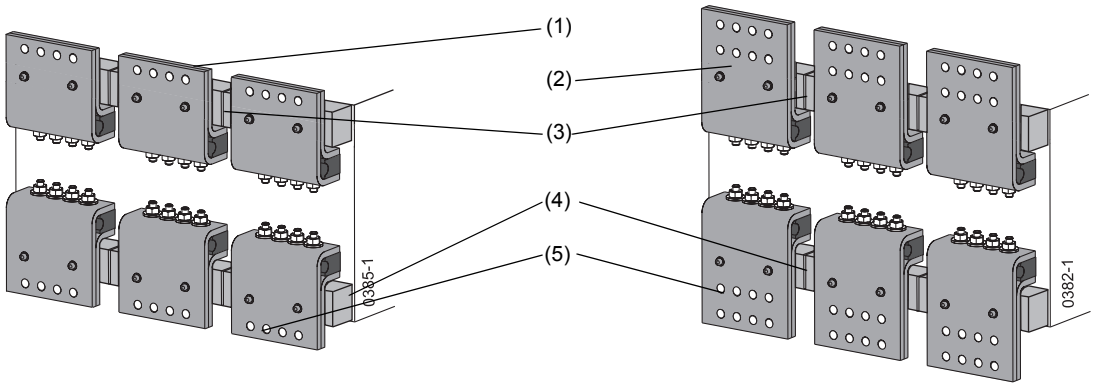
Fastening connecting bars:

(1) For frame size:
I ≤ 1000 A and
II ≤ 2000 A
(2) For frame size:
I 1250 A - 2000 A, breaking capacity H
II 2500 A, 3200 A
III 4000 A
(3) Long connecting bar
(4) Short hexagon socket-head screw ISO 4762 M6 with conical spring washer
(5) Short distance sleeve
(6) Coach screw DIN 603 M12 with conical spring washer and nut
(7) Long distance sleeve
(8) Long hexagon socket-head screw ISO 4762 M6 with conical spring washer
(9) Short connecting bar

Hinweis	**Note**
Diese Anschlussart ist in der BG III Schaltvermögen C nicht zulässig.	This type of connection is not permitted in FS III breaking capacity C.

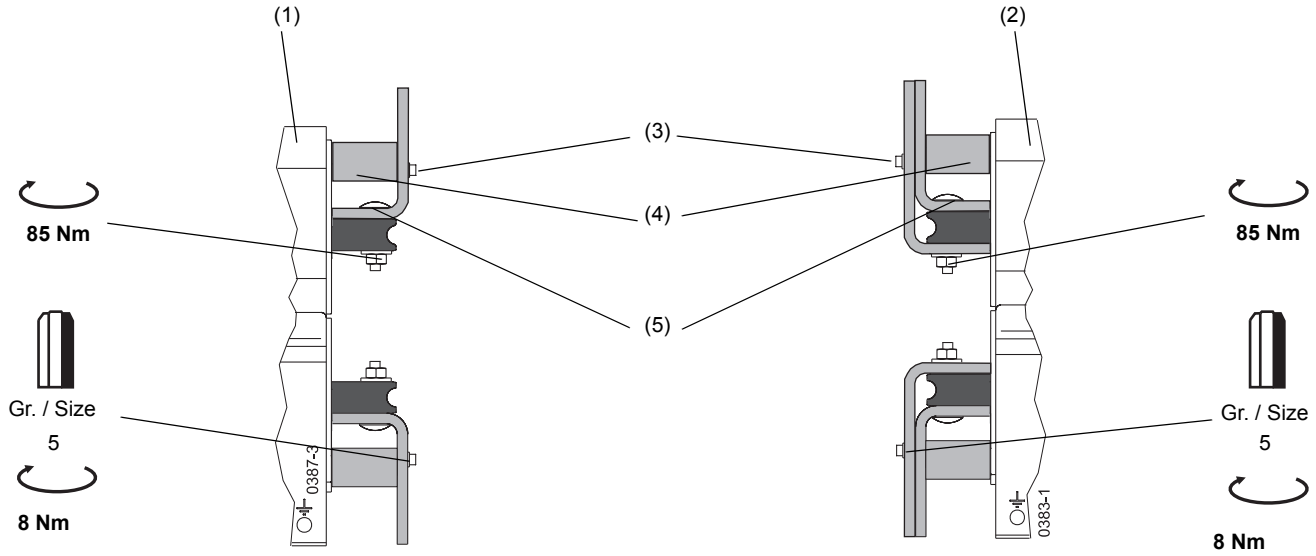
Einschubrahmen

Ausführung der Anschluss-Schienen:



(1) Standardausführung
(2) Ausführung nach DIN 43673 (Doppellochreihe)
(3) Nuten für Phasentrennwände; Einbaulage wie gezeigt!
(4) Stützer
(5) Bohrungen Ø 13,5

Befestigung der Anschluss-Schienen:



(1) Für Baugröße:
I ≤ 1000 A und
II ≤ 2000 A
(2) Für Baugröße:
I 1250 A - 2000 A, Schaltvermögen H
II 2500 A, 3000 A
III 4000 A
(3) Innensechskantschraube ISO 4762 M6 mit Spannscheibe
(4) Stützer; Einbaulage wie gezeigt!
(5) Schlossschraube DIN 603 M12 mit Spannscheibe und Mutter

Umrüsten von Vertikal- oder Flanschanschluss auf Frontanschluss erfordert vorher Einbau des Horizontalanschlusses!

→ (Seite 5-8)

Guide frame

Two variations are offered:

(1) Standard version
(2) Version according to DIN 43673 (double hole row)
(3) Slots for phase separation walls; mounting position as shown!
(4) Support
(5) Holes Ø 13.5

Fastening connecting bars:

(1) For frame size:
I ≤ 1000 A and
II ≤ 2000 A
(2) For frame size:
I 1250 A - 2000 A, breaking capacity H
II 2500 A, 3200 A
III 4000 A
(3) Hexagon socket-head screw ISO 4762 M6 with conical spring washer
(4) Support; mounting position as shown!
(5) Coach screw DIN 603 M12 with conical spring washer and nut

Conversion from vertical or flange connection to front connection requires installation of horizontal connection first!

→ (page 5-8)

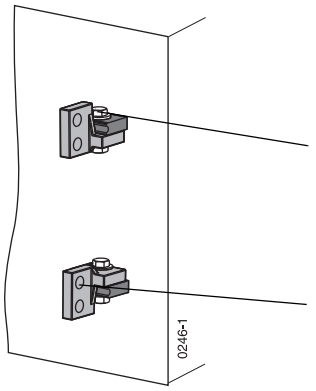
5.2.4 Vertikalanschluss

5.2.4.1 Festeinbauschalter

Baugröße Frame size	Bemessungsnennstrom Rated current
I	≤ 1000 A 1250 A - 2000 A [1)] Schaltvermögen H[1)] breaking capacity H[1)]

[1)] 2 Anschluss-Schienen pro Hauptanschluss, oben und unten mittels Langloch versetzt befestigt, s. Bild für Baugröße II

[1)] 2 connecting bars per main terminal, fixed at upper and lower terminal by means of elongated hole with offset, see drawing for size II.



1 x M12 - 8.8 + Mutter
+ Spannscheiben (oben + unten)

1 x M12 - 8.8 + nut
+ conical spring washers (top + bottom)

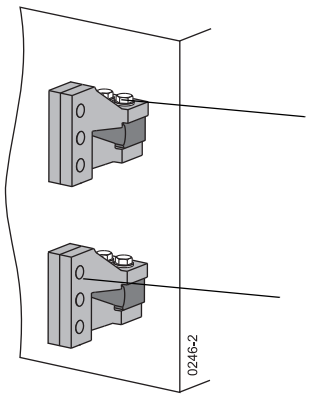
85 Nm

2 x Ø 13.5 mm

Baugröße Frame size	Bemessungsnennstrom Rated current
II	≤ 2500 A [1)] 3200 A

[1)] 1 Anschluss-Schiene pro Hauptanschluss, mittig befestigt, s. Bild für Baugröße I

[1)] 1 connecting bar per main terminal, fixed in the centre, see drawing for size I.



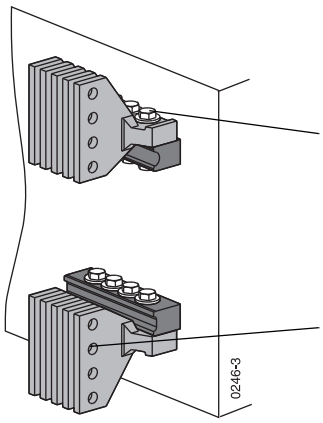
3 x M12 - 8.8 + Muttern
+ Spannscheiben (oben + unten)

3 x M12 - 8.8 + nuts
+ conical spring washers (top + bottom)

85 Nm

3 x Ø 13.5 mm

Baugröße Frame size	Bemessungsnennstrom Rated current
III	≤ 5000 A



4 x M12 - 8.8 + Muttern
+ Spannscheiben (oben + unten)

4 x M12 - 8.8 + nuts
+ conical spring washers (top + bottom)

85 Nm

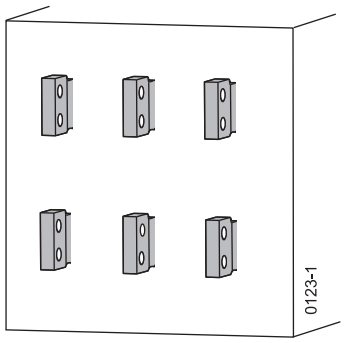
4 x Ø 13.5 mm

5.2.4 Vertical connection

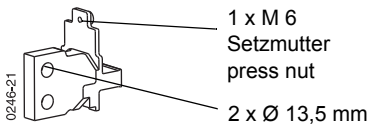
5.2.4.1 Fixed-mounted breaker

5.2.4.2 Einschubrahmen

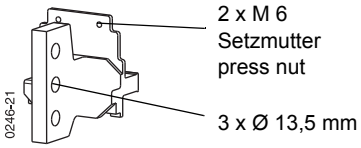
5.2.4.2 Guide frame



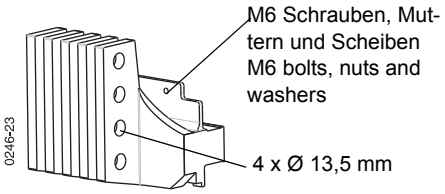
Baugröße Frame size	Bemessungsnennstrom Rated current
I	≤ 1000 A, 1200 A - 2000 A Schaltvermögen H breaking capacity H



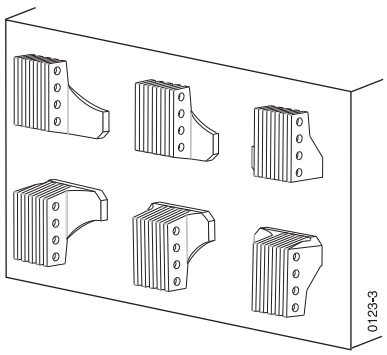
Baugröße Frame size	Bemessungsnennstrom Rated current
II	≤ 2000 A 2500 A 3200 A



Baugröße Frame size	Bemessungsnennstrom Rated current
III	≤ 5000 A



Baugröße Frame size	Bemessungsnennstrom Rated current
II III	4000 A 6300 A



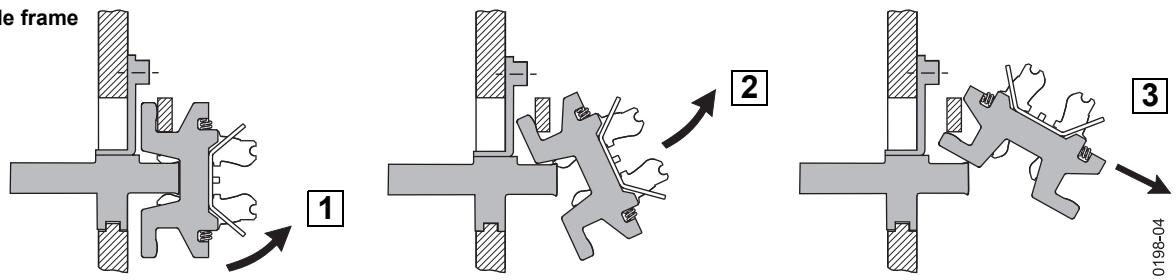
Vertikalanschlüsse links und rechts asymmetrisch

Vertical terminals left and right asymmetrical

Ausbau der Lamellenkontakte

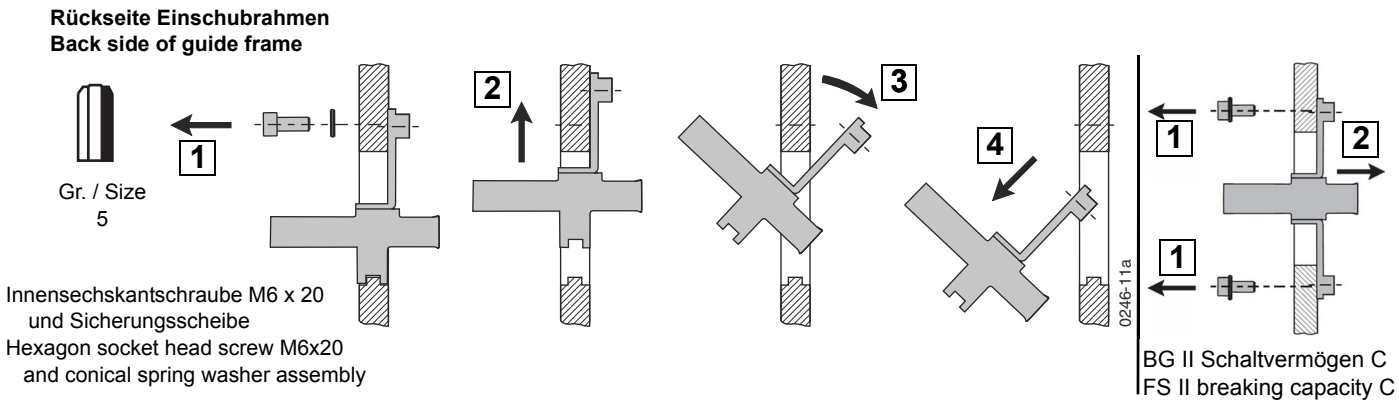
Removing finger contacts

Rückseite Einschubrahmen
Back side of guide frame



Ausbau des Horizontalanschlusses

Removing horizontal connection

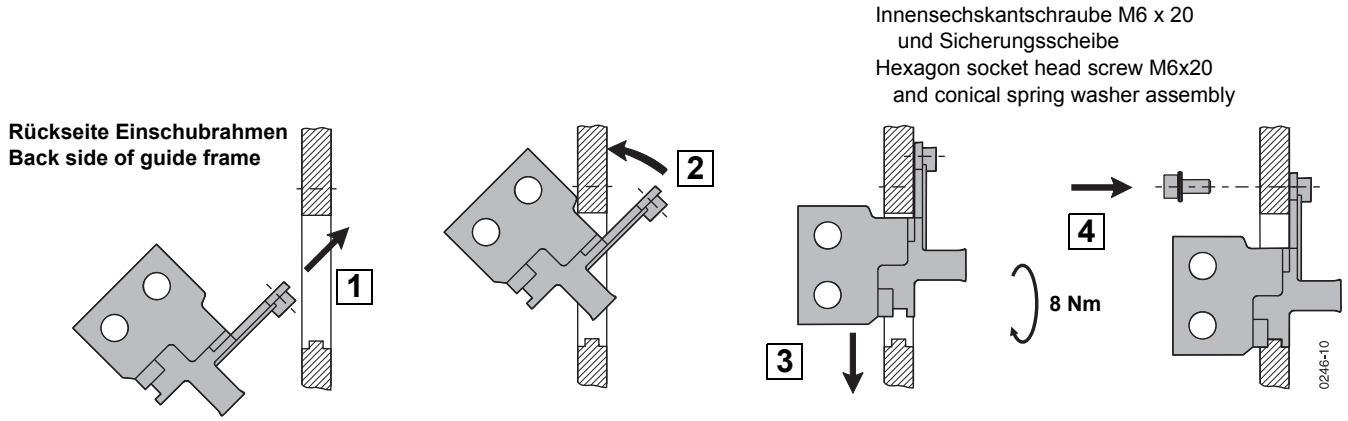


Innensechskantschraube M6 x 20
und Sicherungsscheibe
Hexagon socket head screw M6x20
and conical spring washer assembly

BG II Schaltvermögen C
FS II breaking capacity C

Einbau des Vertikalanschlusses

Installing vertical connection

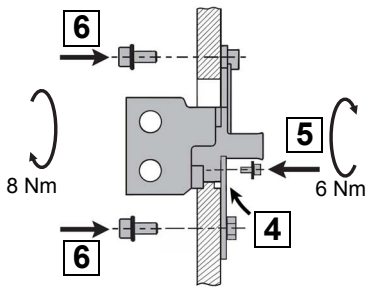


Montageschritte für Einbau von Horizontal- und Flanschanschluss analog.

Mounting steps for installation of horizontal or flange connection are similar.

Einbau des Vertikalanschlusses für BG II, Schaltvermögen C

Installing vertical connection for FS II, breaking capacity C

5 Innensechskantschraube M5 x 12 mit Federring **6** Innensechskantschraube M6 x 20 mit Sicherungsscheibe		**5** Hexagon socket head screw M5x12, with spring washer **6** Hexagon socket head screw M6x20 with conical spring washer
Hinweis		**Note**
Die Abbildung zeigt den oberen Vertikalanschluß, der untere Anschluß ist spiegelbildlich zu montieren		Picture shows upper vertical terminal, bottom must be assembled inversly

Hinweis	**Note**
Die Lamellenblöcke für Leistungsschalter der Baugröße III, 4000 A, sind nicht vollständig mit Lamellen bestückt. Achtung! Bei der Montage nur gleichartig ausgestattete Lamellenblöcke verwenden.	The finger cluster for circuit breaker frame size III, 4000 A, are not fully equiped with contact blades. Attention! Use only similarly equipped finger cluster.

5.2.5 Zulässige Anschluss-Schienenvarianten für Baugröße I 1000 V DC Leistungstrennschalter

Baugröße I 1000 V DC Leistungstrennschalter werden nur in vierpoliger Ausführung angeboten. Plus-/Minuspol des in Reihe zu verschaltenden Leistungstrennschalters bilden die außenliegenden jeweils oberen Anschlüsse der Phasen N und L3. Verfügbare Schienenvarianten für diese beiden Anschlüsse sind Horizontal- und Vertikalanschluss. Die sechs verbleibenden Horizontalanschlüsse sind nach folgenden Schemata zu verschalten.

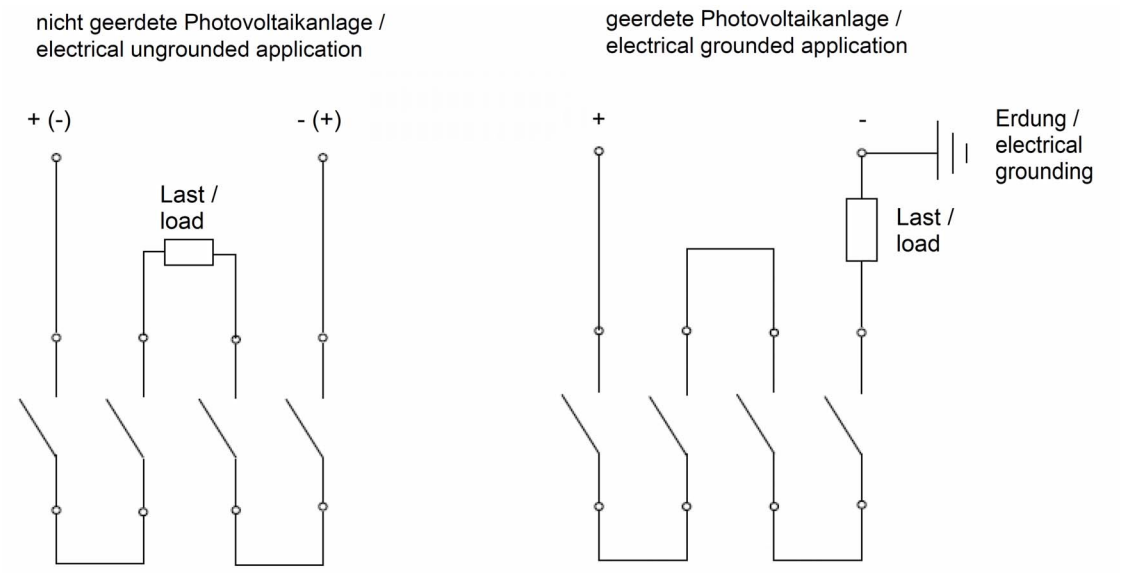
5.2.5 Permissible connection bar versions for frame size I 1000 V DC non-automatic air circuit breaker

Frame size I 1000V DC non-automatic air circuit breakers are only available in the 4-pole version. The upper connections of phases N and L3 form the positive/negative poles in a non-automatic air circuit breaker that is switched in series. Horizontal and vertical connections are available. The six remaining horizontal connections must be connected according to the schematics below.

Hinweis	**Note**
Minimale Anforderung an die Kurzschlussbrücken (Anzahl x Breite x Dicke): 3 x 50 mm x 10 mm	Minimum requirement on the jumpers (quantity x width x thickness) 3 x 50 mm x 10 mm

5.2.6 Zulässige Verschaltungen, Schaltpläne für Baugröße I 1000 V DC Leistungstrennschalter

5.2.6 Permissible connections, connection schemes for frame size I 1000 V DC non-automatic air circuit breaker



5.2.7 Bestellnummern

5.2.7 Order numbers

Anschluss-Schienen Festeinbauschalter Connecting bars fixed-mounted breaker	Baugröße Frame size	Bemessungsnennstrom Rated current	Anzahl [1] Number [1]	Bestellnummer Order number
Frontanschluss einfach oben Front connection, single hole, top	I	≤ 1000 A	1	3WL9111-0AL01-0AA0
		1250 A -1600 A	1	3WL9111-0AL02-0AA0
	II	≤ 2000 A	1	3WL9111-0AL03-0AA0
		2500 A	1	3WL9111-0AL04-0AA0
		3200 A	1	3WL9111-0AL05-0AA0
	III	≤ 4000 A	1	3WL9111-0AL06-0AA0
Frontanschluss Doppelloch oben Front connection, double hole, top	I	≤ 1000 A	1	3WL9111-0AL07-0AA0
		Schaltvermögen / breaking capacity H 1250 A - 2000 A	1	3WL9111-0AL08-0AA0
	II	≤ 2000 A	1	3WL9111-0AL11-0AA0
		2500 A	1	3WL9111-0AL12-0AA0
		3200 A	1	3WL9111-0AL13-0AA0
	III	4000 A	1	3WL9111-0AL14-0AA0
Frontanschluss einfach unten Front connection, single hole, bottom	I	≤ 1000 A	1	3WL9111-0AL51-0AA0
		1250 A - 1600 A	1	3WL9111-0AL52-0AA0
	II	≤ 2000 A	1	3WL9111-0AL53-0AA0
		2500 A	1	3WL9111-0AL54-0AA0
		3200 A	1	3WL9111-0AL55-0AA0
	III	≤ 4000 A	1	3WL9111-0AL56-0AA0
Frontanschluss Doppelloch unten Front connection, double hole, bottom	I	≤ 1000 A	1	3WL9111-0AL57-0AA0
		Schaltvermögen / breaking capacity H 1250 A - 2000 A	1	3WL9111-0AL58-0AA0
	II	≤ 2000 A	1	3WL9111-0AL61-0AA0
		2500 A	1	3WL9111-0AL62-0AA0
		3200 A	1	3WL9111-0AL63-0AA0
	III	4000 A	1	3WL9111-0AL64-0AA0
Vertikalanschluss Vertical connection	I	≤ 1000 A	1	3WL9111-0AM01-0AA0
		Schaltvermögen / breaking capacity H 1250 A - 2000 A	2	
	II	≤ 2500 A	1	3WL9111-0AM02-0AA0
		3200 A	2	
	III	5000 A	1	3WL9111-0AM03-0AA0

[1] Anzahl Anschluss-Schienen pro Hauptanschluss
(z. B. 3-poliger Leistungsschalter = sechs Hauptanschlüsse)

[1] Number of connecting bars per main contact
(e. g. circuit breaker with 3 poles = 6 main contacts)

Anschluss-Schienen Einschubrahmen Connecting bars guide frame	Baugröße Frame size	Bemessungsnennstrom Rated current	Anzahl [1] Number[1]	Bestellnummer Order number
Frontanschluss einfach Front connection, single hole	I	≤ 1000 A	1	3WL9111-0AN01-0AA0
		1250 A - 1600 A	1	3WL9111-0AN02-0AA0
	II	≤ 2000 A	1	3WL9111-0AN03-0AA0
		2500 A	1	3WL9111-0AN04-0AA0
		3200 A	1	3WL9111-0AN05-0AA0
	III	≤ 4000 A	1	3WL9111-0AN06-0AA0
Frontanschluss Doppelloch Front connection, double hole	I	≤ 1000 A	1	3WL9111-0AN07-0AA0
		Schaltvermögen / breaking capacity H 1250 A - 2000 A	1	3WL9111-0AN08-0AA0
	II	≤ 2000 A	1	3WL9111-0AN11-0AA0
		2500 A	1	3WL9111-0AN12-0AA0
		3200 A	1	3WL9111-0AN13-0AA0
	III	4000 A	1	3WL9111-0AN14-0AA0
Vertikalanschluss Vertical connection	I	≤ 1000 A	1	3WL9111-0AN15-0AA0
		Schaltvermögen / breaking capacity H 1250 A - 2000 A	1	3WL9111-0AN16-0AA0
	II	Schaltvermögen / breaking capacity C 1600 A - 3200 A	1	3WL9111-0AN38-0AA0
		2000 A	1	3WL9111-0AN17-0AA0
		2500 A	1	3WL9111-0AN18-0AA0
		3200 A	1	3WL9111-0AN21-0AA0
	III	5000 A	1	3WL9111-0AN22-0AA0
		6300 A 3-polig: oben/unten/ 3 pole: above/below	1 Satz / Set	3WL9111-0AN23-0AA0
		6300 A 4-polig oben / 4 pole above	1 Satz / Set	3WL9111-0AN20-0AA0
		6300 A 4-polig unten / 4 pole below	1 Satz / Set	3WL9111-0AN10-0AA0
Flanschanschluss Flange connection	I	≤ 1000 A	1	3WL9111-0AN24-0AA0
		Schaltvermögen / breaking capacity H 1250 A - 2000 A	1	3WL9111-0AN25-0AA0
	II	≤ 2000 A	1	3WL9111-0AN26-0AA0
		≤ 2500 A	1	3WL9111-0AN27-0AA0
		≤ 3200 A	1	3WL9111-0AN28-0AA0
	III	≤ 4000 A	1	3WL9111-0AN31-0AA0
Horizontalanschluss Horizontal connection	I	≤ 1000 A	1	3WL9111-0AN32-0AA0
		Schaltvermögen / breaking capacity H 1250 A - 2000 A	1	3WL9111-0AN33-0AA0
	II	Schaltvermögen / breaking capacity C 1600 A - 3200 A	1	3WL9111-0AN47-0AA0
		≤ 2000 A	1	3WL9111-0AN34-0AA0
		≤ 2500 A	1	3WL9111-0AN35-0AA0
		≤ 3200 A	1	3WL9111-0AN36-0AA0
	III	≤ 5000 A	1	3WL9111-0AN37-0AA0

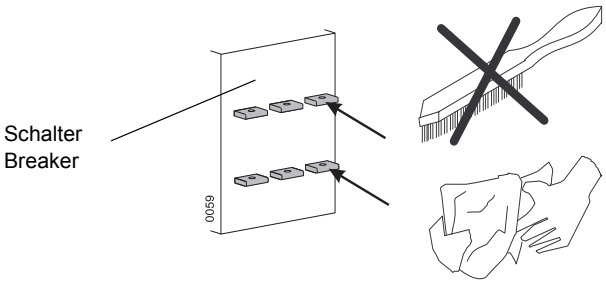
1) Anzahl Anschluss-Schienen pro Hauptanschluss
(z. B. 3-poliger Leistungsschalter = sechs Hauptanschlüsse)

1) Number of connecting bars per main contact
(e. g. circuit breaker with 3 poles = 6 main contacts)

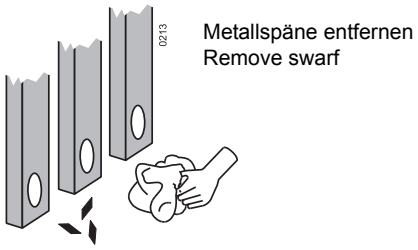
5.3 Hauptleiter anschließen

WARNUNG
Bei 4-poligen Leistungsschaltern ist der N-Leiter immer ganz links anzuschließen. Anderenfalls kann es zu Fehlfunktionen des elektronischen Überstromauslösers kommen. Das Anschließen von Kabeln unmittelbar an die Leistungsschalteranschlüsse ist nicht zulässig.

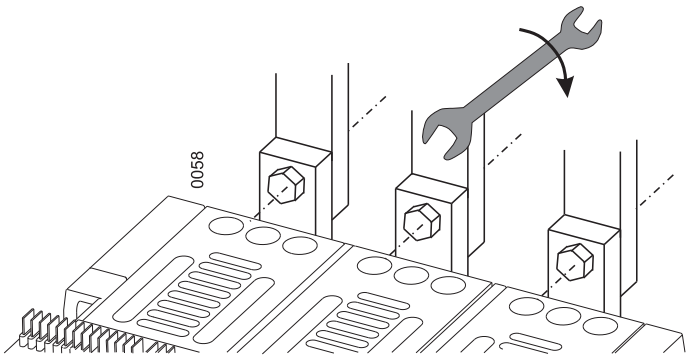
Hauptleiteranschluss säubern



Kupfer-Anlagenschienen säubern



Anlagenseitige Schienen festschrauben



5.3 Connecting the main conductors

WARNING
On 4-pole circuit breakers, the neutral conductor must always be connected all on the left. Otherwise this can cause malfunctions of the electronic overcurrent release. The connection of cables directly to the circuit breaker terminals is not permitted.

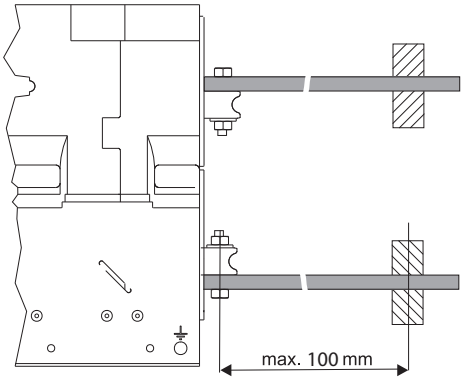
Cleaning the main conductor connection

Cleaning the copper bars

Bolt tight line-side bars

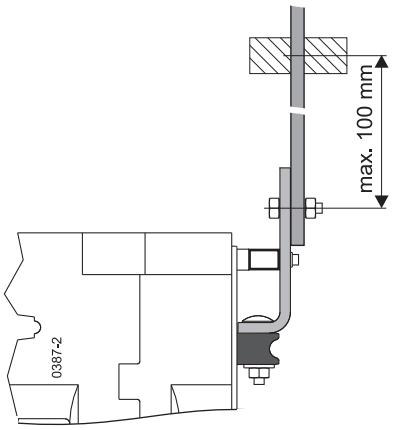
Hauptleiter abstützen

für Schaltvermögen N, S, H

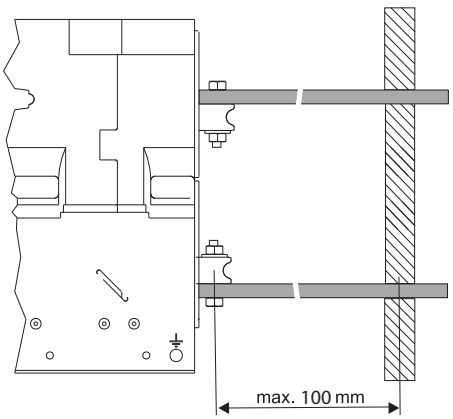


Bracing the main conductors

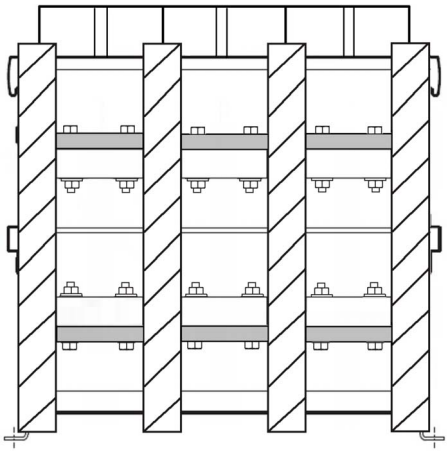
for breaking capacity N, S, H



BG II Schaltvermögen C ($I_{cs} = I_{cu} > 100$ kA)



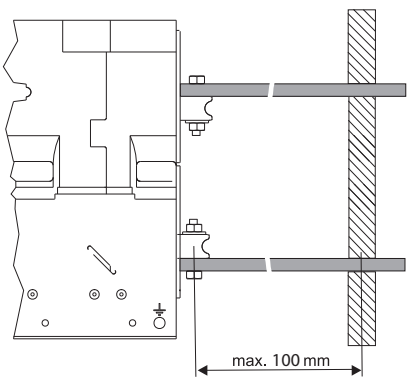
FS II breaking capacity C ($I_{cs} = I_{cu} > 100$ kA)



Hinweis	**Note**
Die Hauptleiter für BG II Schaltvermögen C ($I_{cs} = I_{cu} > 100$ kA) sind in vertikaler und horizontaler Richtung abzustützen.	The main conductors for FS II breaking capacity C ($I_{cs} = I_{cu} > 100$ kA) must be braced in vertical and horizontal direction.

BG III Schaltvermögen C ($I_{cs} = I_{cu} > 100$ kA)

FS III breaking capacity C ($I_{cs} = I_{cu} > 100$ kA)



5.4 Hilfsleiteranschlüsse

Klemmenbelegung:

→ Schaltpläne (Seite 8-1) und folgende

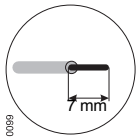
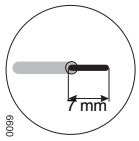
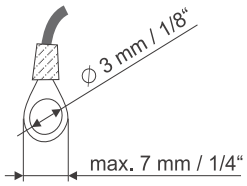
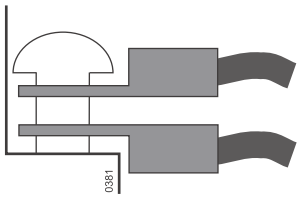
5.4.1 Querschnitte

5.4 Auxiliary conductors

Terminal assignment:

→ Circuit diagrams (page 8-1) and following

5.4.1 Cross sections

Anschluss-Typ **Connection type**	**Leiter abisolieren** **Strip conductors**	**1 x** 	**2 x** 
Schraubklemmen (SIGUT-Technik) **Screw-type terminal (SIGUT system)**		**0,5-2,5 mm²** AWG 20-14 + Aderendhülse 1) Wire end ferrule 1)	**0,5-1,5 mm²** AWG 20-15 + Aderendhülse 1) Wire end ferrule 1)
Schraublose Anschlusstechnik **Screwless terminal system**		**0,5-2,5 mm²** AWG 20-14 + Aderendhülse 2) Wire end ferrule 2)	**0,5-2,5 mm²** AWG 20-14 + Aderendhülse 2) Wire end ferrule 2)
Vormontierte Leitungen **Pre-assembled wires**		**AWG 14** Länge / length: 1 m / 40“	
Ringösen-Schraubtechnik **Ring lug system**		Empfehlung: AMP, Reihe PIDG AWG 16-14 Bestell-Nr. 50881 Recommendation: AMP, PIDG series AWG 16-14 order no. 50881 	

1) 1 x bis 2,5 mm² Rohrform **ohne** Kunststoffhülse nach DIN 46 228 T1
1 x bis 1,5 mm² Rohrform **mit** Kunststoffhülse nach DIN 46 228 T2
2 x bis 1,5 mm² Rohrform **mit** Kunststoffhülse, Zwillings-Aderendhülse

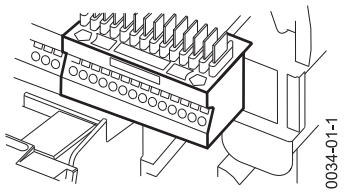
2) 2 x bis 2,5 mm² Rohrform **ohne** Kunststoffhülse nach DIN 46 228 T1
2 x bis 1,5 mm² Rohrform **mit** Kunststoffhülse nach DIN 46 228 T2

1) 1 no. up to 2.5 mm² tube-type **without** insulating sleeve as per DIN 46 228 T1
1 no. up to 1.5 mm² tube-type **with** insulating sleeve as per DIN 46 228 T2
2 nos. up to 1.5 mm² tube-type **with** insulating sleeve, twin wire end ferrule

2) 2 nos. up to 2.5 mm² tube-type **without** insulating sleeve as per DIN 46 228 T1
2 nos. up to 1.5 mm² tube-type **with** insulating sleeve as per DIN 46 228 T2

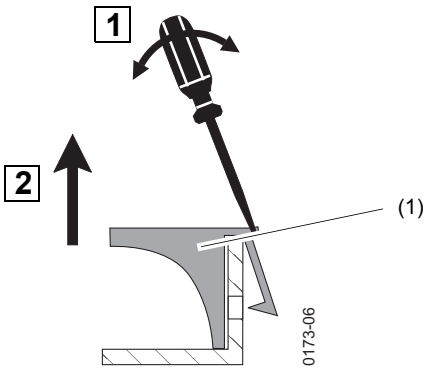
5.4.2 Messerleiste

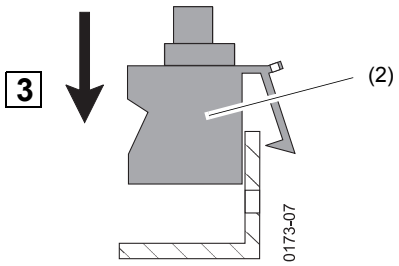
Anordnung

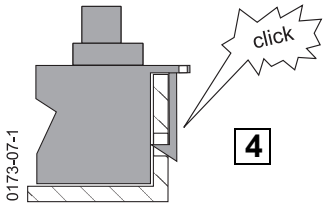


(1) Lichtbogenkammer
(2) Messerleiste

Nachrüsten

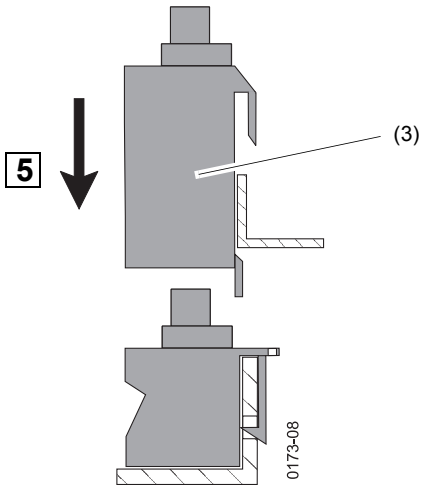


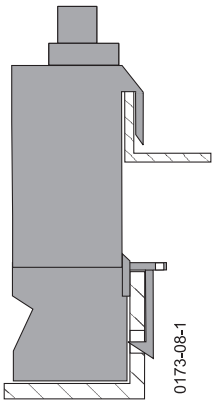


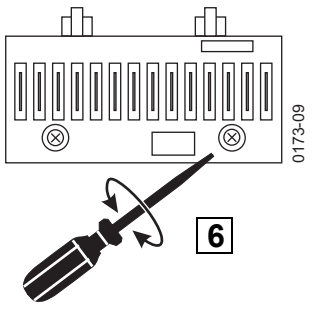


(1) Blindblock
(2) Messerleiste

Nur für Leistungsschalter, 1000 V Ausführung und BG II Schaltvermögen C







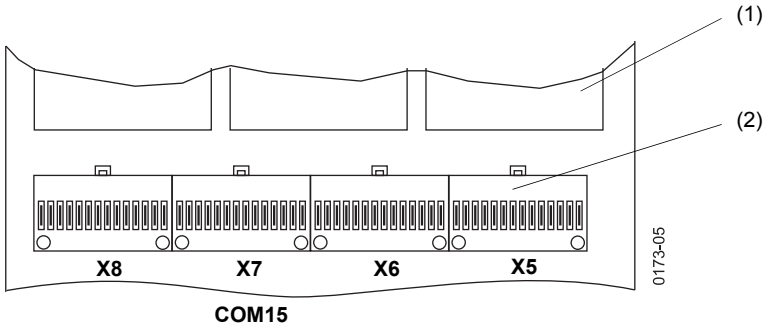


PH 1
0,7 Nm

(3) Messerleistenadapter für hohe Lichtbogenkammer

5.4.2 Receptacle

Arrangement



(1) Arc chute
(2) Receptacle

Retrofitting

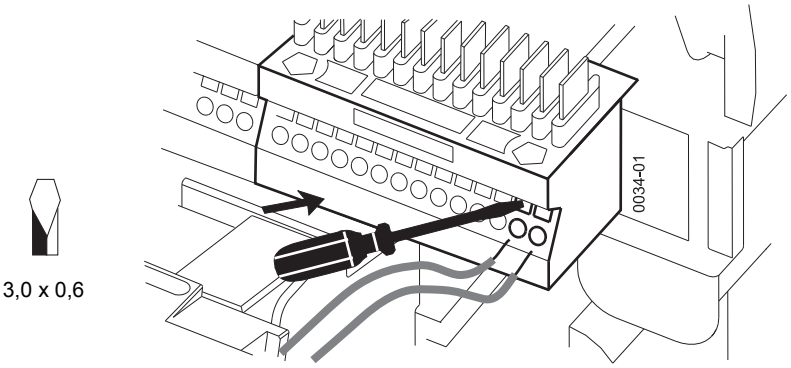
(1) Blanking cover
(2) Receptacle

Only for circuit breaker, 1000 V version and FS II breaking capacity C

(3) Receptacle adapter for high arc chute

Leitungen anschließen

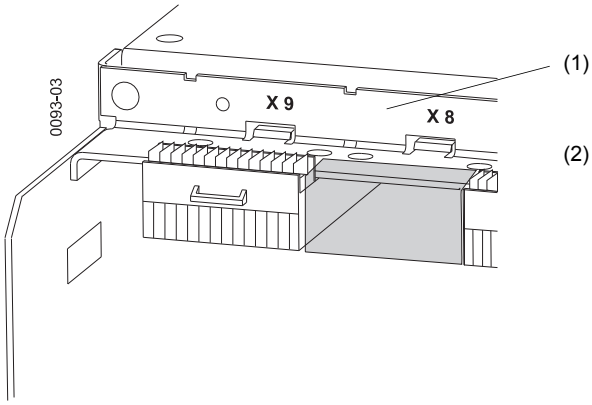
Schraublose Anschlusstechnik



Connecting secondary wiring

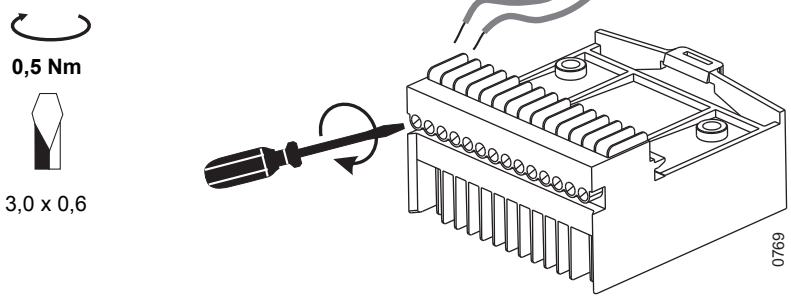
Screwless terminal system

5.4.3 Schleifkontaktmodul Nachrüsten



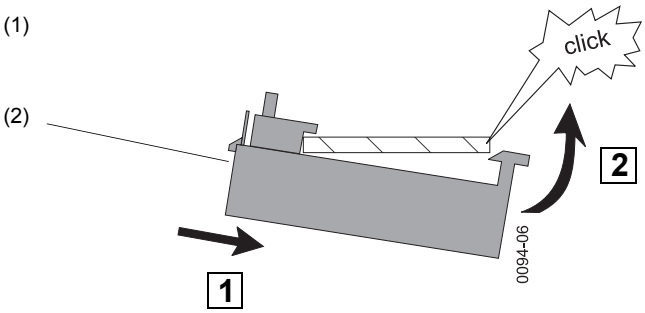
(1) Einschubrahmen mit Schleifkontaktmodulen
(2) Schleifkontaktmodul

Für die SIGUT-Anschlusstechnik steht auch ein einteiliges Schleifkontaktmodul zur Verfügung.



Einteilige Schleifkontaktmodule benötigen keinen Hilfsstromstecker. Die Leitungen werden direkt am Schleifkontaktmodul angeschlossen.

5.4.3 Sliding contact module Retrofitting



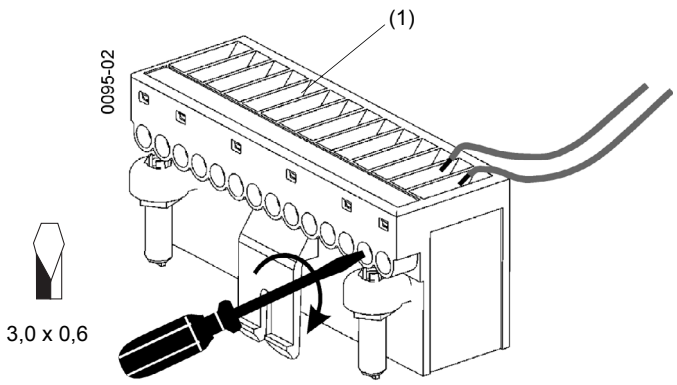
(1) Cradle with sliding contact modules
(2) Sliding contact module

For the SIGUT terminal system, a one-piece sliding contact module is also available.

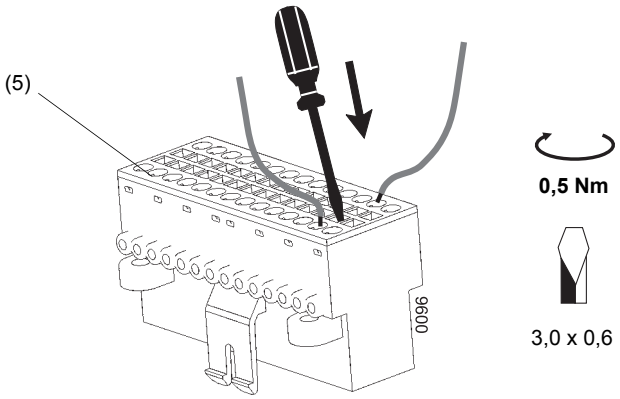
The one-piece sliding contact modules do not require auxiliary plugs. The wiring is directly to the sliding contact module.

5.4.4 Hilfsstromstecker

Ausführungen



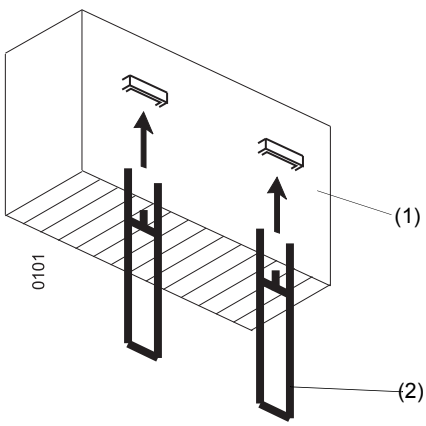
(1) SIGUT-Technik
(2) Ringösen-Schraubtechnik
(3) Isolierte Ringöse
(4) Schrauben ANSI B 18.6.3 #4



(5) Schraublose Anschlusstechnik, 2 Klemmen pro Kontakt
(6) **Nur Festeinbauschalter:** Vormontierte Leitungen

COM15/COM16 → (Seite 9-86)

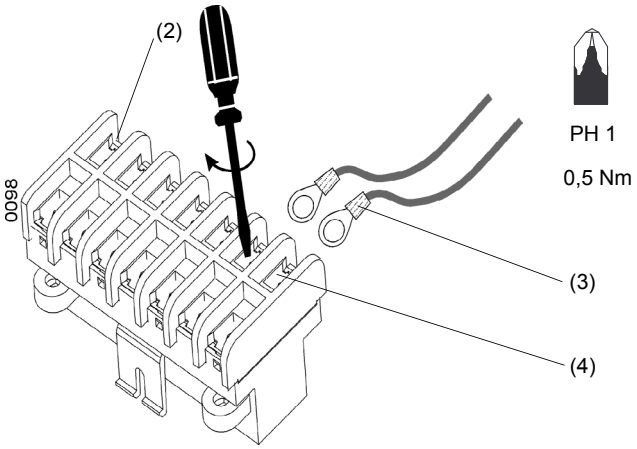
Nur Festeinbauschalter: Führungszungen anbringen



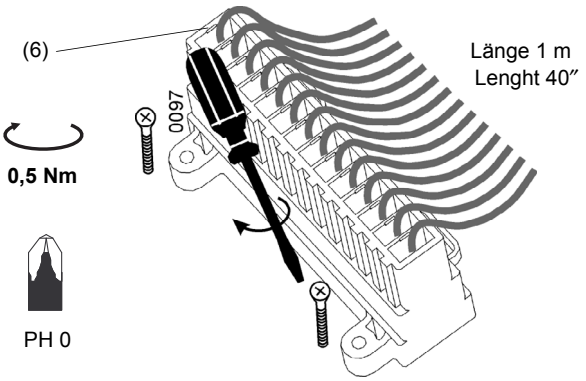
(1) Rückseite Hilfsstromstecker
(2) Führungszungen

5.4.4 Auxiliary connectors

Versions



(1) SIGUT system
(2) Ring lug system
(3) Insulated ring lug
(4) Screws ANSI B 18.6.3 #4



(5) Screwless terminal system, 2 terminals in parallel per contact
(6) **Fixed-mounted breaker only:** pre-assembled wires

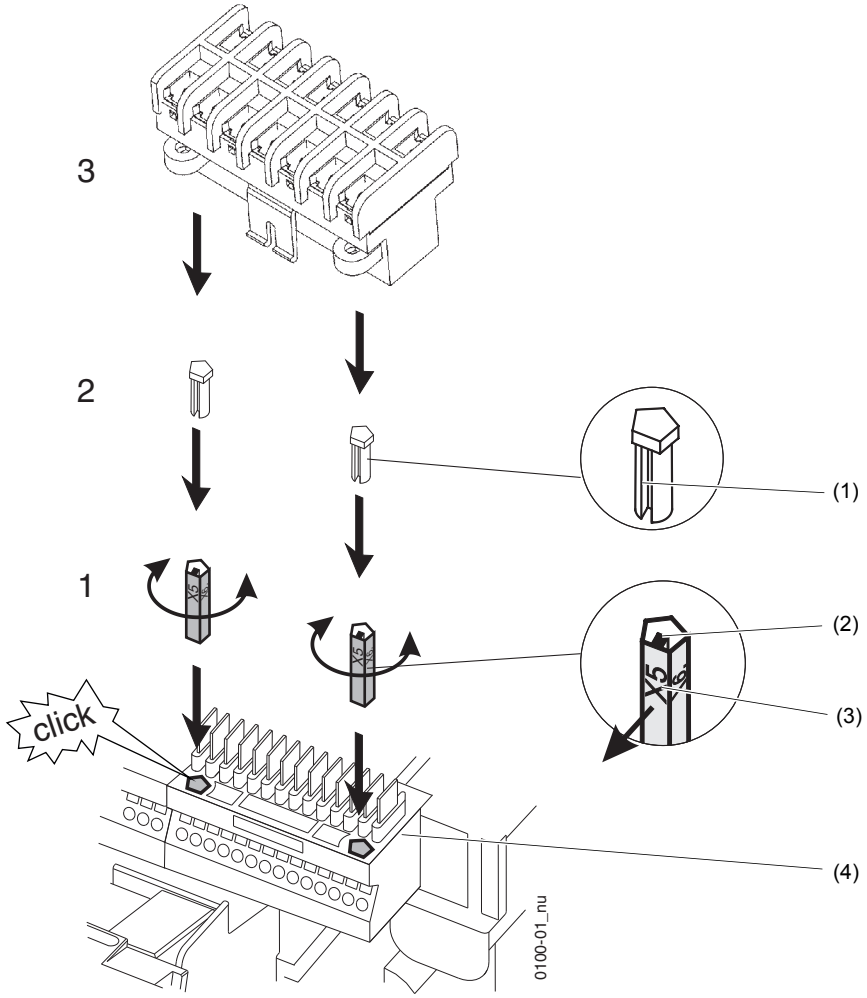
COM15/COM16 → (page 9-86)

Fixed-mounted breaker only: mounting of guide tongues

(1) Back side of auxiliary connector
(2) Guide tongues

Nur Festeinbauschalter
Kodierung Hilfsstromstecker - Messerleiste

Fixed-mounted breaker only
Coding auxiliary connectors

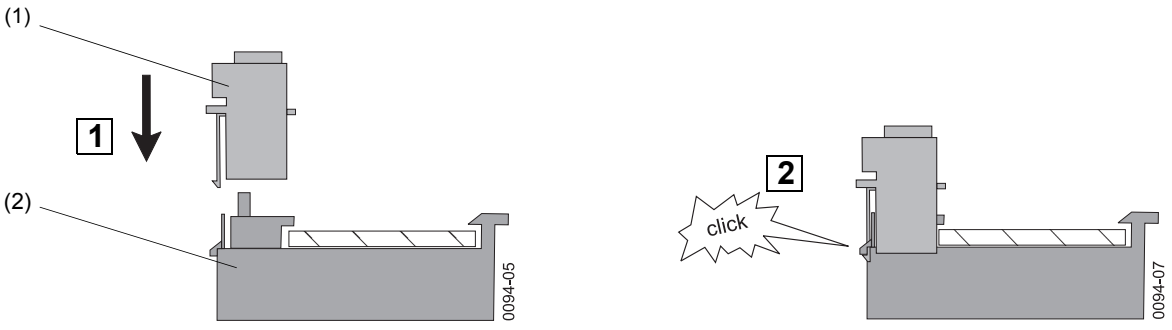


(1) Nut
(2) Führung
(3) Modulbezeichnung (hier: X5; muss nach vorn zeigen)
(4) Modul X5

(1) Male pin: groove
(2) Female socket: guide
(3) Module designation (here X5, must be visible from the front)
(4) Module X5

Hilfsstromstecker aufsetzen

Mounting secondary disconnects

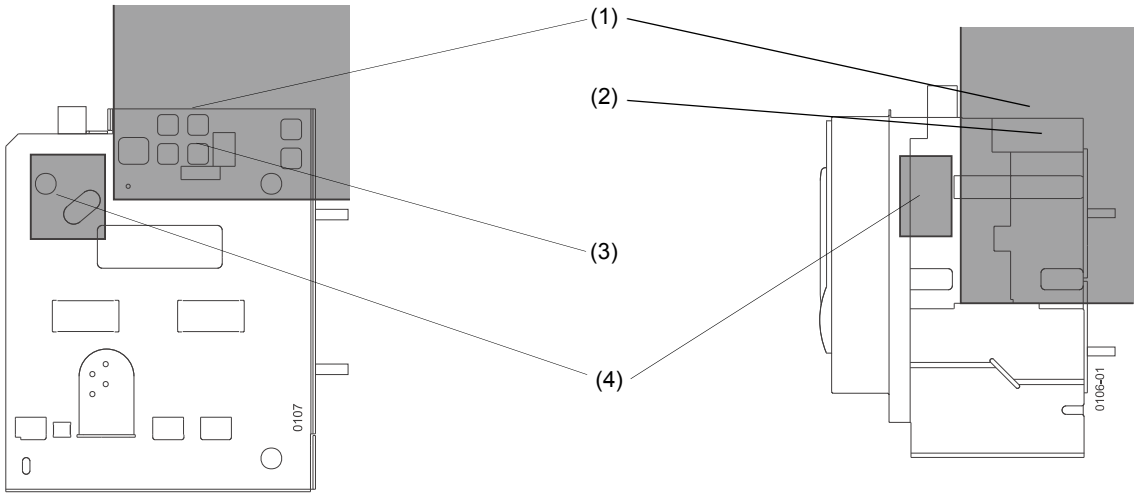


(1) Hilfsstromstecker
(2) **Festeinbauschalter:** Messerleiste
Einschubschalter: Schleifkontaktmodul

(1) Auxiliary connector
(2) **Fixed-mounted breaker:** Breaker secondary disconnect block
Draw-out circuit breaker: Guide frame secondary disconnect block

5.4.5 Unzulässige Bereiche für Leitungen

VORSICHT		CAUTION
Unzulässige Bereiche für Leitungen: **Leitungen können beschädigt werden.**		**Impermissible area for wires:** **Damage to wires in this area.**



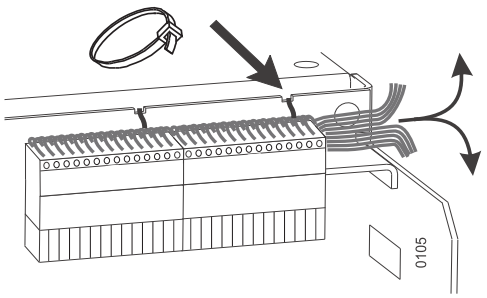
(1) Ausblasraum*)
(2) Tragegriff
(3) Ausblasöffnungen
(4) Verriegelungen

*) Sind Lichtbogenkammerabdeckungen vorhanden, dürfen die Hilfsleiter nicht auf diesen Abdeckungen verlegt werden.

(1) Arcing space*)
(2) Carrying handle
(3) Arcing openings
(4) Interlocks

*) If there are arc chute covers installed, auxiliary wires must not lay directly on top of these covers.

5.4.6 Leitungsverlegung am Einschubrahmen



5.4.7 Bestückung mit Hilfsleiteranschlüssen

Klemmen X6 sind immer vorhanden. In Abhängigkeit von der Ausrüstung des Leistungsschalters mit optionalem Zubehör sind weitere Klemmen erforderlich.

Ggf. müssen die entsprechenden Messerleisten, Hilfsstromstecker und für Einschubrahmen auch Schleifkontaktmodule nachgerüstet werden.

5.4.7 Arrangement of secondary disconnects

The terminals X6 are standard. Depending on optional accessories, additional terminals may be necessary.

In case of necessity, additional receptacles, hand plugs and (for guide frames) sliding contact modules have to be fitted.

Klemme	Optionales Zubehör	Optional accessories
X5	- Motorantrieb mit Speicher mit mechanischem und elektrischem Abruf - 2. Hilfsauslöser = Spannungsauslöser F2 **oder** Unterspannungsauslöser F3 **oder**, verzögerbarer Unterspannungsauslöser F4 - Hilfsstromschalter S3 + S4 oder S7 + S8 oder S3 + S8 - Motorabstellschalter S12 (nur möglich, wenn Motorantrieb gewählt)	- Charging motor with mechanical and electrical closing command - 2nd auxiliary release = shunt trip F2 **or** undervoltage release F3 **or** delayed undervoltage release F4 - Auxiliary switches S3 + S4 or S7 + S8 or S3 + S8 - Motor disconnect switch S12 (only if charging motor exist)
X7	- Ausgelöst-Meldeschalter S24 - Speicherzustandsmeldung S21 - Elektrisch EIN-Taster S10 - Meldeschalter am 1. Hilfsauslöser S22 - Meldeschalter am 2. Hilfsauslöser S23	- Trip signaling switch S24 - Signaling switches storage spring charged S21 - Electrical ON push-button S10 - Signaling switches 1st auxiliary release S22 - Signaling switches 2nd auxiliary release S23
X8	- Überstromauslöser ETU 45B, ETU76B (interner **Cubicle**BUS) - Anschlüsse für externen Stromwandler für Überlastungsschutz im N-Leiter und Erdschlussschutz - Stromwandler im N-Leiter eingebaut - Stromwandler im Sternpunkt des Transformators eingebaut - Fernrücksetzmagnet F7 - externer Spannungswandler	- Overcurrent release ETU 45B, ETU76B (internal **Cubicle**BUS) - Teminals for external current transformer for overload protection of neutral pole and ground-fault protection - Current transformer installed in the neutral conductor - Current transformer installed in the star point of the transformer - Remote reset coil for trip indication F7 - External voltage transformer

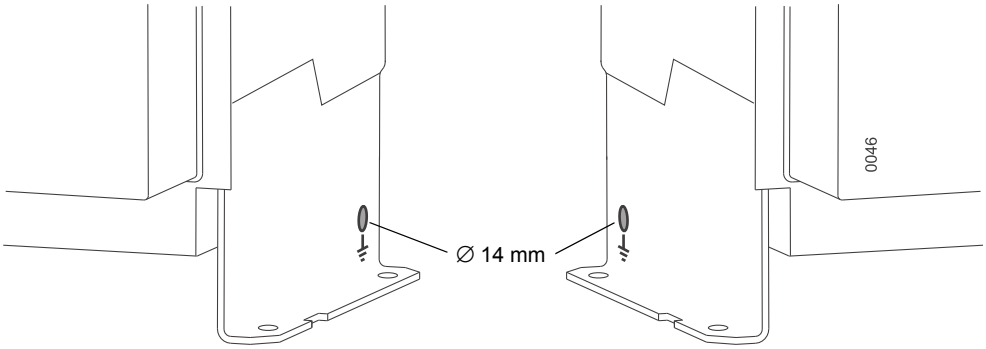
5.4.8 Bestellnummern

5.4.8 Order numbers

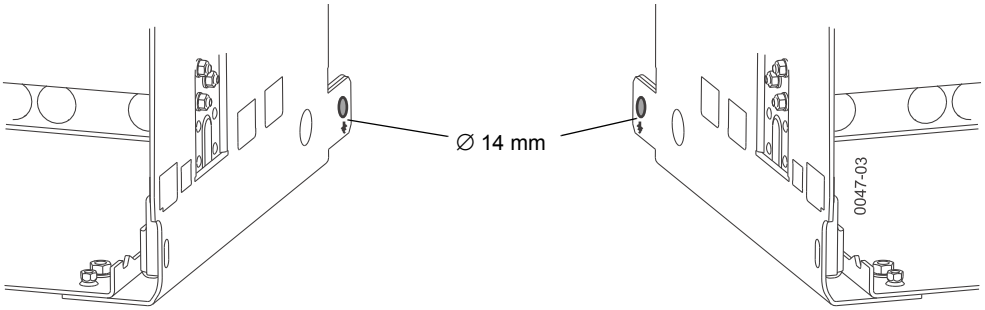
Artikel	Article	Bestellnr. / Order numbers
Messerleiste	Receptacle	3WL9111-0AB01-0AA0
Verlängerung für Messerleiste (Für Ausführung mit hoher Lichtbogenkammer: 1000 V...)	Extension for receptacle (For version with high arc chutes: 1000 V,...)	3WL9111-0AB02-0AA0
Hilfsstromstecker SIGUT	Hand plug SIGUT	3WL9111-0AB03-0AA0
Hilfsstromstecker schraublose Anschlusstechnik	Hand plug screwless terminal system	3WL9111-0AB04-0AA0
Hilfsstromstecker Ringösen	Hand plug ring lug system	3WL9111-0AB05-0AA0
Hilfsstromstecker mit vormontierten Leitungen	Hand plug pre-assembled wires	3WL9111-0AB06-0AA0
Kodiersatz	Coding set	3WL9111-0AB07-0AA0
Schleifkontaktmodul	Secondary disconnects	3WL9111-0AB08-0AA0
Blindblock	Blanking cover	3WL9111-0AB12-0AA0
Messerleiste SIGUT einteilig	Receptacle SIGUT one-piece	3WL9111-0AB18-0AA0

5.5 Schutzleiter anschließen

5.5.1 Festeinbauschalter



5.5.2 Einschubrahmen



Bei BG II 4000 A wird der Einschubrahmen nur durch die Schrauben zur Befestigung im Schaltschrank geerdet.

5.5 Connecting the grounding conductor

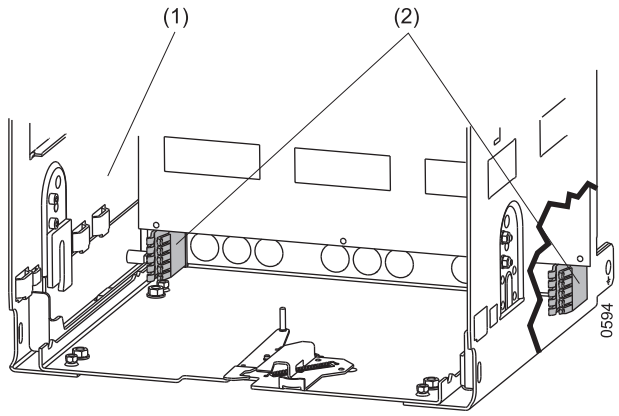
5.5.1 Fixed-mounted breaker

5.5.2 Guide frame

The guide frame of FS II 4000 A is grounded only by the screws fastening it in the cubicle.

5.6 Erdschutz zwischen Einschubrahmen und Einschubschalter

Nicht zulässig bei BG II Schaltvermögen C.



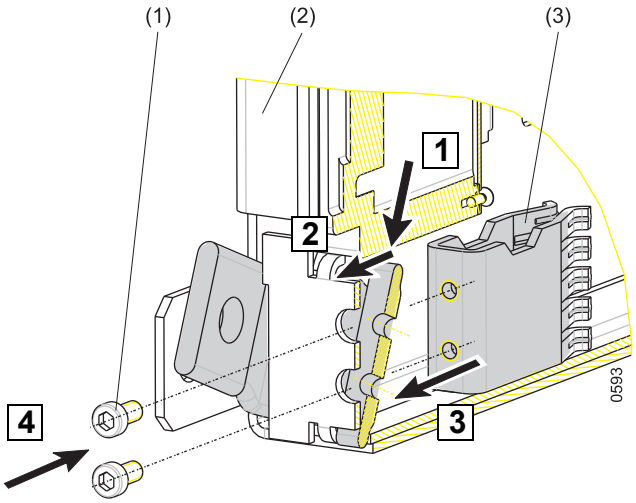
(1) Einschubrahmen
(2) Kontaktmodul für Einschubrahmen
(3) Rückseite des Einschubschalter
(4) Kontaktmodul für Einschubschalter

5.6.1 Nachrüsten

Anbau des Kontaktmoduls am Einschubrahmen

Vor Einbau des Einschubrahmens in die Schaltanlage anbauen.

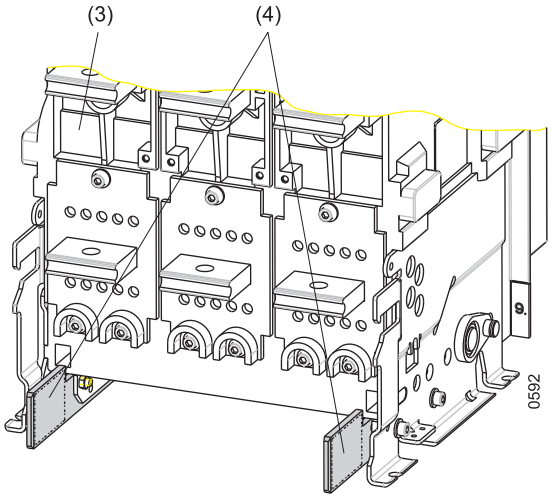




(1) 2 x Innensechskantschraube M6 x 12 DIN 6912
(2) Rückseite des Einschubrahmens
(3) Kontaktmodul
(4) Erdungsanschluss

5.6 Ground protection between guide frame and draw-out circuit breaker

Not permitted in FS II breaking capacity C.

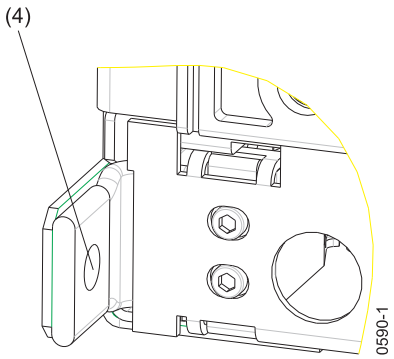


(1) Guide frame
(2) Contact module for the guide frame
(3) Back of the draw-out circuit breaker
(4) Contact module for the draw-out circuit breaker

5.6.1 Retrofitting

Fitting contact module on the guide frame

Mount it before fitting the guide frame in the panel.

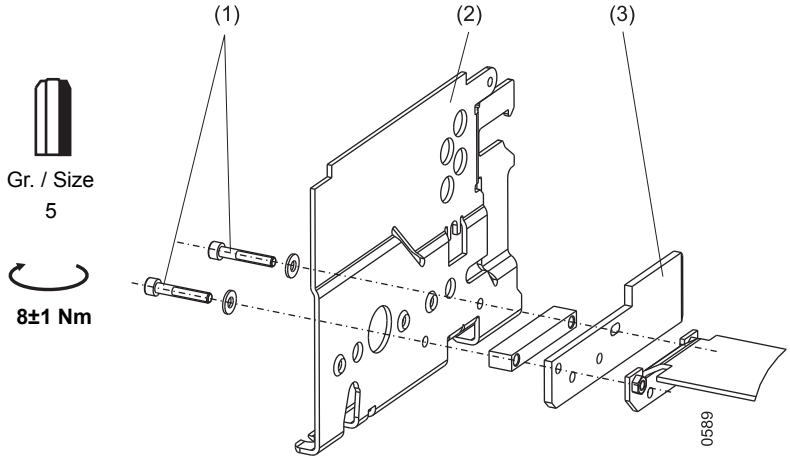


(1) 2 x hexagon socket thin head cap screw M6 x 12 DIN 6912
(2) Back of the guide frame
(3) Contact module
(4) Grounding connection

5.6.2 Kontakt fetten

Lamellenkontakt vor dem Zusammenbau fetten.
Fett: Isoflex Topas NB 52,
Fa. Klüber Lubrication München SE & Co. KG

Kontaktmodul am Einschubschalter anbauen

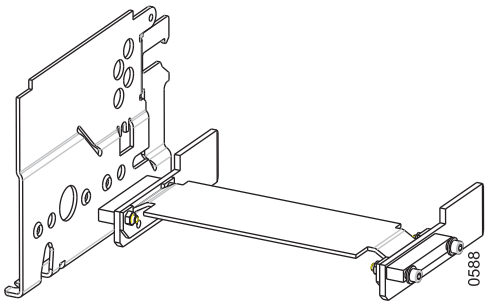


(1) 2 x Innensechskantschraube M6
(2) Innenseite Einschubschalterfuß
(3) Erdungsmesser

5.6.2 Lubrication of contact

Grease finger contact before assembly.
Grease: Isoflex Topas NB 52,
Co. Klüber Lubrication München SE & Co. KG

Fitting contact module to a draw-out circuit breaker



(1) 2 x hexagon socket thin head cap screw M6
(2) Inside of draw-out circuit breaker foot
(3) Grounding blade

5.6.3 Bestellnummern / Z-Zusatz

5.6.3 Order numbers / Z-option

Kontaktmodul für ... **Contact module for ...**	**Bestell-Nr.** **Order no.**
Einschubrahmen mit 30 % der Ausschaltleistung Baugröße I und II guide frame for 30% of make-break capacity frame size I and II	3WL9111-0BA01-0AA0
Einschubrahmen mit 30 % der Ausschaltleistung Baugröße III guide frame for 30% of make-break capacity frame size III	3WL9111-0BA02-0AA0
Einschubschalter BG I / 3-polig draw-out circuit breaker frame size I / 3-pole	3WL9111-0BA05-0AA0
Einschubschalter BG II / 3-polig draw-out circuit breaker frame size II / 3-pole	3WL9111-0BA06-0AA0
Einschubschalter BG III / 3-polig draw-out circuit breaker frame size III / 3-pole	3WL9111-0BA07-0AA0
Einschubschalter BG I / 4-polig draw-out circuit breaker frame size I / 4-pole	3WL9111-0BA08-0AA0
Einschubschalter BG II / 4-polig draw-out circuit breaker frame size II / 4-pole	3WL9111-0BA04-0AA0
Einschubschalter BG III / 4-polig draw-out circuit breaker frame size III / 4-pole	3WL9111-0BA10-0AA0

Hinweis	**Note**
Dieses Zubehör ist für BG II Schaltvermögen C Leistungsschalter und Einschubrahmen nicht erhältlich.	This accessory is not available for FS II breaking capacity C circuit breakers and guide frames.

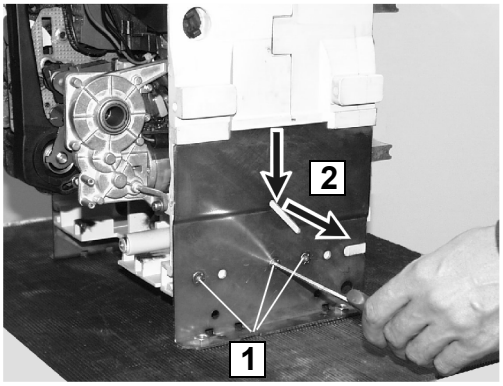
5.7 Umrüsten Festeinbauschalter in Einschubschalter

Nicht zulässig bei BG II und III Schaltvermögen C!

- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Festeinbauschalter ausbauen → (Seite 5-1)
- Anschlüsse bis auf den Horizontalanschluss abrüsten → (Seite 5-4)
- Bedienpult abnehmen → (Seite 24-11)
- Überstromauslöser ausbauen → (Seite 9-72)
- Nennstromkodierung an den neuen Schalterfüßen und am Einschubrahmen anbringen → (Seite 18-7)

5.7.1 Umrüsten

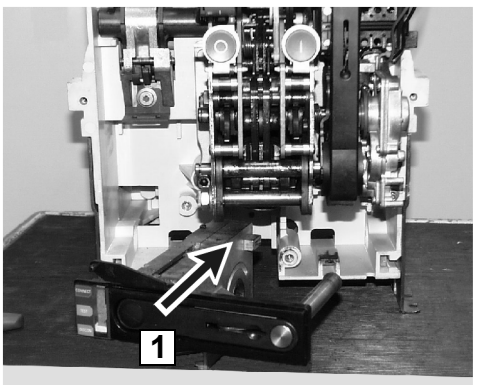
Schalterfüße wechseln





1 3 Senkschrauben M6x20 lösen und entfernen **(Baugröße I** ohne die mittlere Schraube.)
2 Schalterfuß des Festeinbauschalters abnehmen
3 Schalterfuß für Einschubschalter ansetzen
4 Schalterfuß mit 3 bzw.2 Senkschrauben M6x20 anschrauben

Einfahrantrieb einbauen



1 Einfahrantrieb einsetzen

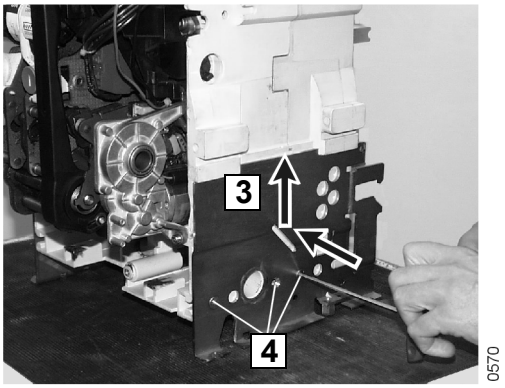
5.7 Converting fixed-mounted circuit breakers into draw-out circuit breakers

Not permitted in FS II and III breaking capacity C!

- Switch off and discharge the storage spring → (page 24-3)
- Remove fixed-mounted circuit breaker → (page 5-1)
- Remove terminals other than horizontal terminals → (page 5-4)
- Remove front panel → (page 24-11)
- Remove overcurrent release → (page 9-72)
- Install rated current coding at the new circuit breaker feet and at the guide frame → (page 18-7)

5.7.1 Conversion

Replacing circuit breaker feet



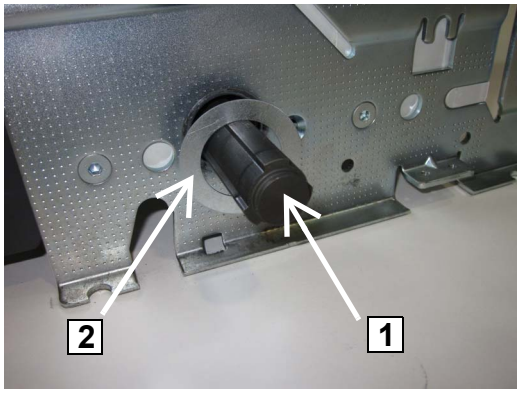


1 Loosen and remove countersunk 3 head screws M6x20 **(Frame size I** without the screw in the middle)
2 Remove circuit breaker foot of fixed-mounted breaker
3 Replace by foot for draw-out circuit breaker
4 Fit it finally using 3x (resp. 2) screws M6x20

Installing racking mechanism

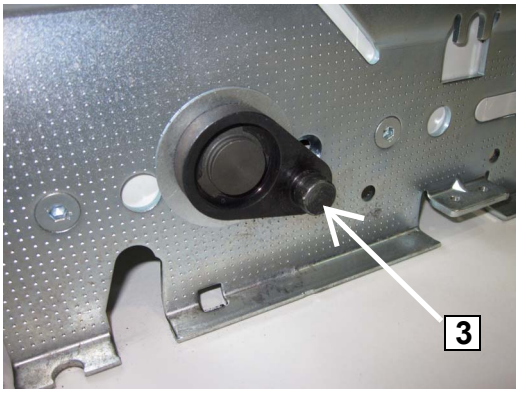
1 Install racking mechanism

Einfahrwelle einbauen

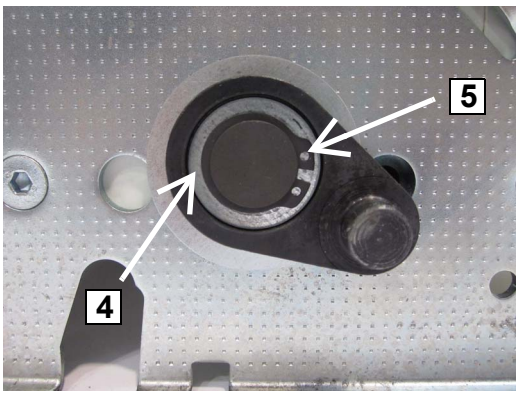


1 Einfahrwelle einsetzen
2 Ausgleichsscheibe Ø 30,1 x Ø 45 x 0,5 einsetzen, wenn Spiel der Einfahrwelle > 0,5 mm (BG I Schaltvermögen H)
Spielausgleich erfolgt beidseitig (links/rechts) !
3 Kurbel aufsetzen

Installing racking shaft



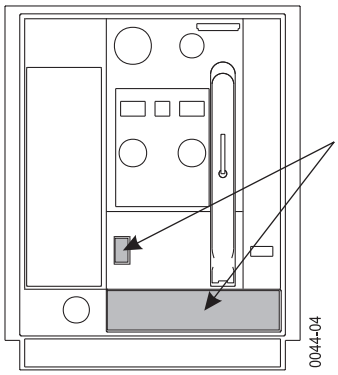
1 Insert racking shaft
2 Insert spacer washer Ø 30,1 x Ø 45 x 0,5, if clearance of racking shaft > 0,5 mm (FS I breaking capacity H)
Adjustment of clearance shall be on both sides (left/right)!
3 Fit crank



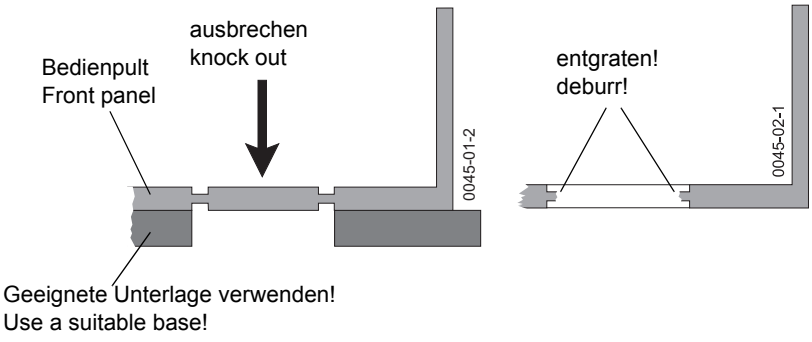
4 Wenn vorhanden, Stützscheiben Ø 17,2 x Ø 26 x ... einsetzen
5 Kurbel mit Sicherungsring DIN 471-17x1 sichern

4 If existing, insert supporting washer Ø 17,2 x Ø 26 x ...
5 Secure crank with retaining ring

Bedienpult ausbrechen

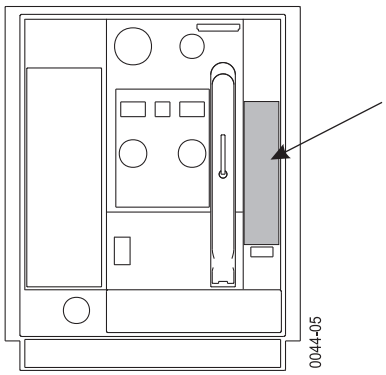


Providing cut-outs in the front panel



Klebeschild am Bedienpult anbringen

Fix adhesive label at the front panel



Anschließend

- Steuerschieber einbauen → (Seite 15-4)
- Überstromauslöser einbauen → (page 9-72)
- Bedienpult anbauen → (Seite 24-25)
- Einschubrahmen mit den für die jeweilige Anschlussart erforderlichen Anschlussschienen ausrüsten (müssen separat bestellt werden) → (Seite 5-4)
- Einschubrahmen einbauen → (Seite 5-1)
- Schalter in Einschubrahmen einsetzen und in Betriebsstellung verfahren → (Seite 6-1)

Then:

- Install control gate → (page 15-4)
- Install overcurrent release → (page 9-72)
- Install front panel → (page 24-25)
- Assemble the required terminals on the guide frame (need to be ordered separately) → (page 5-4)
- Install guide frame → (page 5-1)
- Insert circuit breaker in guide frame and rack into connected position → (page 6-1)

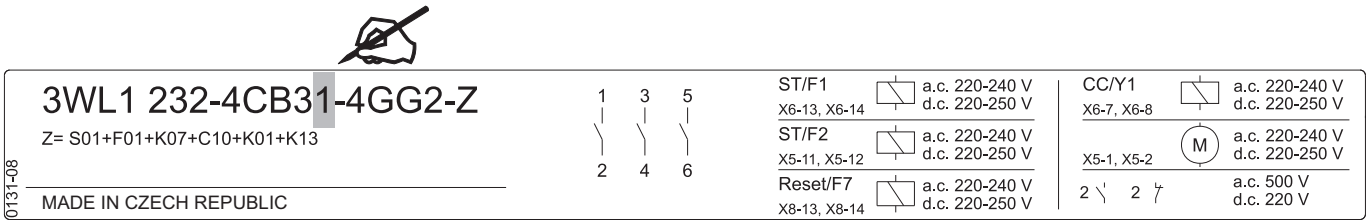
5.7.2 Schilder aktualisieren

Hinweis	Note
Nach dem Einbau zusätzlicher Komponenten sind folgende Angaben mit einem weißen Permanentstift bzw. mit Aufklebern aus dem beiliegenden Etikettenbogen zu aktualisieren! Davor ist es ggf. notwendig die zu korrigierenden Zeichen mit einem schwarzen Permanentstift zu füllen.	After installing additional components, add the following data using a white and indelible ink pen or the appropiate label from the set of labels supplied! If necessary the signs which need to be corrected have to be filled with a black permanent pen before.

5.7.2 Updating the labels

Ausstattungsschild des Leistungsschalters

Options label of the circuit breaker



5.7.3 Bestellnummern / Z-Zusatz

5.7.3 Order numbers / Z-option

Umbausatz für Festeinbau- in Einschubschalter ... Conversion kit for fixed-mounted into draw-out circuit breaker ...	Bestellnummer Order no.	12. Stelle ändern Modify 12th position
BG I-3polig, Schaltvermögen N oder S, ≤ 1600 A frame size I, 3-pole, breaking capacity N or S, ≤ 1600 A	3WL9111-0BC11-0AA0	5
BG I-3polig, 2000 A oder Schaltvermögen H frame size I, 3-pole, 2000 A or breaking capacity H	3WL9111-0BC23-0AA0	
BG I-3polig, 1000 V oder 690V(+20%) frame size I, 3-pole, order code 1000 V or 690V(+20%)	3WL9111-0BC25-0AA0	
BG II-3polig frame size II, 3-pole	3WL9111-0BC12-0AA0	
BG III-3polig frame size III, 3-pole	3WL9111-0BC13-0AA0	
BG I-4polig, Schaltvermögen N oder S, ≤ 1600 A frame size I, 4-pole, breaking capacity N or S, ≤ 1600 A	3WL9111-0BC14-0AA0	
BG I-4polig, 2000 A oder Schaltvermögen H frame size I, 4-pole, 2000 A or breaking capacity H	3WL9111-0BC24-0AA0	
BG I-4polig, 1000 V oder 690V(+20%) frame size I, 4-pole, order code 1000 V or 690V(+20%)	3WL9111-0BC26-0AA0	
BG II-4polig frame size II, 4-pole	3WL9111-0BC15-0AA0	
BG III-4polig frame size III, 4-pole	3WL9111-0BC16-0AA0	

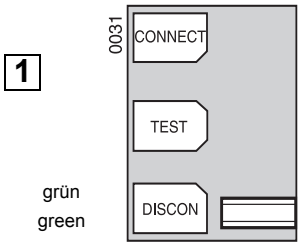
Hinweis	**Note**
Umbausätze können nur über die oben genannte Bestellnummer mit zusätzlicher Angabe der Identnummer des Schalters bestellt werden.	Conversion kits may only be ordered using the above mentioned order number and only together with the identity numbers of the circuit breakers the kits are intended for.

6 Inbetriebnahme

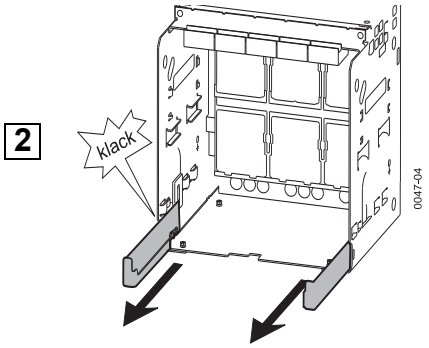
6.1 Vorbereitung des Einschubschalters

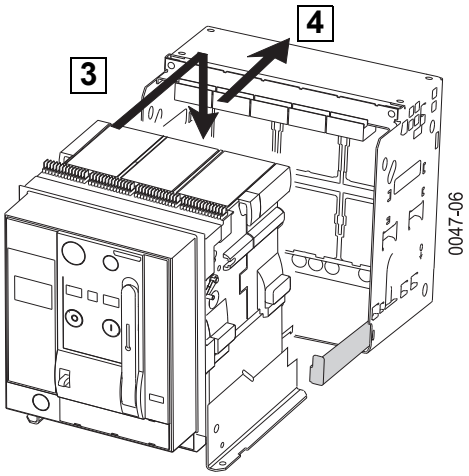
6.1.1 Schalter in Einschubrahmen einsetzen

VORSICHT	CAUTION
Bügelschlösser am Shutter entfernen!	Remove padlocks on the shutter!

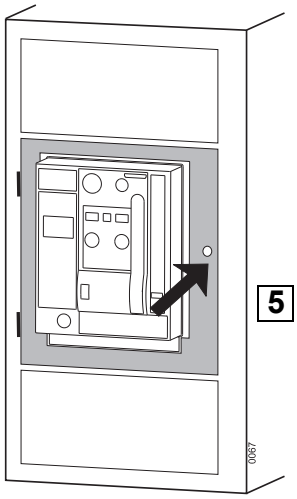


1 Positionsanzeige prüfen
Bei anderer Anzeige ist Einschieben des Schalters nicht möglich.
2 Verfahrschienen herausziehen





3 Schalter einsetzen
4 und in Trennstellung schieben
5 Schaltschranktür schließen



6 Commissioning

6.1 Preparation of draw-out circuit breaker

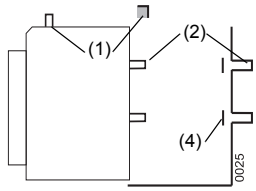
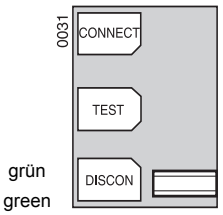
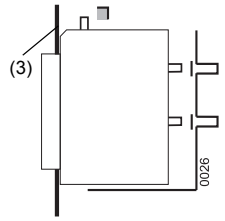
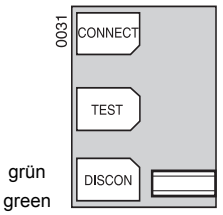
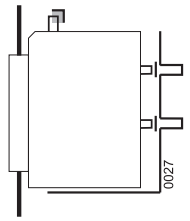
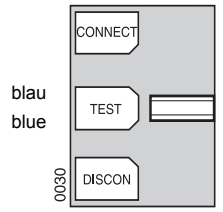
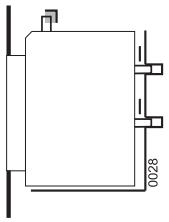
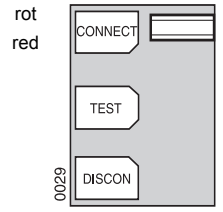
6.1.1 Inserting the circuit breaker in the guide frame

1 Check breaker position indicator
Ensure it shows DISCON. Otherwise the circuit breaker cannot be inserted.
2 Draw out guide rails

3 Place the circuit breaker in the guide frame
4 and push it into disconnected position
5 Close cubicle door

6.1.2 Positionen des Schalters im Einschubrahmen

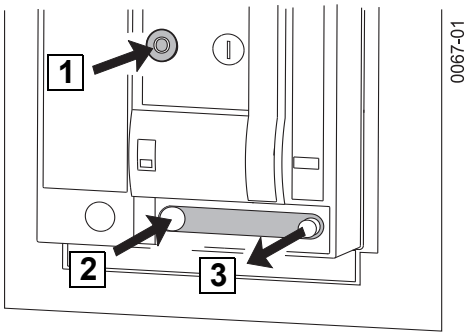
6.1.2 Positions of the breaker in the guide frame

	Darstellung Diagram	Positionsanzeige Positon indicator	Hauptstrom-kreis Power circuit	Hilfstromkreis Auxiliary circuit	Schalt-schranktür Cubicle door	Shutter Shutter
Wartungsstellung **Maintenance position**			getrennt disconnected	getrennt disconnected	offen open	geschlossen closed
Trennstellung **Disconnected position**			getrennt disconnected	getrennt disconnected	geschlossen closed	geschlossen closed
Prüfstellung **Test position**			getrennt disconnected	verbunden connected	geschlossen closed	geschlossen closed
Betriebsstellung **Connected position**			verbunden connected	verbunden connected	geschlossen closed	offen open

(1) Hilfsstromkreis
(2) Hauptstromkreis
(3) Schaltschranktür
(4) Shutter

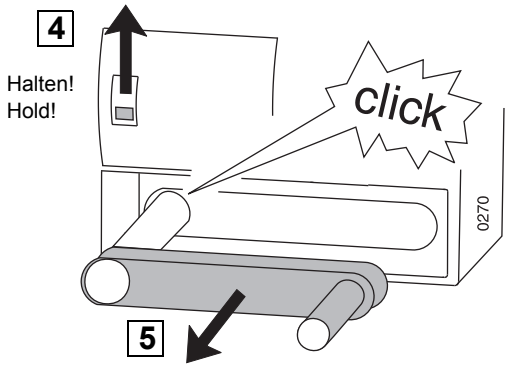
(1) Auxiliary circuit
(2) Primary circuit
(3) Cubicle door
(4) Shutter

6.1.3 Handkurbelsperre lösen / Handkurbel herausziehen



1 Ausschalten
2 Kurbel reindrücken
3 Herausziehen des Handgriffs
4 Hebel hochdrücken und halten
5 Kubel herausziehen

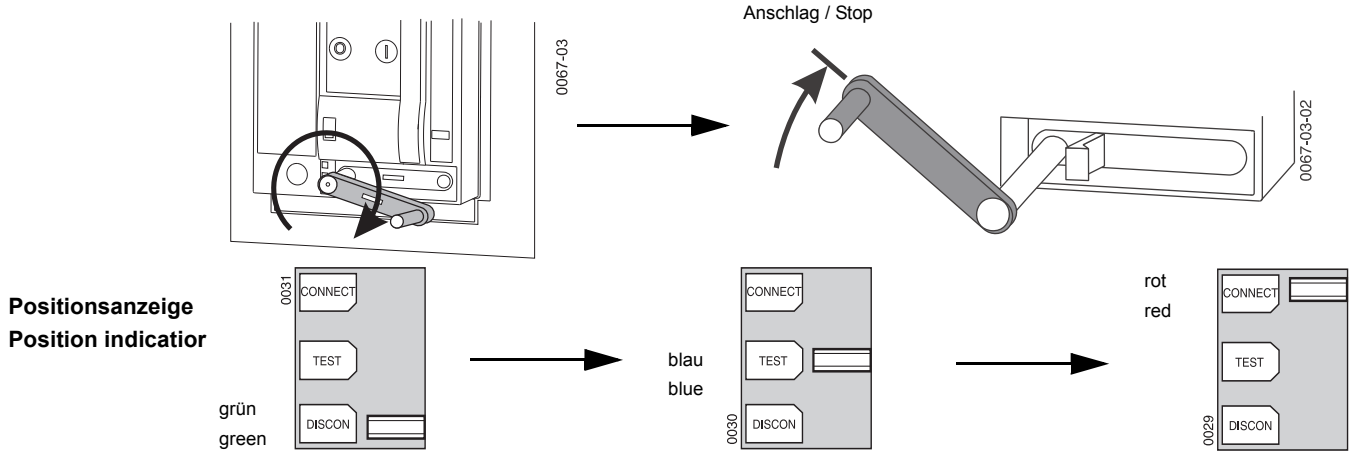
6.1.3 Unlocking the racking handle / Withdrawing racking handle



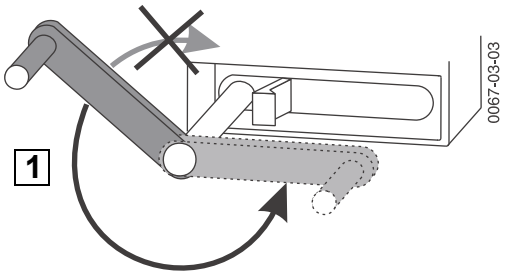
1 OPEN circuit breaker
2 Push crank
3 Pull out the handle
4 Lift and hold the control lever
5 Pull out the crank

6.1.4 Schalter in Betriebsstellung verfahren

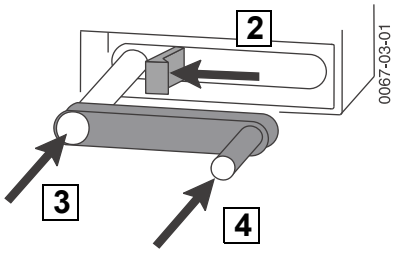
6.1.4 Racking circuit breaker into the connected position



6.1.5 Handkurbel einschieben



6.1.5 Push in the racking handle

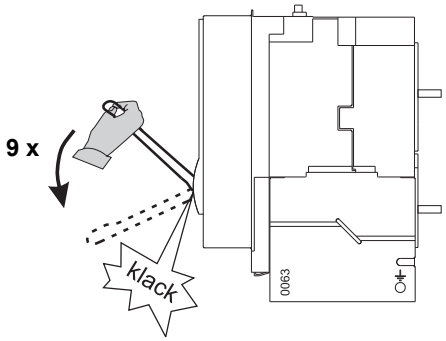


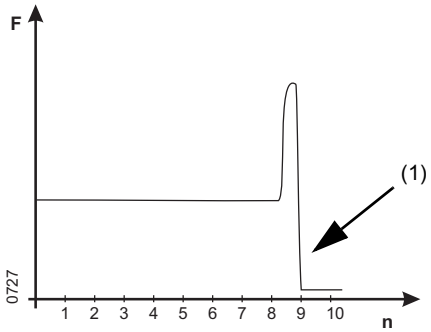
Achtung	Notice
Mögliche Beschädigung durch Handkurbel	Possible damage using the racking handle
Überdrehen der Handkurbel über den Anschlag hinaus kann den Einfahrantrieb beschädigen.	Turn the racking handle beyond the stop may cause damage to the racking mechanism.
Wenn der Anschlag erreicht ist, ist die Handkurbel *entgegen dem Uhrzeigersinn* bis in die Position zu drehen, in der sie eingeschoben werden kann.	When the stop is engaged, rotate the handle *counterclockwise* into a position to allow it to be stowed.

6.2 Federspeicher spannen

6.2.1 Spannen per Hand

WARNUNG		WARNING
Kann Personenschäden verursachen. Einen ausgebauten, freistehenden Leistungsschalter vor dem Spannen des Federspeichers unbedingt in geeigneter Weise abstützen (z. B. bei Wartungsarbeiten auf der Werkbank).		**May result in serious injury.** Secure a not mounted circuit breaker when charging it manually (e. g. during service on the work bench).





F Betätigungskraft
n Anzahl der Hübe
(1) Feder ist gespannt

F Handle force
n Number of strokes
(1) Spring charged

ACHTUNG	NOTICE
Zum Spannen des Federspeichers den Handhebel vollständig umfassen und jeden Hub gleichmäßig und vollständig bis zum Anschlag ausführen. Der 9. Hub ist genau so weit und gleichmäßig zu betätigen, wie die ersten acht Hübe, obwohl die Betätigungskraft deutlich zunimmt. Ist der Federspeicher vollständig gespannt, lässt sich der Handhebel ohne Widerstand bewegen.	To charge the storage spring, grip the handle firmly and carry out each stroke evenly, moving the lever down as far as it will go. Despite a significant increase in the actuating force required, the lever must be moved as far in the ninth stroke as in the first eight. When the storage spring is fully charged, the lever can be moved without resistance.

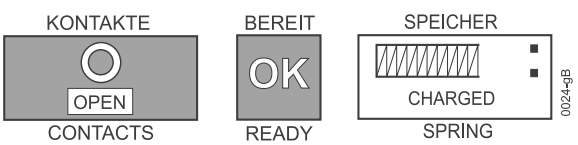
6.2.2 Spannen durch Motorantrieb

Der Motorantrieb startet automatisch nach Anlegen der Steuerspannung. Am Ende des Spannvorgangs schaltet der Motor automatisch ab. Unmittelbar nach einem Einschaltvorgang, bei dem der Federspeicher entspannt wird, wird er vom Motor wieder gespannt, wenn der Motor permanent mit Spannung versorgt wird. → Nachrüsten des Motorantriebs (Seite 13-1)		The motor operating mechanism starts automatically when the control voltage is applied. The motor switches off automatically when the charging process is completed. The motor will re-engage immediately following spring discharge during a closing operation if voltage is applied to recharge the spring again. → Retrofitting the motor operating mechanism (page 13-1)

GEFAHR		DANGER
Gefährliche elektrische Spannung! **Kann Tod, schwere Personenschäden sowie Schäden an Geräten und Ausrüstung bewirken.** Vor dem Arbeiten an diesem Gerät, Anlage unbedingt spannungsfrei schalten.		**Hazardous voltage!** **Will cause death, serious personal injury, or equipment / property damage.** Disconnect power before working on this equipment.

6.3 Checkliste für Inbetriebnahme

6.3 Checklist for commissioning

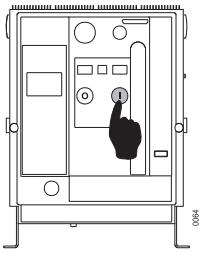
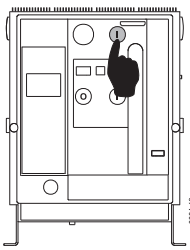
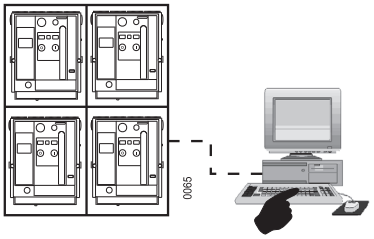
Durchzuführende Arbeiten		**Action required**		✓
Bemessungsstrommodul stecken (bei Einschubschalter in Wartungs- oder Trennstellung) → Bemessungsstrommodul (Seite 9-66)		Insert rating plug (in maintenance or disconnected position of draw out circuit breaker) → Rating plug (page 9-66)		
Rücksetzknopf drücken Mechanische Wiedereinschaltsperre zurückgesetzt		Press red pin to reset Mechanical reclosing lockout		
Betriebswerte am Überstromauslöser einstellen → Überstromauslöser (Seite 9-1)		Set the overcurrent release to appropriate values → Overcurrent releases (page 9-1)		
Schalter ausschalten		Switch OFF circuit breaker		
Hilfs- und Steuerspannungen anschließen		Apply auxiliary and control voltages		
Schaltschranktür schließen		Close the cubicle door		
Einschubschalter in Betriebsstellung verfahren		Rack circuit breaker into connected position		
Handkurbel einschieben (bei Einschubschalter)		Push in the racking handle of the draw out circuit breaker		
Federspeicher spannen		Charge storage spring		
Bedingungen zur Einschaltbereitschaft (je nach Ausführung)		**Conditions for ready-to-close (if applicable)**		
Unterspannungsauslöser	erregt	Under-voltage release	energized	
Spannungsauslöser	nicht erregt	Shunt trip	not energized	
Elektrische Einschaltsperre → (Seite 8-5)	nicht erregt	Electrical closing lockout → (page 8-5)	not energized	
Elektrische Verriegelung des Einschaltmagneten in der Anlagensteuerung	aufgehoben	Electrical interlocking of closing coil in the switch board control wiring	disabled	
Gegenseitige mechanische Schalterverriegelungen	nicht wirksam	Mutual mechanical interlock	not effective	
Sperrvorrichtungen	nicht aktiviert	Locking devices	not activated	
Zustandsanzeigen beachten!		**Observe indications!**		
Achtung: Schalter ist einschaltbereit wenn OK im Fenster BEREIT angezeigt wird und lässt sich manuell oder per Steuerkommando einschalten!		Caution: circuit breaker is ready-to-close if window READY shows OK and may be switched on manually or by remote control		

6.4 Einschalten

6.4 Closing

Zustandsanzeigen
Indications



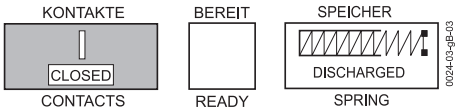
EIN-Taster / ON button	Elektrisch EIN / Electrical ON	Fernbetätigung / Remote activation
		

oder
or

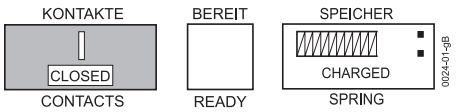
oder
or

Zustandsanzeigen
Indications

Ohne Motorantrieb
Without motor operating mechanism



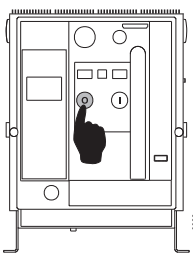
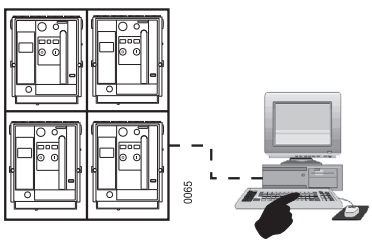
Mit Motorantrieb nach max. 12 s
With motor operating mechanism after max. 12 s



(Unmittelbar nach dem Einschalten wird der Federspeicher durch den Motorantrieb wieder gespannt)
(The storage spring will be recharged by the motor operating mechanism immediately after the breaker has closed)

6.5 Ausschalten

6.5 Switching off

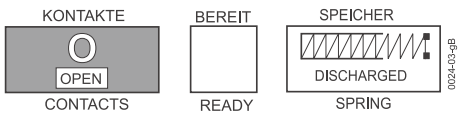
AUS-Taster / OFF button	Fernbetätigung / Remote activation
	

oder
or

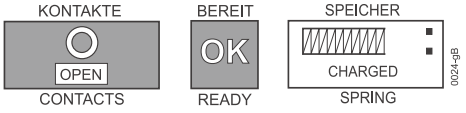
Die minimale Zeitdifferenz zwischen EIN- und AUS-Befehl für den Niederspannungs-Leistungsschalters 3WL soll eine Periode von 100 ms nicht unterschreiten.

The minimum time interval between ON- and OFF-signal of the LOW-Voltage Power Circuit Breakers 3WL shall not be shorter than 100 ms.

Ohne Motorantrieb
Without motor operating mechanism



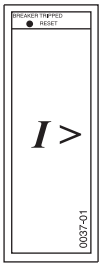
Mit Motorantrieb
With motor operating mechanism



6.6 Auslösen durch Überstromauslöser

6.6 Tripping by overcurrent release

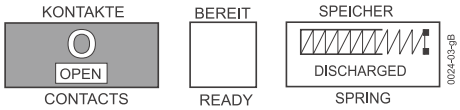
Überstromauslösung	Overcurrent trip



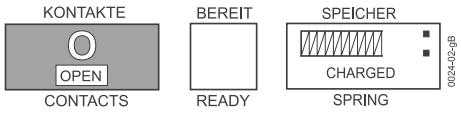


Zustandsanzeigen
Indications

Ohne Motorantrieb
Without motor operating mechanism



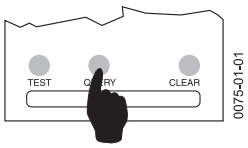
Mit Motorantrieb
With motor operating mechanism

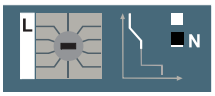
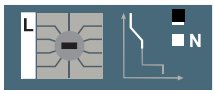
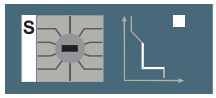
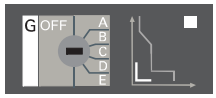


6.7 Wiederinbetriebnahme nach Auslösung durch Überstromauslöser

6.7 Reclosing a circuit breaker tripped by the trip unit

Hinweis	Note
Der Auslösegrund kann mit der Taste „QUERY“ am Überstromauslöser abgefragt werden. Er wird für mindestens zwei Tage gespeichert, sofern der Überstromauslöser vor der Auslösung mindestens 10 min lang aktiviert war.	The reason for tripping can be displayed using the “QUERY” button on the trip unit. This is stored for at least two days, provided that the trip unit was activated for at least 10 minutes before tripping.

<table>
<tr><td>1
Auslösegrund ermitteln /
Find reason for tripping</td><td colspan="5">
</td></tr>
<tr><td rowspan="2">2
Anzeige /

Indicator</td><td>
</td><td>
</td><td>
</td><td>
</td><td>
</td></tr>
<tr><td>Überlast im Hauptleiter

Overload in main conductor</td><td>Überstrom im N-Leiter

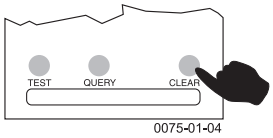
Overload in neutral conductor</td><td>Kurzschluss: kurzzeitverzögerte Auslösung
Short circuit: short-time-delay trip</td><td>Kurzschluss: unverzögerte Auslösung
Short circuit: instantaneous trip</td><td>Erdschluss-Auslösung

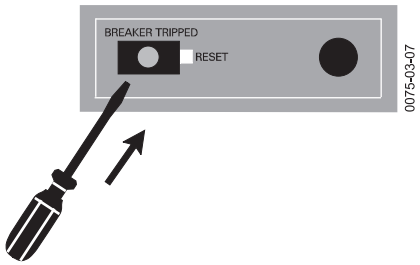
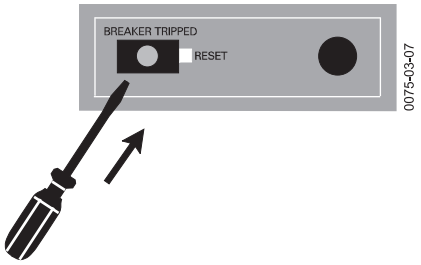
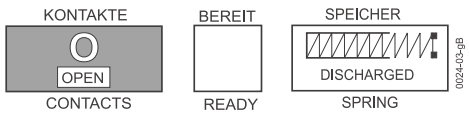
Ground-fault trip</td></tr>
<tr><td>3
Ursache ermitteln und beseitigen /
Find and remedy causes</td><td colspan="2">- Verbraucher prüfen
- Einstellungen am Überstromauslöser überprüfen

- Check downstream load
- Check overcurrent release settings</td><td colspan="3">- Schaltanlage überprüfen
- Verbraucher prüfen

- Inspect panel
- Check downstream load</td></tr>
<tr><td>4
Schalter prüfen /

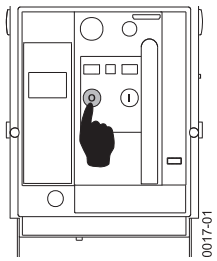
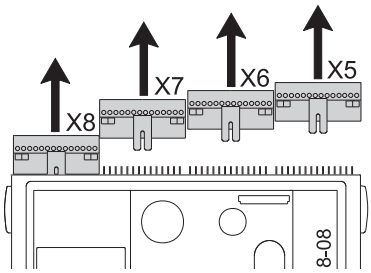
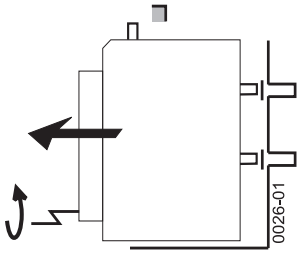
Inspect circuit breaker</td><td colspan="2"></td><td colspan="3">Kontaktsystem auf eventuelle Schäden untersuchen → Wartung (Seite 24-1)

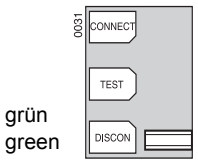
Inspect contact system for possible damage → Maintenance (page 24-1)</td></tr>
<tr><td>5
Auslösegrund löschen /
Clear trip cause</td><td colspan="5">
</td></tr>
</table>

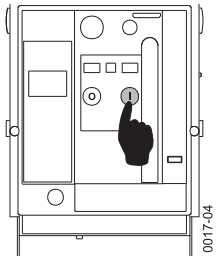
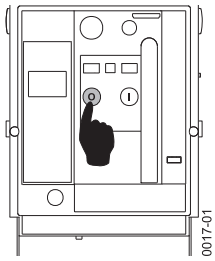
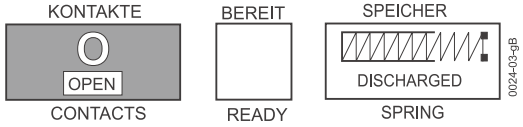
<table>
<tr><td>6
Wiederein-
schaltsperre
zurücksetzen /
Reset reclo-
sing lockout</td><td colspan="2">Mit mechanischer Wiedereinschaltsperre
With mechanical reclosing lockout

</td><td>Automatische Rücksetzung der Wiedereinschaltsperre
→ (Seite 10-2)
Automatic reset reclosing lockout → (page 10-2)</td></tr>
<tr><td>7
Ausgelöst-
Meldung
zurücksetzen /
Reset tripped
indicator</td><td colspan="2">Manuelle Rücksetzung der Wiedereinschaltsperre
und der Ausgelöst-Meldung → (Seite 10-1)
Manual reset reclosing lockout
and reset tripped indicator → (page 10-1)</td><td>
</td></tr>
<tr><td rowspan="2">8
Zustands-
anzeigen /
Indications</td><td>Ohne Motorantrieb
Without motor operating mecha-
nism</td><td colspan="2">
</td></tr>
<tr><td>Mit Motorantrieb
With motor operating mecha-
nism</td><td colspan="2">
</td></tr>
<tr><td>9</td><td colspan="3">→ Federspeicher spannen (Seite 6-4)
→ Einschalten (Seite 6-6)
→ Charge the storage spring (page 6-4)
→ Close (page 6-6)</td></tr>
</table>

6.8 Außerbetriebnahme

6.8 Putting out of service

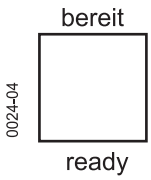
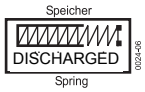
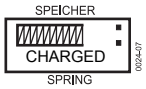
<table>
<tr><th></th><th>Festeinbauschalter /
Fixed-mounted circuit breaker</th><th>Einschubschalter /
Draw-out circuit breaker</th></tr>
<tr><td>1
AUS /
OFF</td><td colspan="2">
</td></tr>
<tr><td>2
Hilfstromkreise trennen /
Disconnect auxiliary circuits</td><td>
</td><td>Hilfsstromkreis
Auxiliary circuit


Positionsanzeige
Position indicator


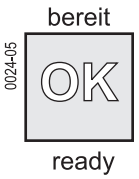
grün
green</td></tr>
<tr><td>3
EIN /
ON</td><td colspan="2">
</td></tr>
<tr><td>4
AUS /
OFF</td><td colspan="2">
</td></tr>
<tr><td>5
Zustandsanzeigen /
Indications</td><td colspan="2">
</td></tr>
</table>

6.9 Störungsbeseitigung

6.9 Troubleshooting → (page 6-12)

Festeinbau-schalter	Einschub-schalter	Störung	Ursache	Abhilfe
X	X	Schalter lässt sich nicht einschalten Schalter ist **nicht** einschaltbereit Einschaltbereitschaftsanzeige: 	1. Federspeicher nicht gespannt 	Federspeicher spannen 
X	X		2. Unterspannungsauslöser nicht erregt	Unterspannungsauslöser an Spannung legen
X	X		3. Mechanische Wiedereinschalt-sperre wirksam	Ursache für Überstromauslösung beseitigen und Rücksetzknopf drücken
X	X		4. Elektrische Einschaltsperre wirksam	Steuerspannung der Einschalt-sperre aufheben [1]
X	X		5. „AUS“ mit Zylinderschloss abgeschlossen (Zubehör)	Zylinderschloss aufschließen [1]
X	X		6. „AUS“ mit Vorhängeschlössern abgeschlossen (Zubehör)	Vorhängeschlösser entfernen [1]
X	X		7. Taster „Mechanisch AUS“ abgeschlossen (Zubehör)	Taster „Mechanisch AUS“ freigeben [1]
X	X		8. „Not-AUS-Taster“ in AUS-Position verriegelt (Zubehör)	„Not-AUS-Taster“ entriegeln [1] Entgegen Uhrzeigersinn drehen
X	X		9. Sperre gegen Einschalten bei geöffneter Schaltschranktür wirksam (Zubehör)	Schaltschranktür schließen
X	X		10. Gegenseitige mechanische Verriegelung wirksam (Zubehör)	Verriegelten Schalter ausschalten bzw. in Trennstellung kurbeln[1]
X	X		11. Elektronischer Überstromauslöser fehlt oder falsch eingebaut	Elektronischen Überstromauslöser richtig einbauen
X	X		12. Spannungsauslöser ist erregt	Spannungsauslöser abschalten
X	X		13. Einschaltmagnet ist erregt	Einschaltmagnet vor Wiedereinschalten abschalten
	X		14. Handkurbel ist herausgezogen	Schalter in Trenn-, Prüf- oder Betriebsstellung kurbeln, Handkurbel entriegeln und bündig einstecken

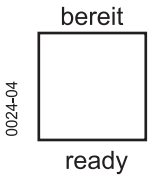
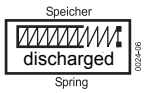
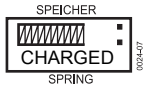
[1] Sicherheitseinrichtung!
Aufhebung der Sicherheitsmaßnahme nur nach Überprüfen der betriebsmäßigen Zulässigkeit!

Festeinbau-schalter	Einschub-schalter	Störung	Ursache	Abhilfe
X	X	Schalter lässt sich nicht einschalten Schalter ist einschaltbereit	1. Betriebsspannung des Einschaltmagneten falsch bzw. nicht vorhanden	Kontrollieren bzw. richtige Spannung anlegen
	X	Einschaltbereitschaftsanzeige:	2. Schalter steht in Trennstellung im Einschubrahmen	Schalter in Prüfstellung bzw. Betriebsstellung kurbeln
X			3. Hilfsstromstecker abgezogen	Hilfsstromstecker aufstecken
	X	Schalter kann aus der Wartungsstellung nicht in die Trennstellung geschoben werden	1. Der Einfahrmechanismus steht nicht in Trennstellung	Einfahrmechanismus in Trennstellung kurbeln (grüne Positionsanzeige)
	X	Schalter kann nicht in die Einfahrschienen eingesetzt werden	1. Werkseitige Kodierung von Schalter und Einschubrahmen stimmen nicht überein	Schaltertyp entsprechend Angaben am Einschubrahmen verwenden
	X	Beim Kurbeln von der Trenn- in die Prüfstellung bewegt sich der Schalter während der ersten ca. 6 Umdrehungen nicht	1. Kein Fehler, funktionsbedingt	Weiter kurbeln
	X	Zum Verfahren lässt sich die Handkurbel nicht herausziehen	1. Schalter ist eingeschaltet	Taster „Mechanisch AUS“ drücken und Handkurbelsperre anheben [2)]
	X		2. Schaltschranktür nicht vollständig geschlossen (Verfahrsperre als Zubehör)	Schaltschranktür schließen
	X	Handkurbel lässt sich nicht zurückstecken	1. Handkurbel ist verriegelt	Schalter in Trenn-, Prüf- oder Betriebsstellung kurbeln, Handkurbel entriegeln und bündig einstecken
X		Schaltschranktür lässt sich nicht öffnen (Türverriegelung als Zubehör)	1. Eingeschalteter Schalter verriegelt die Schaltschranktür	Schalter ausschalten [2)]
	X		2. Schalter steht in Betriebsstellung	Schalter in Prüf- oder Trennstellung kurbeln [2)]

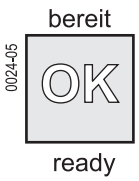
[2)] Nur zulässig, wenn der Hauptstromkreis unterbrochen werden darf!

6.9 Störungsbeseitigung → (Seite 6-10)

6.9 Troubleshooting

Fixed-mounted circuit- breaker	Draw-out circuit breaker	Disturbance	Cause	Remedy
X	X	circuit breaker cannot be closed and circuit breaker **not** ready to close. Ready-to-close indicator shows: 	1. Spring not charged 	Charge spring 
X	X		2. Undervoltage release not energized	Energize undervoltage release
X	X		3. Mechanical reclosing lock-out effective	Rectify cause of overcurrent tripping and press reset button
X	X		4. Electrical closing interlock effective	Switch off control voltage for interlocking [1]
X	X		5. “OFF” locked off by cylinder lock (accessories)	Unlock[1]
X	X		6. “OFF” locked off by padlocks (accessories)	Remove padlocks [1]
X	X		7. “Mechanical OFF” button locked off (accessories)	Unlock the “Mechanical OFF” button [1]
X	X		8. “EMERGENCY OFF” button engaged in operating position (accessories)	Release “EMERGENCY OFF” button [1] by rotating it
X	X		9. Lockout against closing with cubicle door open effective (accessories)	Close cubicle door
X	X		10. Mutual mechanical circuit breaker interlocks effective (accessories)	Open second circuit breaker or rack into disconnected position [1]
X	X		11. Electronic overcurrent release (trip unit) missing or incorrectly installed	Fit electronic overcurrent release properly
X	X		12. Shunt trip energized	De-energize shunt trip
X	X		13. Closing coil energized	Closing coil has to be de-energized shortly for reclosing
	X		14. Racking handle withdrawn	Rack circuit breaker into disconnected, test or connected position, unlatch crank and push it fully in

[1] Safety feature!
This remedy action amounts to a reversal (disabling) of a safety precaution installed earlier. Please do ensure that such disabling is now permissible / authorized!

Fixed-mounted circuit- breaker	Draw-out circuit breaker	Disturbance	Cause	Remedy
X	X	circuit breaker cannot be closed and circuit breaker ready to close. Ready-to-close indicator:  	1. Closing coil not energized or incorrectly energized	Check or apply correct voltage
	X		2. circuit breaker in disconnected position in guide frame	Rack circuit breaker into test or connected position
X			3. Auxiliary connectors have been removed	Plug in the auxiliary connectors
	X	Circuit breaker cannot be moved from the maintenance position into the disconnected position	1. Racking mechanism of breaker not in disconnected position (note breaker position indicator)	Rack the mechanism into disconnected position (green position indication)
	X	Circuit breaker cannot be fitted in the guide rails	1. Factory mounted coding of breaker and guide frame doesn't match	Use breaker type according to guide frame label
	X	When racking from the disconnected into the test position, the circuit breaker does not move during the first 6 rotations (approximately)	1. Not a fault	Continue racking
	X	Racking handle cannot be drawn out	1. Circuit breaker is closed	Press "Mechanical OFF" button and pull racking handle block out [2]
	X		2. Cubicle door not completely closed (Locking device as accessory)	Close cubicle door
	X	Racking handle cannot be pushed in	1. Racking handle is interlocked	Rack circuit breaker into disconnected, test or connected position, unlatch crank and push it fully in
X		Cubicle door cannot be opened (door interlock as accessory)	1. Closed circuit breaker is preventing opening of cubicle door	Open the circuit breaker [2]
	X		2. Circuit breaker in connected position	Rack circuit breaker into test or disconnected position [2]

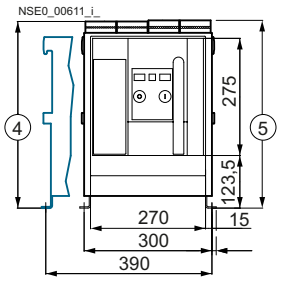
[2] Only permissible if the power circuit may be interrupted!

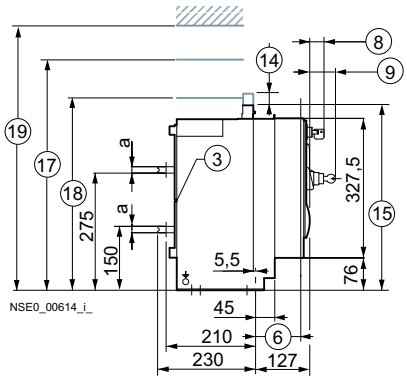
7 Baugrößen und Maßbilder für 3WL1

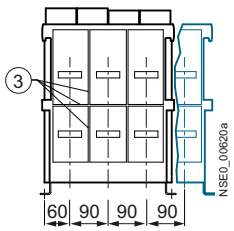
7.1 Baugröße I, Festeinbau, 3- und 4-polig

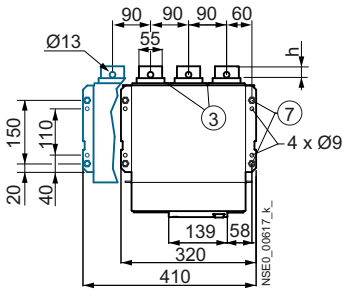
Die seitliche gebrochene Kontur entspricht der 4-poligen Ausführung.

Standardausführung Horizontalanschluss





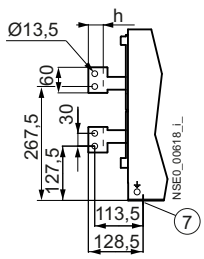




	Abmessungen		Dimensions	
③	Nuten (4 mm breit, 5 mm tief) für Abstützung von Phasentrennwänden in der Anlage		Slots (4 mm wide, 5 mm deep) to support the phase barriers in the switchgear	③
④ ⑤	Hilfsstromstecker mit SIGUT-Schraubklemmtechnik schraubloser Anschlusstechnik COM15/COM16 → (Seite 9-87)	→ (5-15) 437 440 462	Auxiliary connector with SIGUT screwing system screwless terminal system COM15/COM16 → (page 9-87)	④ ⑤
⑥	Maß zur Innenfläche der geschlossenen Schaltanlagentür	106	Dimension to inside of closed cubicle door	⑥
⑦	Befestigungspunkte zur Leistungsschaltermontage in der Anlage (Rastermaß in mm) 4 x Setzmutter M8 (150) und 4 x Ø 9 (110)		Fixing points for mounting the circuit breaker in the switchgear; (spacing in mm) 4 x press nut M8 (150) and 4 x Ø 9 (110)	⑦
⑧	Abschließvorrichtung „Sicheres AUS“	33,5	“Secure OFF” locking device	⑧
⑨	Schlüsselbetätigung	60,5	Key operation	⑨
⑭	Raum für Kabelbaum zu elektrischen Hilfsanschlüssen	20	Space for wire harness to electrical auxiliary circuit breaker connections	⑭

Z-Zusatz U_e oder „X“ = Schaltvermögen → (Seite 27-3)		Standard	A05, A16 oder / or „DC“	Z-option U_e or „X“ = breaking capacity → (27-1)	
⑮	Maximale Gerätehöhe	462	462	Maximum device height	⑮
⑰	Montageraum zum Entnehmen der Lichtbogenkammern	541	591	Mounting space for arc chutes	⑰
⑱	Lichtbogenkammeroberkante	401	451	Arc chute upper edge	⑱
⑲	Sicherheitsabstände	→ (7-2) → (5-20)		Safety distances	⑲

Vertikalanschluss



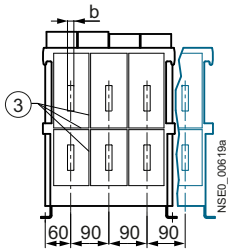
7 Frame sizes and dimension drawings for 3WL1

7.1 Frame size I, fixed-mounted version, 3-pole and 4-pole

The broken contour at the side depicts the 4-pole version.

Standard version, horizontal connection

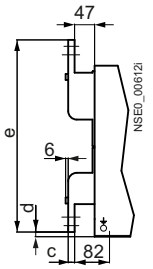
Vertical connection



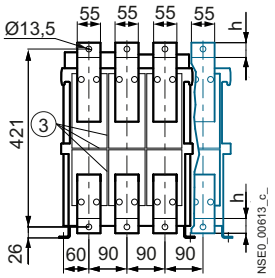
Anschlussmaße
Terminal dimensions

	Max. Schalterbemessungsnennstrom Max. rated current of circuit breaker		
	≤ AC 1000 A, nur Schaltvermögen N und S / breaking capacity N and S only		
		AC 1250–2000 A oder / or Schaltvermögen H / breaking capacity H oder / or ≤ DC 2000 A	
a	10	15	Anschlussdicke / terminal thickness
b	10	20	
c	10	15	
d	11	6	Abstand / distance
e	451	461	Abstand / distance
f	34	39	Überstand / protrusion
g	541	551	Abstand / distance
h	35		Anschlussflächenlänge / terminal face length
m	80		

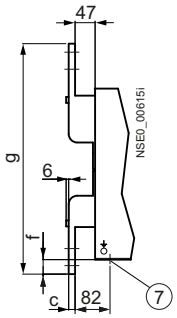
Frontanschluss (einfach)



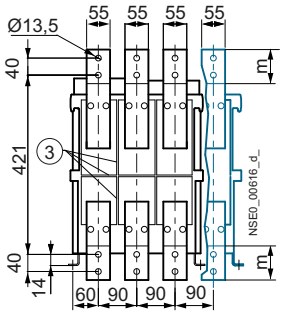
Front connection (single hole)



Frontanschluss (Doppelloch)



Front connection (double hole)



Sicherheitsabstände
Safety distances

BG I, Festeinbau **FS I, Fixed-version**	... zu geerdeten oder nicht-leitenden Teilen ... to grounded or non-conducting parts			... zu spannungsführenden Teilen ... to voltage carrying parts			IT-System
Betriebsspannung **Operational voltage**	oberhalb ⑲ above	seitlich sideways	hinten rear	oberhalb ⑲ above	seitlich sideways	hinten rear	oberhalb ⑲ above
	Standard Lichtbogenkammer - 401 mm - Standard arc chute						
AC 500 V „N/S“	510[1)]	0	0	585	20	20	551
AC 500 V „H“	510	0	0	685	50	20	551
AC 690 V „N/S“	510[1)]	0	0	735	50	125	---
AC 690 V „H“	510	0	0	935	75	140	---
	Hohe Lichtbogenkammer - 451 mm - High arc chute (A05, A16 oder / or „DC“)						
AC 690 V	560	0	0	935	75	140	601[3)]
AC 690 V + 20% „H“	615	0	0	935	100	140	---
AC 1000 V „H“	615	0	0	935	100	140	---
DC 1000 V	551	0	0	[2)]			---

1) für geschlossene Flächen,
0 mm oberhalb Hilfsstecker für Streben, Gitter und Lochbleche

2) Mit isolierender Abschirmung, Abstand siehe „nicht-leitende Teile“

3) U_e=1000 V mit Schaltvermögen H und Z-Option Z=A05

1) for closed surfaces only,
0 mm above auxiliary connectors for struts, grids and perforated plates

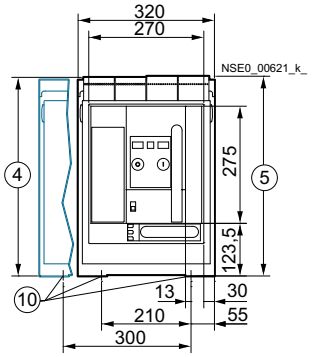
2) With insulating cover, for spacing see „non-conducting parts“

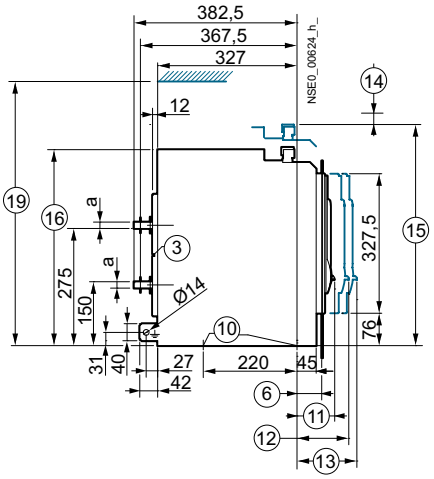
3) U_e=1000 V with breaking capacity H and Z-option Z=A05

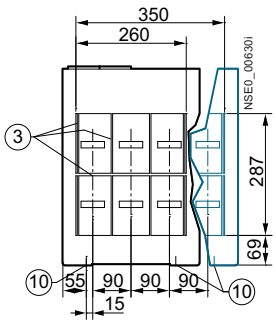
7.2 Baugröße I, Einschubausführung, 3- und 4-polig

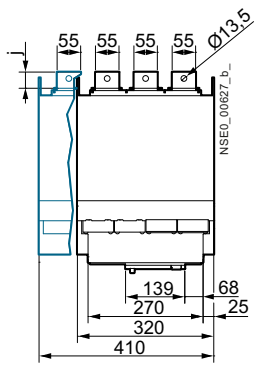
Die seitliche gebrochene Kontur entspricht der 4-poligen Ausführung.

Standardausführung Horizontalanschluss





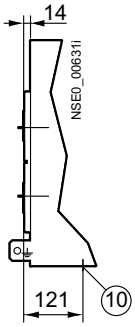




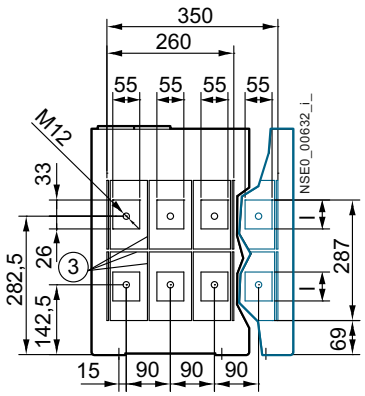
Abmessungen **Dimensions**

Z-Zusatz oder „X“ = Schaltvermögen → (Seite 27-3)		Standard	A05, A16 oder / or „DC“	Z-option or „X“ = breaking capacity → (page 27-1)	
③	Nuten (4 mm breit, 5 mm tief) für Abstützung von Phasentrennwänden in der Anlage			Slots (4 mm wide, 5 mm deep) to support the phase barriers in the switchgear	③
④ ⑤	Hilfsstromstecker mit SIGUT-Schraubklemmtechnik (einteilig) schraubloser Anschlusstechnik	→ (5-15) 465 (446) 468	→ (5-15) 515 (496) 518	Auxiliary connector with SIGUT screwing system (one-piece) screwless terminal system	④ ⑤
⑥	Maß zur Innenfläche der geschlossenen Schaltanlagentür	58,0		Dimension to inside of closed cubicle door	⑥
⑩	Befestigungslöcher	Ø 9		Fixing holes	⑩
⑪	Schalter in Betriebsstellung	88,5		Circuit breaker in connected position	⑪
⑫	Schalter in Prüfstellung	121,5		Circuit breaker in test position	⑫
⑬	Schalter in Trennstellung	140,5		Circuit breaker in disconnected position	⑬
⑭	Raum für Kabelbaum zu elektrischen Hilfsanschlüssen	20		Space for wire harness to electrical auxiliary circuit breaker connections	⑭
⑮	Maximale Gerätehöhe	468	518	Maximum device height	⑮
⑯	Einschubrahmenoberkante	460	510	Guide frame upper edge	⑯
⑲	Sicherheitsabstände	→ (7-4) → (5-20)		Safety distances	⑲

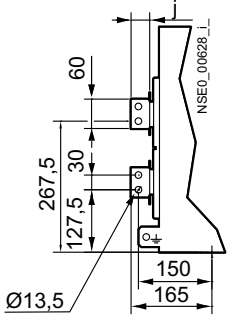
Flanschanschluss



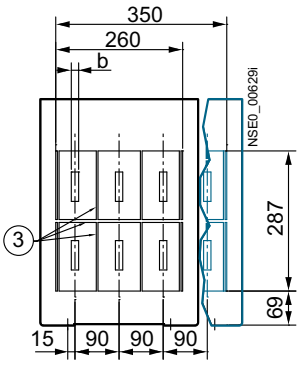
Flange connection



Vertikalanschluss



Vertical connection



7.2 Frame size I, withdrawable version, 3-pole and 4-pole

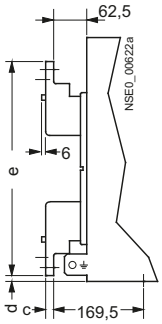
The broken contour at the side depicts the 4-pole version.

Standard version, horizontal connection

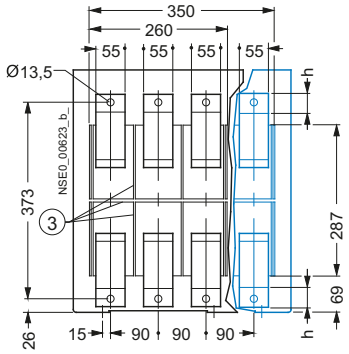
Anschlussmaße
Terminal dimensions

	Max. Schalterbemessungsnennstrom Max. rated current of circuit breaker		
	bis / up to AC 1000 A, nur Schaltvermögen N und S / breaking capacity N and S only		
		AC 1250-2000 A oder / or Schaltvermögen H / breaking capacity H	
a	10	15	Anschlussdicke / terminal thickness
b	10	15	
c	10	15	
d	11	6	Abstand / distance
e	403	413	Abstand / distance
f	34	39	Überstand / protrusion
g	493	503	Abstand / distance
h	35		Anschlussflächenlänge / terminal face length
j	38		
l	59		
m	80		

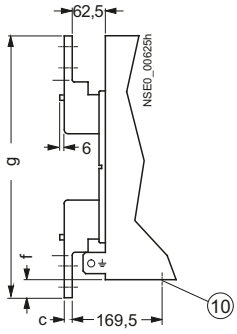
Frontanschluss (einfach)



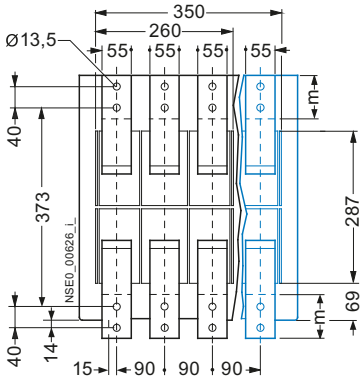
Front connection (single hole)



Frontanschluss (Doppelloch)



Front connection (double hole)



Sicherheitsabstände

Safety distances

BG I, Einschubtechnik **FS I, withdrawable version**	... zu geerdeten oder nicht-leitenden Teilen ... to grounded or non-conducting parts			... zu spannungsführenden Teilen ... to voltage carrying parts			IT-System
	oberhalb ⑲ above	seitlich sideways	hinten rear	oberhalb ⑲ above	seitlich sideways	hinten rear	oberhalb ⑲ above
Lichtbogenkammerabdeckung Arc chute cover → (21-2)	ohne/mit without/with	ohne/mit without/with	ohne/mit without/with	ohne/mit without/with	ohne/mit without/with	ohne/mit without/with	ohne without
Betriebsspannung **Operational voltage**	**Standard Lichtbogenkammer - ⑯ = 460 mm - Standard arc chute**						
AC 500 V „N/S“	515[1] / 460	0 / 40 [2]	0 / 0	615 / 479	20 / 100	20 / 14	551
AC 500 V „H“	515[1] / 460	0 / 40 [2]	0 / 0	715 / 479	50 / 50	20 / 14	---
AC 690 V „N/S“	515[1] / 460	0 / 40 [2]	0 / 0	765 / 479	50 / 100	125 / 14	---
AC 690 V „H“	515[1] / 460	0 / 40 [2]	0 / 0	965 / 479	75 / 225	140 / 14	---
	Hohe Lichtbogenkammer - ⑯ = 510 mm - High arc chute (A05, A16 oder / or „DC“)						
AC 690 V „H“	565 / ---	0 / -	0 / -	1017 / ---	75 / ---	140 / ---	601[3]
AC 690 V + 20% „H“	620 / ---	0 / -	0 / -	1017 / ---	100 / ---	140 / ---	---
AC 1000 V	620 / ---	0 / -	0 / -	1017 / ---	100 / ---	140 / ---	---

1) Wert für Platte, 0 mm oberhalb Hilfsstecker für Streben und Gitter

2) Wert für Platten, die seitliche Öffnungen im Einschubrahmen verdecken, 0 mm für Streben und Gitter

3) U_e=1000 V mit Schaltvermögen H und Z-Option Z=A05

1) for plates only, 0 mm above auxiliary connectors for struts and grids

2) for plates only covering openings on a guide frames side, 0 mm for struts and grids

3) U_e=1000 V with breaking capacity H and Z-option Z=A05

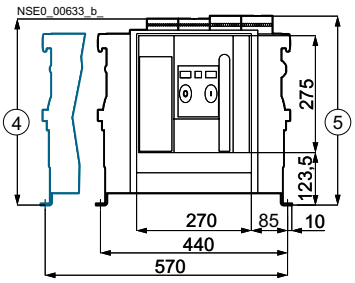
7.3 Baugröße II, Festeinbau, 3- und 4-polig

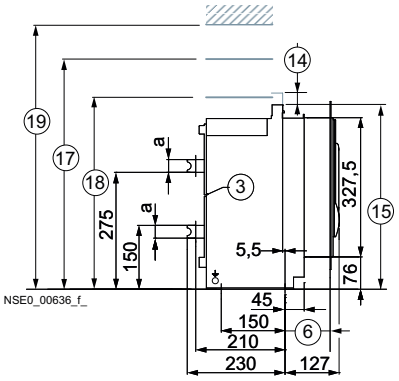
Die seitliche gebrochene Kontur entspricht der 4-poligen Ausführung.

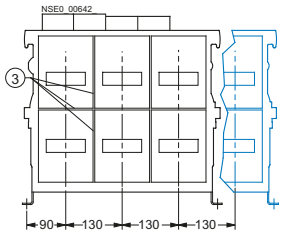
7.3 Frame size II, fixed-mounted version, 3-pole and 4-pole

The broken contour at the side depicts the 4-pole version.

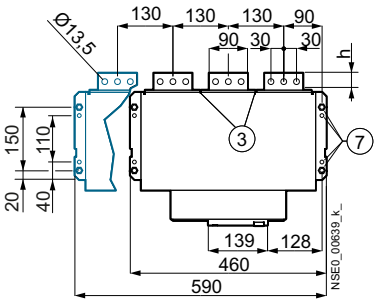
Standardausführung Horizontalanschluss







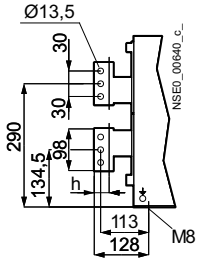
Standard version, horizontal connection



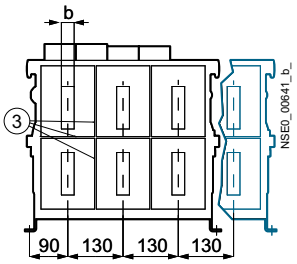
	Abmessungen		Dimensions
③	Nuten (4 mm breit, 5 mm tief) für Abstützung von Phasentrennwänden in der Anlage		Slots (4 mm wide, 5 mm deep) to support the phase barriers in the switchgear
④ ⑤	Hilfsstromstecker mit SIGUT-Schraubklemmtechnik schraubloser Anschlusstechnik COM15/COM16 → (Seite 9-87)	→ (5-15) 437 440 462	Auxiliary connector with SIGUT screwing system screwless terminal system COM15/COM16 → (page 9-87)
⑥	Maß zur Innenfläche der geschlossenen Schaltanlagentür	106	Dimension to inside of closed cubicle door
⑦	Befestigungspunkte zur Leistungsschalter-montage in der Anlage (Rastermaß in mm) 4 x Setzmutter M8 (150) und 4 x Ø 9 (110)		Fixing points for mounting the circuit breaker in the switchgear (spacing in mm) 4 x press nut M8 (150) and 4 x Ø 9 (110)
⑭	Raum für Kabelbaum zu elektrischen Hilfs-anschlüssen	20	Space for wire harness to electrical auxiliary circuit breaker connections

U_e, Z-Zusatz oder „X" = Schaltvermögen → (Seite 27-3)		Standard DC: ≤ 600 V	A05, A15, „C", DC: > 600 V	U_e, Z-option or „X" = breaking capacity → (27-1)
⑮	Maximale Gerätehöhe	462	462	Maximum device height
⑰	Montageraum zum Entnehmen der Lichtbogenkammern	541	591	Mounting space for arc chutes
⑱	Lichtbogenkammeroberkante	401	451	Arc chute upper edge
⑲	Sicherheitsabstände	→ (7-6) → (5-20)		Safety distances

Vertikalanschluss bis 3200 A AC und 4000 A DC

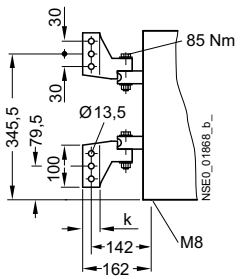


Vertical connection up to 3200 A AC and 4000 A DC

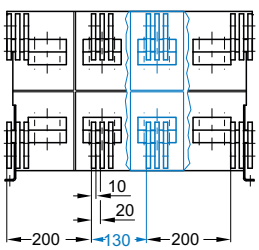


Vertikalanschluss bis 4000 A AC

k = 40 Anschlussflächenlänge / terminal face length



Vertical connection up to 4000 A AC

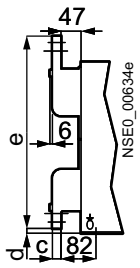


Anschlussmaße

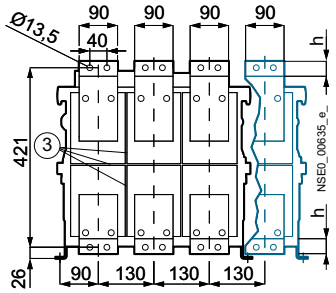
Terminal dimensions

	Max. Schalterbemessungsnennstrom Max. rated current of circuit breaker				
	bis / up to AC 2000 A				
		bis / up to DC 2000 A			
			AC 2500 A		
				AC 3200 A / DC 4000 A	
a	10	10	15	30	Anschlussdicke / terminal thickness
b	15	15	15	30	
c	10	10	20	20	
d	11	11	6	6	Abstand / distance
e	451	451	461	461	Abstand / distance
f	34	34	39	39	Überstand / protrusion
g	541	541	551	551	Abstand / distance
h	35				Anschlussflächenlänge / terminal face length
m	80			---	

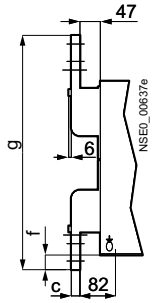
Frontanschluss (einfach)



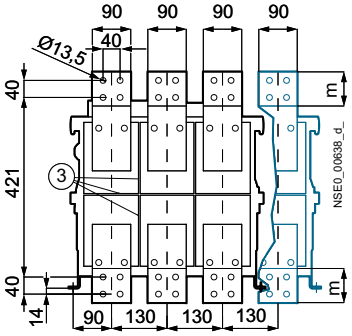
Front connection (single hole)



Frontanschluss (Doppelloch)



Front connection (double hole)



Sicherheitsabstände

Safety distances

BG II, Festeinbau **FS II, Fixed-version**	... zu geerdeten oder nicht-leitenden Teilen ... to grounded or non-conducting parts			... zu spannungsführenden Teilen ... to voltage carrying parts			IT-System
Betriebsspannung **Operational voltage**	oberhalb ⑲ above	seitlich sideways	hinten rear	oberhalb ⑲ above	seitlich sideways	hinten rear	oberhalb ⑲ above
	Standard Lichtbogenkammer - 401 mm - Standard arc chute (≤ AC 690 V, ≤ DC 600 V)						
AC 500 V	510[1)]	0	0	685	50	20	551
AC 690 V	510[1)]	0	0	1035	100	140	---
DC 300 V	480	0	0	[2)]			---
DC 600 V	635	0	0	[2)]			---
	Hohe Lichtbogenkammer - 451 mm - High arc chute (A05, A15, „C“, > DC 600 V)						
AC 690 V „H“	560	0	0	1085	100	140	501[3)]
AC 690 V + 20% „H“	615	0	0	865	100	125	---
AC 1000 V „H“	615	0	0	865	100	125	---
AC 1150 V	615	0	0	[2)]			---
DC 1000 V	585	0	0	[2)]			---

1) für geschlossene Flächen,
0 mm oberhalb Hilfsstecker für Streben, Gitter und Lochbleche

2) Mit isolierender Abschirmung, Abstand siehe „nicht-leitende Teile“

3) U_e=1000 V mit Schaltvermögen H und Z-Option Z=A05

1) for closed surfaces only,
0 mm above auxiliary connectors for struts, grids and perforated plates

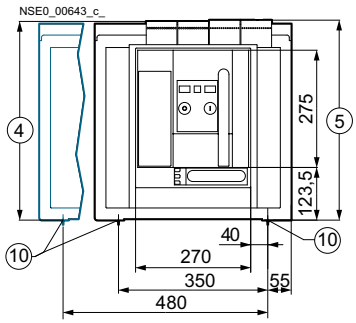
2) With insulating cover, for spacing see „non-conducting parts“

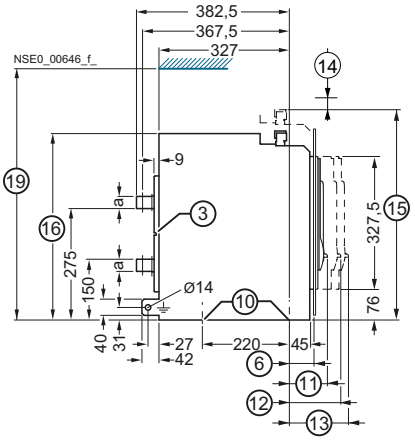
3) U_e=1000 V with breaking capacity H and Z-option Z=A05

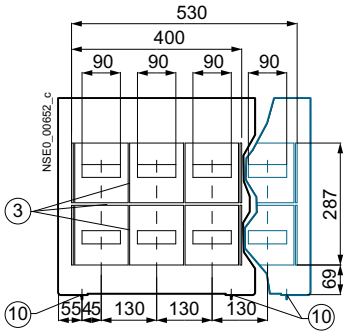
7.4 Baugröße II, Einschubausführung, 3- und 4-polig

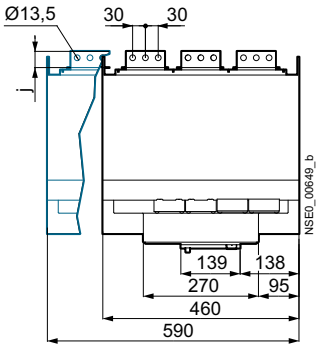
Die seitliche gebrochene Kontur entspricht der 4-poligen Ausführung.

Standardausführung Horizontalanschluss





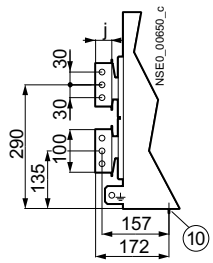




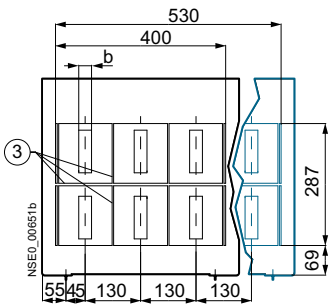
Abmessungen

Z-Zusatz oder „X“ = Schaltvermögen → (Seite 27-3)		Standard DC: ≤ 600 V	A05, A15, „C“, DC: > 600 V	Z-option or „X“ = breaking capacity → (27-1)
③	Nuten (4 mm breit, 5 mm tief) für Abstützung von Phasentrennwänden in der Anlage			Slots (4 mm wide, 5 mm deep) to support the phase barriers in the switchgear
④	Hilfsstromstecker mit	→ (5-15)	→ (5-15)	Auxiliary connector with
④	SIGUT-Schraubklemmtechnik (einteilig)	465 (446)	515 (496)	SIGUT screwing system (one-piece)
⑤	schraubloser Anschlusstechnik	468	518	screwless terminal system
⑥	Maß zur Innenfläche der geschlossenen Schaltanlagentür	58,0		Dimension to inside of closed cubicle door
⑩	Befestigungslöcher	Ø 9		Fixing holes
⑪	Schalter in Betriebsstellung	88,5		Circuit breaker in connected position
⑫	Schalter in Prüfstellung	121,5		Circuit breaker in test position
⑬	Schalter in Trennstellung	140,5		Circuit breaker in disconnected position
⑭	Raum für Kabelbaum zu elektrischen Hilfsanschlüssen	20		Space for wire harness to electrical auxiliary circuit breaker connections
⑮	Maximale Gerätehöhe	468	518	Maximum device height
⑯	Einschubrahmenoberkante	460	510	Guide frame upper edge
⑲	Sicherheitsabstände	→ (7-8) → (5-20)		Safety distances

Vertikalanschluss bis 3200 A AC und 4000 A DC

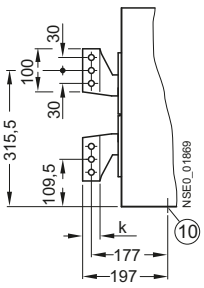


Vertical connection up to 3200 A AC and 4000 A DC

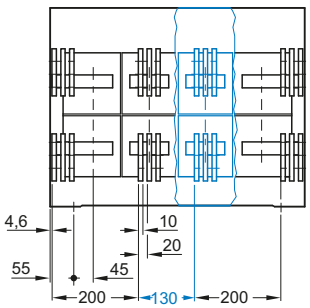


Vertikalanschluss bis 4000 A AC

k = 40 Anschlussflächenlänge / terminal face length



Vertical connection up to 4000 A AC



7.4 Frame size II, withdrawable version, 3-pole and 4-pole

The broken contour at the side depicts the 4-pole version.

Standard version, horizontal connection

Dimensions

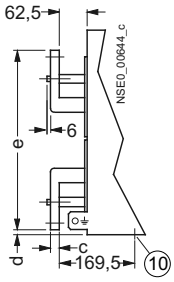
Z-option or „X“ = breaking capacity → (27-1)		Standard DC: ≤ 600 V	A05, A15, „C“, DC: > 600 V	Z-option or „X“ = breaking capacity → (27-1)
③	Slots (4 mm wide, 5 mm deep) to support the phase barriers in the switchgear			
④	Auxiliary connector with	→ (5-15)	→ (5-15)	
④	SIGUT screwing system (one-piece)	465 (446)	515 (496)	
⑤	screwless terminal system	468	518	
⑥	Dimension to inside of closed cubicle door	58,0		
⑩	Fixing holes	Ø 9		
⑪	Circuit breaker in connected position	88,5		
⑫	Circuit breaker in test position	121,5		
⑬	Circuit breaker in disconnected position	140,5		
⑭	Space for wire harness to electrical auxiliary circuit breaker connections	20		
⑮	Maximum device height	468	518	
⑯	Guide frame upper edge	460	510	
⑲	Safety distances	→ (7-8) → (5-20)		

Anschlussmaße

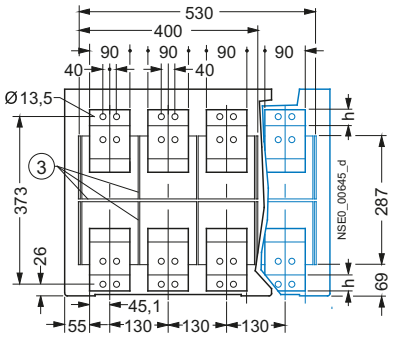
Terminal dimensions

	Max. Schalterbemessungsnennstrom Max. rated current of circuit breaker			
	bis / up to AC 2000 A / DC 2000 A			
		AC 2500 A		
			AC 3200 A / DC 4000 A	
a	10	15	30	Anschlussdicke / terminal thickness
b	10	15	30	
c	10	20	20	
d	11	6	6	Abstand / distance
e	403	413	413	Abstand / distance
f	34	39	39	Überstand / protrusion
g	493	503	503	Abstand / distance
h	35			Anschlussflächenlänge / terminal face length
j	38		---	
m	80		---	

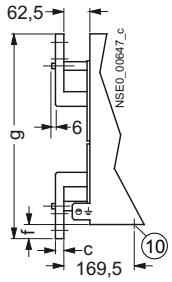
Frontanschluss (einfach)



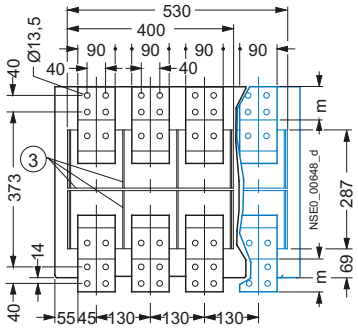
Front connection (single hole)



Frontanschluss (Doppelloch)

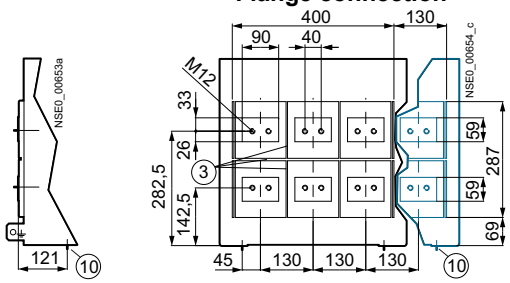


Front connection (double hole)



Flanschanschluss

Flange connection



Sicherheitsabstände

Safety distances

BG II, Einschubtechnik **FS II, withdrawable version**	... zu geerdeten oder nicht-leitenden Teilen ... to grounded or non-conducting parts			... zu spannungsführenden Teilen ... to voltage carrying parts			IT-System
	oberhalb ⑲ above	seitlich sideways	hinten rear	oberhalb ⑲ above	seitlich sideways	hinten rear	oberhalb ⑲ above
Lichtbogenkammerabdeckung Arc chute cover → (21-2)	ohne/mit without/with	ohne/mit without/with	ohne/mit without/with	ohne/mit without/with	ohne/mit without/with	ohne/mit without/with	ohne without
Betriebsspannung **Operational voltage**	**Standard Lichtbogenkammer - ⑯ = 460 mm - Standard arc chute (≤ AC 690 V, ≤ DC 600 V)**						
AC 500 V	515[1] / 460	0 / 70 [2]	0 / 0	715 / 479	50 / 50	14 / 14	551
AC 690 V	515[1] / 460	0 / 70 [2]	0 / 0	1065 / 479	100 / 225	30 / 14	---
DC 300 V	496 / ---	0 / -	0 / -	[3]			---
DC 600 V	651 / ---	0 / -	0 / -	[3]			---
	Hohe Lichtbogenkammer - ⑯ = 510 mm - High arc chute (A05, A15, „C“, > DC 600V)						
AC 690 V „H“	565[1] / ---	0 / -	0 / -	1017 / ---	100 / ---	30 / ---	517[4]
AC 690 V + 20%, „H“	620 / ---	0 / -	0 / -	1017 / ---	100 / ---	140 / ---	---
AC 1000 V „H“	620 / ---	0 / -	0 / -	1017 / ---	100 / ---	140 / ---	---
AC 1150 V	620 / ---	0 / -	0 / -	[3]			---
DC 1000 V	615 / ---	0 / -	0 / -	[3]			---

1) für geschlossene Flächen,
0 mm oberhalb Hilfsstecker für Streben, Gitter und Lochbleche

2) Wert für Platten, die seitliche Öffnungen im Einschubrahmen verdecken, 0 mm für Streben und Gitter

3) Mit isolierender Abschirmung, Abstand siehe „nicht-leitende Teile“

4) U_e=1000 V mit Schaltvermögen H und Z-Option Z=A05

1) for closed surfaces only, 0 mm above auxiliary connectors for struts, grids and perforated plates

2) for plates only covering openings on a guide frames side,
0 mm for struts and grids

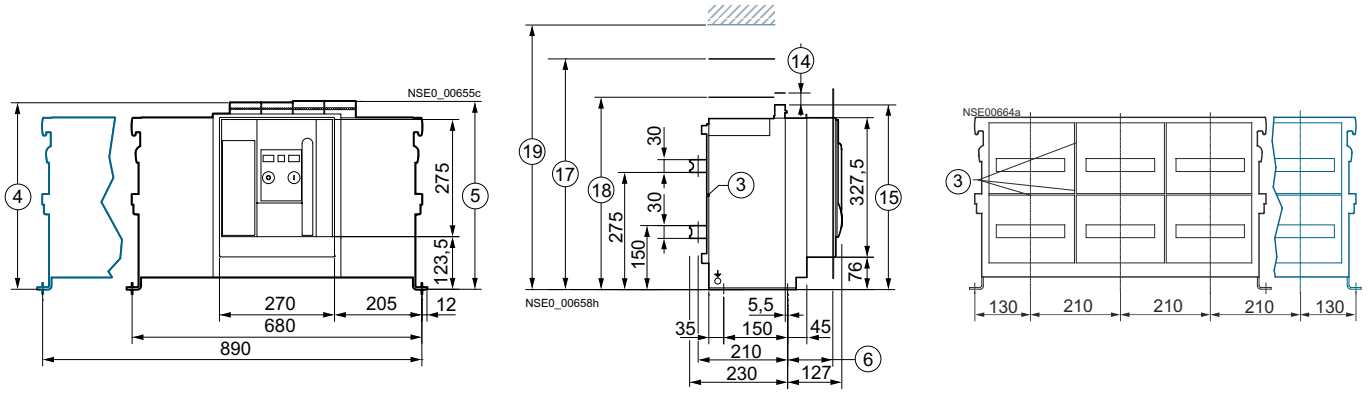
3) With insulating cover, for spacing see „non-conducting parts“

4) U_e=1000 V with breaking capacity H and Z-option Z=A05

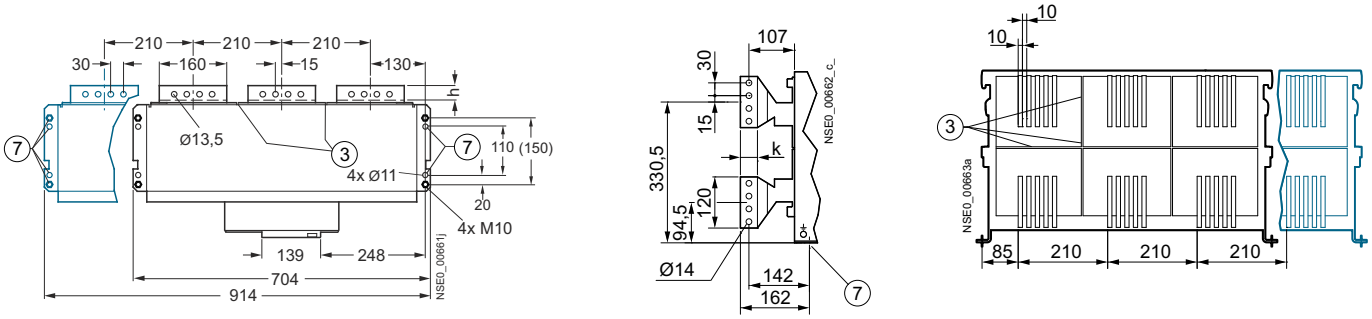
7.5 Baugröße III, Festeinbau, 3- und 4-polig

Die seitliche gebrochene Kontur entspricht der 4-poligen Ausführung.

Standardausführung Horizontalanschluss



Vertikalanschluss



7.5 Frame size III, fixed-mounted version, 3-pole and 4-pole

The broken contour at the side depicts the 4-pole version.

Standard version, horizontal connection

Vertical connection

	Abmessungen		Dimensions	
③	Nuten (4 mm breit, 5 mm tief) für Abstützung von Phasentrennwänden in der Anlage		Slots (4 mm wide, 5 mm deep) to support the phase barriers in the switchgear	③
④ ⑤	Hilfsstromstecker mit SIGUT-Schraubklemmtechnik schraubloser Anschlusstechnik COM15/COM16 → (Seite 9-87)	→ (5-15) 437 440 462	Auxiliary connector with SIGUT screwing system screwless terminal system COM15/COM16 → (page 9-87)	④ ⑤
⑥	Maß zur Innenfläche der geschlossenen Schaltanlagentür	106	Dimension to inside of closed cubicle door	⑥
⑦	Befestigungspunkte zur Leistungsschaltermontage in der Anlage; (Rastermaß) 4 x Setzmutter M10 (150 mm) und 4 x Ø 11 (110 mm)		Fixing points for mounting the circuit breaker in the switchgear; (spacing) 4 x press nut M10 (150 mm) and 4 x Ø 11 (110 mm)	⑦
⑭	Raum für Kabelbaum zu elektrischen Hilfsanschlüssen	20	Space for wire harness to electrical auxiliary circuit breaker connections	⑭

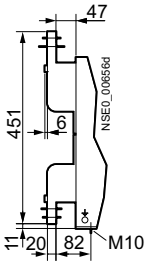
	U_e, Z-Zusatz oder „X“ = Schaltvermögen → (Seite 27-3)	≤ AC 690 V „H“	> AC 690 V, A05, oder / or „C“	U_e, Z-option or/ „X“ = breaking capacity → (page 27-1)	
⑮	Maximale Gerätehöhe	462	462	Maximum device height	⑮
⑰	Montageraum zum Entnehmen der Lichtbogenkammern	541	591	Mounting space for arc chutes	⑰
⑱	Lichtbogenkammeroberkante	401	451	Arc chute upper edge	⑱
⑲	Sicherheitsabstände	→ (7-10) → (5-20)		Safety distances	⑲

Anschlussmaße

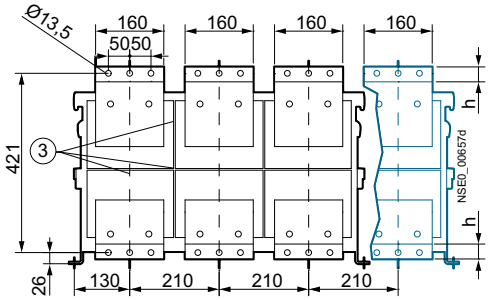
Terminal dimensions

h	35	Anschlussflächenlänge / terminal face length
k	40	
m	80	

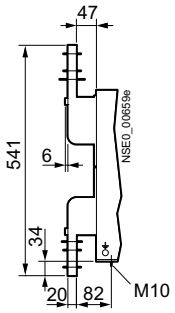
Frontanschluss (einfach)



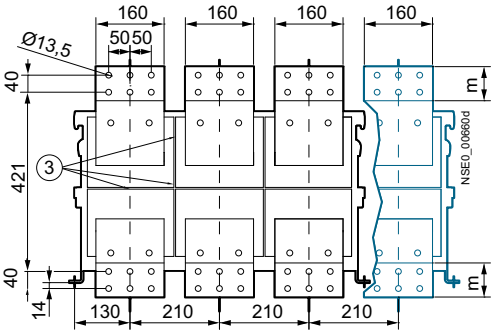
Front connection (single hole)



Frontanschluss (Doppelloch)



Front connection (double hole)



Sicherheitsabstände

Safety distances

BG III, Festeinbau **FS III, Fixed-version**	... zu geerdeten oder nicht-leitenden Teilen ... to grounded or non-conducting parts			... zu spannungsführenden Teilen ... to voltage carrying parts			IT-System
Betriebsspannung **Operational voltage**	oberhalb ⑲ above	seitlich sideways	hinten rear	oberhalb ⑲ above	seitlich sideways	hinten rear	oberhalb ⑲ above
	Standard Lichtbogenkammer - 401 mm - Standard arc chute						
AC 500 V	510[1)]	0	0	510	20	20	451
AC 690 V	510[1)]	0	0	935	100	125	---
	Hohe Lichtbogenkammer - 451 mm - High arc chute (> AC 690 V, A05, oder / or „C“)						
AC 690 V	560	0	0	985	75	140	501[2)]
AC 690 V + 20%„H“	615	0	0	865	100	125	---
AC 1000 V	615	0	0	865	100	125	---
AC 1150 V	615	0	0	[3)]			---

1) für geschlossene Flächen,
0 mm oberhalb Hilfsstecker für Streben, Gitter und Lochbleche

2) U_e=1000 V mit Schaltvermögen H und Z-Option Z=A05 oder Schaltvermögen C

3) Mit isolierender Abschirmung, Abstand siehe „nicht-leitende Teile“

1) for closed surfaces only,
0 mm above auxiliary connectors for struts, grids and perforated plates

2) U_e=1000 V with breaking capacity H and Z-option Z=A05 or breaking capacity C

3) With insulating cover, for spacing see „non-conducting parts“

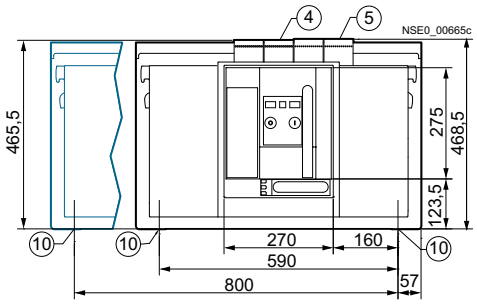
7.6 Baugröße III, Einschubausführung, 3- und 4-polig

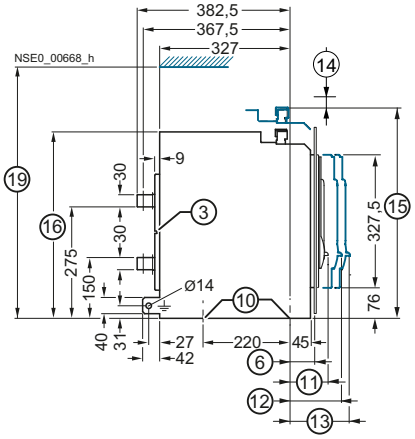
Die seitliche gebrochene Kontur entspricht der 4-poligen Ausführung.

7.6 Frame size III, withdrawable version, 3-pole and 4-pole

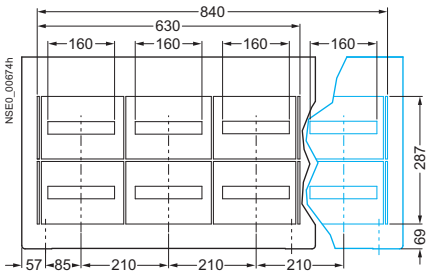
The broken contour at the side depicts the 4-pole version.

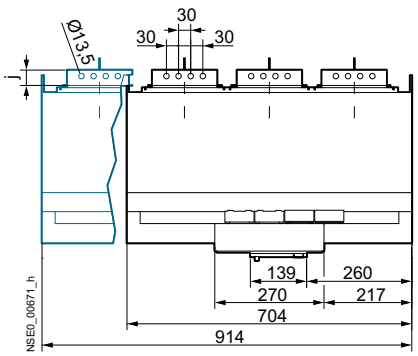
Standardausführung Horizontalanschluss





Standard version, horizontal connection

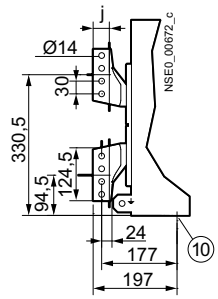




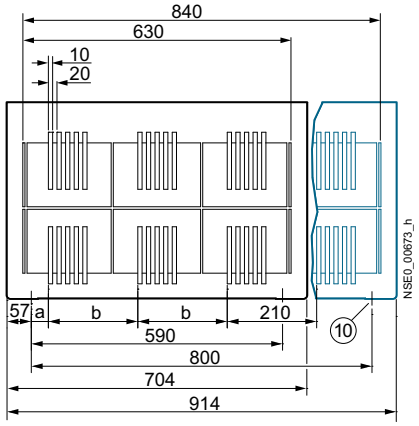
Abmessungen / **Dimensions**

	U_e, Z-Zusatz oder „X“ = Schaltvermögen → (27-3)	≤ 690 V AC „H“	> 690 V AC, A05 oder / or „C“	U_e, Z-option or/ „X“ = breaking capacity → (27-1)
③	Nuten (4 mm breit, 5 mm tief) für Abstützung von Phasentrennwänden in der Anlage			Slots (4 mm wide, 5 mm deep) to support the phase barriers in the switchgear
④ ⑤	Hilfsstromstecker mit SIGUT-Schraubklemmtechnik (eint.) schraubloser Anschlusstechnik	→ (5-15) 465 (446) 468	→ (5-15) 515 (496) 518	Auxiliary connector with SIGUT screwing system (one-piece) screwless terminal system
⑥	Maß zur Innenfläche der geschlossenen Schaltanlagentür	58,0		Dimension to inside of closed cubicle door
⑩	Befestigungslöcher	Ø 9		Fixing holes
⑪	Schalter in Betriebsstellung	88,5		Circuit breaker in connected position
⑫	Schalter in Prüfstellung	121,5		Circuit breaker in test position
⑬	Schalter in Trennstellung	140,5		Circuit breaker in disconnected position
⑭	Raum für Kabelbaum zu elektrischen Hilfsanschlüssen	20		Space for wire harness to electrical auxiliary circuit breaker connections
⑮	Maximale Gerätehöhe	468	518	Maximum device height
⑯	Einschubrahmenoberkante	460	510	Guide frame upper edge
⑲	Sicherheitsabstände	→ (7-12) → (5-20)		Safety distances

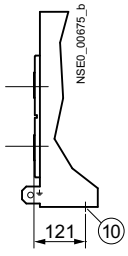
Vertikalanschluss, bis 6300 A



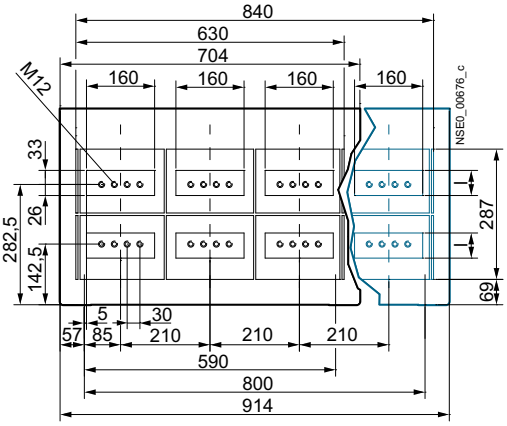
Vertical connection, up to 6300 A



Flanschanschluss, bis 4000 A



Flange connection, up to 4000 A

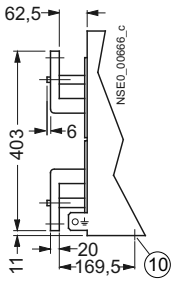


Anschlussmaße

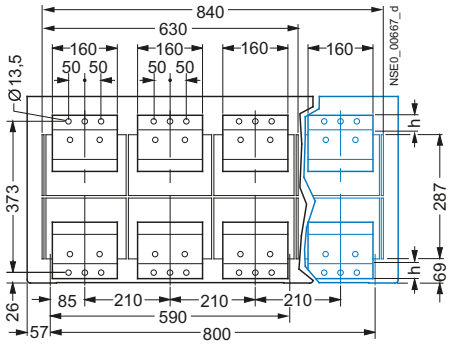
Terminal dimensions

	Max. Schalterbemessungsnennstrom Max. rated current of circuit breaker			
	bis / up to 4000 A AC			
		5000 A AC		
			6300 A AC	
a	40	40	5	Abstände / spacing
b	210	210	245	
h	35	---	---	Anschlussflächenlänge / terminal face length
j	38			
l	59	---	---	
m	80	---	---	

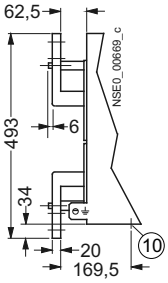
Frontanschluss (einfach)



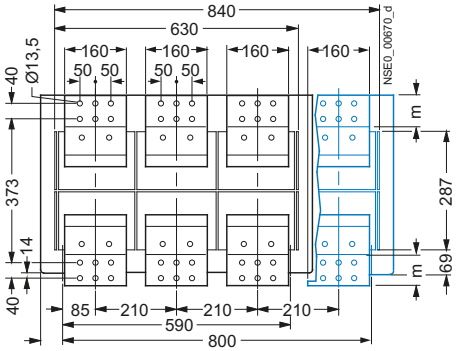
Front connection (single hole)



Frontanschluss (Doppelloch)



Front connection (double hole)



Sicherheitsabstände

Safety distances

BG III, Einschubtechnik **FS III, withdrawable version**	... zu geerdeten oder nicht-leitenden Teilen ... to grounded or non-conducting parts			... zu spannungsführenden Teilen ... to voltage carrying parts			IT-System
	oberhalb ⑲ above	seitlich sideways	hinten rear	oberhalb ⑲ above	seitlich sideways	hinten rear	oberhalb ⑲ above
Lichtbogenkammerabdeckung Arc chute cover → (21-3)	ohne/mit without/with	ohne/mit without/with	ohne/mit without/with	ohne/mit without/with	ohne/mit without/with	ohne/mit without/with	ohne without
Betriebsspannung **Operational voltage**	**Standard Lichtbogenkammer - ⑯ = 460 mm - Standard arc chute**						
AC 500 V	515[1] / 460	0 / 40[2]	0 / 0	515 / 479	20 / 50	14 / 14	465
AC 690 V	515[1] / 460	0 / 40[2]	0 / 0	965 / 479	100 / 200	14 / 14	---
	Hohe Lichtbogenkammer - ⑯ = 510 mm - High arc chute (> AC 690 V, A05 oder / or „C“)						
AC 690 V	565 / ---	0 / --	0 / --	815 / --	100 / ---	14 / ---	517[3]
AC 1000 V „H“	565 / ---	0 / --	0 / --	815 / --	100 / ---	14 / ---	---
AC 1000 V „C“	620 / ---	0 / --	0 / --	867 / --	100 / ---	14 / ---	---
AC 1150 V	620 / ---	0 / --	0 / --	[4]			---

1) Wert für Platte, 0 mm oberhalb Hilfsstecker für Streben und Gitter

2) Wert für Platten, die seitliche Öffnungen im Einschubrahmen verdecken, 0 mm für Streben und Gitter

3) U_e=1000 V mit Schaltvermögen H und Z-Option Z=A05 oder Schaltvermögen C

4) Mit isolierender Abschirmung, Abstand siehe „nicht-leitende Teile“

1) for plates only, 0 mm above auxiliary connectors for struts and grids

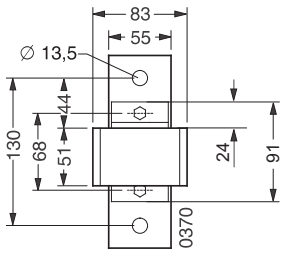
2) for plates only covering openings on a guide frames side, 0 mm for struts and grids

3) U_e=1000 V with breaking capacity H and Z-option Z=A05 or breaking capacity C

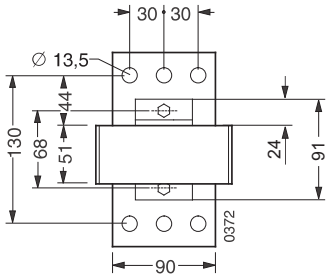
4) With insulating cover, for spacing see „non-conducting parts“

7.7 Externer Wandler für Neutralleiter

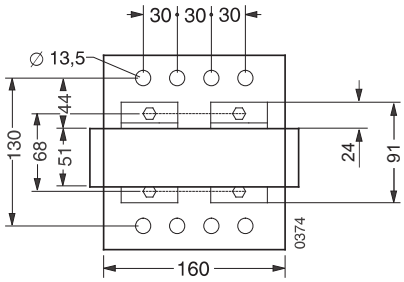
Baugröße I



Baugröße II



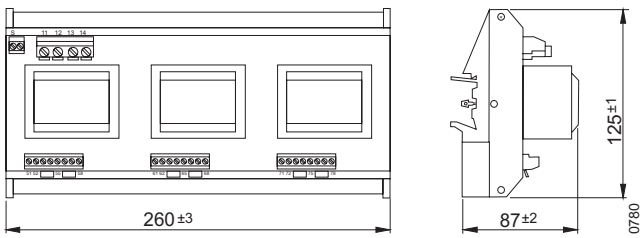
Baugröße III



Der N-Leiter Wandler wird mit 2 m Kabelbaum geliefert, der mit dem passenden Steckkontakt zum Wandler ausgerüstet ist.

7.8 Spannungswandler

→ (9-116)

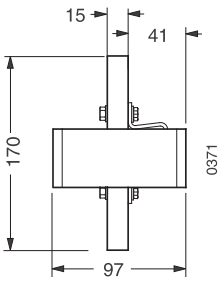


7.9 Weitere Maßbilder

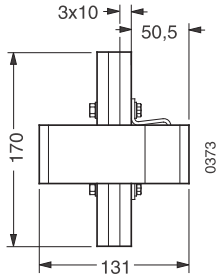
- Tragwinkel für Anbau an senkrechte Ebene
  → (Seite 5-2)
- Türdichtungsrahmen IP41
  → (Seite 22-1)
- Schutzabdeckung IP55
  → (Seite 23-1)

7.7 External transformer for neutral

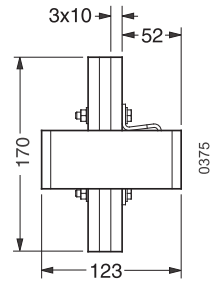
Frame size I



Frame size II



Frame size III



The neutral sensor comes with a wiring of 2 m (80“) length, equipped with the mating connector fitting to the sensor.

7.8 Voltage transformer

7.9 Further dimension drawings

- Mounting angles for mounting to vertical surface
  → (page 5-2)
- Door sealing frame IP41
  → (page 22-1)
- Protective cover IP55
  → (page 23-1)

8 Schaltpläne

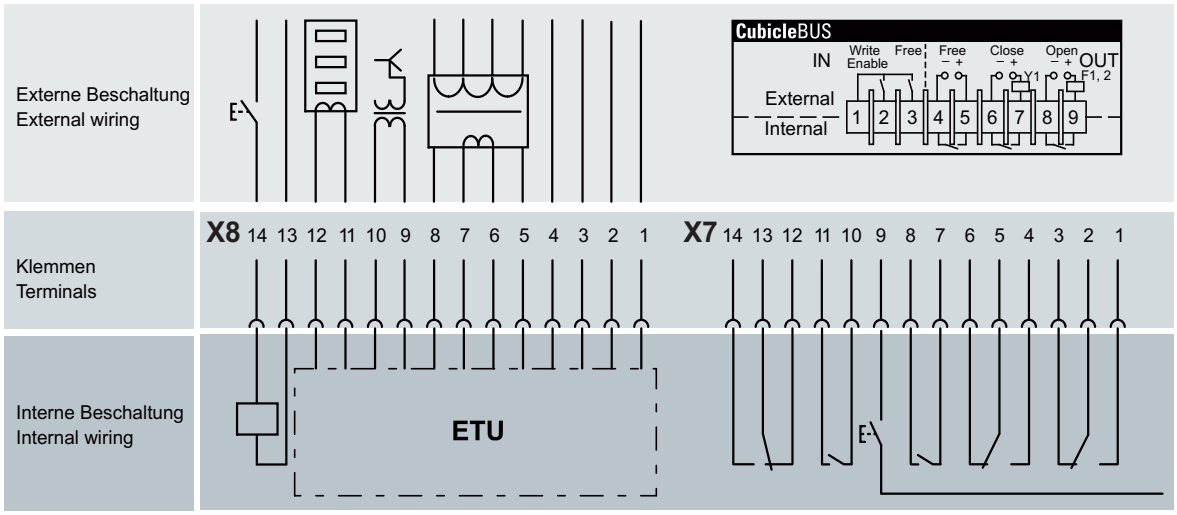
8.1 Klemmenbelegung Zubehör

X8		externe Beschaltung	external wiring
14	L/L+	U_S/U_C	
13	N/L-		
12		z.B. Wandler im Transformator-Sternpunkt oder Summenstromwandler 1200 A/1 A	e.g. current transformer in star-point of power transformer or a summation current transformer 1200 A/1 A
11			
10	]	Brücke, wenn kein N-Wandler	Shortterminals if there is no N-sensor
9			
8	N		
7	L3		
6	L2		
5	L1		
4	24 V DC input		
3			
2		Abschlußwiderstand 120 Ω, 0,5 W, wenn kein externes **Cubicle**BUS -Modul angeschlossen ist	Termination resistor 120 Ω, 0,5 W, if there is no external **Cubicle**BUS-module connected
1			

8 Circuit diagrams

8.1 Terminal assignment accessory

X7		externe Beschaltung	external wiring
14		**COM15/COM16** (Option F02/F12)	
13			
12			
11			
10			
9	L/L+ U_S/U_C		
8			
7			
6			
5			
4			
3			
2			
1			



X7
Nicht vorhanden bei Kommunikationsfunktion „F02“ oder „F12“. Auf der Position von „-X7“ befindet sich das Modul COM15/ COM16
Not available with communication connection „F02“ or „F12“. COM15/COM16 module is at position „-X7“

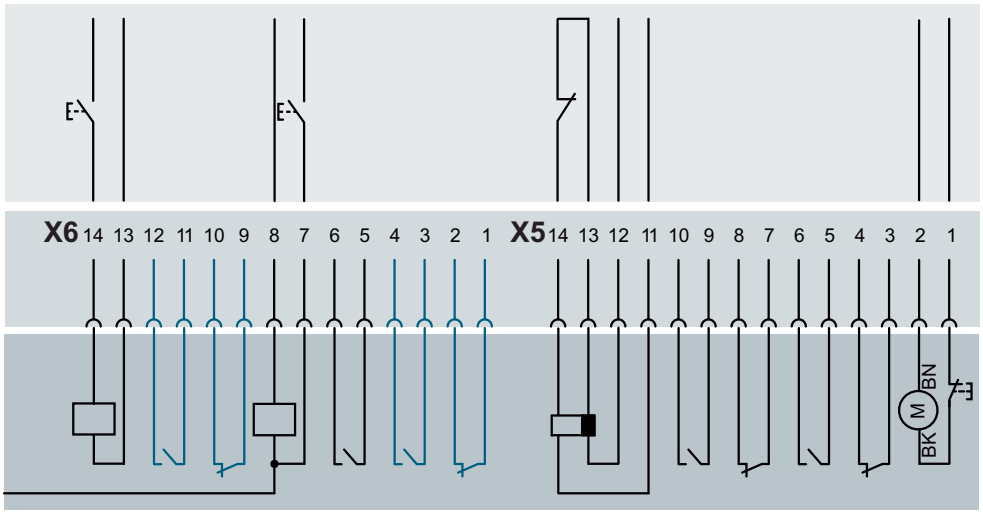
X8		interne Beschaltung	internal wiring
14	F7	Fern-Rücksetzmagnet	Remote reset bell alarm & tripped indicator
13			
12	S2	G-Wandler	G-transformer
11	S1	G-Wandler	G-transformer
10	S2	N-Wandler	N-transformer
9	S1	N-Wandler	N-transformer
8	com	ext. Spannungswandler Stern	external voltage transformer
7	L3	externer Spannungswandler	external voltage transformer
6	L2	externer Spannungswandler	external voltage transformer
5	L1	externer Spannungswandler	external voltage transformer
4	0 V DC		
3	24 V DC		
2	**Cubicle**BUS +		
1	**Cubicle**BUS -		

X7		interne Beschaltung	internal wiring
14	S24	1. ausgelöst Meldeschalter (RESET-Stellung)	1st trip signaling switch (RESET-position)
13			
12			
11	S21	Speicherzustandmeldung	„Spring charged“ signal
10			
9	S10	Elektrisch „EIN“	Local electric close
8	S25	2. ausgelöst Meldeschalter	2nd trip signaling switch
7			
6	S22	Meldeschalter am ersten Hilfsauslöser	Signaling contact at the 1st auxiliary release
5			
4			
3	S23	Meldeschalter am zweiten Hilfsauslöser	Signaling contact at the 2nd auxiliary release
2			
1			

X6		externe Beschaltung	external wiring
14	F1	Erster Hilfsauslöser „f“	1st auxiliary release „ST“
13			
12	S1	„S“ *)	„NO“ *)
11			
10	S1	„Ö“ *)	„NC“ *)
9			
8		Einschaltmagnet	Closing solenoid
7			
6	S20	Einschaltbereitschafts-meldung	„Ready to close“ signal
5			
4	S2	„S“ *)	„NO“ *)
3			
2	S2	„Ö“ *)	„NC“ *)
1			

*) Hilfsschalter S1 und S2 gehören zur Standardausstattung
Auxiliary switches S1 and S2 belong to standard configuration

X5		externe Beschaltung	external wiring
14		nur F4 „schnell AUS“	F4 only „quick OFF“
13			
12		zweiter Hilfsauslöser: F2 „ST“, F3 „UVR“, F4 „UVR_{td}“	2nd auxiliary release: F2 „ST“, F3 „UVR“, F4 „UVR_{td}“
11			
10		S3 „S“ oder S7 „S“	S3 „NO“ or S7 „NO“
9			
8		S3 „Ö“ oder S7 „S“	S3 „NC“ or S7 „NO“
7			
6		S4 „S“ oder S8 „S“	S4 „NO“ or S8 „NO“
5			
4		S4 „Ö“ oder S8 „S“	S4 „NC“ or S8 „NO“
3			
2	S12	Motorantrieb, (optional: Motorabstellschalter)	Charging motor, (optional: motor main switch)
1			

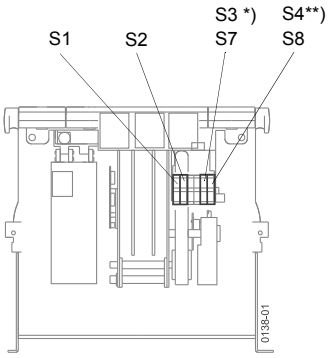


X6		interne Beschaltung	internal wiring
14	L/L+	U_c	U_c
13	N/L-		
12			
11			
10			
9			
8	L/L+	U_c	U_c
7	L/L-		
6			
5			
4			
3			
2			
1			

X5		interne Beschaltung	internal wiring
14	( ])	NOT-HALT oder Brücke	EMERGENCY STOP or short terminals
13			
12	L/L+	U_c	U_c
11	N/L-		
10			
9			
8			
7			
6			
5			
4			
3			
2	L/L+	U_c	U_c
1	L/L-		

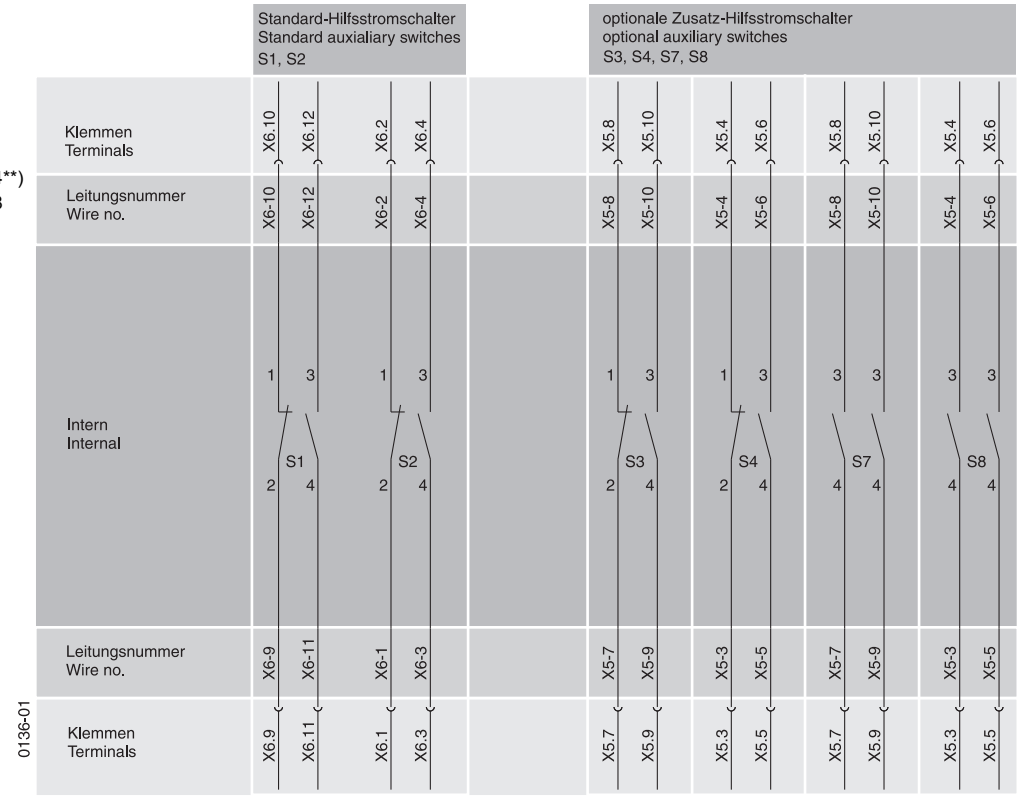
8.2 Hilfsstromschalter

8.2 Auxiliary switches



*) gleicher Einbauplatz wie S7
same location as S7

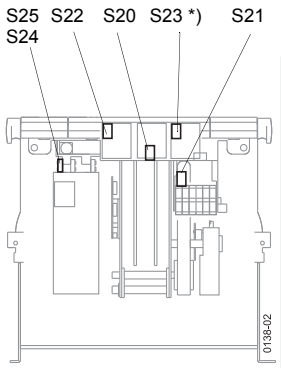
**) gleicher Einbauplatz wie S8
same location as S8



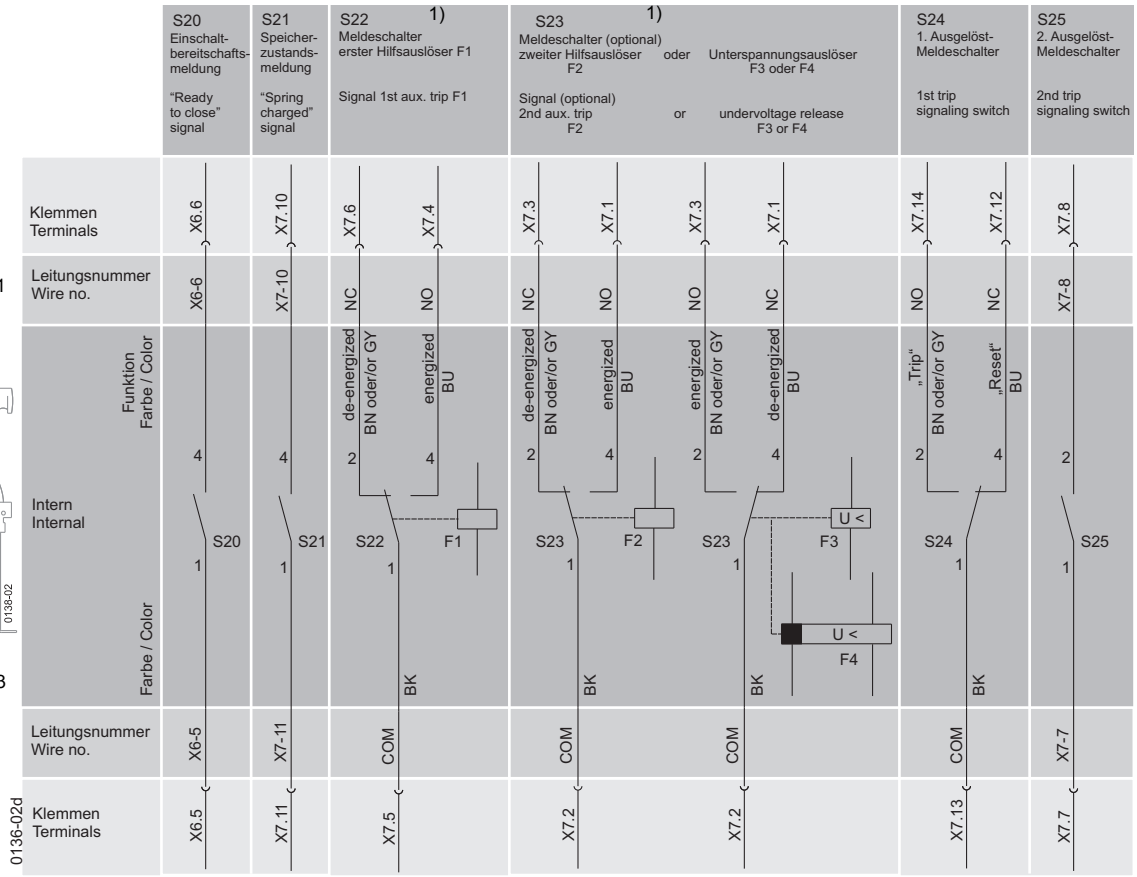
Bestell-Nr. Leistungsschalter, 16. Stelle (?) Order no. circuit breaker, 16th position (?)		Ausstattung mit Hilfsstromschaltern Equipped with auxiliary switches						
		S1	**S2**		**S3**	**S4**	**S7**	**S8**
3WL1_ _ _ - _ _ _ _ _ - _ _ _?-Z	2	X	X					
	4	X	X		X	X		
	7	X	X				X	X
	8	X	X		X			X

8.3 Meldeschalter

8.3 Signaling switches



*) gleicher Einbauplatz wie S43
same location as S43



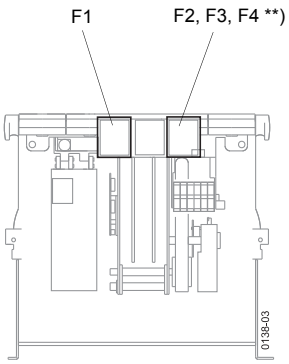
1) Schließer-Kontakt geschlossen bedeutet, Unterspannungsauslöser angezogen bzw. Spannungsauslöser nicht angezogen - Einschaltbereitschaft möglich.

Schließer-Kontakt offen bedeutet, Unterspannungsauslöser abgefallen bzw. Spannungsauslöser angezogen - Schalter nicht einschaltbereit.

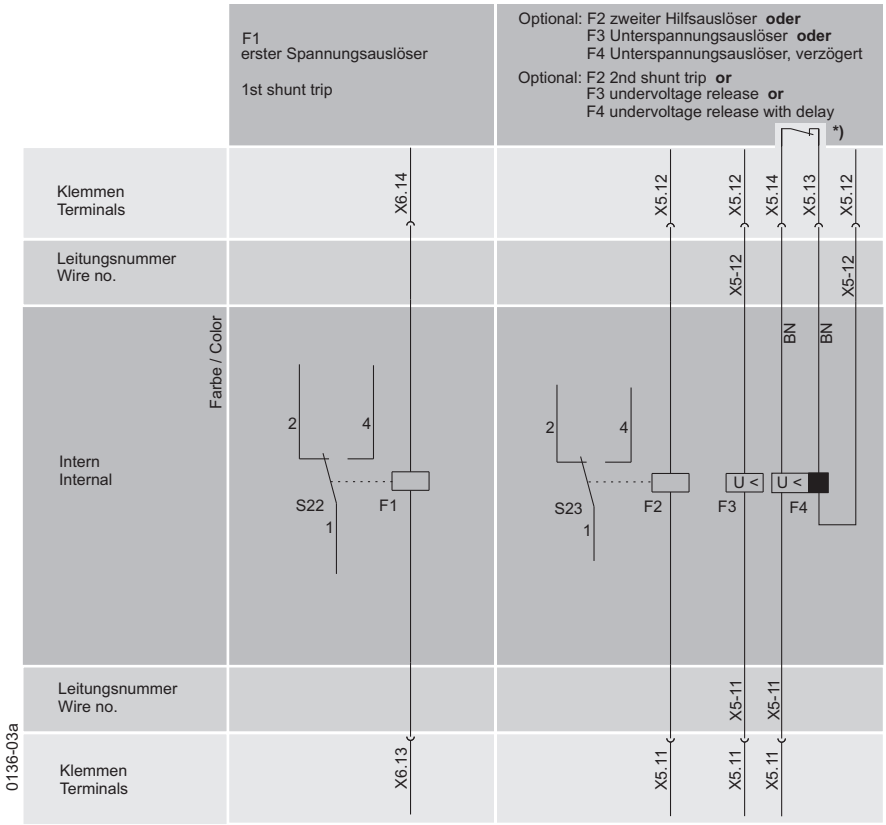
1) NO-contact closed means that the undervoltage release is energized or shunt trip is not energized - circuit breaker is possibly “ready to close”.

NO-contact open means that the undervoltage release is not energized or shunt trip is energized - circuit breaker is not “ready to close”.

8.4 Hilfsauslöser / Elektrische Einschaltsperre



**) gleicher Einbauplatz
same location

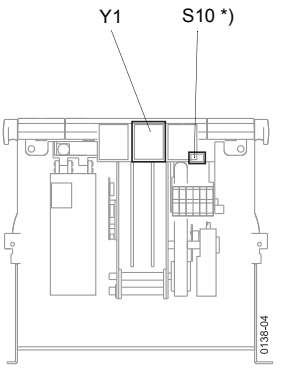


*) NOT-AUS oder Brücke (auch bei F3 möglich)
Spannungsauslöser mit 100 % ED können als elektrische Einschaltsperre genutzt werden.

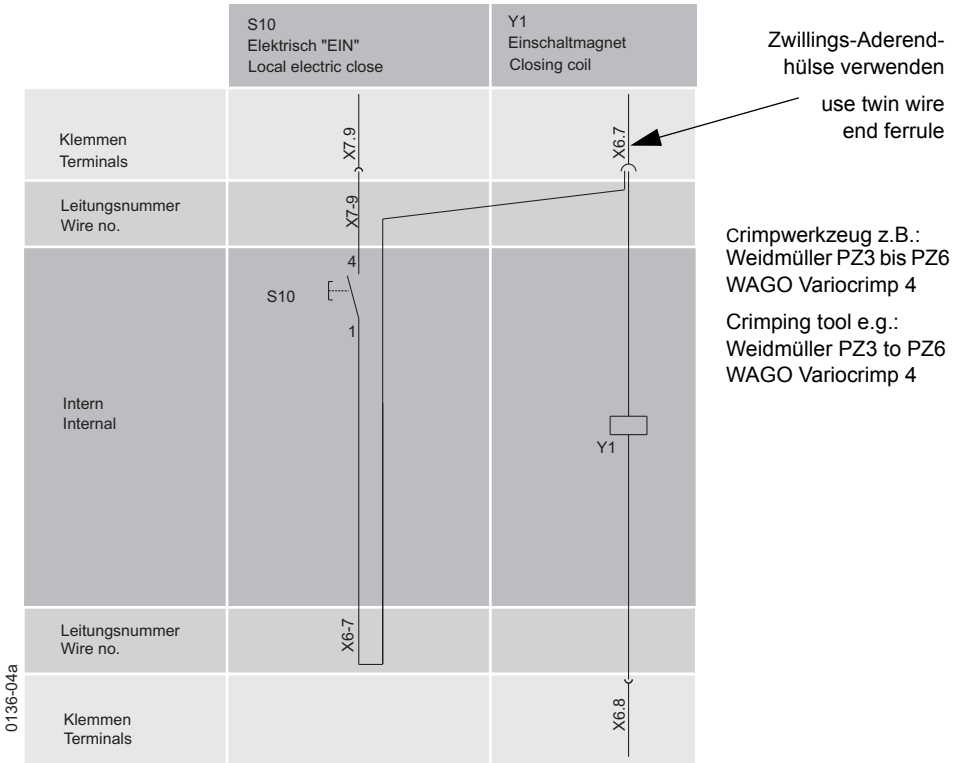
8.4 Auxiliary releases / Electrical closing lockout

*) EMERGENCY OFF or short terminals (also possible at F3)
Shunt trips with 100% duty cycle may act as an electrical closing lockout.

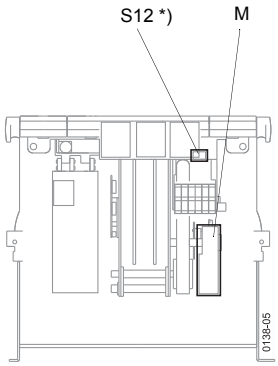
8.5 Einschaltmagnet / Elektrisch EIN



*) gleicher Einbauplatz wie S12
same location as S12



8.6 Motorantrieb



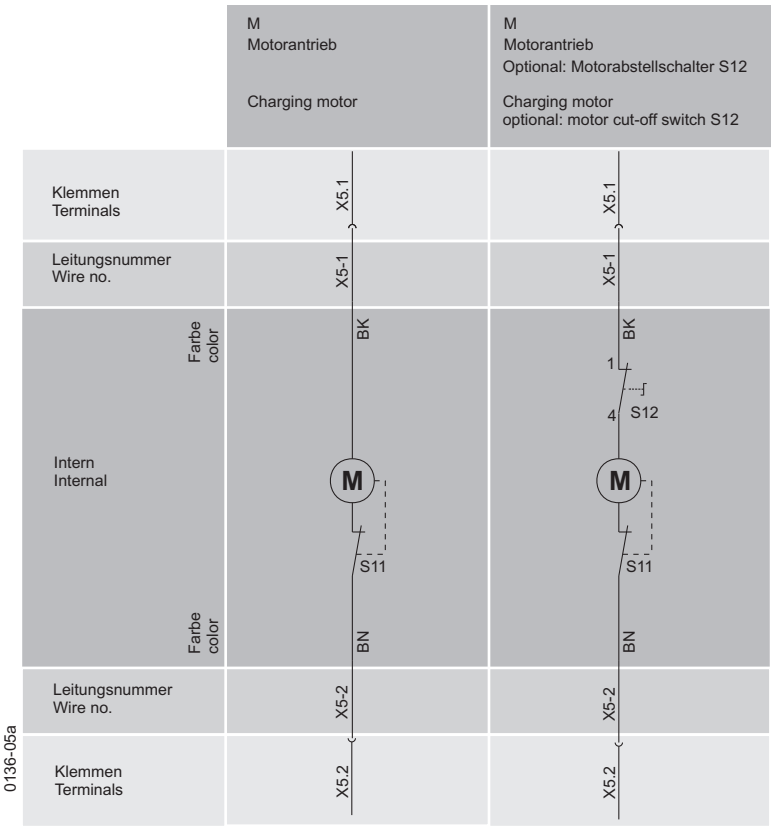
*) gleicher Einbauplatz wie S10
same location as S10



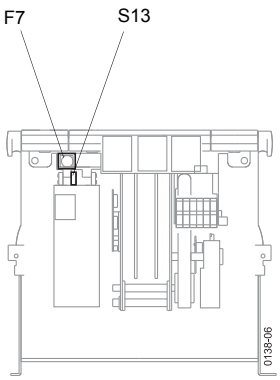
24 - 30 V DC
48 - 60 V DC

L+→ X5.2 Braun / Brown
L- → X5.1 Schwarz / Black

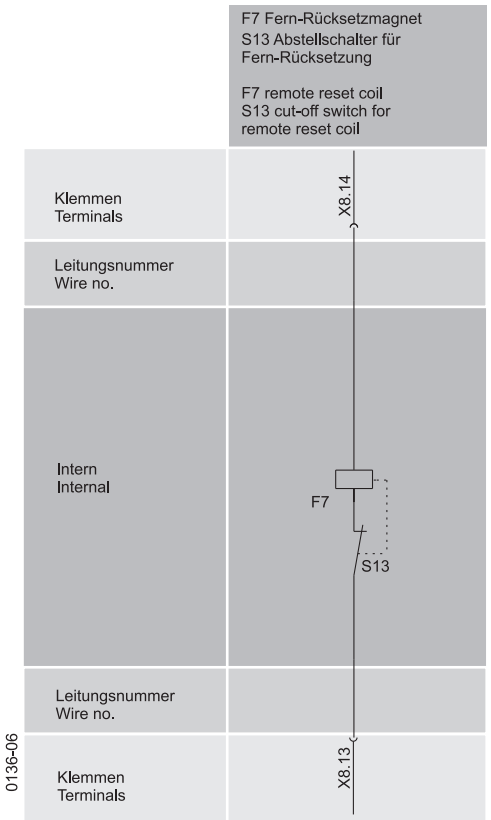
8.6 Motor operating mechanism



8.7 Fernrücksetzmagnet



8.7 Remote reset coil

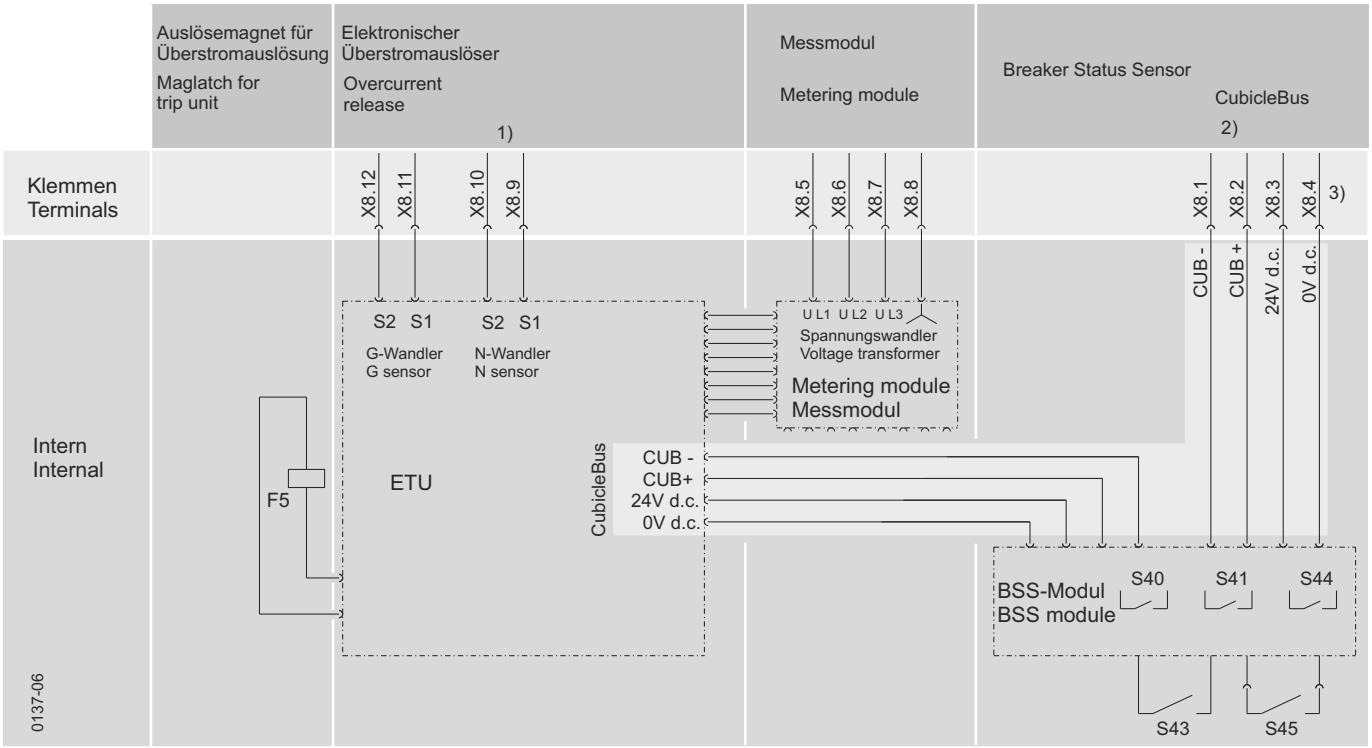


8.8 Schutzkreise für ETU45B - ETU76B

8.8.1 Mit Breaker Status Sensor (BSS) und Messmodul

8.8 Trip unit circuitry for ETU45B - ETU76B

8.8.1 With Breaker Status Sensor (BSS) and metering module



1) Drahtbrücke X8.9-X8.10 wenn kein externer N-Wandler

2) Abschlusswiderstand 120 Ω, 0,5 W an X8-1 / X8-2, wenn kein externes **Cubicle**BUS-Modul angeschlossen ist

3) Wenn **kein** Messmodul und auch **kein** BSS-Modul verwendet werden: Direktverbindung X8 zu ETU

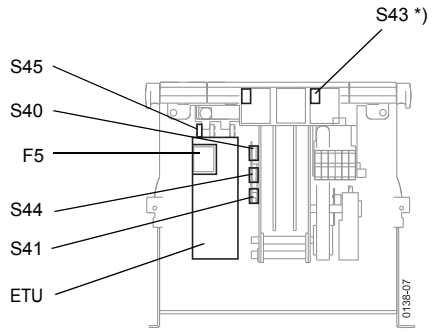
1) Jumper X8.9-X8.10 if there is no external N sensor

2) Terminating resistor 120 Ω, 0.5 W on X8-1 / X8-2, if not external **Cubicle**BUS - module is connected

3) If **no** metering module and **no** BSS module is used: Direct connection X8 to ETU

- BSS-Modul: Schalter Status Sensor
- **Cubicle**BUS : Bussystem zur Verbindung von Schalterkomponenten und zum Feldbus (PROFIBUS-DP)
- ETU: Elektronischer Überstromauslöser
- S40 Meldeschalter Einschaltbereitschaft
- S41 Meldeschalter Speicherzustand
- S43 Meldeschalter am zweiten Hilfsauslöser F2 oder F3 oder F4
- S44 Meldeschalter Schaltstellung Hauptkontakte (EIN / AUS)
- S45 Ausgelöst-Meldeschalter

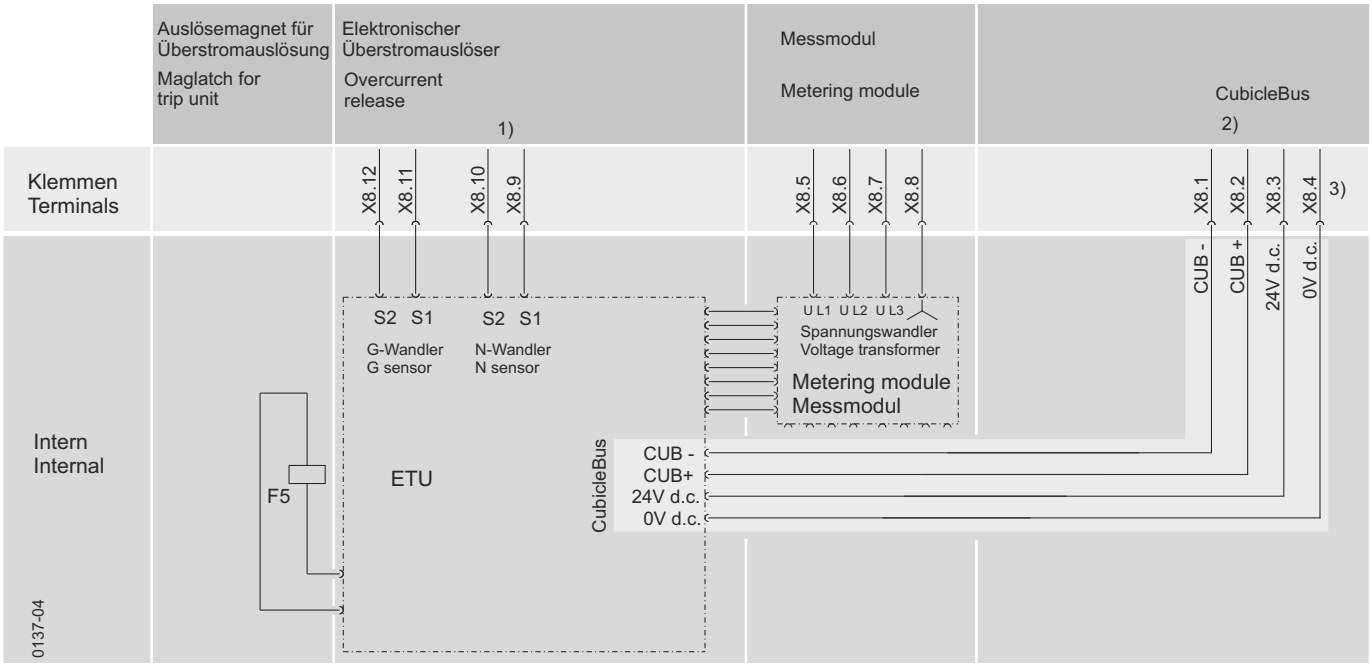
- BSS module: Breaker Status Sensor
- **Cubicle**BUS : Bus system for interconnection of circuit breaker components and connection to the fieldbus (PROFIBUS-DP)
- ETU: Overcurrent release
- S40 Signaling switch ready-to-close
- S41 Signaling switch spring charged
- S43 Signaling switch 2nd auxiliary release F2 or F3 or F4
- S44 Signaling switch ON-OFF position
- S45 Trip signaling switch



*) gleicher Einbauplatz wie S23
same location as S23

8.8.2 Nur mit Messmodul

8.8.2 With Metering module only



1) Drahtbrücke X8.9-X8.10 wenn kein externer N-Wandler

2) Abschlusswiderstand 120 Ω, 0,5 W an X8-1 / X8-2, wenn kein externes **Cubicle**BUS -Modul angeschlossen ist

3) Wenn **kein** Messmodul und auch **kein** BSS-Modul verwendet werden: Direktverbindung X8 zu ETU

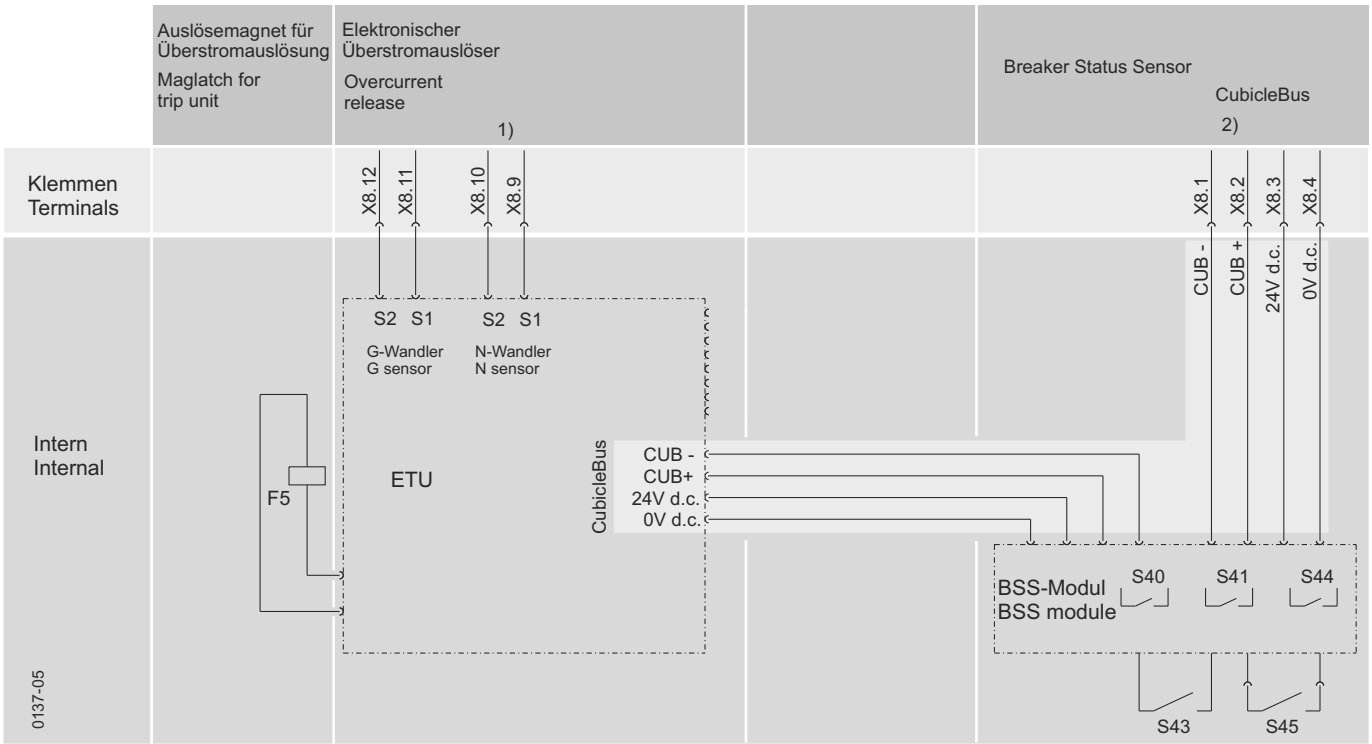
1) Jumper X8.9-X8.10 if there is no external N sensor

2) Terminating resistor 120 Ω, 0.5 W on X8-1 / X8-2, if not external **Cubicle**BUS - module is connected

3) If **no** metering module and **no** BSS module is used: Direct connection X8 to ETU

8.8.3 Nur mit Breaker Status Sensor (BSS)

8.8.3 With Breaker Status Sensor (BSS) only



1) Drahtbrücke X8.9-X8.10 wenn kein externer N-Wandler

2) Abschlusswiderstand 120 Ω, 0,5 W an X8-1 / X8-2, wenn kein externes **Cubicle**BUS -Modul angeschlossen ist

1) Jumper X8.9-X8.10 if there is no external N sensor

2) Terminating resistor 120 Ω, 0.5 W on X8-1 / X8-2, if not external **Cubicle**BUS - module is connected

9 Elektronische Ausrüstung

HINWEIS
Wir haben den Inhalt der Druckschrift auf Übereinstimmung mit der beschriebenen Hardware und Software geprüft. Dennoch können Abweichungen nicht ausgeschlossen werden, so dass wir für die vollständige Übereinstimmung keine Gewähr übernehmen. Die Angaben in dieser Druckschrift werden regelmäßig überprüft, notwendige Korrekturen sind in den nachfolgenden Auflagen enthalten.

9.1 Überstromauslöser

9.1.1 Funktionsübersicht

	Überstromauslöser / Overcurrent release				
Funktionen Functions	**ETU15B → (9-3)**	**ETU25B → (9-6)**	**ETU27B → (9-9)**	**ETU45B → (9-12)**	**ETU76B → (9-17)**
Grundschutzfunktionen → (Seite 9-22) **Basic protective functions** → (page 9-22)					
Überlastschutz, langzeitverzögert (L-Auslösung) Overload protection, Long-time-delayed (L-tripping)	✓	✓	✓	✓	✓
Kurzzeitverzögerter Kurzschluss-Schutz (S-Auslösung) Short-time-delay short-circuit protection (S-tripping)	-	✓	✓	✓	✓
Unverzögerter Kurzschluss-Schutz (I-Auslösung) Instantaneous short-circuit protection (I-tripping)	✓	✓ 1)	✓ 1)	✓	✓
Neutralleiter-Schutz (N-Auslösung) Neutral conductor protection (N-tripping)	-	-	✓	✓	✓
Erdschlussauslösung (G-Auslösung) Ground-fault tripping (G-tripping)	-	-	✓	o	o
Zusätzliche Funktionen → (Seite 9-25) **Additional functions** → (page 9-25)					
Lastüberwachung Load monitoring	-	-	-	✓	✓
Voreilende Meldung „L-Auslösung“ Leading signal "L-tripping "	-	-	-	✓	✓
Thermisches Gedächtnis ein-/ausschaltbar Thermal memory can be switched on/off	-	-	-	✓	✓
Zeitverzögerte Selektivitäts-Steuerung Zone selective interlocking	-	-	-	o	o
N-Leiterschutz ein-/ausschaltbar Neutral conductor protection can be switched on/off	-	-	✓	✓	✓
Kurzverzögerter Kurzschlussschutz ein-/ausschaltbar Short-time-delay short-circuit protection can be switched on/off	-	-	-	✓	✓
Unverzögerter Kurzschlussschutz ein-/ausschaltbar Instantaneous short-circuit protection can be switched on/off	-	-	-	✓	✓
Kurzverzögerter Kurzschlussschutz umschaltbar auf I^2t Short-time-delay short-circuit protection switchable to I^2t	-	-	-	✓	✓
Überlastschutz umschaltbar auf I^4t Overload protection switchable to I^4t	-	-	-	✓	✓
Überlastschutz ein-/ausschaltbar Overload protection can be switched on/off	-	-	-	-	✓
Umschaltbare Parametersätze Changeable parameter sets	-	-	-	-	✓
Erdschlussschutz umschaltbar auf I^2t Ground-fault switchable to I^2t	-	-	-	✓	✓
Erdschlussalarm Ground-fault alarm	-	-	-	o	o

9 Electronic components

NOTICE
The information contained in this manual has been verified to be accurate. However, the possibility of deviations can not be excluded as updates are incorporated to the product. All updates to the hardware and software will be included in the next revision of the manual.

9.1 Overcurrent releases

9.1.1 Overview of functions

	Überstromauslöser / Overcurrent release				
Funktionen Functions	**ETU15B → (9-3)**	**ETU25B → (9-6)**	**ETU27B → (9-9)**	**ETU45B → (9-12)**	**ETU76B → (9-17)**
Anzeige → (Seite 9-30) **Display** → (page 9-30)					
Anzeige alphanumerisch Alphanumeric display	-	-	-	o	-
Grafische Anzeige (fest eingebaut) Graphical display (fixed-mounted)	-	-	-	-	✓
Kommunikation Communication					
Kommunikation über **Cubicle**BUS Communication via **Cubicle**BUS	-	-	-	✓	✓
Kommunikation über PROFIBUS-DP Communication via PROFIBUS-DP	-	-	-	o	o
Kommunikation über Ethernet Communication via Ethernet	-	-	-	o	o
Messfunktion PLUS → (Seite 9-90) **Metering function PLUS** → (page 9-90)					
Messfunktion Metering function	-	-	-	o	o
Messfunktion *PLUS* Metering function *PLUS*	-	-	-	o	o
Parametrierung Parameterization					
Parametrierung über Drehkodierschalter Parameterization by rotary coding switches	✓	✓	✓	✓	-
Parametrierung über Kommunikation (Absolutwerte) Parameterization by communication (absolute values)	-	-	-	-	✓
Parametrierung über Menü (Absolutwerte) Parameterization by menu (absolute values)	-	-	-	-	✓
Fernparametrierung der Grundfunktionen Remote parameterization of basic protection functions	-	-	-	-	✓
Fernparametrierung der zusätzlichen Funktionen Remote parameterization of additional functions	-	-	-	✓	✓
Sonstiges Other					
Anschlussmöglichkeit für eine externe DC-24-V-Versorgung Provision for connecting to an external 24 V DC power supply	-	-	-	✓	✓

✓ Standard
o optional
- nicht verfügbar
1) fest eingestellt

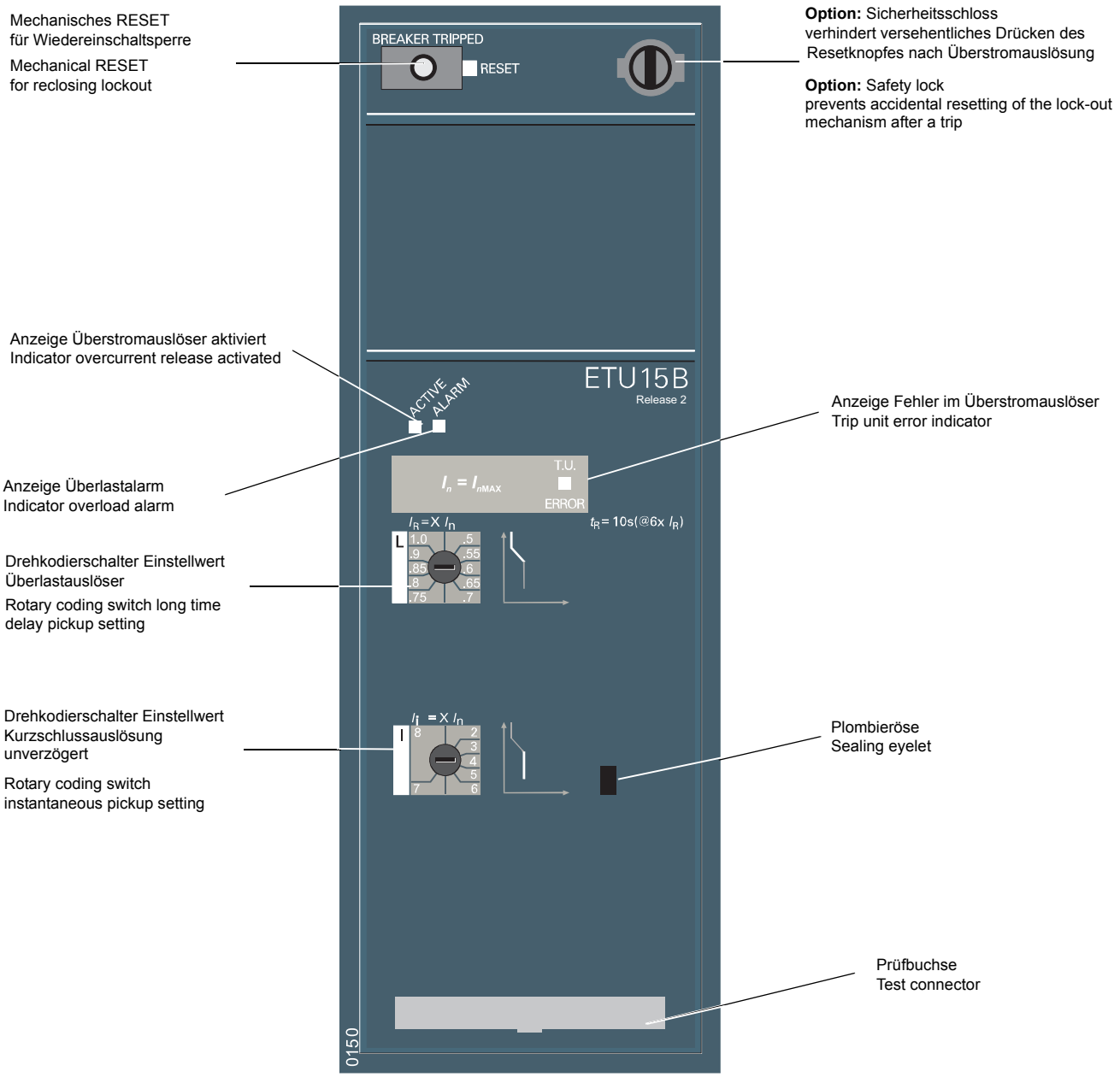
✓ standard
o optional
- not available
1) fixed

9.1.2 Überstromauslöser ETU15B

Ansicht

9.1.2 Overcurrent release ETU15B

Design



VORSICHT		CAUTION
Zum Schutz der elektrostatisch gefährdeten Bauelemente (EGB) ist die beigefügte Schutzkappe auf die Prüfbuchse zu setzen. Vor Entfernen der Schutzkappe sind anzuschließende Geräte und das Bedienpersonal auf das gleiche Potenzial zu bringen.		To protect the electrostatic sensitive devices (ESD) the attached protective cover must be installed on the test connector. Before the protective cover is removed, ensure that equipment to be connected, and also operating personnel, are at the same potential.

Einstellen des Überstromschutzes

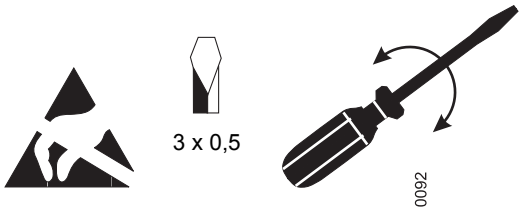
Overcurrent protection settings

VORSICHT	CAUTION
Parametereinstellungen grundsätzlich nur vornehmen, wenn der Leistungsschalter ausgeschaltet ist. Eine Veränderung der Parameter bei eingeschaltetem Leistungsschalter kann zu ungewolltem Auslösen des Leistungsschalters führen.	Adjust parameters only when the circuit-breaker is switched off. If the parameters are modified with the circuit-breaker switched on, this can trip the circuit-breaker unintentionally.

VORSICHT	CAUTION
Bei der Anlagenprojektierung und Selektivitätsbetrachtung ist sicherzustellen, dass der Leistungsschalter nicht Ströme führen kann, die oberhalb der im Katalog angegebenen Schaltleistungswerte liegen. Übergeordnete Schutzgeräte sind so einzustellen, dass diese Fehlerfälle sicher abgeschaltet werden.	When planning a project and considering selectivity it has to be ensured loads carried by the circuit-breaker will not exceed the breaking capacity stated in the 3WL catalogue. Upstream protection equipment has to be set in a way, that these faults are interrupted safely.

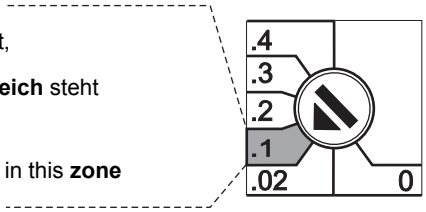
Die Einstellung aller Parameter erfolgt mit Drehkodierschaltern.

All parameters are adjusted with rotary coding switches.



Der Wert 0,1 ist eingestellt,
wenn der Drehschalter
in diesem **Drehwinkelbereich** steht

The value 0.1 is set if the
rotary switch is positioned in this **zone**



Schutzfunktionen

→ Überlastschutz –
L-Auslösung (page 9-22)

→ Kurzverzögerte Kurzschlussauslösung –
S-Auslösung (Seite 9-22)

Protective functions

→ Overload protection –
L-tripping (page 9-22)

→ Short-time-delayed short-circuit tripping –
S-tripping (page 9-22)

Kennlinien

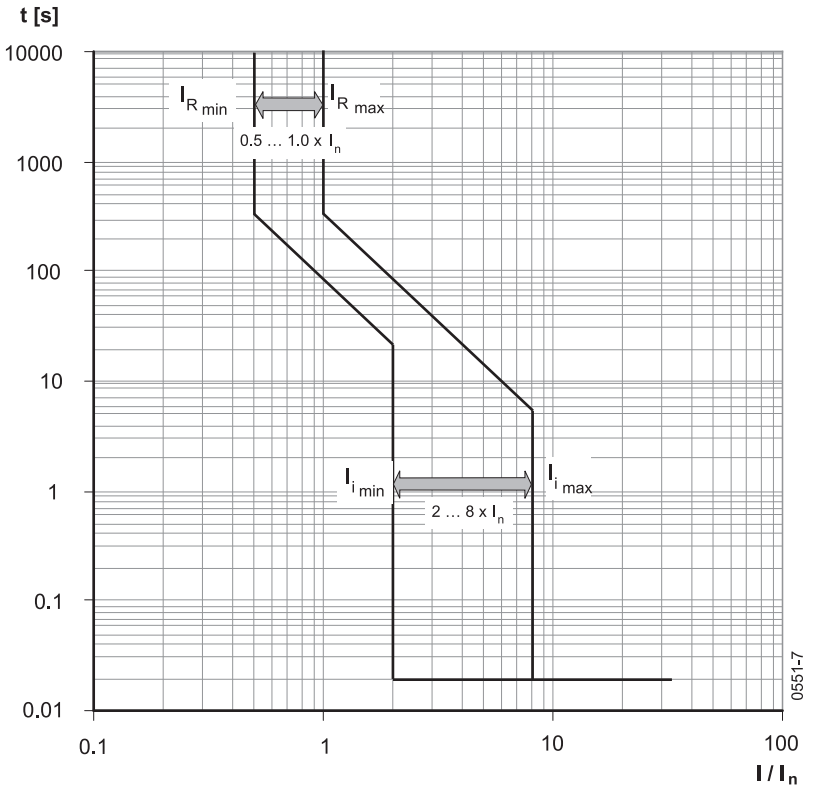
Die im Folgenden dargestellten Bereiche sind reine Einstellbereiche der jeweiligen Parameter. Mögliche Toleranzbereiche wurden dabei nicht berücksichtigt.

L-, I-Auslösung

Characteristics

The ranges shown in the following are only setting ranges of the respective parameters. Possible tolerance ranges have not been considered.

L-, I-tripping

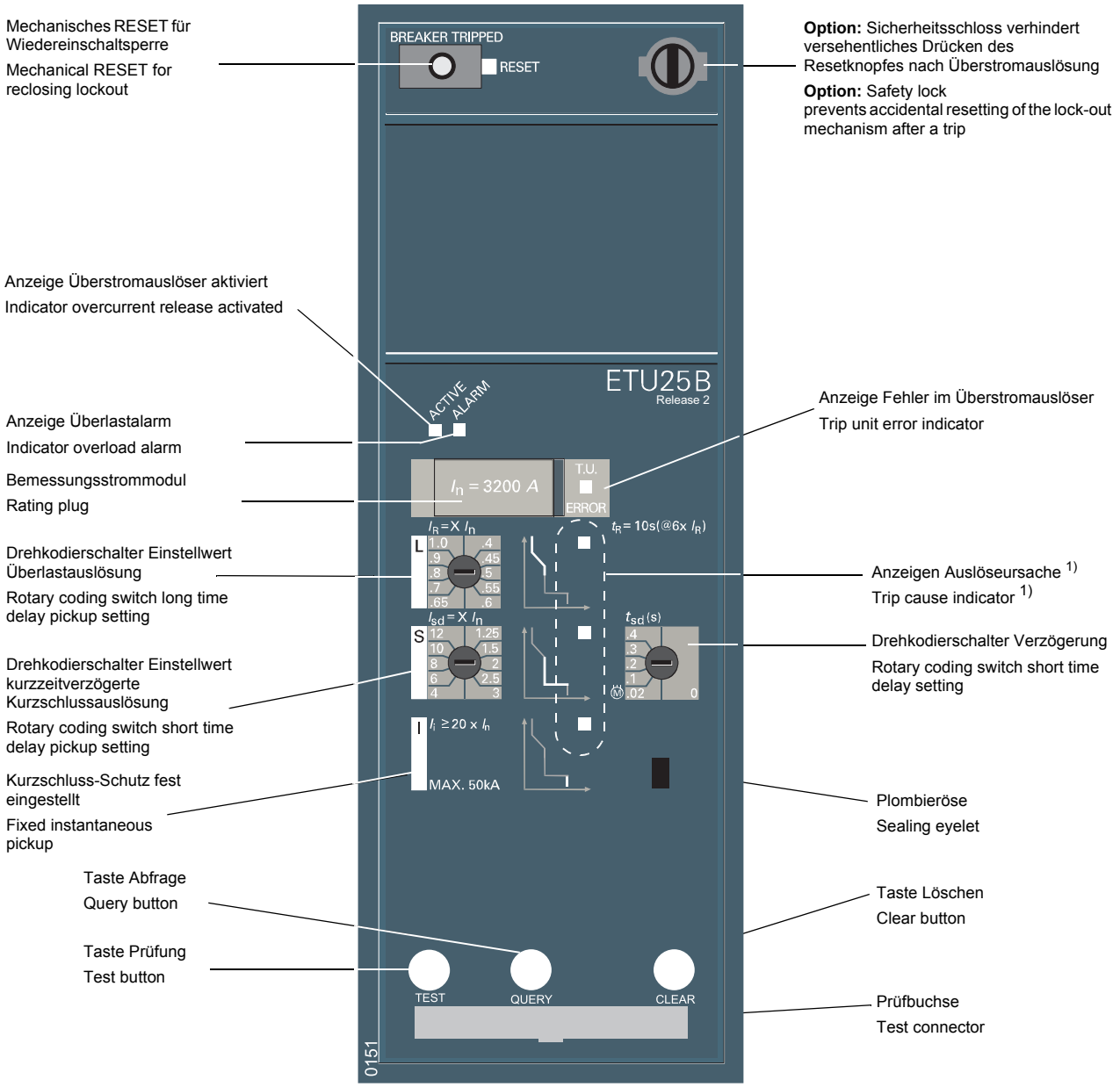


9.1.3 Überstromauslöser ETU25B

Ansicht

9.1.3 Overcurrent release ETU25B

Design



1) Die Auslöseursache wird für mindestens zwei Tage gespeichert, sofern der Überstromauslöser vor der Auslösung mindestens 10 min lang aktiviert war.

1) The trip cause is stored internally for at least two days, if the overcurrent release had been activated for at least 10 min before tripping.

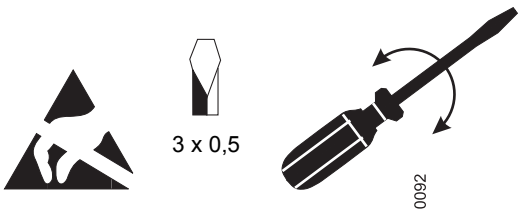
VORSICHT		CAUTION
Zum Schutz der elektrostatisch gefährdeten Bauelemente (EGB) ist die beigefügte Schutzkappe auf die Prüfbuchse zu setzen. Vor Entfernen der Schutzkappe sind anzuschließende Geräte und das Bedienpersonal auf das gleiche Potenzial zu bringen.		To protect the electrostatic sensitive devices (ESD) the attached protective cover must be installed on the test connector. Before the protective cover is removed, ensure that equipment to be connected, and also operating personnel, are at the same potential.

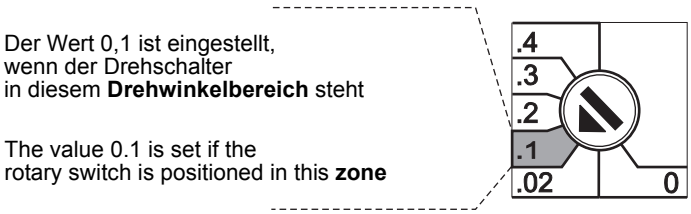
VORSICHT	CAUTION
Parametereinstellungen grundsätzlich nur vornehmen, wenn der Leistungsschalter ausgeschaltet ist. Eine Veränderung der Parameter bei eingeschaltetem Leistungsschalter kann zu ungewolltem Auslösen des Leistungsschalters führen.	Adjust parameters only when the circuit-breaker is switched off. If the parameters are modified with the circuit-breaker switched on, this can trip the circuit-breaker unintentionally.

VORSICHT	CAUTION
Bei der Anlagenprojektierung und Selektivitätsbetrachtung ist sicherzustellen, dass der Leistungsschalter nicht Ströme führen kann, die oberhalb der im Katalog angegebenen Schaltleistungswerte liegen. Übergeordnete Schutzgeräte sind so einzustellen, dass diese Fehlerfälle sicher abgeschaltet werden.	When planning a project and considering selectivity it has to be ensured loads carried by the circuit-breaker will not exceed the breaking capacity stated in the 3WL catalogue. Upstream protection equipment has to be set in a way, that these faults are interrupted safely.

Die Einstellung aller Parameter erfolgt mit Drehkodierschaltern.

All parameters are adjusted with rotary coding switches.





Schutzfunktionen

→ Überlastschutz – L-Auslösung (page 9-22)

→ Kurzverzögerte Kurzschlussauslösung – S-Auslösung (Seite 9-22)

→ Unverzögerte Kurzschlussauslösung – I-Auslösung (Seite 9-24)

Protective functions

→ Overload protection – L-tripping (page 9-22)

→ Short-time-delayed short-circuit tripping – S-tripping (page 9-22)

→ Instantaneous short-circuit tripping – I-tripping (page 9-24)

Kennlinien

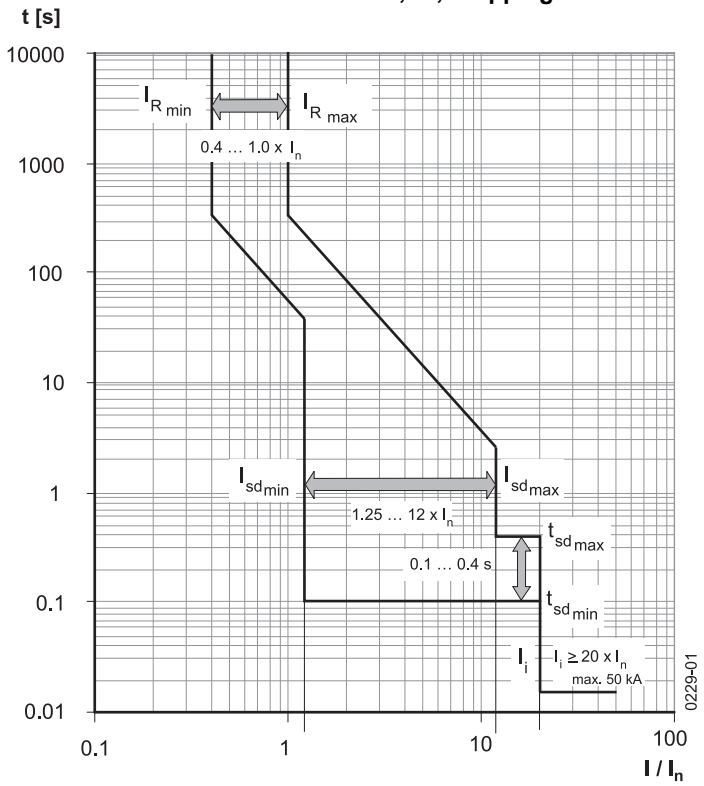
Die im Folgenden dargestellten Bereiche sind reine Einstellbereiche der jeweiligen Parameter. Mögliche Toleranzbereiche wurden dabei nicht berücksichtigt.

L-, S-, I-Auslösung

Characteristics

The ranges shown in the following are mere setting ranges of the respective parameters. Possible tolerance ranges have not been considered.

L-, S-, I-tripping

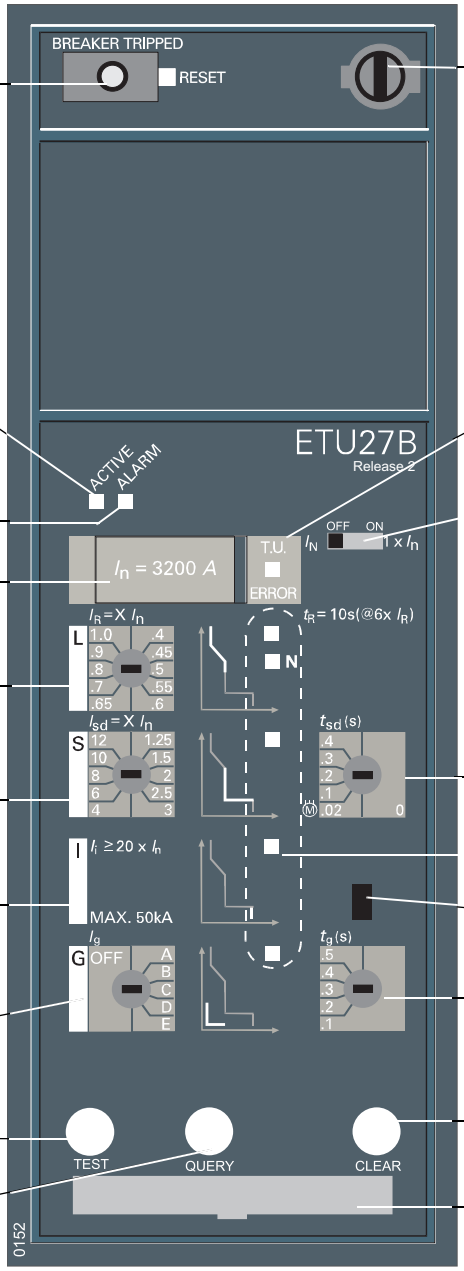


9.1.4 Überstromauslöser ETU27B

Ansicht

9.1.4 Overcurrent release ETU27B

Design



Mechanisches RESET
für Wiedereinschaltsperre

Mechanical RESET
for reclosing lockout

Option: Sicherheitsschloss
verhindert versehentliches Drücken des Resetknopfes nach Überstromauslösung

Option: Safety lock
prevents accidental resetting of the lock-out mechanism after a trip

Anzeige Überstromauslöser aktiviert
Indicator overcurrent release activated

Anzeige Fehler im Überstromauslöser
Trip unit error indicator

Anzeige Überlastalarm
Indicator overload alarm

N-Leiter-Schutz Ein/Aus
Neutral protection On/Off

Bemessungsstrommodul
Rating plug

Drehkodierschalter Einstellwert
Überlastauslösung

Rotary coding switch long time delay pickup setting

Drehkodierschalter Einstellwert
kurzzeitverzögert
Kurzschlussauslösung

Rotary coding switch short time delay pickup setting

Drehkodierschalter Verzögerung
Kurzschlussauslösung
Rotary coding switch short time delay setting

Anzeigen Auslöseursache 1)
Trip cause indicator 1)

Kurzschluss-Schutz
fest eingestellt

Fixed instantaneous pickup

Plombieröse
Sealing eyelet

Drehkodierschalter Einstellwert
Erdschlussschutz (siehe 9-76)

Rotary coding switch ground-fault pickup setting (see 9-76)

Drehkodierschalter Verzögerung
Erdschlussschutz
Rotary coding switch ground-fault time delay setting

Taste Prüfung
Test button

Taste Löschen
Clear button

Taste Abfrage
Query button

Prüfbuchse
Test connector

1) Die Auslöseursache wird für mindestens zwei Tage gespeichert, sofern der Überstromauslöser vor der Auslösung mindestens 10 min lang aktiviert war.

1) The trip cause is stored internally for at least two days, if the overcurrent release has been activated for at least 10 min before tripping.

VORSICHT		CAUTION
Zum Schutz der elektrostatisch gefährdeten Bauelemente (EGB) ist die beigefügte Schutzkappe auf die Prüfbuchse zu setzen. Vor Entfernen der Schutzkappe sind anzuschließende Geräte und das Bedienpersonal auf das gleiche Potenzial zu bringen.		To protect the electrostatic sensitive devices (ESD) the attached protective cover must be installed on the test connector. Before the protective cover is removed, ensure that equipment to be connected, and also operating personnel, are at the same potential.

Einstellen des Überstromschutzes

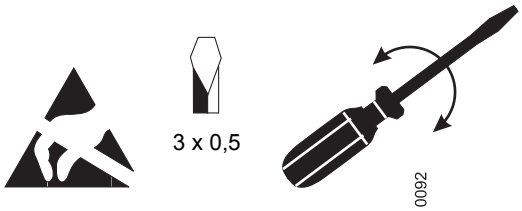
Overcurrent protection settings

VORSICHT	CAUTION
Parametereinstellungen grundsätzlich nur vornehmen, wenn der Leistungsschalter ausgeschaltet ist. Eine Veränderung der Parameter bei eingeschaltetem Leistungsschalter kann zu ungewolltem Auslösen des Leistungsschalters führen.	Adjust parameters only when the circuit-breaker is switched off. If the parameters are modified with the circuit-breaker switched on, this can trip the circuit-breaker unintentionally.

VORSICHT	CAUTION
Bei der Anlagenprojektierung und Selektivitätsbetrachtung ist sicherzustellen, dass der Leistungsschalter nicht Ströme führen kann, die oberhalb der im Katalog angegebenen Schaltleistungswerte liegen. Übergeordnete Schutzgeräte sind so einzustellen, dass diese Fehlerfälle sicher abgeschaltet werden.	When planning a project and considering selectivity it has to be ensured loads carried by the circuit-breaker will not exceed the breaking capacity stated in the 3WL catalogue. Upstream protection equipment has to be set in a way, that these faults are interrupted safely.

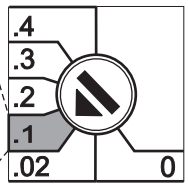
Die Einstellung der Parameter für die Grundfunktionen erfolgt mit Drehkodierschaltern.

The parameters for the basic functions are adjusted with rotary coding switches.



Der Wert 0,1 ist eingestellt,
wenn der Drehschalter
in diesem **Drehwinkelbereich** steht

The value 0.1 is set if the
rotary switch is positioned in this **zone**



Die Ein/Ausschaltung des N-Leiterschutzes erfolgt mit einem Schiebeschalter.

The neutral conductor protection is switched on/off with a slide switch.

Schutzfunktionen

→ Überlastschutz –
L-Auslösung (Seite 9-22)

→ Kurzverzögerte Kurzschlussauslösung –
S-Auslösung (Seite 9-22)

→ Unverzögerte Kurzschlussauslösung –
I-Auslösung (Seite 9-24)

→ Erdschlussauslösung –
G-Auslösung (page 9-24)

→ Neutralleiterschutz –
N-Auslösung (Seite 9-25)

Protective functions

→ Overload protection –
L-tripping (page 9-22)

→ Short-time-delayed short-circuit tripping –
S-tripping (page 9-22)

→ Instantaneous short-circuit tripping –
I-tripping (page 9-24)

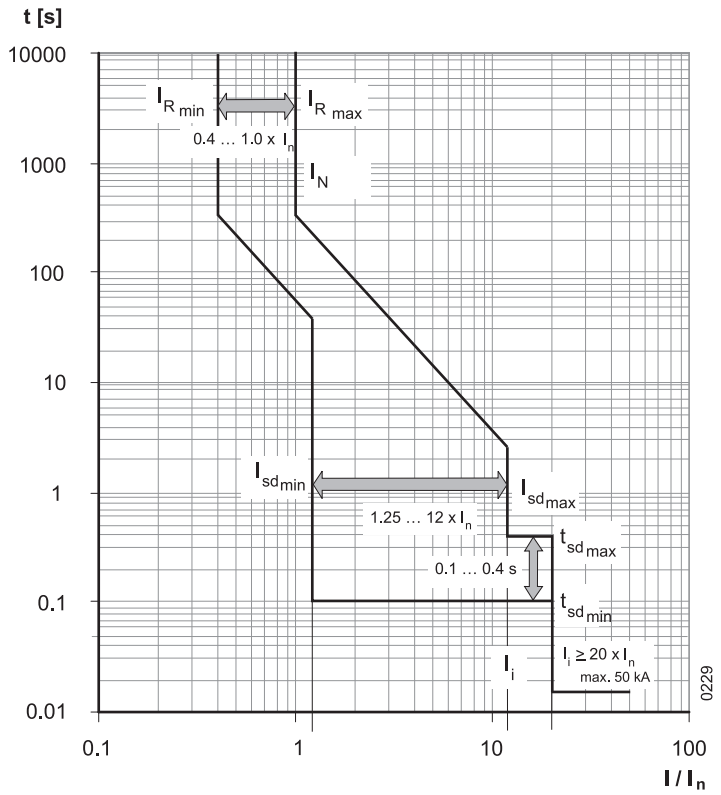
→ Ground fault tripping -
G-tripping (page 9-24)

→ Neutral conductor protection -
N-tripping (page 9-25)

Kennlinien

Die im Folgenden dargestellten Bereiche sind reine Einstellbereiche der jeweiligen Parameter. Mögliche Toleranzbereiche wurden dabei nicht berücksichtigt.

L-, S-, I-, N-Auslösung

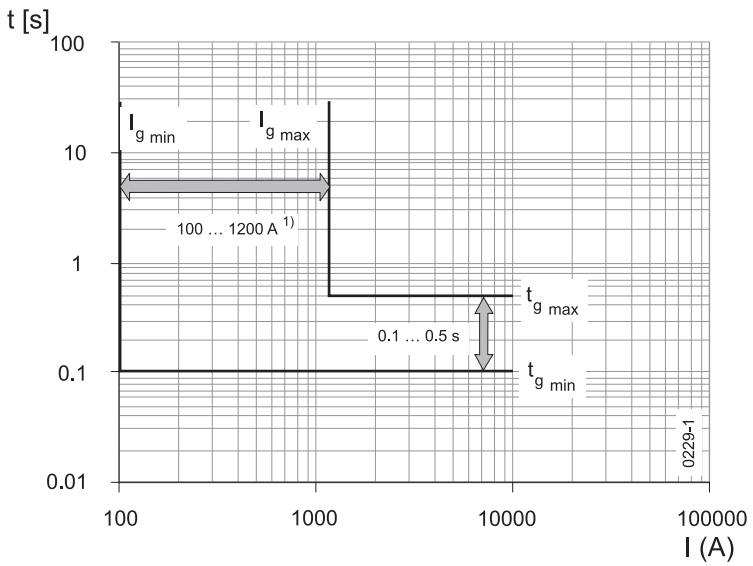


Characteristics

The ranges shown in the following are mere setting ranges of the respective parameters. Possible tolerance ranges have not been considered.

L, S-, I-, N-tripping

Erdschlussauslösung



Ground-fault tripping

1) Baugröße I und II: 100 ... 1200 A
Baugröße III: 400 ... 1200 A

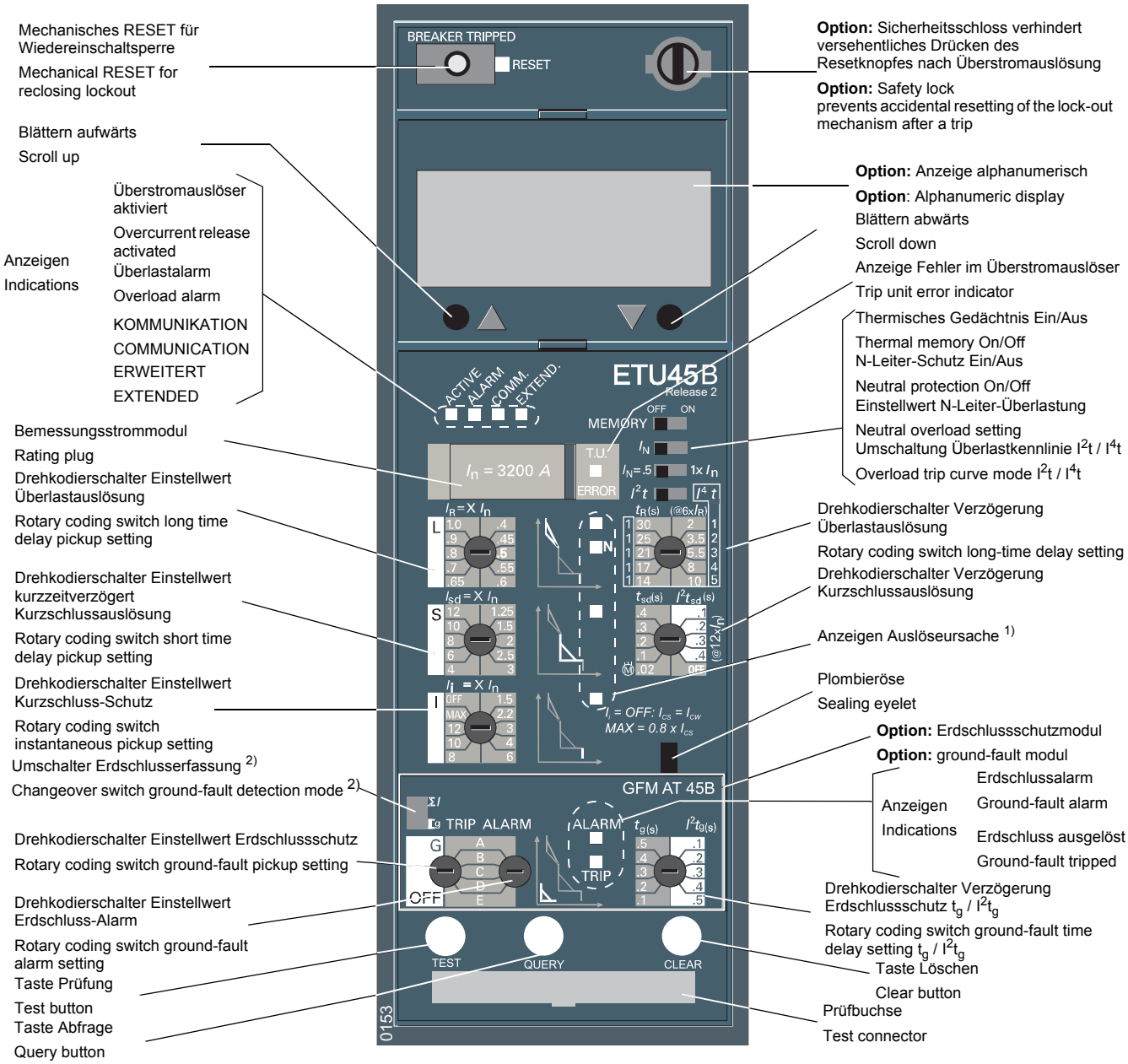
1) Frame size I and II: 100 ... 1200 A
Frame size III: 400 ... 1200 A

9.1.5 Überstromauslöser ETU45B

Ansicht

9.1.5 Overcurrent release ETU45B

Design



1) Die Auslöseursache wird für mindestens zwei Tage gespeichert, sofern der Überstromauslöser vor der Auslösung mindestens 10 min lang aktiviert war. (mit Hilfsenergie beliebig lange)

2) Umschalter nur bei ausgebautem Modul zugänglich.

1) The trip cause is stored internally for at least two days, if the overcurrent release has been activated for at least 10 min before tripping. (for unlimited time with auxiliary power).

2) Changeover switch only accessible with removed module.

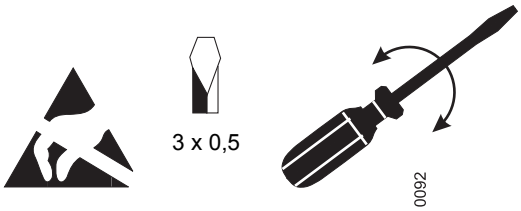
VORSICHT		CAUTION
Zum Schutz der elektrostatisch gefährdeten Bauelemente (EGB) ist die beigefügte Schutzkappe auf die Prüfbuchse zu setzen. Vor Entfernen der Schutzkappe sind anzuschließende Geräte und das Bedienpersonal auf das gleiche Potenzial zu bringen.		To protect the electrostatic sensitive devices (ESD) the attached protective cover must be installed on the test connector. Before the protective cover is removed, ensure that equipment to be connected, and also operating personnel, are at the same potential.

VORSICHT	CAUTION
Parametereinstellungen grundsätzlich nur vornehmen, wenn der Leistungsschalter ausgeschaltet ist. Eine Veränderung der Parameter bei eingeschaltetem Leistungsschalter kann zu ungewolltem Auslösen des Leistungsschalters führen.	Adjust parameters only when the circuit-breaker is switched off. If the parameters are modified with the circuit-breaker switched on, this can trip the circuit-breaker unintentionally.

VORSICHT	CAUTION
Bei der Anlagenprojektierung und Selektivitätsbetrachtung ist sicherzustellen, dass der Leistungsschalter nicht Ströme führen kann, die oberhalb der im Katalog angegebenen Schaltleistungswerte liegen. Übergeordnete Schutzgeräte sind so einzustellen, dass diese Fehlerfälle sicher abgeschaltet werden.	When planning a project and considering selectivity it has to be ensured loads carried by the circuit-breaker will not exceed the breaking capacity stated in the 3WL catalogue. Upstream protection equipment has to be set in a way, that these faults are interrupted safely.

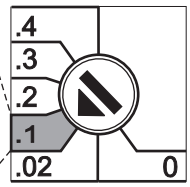
Die Einstellung der Parameter für die Grundfunktionen erfolgt mit Drehkodierschaltern.

The parameters for the basic functions are adjusted with rotary coding switches.



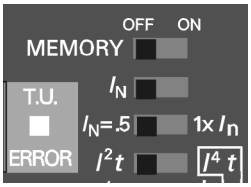
Der Wert 0,1 ist eingestellt, wenn der Drehschalter in diesem **Drehwinkelbereich** steht

The value 0.1 is set if the rotary switch is positioned in this **zone**



Verschiedene Zusatzfunktionen werden mit Schiebeschaltern eingestellt.

Various additional functions are adjusted with slide switches.



Die Einstellungen für die Zusatzfunktion „Lastüberwachung“ können erfolgen über:

- das alphanumerische Display → (Seite 9-30)
- die Prüfbuchse mit dem BDA → (Seite 9-122)
- über den PROFIBUS-DP mit einem PC mit installierter Software „powerconfig“. → (Seite 27-3)

Diese Einstellungen können nur vorgenommen werden, wenn der Überstromauslöser aktiviert ist, d. h. eine externe 24 V DC-Spannungsversorgung angeschlossen ist.

The settings for the additional function “load monitoring” can be adjusted through:

- the alphanumeric display → (page 9-30)
- the test socket with the BDA → (page 9-122)
- the PROFIBUS-DP with a PC and the software “powerconfig” → (page 27-2)

These settings can only be adjusted if the overcurrent release is activated, i.e. it must be connected to an external 24 V DC voltage supply.

Schutzfunktionen

→ Überlastschutz –
L-Auslösung (Seite 9-22)

→ Kurzverzögerte Kurzschlussauslösung –
S-Auslösung (Seite 9-22)

→ Unverzögerte Kurzschlussauslösung –
I-Auslösung (Seite 9-24)

→ Erdschlussauslösung –
G-Auslösung (Seite 9-24)

→ Neutralleiterschutz –
N-Auslösung (Seite 9-25)

→ Lastüberwachung („Lastaufnahme / Lastabwurf“)
(Seite 9-25)

→ Voreilende Meldung „L-Auslösung“ (Seite 9-26)

→ Thermisches Gedächtnis ein- / ausschaltbar
(Seite 9-26)

→ Erdschlussschutzmodule (Seite 9-68)

Protective functions

→ Overload protection –
L-tripping (page 9-22)

→ Short-time-delayed short-circuit tripping –
S-tripping (page 9-22)

→ Instantaneous short-circuit tripping –
I-tripping (page 9-24)

→ Ground fault tripping -
G-tripping (page 9-24)

→ Neutral conductor protection -
N-tripping (page 9-25)

→ Load monitoring (load restore/load shedding
(page 9-25)

→ Leading signal "L-tripping" (page 9-26)

→ Thermal memory can be switched On/Off
(page 9-26)

→ Ground fault protection modules (page 9-68)

Kennlinien

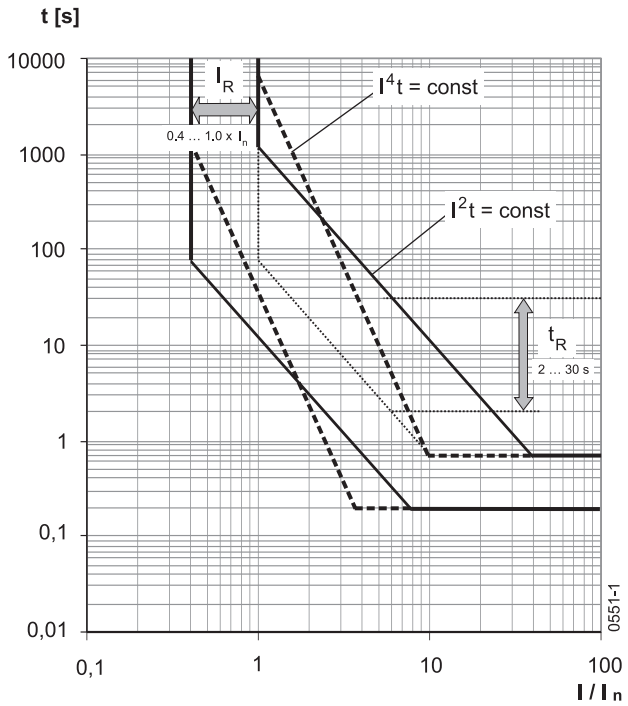
Die im Folgenden dargestellten Bereiche sind reine Einstellbereiche der jeweiligen Parameter. Mögliche Toleranzbereiche wurden dabei nicht berücksichtigt.

Characteristics

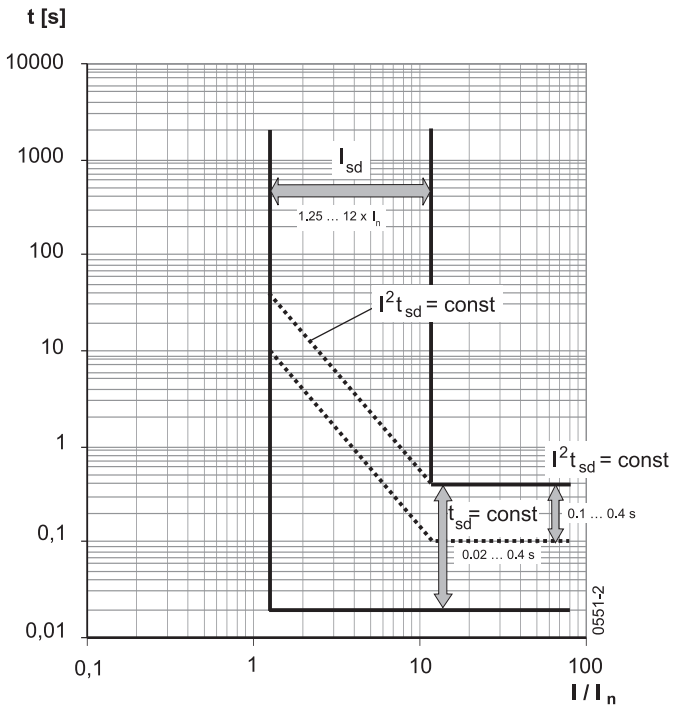
The ranges shown in the following are only setting ranges of the respective parameters. Possible tolerance ranges have not been considered.

L-Auslösung

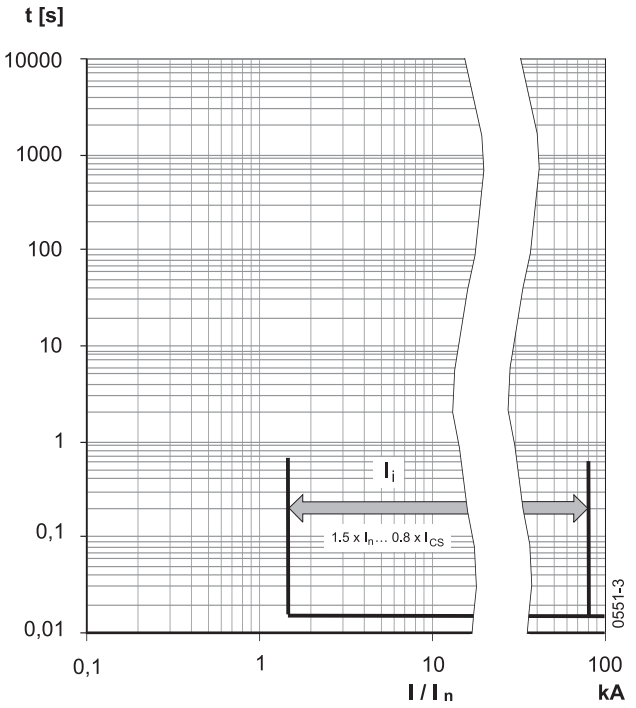
L-tripping



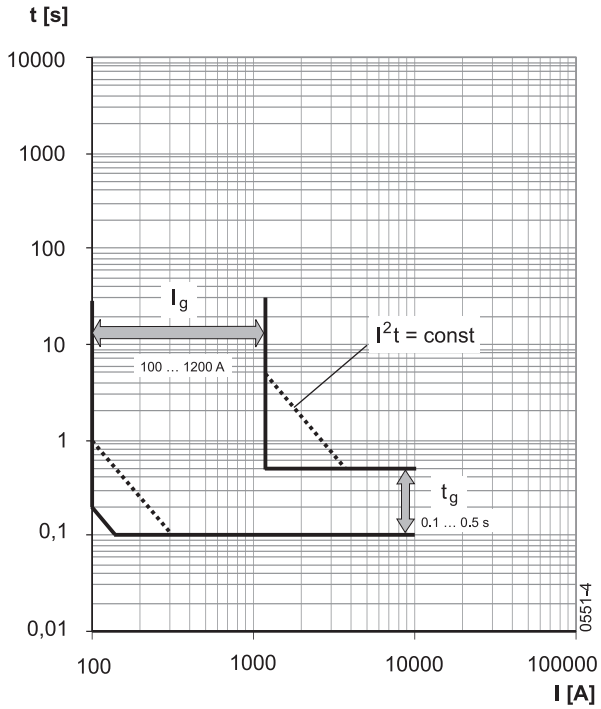
S-Auslösung **S-tripping**



I-Auslösung **I-tripping**



Erdschlussauslösung **Ground-fault tripping**

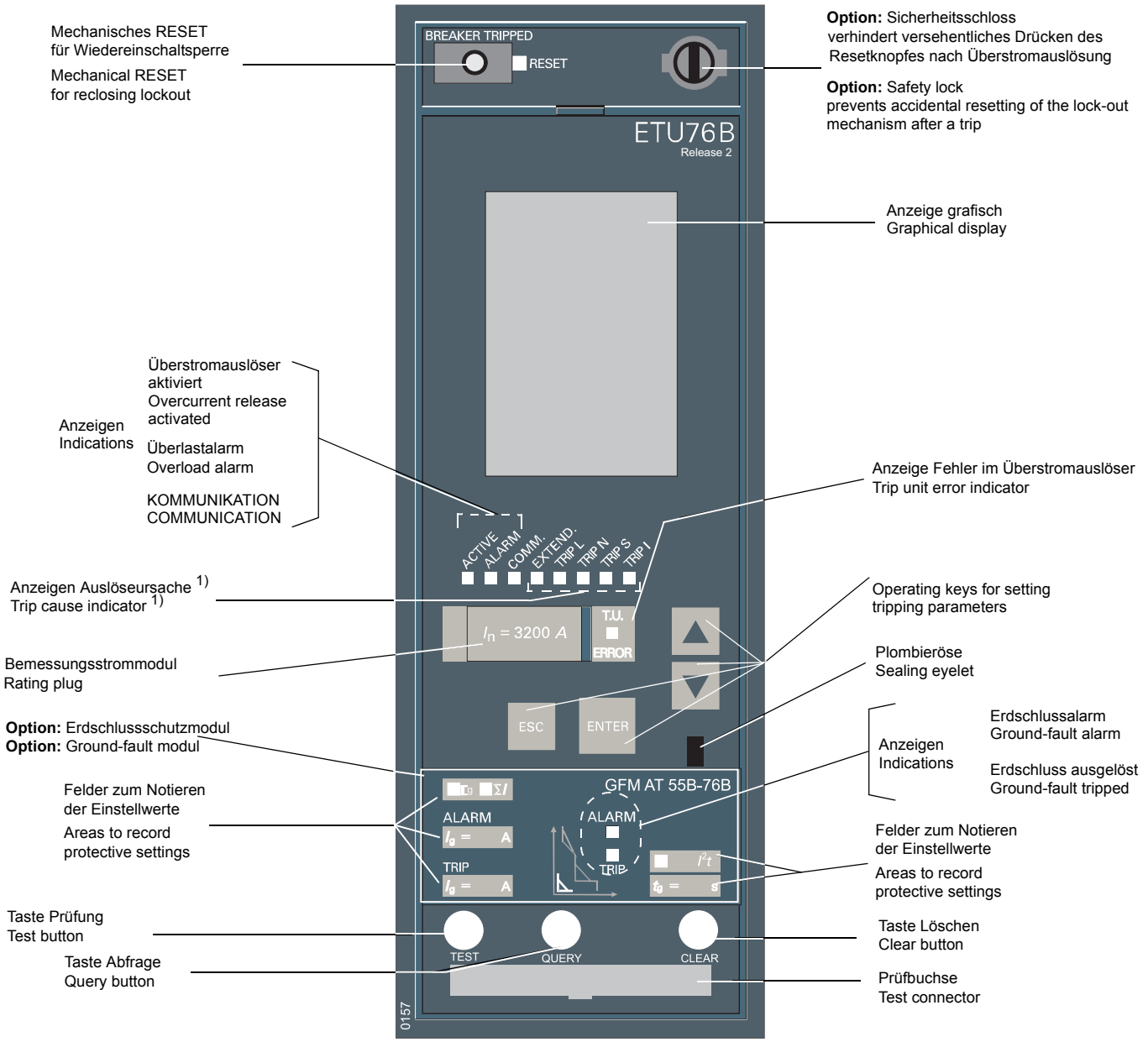


9.1.6 Überstromauslöser ETU76B

Ansicht

9.1.6 Overcurrent release ETU76B

Design



1) Die Auslöseursache wird für mindestens zwei Tage gespeichert, sofern der Überstromauslöser vor der Auslösung mindestens 10 min lang aktiviert war. (mit Hilfsenergie beliebig lange)

1) The trip cause is stored internally for at least two days, if the overcurrent release has been activated for at least 10 min before tripping. (for unlimited time with auxiliary power).

VORSICHT		CAUTION
Zum Schutz der elektrostatisch gefährdeten Bauelemente (EGB) ist die beigefügte Schutzkappe auf die Prüfbuchse zu setzen. Vor Entfernen der Schutzkappe sind anzuschließende Geräte und das Bedienpersonal auf das gleiche Potenzial zu bringen.		To protect the electrostatic sensitive devices (ESD) the attached protective cover must be installed on the test connector. Before the protective cover is removed, ensure that equipment to be connected, and also operating personnel, are at the same potential.

VORSICHT	CAUTION
Parametereinstellungen grundsätzlich nur vornehmen, wenn der Leistungsschalter ausgeschaltet ist. Eine Veränderung der Parameter bei eingeschaltetem Leistungsschalter kann zu ungewolltem Auslösen des Leistungsschalters führen.	Adjust parameters only when the circuit-breaker is switched off. If the parameters are modified with the circuit-breaker switched on, this can trip the circuit-breaker unintentionally.

VORSICHT	CAUTION
Bei der Anlagenprojektierung und Selektivitätsbetrachtung ist sicherzustellen, dass der Leistungsschalter nicht Ströme führen kann, die oberhalb der im Katalog angegebenen Schaltleistungswerte liegen. Übergeordnete Schutzgeräte sind so einzustellen, dass diese Fehlerfälle sicher abgeschaltet werden.	When planning a project and considering selectivity it has to be ensured loads carried by the circuit-breaker will not exceed the breaking capacity stated in the 3WL catalogue. Upstream protection equipment has to be set in a way, that these faults are interrupted safely.

VORSICHT	CAUTION
Bei Abschaltung der Überlastschutzfunktion ist sicherzustellen, dass keine Überlastfälle eintreten können. Eine thermische Zerstörung des Schaltgerätes, der Anlage oder des Verbrauchers wären die Folge. Auftretende Überlastfälle können in diesem Fall nur bei Überschreiten der Ansprechwerte für die Kurzschlussschutzfunktion (verzögert oder unverzögert) durch Auslösung abgeschaltet werden. Diese Ansprechwerte sind entsprechend anzupassen.	When deactivating the overload protection, it has to be ensured overloads will not occur. Otherwise, thermal destruction of the circuit-breaker, the switchgear or the consumer load could result. In these cases occurring overloads can only be handled by the short time and instantaneous protection. The pick-up values need to be adjusted accordingly.

Die Einstellung aller Parameter für die Grund- und Zusatzfunktionen kann erfolgen über:

- das Grafikdisplay → (Seite 9-42)
- die Prüfbuchse mit dem BDA → (Seite 9-122)
- über den PROFIBUS-DP mit einem PC mit installierter Software „powerconfig“ → (Seite 27-3)
- über den Modbus mit einem PC und zusätzlicher Software

Dazu muss der Überstromauslöser aktiviert, d. h. eine externe 24 V DC-Spannungsversorgung angeschlossen sein.

All parameters for the basic and the additional functions can be adjusted through:

- the graphical display → (page 9-42)
- the test socket with the BDA → (page 9-122)
- the PROFIBUS-DP with a PC and the software "powerconfig" → (page 27-2)
- the Modbus with a PC and additional software

To do this, the overcurrent release must be activated, i.e. it must be connected to an external 24 V DC voltage supply.

Schutzfunktionen

→ Überlastschutz – L-Auslösung (Seite 9-22)

→ Kurzverzögerte Kurzschlussauslösung – S-Auslösung (Seite 9-22)

→ Unverzögerte Kurzschlussauslösung – I-Auslösung (Seite 9-24)

→ Erdschlussauslösung – G-Auslösung (Seite 9-24)

→ Erdschlussschutzmodule (Seite 9-68)

→ Neutralleiterschutz – N-Auslösung (Seite 9-25)

→ Lastüberwachung („Lastaufnahme / Lastabwurf“) (Seite 9-25)

→ Voreilende Meldung „L-Auslösung“ (Seite 9-26)

→ Thermisches Gedächtnis ein- / ausschaltbar (Seite 9-26)

Protective functions

→ Overload protection – L-tripping (page 9-22)

→ Short-time-delayed short-circuit tripping – S-tripping (page 9-22)

→ Instantaneous short-circuit tripping – I-tripping (page 9-24)

→ Ground fault tripping - G-tripping (page 9-24)

→ Ground fault protection modules (page 9-68)

→ Neutral conductor protection - N-tripping (page 9-25)

→ Load monitoring (load restore/load shedding (page 9-25)

→ Leading signal "L-tripping" (page 9-26)

→ Thermal memory can be switched On/Off (page 9-26)

Kennlinien

Die im Folgenden dargestellten Bereiche sind reine Einstellbereiche der jeweiligen Parameter. Mögliche Toleranzbereiche wurden dabei nicht berücksichtigt.

Die Kennlinien gelten für einen Leistungsschalter in der Ausführung Schaltvermögen H, 440 V, Baugröße II, mit Erdschlussschutzmodul.

→ Überlastschutz – L-Auslösung (Seite 9-14)

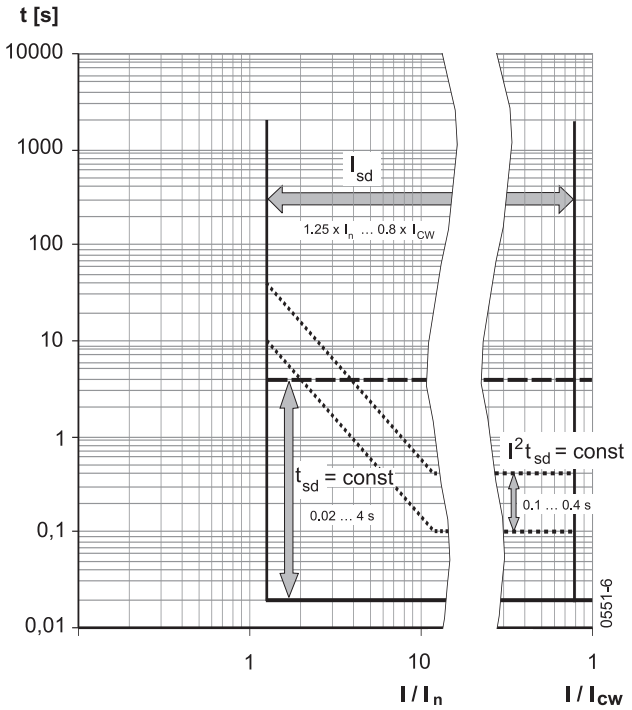
Characteristics

The ranges shown in the following are only setting ranges of the respective parameters. Possible tolerance ranges have not been considered.

The characteristics apply to the circuit breaker version breaking capacity H, at 440 V, frame size II, with ground-fault protection module.

→ Overload protection – L-tripping (page 9-14)

S-Auslösung



→ Unverzögerte Kurzschlussauslösung – I-Auslösung (Seite 9-15)

→ Erdschlussauslösung – G-Auslösung (Seite 9-16)

S-tripping

→ Instantaneous short-circuit tripping – I-tripping (page 9-15)

→ Ground-fault tripping - G-tripping (page 9-16)

9.1.7 Bestellnummern

9.1.7 Order numbers

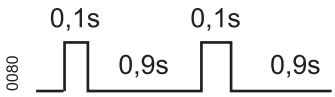
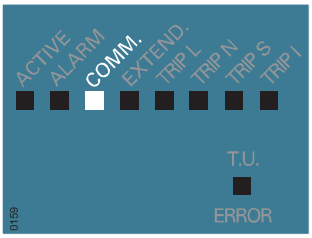
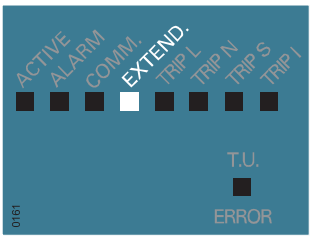
Überstromauslöser Overcurrent release		Bestell-Nr. Order no.
ETU15B		3WL9311-5AA00-0AA2
ETU25B		3WL9312-5AA00-0AA2
ETU27B		3WL9312-7AA00-0AA2
ETU45B		3WL9314-5AA00-0AA2
ETU45B	mit Messfunktion PLUS with metering function PLUS	3WL9314-5AA20-0AA2
ETU76B		3WL9317-6AA00-0AA2
ETU76B	mit Messfunktion PLUS with metering function PLUS	3WL9317-6AA20-0AA2

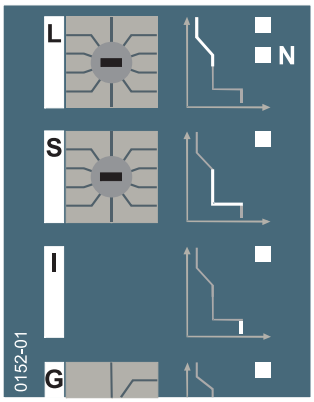
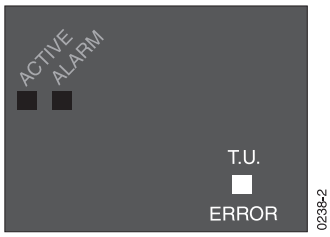
9.1.8 Anzeigen

Die Ausstattung der Anzeigen ist abhängig vom Typ des Überstromauslösers.

9.1.8 Indications

Scope of indications depends on the type of overcurrent release.

Überlastauslöser ist aktiviert. **$I > I_{min}$** - oder wenn 24 V Hilfsspannung anliegt **I_{min}:** - 80 A für Baugröße I / II - 150 A für Baugröße III	 Blitzlicht / Flashing LED 	**Overcurrent release is activated** **$I > I_{min}$** - or when 24 V auxiliary power is applied **I_{min}:** - 80 A for frame size I / II - 150 A for frame size III
Überstromalarm - Dauerlicht, wenn **$I \geq I_R$**		**Overcurrent alarm** - Steady light, if **$I \geq I_R$**
Kommunikation aktiv - Ein anderer **Cubicle**BUS-Teilnehmer wurde erkannt und Kommunikation aufgenommen		**Communication active** - Another **Cubicle**BUS participant has been recognised and communication started.
Erweiterte Schutzfunktion hat ausgelöst - verursacht durch Messfunktion - Auslösegrund im Ereignisspeicher gespeichert - Auslösegrund auslesbar über: * BDA * PROFIBUS-DP und PC mit Software „powerconfig“ → (Seite 27-3) * Grafisches Display (ETU76B) * Externe digitale Ausgangsmodule		**Extended protective function has tripped** - due to metering function - trip cause saved in event memory - trip cause readable through: * BDA * PROFIBUS-DP and PC with software “powerconfig” → (page 27-2) * graphic display (ETU76B) * External digital output modules

Schutzfunktion hat ausgelöst (Überstrom) - Anzeige leuchtet, wenn Query-Taste gedrückt - Nur ein Auslösegrund wird angezeigt - Nur der letzte Auslösegrund wird angezeigt	 oder / or 	**Protective function has tripped (Overcurrent)** - Indicator lights up when the Query button is pressed - Only one trip cause is displayed - Only the last trip cause is displayed
LED T.U. ERROR **1. T.U. Error blinkt:** Schutzfunktion ist eingeschränkt, die Schutzparameter sind auf die Minimalwerte zurück gesetzt. Ursachen: - Bemessungsstrom des Bemessungsstrommoduls ist größer als der des Leistungsschalters - Drehkodierschalter in undefinierter Zwischenstellung - Überstromauslöser defekt **2. T.U. Error leuchtet dauernd:** Schutzfunktion ist nicht gewährleistet. Ursachen: - Bemessungsstrommodul und Leistungsschalter sind nicht kompatibel - Überstromauslöser defekt		**LED T.U. ERROR** **1. T.U. Error flashes** Limited protective function, the protective parameters are reset to minimum values. Causes: - Rated current of the rating plug is higher than that of the circuit breaker - Rotary coding switch in undefined intermediate position - Trip unit defective **2. T.U. Error lights up continuously:** Protective function not guaranteed. Causes: - Rating plug not compatible with circuit breaker type - Trip unit defective

9.1.9 Schutzfunktionen

9.1.9.1 Grundschutzfunktionen

Die Grundschutzfunktionen des Überstromauslösers sind ohne zusätzliche Hilfsspannung sichergestellt. Die erforderliche Energie wird von schalterinternen Energiewandlern bereitgestellt.

Für die Bewertung der Ströme wird durch die Elektronik des Überstromauslösers der Effektivwert (r.m.s.) berechnet.

Die Parametrierung der einzelnen Funktionen erfolgt typenabhängig mittels:

- Drehkodierschalter (ETU15B … 45B)
- elektronischer Datenübertragung (ETU55B ... 76B) über:
  - die Prüfbuchse mit dem BDA
  - den PROFIBUS-DP mit einem PC und der Software „powerconfig“ → (Seite 27-3)
- Bedientastenfeld (ETU76B).

9.1.9 Protective functions

9.1.9.1 Basic protective functions

The basic protective functions of the overcurrent release are ensured without additional auxiliary voltage. The required energy is supplied by the circuit breaker's internal energy transformers.

To evaluate the currents, the electronic system of the overcurrent release calculates the r.m.s value.

The individual functions are parameterised according to the types through:

- rotary coding switch (ETU15B … 45B)
- electronic data transfer (ETU55B ... 76B) through
  - the test socket with the BDA
  - the PROFIBUS-DP with a PC and the software "powerconfig" → (page 27-2)
- the control board (ETU76B)

Überlastschutz – L-Auslösung

Der Einstellwert I_R bestimmt den maximalen Dauerstrom, bei dem der Schalter ohne Auslösung betrieben werden kann. Der Trägheitsgrad t_R bestimmt, wie lange eine Überlast andauern kann, ohne dass es zu einer Auslösung kommt.

Overload protection – L-tripping

The current setting I_R defines the maximum continuous current the circuit breaker can carry without tripping. The time-lag class t_R determines the maximum duration of an overload without tripping.

	Einstellwerte für I_R	**Current setting values for I_R**
ETU15B	0,5 / 0,55 / 0,6 / 0,65 / 0,7 / 0,75 / 0,8 / 0,85 / 0,9 / 1	0.5 / 0.55 / 0.6 / 0.65 / 0.7 / 0.75 / 0.8 / 0.85 / 0.9 / 1
ETU25B, …27B, ..45B	0,4 / 0,45 / 0,5 / 0,55 / 0,6 / 0,65 / 0,7 / 0,8 / 0,9 / 1,0	0.4 / 0.45 / 0.5 / 0.55 / 0.6 / 0.65 / 0.7 / 0.8 / 0.9 / 1.0
ETU76B	0,4 ... 1,0 (I_R = … x I_n , Angabe in Ampere)	0.4 ... 1.0 (I_R = … x I_n , data in Amps)

	Einstellwerte für t_R (bei 6 x I_R)	**settings for t_R (at 6 x I_R)**
ETU15B	10 s	10 s
ETU25B, …27B, ..45B	2 / 3,5 / 5,5 / 8 / 10 / 14 / 17 / 21 / 25 / 30 s	2 / 3.5 / 5.5 / 8 / 10 / 14 / 17 / 21 / 25 / 30 s
ETU76B	2 … 30 s	2 … 30 s

Die Auslösekennlinie hat eine I^2t-Charakteristik. Für einige Überstromauslöser besteht die Möglichkeit, auf eine I^4t-Charakteristik umzuschalten. → (Seite 9-27)

The tripping characteristic is an I^2t-characteristic. Some overcurrent releases can be switched over to an I^4t-characteristic. → (page 9-27)

Kurzverzögerte Kurzschlussauslösung – S-Auslösung

Bei den Überstromauslösern ETU25B, ..27B, ..45B und ..76B kann die Auslösung infolge eines Kurzschlussstromes I_{sd} um die Zeit t_{sd} verzögert werden.

Damit kann eine Selektivität des Kurzschlussschutzes in Schaltanlagen mit mehreren Staffelebenen erreicht werden.

Short-time-delayed short-circuit tripping – S-tripping

On overcurrent releases ETU25B, ..27B, ..45B and .76B, tripping due to the short-circuit current I_{sd} can be delayed by the time t_{sd}.

This provides selectivity for the short-circuit protection in switchgear with several grading levels.

	Einstellwerte für I_{sd} (Angabe in Ampere)	**Current setting values for I_{sd}** (data in Amps)
ETU25B, …27B, ..45B	I_{sd} = (1,25 / 1,5 / 2 / 2,5 / 3 / 4 / 6 / 8 / 10 / 12) x I_n	I_{sd} = (1.25 / 1.5 / 2 / 2.5 / 3 / 4 / 6 / 8 / 10 / 12) x I_n
ETU76B	I_{sd} = 1,25 x I_n … 0,8 x I_{cw}	I_{sd} = 1.25 x I_n … 0.8 x I_{cw}

	Einstellwerte für t_{sd}	Setting values for t_{sd}
ETU25B, ETU27B	t_{sd} = 0 / 0,02(M)[1] / 0,1 / 0,2 / 0,3 / 0,4 s	t_{sd} = 0 / 0.02(M)[1] / 0.1 / 0.2 / 0.3 / 0.4 s
ETU45B	t_{sd} = 0,02(M)[1] / 0,1 / 0,2 / 0,3 / 0,4 s; OFF	t_{sd} = 0.02(M)[1] / 0.1 / 0.2 / 0.3 / 0.4 s; OFF
ETU76B	t_{sd} = 0,02(M)[1] / 0,08 … 4 s [2] ; OFF	t_{sd} = 0.02(M)[1] / 0.08 … 4 s [2] ; OFF

1) Die Verzögerungszeit 0,02 s ist keine Staffelzeit!
In dieser Stellung wird die Motorschutzfunktion eingeschaltet.

2) Für Einstellwerte t_{sd} > 0,4 s erfolgt automatisch eine Reduzierung des maximal möglichen Einstellwertes I_{sd} in Abhängigkeit von der Baugröße auf:
Baugröße I: 15 kA
Baugröße II: 20 kA
Baugröße III: 30 kA

1) The time delay 0.02 s isn't a grading time!
In this position, the motor protection function is activated.

2) For settings t_{sd} >0.4 s, the maximum possible setting I_{sd} is reduced automatically according to the frame size:
Frame size I : 15 kA
Frame size II: 20 kA
Frame size III: 30 kA

Die maximal zulässigen, einstellbaren Stromwerte sind vom Kurzschlussschaltvermögen und der Betriebsspannung abhängig. Die maximalen Werte können dem Typschild entnommen werden.

The maximum permissible, adjustable current values depend on the short-circuit breaking capacity and the operational voltage. The maximum values can be found on the type label.

Mit dem Einstellwert t_{sd} = 0 s können die Überstromauslöser ETU25B und ETU27B einen unverzögerten Kurzschlussschutz mit einstellbarem Ansprechwert realisieren, der kleiner ist, als der fest-eingestellte Ansprechwert I_i.
Die Einstellung „OFF“ für Überstromauslöser ETU45B und ETU76B dient dazu, den kurzverzögerten Kurzschlussschutz abzuschalten.

With the setting t_{sd} = 0 s, the overcurrent releases ETU25B and ETU27B can provide an instantaneous short-circuit protection with an adjustable operate value which is smaller than the fixed operate value I_i.
The setting “OFF” for the overcurrent releases ETU45B and ETU76B is provided to deactivate the short-time-delay short-circuit protection.

Für einige Überstromauslöser besteht die Möglichkeit, auf eine I^2t-Charakteristik umzuschalten. → (Seite 9-27)

Some overcurrent releases can be switched over to an I^2t-characteristic. → (page 9-27)

Bei Verwendung der zeitverkürzten Selektivitätssteuerung (ZSI) → (Seite 9-27) in Schalterstellung "S" oder "S+G" wird der Wert für die Verzögerungszeit t_{sd} auf 50 ms gesetzt, wenn der Leistungsschalter im Kurzschlussfall kein Blockiersignal von einem nachgeordneten Leistungsschalter erhält. Er schaltet dann unabhängig vom eingestellten Wert für t_{sd} bereits nach 50 ms ab.

If the zone selective interlocking (ZSI) link → (page 9-27) is used, and the ZSI module is set to "S" or "S+G" the delay time t_{sd} is automatically set to 50 ms provided that in the event of short-circuit the circuit breaker does not receive a blocking signal from a downstream circuit breaker. In this case regardless of the adjusted t_{sd} value the circuit breaker will trip after 50 ms

Mit Blockiersignal gilt weiter die eingestellte Zeit t_{sd}. Zur Sicherheit wird nach höchstens 3 s das Blockiersignal beendet.

If a blocking signal exists the adjusted delay time t_{sd} is valid. For safety reasons after 3 s maximum the blocking signal is terminated.

Motorschutzfunktion

In der Schalterstellung t_{sd} = Ⓜ (0,02 s) wird eine spezielle Schutzfunktion für elektromotorische Antriebe eingeschaltet. Sie verhindert das Ansprechen der kurzverzögerten Kurzschlussauslösung auf die Einschaltstromspitze von Elektromotoren. Gleichzeitig wird ein Phasenausfallschutz aktiviert → (Seite 9-26) und die Zeitkonstante für die interne rechnerische Nachbildung des Erwärmungs- und Abkühlungsprozesses von Anlagenschutz auf Motorschutz umgeschaltet.

Motor protection function

In the circuit breaker position t_{sd} = Ⓜ (0.02 s), a special protection function for electromotive drives is activated. It prevents the short-time-delay short-circuit tripping from being activated during the peak inrush current of electric motors. At the same time, a phase failure protection is activated → (page 9-26) and the time constant for the internally calculated reproduction of the temperature-rise and cooling process is switched over from switchgear protection to motor protection.

Unverzögerte Kurzschlussauslösung – I-Auslösung

Die Überschreitung des Einstellwert I_i führt zu einer unverzögerten Abschaltung des Leistungsschalters.

Einstellwerte für I_i	
ETU15B	I_i = (2 / 3 / 4 / 5 / 6 / 7 / 8) x I_n
ETU25B, ETU27B	$I_i \geq 20$ x I_n (fest eingestellt) MAX = 50 kA
ETU45B	OFF [1)] I_i = (1,5 / 2,2 / 3 / 4 / 6 / 8 / 10 / 12) × I_n MAX = 0,8 x I_{CS}
ETU76B	I_i = 1,5 x I_n … 0,8 x I_{cs} ; OFF [1)] (Angabe in Ampere) MAX = 100 kA

1) Bei abgeschalteter I-Auslösung reduziert sich das Ausschaltvermögen des Leistungsschalters auf $I_{CS} = I_{CW}$.
Für die Überstromauslöser ETU45B und ETU76B ist es nicht möglich, gleichzeitig den kurzverzögerten Kurzschlussschutz, Einstellung t_{sd} = OFF, und den unverzögerten Kurzschlussschutz, I_i = OFF, abzuschalten!
Wird bei t_{sd} = OFF die Einstellung I_i = OFF ausgewählt, erfolgt intern automatisch eine Korrektur auf I_i = 1,5 x I_n.

Erdschlussauslösung – G-Auslösung

Ist der Überstromauslöser mit einem Erdschlussschutzmodul ausgestattet, können Verbraucher vor unzulässig hohen Erdschlussströmen geschützt werden.

	Erdschlussschutz → (Seite 9-68)	**ground-fault protection** → (page 9-68)
ETU15B, ETU25B	nicht verfügbar	not available
ETU27B	Standard: Bei symmetrischer Belastung der Außenleiter durch vektorielle Summenbildung der Ströme	Standard: vectorial summation of currents, if loading is balanced to ground
ETU45B, ETU76B	Bei symmetrischer Belastung der Außenleiter durch vektorielle Summenbildung der Ströme. Optional erhältlich: separater Wandler 1200 A :1 A	Vectorial summation of currents, if loading is balanced to ground Optional available: external current transformer 1200 A : 1 A

Der Ansprechwert I_g legt zusammen mit der Einstellung der Verzögerungszeit t_g die Abschaltung von Erdschlussfehlern fest.

Einstellwerte für Ansprechwert I_g		
	Baugröße	
	I / II	**III**
A	100 A	400 A
B	300 A	600 A
C	600 A	800 A
D	900 A	1000 A
E	1200 A	1200 A
OFF		

Einstellwerte für t_g	
ETU27B, ETU45B	t_g = 0,1 / 0,2 / 0,3 / 0,4 / 0,5 s
ETU76B	t_g = 0,1 … 0,5 s

Bei Schalterstellung „G“ oder „S+G“ am ZSI-Modul (zeitverzögerte Selektivitäts-Steuerung) → (Seite 9-27) wird der Wert für die Verzö-

Instantaneous short-circuit tripping – I-tripping

If the current setting I_i is exceeded, the circuit breaker is tripped instantaneously.

Current setting values for I_i	
ETU15B	I_i = (2 / 3 / 4 / 5 / 6 / 7 / 8) x I_n
ETU25B, ETU27B	$I_i \geq 20$ x I_n (fixed setting) MAX = 50 kA
ETU45B	OFF [1)] I_i = (1.5 / 2.2 / 3 / 4 / 6 / 8 / 10 / 12) × I_n MAX = 0.8 x I_{CS}
ETU76B	I_i = 1.5 x I_n … 0.8 x I_{cs} ; OFF [1)] (data in Amps) MAX = 100 kA

1) If the I-tripping is deactivated, the breaking capacity of the circuit breaker is reduced to $I_{CS} = I_{CW}$.
For the overcurrent releases ETU45B and ETU76B it is not possible to deactivate the short-time-delay short-circuit protection, setting t_{sd} = OFF, and the instantaneous short-circuit protection I_i = OFF at the same time!
If the setting I_i = OFF is selected with t_{sd} = OFF, there is an automatic internal correction to I_i = 1.5 x I_n.

Ground-fault tripping – G-tripping

If the overcurrent release is equipped with an ground-fault protection module, loads can be protected against impermissibly high ground-fault currents.

The pickup I_g, together with the setting for the time-delay t_g, determines the shutdown of ground-fault currents.

Setting values for pickup current I_g		
	Frame size	
	I / II	**III**
A	100 A	400 A
B	300 A	600 A
C	600 A	800 A
D	900 A	1000 A
E	1200 A	1200 A
OFF		

Setting values for t_g	
ETU27B, ETU45B	t_g = 0.1 / 0.2 / 0.3 / 0.4 / 0.5 s
ETU76B	t_g = 0.1 … 0.5 s

If the ZSI module (zone selective interlocking) → (page 9-27) is set to "G" or "S+G" the delay time t_g is automatically set to 100 ms pro-

gerungszeit t_g auf 100 ms gesetzt, wenn der Leistungsschalter im Erdschlussfall kein Blockiersignal von einem nachgeordneten Leistungsschalter erhält. Er schaltet dann unabhängig vom eingestellten Wert für t_g bereits nach 100 ms ab. Mit Blockiersignal gilt weiter die eingestellte Zeit t_g. Zur Sicherheit wird nach längstens 3 s das Blockiersignal beendet.

Für einige Überstromauslöser besteht die Möglichkeit, auf eine I^2t-Charakteristik umzuschalten. → (Seite 9-28)

vided that in the event of ground-fault the circuit breaker does not receive a blocking signal from a downstream circuit breaker. In this case regardless of the adjusted t_g value the circuit breaker will trip after 100 ms. If a blocking signal exists the adjusted delay time t_g is valid. For safety reasons after 3 s the blocking signal is terminated.

Some overcurrent releases can be switched over to an I^2t-characteristic. → (page 9-28)

Neutralleiterschutz – N-Auslösung

Die Überstromauslöser ETU27B,..45B und ..76B bieten die Möglichkeit, auch den Neutralleiter vor Überlast zu schützen. Dazu ist ein Stromwandler für den Neutralleiter erforderlich, der ggf. nachgerüstet werden kann. → (Seite 9-115)

Für die Auslösung gilt der gleiche Trägheitsgrad t_R, wie für die Überlastauslösung.

Einstellwerte für I_N	
ETU27B	$I_N = I_n$; OFF
ETU45B	$I_N = (0{,}5 / 1{,}0) \times I_n$; OFF
ETU76B	$I_N = (0{,}2 \ldots 2{,}0^{1)}) \times I_n$; OFF

1) Einstellwerte über 1,0 x I_n stehen nur für 3polige Schalter zur Verfügung.

Neutral conductor protection – N-tripping

The overcurrent releases ETU27B, ..45B, and ..76B offer the possibility to protect the neutral conductor against overload, too. This requires a current transformer for the neutral conductor, which can be retrofitted if necessary. → (page 9-115)

As for tripping, the same time-lag class t_R applies as for overload tripping.

Setting values for I_N	
ETU27B	$I_N = I_n$; OFF
ETU45B	$I_N = (0.5 / 1.0) \times I_n$; OFF
ETU6B	$I_N = (0.2 \ldots 2.0^{1)}) \times I_n$; OFF

1) Current settings above 1.0 x I_N are only available for 3-pole circuit breakers.

VORSICHT		**CAUTION**
Einstellwerte $I_N > 1 \times I_n$ nur bei entsprechender Dimensionierung des N-Leiters verwenden!		Setting values $I_N > 1 \times I_n$ should only be used if the neutral conductor has been sufficiently dimensioned.

9.1.9.2 Weitere Funktionen

Lastüberwachung („Lastaufnahme / Lastabwurf“)

Die Überstromauslöser ETU45B und ETU76 B bieten die Möglichkeit, den Laststrom zusätzlich zu überwachen. Es lassen sich zwei Stromwerte, „Lastabwurf“ und „Lastaufnahme“, und eine Verzögerungszeit t_x einstellen.

Bei Unterschreiten des Einstellwertes „Lastaufnahme“ und gleichzeitigem Überschreiten des unteren Grenzwertes der Stromübertragung wird nach Ablauf der eingestellten Verzögerungszeit t_x über den **Cubicle**BUS eine Meldung ausgegeben. Bei Überschreiten des Einstellwertes „Lastabwurf“ wird nach Ablauf der eingestellten Verzögerungszeit t_x über den **Cubicle**BUS eine Meldung ausgegeben. Diese Meldungen können zum Zu- bzw. Abschalten von Verbrauchern genutzt werden. Damit lassen sich z. B. Überlastauslösungen von Einspeiseschaltern vorbeugend vermeiden.

Einstellwerte für Lastüberwachung	
„Lastabwurf“ und „Lastaufnahme“	40 A … 1,5 x I_R
Verzögerungszeit	t_x = 1 … 15 s

Die Einstellung der Lastüberwachung kann erfolgen über:

- das alphanumerisches Display (ETU45B)
- das Grafikdisplay (ETU76B)
- die Prüfbuchse mit dem BDA
- den PROFIBUS-DP mit einem PC und der Software „powerconfig“ → (Seite 27-3)
- den Modbus mit einem PC und dafür vorgesehener Software

9.1.9.2 Additional functions

Load monitoring (load restore / load shedding)

The overcurrent releases ETU45B and ETU76B offer the possibility of additional load monitoring. Two current values, “load shedding” and “load restore”, as well as a delay time t_x, can be set.

If the actual load falls below the setting “load restore” but simultaneously exceeds the “minimum of communicated currents” parameter a signal is generated through the **Cubicle**BUS after the set delay time t_x has elapsed. Also if the the actual load exceeds the setting “load shed” a signal is generated through the **Cubicle**BUS after the delay time t_x has elapsed. These signals can be used to connect or disconnect loads, thereby preventing an overload tripping of incoming circuit breakers.

Setting values for load monitoring	
“Load shedding” and “load restore”	40 A … 1.5 x I_R
Delay time	t_x = 1 … 15 s

Load monitoring can be adjusted through:

- the alphanumeric display (ETU45B)
- the graphical display (ETU76B)
- the test socket with the BDA
- the PROFIBUS-DP with a PC and the software „powerconfig” → (page 27-2)
- the Modbus with a PC and software

Voreilende Meldung „L-Auslösung“

Die Überstromauslöser ETU45B und ETU76B stellen eine voreilende Meldung „L-Auslösung“ bereit. Diese wird 100 ms vor der Überlastauslösung über den **Cubicle**BUS ausgegeben. Damit können z.B. Thyristor-Regelgeräte abgesteuert werden. Die Meldung erfolgt auch wenn der Schalter über den internen Selbsttest ausgelöst wird.

Phasenausfallschutz

Beim Überstromauslöser ETU76B kann der Phasenausfallschutz auch eingeschaltet werden, wenn der Motorschutz → (Seite 9-23) nicht aktiviert ist.

Ist bei aktiviertem Phasenausfallschutz der Betriebsstrom der am niedrigsten belasteten Phase um 50 % kleiner als der Betriebsstrom der am höchsten belasteten Phase, so wird der Einstellwert I_R automatisch auf 80 % reduziert. Unterscheiden sich die Werte der drei Phasenströme um weniger als 50 %, so gilt wieder der Einstellwert I_R.

Thermisches Gedächtnis ein- / ausschaltbar

Die Überstromauslöser ETU45B und ETU76B bieten die Möglichkeit, die interne rechnerische Nachbildung der thermischen Prozesse in nachgeordneten Anlagen und Verbrauchern auch dann fortzusetzen, wenn der Leistungsschalter ausgeschaltet und keine externe Spannungsversorgung der Elektronik gegeben ist. Damit kann auch bei häufigen Ein- und Ausschaltvorgängen und wechselnder Belastung ein wirksamer Schutz vor thermischer Überlastung gewährleistet werden.

Verhalten im Überlastbereich:

- oberhalb von 1,125 x I_R erfolgt eine streng monotone Erwärmung gemäss Kennlinie

Verhalten im Nennstrombereich:

- unterhalb von 1,125 x I_R erfolgt keine Erwärmung
- es erfolgt eine Abkühlung nach Exponentialfunktion mit einer Zeitkonstanten von 18 x t_R für Anlagenschutz bzw. 10 x t_R für Motorschutz

Verhalten bei _ParaSwitchTherm = EIN:

Bei eingeschaltetem Thermischen Gedächtnis wird die thermischen Vorgeschichte berücksichtigt:

- nach einer Auslösung werden die thermischen Speicher der Phasen mit dem auf 90 % reduzierten Wärmeequivalent der wärmsten Phase vorbesetzt (Ermöglichen des Wiedereinschaltens)
- Abkühlung nach Exponentialfunktion mit einer Zeitkonstanten von 18 x t_R für Anlagenschutz bzw. 10 x t_R für Motorschutz.

Bei eigenversorgten Auslösern wird in der Phase der Deaktivierung die Abkühlung bei Re-Aktivierung für eine Zeitspanne von max. 60 min. softwaremässig nachempfunden, so dass sich für fremd- und eigenversorgte Auslöser annähernd gleiche Auslösezeiten ergeben.

Verhalten bei _ParaSwitchTherm = AUS:

Bei abgeschaltetem Thermischen Gedächtnis wird die thermische Vorgeschichte nicht berücksichtigt:

- der Auslöser startet bei Aktivierung immer mit Wärmespeicher NULL

Leading signal “L-tripping”

The overcurrent releases ETU45B and ETU76B provide a leading signal "L-tripping", which is transmitted through the **Cubicle**BUS 100 ms before overload tripping. In this way it is possible e.g. to disconnect thyristor controllers. The signal is also provided even if the circuitbreaker is released about the internal self-test.

Phase failure protection

In overcurrent release ETU76B, the phase failure protection can also be activated if the motor protection → (page 9-23) is not activated.

If the phase failure protection is activated and the operating current of the lowest loaded phase is 50% smaller than the operating current of the highest loaded phase, the setting value I_R is automatically reduced to 80%. If the values of the three phase currents differ by less than 50%, the setting I_R applies again.

Thermal memory can be switched On/Off

Overcurrent releases ETU45B and ETU76B offer the possibility to continue with the internally calculated reproduction of the thermal processes in downstream switchgear and consumers even if the circuit breaker is open and the electronic system has no external supply. In this way, an effective protection against thermal overload can be guaranteed for frequent closing and opening processes, too.

Behaviour in the overload range:

- above 1.125 x I_R a strictly monotonic warming according to the overload characteristics takes place

Behaviour in the nominal current range:

- under 1.125 x I_R no warming takes place
- cooling down according to an exponential function with a time constant of 18 x t_R and 10 x t_R for switchgear protection and motor protection respectively

Behaviour with _ParaSwitchTherm = ON:

If the thermal memory is activated the thermal prehistory will be taken into account:

- after a trip the thermal memories of the phases will be set to 90% of the thermal equivalent of the warmest phase (enable re-closing)
- cooling down according to an exponential function with a time constant of 18 x t_R and 10 x t_R for switchgear protection and motor protection respectively

Trip units not connected to an external power supply will calculate the cooling down after re-closure of the circuit breaker for a maximum period of 60 minutes. Thus trip unit powered from CTs or an external source will show a similar behaviour as regards tripping times.

Behaviour with _ParaSwitchTherm = OFF:

If the thermal memory is deactivated the thermal prehistory will not be taken into account:

- on start-up the thermal memory is set to zero

- nach einer Auslösung werden die thermischen Speicher der Phasen auf NULL gesetzt

Aktivieren des thermischen Gedächtnisses kann erfolgen über:

- einen Schiebeschalter (ETU45B)



- das Grafikdisplay (ETU76B)
- die Prüfbuchse mit dem BDA (ETU76B)
- den PROFIBUS-DP mit einem PC und der Software „powerconfig“ → (Seite 27-3) (ETU76B).
- den Modbus mit einem PC und zusätzlicher Software

Zeitverzögerte Selektivitäts-Steuerung (ZSI)

Die Kombination des Leistungsschalters mit einem ZSI-Modul → (Seite 9-103) erlaubt es, in Schaltanlagen mit mehreren Staffelebenen einen auftretenden Kurzschluss genau zu lokalisieren.

Dazu werden alle Leistungsschalter über ihre ZSI-Module miteinander verbunden.

Im Kurz- und/oder Erdschlussfall fragt jeder vom Kurzschlussstrom durchflossene Leistungsschalter die ihm direkt nachgeordneten Leistungsschalter ab, ob der Kurz- und/oder Erdschluss auch in der nächsten untergeordneten Staffelebene auftritt. Es löst nur der, in Energieflussrichtung gesehen, nächstgelegene, dem Kurz- und/oder Erdschluss vorgeordnete Leistungsschalter aus.

Eine eingestellte Verzögerungszeit t_{sd} für die Kurzschlussauslösung wird auf 50 ms gesetzt bei Schalterstellung am ZSI-Modul „S“ oder „S+G“, wenn der Leistungsschalter im Kurzschlussfall kein Blockiersignal ZSI-IN von einem nachgeordneten Leistungsschalter erhält. Bei einem erkannten Kurzschluss wird ein Blockiersignal ZSI-OUT an die vorgeordneten Leistungsschalter ausgegeben.
Die Kurzschlussauslösung erfolgt jedoch frühestens nach 50 ms, typisch sind 80 … 90 ms.

Eine eingestellte Verzögerungszeit t_g für die Erdschlussauslösung wird auf 100 ms gesetzt bei Schalterstellung am ZSI-Modul „G“ oder „S+G“, wenn der Leistungsschalter im Erdschlussfall kein Blockiersignal ZSI-IN von einem nachgeordneten Leistungsschalter erhält. Bei einem erkannten Erdschluss wird ein Blockiersignal ZSI-OUT an die vorgeordneten Leistungsschalter ausgegeben. Die Erschlussauslösung erfolgt jedoch frühestens nach 100 ms, typisch sind 130 ... 140 ms.

Zur Sicherheit wird nach längstens 3 s ein ausgegebenes Blockiersignal ZSI-OUT beendet.

Überlastschutz umschaltbar auf I^4t

Die Überstromauslöser ETU45B und ETU76B bieten die Möglichkeit, für den Überlastschutz mittels Schiebeschalter von der I^2t- auf eine I^4t-abhängige Funktion umzuschalten. Damit wird die Selektivität des Überlastschutzes in Kombination mit Sicherungen verbessert.

In diesem Fall ändern sich die Einstellmöglichkeiten für den Trägheitsgrad t_R wie folgt:

Einstellwerte für t_R	
ETU45B	t_R = 1 / 2 / 3 / 4 / 5 s (bei 6 x I_n)

- after a trip the thermal memories of the phases will be set to zero

The thermal memory can be activated through:

- a slide switch (ETU45B)



- the graphical display (ETU76B)
- the test socket with the BDA (ETU76B)
- the PROFIBUS-DP with a PC and the software „powerconfig" → (page 27-2) (ETU76B).
- the Modbus with a PC and additional software

Zone selective interlocking (ZSI)

If the circuit breaker is combined with a ZSI-module → (page 9-103), a short-circuit occurring in systems with several grading levels can be localised precisely.

For this purpose, all circuit breakers are interconnected via their ZSI-modules.

When a short-circuit or ground-fault occurs, each circuit breaker affected by the short-circuit or ground-fault current queries its downstream circuit breaker to determine whether the short-circuit or ground-fault is present in the next downstream grading level. In the direction of the energy flow, only the circuit breaker nearest to the short-circuit or ground-fault in the upstream direction is tripped.

A possible delay time setting t_{sd} for the short-circuit tripping is set to 50 ms if "S" or "S+G" is selected on the ZSI module and if in the event of short-circuit the circuit breaker does not receive a blocking signal ZSI-IN sent from its downstream circuit breaker. In case of a detected short-circuit a blocking signal ZSI-OUT will be sent to the preceeding circuit breakers.
The trip does take place after at least 50 ms. It typically delays between 80 and 90 ms.

A possible delay time setting t_g for the ground-fault tripping is set to 100 ms if "G" or "S+G" is selected on the ZSI module and if in the event of ground-fault the circuit breaker does not receive a blocking signal ZSI-IN sent from its downstream circuit breaker.
In case of a detected ground-fault a blocking signal ZSI-OUT will be sent to the preceeding circuit breakers. The trip does take place after at least 100 ms. It typically delays between 130 and 140 ms.

For safety reason after a maximum delay time of 3 s a given blocking signal ZSI-OUT is terminated.

Overload protection switchable to I^4t

The overcurrent releases ETU 45B and ETU76B offer the possibility to switch over from the I^2t to an I^4t inverse-time function for the overload protection by means of a slide switch. This improves the selectivity of the overload protection in combination with fuses.

In this case, the setting possibilities for the time-lag class t_R change as follows:

Setting values for t_R	
ETU45B	t_R = 1 / 2 / 3 / 4 / 5 s (at 6 x I_n)

Überlastschutz abschaltbar

Beim Überstromauslöser ETU76B ist es möglich, den Überlastschutz abzuschalten. Das kann z. B. erforderlich sein, wenn die Einspeisung der Anlage durch einen Generator erfolgt.

Die Abschaltung kann erfolgen über:

- das Grafikdisplay
- die Prüfbuchse mit dem BDA
- den PROFIBUS-DP mit einem PC und der Software „powerconfig“ → (Seite 27-3)
- den Modbus mit einem PC und zusätzlicher Software

Switching off overload protection

On overcurrent release ETU76B it is possible to switch off the overload protection. This might be necessary e.g. if the system is fed by a generator.

Switching off can be effected through:

- the graphical display
- the test socket with the BDA
- the PROFIBUS-DP with a PC and the software "powerconfig". → (page 27-2)
- the Modbus with a PC and additional software

VORSICHT	CAUTION
Bei Abschaltung der Überlastschutzfunktion ist sicherzustellen, dass keine Überlastfälle eintreten können. Eine thermische Zerstörung des Schaltgerätes, der Anlage oder des Verbrauchers wären die Folge. Auftretende Überlastfälle können in diesem Fall nur bei Überschreiten der Ansprechwerte für die Kurzschlussschutzfunktion (verzögert oder unverzögert) durch Auslösung abgeschaltet werden. Diese Ansprechwerte sind entsprechend anzupassen.	When deactivating the overload protection, it has to be ensured overloads will not occur. Otherwise, thermal destruction of the circuit-breaker, the switchgear or the consumer load could result. In these cases occurring overloads can only be handled by the short time and instantaneous protection. The pick-up values need to be adjusted accordingly.

Kurzverzögerter Kurzschlussschutz umschaltbar auf I^2t

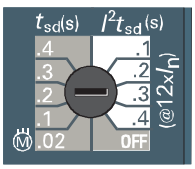
Die Überstromauslöser ETU45B und ETU76B bieten die Möglichkeit, von einer konstanten Verzögerungszeit auf eine I^2t -Kennlinie umzuschalten. Dadurch wird die Verzögerungszeit bei konstantem I^2t_{sd}-Wert abhängig vom Kurzschlussstrom und es kann eine bessere Selektivität mit nachgeschalteten Sicherungen erreicht werden.

In diesem Fall ändern sich die Einstellmöglichkeiten für den Trägheitsgrad wie folgt:

Einstellwerte für t_{sd}	
ETU45B, ETU76B	t_{sd} = 0,1 / 0,2 / 0,3 / 0,4 s (bei 12 x I_n)

Die Umschaltung auf die I^2t_{sd}-abhängige Kennlinie kann erfolgen über:

- den t_{sd}-Drehkodierschalter (ETU45B); diesen auf einen Wert im weiß gekennzeichneten Bereich stellen.



- das Grafikdisplay (ETU76B)
- die Prüfbuchse mit dem BDA (ETU76B)
- den PROFIBUS-DP mit einem PC und der Software „powerconfig“ → (Seite 27-3) (ETU76B).
- den Modbus mit einem PC und zusätzlicher Software

Erdschlussschutz umschaltbar auf I^2t-Kennlinie

Die Erdschlussschutzmodule für die Überstromauslöser ETU45B und ETU76B bieten die Möglichkeit, von einer konstanten Verzögerungszeit auf eine I^2t-Kennlinie umzuschalten.

Dadurch erhält man eine Auslösekennlinie mit stromabhängiger Verzögerungszeit bei konstantem I^2t_g-Wert und kann in Schaltan-

Short-time-delay short-circuit protection switchable to I^2t

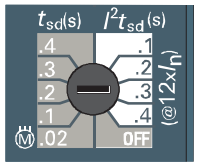
The overcurrent releases ETU 45B and ETU76B offer the possibility to switch over from a constant time delay to an I^2t-characteristic. In this way, the time delay depends on the short-circuit current, but with a constant I^2t_{sd}-value, providing a better selectivity with downstream fuses.

In this case, the setting possibilities for the time-lag class change as follows:

Setting values for t_{sd}	
ETU45B, ETU78B	t_{sd} = 0.1 / 0.2 / 0.3 / 0.4 s (at 12 x I_n)

Switchover to the I^2t_{sd}-characteristic can be made through:

- the t_{sd} rotary coding switch (ETU45B); which must be set to a value in the white area.



- the graphical display (ETU76B)
- the test socket with the BDA (ETU76B)
- the PROFIBUS-DP with a PC and the software "powerconfig" → (page 27-2) (ETU76B).
- the Modbus with a PC and additional software

Ground-fault protection switchable to I^2t characteristic

The ground-fault protection modules for the overcurrent releases ETU45B and ETU76B offer the possibility to switch over from a constant delay time to an I^2t-characteristic.

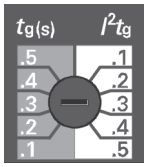
This provides an inverse-time tripping characteristic with a constant I^2t_g-value, providing better selectivity of the ground-fault protection

lagen mit mehreren Staffelebenen eine bessere Selektivität des Erdschlussschutzes erzielen.

Die Einstellbereiche für die Verzögerungszeit bleiben unverändert.

Die Umschaltung auf die I^2t_g-abhängige Kennlinie kann erfolgen über:

- den t_g-Drehkodierschalter (ETU45B); diesen auf einen Wert im weiß gekennzeichneten Bereich stellen.



- das Grafikdisplay (ETU76B)
- die Prüfbuchse mit dem BDA (ETU76B)
- den PROFIBUS-DP mit einem PC und der Software „powerconfig“ → (Seite 27-3) (ETU76B).
- den Modbus mit einem PC und zusätzlicher Software

Erdschlussalarm

→ Erdschlussschutz (Seite 9-68)

Umschaltbare Parametersätze

Der Überstromauslöser ETU76B gestattet die Speicherung von zwei unterschiedlichen Parametersätzen für die Schutzfunktionen.

Damit ist es möglich, beim Umschalten auf eine andere Einspeisung auch anderen Schutzbedürfnissen Rechnung zu tragen.

Die Umschaltung kann erfolgen manuell über:

- das Grafikdisplay
- die Prüfbuchse mit dem BDA
- den PROFIBUS-DP mit einem PC und der Software „powerconfig“ → (Seite 27-3)

oder automatisiert über:

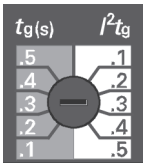
- den PROFIBUS-DP
- den Modbus mit einem PC und zusätzlicher Software
- den **Cubicle**BUS mit einem Eingangssignal am digitalen Eingangsmodul.

in system with several grading levels.

The setting options for the delay time remain unchanged.

Switchover to the I^2t_g-characteristic can be made through:

- the t_g rotary coding switch (ETU45B); this must be set to a value in the white area



- the graphical display (ETU76B)
- the test socket with the BDA (ETU76B)
- the PROFIBUS-DP with a PC and the software "powerconfig" → (page 27-2) (ETU76B).
- the Modbus with a PC and additional software

Ground-fault alarm

→ Ground-fault protection (page 9-68)

Changeable parameter sets

The overcurrent release ETU76B enables the storage of two different parameter sets for protective functions.

This enables changeover to new protection settings whenever there is a transfer to another supply source.

Switchover can be made manually through:

- the graphical display
- the test socket with the BDA
- the PROFIBUS-DP with a PC and the software "powerconfig" → (page 27-2)

or automatically via:

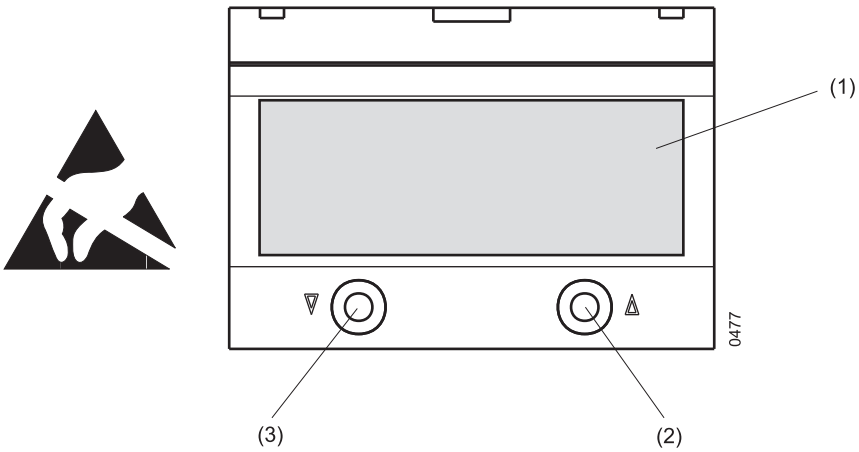
- the PROFIBUS-DP
- the Modbus with a PC and additional software
- the **Cubicle**BUS with an input signal at the digital input module.

9.1.10 Displays

Alphanumerisches Display bei ETU45B

Das alphanumerische Display steht optional für die Überstromauslöser vom Typ ETU45B zur Verfügung.

Aufbau



(1) Bildschirm (4 Zeilen à 20 Zeichen)
(2) Taste Nach-oben
(3) Taste Nach-unten

Nachrüsten

Der Überstromauslöser ETU45B kann nachträglich mit einem alphanumerischen Display ausgestattet werden.

GEFAHR

Gefährliche elektrische Spannung!

Kann Tod, schwere Personenschäden sowie Schäden an Geräten und Ausrüstung bewirken.

Vor dem Arbeiten an diesem Gerät, Anlage unbedingt spannungsfrei schalten.



- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Externe Spannungsversorgung 24 V DC ausschalten, sofern vorhanden
- Plombierhaube des Überstromauslösers entfernen, sofern vorhanden → (Seite 9-78)

9.1.10 Displays

Alphanumeric display of ETU45B

The alphanumeric display is available as an option for overcurrent releases of the types ETU45B.

Design

(1) Screen (4 lines with 20 characters each)
(2) Up-key
(3) Down-key

Retrofitting

The overcurrent release ETU45B, can be retrofitted with an alphanumeric display.

DANGER

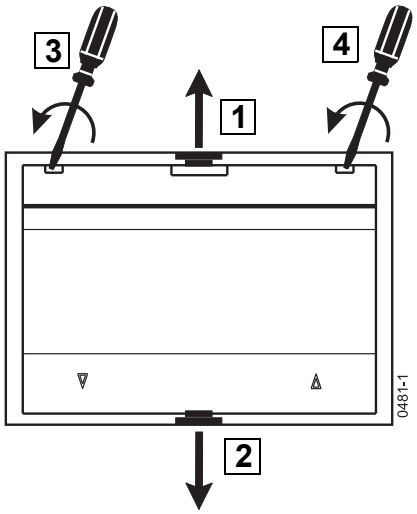
Hazardous voltage!

Will cause death, serious personal injury, or equipment / property damage.

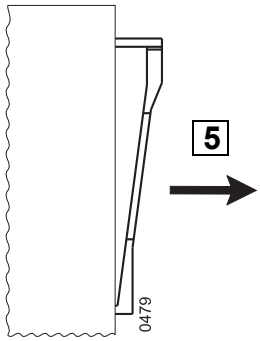
Disconnect power before working on this equipment.

- Switch off and discharge the storage spring → (page 24-3)
- Switch off external 24 V DC voltage supply, if applicable
- Remove sealing cap of overcurrent release, if applicable → (page 9-78)

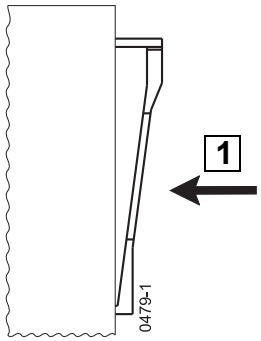
Blindabdeckung ausbauen



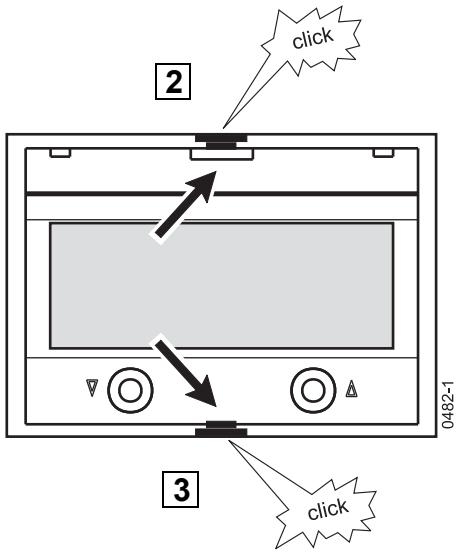
Removing dummy flange



Display einsetzen und einrasten



Installing display and latching it tight



- Die Anzeige kann auch nach oben geneigt eingesetzt werden! Die Tasten sind dann über der Anzeige
- Plombierhaube des Überstromauslösers ggf. aufsetzen und plombieren → (Seite 9-78)
- Externe Spannungsversorgung 24-V-DC einschalten, sofern vorhanden

- The display may be inserted inclined upwards with buttons above the display!
- Fit and seal trip unit sealing cap, if applicable, → (page 9-78)
- Switch on external 24 V DC voltage supply, if applicable

Ändern der Einbaulage

Werksseitig wird das alphanumerische Display nach unten geneigt eingebaut. Es kann jedoch um 180° gedreht werden. Danach ist das Display nach oben geneigt.

Modifying the displays inclination

At the factory, the alphanumeric display is installed with a downward inclination. However, it can be turned by 180°; the display is then inclined upwards.

GEFAHR

Gefährliche elektrische Spannung!

Kann Tod, schwere Personenschäden sowie Schäden an Geräten und Ausrüstung bewirken.

Vor dem Arbeiten an diesem Gerät, Anlage unbedingt spannungsfrei schalten.



DANGER

Hazardous voltage!

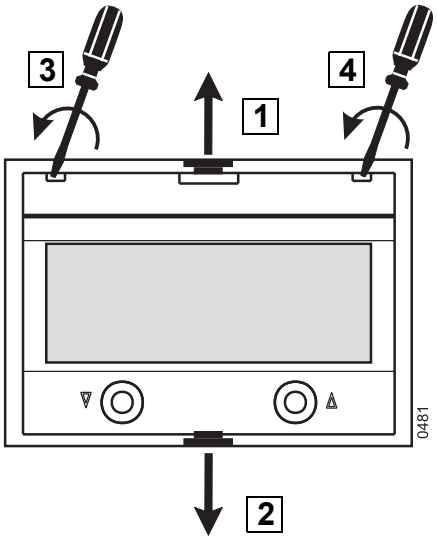
Will cause death, serious personal injury, or equipment / property damage.

Disconnect power before working on this equipment.

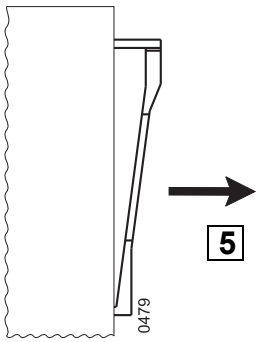
- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Externe Spannungsversorgung 24 V DC ausschalten, sofern vorhanden
- Plombierhaube des Überstromauslösers entfernen, sofern vorhanden → (Seite 9-78)

- Switch off and discharge the storage spring → (page 24-3)
- Switch off external 24 V DC voltage supply, if applicable
- Remove trip unit sealing cap, if applicable → (page 9-78)

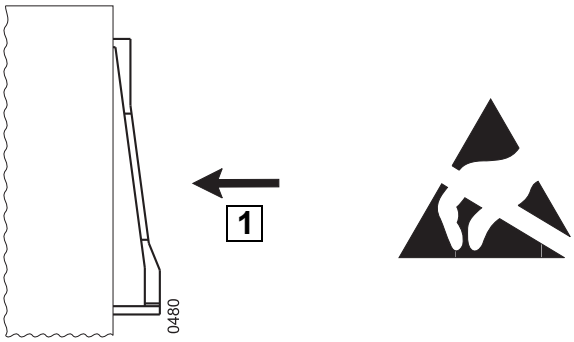
Display ausbauen



Removing the display

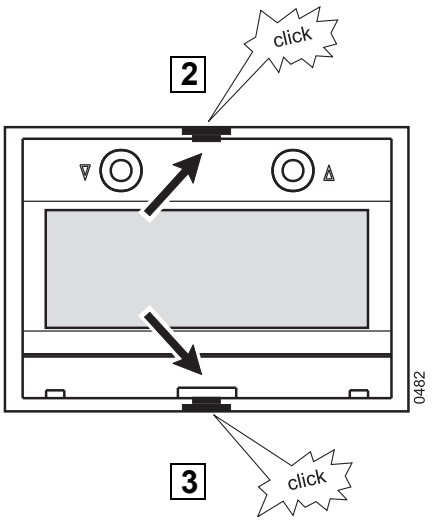


Display um 180° gedreht einsetzen und einrasten



- Plombierhaube des Überstromauslösers ggf. aufsetzen und plombieren → (Seite 9-78)
- Externe Spannungsversorgung 24-V-DC einschalten, sofern vorhanden

Installing the display turned by 180° and latching it tight



- Fit and seal the trip unit sealing cap, if applicable → (page 9-78)
- Switch on external 24 V DC voltage supply, if applicable

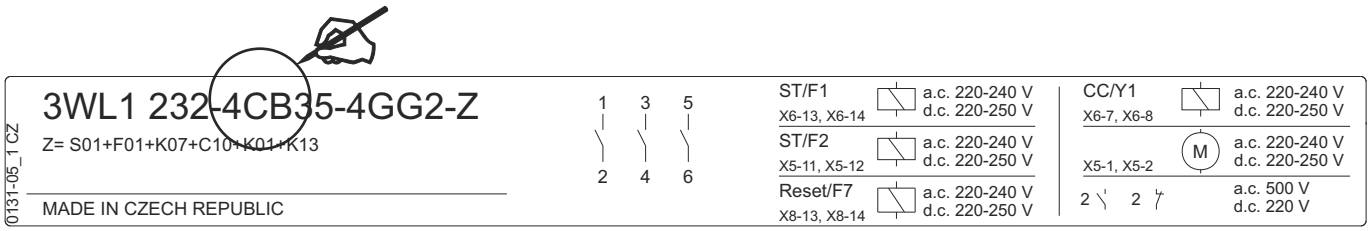
Schilder aktualisieren

Updating the options label

Hinweis	Note
Nach dem Einbau zusätzlicher Komponenten sind folgende Angaben mit einem weißen Permanentstift bzw. mit Aufklebern aus dem beiliegenden Etikettenbogen zu aktualisieren! Davor ist es ggf. notwendig die zu korrigierenden Zeichen mit einem schwarzen Permanentstift zu füllen.	After installing additional components, add the following data using a white and indelible ink pen or the appropiate label from the set of labels supplied! If necessary the signs which need to be corrected have to be filled with a black permanent pen before.

Ausstattungsschild des Leistungsschalters

Options label of the circuit breaker



	Bestell-Nr. Order no.	9. Stelle ändern Modify 9th position
Alphanumerisches Display für ETU45B Alphanumeric display for ETU45B	3WL9111-0AT81-0AA0	F

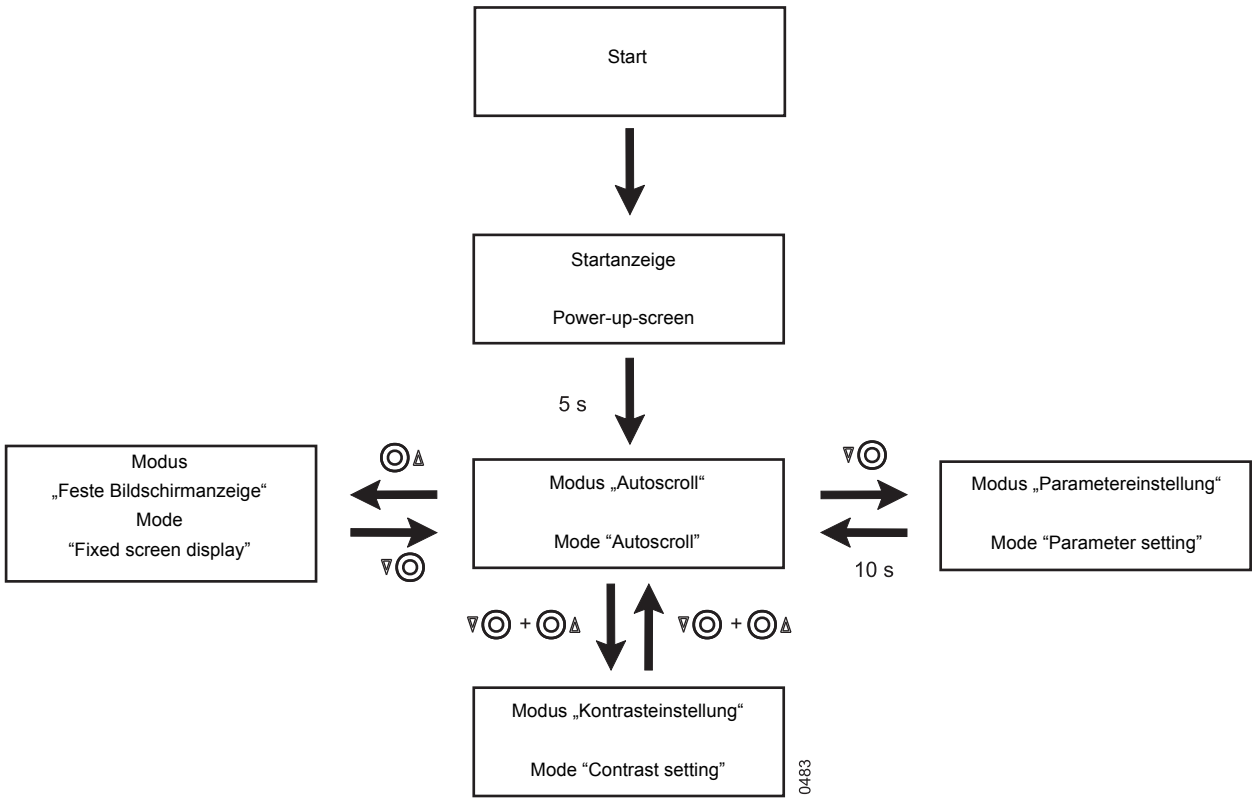
Menüstruktur ETU45B

Nach dem Anlegen der Versorgungsspannung wechselt die Displaydarstellung nach ca. 5 s von der Startanzeige in den Autoscroll-Modus. Von dort aus kann mit Hilfe der beiden Tasten in weitere Modi verzweigt werden.

Menu structure ETU45B

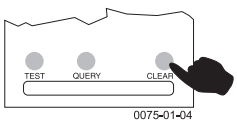
After the supply voltage has been applied, the display changes from “Power-up screen” to “Autoscroll” mode after about 5 s. Thereafter, further modes can be accessed by means of the two buttons.

Übersicht / Overview



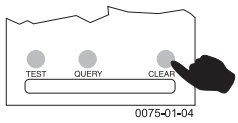
Modus „Autoscroll“

Im normalen Betrieb befindet sich das Display im Autoscroll-Modus.

Um in den Modus „Autoscroll“ zu gelangen, folgende Taste(n) drücken:	
Im Modus „Feste Bildschirmanzeige“	▽◎
Im Modus „Zähler Auslösungen zurücksetzen“	▽◎ oder ◎△
Im Modus „Kontrasteinstellung“	▽◎ + ◎△
Im Modus „Parametereinstellung“	10 Sekunden keine Taste drücken
Im Modus „Info Auslösungen“	

“Autoscroll” mode

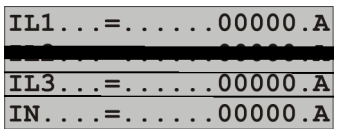
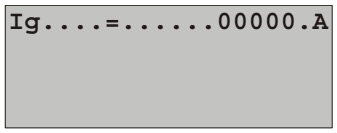
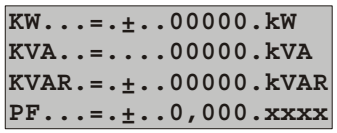
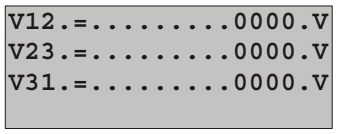
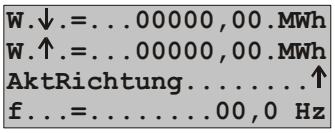
During normal operation, the display is in “Autoscroll” mode

To access Autoscroll mode, press the following button(s)	
In mode “Fixed screen display”	▽◎
In mode “Tripping counter reset”	▽◎ or ◎△
In mode “Contrast setting”	▽◎ + ◎△
In mode “Parameter setting”	Do not press any button for 10 seconds
In mode “Tripping info”	

In diesem Modus wird automatisch alle 5 Sekunden zum nächsten Screen gewechselt.

Ist kein Messmodul installiert, wechselt die Anzeige ständig zwischen den Screens 1 und 2.

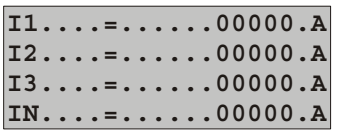
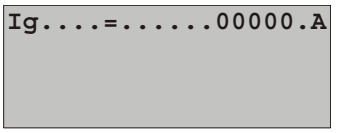
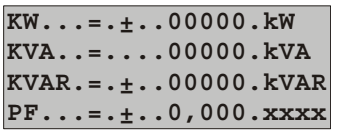
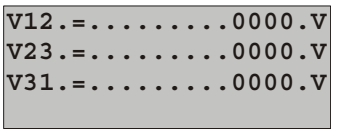
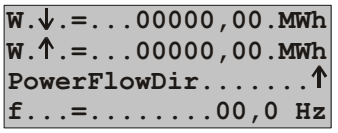
Ist ein Messmodul installiert, werden im Autoscroll-Modus insgesamt fünf Screens angezeigt.

Angezeigte Screens im Modus „Autoscroll“	
ohne Messmodul	
Screen 1  	Strom I_{L1} Strom I_{L2} Strom I_{L3} Strom I_N
Screen 2  	Erdschlussstrom I_g (Es wird nur dann ein Wert angezeigt, wenn ein Erdschlussschutzmodul eingebaut ist.)
bei eingebautem Messmodul zusätzlich	
Screen 3  	Wirkleistung P Scheinleistung S Blindleistung Q Leistungsfaktor
Screen 4  	Spannung U_{12} Spannung U_{23} Spannung U_{31}
Screen 5  	Energie (positive Richtung) Energie (negative Richtung) Aktuelle Energieflussrichtung Frequenz

In this mode, the display automatically changes to the next screen every 5 seconds.

If there is no metering module available, the display changes continuously between the screens 1 and 2.

If there is a metering module available, a total of five screens are displayed in “Autoscroll” mode.

Screens displayed in the “Autoscroll” mode	
without metering module	
Screen 1  	Current I_1 Current I_2 Current I_3 Current I_N
Screen 2  	Ground-fault current I_g (A value is only displayed if an ground-fault protection module is fitted.)
with metering module installed, additionally	
Screen 3  	Active power P Apparent power S Reactive power Q Power factor
Screen 4  	Voltage U_{12} Voltage U_{23} Voltage U_{31}
Screen 5  	Energy (positive direction) Energy (negative direction) Present direction of energy flow Frequency

HINWEIS	**NOTICE**
Beim erneuten Aufbau einer Bildschirmseite werden die anzuzeigenden Daten stets aktualisiert. Während der Darstellung einer Bildschirmseite erfolgt keine Aktualisierung.	The data to be displayed are updated every time the screen page is set up again. No updates take place when a screen page is being displayed.

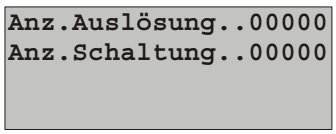
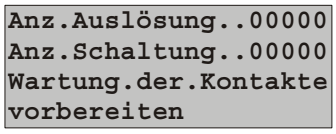
Tastenfunktionen im Modus „Autoscroll“	
	Anzeige wird eingefroren; Wechsel in den Modus „Feste Bildschirmanzeige“
	Wechsel in den Modus „Parametereinstellung“
	Wechsel in den Modus „Kontrasteinstellung“

Button functions in the “Autoscroll” mode	
	Display is frozen Switchover to mode “Fixed screen display”
	Change to mode “Parameter setting”
	Change to mode “Contrast setting”

Modus „Feste Bildschirmanzeige“

Um in den Modus „Feste Bildschirmanzeige“ zu gelangen, folgende Taste drücken:	
Im Modus „Autoscroll“	

In diesem Modus werden Wartungsinformationen mit der Anzahl der Auslösungen und Schaltungen des Leistungsschalters sowie mit Wartungshinweisen angezeigt. Die angezeigten Informationen hängen von der Anzahl der Auslösungen des Leistungsschalters ab.

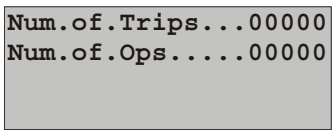
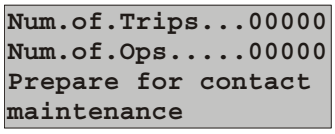
	Anzahl der Auslösungen Anzahl der Schaltungen
	Anzahl der Auslösungen Anzahl der Schaltungen Wartungshinweise

Tastenfunktionen im Modus „Feste Bildschirmanzeige“	
	Wechsel in den nächsthöheren Screen
	Wechsel in den Modus „Autoscroll“
Wenn Screen 6 angezeigt wird 	Wechsel in den Modus „Zähler Auslösungen zurücksetzen“

Mode “Fixed screen display”

To access “Fixed screen display” mode, press the following button:	
In “Autoscroll” mode	

In this mode, maintenance information is provided with the number of circuit breaker trips and switching operations as well as with maintenance instructions. The information displayed depends on the number of circuit breaker trips operations.

	Number of tripping operations Number of switching operations
	Number of tripping operations Number of switching operations Maintenance instructions

Button functions in mode “Fixed screen display”	
	Change to next higher screen level
	Change to “Autoscroll” mode
If screen 6 is displayed 	Change to mode “Tripping counter reset”

Untermodus „Zähler Auslösungen zurücksetzen“

Dieser Modus bietet die Möglichkeit, den Zähler für die Auslösungen und Schaltungen auf den Wert Null zurückzusetzen.

Submode “Tripping counter reset”

This mode offers the possibility to reset the counter for the trips and the switching operations to zero.

VORSICHT	CAUTION
Das Zurücksetzen des Zählers sollte nur erfolgen, nachdem die Kontakte gewartet wurden. Wird der Zähler zurückgesetzt, ohne dass die Kontakte gewartet wurden, stimmen die angezeigten Wartungsinformationen nicht mehr mit dem tatsächlichen Zustand der Kontakte überein.	If the counter is reset without contact maintenance having been performed, the maintenance information displayed will not correspond to the actual condition of the contacts. This can destroy the contacts.

Um in den Modus „Zähler zurücksetzen“ zu gelangen, folgende Taste(n) drücken:	
Im Modus „Feste Bildschirmanzeige“, wenn Screen 6 angezeigt wird	▽ ◎ + ◎ △

To access “Tripping counter reset mode”, press the following button(s)	
In the mode “Fixed screen display”, when screen 6 is displayed	▽ ◎ + ◎ △

Angezeigte Screens im Modus „Zähler Auslösungen zurücksetzen“	

Screen 1
`Zähler.f.Auslösg.und`
`Schaltg.rücksetzen?`
`ja:.↑+↓`
`nein:.↑.oder.↓`
	Dieser Screen dient als Sicherheitsabfrage.
	Das Rücksetzen des Zählers nur nach Wartung der Kontakte durchführen!

Screen 2
`Zähler.f.Auslösg.und`
`Schaltg`
`zurückgesetzt`
`weiter:.↑.oder.↓`
	Das Rücksetzen der Zähler für die Auslösungen und Schaltungen wird bestätigt.

Screens displayed in mode “Tripping counter reset”	

Screen 1
`Reset.Trips.and.Ops`
`Counter?`
`yes:.↑+↓`
`no:.↑.or.↓`
	This screen is used for safety queries.
	Reset the counter after contact maintenance only!

Screen 2
`Trips.and.Ops`
`Counter.reset`
`continue:.↑.or.`
	Counter reset for trips and switching operations confirmed.

Tastenfunktionen im Modus „Zähler Auslösungen zurücksetzen“	
Wenn Screen 1 angezeigt wird	
▽ ◎ oder ◎ △	Abbruch, kein Zurücksetzen der Zähler auf Null. Wechsel in den Modus „Autoscroll“
▽ ◎ + ◎ △	Zurücksetzen der Zähler auf Null Wechsel zu Screen 2.
Wenn Screen 2 angezeigt wird	
▽ ◎ oder ◎ △	Wechsel in den Modus „Autoscroll“

Button functions in mode “Tripping counter reset”	
If screen 1 is displayed	
▽ ◎ or ◎ △	Cancelling, no counter reset to zero Change to “Autoscroll” mode
▽ ◎ + ◎ △	Counter reset to zero Change to screen 2
If screen 2 is displayed	
▽ ◎ or ◎ △	Change to “Autoscroll” mode

Modus „Parametereinstellung“

VORSICHT
Parametereinstellungen grundsätzlich nur vornehmen, wenn der Leistungsschalter ausgeschaltet ist. Eine Veränderung der Parameter bei eingeschaltetem Leistungsschalter kann zu ungewolltem Auslösen des Leistungsschalters führen.

Dieser Modus erlaubt die Einstellung folgender Parameter:

- Lastabwurf
- Lastaufnahme
- Verzögerungszeit Lastabwurf / Lastaufnahme
- Spracheinstellung für Display

Um in den Modus „Parametereinstellung“ zu gelangen, folgende Taste(n) drücken:	
Im Modus „Autoscroll“	

Angezeigte Screens im Modus „Parametereinstellung“	

Screen 1
`Parameter Ändern`
`Lastabwurf..=.0000.A`
`↑=+ ↓=-`
`↑.und.↓=Bestätigen`
	Einstellung
	Lastabwurf

Screen 2
`Parameter Ändern`
`Lastaufnahme=.0000.A`
`↑=+ ↓=-`
`↑.und.↓=Bestätigen`
	Einstellung
	Lastaufnahme

Screen 3
`Parameter Ändern`
`tx.........=...00.s`
`↑=+ ↓=-`
`↑.und.↓=Bestätigen`
	Einstellung
	Verzögerungszeit
	Lastabwurf / -aufnahme

Screen 4
`Parameter Ändern`
`Sprache/Lang=...XXXX`
`↑=+ ↓=-`
`↑.und.↓=Bestätigen`
	Einstellung
	Sprache Display
	Für XXXX kann stehen:
	ENGL für englisch oder
	DEUT für deutsch

Screen 5
`Parameter werden`
`geändert`
`10s warten`
	Parameteränderungen werden durchgeführt,
	nach 10 Sekunden Wechsel in den Modus „Autoscroll“

Mode “Parameter setting”

CAUTION
Adjust parameters only when the circuit breaker is switched off. If the parameters are modified with the circuit breaker switched on, this can trip the circuit breaker unintentionally.

In this mode, the following parameters can be adjusted:

- load shedding
- load restore
- delay time for load shedding/load restore
- language setting for display

To access “Parameter setting” mode, press the following button(s):	
In “Autoscroll” mode	

Screens displayed in the mode “Parameter setting”	

Screen 1
`Change Parameters`
`Load.Shed..=.0000.A`
`↑=+ ↓=-`
`↑.und.↓=Confirm`
	Setting
	Load shedding

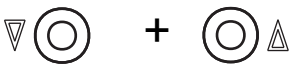
Screen 2
`Change Parameters`
`Load.Restore=.0000.A`
`↑=+ ↓=-`
`↑.und.↓=Confirm`
	Setting
	Load restore

Screen 3
`Change Parameters`
`tx.........=...00.s`
`↑=+ ↓=-`
`↑.und.↓=Confirm`
	Setting
	Delay time
	Load shedding/load restore

Screen 4
`Change Parameters`
`Sprache/Lang=...XXXX`
`↑=+ ↓=-`
`↑.und.↓=Confirm`
	Setting
	Display language
	XXXX may be
	ENGL for english or
	DEUT for german

Screen 5
`Changed.Parameter`
`being.saved,`
`wait.10s`
	Parameter settings are being changed, switches to “Autoscroll” mode after 10 seconds

HINWEIS	NOTICE
Wird bei angezeigtem Screen 1, 2, 3 oder 4 innerhalb von 10 s keine Taste betätigt, wird der Modus „Parametereinstellung“ abgebrochen. Bereits vorgenommene Parameteränderungen werden nicht übernommen. Es erfolgt der Wechsel in den Modus „Autoscroll“.	When screen 1, 2, 3 or 4 is displayed and no key is pressed within 10 seconds, mode “Parameter setting” is canceled. Any parameter changes performed are not accepted. Display switches back to “Autoscroll” mode

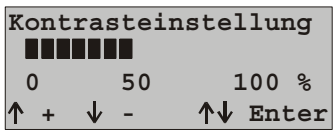
Tastenfunktionen im Modus „Parametereinstellung“	
	Erhöht den eingestellten Wert
	Verringert den eingestellten Wert
	Bestätigt den eingestellten Wert, Wechsel zum nächsten Screen

Button functions in mode “Parameter setting”	
	Increases the set value
	Reduces the set value
	Confirms the set value Switches to the next screen

Modus „Kontrasteinstellung“

Dieser Modus erlaubt die Kontrasteinstellung des Displays.

Um in den Modus „Kontrasteinstellung“ zu gelangen, folgende Taste(n) drücken:	
Im Modus „Autoscroll“	

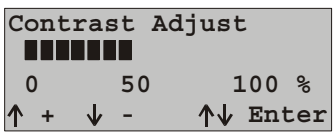
Angezeigte Screens im Modus „Kontrasteinstellung“	
Screen 1 	Kontrasteinstellung Je länger der Balken, desto höher der Kontrast.

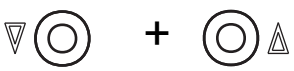
Tastenfunktionen im Modus „Kontrasteinstellung“	
	Erhöht den Kontrast
	Verringert den Kontrast
	Eingestellten Kontrast übernehmen, Wechsel in den Modus „Autoscroll“

Mode “Contrast setting”

In this mode, the contrast of the display can be adjusted.

To access “Contrast setting” mode, press the following button(s):	
In “Autoscroll” mode	

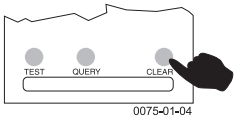
Screens displayed in the mode “Contrast setting”	
Screen 1 	Contrast setting The longer the bar, the higher the contrast

Button functions in mode “Contrast setting”	
	Increases the contrast
	Reduces the contrast
	Accepts the contrast, switch to the “Autoscroll” mode

Anzeige „Info Auslösung“

In diesen Modus wird automatisch gewechselt, sobald eine Auslösung erfolgte, vorausgesetzt es ist eine externe DC-24-V-Spannung angeschlossen.

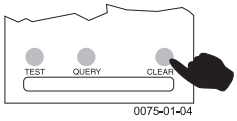
Angezeigte Screens im Modus „Info Auslösung“	
Auslösung.....XX Ausgelöst Phase...YY	Art der Auslösung Betroffene Phase Für XX kann stehen: L, S, I, G, N Für YY kann stehen: L1, L2, L3, N

Tastenfunktionen im Modus „Info Auslösung“	
▽ ◎ + ◎ △	Anzeige der Wartungsinformationen Erneutes Drücken: Rückkehr in Modus „Info Auslösung“
	CLEAR-Taste drücken Wechsel in den Modus „Autoscroll“

Screen “Tripping info”

In this mode, there is an automatic change as soon as there is a tripping, provided that an external 24 V DC voltage supply has been connected.

Screens displayed in the mode “Tripping info”	
Trip.Cause.....XX Tripped.Phase.....YY	Tripping type Phase affected XX may be: L, S, I, G, N YY may be: L1, L2, L3, N

Button functions in the mode “Tripping info”	
▽ ◎ + ◎ △	Display of maintenance instructions If pressed again: Return to the mode “Tripping info”
	Press CLEAR-button Switches to “Autoscroll” mode

Anzeige „Parameteränderungen anzeigen“

In diesen Modus wird automatisch gewechselt, sobald ein beliebiger Parameter über die Drehkodierschalter geändert wurde, vorausgesetzt es ist eine externe DC-24-V-Spannungsversorgung angeschlossen.

Angezeigte Screens im Modus „Parameteränderungen anzeigen“	
Einstellung geändert xxxxxx.=...000000.yy	Anzeige des geänderten Wertes

Screen “Display parameter changes”

The display automatically switches to this mode when a parameter has been changed via the rotary coding switches, provided an external 24 V DC voltage supply has been connected.

Screens displayed in mode “Display parameter changes”	
Parameter changed: xxxxxx.=...00000.yyy	Display of the changed value

Größen sowie deren Werte und Einheiten, die in Screen 1 angezeigt werden können.	Technical data with values and units that can be displayed in screen 1

Geänderte Größe	Mögliche Anzeige	Einheit
IR.....=....00000.YY	Absolutwert	A
ISD....=....00000.YY	Absolutwert	A
Ii.....=....00000.YY	Absolutwert oder OFF	A
Ig.....=.....0000.YY	Absolutwert	A
Ig.alarm.=...0000.YY	Absolutwert	A
tg.....=......000.YY	100 200 300 400 500	ms
I^2tg..=......000.YY	100 200 300 400 500	ms
I^2tR..=......000.YY	2 3,5 5,5 8 10 14 17 21 25 30	s
I^4tR..=........0.YY	1 2 3 4 5	s
tSD....=......000.YY	20 100 200 300 400	ms
I^2tSD.=......000.YY	100 200 300 400	ms
th.mem.=......000...	ON OFF	..

Changed data	Displayed Values	Unit
IR.....=....00000.YY	LT pickup value in primary amperes	A
ISD....=....00000.YY	ST pickup value in primary amperes	A
Ii.....=....00000.YY	IN pickup value in primary amperes	A
Ig.....=.....0000.YY	GF pickup value in primary amperes	A
Ig.ala.=.....0000.YY	GF alarm pickup value in primary amperes	A
tg.....=......000.YY	GF delay: 100 200 300 400 500	ms
I^2tg..=......000.YY	GF I^2t delay: 100 200 300 400 500	ms
I^2tR..=......000.YY	LT I^2t delay: 2 3,5 5,5 8 10 14 17 21 35 30	s
I^4tR..=........0.YY	LT I^4t delay: 1 2 3 4 5	s
tSD....=......000.YY	ST delay: 20 100 200 300 400	ms
I^2tSD.=......000.YY	100 200 300 400	ms
th.mem.=.....000....	ON OFF	..

IR	Ansprechstrom für Überlastauslösung	Current for overload tripping
ISD	Ansprechstrom für kurzzeitverzögerte Kurzschlussauslösung	Current for short-time delayed short-circuit tripping
Ii	Ansprechstrom für unverzögerte Kurzschlussauslösung	Current for instantaneous short-circuit tripping
Ig	Ansprechstrom für Auslösung des Erdschlussschutzes (Wird nur angezeigt, wenn ein Erdschlussschutzmodul eingebaut ist.)	Current for ground-fault protection tripping (this is only displayed if there is an ground-fault protection module available)
Ig alarm	Ansprechstrom für Alarmanzeige des Erdschlussschutzes (Wird nur angezeigt, wenn ein Erdschlussschutzmodul eingebaut ist.)	Response current for ground-fault protection alarm indicator (this is only displayed if a ground-fault protection module is installed)
tg	Verzögerungszeit für den Erdschlussschutz (Wird nur angezeigt, wenn ein Erdschlussschutzmodul eingebaut ist.)	Delay time for ground-fault protection (this is only displayed if a ground-fault protection module is installed)
I2tg	I^2t-abhängige Verzögerung des Erdschlussschutzes (Wird nur angezeigt, wenn ein Erdschlussschutzmodul eingebaut ist.)	Inverse-time delay (I^2t-dependent) of ground-fault protection (this is only displayed if a ground-fault protection module is installed)
I2tR	I^2t-abhängige Verzögerung der Überlastauslösung	Inverse-time delay (I^2t-dependent) for overload tripping
I4tR	I^4t-abhängige Verzögerung der Überlastauslösung	Inverse-time delay (I^4t-dependent) for overload tripping
tSD	Verzögerungszeit Kurzschlussauslösung	Delay time of short-circuit tripping
I2tSD	I^2t-abhängige Verzögerungszeit der Kurzschlussauslösung	Inverse-time delay (I^2t-dependent) for short-circuit tripping
th mem	Zeigt an, ob Temperaturgedächtnis ein- / ausgeschaltet ist	Indicates whether thermal memory is on / off

Tastenfunktionen im Modus „Parameteränderungen anzeigen“	Button functions in mode “Display parameter changes”
Der geänderte Wert wird für 4 Sekunden angezeigt. Danach Rückkehr in den Modus, in dem sich das Display vorher befand.	The changed value is displayed for 4 seconds. The display then switches back to the previous mode.

Grafikdisplay bei ETU76B

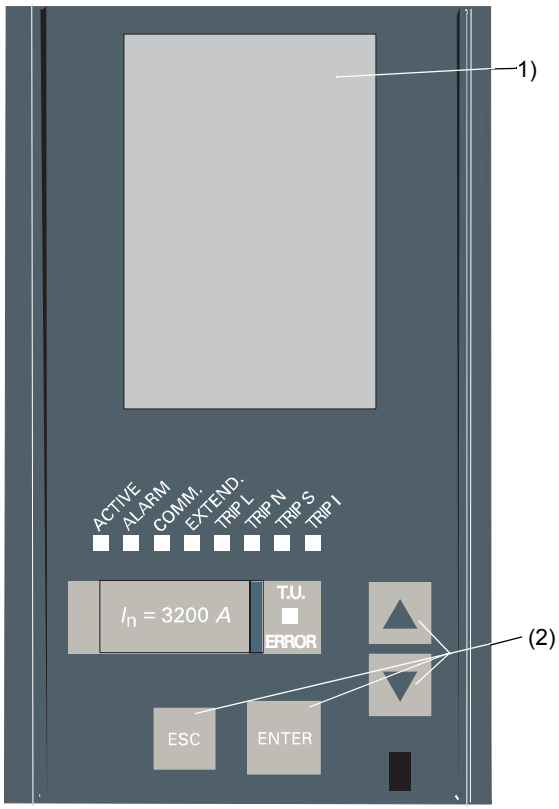
Der Überstromauslöser ETU76B ist standardmäßig mit einem fest eingebauten Grafikdisplay ausgestattet. Dieses Display ermöglicht eine maximal 8-zeilige Textausgabe oder die grafische Darstellung von Kurvenverläufen.

Es dient sowohl der Anzeige von Daten als auch zur Parametrierung des Überstromauslösers und der Messfunktion. Die Bedienung des Displays erfolgt über die Bedientasten am Überstromauslöser.

Graphical display of ETU76B

The overcurrent release ETU76B is equipped with a fixed-mounted graphical display as standard. This display enables a text output with a maximum of 8 lines or the graphical representation of characteristics.

It is used both to display data and to parameterise the overcurrent release as well as the metering function. The display is operated through the control provided on the overcurrent release.

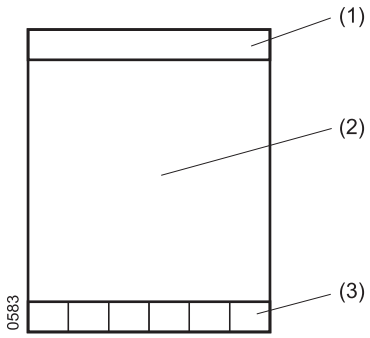


(1) Grafikdisplay
(2) Bedientasten

(1) Graphical display
(2) Operating keys

Aufbau des Displays

Display design

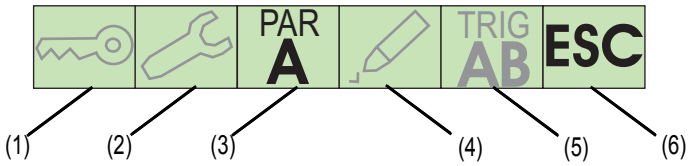


(1) Menüüberschrift
(2) 8-zeilige alphanumerische Anzeige oder grafische Darstellung von Kurvenverläufen
(3) Statuszeile

(1) Menu title
(2) 8-line alphanumeric display or graphical representation of characteristics
(3) Status line

Statuszeile

In der Statuszeile wird durch fett dargestellte Symbole angezeigt, welche Handlungen durch den Bediener zum gegenwärtigen Zeitpunkt möglich sind und welche Einstellungen gerade aktiv sind.



(1) Zugang nur mit Passwort
(2) Wartung erforderlich
(3) Eingestellter Parametersatz für die Schutzfunktionen
(4) Editiermöglichkeit
(5) Eingestellter Trigger
(6) oberes oder unteres Ende der Liste erreicht / Handlungsmöglichkeiten für den Bediener /

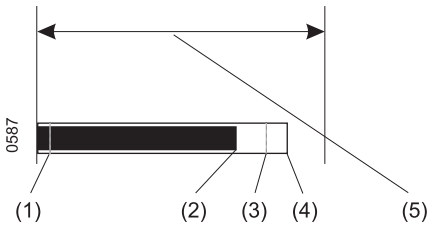
Status line

The status line shows, by means of bold symbols, which actions the operator can carry out and which settings are currently active at this moment.

(1) Access with password only
(2) Maintenance required
(3) Set parameter set for protective functions
(4) Editing option
(5) Set trigger
(6) upper or lower end of a list reached
Possible actions by the operator

Darstellung von Balkendiagrammen

Die Messwerte für einige Parameter werden sowohl als Zahlenwert als auch grafisch als Balkendiagramm dargestellt.



(1) Gemessenes Minimum
(2) Aktueller Messwert
(3) Gemessenes Maximum
(4) 100% des zu messenden Parameters
(5) Breite des Displays

Die Markierungen für gemessenes Minimum und Maximum werden während der Messung automatisch aktualisiert.

Representation of bar diagrams

The measured-values for some parameters are displayed both as numerical values and graphically in form of a bar diagram.

(1) Lowest measured-value
(2) Current measured value
(3) Highest measured-value
(4) 100% of the measured parameter
(5) Width of display

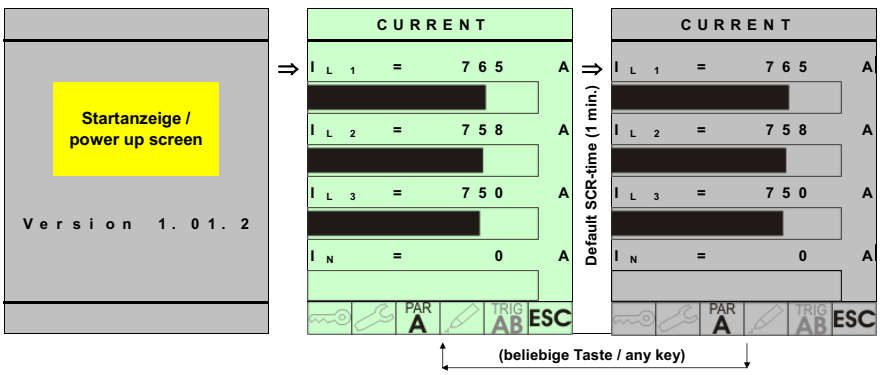
The markings for the lowest and highest measured-value are automatically updated during the measurement.

Anzeige während des Betriebes

Nach dem Anlegen der Versorgungsspannung wechselt die Displaydarstellung nach ca. 5 s von der Startanzeige in die Betriebsanzeige. Es werden die Ströme in den drei Phasen und im N-Leiter angezeigt und als Balkendiagramm dargestellt. Nach ca. 1 min schaltet sich die Hintergrundbeleuchtung des Displays ab. Sie kann durch Betätigen einer beliebigen Taste wieder eingeschaltet werden.

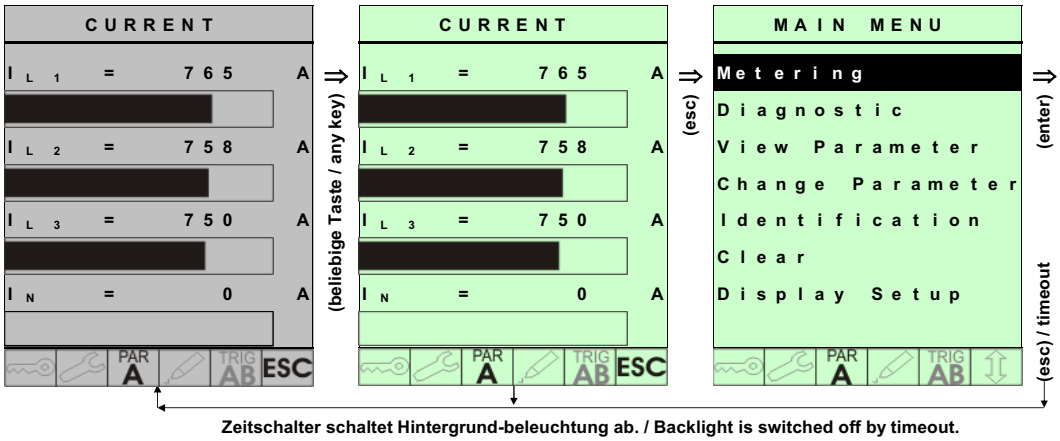
Display during operation

After the supply voltage is applied, the display switches from the "power up screen" to the operational screen after approximately 5 seconds. It shows the currents in the three phases and in the neutral conductor as values and in form of a bar diagram. The background illumination of the display is automatically switched off after approximately 1 minute. It can be switched on again by pressing any button.



Aufrufen des Hauptmenüs

Calling the main menu



Die Dauer, nach der die Hintergrundbeleuchtung abgeschaltet wird und der Bildschirm wieder die Ströme anzeigt kann unter „Einstellungen“ ⇒ „Default SCR“ zwischen 30 und 600 Sekunden eingestellt werden.

The time until the background illumination is switched off and the currents are displayed again may be set between 30 to 600 seconds at „Display Setup“ ⇒ „Default SCR“.

Navigieren in der Menüstruktur und Werteeingabe

Navigating the menu structure and entering values

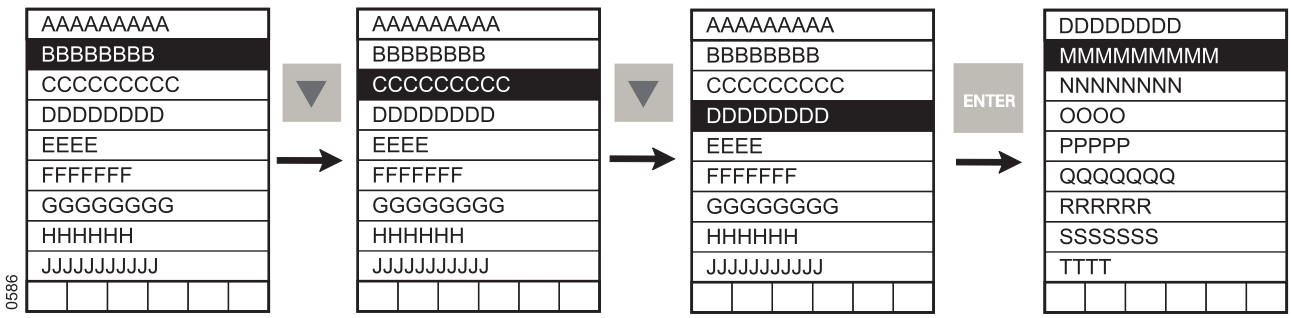
Das Navigieren in der Menüstruktur erfolgt mit den Bedientasten

To navigate in the menu structure, use the operating keys.

Tastenfunktionen		Button functions
Verschieben der Markierung oder Wert erhöhen oder verringern	▲ ▼	Shift the marking or indrease or decrease a value
Auswahl des markierten Menüpunktes bzw. Einstellung eingeben	ENTER	Select the marked menu item or accept the entered value
Wechsel in das vorherige Menü	ESC	Return to the previous menu

Auswahl eines Menüpunktes

Selection of a menu item



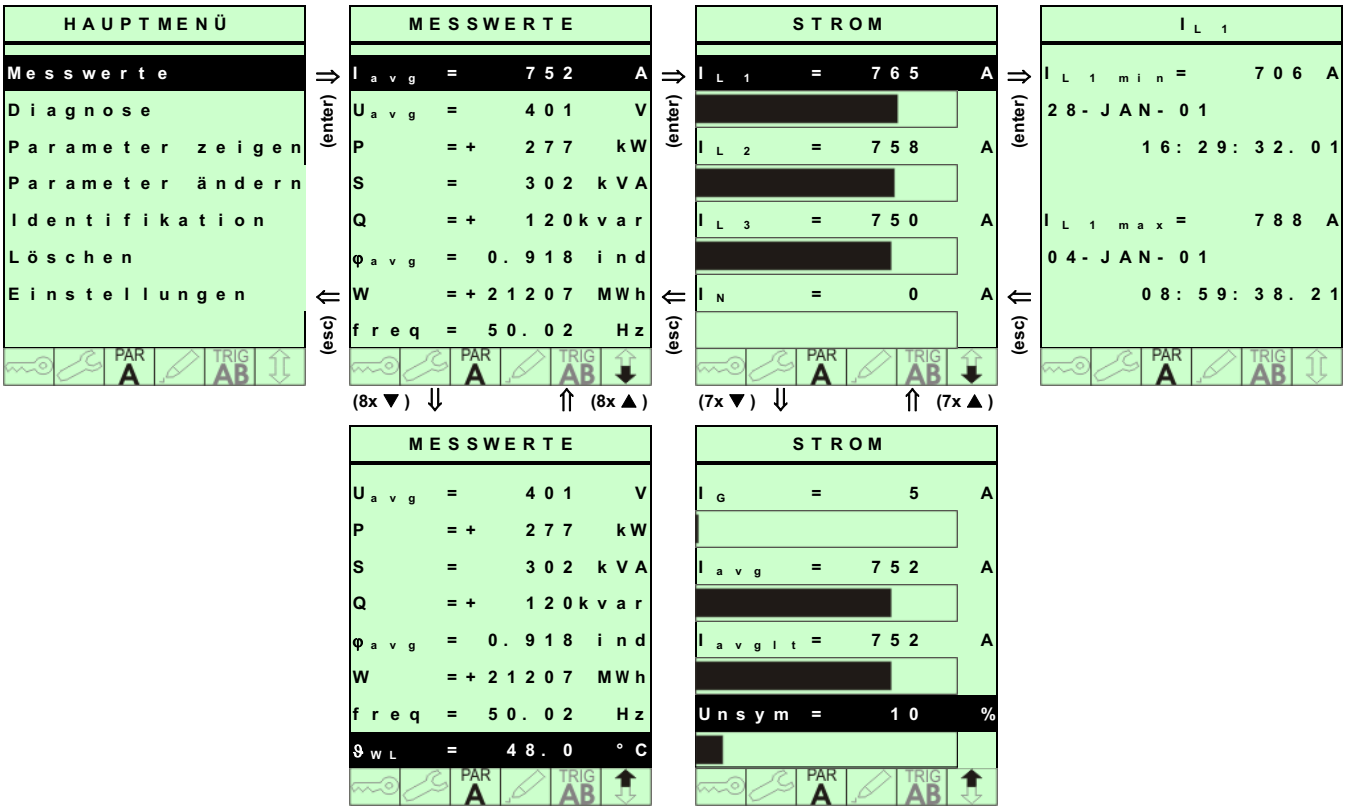
Im folgenden wird gezeigt, wie man sich Daten anzeigen lassen kann und wie man Parameter einstellt. Der besseren Übersicht halber erfolgt die Darstellung einsprachig zunächst in deutsch, dann in englisch. Die zur Verfügung stehenden Menüpunkte sind von der Konfiguration von Schalter und ETU abhängig und können von den hier gezeigten abweichen.

The following pages describe how to display data and how to set parameters. For a better overview, the representation is given in German first, and then in English. The menues depend on the configuration of circuit breaker and ETU and may be different from the shown examples.

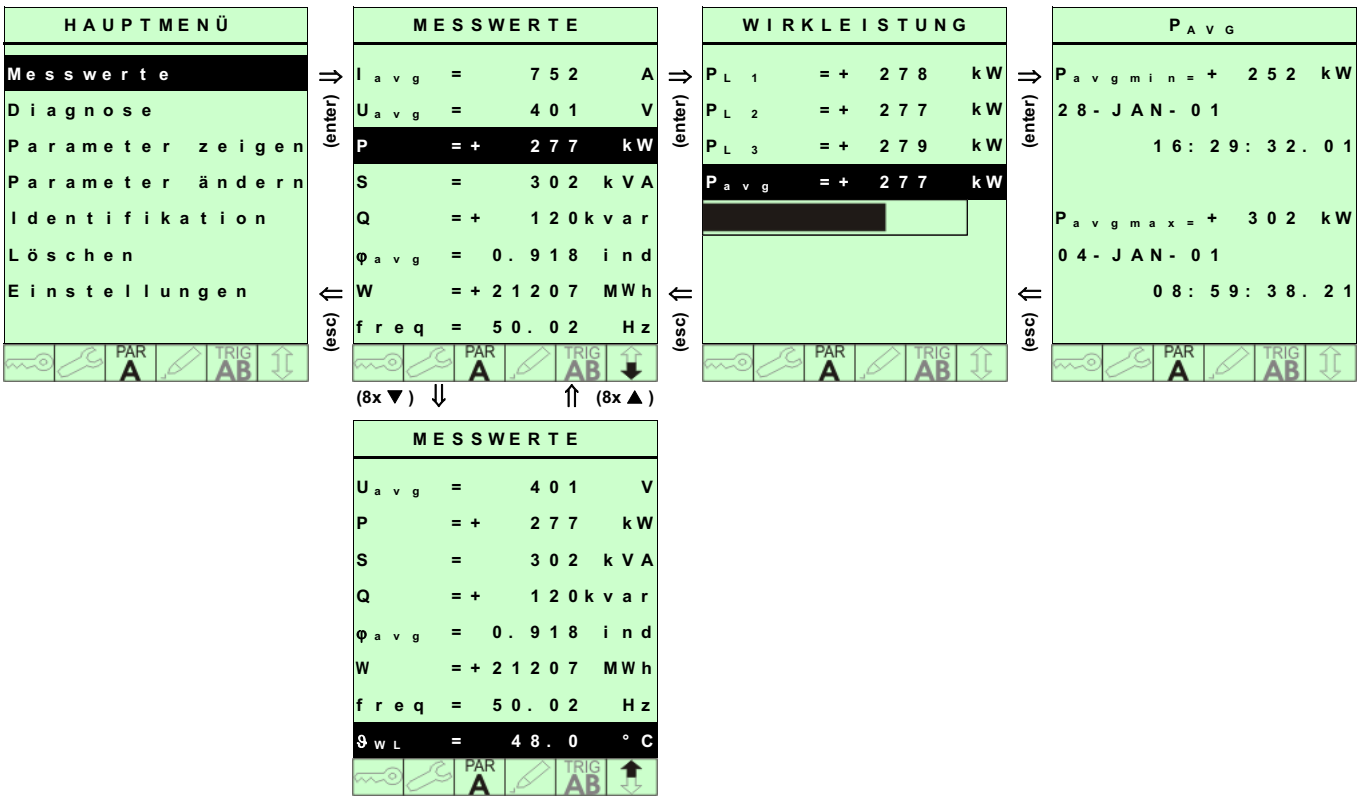
English part continued on → (page 9-56).

Messwerte anzeigen

Beispiel 1: Anzeige der Ströme



Beispiel 2: Leistungswerte anzeigen

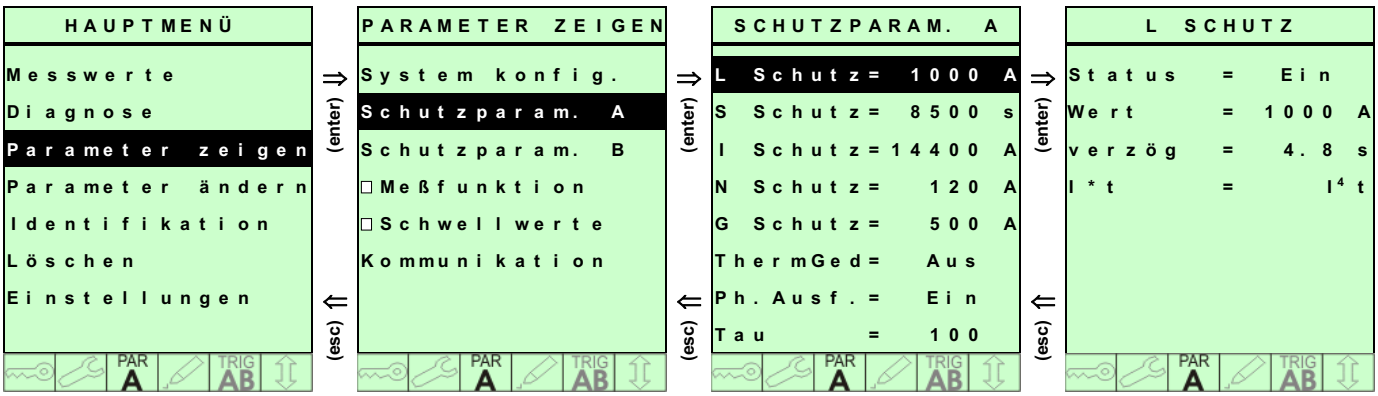


Beispiel 3: Anzeige der Harmonischen



Parameter anzeigen

Beispiel 4: Eingestellte Schutzparameter anzeigen

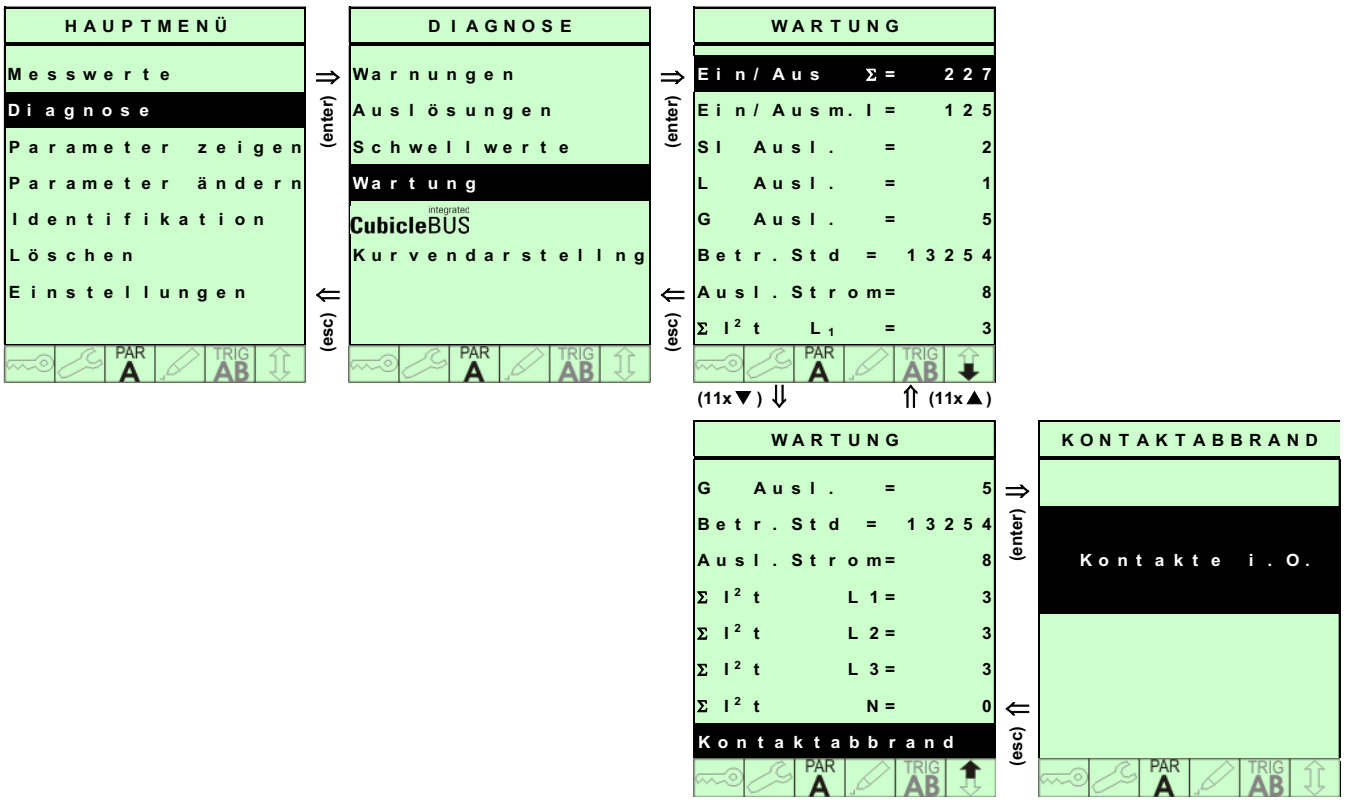


Beispiel 5: Eingestellten Schutzparametersatz auswählen



Diagnoseinformationen aufrufen

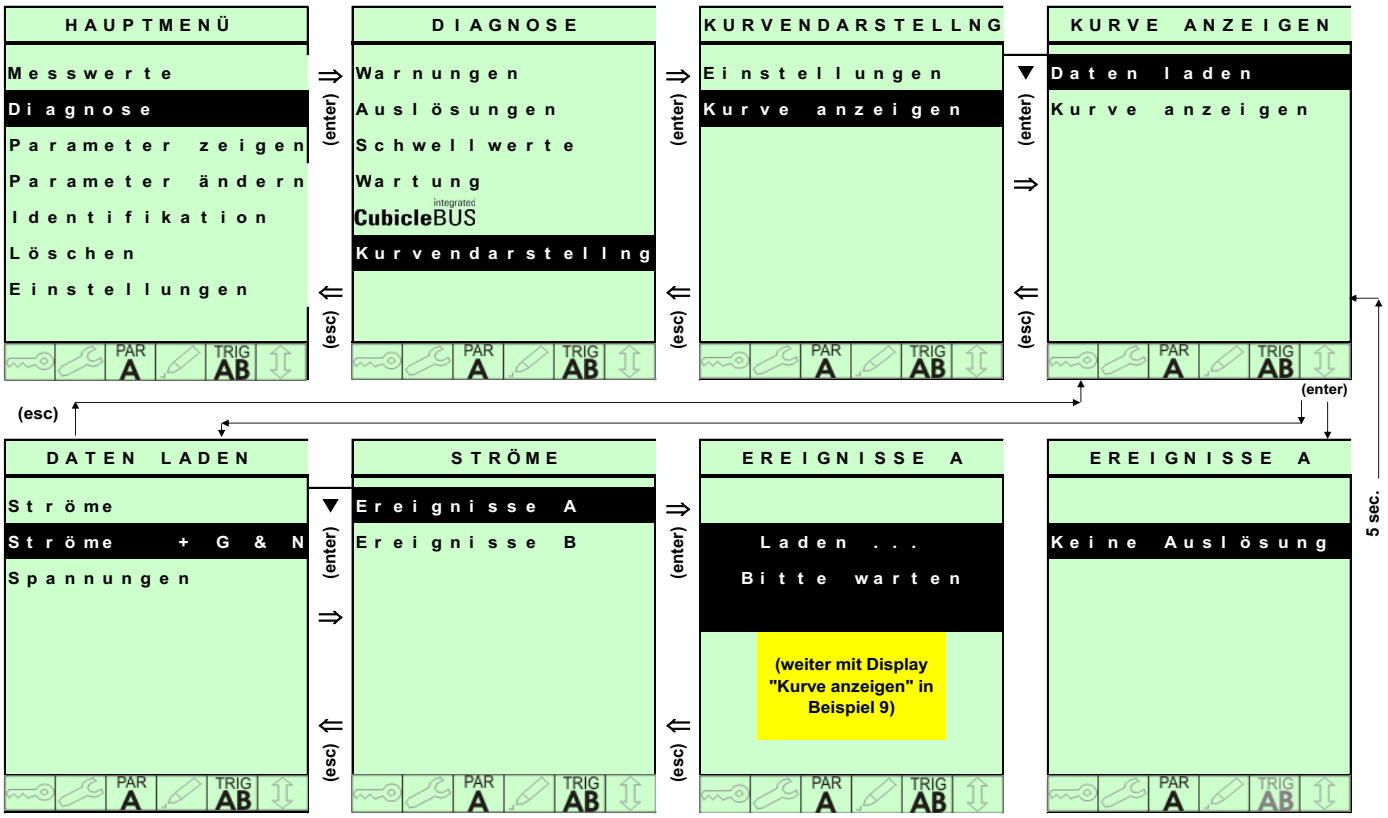
Beispiel 6: Wartungsinformationen abfragen



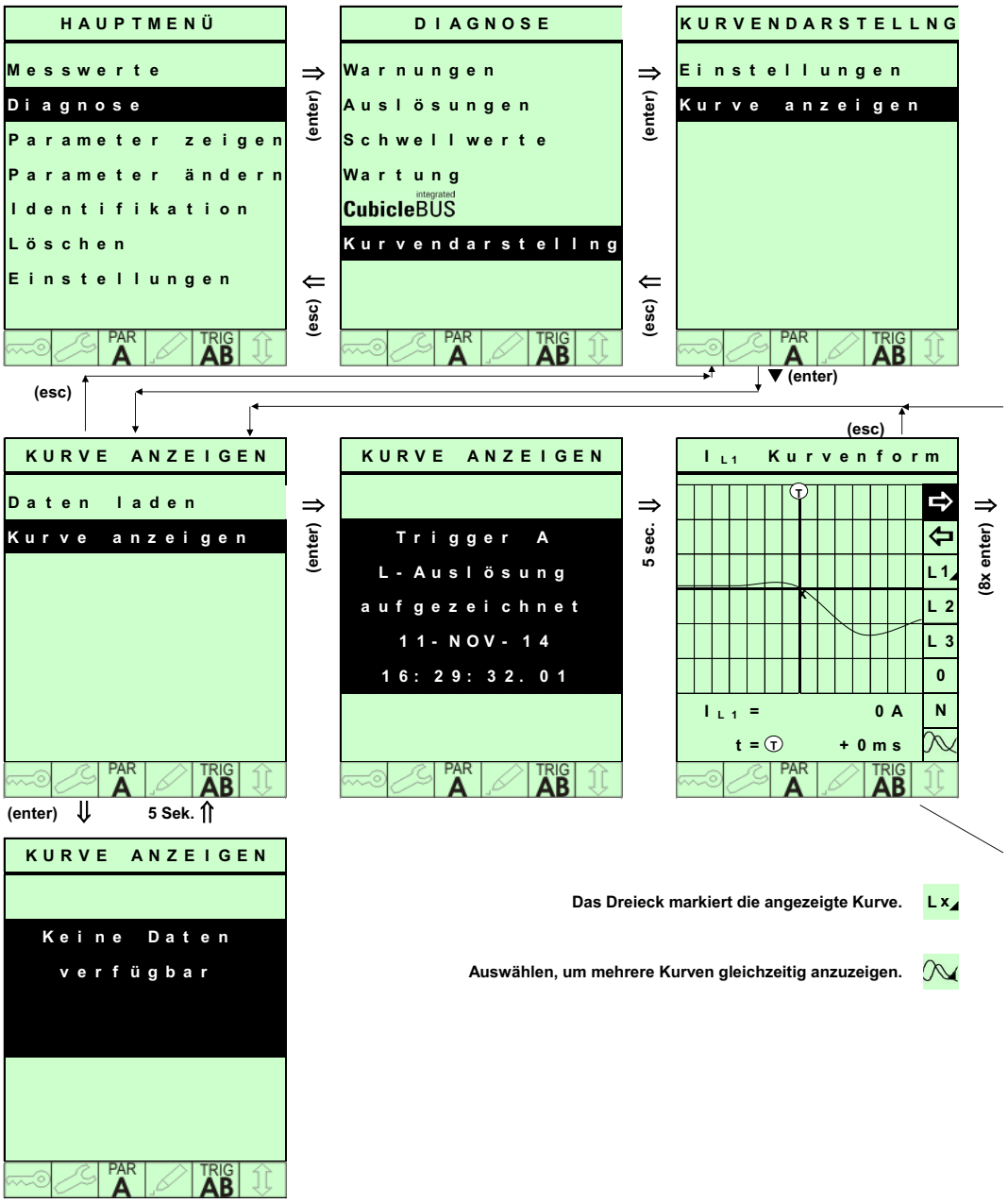
Beispiel 7: Kurvendarstellung einstellen



Beispiel 8: Ereignis für die Kurvendarstellung auswählen

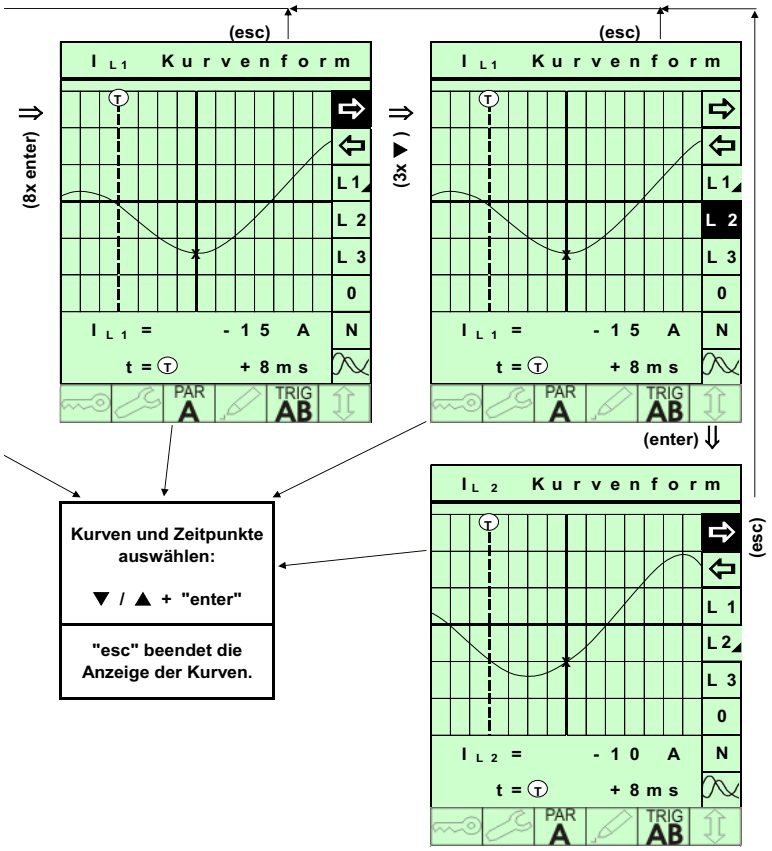


Beispiel 9: Kurven anzeigen



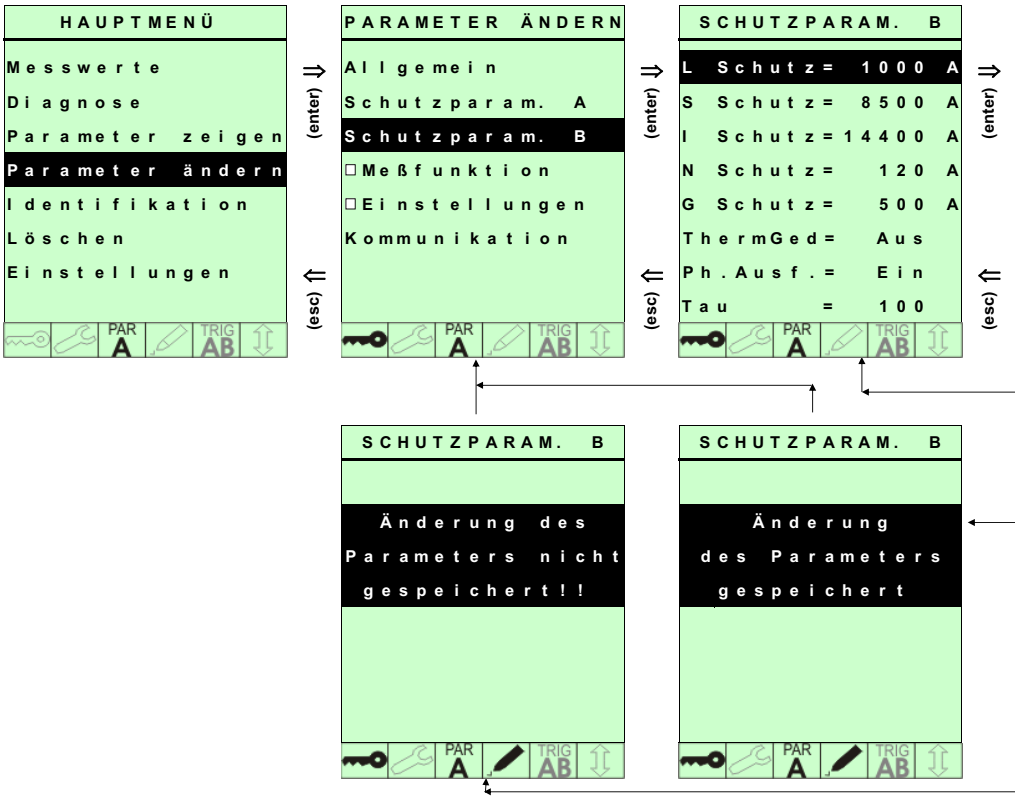
Das Dreieck markiert die angezeigte Kurve. L x

Auswählen, um mehrere Kurven gleichzeitig anzuzeigen.


(esc)
I L1 Kurvenform
(8x enter)
(3x ▶)
L1
L 2
L 3
0
I L1 = - 15 A
t = T + 8 ms
N
PAR
A
TRIG
AB
(esc)
I L1 Kurvenform
(enter)
I L 2 Kurvenform
(esc)
Kurven und Zeitpunkte auswählen:
▼ / ▲ + "enter"
"esc" beendet die Anzeige der Kurven.

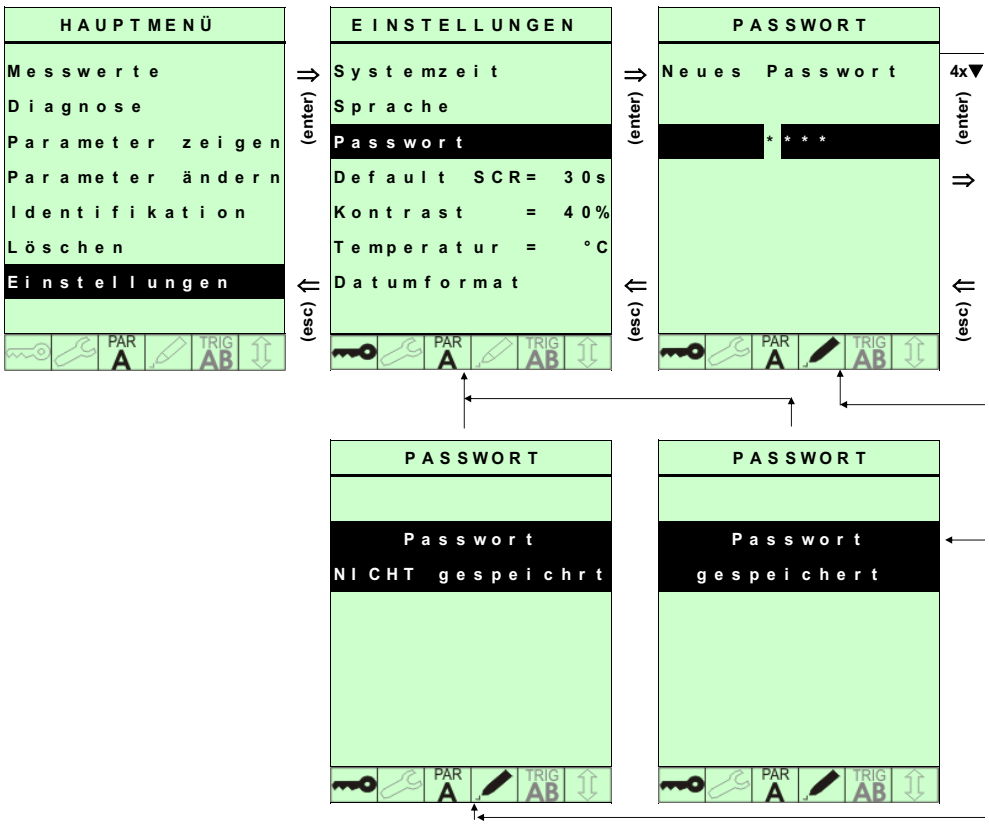
Parameter ändern

Beispiel 10: Schutzparameter einstellen

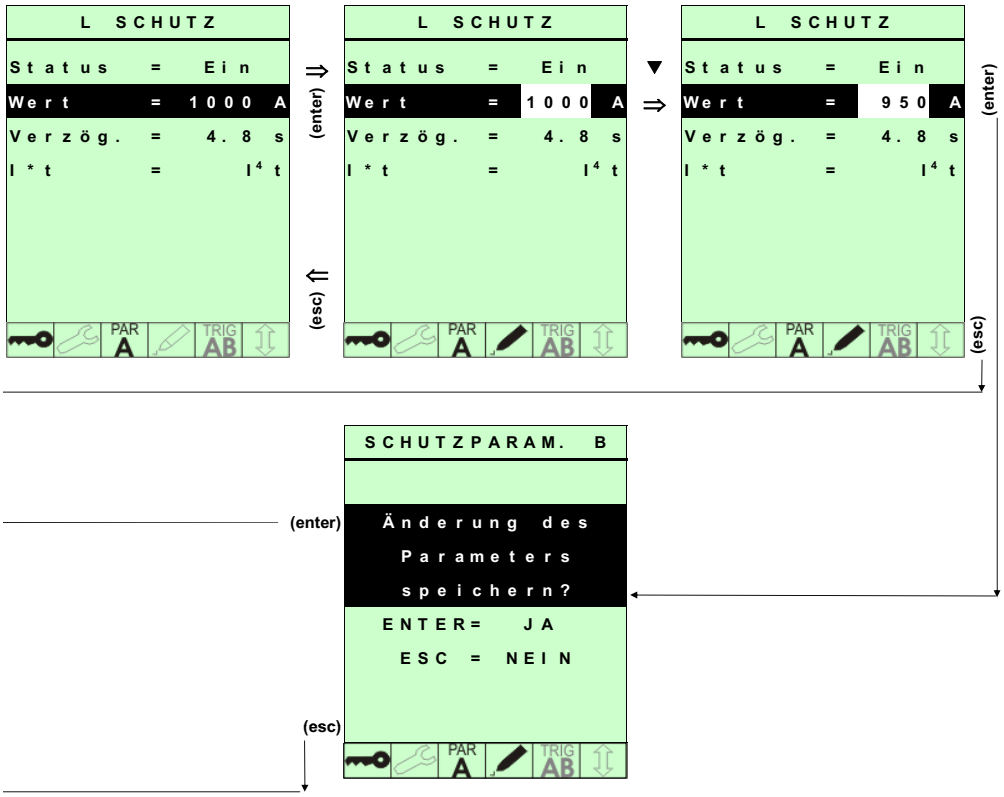


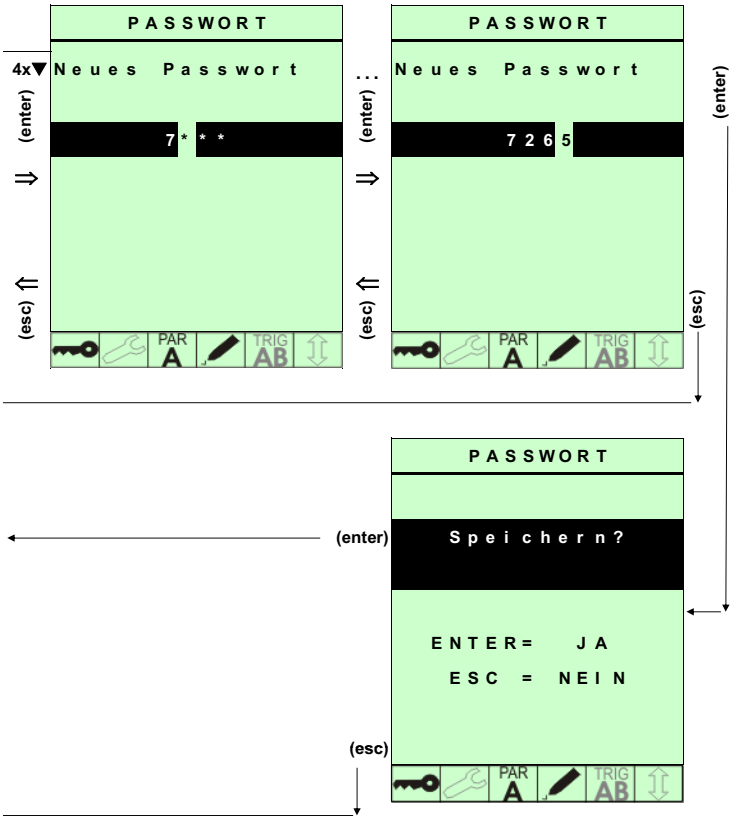
Einstellungen

Beispiel 11: Passwort eingeben



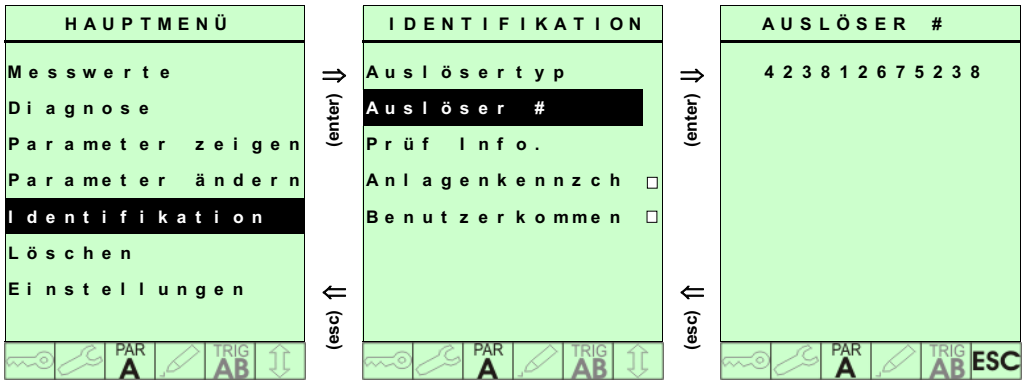
english part continued on (page 9-56)


L SCHUTZ
Status = Ein
Wert = 1000 A
Verzög. = 4.8 s
I*t = I⁴t
(enter)
(esc)
L SCHUTZ
Status = Ein
Wert = 1000 A
Verzög. = 4.8 s
I*t = I⁴t
L SCHUTZ
Status = Ein
Wert = 950 A
Verzög. = 4.8 s
I*t = I⁴t
(enter)
(esc)
SCHUTZPARAM. B
(enter)
Änderung des Parameters speichern?
ENTER= JA
ESC = NEIN
(esc)


PASSWORT
4x▼
Neues Passwort
7**
(enter)
(esc)
...
PASSWORT
Neues Passwort
7265
(enter)
(esc)
(enter)
(esc)
PASSWORT
(enter)
Speichern?
ENTER= JA
ESC = NEIN
(esc)

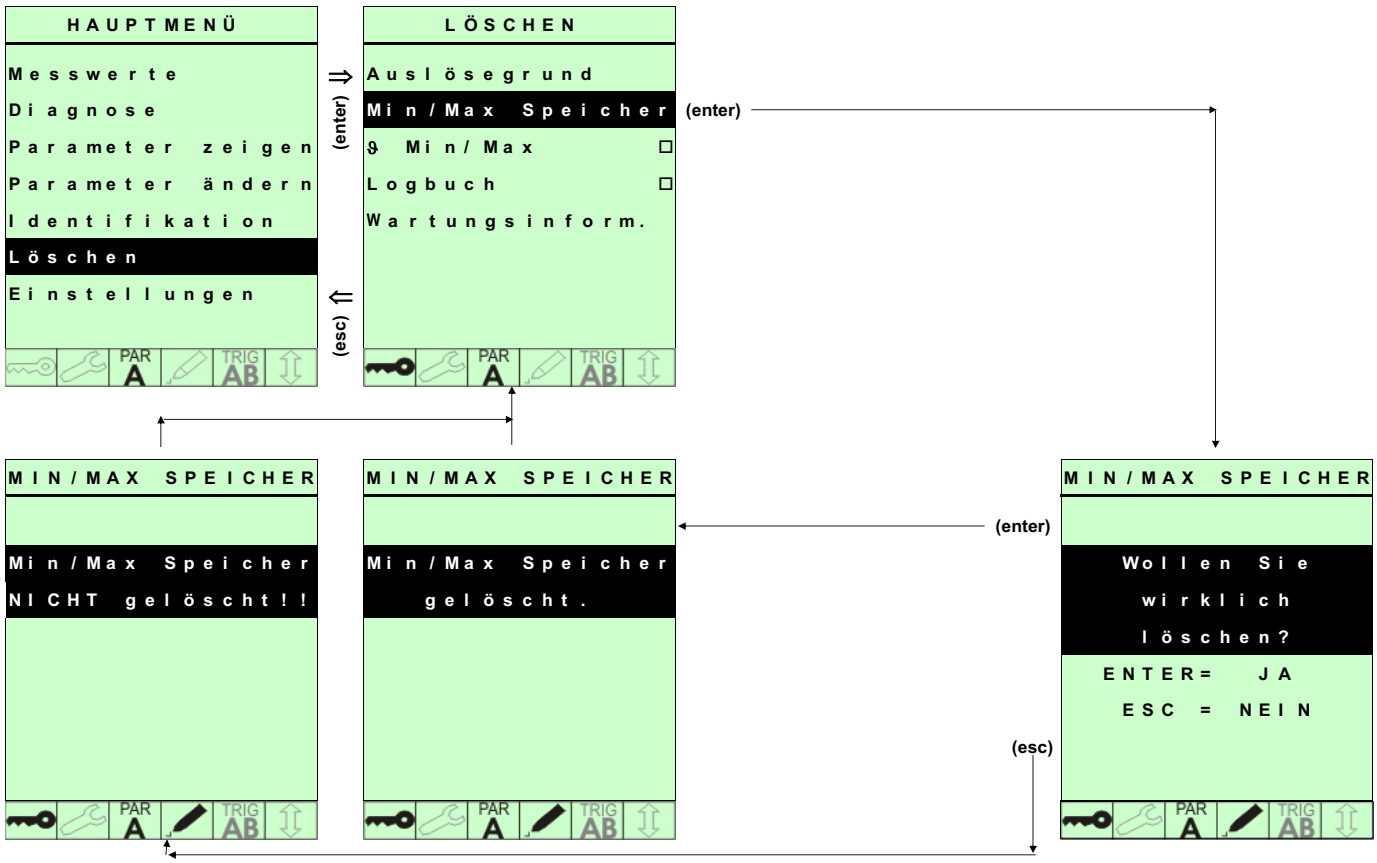
Identifikationen

Beispiel 12: Identifikation



Rückstellungen

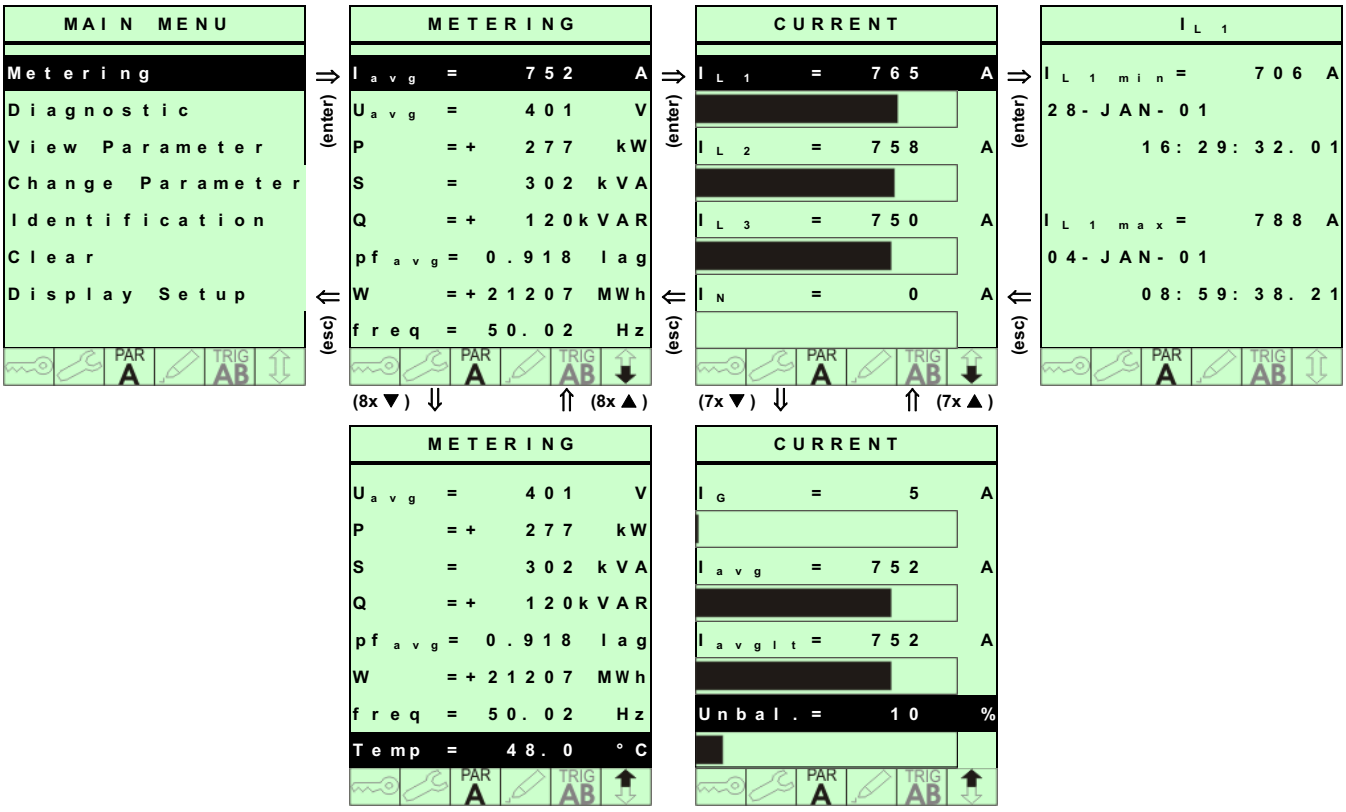
Beispiel 13: Gemessene Maximal- und Minimalwerte löschen



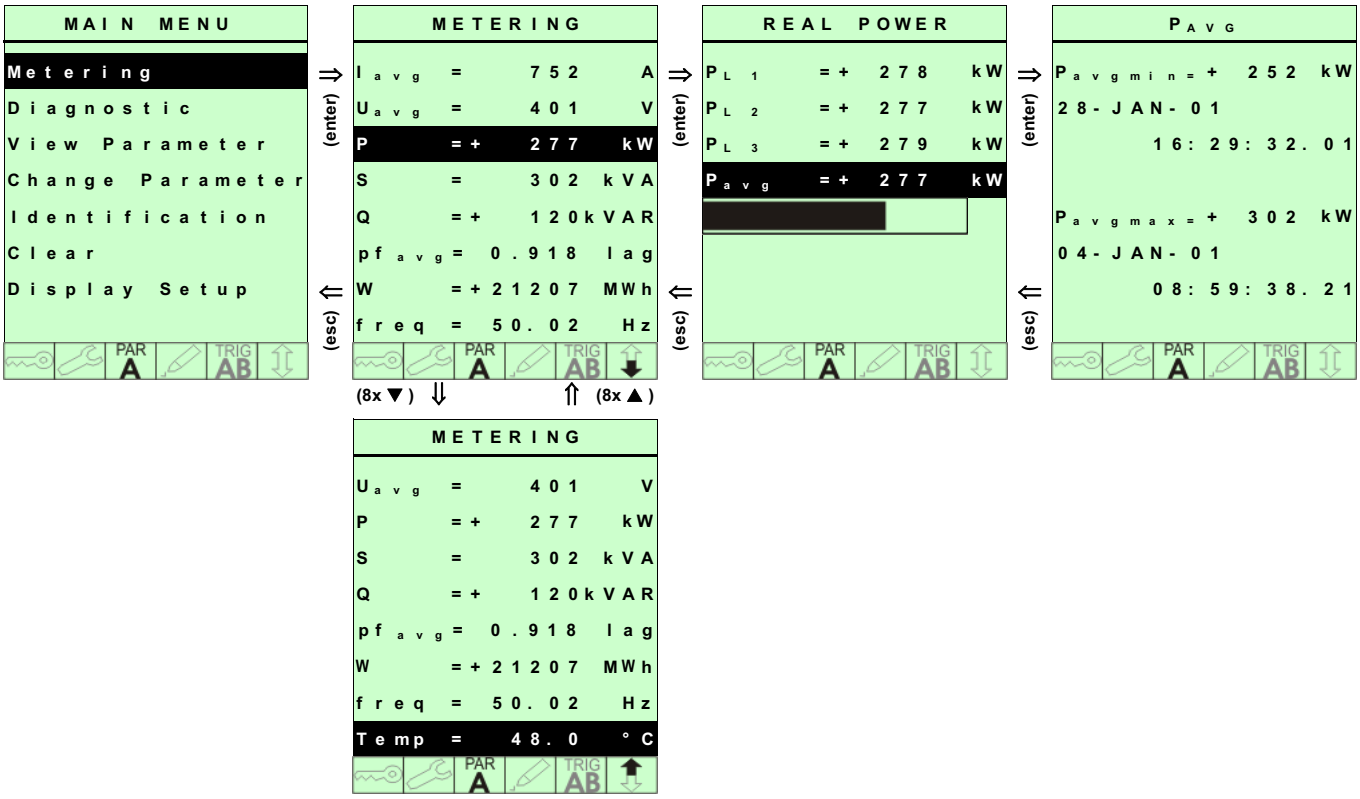
english part continued on (page 9-56)

Displaying measured-values

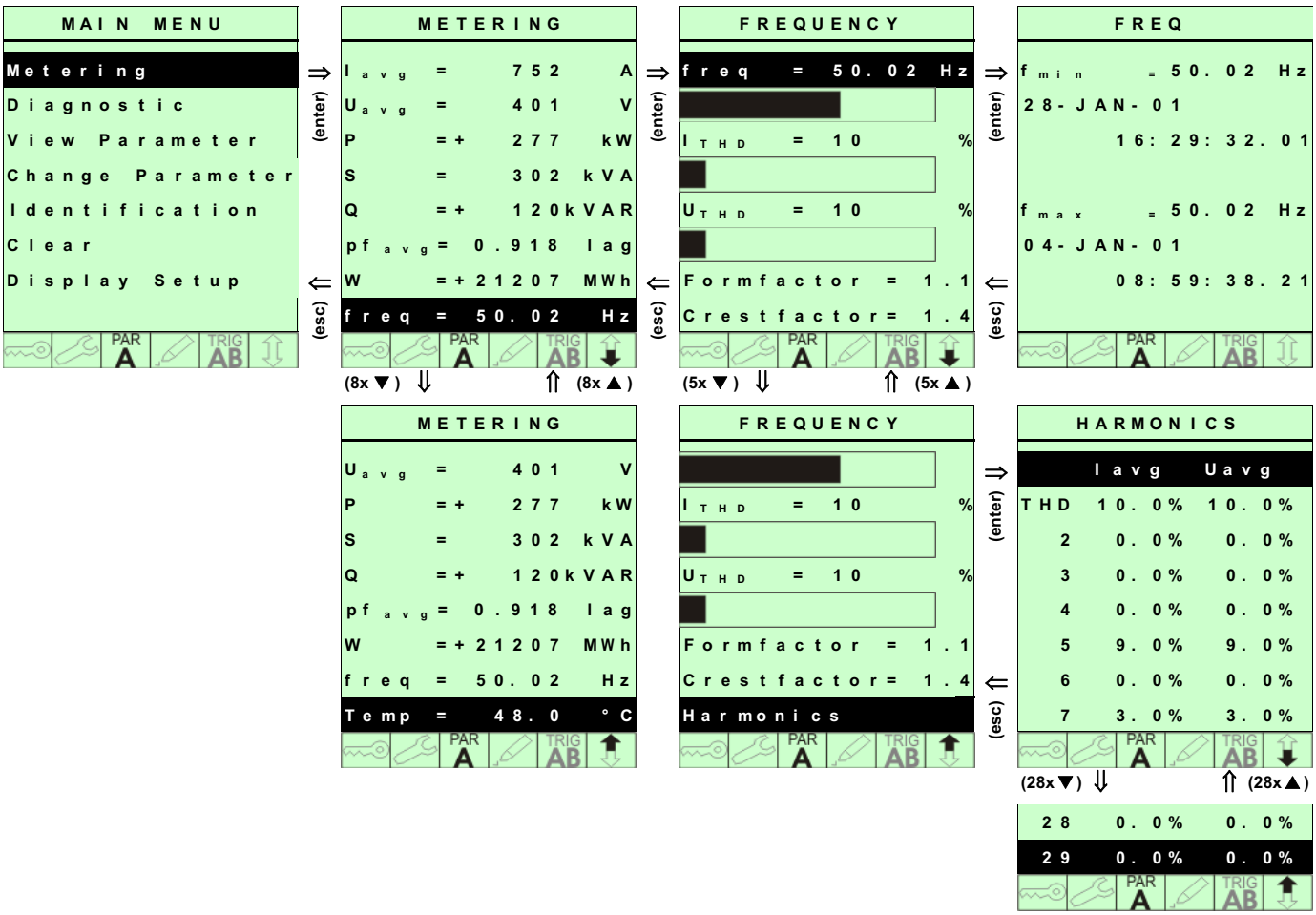
Example 1: Displaying the currents



Example 2: Displaying active power

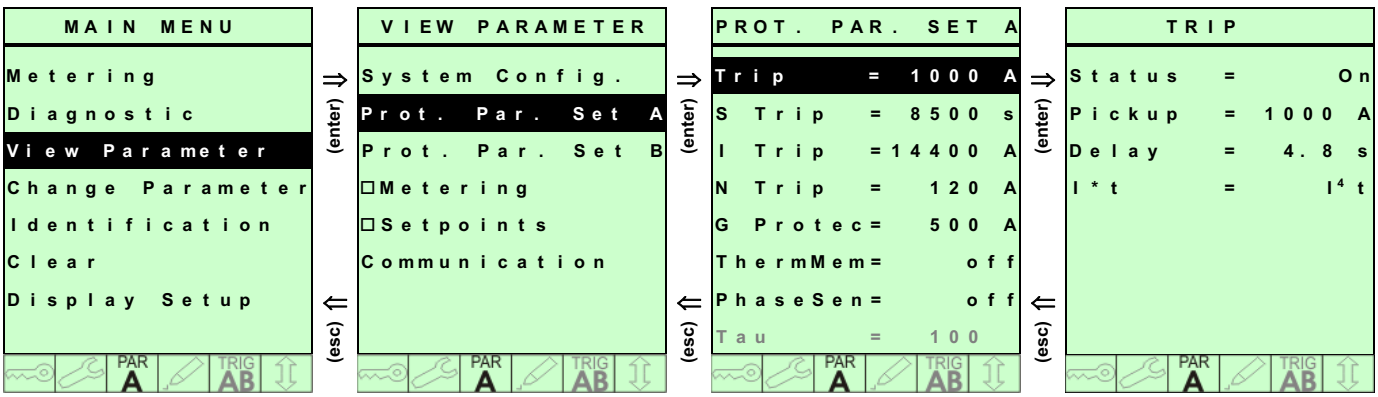


Example 3: Displaying harmonics

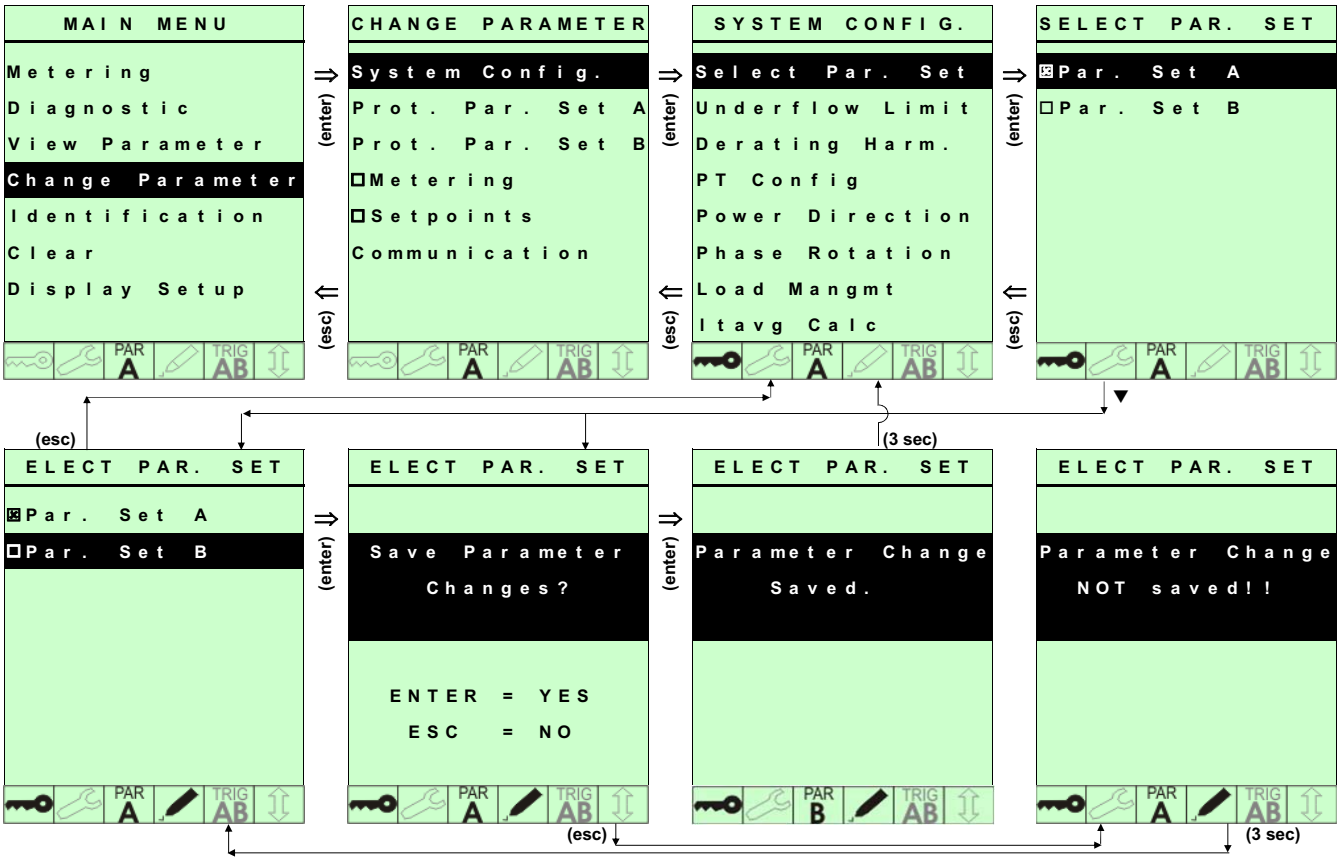


Displaying parameters

Example 4: Displaying protection parameter settings

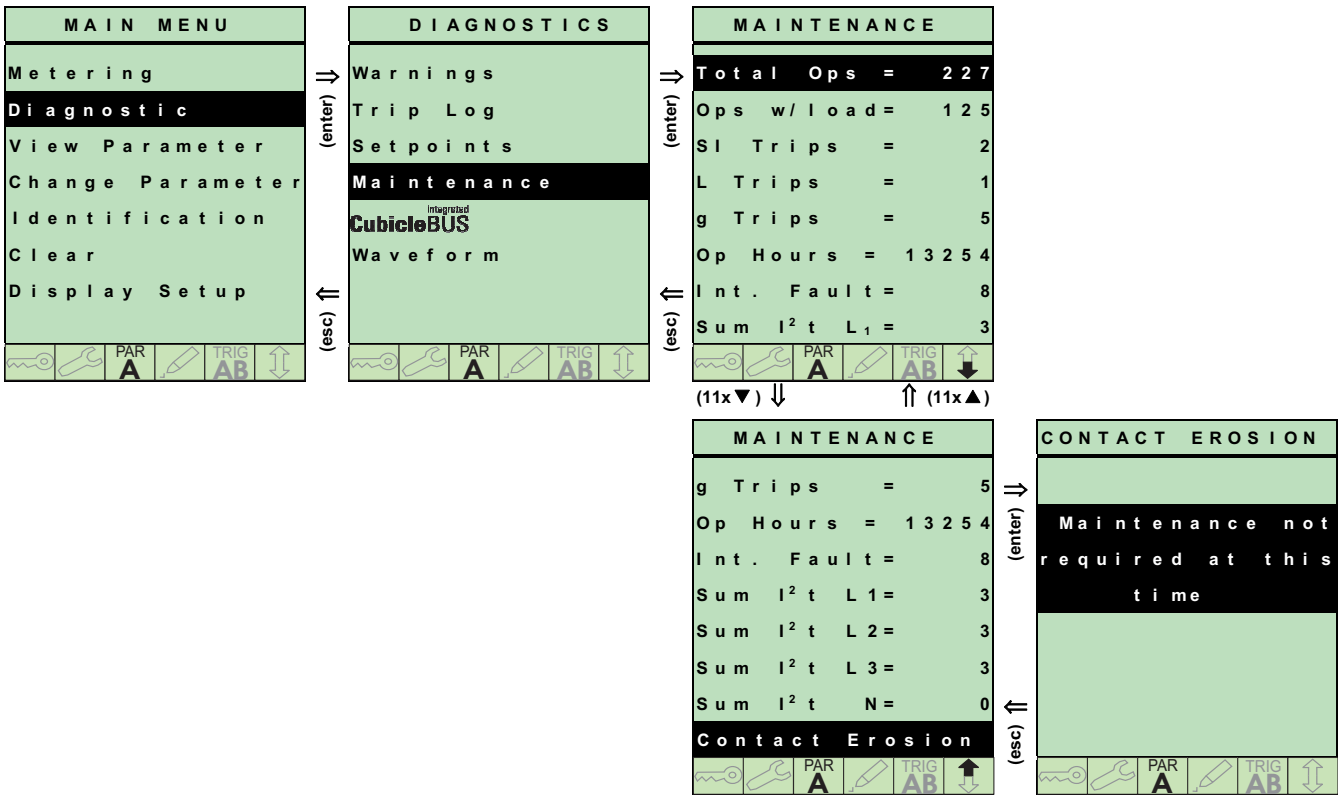


Example 5: Choosing the protection parameter set

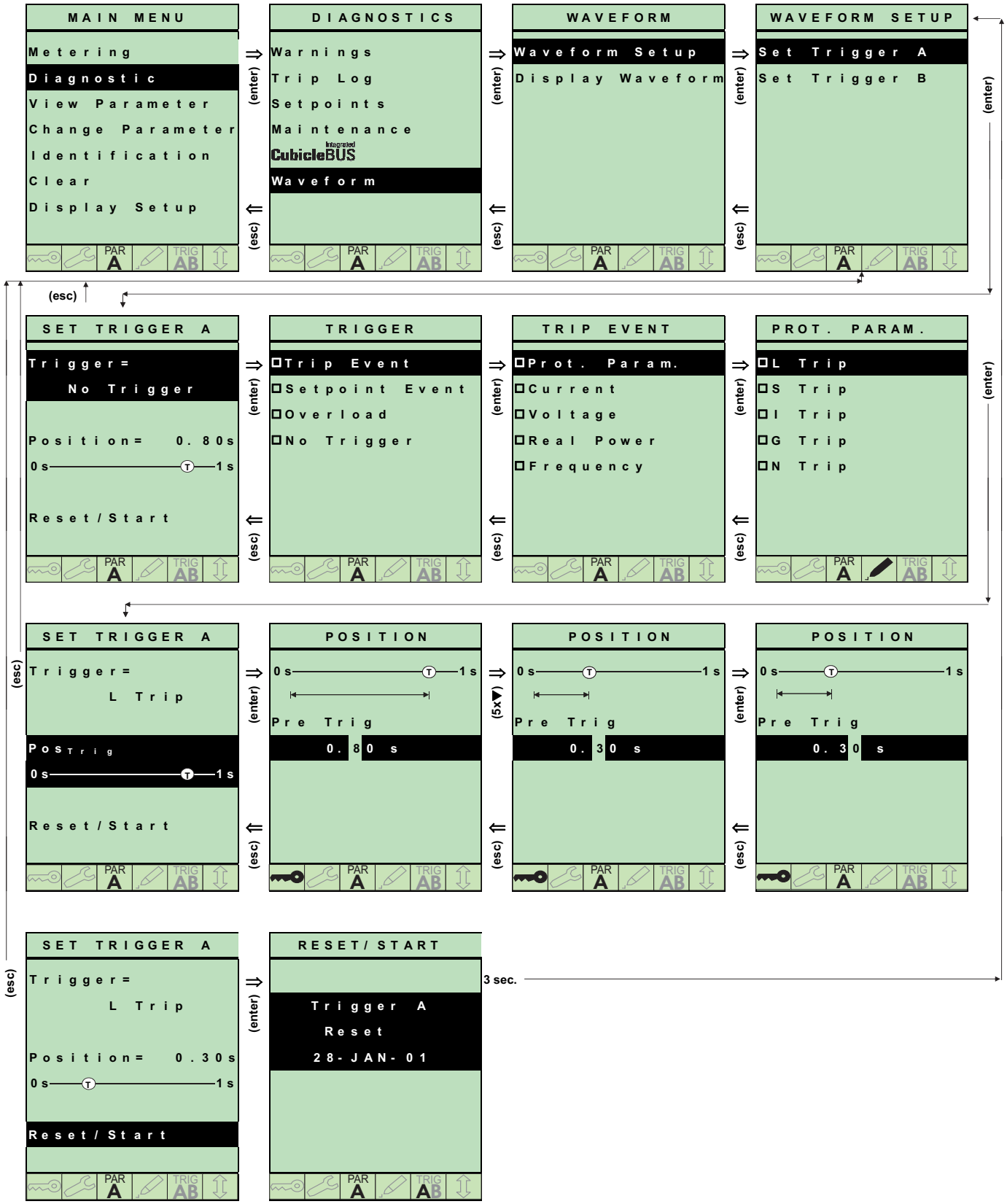


Calling up diagnostic information

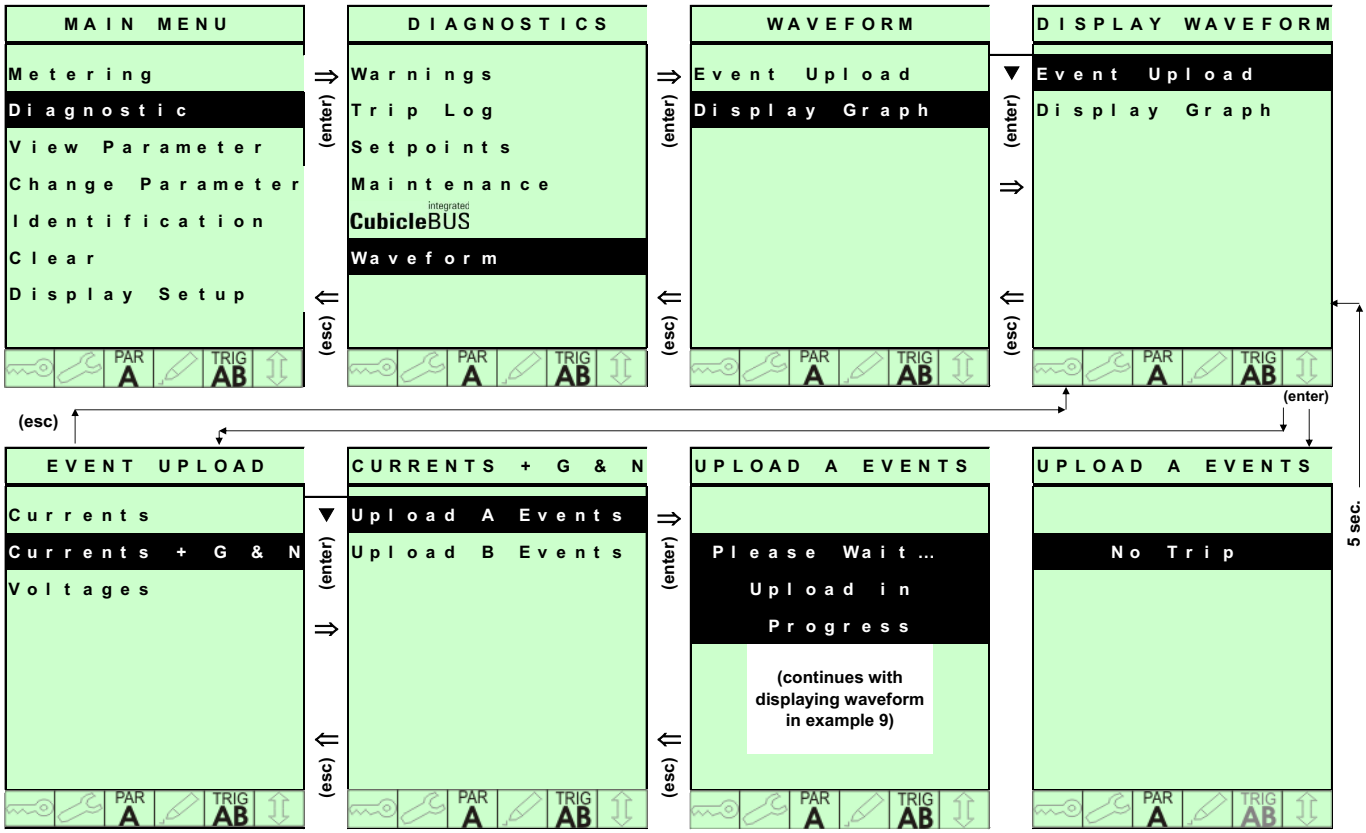
Example 6: Inquiring maintenance information



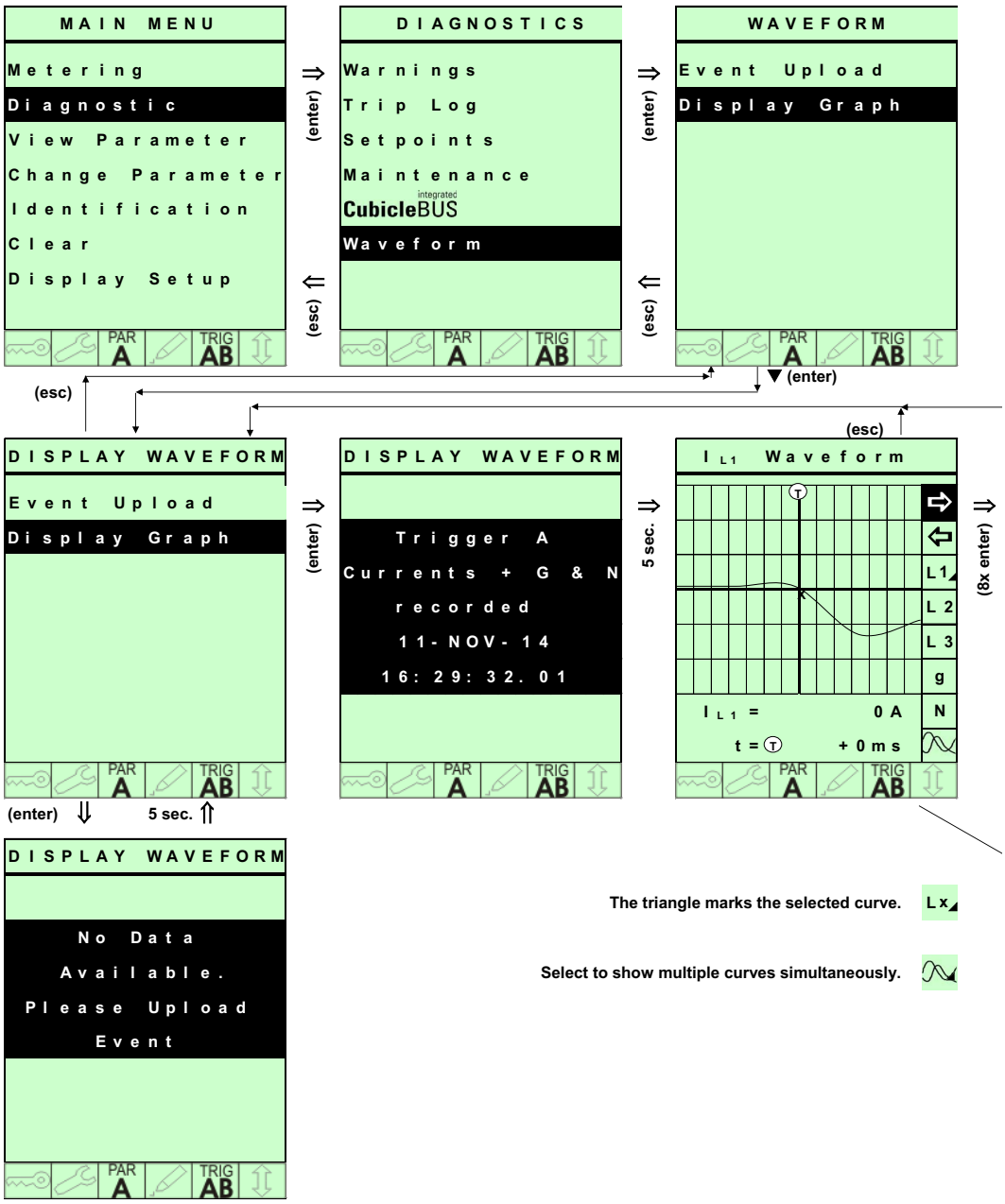
Example 7: Adjusting representation of characteristics

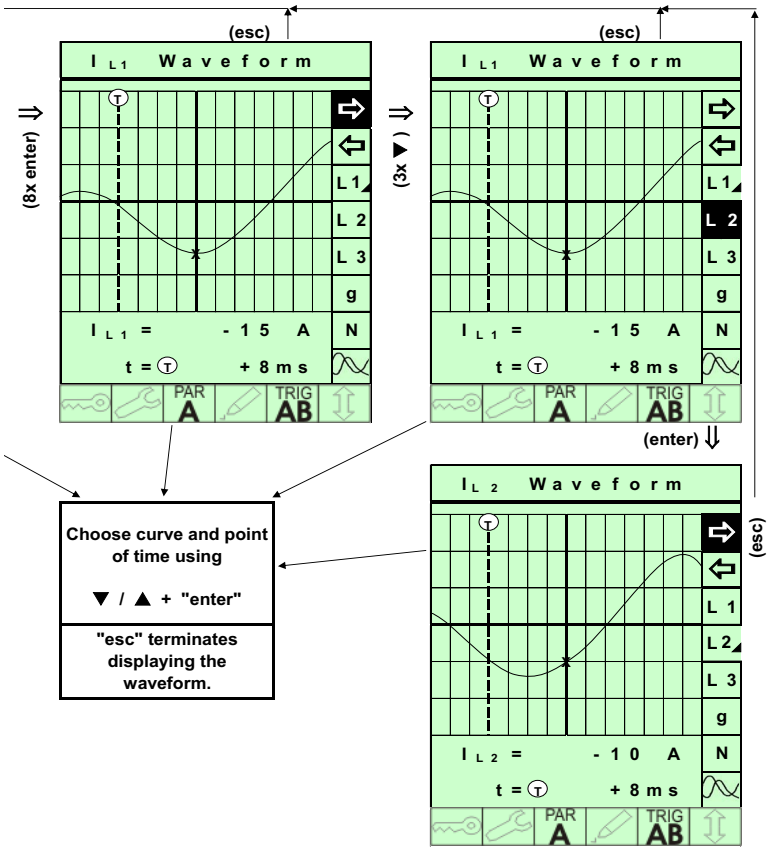


Example 8: Selecting event for displaying characteristics



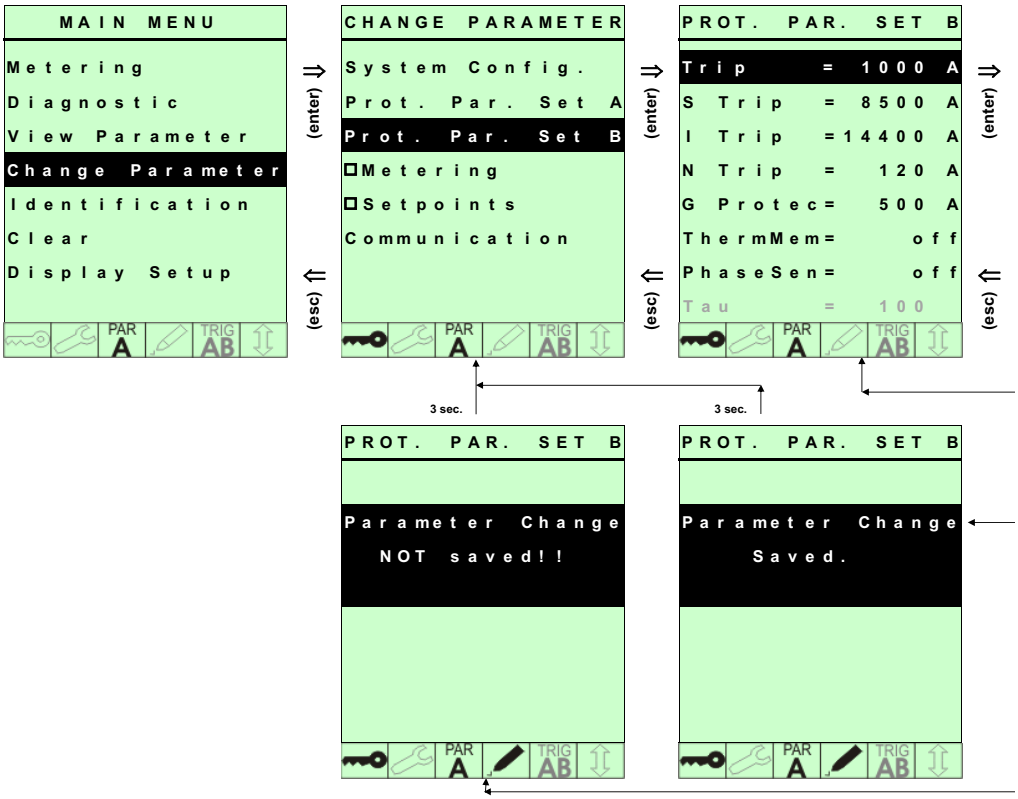
Example 9: Displaying characteristics




(esc)
I L1 Waveform
(8x enter)
(3x ▶)
L 1
L 2
L 3
g
N
I L1 = - 15 A
t = T + 8 ms
PAR
A
TRIG
AB
(enter)
I L2 Waveform
Choose curve and point of time using
▼ / ▲ + "enter"
"esc" terminates displaying the waveform.

Changing parameters

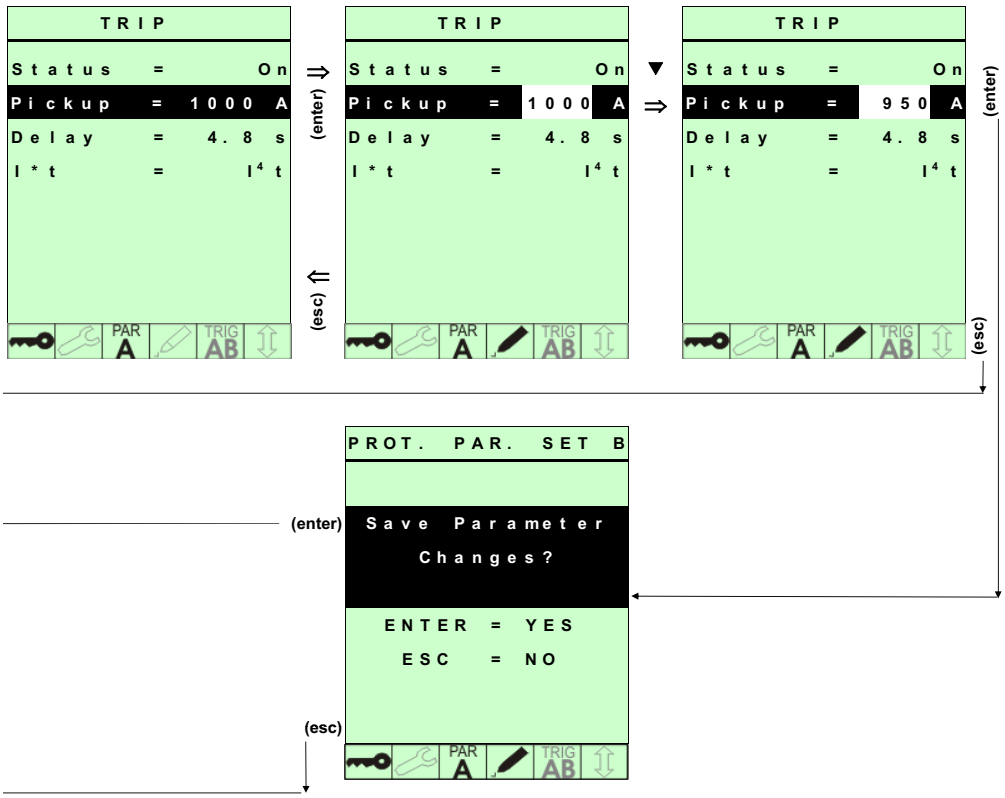
Example 10: Setting protection parameters

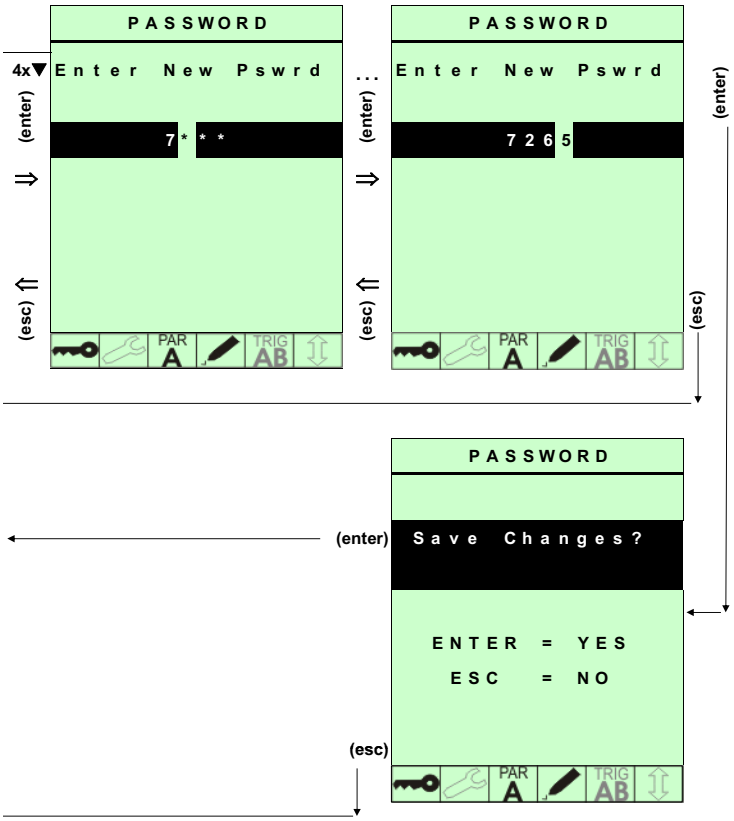


Adjusting the settings

Example 11: Entering password

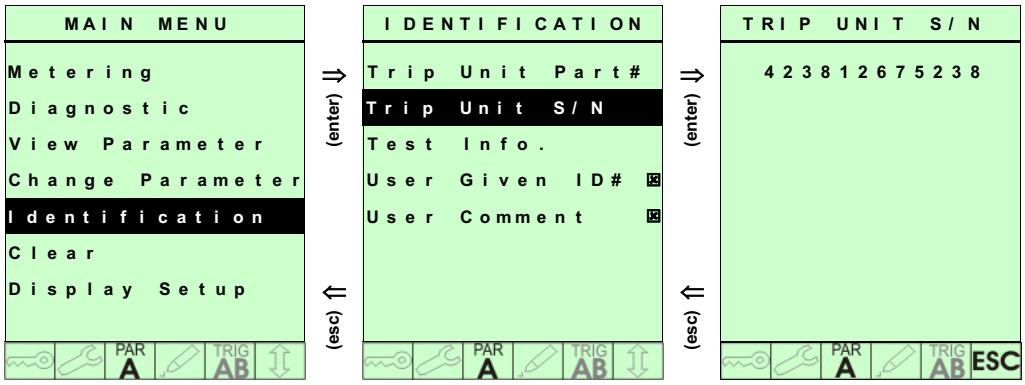



TRIP
Status = On
Pickup = 1000 A
Delay = 4.8 s
I*t = I4t
(enter)
(esc)
TRIP
Status = On
Pickup = 1000 A
Delay = 4.8 s
I*t = I4t
TRIP
Status = On
Pickup = 950 A
Delay = 4.8 s
I*t = I4t
(enter)
(esc)
PROT. PAR. SET B
(enter)
Save Parameter Changes?
ENTER = YES
ESC = NO
(esc)


PASSWORD
4x▼
Enter New Pswrd
7* * *
(enter)
(esc)
PASSWORD
Enter New Pswrd
7265
(enter)
(esc)
(enter)
(esc)
PASSWORD
(enter)
Save Changes?
ENTER = YES
ESC = NO
(esc)

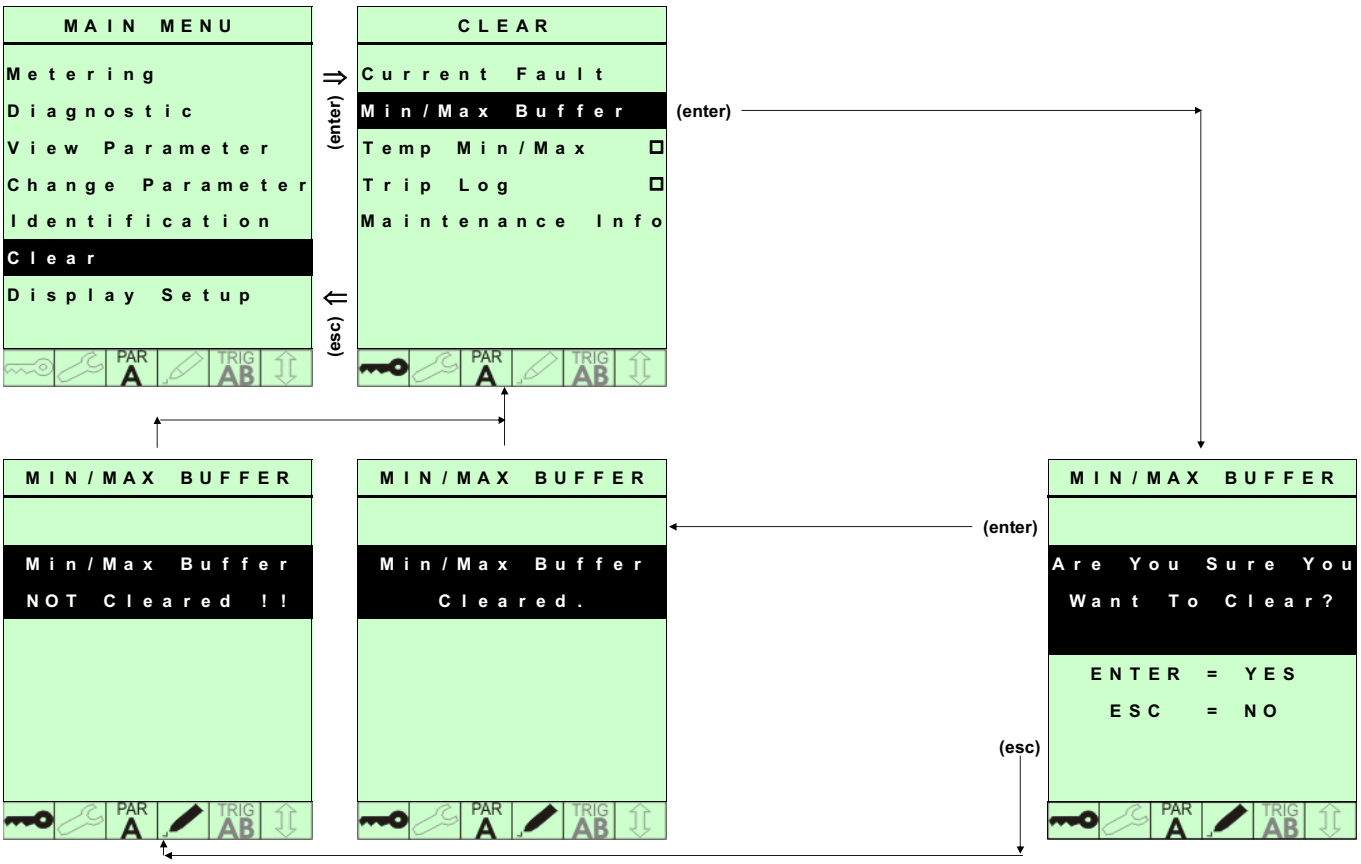
Identifications

Example 12: Identification



Clear

Example 13: Deleting the measured minimum and maximum values

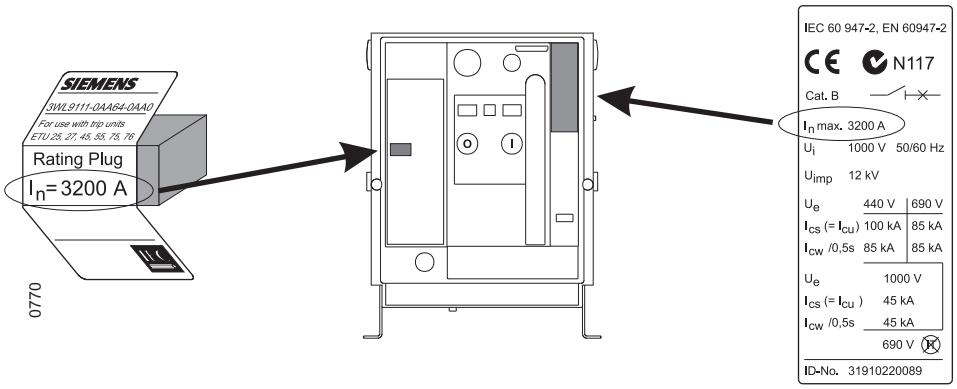


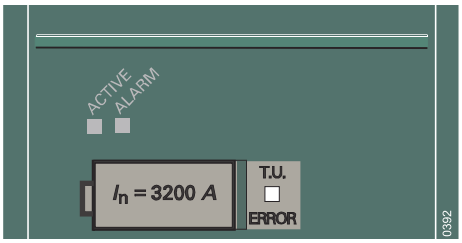
9.1.11 Bemessungsstrommodul

VORSICHT
Beim Austausch des Bemessungsstrommoduls ist sicherzustellen, dass dessen Bemessungsstrom I_n kleiner oder gleich dem zulässigen maximalen Bemessungsnennstrom $I_{n\,max}$ des Leistungsschalters ist. Anderenfalls kann es zur thermischen Überlastung des Schalters und ggf. auch der Anlage kommen. Der kleinste zulässige Bemessungsstrom für Schalter BG III ist 1250 A.

9.1.11 Rating plug

CAUTION
If the rating plug is to be replaced the rated current I_n of the rating plug has to be equal to or smaller than the maximum rated current $I_{n\,max}$ of the circuit breaker. Otherwise a thermal overload of the circuit breaker / installation can occur. Minimum permissible rating plug for a circuit breaker of frame size III is 1250 A.







Das Bemessungsstrommodul bestimmt den Bemessungsstrom innerhalb eines gewissen Bereiches für eine gegebene Baugröße des Leistungsschalters.

Wird ein Bemessungsstrommodul für einen Strom gesteckt, der größer ist, als der maximal zulässige Bemessungsstrom des Leistungsschalters, so wird dieser Fehler von der Elektronik des Überstromauslösers erkannt und mit einer blinkenden Anzeige T.U. ERROR signalisiert.

Der Überstromauslöser ignoriert den vom falschen Bemessungsstrommodul vorgegebenen Wert für den Bemessungsstrom und setzt diesen auf den Wert des für die Baugröße des betreffenden Leistungsschalters kleinsten Bemessungsstrommoduls.

Gleiches passiert, wenn für einen Schalter der Baugröße III ein Bemessungsstrommodul kleiner 1250 A verwendet wird oder gar kein Bemessungsstrommodul gesteckt ist. Alle eingestellten Schutzparameter werden entsprechend angepasst; die Anzeige T.U. ERROR blinkt.

Wird ein Leistungsschalter ohne Bemessungsstrommodul in Betrieb genommen, blinkt die Anzeige T.U. ERROR und der Überstromauslöser setzt den Bemessungsstrom auf den Wert des für die Baugröße des betreffenden Leistungsschalters kleinsten Bemessungsstrommoduls.

The rating plug defines the rated current within a specific range for a given circuit breaker size.

If a rating plug with a higher current than the maximum permissible circuit breaker rated current is plugged in, the electronic system of the overcurrent release recognizes this error and signals it with a flashing indication T.U. ERROR.

The overcurrent release ignores the default value for the rated current provided by the false rating plug and adjusts it to the value of the smallest rating plug provided for the frame size of the circuit breaker concerned.

The same happens if a circuit breaker with frame size III is equipped with a rating plug smaller than 1250 A. All set protection parameters are adjusted accordingly; the T.U. ERROR indicator will flash.

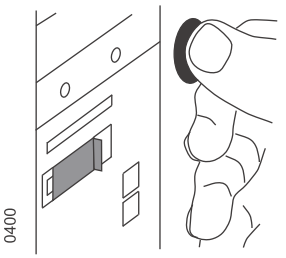
If a circuit breaker is started up without a rating plug, the T.U. ERROR indicator will flash and the overcurrent release sets the rated current to the value of the smallest rating plug for the frame size of the circuit breaker used.

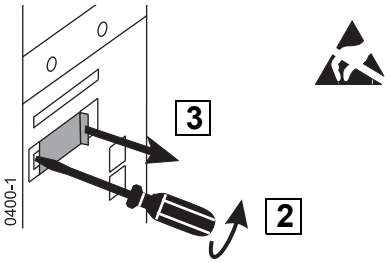
Bestellnummern **Order numbers**

Baugröße Frame size			Bemessungsstrommodul Rating plug	Bestell-Nr. Order no.
I	II		250 A 315 A 400 A 500 A 630 A 800 A 1000 A	3WL9111-2AA51-0AA0 3WL9111-2AA52-0AA0 3WL9111-2AA53-0AA0 3WL9111-2AA54-0AA0 3WL9111-2AA55-0AA0 3WL9111-2AA56-0AA0 3WL9111-2AA57-0AA0
		III	1250 A 1600 A	3WL9111-2AA58-0AA0 3WL9111-2AA61-0AA0
	II		2000 A 2500 A 3200 A	3WL9111-2AA62-0AA0 3WL9111-2AA63-0AA0 3WL9111-2AA64-0AA0
			4000 A 5000 A 6300 A	3WL9111-2AA65-0AA0 3WL9111-2AA66-0AA0 3WL9111-2AA67-0AA0

Bemessungsstrommodul tauschen **Exchange of rating plug**

VORSICHT	**CAUTION**
Das Bemessungsstrommodul darf nur unter folgenden Bedingungen gezogen werden:	The rating plug may be removed only if:
- Der Einschubschalter befindet sich in der Trennstellung oder - der Festeinbauschalter ist ausgeschaltet und der Überstromauslöser ist von der Hilfsspannungsversorgung getrennt oder - der Überstromauslöser ist ausgebaut.	- The draw-out circuit breaker is in the disconnect position or - the fixed-mounted breaker is switched off and the overcurrent release disconnected from control supply or - the overcurrent release has been removed from the breaker.
Ein Betrieb des Überstromauslösers ohne Bemessungsstrommodul ist nicht zulässig	**Operating the overcurrent release without rating plug is not permitted.**





9.1.12 Erdschlussschutzmodul

Die Überstromauslöser ETU45B und ETU76B können optional mit einem Erdschlussschutzmodul ausgestattet werden. Es dient dem Schutz nachgeordneter Verbraucher vor unzulässig hohen Erdschlussströmen.

Das Überschreiten des Einstellwertes führt je nach Ausführung des Erdschlussschutzmoduls nur zur Ausgabe einer Meldung oder gleichzeitig auch zum Auslösen des Überstromauslösers.→ (Seite 9-24)

Folgende Gerätekombinationen sind möglich:

Überstromauslöser	Erdschlussschutzmodul
ETU76B	GFM AT 55B-76B
ETU45B	GFM AT 45B

Die Erdschlusserfassung kann durch zwei Arten erfolgen:

- bei symmetrischer Belastung der Außenleiter durch vektorielle Summenbildung der Ströme
- Direkte Messung des Erdschlussstromes mit einem separaten Wandler 1200 A : 1 A.

9.1.12 Ground-fault protection module

The overcurrent releases ETU45B and ETU 76B can be optionally equipped with a ground-fault protection module. It is used to protect downstream loads against unpermissibly high ground-fault currents.

Depending on the ground-fault protection module version, the set value being exceeded will cause either an alarm only or an alarm and a trip at the same time. → (page 9-24)

The following device combinations are possible:

Overcurrent release	Ground-fault protection module
ETU76B	GFM AT 55B-76B
ETU45B	GFM AT 45B

There are two means of ground-fault detection:

- symmetrical load of the phase conductor by vectorial summation
- Direct measuring of the ground-fault current with a separate transform 1200 A : 1 A

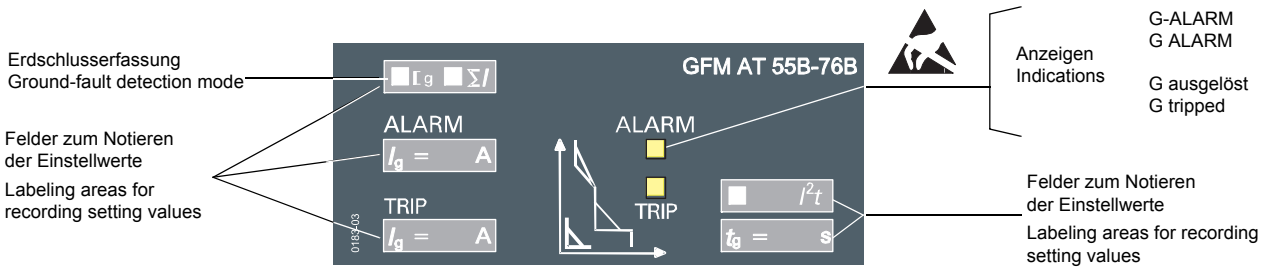
Hinweis	Note
Bei Erdschlusserfassung mittels vektorieller Summenbildung der Ströme in einem 4 poligem Netz wird dringend empfohlen, auch den Strom des N-Leiters einzubeziehen. Dazu ist ein N-Wandler erforderlich, der ggf. nachgerüstet werden muss. Anderenfalls führt auch ein entsprechender Strom im N-Leiter zum Ansprechen des Erdschlussschutzes. → (Seite 8-7)	If the ground fault is detected by vectorial summation of the currents in a 4 pole network, it is imperatively recommended to include the current of the neutral conductor, too. This requires a neutral conductor transformer, which may have to be retrofitted. Otherwise, a corresponding current in the neutral conductor will also activate the ground-fault protection. → (page 8-7)

Alarm- und Ausgelöstmeldungen können über den **Cubicle**BUS und PROFIBUS-DP / Modbus ausgegeben werden.

Alarm and trip signals can be transmitted through the **Cubicle**BUS and the PROFIBUS-DP/Modbus.

Modul GFM AT 55B-76B

Module GFM AT 55B-76B

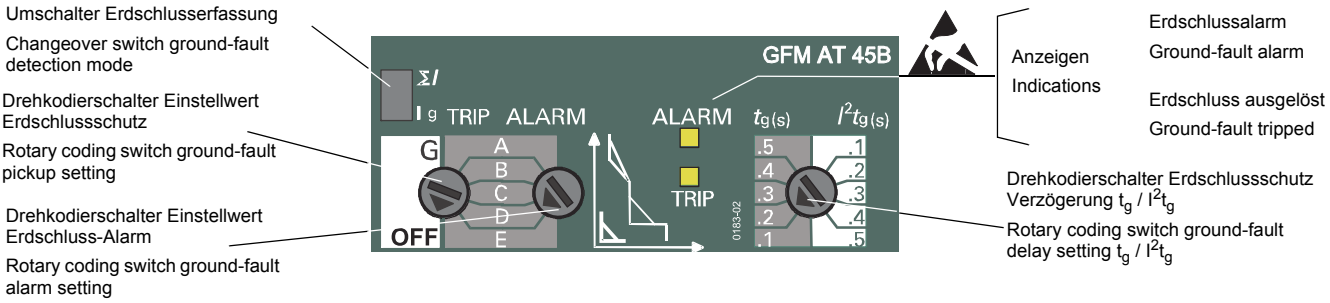


- Erdschlussschutz durch Auslösung des Leistungsschalters und Alarmmeldung
- Auslösung kann abgeschaltet werden
- Modul parametrierbar über:
  - das Grafikdisplay (ETU76B)
  - die Prüfbuchse mit dem BDA (ETU76B)
  - den PROFIBUS-DP mit einem PC und der Software „powerconfig“ → (Seite 27-3) (ETU76B).
- Erdschlusserfassung wählbar:
  - vektorielle Summenbildung Σ I = L1+L2+L3+N
  - externer Erdschlusswandler SI = 1200 A : 1 A

- Ground-fault protection by way of alarm signal and tripping the circuit breaker
- Tripping function can be switched off
- Module programmable via:
  - the graphical display (ETU76B)
  - the test socket with the BDA (ETU76B)
  - the PROFIBUS-DP with a PC and the software "powerconfig"→ (page 27-2) (ETU76B).
- Ground-fault detection mode selectable:
  - vectorial summation Σ I = L1+L2+L3+N
  - external ground-fault transformer SI = 1200 A : 1 A

Modul GFM AT 45B

Module GFM AT 45B



- Erdschlussschutz durch Auslösung des Leistungsschalters und Alarmmeldung
- Auslösung kann abgeschaltet werden, Stellung OFF
- Umschalter Erdschlusserfassung nur bei ausgebautem Modul oder ausgebautem Überstromauslöser zugänglich

- Ground-fault protection by tripping the circuit breaker and alarm signaling
- Tripping function can be switched off, OFF position
- Changeover switch for ground-fault detection mode only accessible with removed module or removed overcurrent release.

Einstellwerte für I_g	Baugröße	
	I / II	III
A	100 A	400 A
B	300 A	600 A
C	600 A	800 A
D	900 A	1.000 A
E	1.200 A	1.200 A
OFF		

Current Settings for I_g	Frame size	
	I / II	III
A	100 A	400 A
B	300 A	600 A
C	600 A	800 A
D	900 A	1,000 A
E	1,200 A	1,200 A
OFF		

Einstellwerte für t_g	
ETU27B … 45B	t_g = 0,1 / 0,2 / 0,3 / 0,4 / 0,5 s
ETU76B	t_g = 0,1 … 0,5 s

Settings for t_g	
ETU27B … 45B	t_g = 0.1 / 0.2 / 0.3 / 0.4 / 0.5 s
ETU76B	t_g = 0.1 … 0.5 s

Nachrüsten

Retrofitting

GEFAHR

Gefährliche Spannung sowie bewegliche Teile mit hoher Geschwindigkeit.

Kann Tod, schwere Personenschäden sowie Schäden an Geräten und Ausrüstung bewirken.

Vor dem Arbeiten an diesem Gerät, Anlage unbedingt spannungsfrei schalten.

Vor dem Entfernen jeglicher Abdeckungen und des Bedienpults des Leistungsschalters unbedingt Speicherfeder entspannen.→ (Seite 24-3)



DANGER

Hazardous voltages and high-speed moving parts.

Will cause death, serious personal injury, or equipment / property damage.

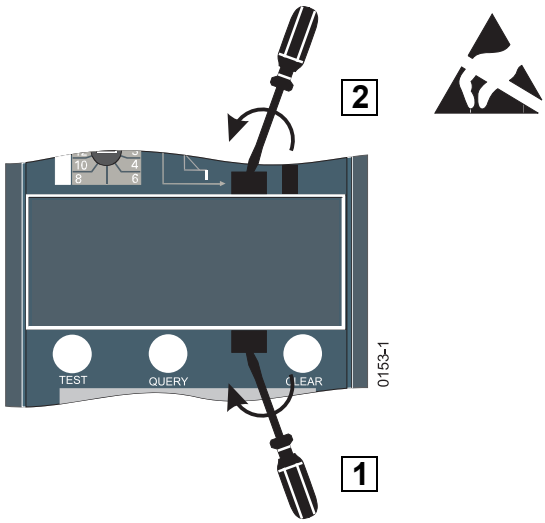
Always de-energize and ground equipment before working on this equipment.

Discharge springs before removing barriers / covers → (page 24-3).

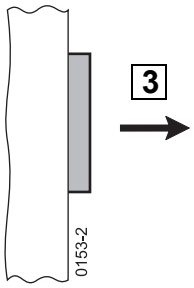
- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Externe Spannungsversorgung 24 V DC ausschalten, sofern vorhanden
- Plombierhaube des Überstromauslösers entfernen, sofern vorhanden → (Seite 9-78)

- Switch off and discharge the storage spring → (page 24-3)
- Switch off external 24 V DC voltage supply, if applicable
- Remove sealing cap of overcurrent release, if applicable → (page 9-78)

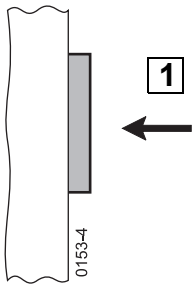
Blindmodul ausbauen



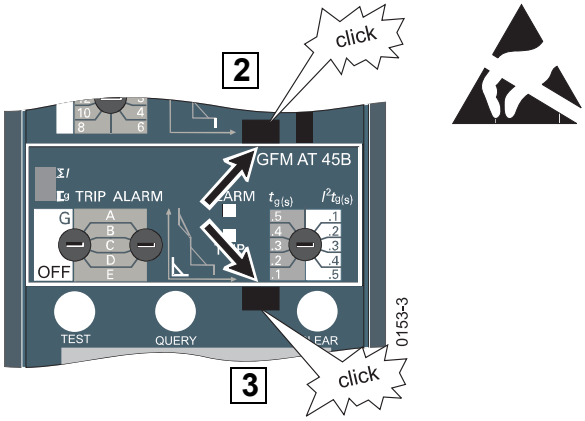
Removing dummy module



Erdschlussschutzmodul einsetzen und einrasten



Installing and snapping the ground-fault protection module into place



- Externe Spannungsversorgung 24-V-DC einschalten, sofern vorgesehen
- Parameter für Erdschlussschutz einstellen
- Prüfung der Auslösefunktion mit Hilfe des Handprüfgerätes → (Seite 9-130)
- Plombierhaube des Überstromauslösers ggf. aufsetzen und plombieren → (Seite 9-78)

- Switch on external voltage supply 24 V DC, if applicable
- Adjust settings for ground-fault protection
- Test the tripping function with the handheld test device → (page 9-130)
- Install and seal sealing cap of overcurrent release, if applicable → (page 9-78)

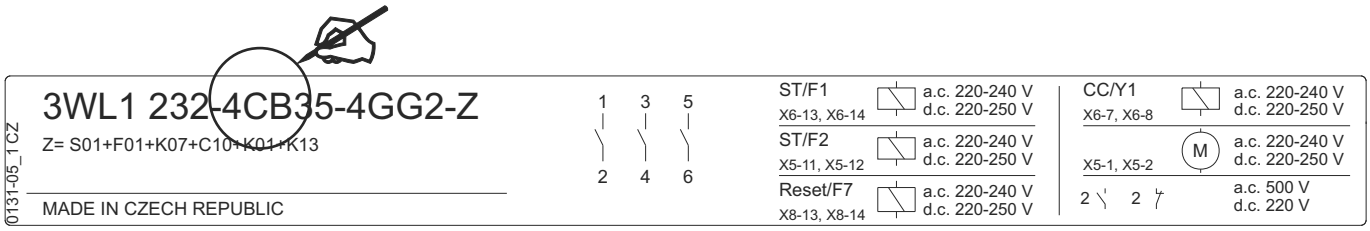
Schilder aktualisieren

Updating the options label

Hinweis	Note
Nach dem Einbau zusätzlicher Komponenten sind folgende Angaben mit einem weißen Permanentstift bzw. mit Aufklebern aus dem beiliegenden Etikettenbogen zu aktualisieren! Davor ist es ggf. notwendig die zu korrigierenden Zeichen mit einem schwarzen Permanentstift zu füllen.	After installing additional components, add the following data using a white and indelible ink pen or the appropiate label from the set of labels supplied! If necessary the signs which need to be corrected have to be filled with a black permanent pen before.

Ausstattungsschild des Leistungsschalters

Options label of the circuit breaker



Bestellnummern und MLFB-Änderung

Order numbers and MLFB-change

Erdschlussschutzmodul **Ground-fault protection module**	**Bestell-Nr.** **Order no.**	**10. Stelle ändern** **Modify 10th position**
GFM AT für ETU76B GFM AT for ETU76B	3WL9111-0AT56-0AA0	G
GFM AT für ETU45B GFM AT for ETU45B	3WL9111-0AT53-0AA0	G

9.1.13 Austausch des Überstromauslösers

9.1.13 Replacing the overcurrent release

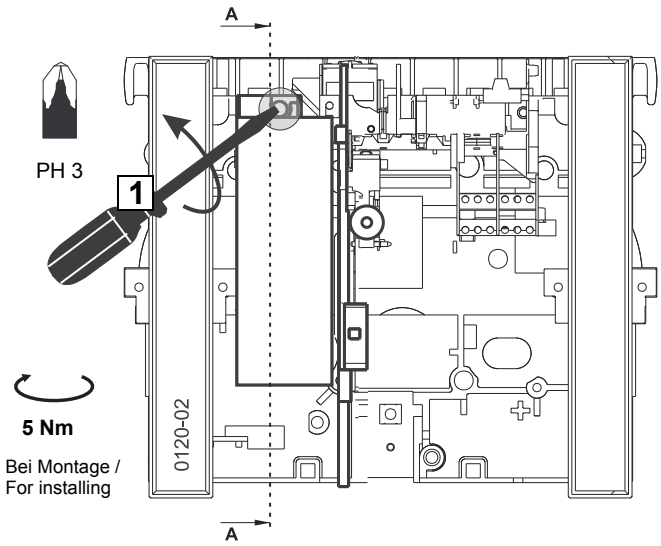
GEFAHR		**DANGER**
Gefährliche elektrische Spannung! **Kann Tod, schwere Personenschäden sowie Schäden an Geräten und Ausrüstung bewirken.** Vor dem Arbeiten an diesem Gerät, Anlage unbedingt spannungsfrei schalten.		**Hazardous voltage!** **Will cause death, serious personal injury, or equipment / property damage.** Disconnect power before working on this equipment.

ACHTUNG		**NOTICE**
Austausch nur durch Personal, welches das „Service- und Montageseminar - Niederspannungs Leistungsschalter 3WL“ bei SIEMENS besucht hat.		Replacement only by qualified personnel, who have participated in the “seminar for Service and assembly of low-voltage circuit breakers 3WL” at SIEMENS.

VORSICHT		**CAUTION**
Überstromauslöser nur auswechseln, wenn Schalter AUS und Federspeicher entspannt ist.		Exchange overcurrent release only if circuit breaker is OFF and storage spring is not charged.

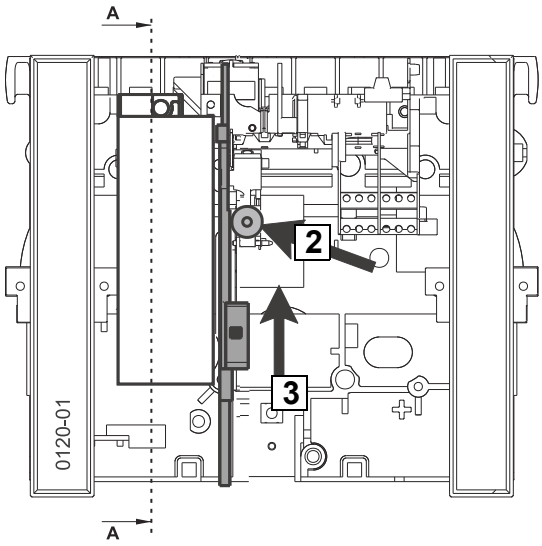
Ausbau

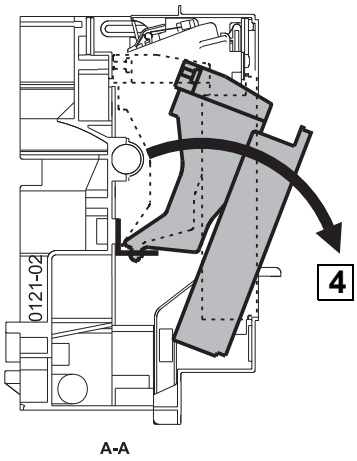
- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Bedienpult abnehmen → (Seite 24-11)

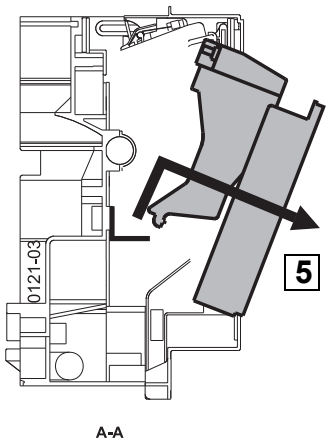


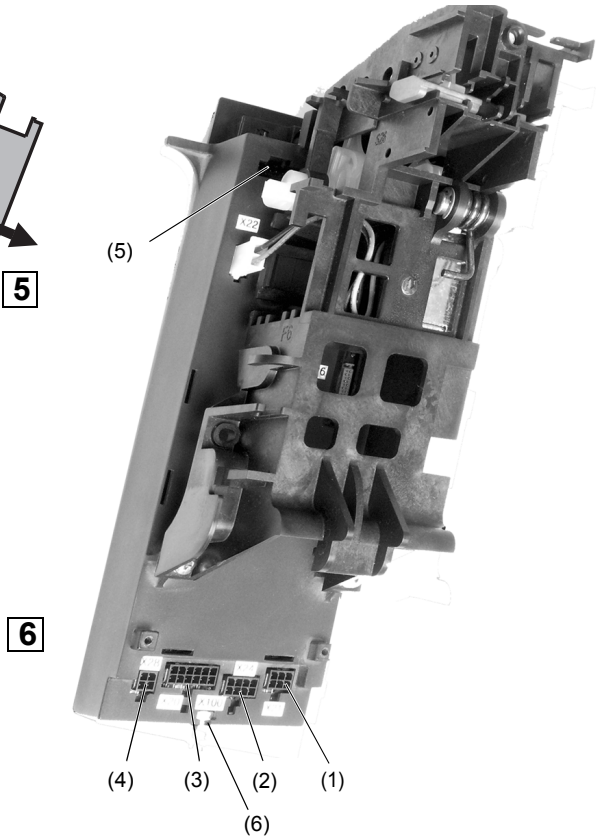
Removing

- Switch off and discharge the storage spring → (page 24-3)
- Remove front panel → (page 24-11)









(1) **Energiewandler** (X21)
(2) N-/g-Wandler (X24)
(3) Messwandler Teil 1 (X20)
(4) Messwandler Teil 2 (X28)
(5) 5poliger **Cubicle**BUS (X27)
(6) Anschluss Gehäusemasse (X100)

Stecker abziehen

Die Belegung der Anschlussbuchsen ist typenabhängig.

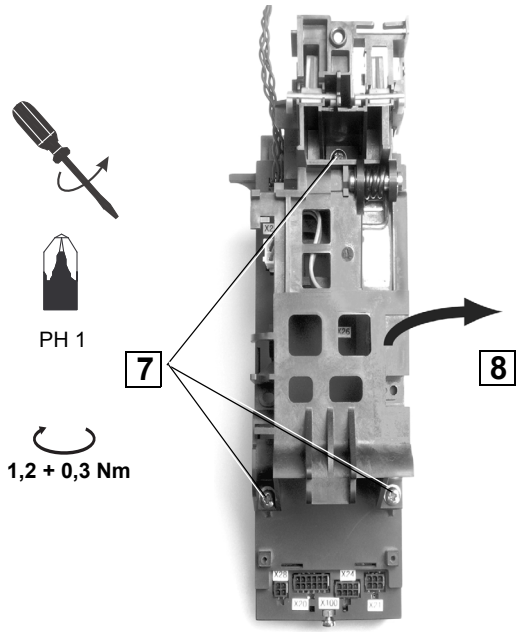
(1) **Energy transformer** (X21)
(2) N-/g-transformer (X24)
(3) Measuring transformer part 1 (X20)
(4) Measuring transformer part 2 (X28)
(5) 5-pole **Cubicle**BUS (X27)
(6) Connection GND (X100)

Remove connectors

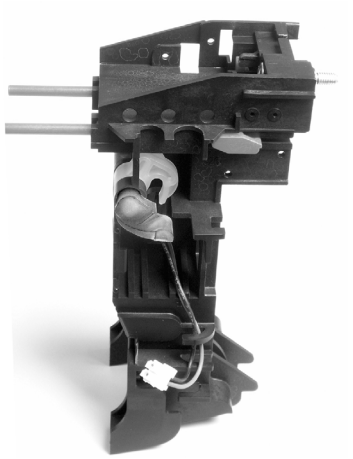
The pin assignment of the connecting socket depends on the type.

Hinweis	**Note**
Vor dem Abziehen der Stecker Leitungsverlegung merken. Sie muss beim Einbau in gleicher Art wieder hergestellt werden, um ein Einklemmen von Leitungen beim Zusammenbau zu verhindern.	Mark the position of the connector so that you can maintain the wire polarity to avoid a destruction of the wire.

VORSICHT		**CAUTION**
Wandler nur mit dem vorgesehenen Prüfgerät überprüfen. Direkte Messungen an den Wandlersteckern sind zu unterlassen. Diese können beschädigt werden, was den Ausfall des Überstromauslösers zur Folge haben kann.		Current transformers must only be tested using the test device provided. Do not take direct measurements at the current-transformer connectors, as they may sustain damage, which could cause the overcurrent release to fail.







ETU umrüsten

ETU retrofitting

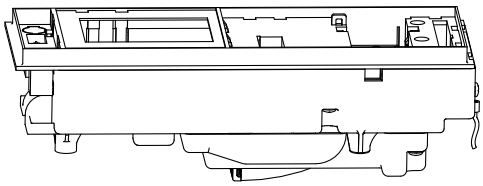


Ersatz „Release 2“ durch „Release 2“

Tausch der ETU-Box

Replacement of "Release 2" by "Release 2"

Interchange of ETU-Box



Ersatz „Release 2“ durch „Release 1“ ist nicht möglich

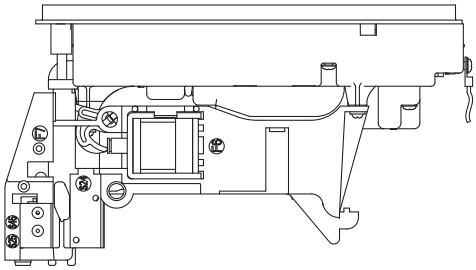
Ersatz „Release 1“ durch „Release 2“

Tausch der Baugruppe (ETU-Box und Träger mit Ausstattung, komplette Bestellnummer MLFB erforderlich)

Replacement of "Release 2" by "Release 1" is not possible

Replacement of "Release 1" by "Release 2"

Interchange of mounting group (ETU-Box and equipped carrier, complete order number MLFB necessary)



Einbau

Der Einbau erfolgt in umgekehrter Reihenfolge.

ACHTUNG	NOTICE
Verdrehung der Schwingmetalle vermeiden. Anziehdrehmoment beachten.	Avoid contorsion of anti-vibration rubber, pay attention to tightening torque.

Wird ein Überstromauslösersystem mit einer anderen Konfiguration als bisher verwendet eingebaut, so ist die Bestell-Nr. auf dem Ausstattungsschild des Leistungsschalters entsprechend den Katalogangaben zu korrigieren.

ACHTUNG	NOTICE
Nach Austausch des Überstromauslösers unbedingt Prüfung mit dem Handprüfgerät durchführen! → (Seite 9-126)	After replacing the overcurrent release, always test with the test unit! → (page 9-126)

Das Ergebnis der Prüfung ist schriftlich zu dokumentieren. Dazu ist das Formblatt „Meldung über Leistungsschalter-Umbau“ zu nutzen. Das Formblatt kann am Ende der Bedienungsanleitung kopiert werden. → (Seite 29-2) Um die Zurückverfolgbarkeit der Schalterausstattung beim Hersteller zu gewährleisten, ist der Umbau dem Technischen Service von SIEMENS mitzuteilen. Dazu ist das Formblatt vollständig ausgefüllt an die zuständige Adresse zu senden.

Zur Bestellung von Überstromauslösersystemen siehe Katalog SENTRON WL.

Für diesbezügliche Rückfragen steht die Hotline (Technical assistance) zur Verfügung.

Installation

Installation is done in reverse order.

If an overcurrent release with another configuration than the existing one is installed, the order no. on the type label of the circuit breaker must be changed according to the catalogue data.

The result of the test has to be documented. For that reason the form “Announcement of circuit breaker modification” should be used. The form can be copied from the end of this operating instructions. → (page 29-3) To ensure the retraceability of the circuit breaker equipment at the manufacturers site, the modification needs to be announced to the Technical Service of SIEMENS. To provide this information the form should be filled out completely and should be send to the responsible address.

For ordering overcurrent releases, please refer to catalogue SENTRON WL.

Please contact the hotline for technical assistance if you have any questions.

9.1.14 Interner Selbsttest der Überstromauslösefunktion

Für Inbetriebnahme und Funktionskontrolle.

Voraussetzungen

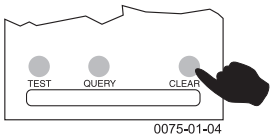
- Überstromauslöser ist aktiviert durch:
  Betriebsstrom
  externe Spannungsversorgung
- Strom nicht im Überlastbereich
  → Anzeigen (Seite 9-20)

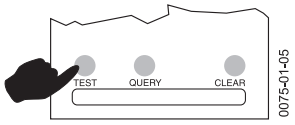
9.1.14 Internal self-test of the overcurrent tripping function

For commissioning and function testing.

Conditions

- overcurrent release is activated by:
  normal current
  external voltage supply
- operating current not in overload range
  → Indications (page 9-20)

<table>
<tr><td></td><td colspan="3">Interner Selbsttest des Schalters ohne Auslösung
Internal self test of the breaker without tripping</td></tr>
<tr><td></td><td colspan="3">Der normale Betrieb des Leistungsschalters wird nicht beeinträchtigt
Normal operation of the circuit breaker is not impaired</td></tr>
<tr><td></td><td colspan="3">Der Test kann jederzeit mit
CLEAR abgebrochen werden


The test can be interrupted
at any time by pressing CLEAR</td></tr>
<tr><td>1</td><td colspan="3">
</td></tr>
<tr><td>2</td><td colspan="3">Lauflicht / Running light
(Alle Anzeigen leuchten nacheinander auf / All indicators will light up one after another)</td></tr>
<tr><td></td><td colspan="2">Dauer des Lauflichts entspricht dem eingestellten Trägheitsgrad t_R

The flashing time corresponds to the time-lag class t_R</td><td>Die Abweichung der Lauflichtdauer vom eingestellten Trägheitsgrad t_R ist grösser als 10 %
The flashing time deviates from the set time-lag class t_R more than 10 %</td></tr>
<tr><td>3</td><td>Anzeige L-Auslösung leuchtet
The L-tripping indicator lights up

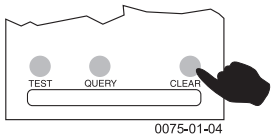
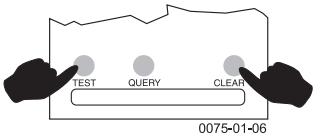
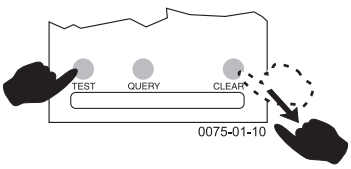
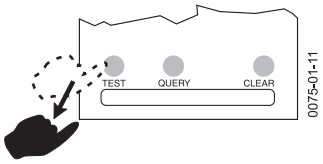
Test OK:</td><td>Anzeige T.U. ERROR leuchtet
LED T.U. ERROR lights up

Test nicht OK / Test not OK:</td><td>Test nicht OK / Test not OK
Überstromauslöser ist defekt, auch wenn Anzeige L-Auslösung leuchten sollte
Overcurrent release is defective, even if the L-tripping indicator lights up</td></tr>
<tr><td>4</td><td>- Anzeige erlischt nach 30 s
- Ende des Selbsttests
- Vorzeitiges Beenden mit CLEAR

- LEDs go out after 30 s
- End of internal self test
- Premature ending of test by CLEAR</td><td colspan="2"></td></tr>
<tr><td>5</td><td>Überstromauslöser OK
Overload release OK</td><td colspan="2">Prüfung mit Handprüfgerät
Please carry out a comprehensive testing with handheld test device</td></tr>
</table>

Interner Selbsttest des Schalters *mit Auslösung* → (Seite 9-77)

Internal circuit breaker self-test *with tripping* → (page 9-77)

	Interner Selbsttest des Schalters *mit Auslösung* **Internal circuit breaker self-test *with tripping***		
	Interner Selbsttest mit Auslösung nur durchführen, wenn nachgeordnete Stromkreise abgeschaltet werden dürfen! Internal self test with tripping should only be performed if downstream circuits are allowed to be safety disconnected!		
	Der Test kann jederzeit mit CLEAR abgebrochen werden  The test can be canceled at any time by pressing CLEAR		
1	**1**  **2**  **3** 		
2	**Lauflicht /Running light** (Alle Anzeigen leuchten nacheinander auf / All indicators will light up one after another)		
3	Dauer des Lauflichts entspricht dem eingestellten Trägheitsgrad t_R The flashing time corresponds to the time-lag class t_R		Die Abweichung der Lauflichtdauer vom eingestellten Trägheitsgrad t_R ist grösser als **10%** The flashing time deviates from the set time-lag class t_R more than **10%**
4	Schalter löst aus Breaker trips Test **OK**	Schalter löst nicht aus. Breaker does not trip Test **nicht OK** / Test **not OK**	Test **nicht OK** / Test **not OK** Überstromauslöser ist defekt, auch wenn Schalter auslösen sollte Overcurrent release is defective, even if the circuit breaker trips
5	→ Wiederinbetriebnahme nach Auslösung durch Überstromauslöser (Seite 6-7) → Reclosing a circuit breaker tripped by the trip unit (page 6-7)	- Prüfung mit Handprüfgerät - Verdrahtung Auslöser - Auslösemagnet prüfen - Auslösemagnet prüfen - Please carry out a comprehensive test with test unit - Check wiring between overcurrent release and tripping solenoid - Test tripping solenoid	

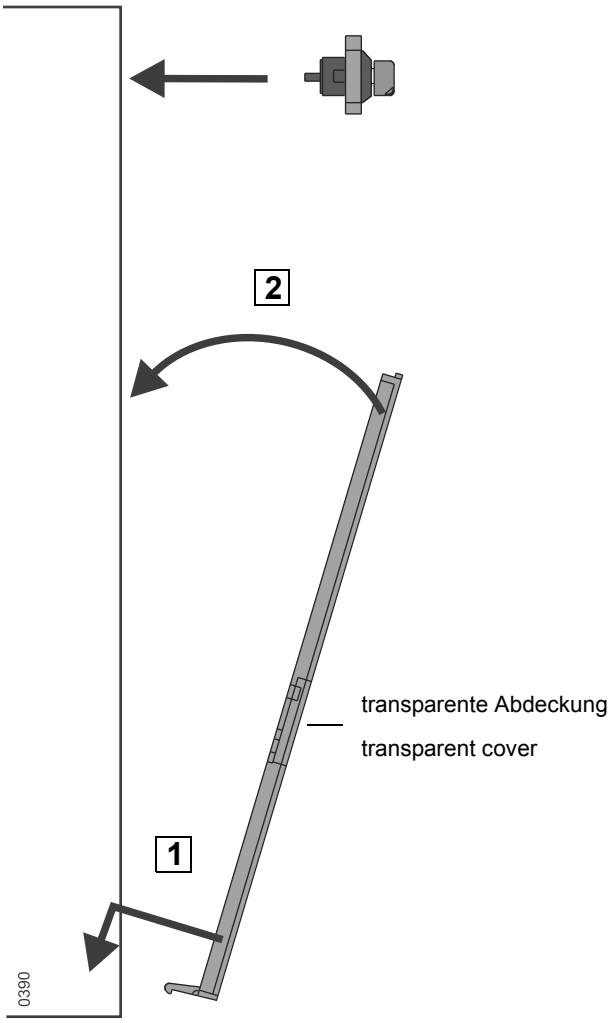
Interner Selbsttest des Schalters *ohne Auslösung* → (Seite 9-76) Internal self test of the breaker *without tripping* → (page 9-76)

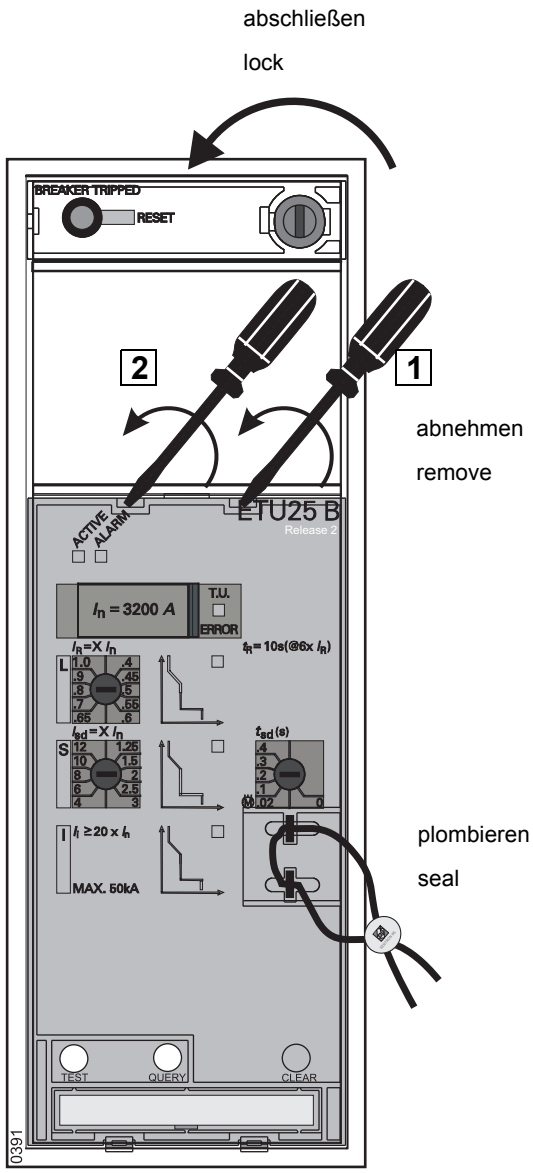
9.1.15 Plombier- und Abschließvorrichtung

Montage der Abschließvorrichtung → (Seite 15-17)

9.1.15 Sealing and locking device

Assembly of the locking device → (page 15-17)





Hinweis	Note
Draht zum Plombieren möglichst kurz halten!	Keep sealing wire as short as possible!

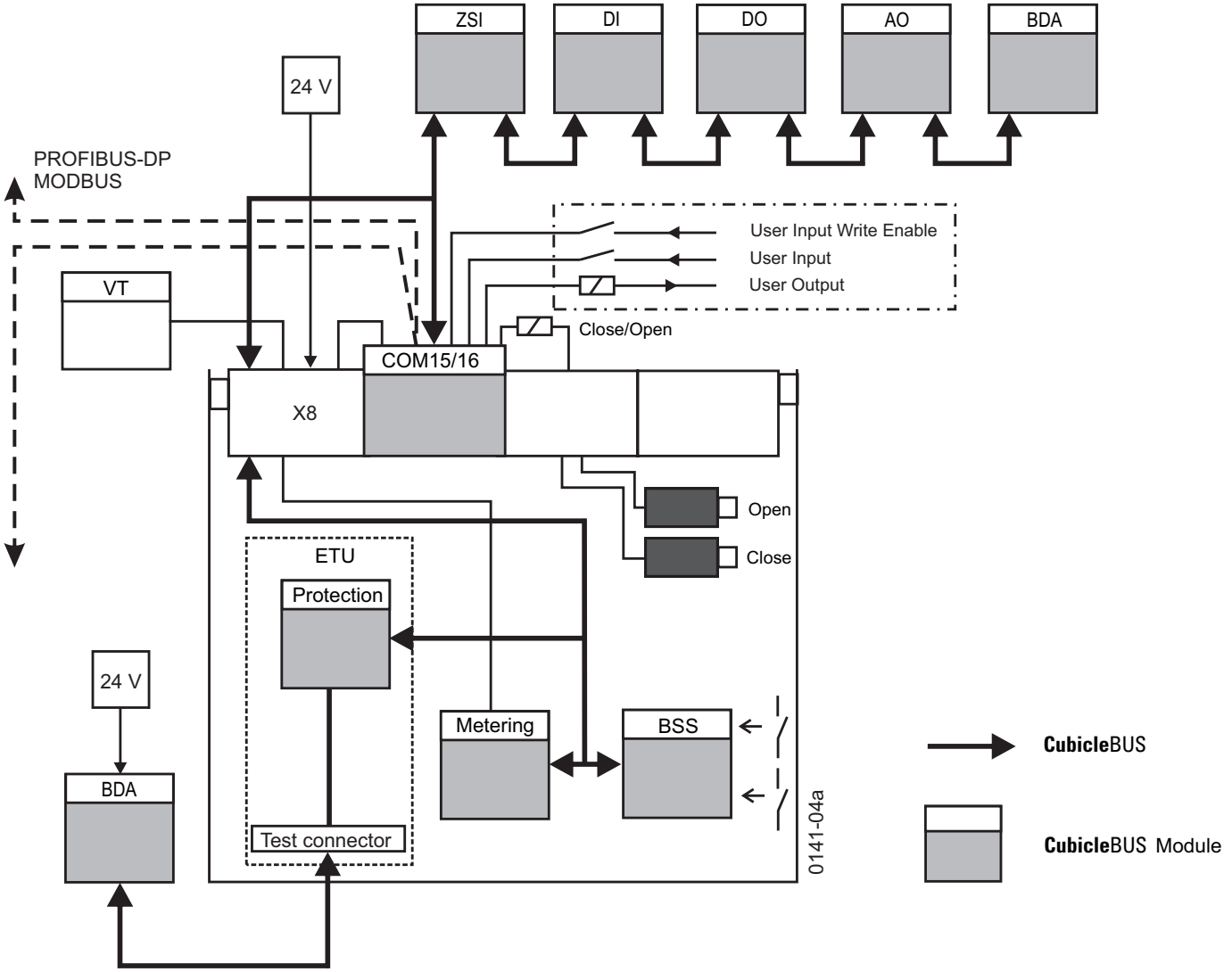
	Bestell-Nr. Order no.
ETU15B … ETU45	3WL9111-0AT45-0AA0
ETU76B	3WL9111-0AT46-0AA0

9.2 CubicleBUS-Module

9.2.1 System-Architektur

9.2 CubicleBUS-modules

9.2.1 System architecture



- **AO:** Analoges Ausgangsmodul
- **BDA:** Breaker Data Adapter; Adapter zum Parametrieren, Bedienen und Beobachten des Leistungsschalters mit einem beliebigen browserfähigen Ein- / Ausgabegerät; Anschluss über Prüfbuchse des Überstromauslösers oder Westernbuchse (RJ45) des letzten externen **Cubicle**BUS-Moduls
- **BSS:** Breaker Status Sensor für die Erfassung der Meldungen über den Zustand des Leistungsschalters
- **Cubicle**BUS**:** Internes Bussystem für die Verbindung von Schalterkomponenten untereinander und für den Anschluss von externen **Cubicle**BUS-Modulen
- **COM15/16:** Kommunikationsmodul für die Verbindung zwischen **Cubicle**BUS und Modbus
- **DI:** Digitale Eingangsmodule für potentialfreie Eingangssignale „0/1“-Signale; maximal zwei Module mit unterschiedlicher Konfiguration anschließbar
- **DO:** Digitale Ausgangsmodule mit je 6 Ausgängen; maximal drei Module mit unterschiedlicher Konfiguration bzw. Ausführung anschließbar
- **ETU:** Elektronischer Überstromauslöser
- **Metering:** Messfunktion *PLUS*
- **PROFIBUS-DP:** Feldbus zur Verbindung von Automatisierungskomponenten
- **Protection:** Schutzmodul
- **VT:** Spannungswandler
- **ZSI:** Modul für zeitverkürzte Selektivitätssteuerung (ZSS) (engl. Zone Selective Interlocking), muss immer als erstes Modul angeschlossen werden

- **AO**: Analog output module
- **BDA**: Breaker Data Adapter; adapter for parameterizing, operating and monitoring the circuit breaker via any input/output unit with browser features; connection through test socket of overcurrent release or western socket (RJ45) of the last external **Cubicle**BUS-module
- **BSS**: Breaker Status Sensor for acquisition of signals about the circuit breaker status
- **Cubicle**BUS: Internal bus system for interconnection of circuit breaker components and for connection of external **Cubicle**BUS-modules
- **COM15/16**: Communications module for interconnection of **Cubicle**BUS and Modbus
- **DI**: Digital input modules for potential-free input signals - “0/1”-signals; two modules with different configurations connectable as a maximum
- **DO**: Digital output modules with 6 outputs each; a maximum of three modules with different configurations or versions connectable
- **ETU**: Electronic overcurrent release
- **Metering**: Metering function *PLUS*
- **PROFIBUS-DP**: Field bus for connection of automation components
- **Protection**: Protection module
- **VT**: Voltage transformer
- **ZSI**: Module for zone selective interlocking, must always be connected as the first module

Hinweis	**Note**
Die Grundschutzfunktionen der elektronischen Überstromauslöser benötigen keine Hilfsenergie. Sollen zusätzlichen Funktionen der Überstromauslöser genutzt werden, die einen Datenaustausch über den **Cubicle**BUS erfordern, muss eine externe 24 V DC-Spannungsversorgung angeschlossen werden. → (Seite 9-121)	The basic functions of the electronic overcurrent releases do not require auxiliary power supply. To use extended functions of the overcurrent releases requiring data exchange via the **Cubicle**BUS, an external 24 V DC voltage supply must be connected. → (page 9-121)

9.2.2 Interne Module

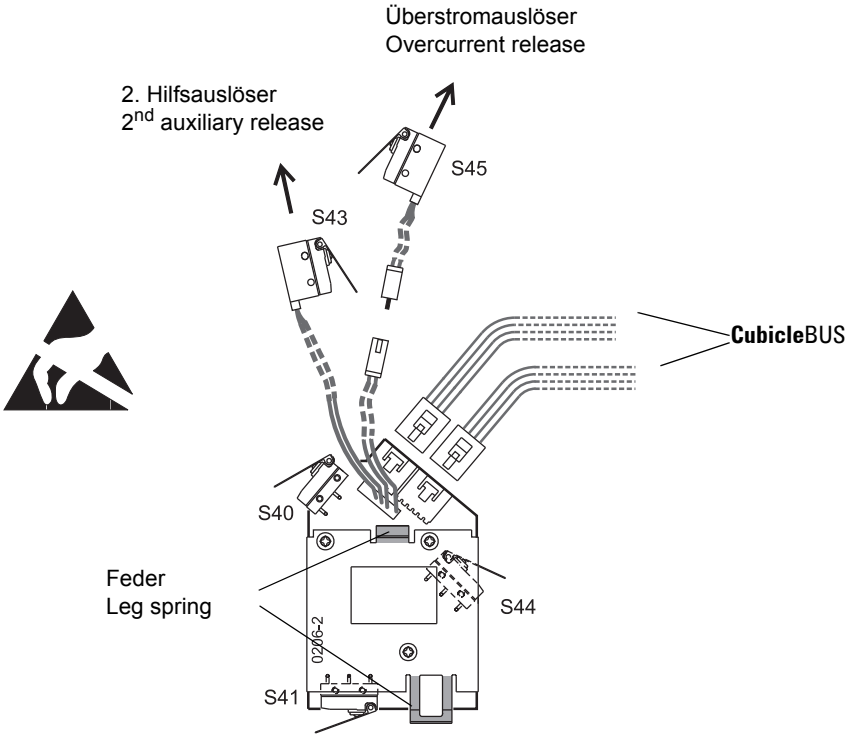
9.2.2.1 Breaker Status Sensor (BSS)

Für das Sammeln von Informationen über den Zustand des Leistungsschalters mittels Meldeschalter und deren Übertragung auf den **Cubicle**BUS.

9.2.2 Internal modules

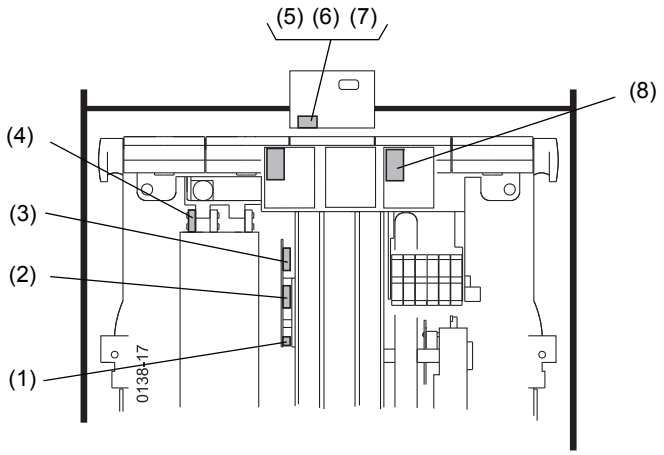
9.2.2.1 Breaker Status Sensor (BSS)

For collecting circuit breaker status information via signaling switches and transmitting these data to the **Cubicle**BUS.



Meldeschalter für den BSS

Signaling switches for BSS



(1) Meldeschalter Speicherzustand S41
(2) Meldeschalter S44 Hauptkontakte (EIN / AUS)
(3) Meldeschalter Einschaltbereitschaft S40
(4) Ausgelöst-Meldeschalter S45
(5) Meldeschalter Betriebsstellung S46
(6) Meldeschalter Prüfstellung S47
(7) Meldeschalter Trennstellung S48
(8) Meldeschalter S43 am zweiten Hilfsauslöser

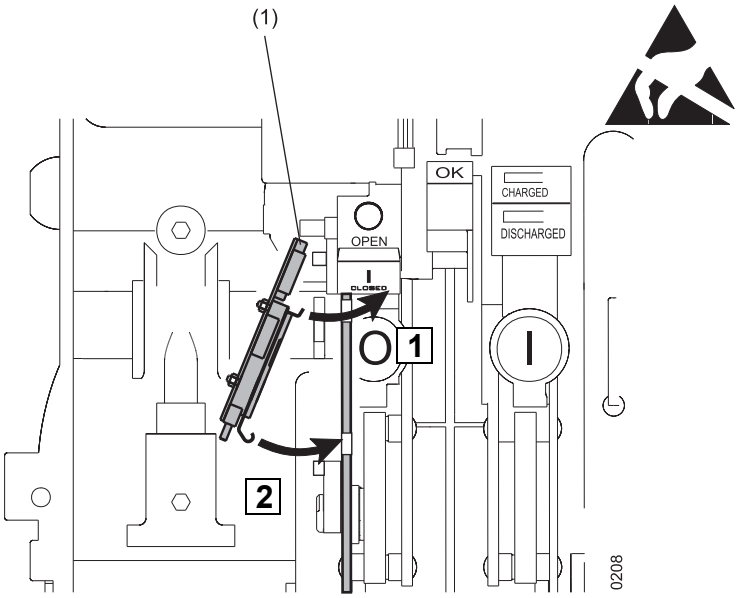
(1) Signaling switch spring charged S41
(2) Signaling switch ON-OFF position S44
(3) Signaling switch ready-to-close S40
(4) Trip signaling switch S45
(5) Signaling switch connected position S46
(6) Signaling switch test position S47
(7) Signaling switch disconnected position S48
(8) Signaling switch S43 2nd auxiliary release

BSS-Modul montieren

WARNUNG

Vor dem Arbeiten an diesem Gerät, Anlage unbedingt spannungsfrei schalten sowie das Gerät erden.

- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Bedienpult abnehmen → (Seite 24-11)
- Überstromauslöser ausbauen → (Seite 9-72)



(1) BSS
(2) Schaltwelle
(3) BSS
(4) Einschaltbereitschaftsanzeige
(5) Antriebswelle
(6) Mitnehmer

Meldeschalter am Hilfsauslöser UVR anbringen

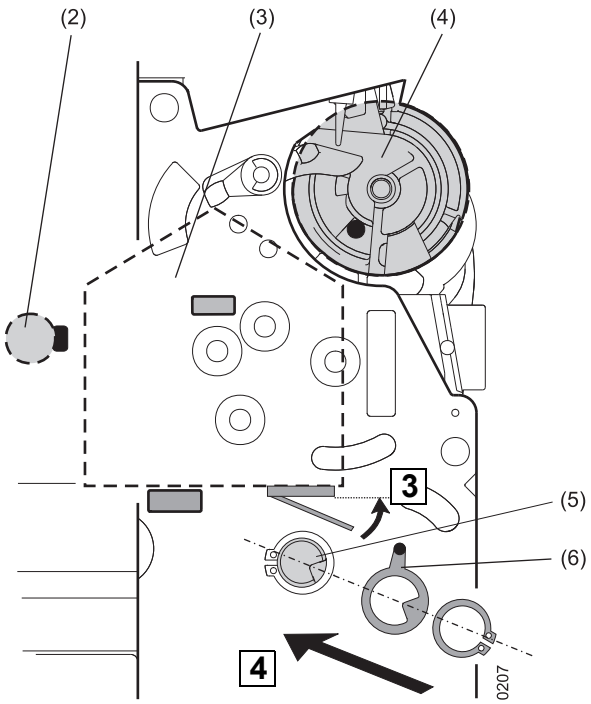
- → (Seite 11-3)

Installing the BSS module

WARNING

Always de-energize and ground equipment before working on this equipment.

- Switch off and discharge the storage spring → (page 24-3)
- Remove front panel → (page 24-11)
- Remove the overcurrent release → (page 9-72)



(1) BSS
(2) Main shaft
(3) BSS
(4) Ready-to-close indicator
(5) Operating shaft
(6) Driver

Attaching signaling switch on the auxiliary release

- → (page 11-3)

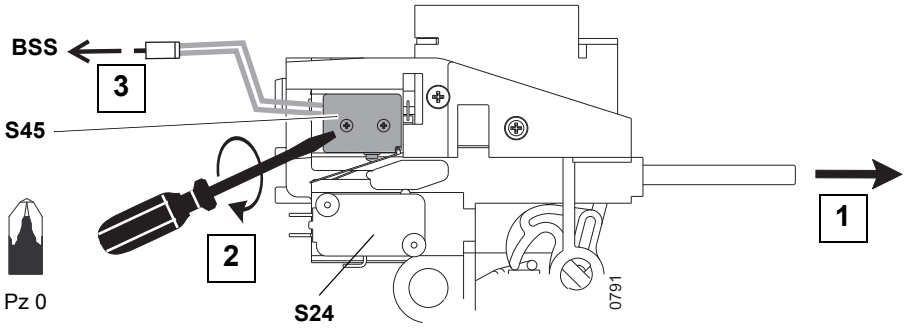
Meldeschalter am Schutzmodul montieren

Attaching signaling switch on the protection module

VORSICHT	**CAUTION**
Selbstschneidende Schrauben vorsichtig anziehen. Die Meldeschalter dürfen sich bei der Montage nicht verformen.	Tighten self-tapping screws carefully. The signaling switches must not be deformed during installation.

Überstromauslöser Systemträger in Kunststoffausführung (schwarz):

Carrier of overcurrent system, plastic made (black):



S24 Ausgelöstmeldeschalter (ohne Kommunikation)
S45 Ausgelöstmeldeschalter (mit COM15/16 - Modul)

S24 Trip signaling switch (without communication)
S45 Trip signaling switch (with COM15/16 - modul)

BSS-Modul anschließen

Connecting BSS-module

GEFAHR		DANGER
Gefährliche elektrische Spannung! **Kann Tod, schwere Personenschäden sowie Schäden an Geräten und Ausrüstung bewirken.** Vor dem Arbeiten an diesem Gerät, Anlage unbedingt spannungsfrei schalten.		**Hazardous voltage!** **Will cause death, serious personal injury, or equipment / property damage.** Disconnect power before working on this equipment.

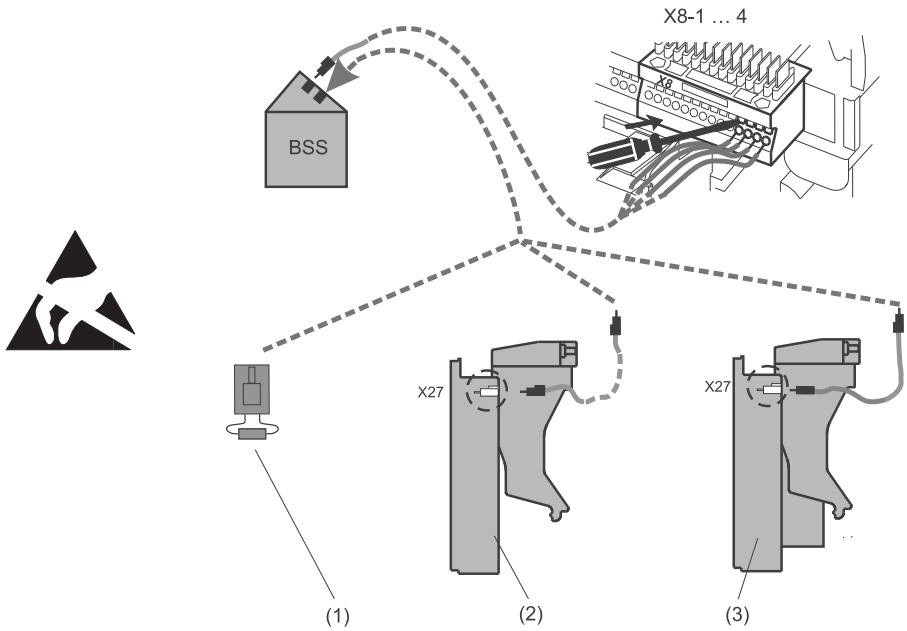
Der erste **Cubicle**BUS-Anschluss führt an die Messerleiste X8. Der zweite **Cubicle**BUS-Anschluss erfolgt je nach Ausstattung des Leistungsschalters.

→ Schaltpläne (Seite 8-1)

The first **Cubicle**BUS connection leads to receptacle X8. The second **Cubicle**BUS connection is performed according to the circuit breaker equipment.

→ Circuit diagrams (page 8-1)

Hinweis	Note
Ggf. fehlende Hilfsstromanschlüsse nachrüsten (Messerleiste, Hilfsstromstecker, Schleifkontaktmodul für Einschubrahmen). → (Seite 5-15)	If necessary missing auxiliary terminals may be retrofitted (receptacle, auxiliary connectors and sliding contact module for guide frames). → (page 5-15)



(1) Abschlusswiderstand für ETU15B … 27B oder bei Leistungstrennschaltern
(2) ETU45B … 76B ohne Messfunktion
(3) ETU45B … 76B mit Messfunktion

(1) Terminating resistor for ETU15B ... 27B or at non-automatic circuit breakers
(2) ETU45B ... 76B without metering function
(3) ETU45B ... 76B with metering function

9.2.2.2 COM15-Modul

Schnittstellenadapter für:

- die Umsetzung der **Cubicle**BUS -Signale auf PROFIBUS-DP-Signale und umgekehrt
- bei Einschubschaltern:
  Erfassen der Position des Leistungsschalters im Einschubrahmen mit den Meldeschaltern S 46, S 47 und S 48 und Ausgabe entsprechender Meldungen auf den **Cubicle**BUS und den PROFIBUS-DP.
- Bereitstellung von speziellen Funktionen über zusätzliche Ein- und Ausgänge (z. B. zur Steuerung des Leistungsschalters und zur Parametrierung)

Weitere Informationen enthält das Handbuch „SENTRON 3WL/3VL Kommunikationsfähige Leistungsschalter - PROFIBUS-DP“

9.2.2.2 COM15 module

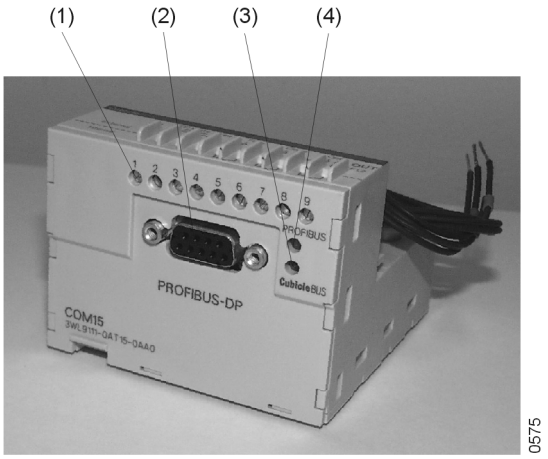
Interface adapter for:

- converting **Cubicle**BUS signals to PROFIBUS-DP signals and vice versa
- on draw-out circuit breakers:
  detecting the circuit breaker position in the guide frame with the signaling switches S46, S47 and S48, and emitting the corresponding signals on the **Cubicle**BUS and the PROFIBUS-DP.
- providing special functions by additional inputs and outputs (e.g. to control the circuit breaker and for parameterization)

Further Information is given in the manual “SENTRON 3WL/3VL Circuit Breakers with communication capability - PROFIBUS-DP”

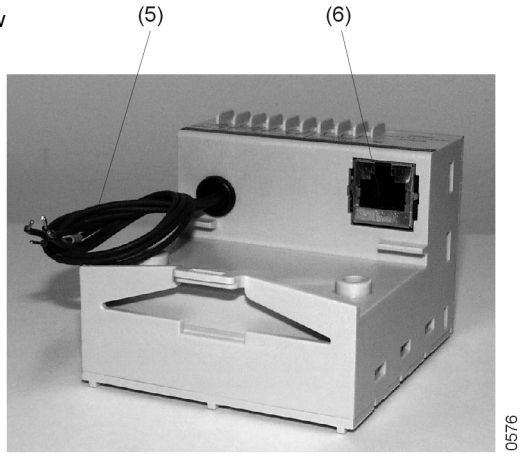
Hinweis	**Note**
Dies ist ein Produkt für Umgebung A. In Haushaltsumgebung kann dieses Gerät unerwünschte Funkstörungen verursachen; in diesem Fall kann der Anwender verpflichtet sein, angemessene Maßnahmen durchzuführen	This is a product for environment A. In residential environment this device can cause unwanted radio interferences. In this case the user can be put in charge to perform special measures.

Ansicht



(1) Anschlussklemmen für zusätzliche Ein- bzw. Ausgänge zur Bereitstellung spezieller Funktionen
(2) Sub-D-Stecker, 9polig, für PROFIBUS-DP-Anschluss
(3) **Cubicle**BUS -LED
(4) PROFIBUS-DP-LED
(5) Anschlussleitungen zum Handstecker X8
(6) **Cubicle**BUS -Anschluss zum Anschließen externer **Cubicle**BUS -Module oder des Abschlusswiderstandes

View



(1) Connection terminals for additional inputs and outputs to provide special functions
(2) SUB-D plug, 9-pole, for PROFIBUS-DP connection
(3) **Cubicle**BUS LED
(4) PROFIBUS-DP-LED
(5) Connecting cables to hand plug X8
(6) **Cubicle**BUS connection for connecting external **Cubicle**BUS -modules or for the terminating resistor

Anzeigen

LED	Anzeige	Bedeutung
PROFIBUS-DP	aus	Keine Spannung am COM15
	grün	PROFIBUS-DP-Kommunikation funktioniert
	rot	Busfehler oder Bus nicht ansprechbar
CubicleBUS	aus	Keine **Cubicle**BUS-Module gefunden
	grün	**Cubicle**BUS-Kommunikation funktioniert
	grün blinkend	**Cubicle**BUS-Teilnehmer gefunden, aber die **Cubicle**BUS-Verbindung innerhalb des Schalters ist gestört
	rot	**Cubicle**BUS-Fehler

Indications

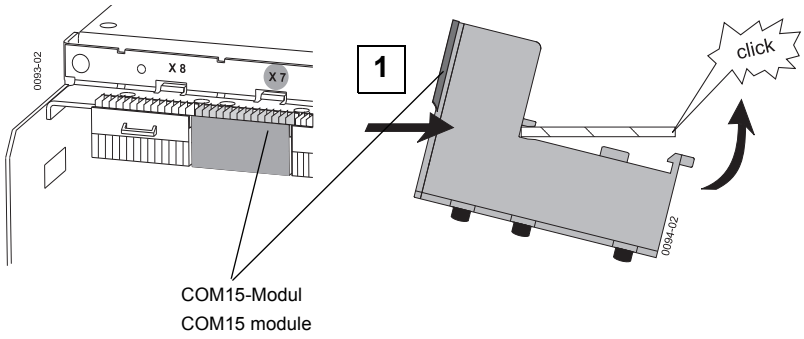
LED	Indication	Significance
PROFIBUS-DP	off	No voltage at COM15
	green	PROFIBUS-DP communication operating
	red	Bus fault or bus not responding
CubicleBUS	off	No **Cubicle**BUS-modules found
	green	**Cubicle**BUS communication operating
	green flashing	**Cubicle**BUS participant found, but **Cubicle**BUS connection inside circuit breaker disturbed
	red	**Cubicle**BUS faulty

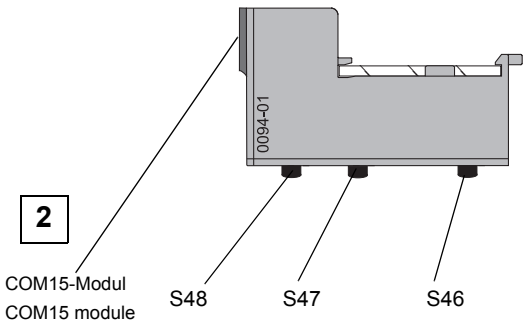
COM15-Modul am Einschubrahmen montieren

- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Schalter in Wartungsstellung ziehen → (Seite 24-4)

Fitting COM15 module on the guide frame

- Switch off and discharge the storage spring → (page 24-3)
- Pull the breaker into maintenance position → (page 24-4)





S46, S47 und S48:

Meldeschalter zur Erfassung der Position des Leistungsschalters im Einschubrahmen zur Weiterleitung auf den PROFIBUS-DP und den **Cubicle**BUS

S46, S47 and S48:

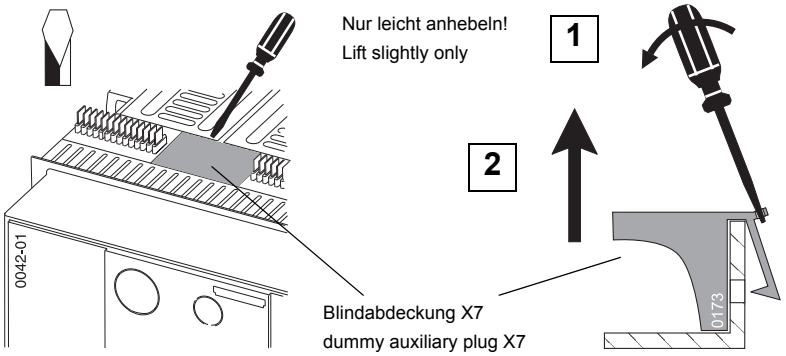
Signaling switches for detecting the circuit breaker position in the guide frame and transfer to PROFIBUS-DP and **Cubicle**BUS

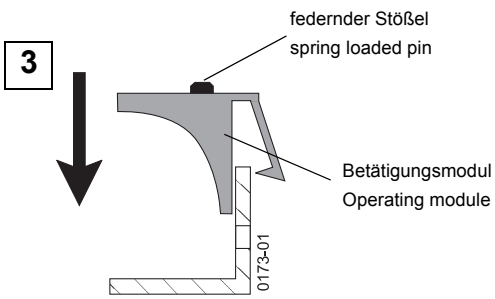
Betätigungsmodul mit Stößel am Einschubschalter montieren

Für die Betätigung der Meldeschalter S46, S47 und S48.

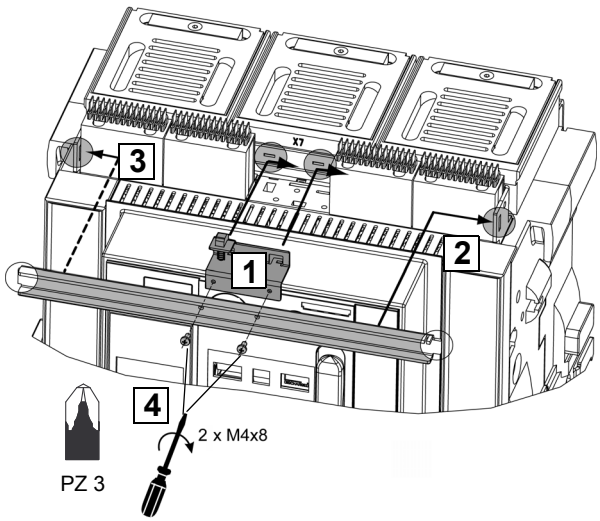
Fitting operating module with pin on the draw-out circuit breaker

For actuating signaling switches S46, S47 and S48.

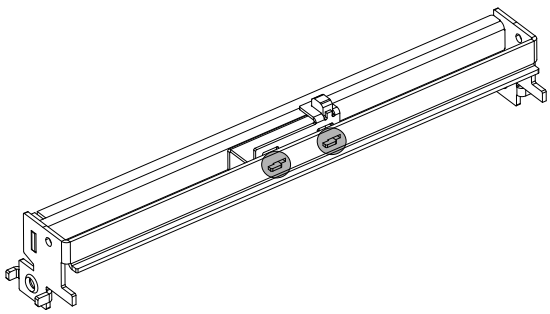




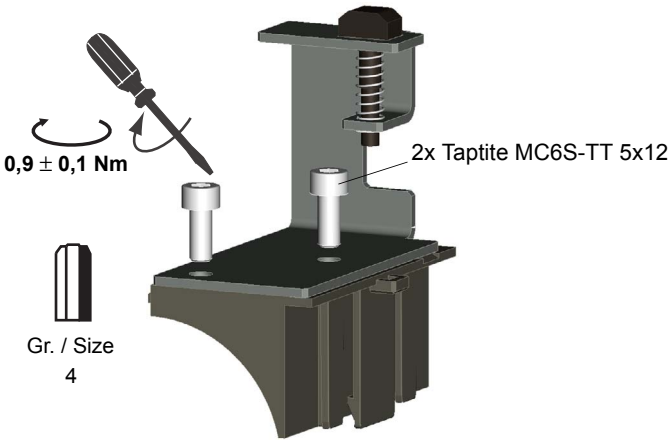
Nur für BG II und BG III mit U_e = 1000 V und
BG II Schaltvermögen C:



FS II and FS III with U_e = 1000 V only and
FS II breaking capacity C



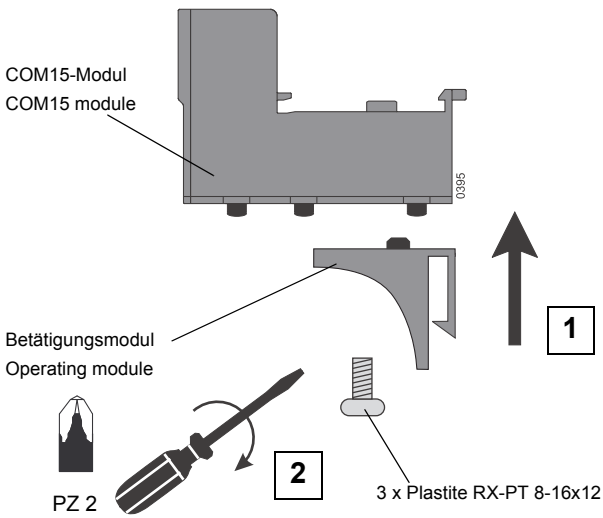
BG I 1000 V oder 690 V(+20%) Bemessungsbetriebsspannung



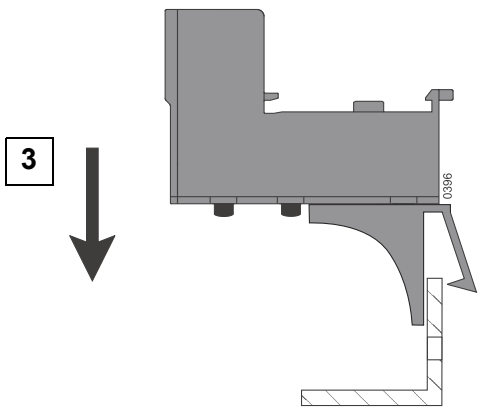
FS I 1000 V or 690 V(+20%) rated operational voltage



COM15-Modul am Festeinbauschalter montieren



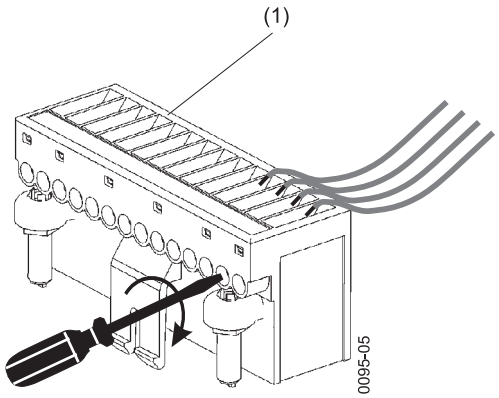
Fitting COM15 module on the fixed-mounted breaker



Leitungen anschließen

→ Schaltpläne (Seite 8-1)

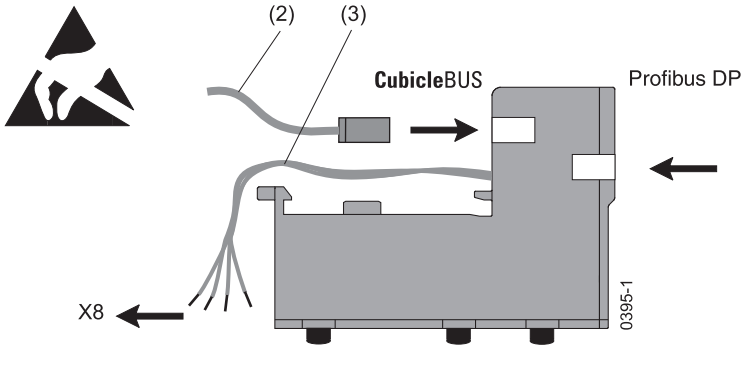
Hinweis	Note
Ggf. fehlende Hilfsstromanschlüsse nachrüsten (Messerleiste, Hilfsstromstecker, Schleifkontaktmodul für Einschubrahmen). → (Seite 5-15)	If necessary missing auxiliary terminals may be retrofitted (receptacle, auxiliary connectors and sliding contact module for guide frames). → (page 5-15)



(1) Handstecker X8
(2) Verbindungsleitung zum ersten externen **Cubicle**BUS-Modul oder Abschlusswiderstand
(3) Verbindungsleitung zum Handstecker X8

Connecting wires

→ Circuit diagrams (page 8-1)



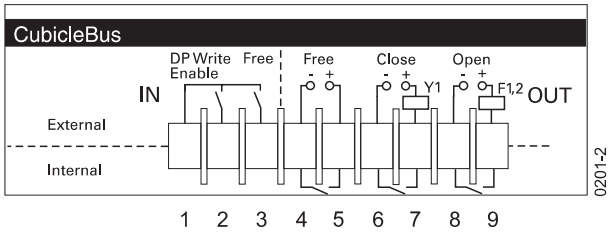
(1) Hand plug X8
(2) Connecting cable to first external **Cubicle**BUS-module or terminating resistor
(3) Connecting cable to hand plug X8

Beschriftung	Belegung	Klemme
X8-1	**Cubicle**BUS -	X8.1
X8-2	**Cubicle**BUS +	X8.2
X8-3	24 V DC +	X8.3
X8-4	24 V DC Masse	X8.4

Designation	Assignment	Terminal
X8-1	**Cubicle**BUS -	X8.1
X8-2	**Cubicle**BUS +	X8.2
X8-3	24 V DC +	X8.3
X8-4	24 V DC GND	X8.4

ACHTUNG	NOTICE
Werden keine externen **Cubicle**BUS-Module am COM15-Modul angeschlossen, ist in den **Cubicle**BUS-Anschluss der Abschlusswiderstand zu stecken. Anderenfalls kann es zu Fehlfunktionen der Elektronik kommen.	If no external **Cubicle**BUS-modules are connected to the COM15-module, the terminating resistor has to be plugged into the **Cubicle**BUS-terminating. Otherwise there may be malfunctions in the electronic system.

Anschlüsse für zusätzliche Ein- und Ausgänge



Nähere Informationen über die Verwendung dieser Ein- und Ausgänge enthält das Handbuch „SENTRON 3WL / 3VL kommunikationsfähige Leistungsschalter – PROFIBUS-DP“.

Connections for additional inputs and outputs

Further information about the application of these inputs and outputs is given in the manual “SENTRON 3WL/3VL Circuit Breakers with communication capability – PROFIBUS-DP”.

9.2.2.3 COM16-Modul

Schnittstellenadapter für:

- die Umsetzung der **Cubicle**BUS-Signale auf Modbus-Signale und umgekehrt
- bei Einschubschaltern: Erfassen der Position des Leistungsschalters im Einschubrahmen mit den Meldeschaltern S46, S47 und S48 und Ausgabe entsprechender Meldungen auf den **Cubicle**BUS und den Modbus.
- Bereitstellung von speziellen Funktionen über zusätzliche Ein- und Ausgänge (z. B. zur Steuerung des Leistungsschalters und zur Parametrierung)

Hinweis
Das Modul ist in der Bestellergänzung F12 und dem Nachrüstkit 3WL9111-0AT18-0AA0 enthalten sowie als 3WL9111-0AT17-0AA0 erhältlich.

Installation und Betrieb

Der mechanische Einbau erfolgt wie beim COM15-Modul:
am Einschubrahmen → (Seite 9-86)
am Festeinbauschalter → (Seite 9-87).

Installation und Betrieb wird im Systemhandbuch mit der Dokumentbestellnummer 3ZX1012-0WL10-1AB1 beschrieben. Es kann kostenlos heruntergeladen werden unter:
http://support.automation.siemens.com/WW/view/de/39850157

9.2.2.3 COM16 module

Interface adapter for:

- converting **Cubicle**BUS signals to Modbus signals and vice versa
- on draw-out circuit breakers: detecting the circuit breaker position in the guide frame with the signaling switches S46, S47 and S48, and emitting the corresponding signals on the **Cubicle**BUS and the Modbus.
- providing special functions through additional inputs and outputs (e.g. to control the circuit breaker and for parameterization)

Note
This module is included in the ordering addendum F12 and the retrofit kit 3WL9111-0AT18-0AA0 and available as 3WL9111-0AT17-0AA0.

Installation and operation

Assembly is done as for the COM15 module:
for the guide frame → (page 9-86)
for fixed-mounted breakers → (page 9-87)

Installation and operating is described in the systemhandbook with document order number 3ZX1012-0WL10-1AC1. It can be downloaded free of charge from:
http://support.automation.siemens.com/WW/view/en/39850157

9.2.2.4 Messfunktion *PLUS*

Die Überstromauslöser ETU45B und ETU76B können mit einer Messfunktion ausgestattet werden. Diese erfordert jedoch das Vorhandensein von externen Spannungswandlern, die eine dreiphasige Messspannung bereitstellen. → (Seite 9-116)

Zusätzlich zu den Werten für die Ströme stellt die Messfunktion über den **Cubicle**BUS Angaben über Spannungen, Leistungen, Energiewerte, Leistungsfaktoren und über die Frequenz für die weitere Verarbeitung bereit.

Diese Daten können beispielsweise auf dem Display der Überstromauslöser angezeigt, mit Hilfe des COM15 / COM16-Moduls auf den PROFIBUS-DP übertragen und an die Ausgänge von externen **Cubicle**BUS-Modulen übergeben werden. Auf ihrer Grundlage lassen sich Aussagen über den Zustand des Energienetzes treffen. Bei Verwendung der Messfunktion ohne Kommunikation wird für die Funktionalität eine externe 24 V Hilfsspannungsversorgung benötigt.

9.2.2.4 Metering function *PLUS*

Trip unit ETU45B and ETU76B can be equipped with a metering function. This, however, requires external voltage transformers providing a three-phase metering voltage. → (page 9-116)

In addition to the values for the currents, the metering function provides data on voltages, powers, energy values, power factors and frequency through the **Cubicle**BUS, for further processing.

This data can be shown on the display of the trip unit, transmitted to the PROFIBUS-DP through the COM15/COM16-modules and transferred to the outputs of external **Cubicle**BUS-modules. Based on these data, conclusions can be drawn about the condition of the power system. To use the metering function without communication an external 24 V auxiliary voltage supply is required.

Messgröße	Measured parameter	Genauigkeit[1] / Accuracy[1]
Ströme I_{L1}, I_{L2}, I_{L3}, I_N	Currents I_{L1}, I_{L2}, I_{L3}, I_N	± 1 %
Erdschlussstrom I_g (Messung mit externem G-Wandler)	Ground-fault current I_g (Measurement with external ground-fault transformer)	± 5 %
Verkettete Spannungen U_{L12}, U_{L23}, U_{L31}	Line-to-line voltage U_{L12}, U_{L23}, U_{L31}	± 1%
Sternpunktspannungen U_{L1N}, U_{L2N}, U_{L3N}	Neutral point voltages U_{L1N}, U_{L2N}, U_{L3N}	±1 %
Momentaner Mittelwert der verketteten Spannungen U_{avgD}	Present average of line-to-line voltage U_{avgD}	± 1 %
Momentaner Mittelwert der Sternpunktspannungen U_{avgY}	Present average of neutral point voltages U_{avgY}	± 1 %
Scheinleistungen S_{L1}, S_{L2}, S_{L3}	Apparent power S_{L1}, S_{L2}, S_{L3}	± 2 %
Summe Scheinleistung	Total apparent power	± 2 %
Wirkleistungen P_{L1}, P_{L2}, P_{L3}	Active power P_{L1}, P_{L2}, P_{L3}	± 3 % @ cosφ > 0.6
Summe Wirkleistung	Total active power	± 3 % @ cosφ > 0.6
Blindleistungen Q_{L1}, Q_{L2}, Q_{L3}	Reactive power Q_{L1}, Q_{L2}, Q_{L3}	± 4 % @ cosφ > 0.6
Blindleistung Total	Total reactive power	± 4 % @ cosφ > 0.6
Leistungsfaktoren $\cos\varphi_{L1}$, $\cos\varphi_{L2}$, $\cos\varphi_{L3}$,	Power factors $\cos\varphi_{L1}$, $\cos\varphi_{L2}$, $\cos\varphi_{L3}$,	± 0.04
Leistungsfaktor total $\cos\varphi_{avg}$,	Power factor total $\cos\varphi_{avg}$	± 0.04
Langzeitmittelwert der Ströme in den Phasen L_1, L_2, L_3	Long-time average of currents I_{L1}, I_{L2}, I_{L3}	± 1 %
Langzeitmittelwert Strom 3-phasig	Long-time average of 3-phase current	± 1 %
Langzeitmittelwert Wirkleistung in den Phasen L_1, L_2, L_3	Long-time average of active power in L_1, L_2, L_3	± 3 % @ cosφ > 0.6
Langzeitmittelwert Wirkleistung 3-phasig	Long-time average of active power 3-phase	± 3 % @ cosφ > 0.6
Langzeitmittelwert Scheinleistung der Phasen L_1, L_2, L_3	Long-time average of apparent power in L_1, L_2, L_3	± 2 %
Langzeitmittelwert Scheinleistung 3-phasig	Long-time average of apparent power 3-phase	± 2 %
Langzeitmittelwert Blindleistung 3-phasig	Long-time average of reactive power 3-phase	± 4 % @ cosφ > 0.6
Wirkarbeit Bezug	Energy consumed	± 3 %
Wirkarbeit Rückspeisung	Energy delivered	± 3 %
Blindarbeit Bezug	Reactive energy consumed	± 4 %
Blindarbeit Rückspeisung	Reactive energy delivered	± 4 %
Frequenz	Frequency	± 0.1 Hz
Klirrfaktoren Strom und Spannung	Distortion factor of current and voltage	± 3 % bis 29. Harmonischen up to 29th harmonic
Phasenunsymmetrie Strom und Spannung[2]	Phase unbalance of current and voltage[2]	± 1 %

1) **Genauigkeit wir folgendermaßen angegeben:**
± (x % vom Messbereichendwert + 2 LSD (Least Significant Digit)
für ein Jahr nach der Kalibrierung

Referenzbedingung:
Eingangsstrom I: $I_{n\,max}$ ± 1 %
Eingangsspannung: U_n ± 1 %
Frequenz f: 50 Hz
Leistungsfaktor: cosφ = 1
Kurvenform: Sinus, Klirrfaktor < 5 % symmetrische Belastung
Umgebungstemperatur: 35 °C ± 5 °C
Hilfsspannung: DC 24 V nach DIN 19240 / EN 61131

Anwärmzeit: 2 Stunden
Fremdfelder: keine

Messbereich:
Strom 0,2 ... 1,2 $I_{n\,max}$
Spannung 0,8 ... 1.2 U_n

2) **IEC-Definition:**
Verhältnis des größten Unterschiedes der Phase zur höchstbelasteten Phase.

1) **Definition of accuracy:**
± (x % of measuring range + 2 LSD (Least Significant Digit) for one year after calibration

Reference condition:
Input current I: $I_{n\,max}$ ± 1%
Input voltage U: U_n ± 1%
Frequency f: 50 Hz
Powerfactor: cosφ = 1
Waveform: sine, harmonic distortion < 5% symmetrical load
Ambient temperature: 35 °C ± 5 °C
Auxiliary voltage: DC 24 V according DIN 19240 / EN 61131

Warm-up time: 2 hours
External fields: no

Metering range:
Current: 0.2 ... 1.2 $I_{n\,max}$
Voltage: 0.8 ... 1.2 U_n

2) **IEC-Definition:**
Ratio of the largest difference between the phases and the most heavily loaded phase.

Erweiterte Schutzfunktionen

Mit Hilfe der Messfunktion können erweiterte Schutzfunktionen realisiert werden, die über die Funktionalität der Überstromauslöser hinausgehen.

Extended protective functions

The metering function is used to implement extended protective functions beyond the functionality of the overcurrent releases.

Parameter		Einstellbereich Range	Verzögerung Delay
Unterspannung	Under voltage	100 … 1100 V	0 … 15 s
Überspannung	Over voltage	200 … 1200 V	0 … 15 s
Wirkleistung Bezug	Active power in normal direction	1 … 12000 kW	0 … 15 s
Wirkleistung Einspeisung	Active power in reverse direction	1 … 12000 kW	0 … 15 s
Überfrequenz	Over frequency	40 … 70 Hz	0 … 15 s
Unterfrequenz	Under frequency	40 … 70 Hz	0 … 15 s
Phasenunsymmetrie Strom[1)]	Phase current unbalance[1)]	5 … 50 %	0 … 15 s
Phasenunsymmetrie Spannung[1)]	Phase voltage unbalance[1)]	5 … 50 %	0 … 15 s
Drehfelderkennung	Phase rotation		
Klirrfaktor Strom	Current distortion factor	3 … 50 %	5 … 15 s
Klirrfaktor Spannung	Voltage distortion factor	3 … 50 %	5 … 15 s

1) **ANSI-Definition:**
Verhältnis des größten Unterschiedes der Phasen zum Mittelwert der Phasen.
IEC-Definition:
Verhältnis des größten Unterschiedes der Phase zur höchstbelasteten Phase.

1) **ANSI-Definition:**
Ratio of the largest difference between the phases and the average of all 3 phases.
IEC-Definition:
Ratio of the largest difference between the phases and the most heavily loaded phase.

Über- bzw. unterschreitet einer dieser Parameter den für ihn eingestellten Wert, erhält der Überstromauslöser nach der eingestellten Verzögerung über den **Cubicle**BUS die Aufforderung auszulösen.

Die Einstellung der Parameter kann erfolgen über:

- die Prüfbuchse mit dem BDA
- den PROFIBUS-DPmit einem PC und der PC-Software „powerconfig“ → (Seite 27-3)
- das Grafikdisplay (ETU76B).

If one of these parameters exceeds or falls below its default settings, the overcurrent release is tripped after the adjusted delay through the **Cubicle**BUS.

The parameters can be adjusted through:

- the test socket with the BDA
- the PROFIBUS-DP with a PC and the PC-software “powerconfig” → (page 27-2)
- the graphical display (ETU76B)

Setpoints

Durch die Setpoint-Funktion können spezielle Ereignisse im Energienetz signalisiert bzw. aufgezeichnet werden.

Setpoints

The setpoint function can be used to signal or record special events in the power system.

Parameter		Bereich Range	Verzögerung Delay
Überstrom Phase	Phase overcurrent	30 … 10000 A	0 … 255 s
Überstrom Erdstrom	Ground overcurrent	30 … 1200 A	0 … 255 s
Überstrom Neutralleiter	Neutral conductor overcurrent	30 … 10000 A	0 … 255 s
Phasenunsymmetrie Strom[1)]	Phase current unbalance[1)]	5 … 50 %	0 … 255 s
Langzeitmittelwert Strom	Long-time average current	30 … 10000 A	0 … 255 s
Unterspannung	Under voltage	100 … 1100 V	0 … 255 s
Phasenunsymmetrie Spannung[1)]	Phase voltage unbalance[1)]	5 … 50 %	0 … 255 s
Überspannung	Over voltage	100 … 1100 V	0 … 255 s
Wirkleistung überschritten Bezug	Over power in normal direction	1 … 12000 kW	0 … 255 s
Wirkleistung überschritten Rückspeisung	Over power in reverse direction	1 … 12000 kW	0 … 255 s
Langzeitmittelwert Wirkleistung überschritten	Long-time active power average exceeded	1 … 12000 kW	0 … 255 s
Langzeitmittelwert Scheinleistung überschritten	Long-time apparent power average exceeded	1 … 12000 kVA	0 … 255 s
Langzeitmittelwert Blindleistung überschritten	Long-time reactive power average exceeded	1 … 12000 kVar	0 … 255 s
Blindleistung überschritten Bezug	Reactive power exceeded in normal direction	1 … 12000 kVar	0 … 255 s
Blindleistung überschritten Rückspeisung	Reactive power exceeded in reverse direction	1 … 12000 kVar	0 … 255 s
Scheinleistung überschritten	Apparent power exceeded	1 … 12000 kVA	0 … 255 s
Überfrequenz	Over frequency	40 … 70 Hz	0 … 255 s
Unterfrequenz	Under frequency	40 … 70 Hz	0 … 255 s
Leistungsfaktor unterschritten	Power factor (PF) undershot	-0,001 … 0,001	0 … 255 s
Leistungsfaktor überschritten	Power factor (PF) exceeded	-0,001 … 0,001	0 … 255 s
Klirrfaktor Strom überschritten	Current distortion factor exceeded	3 … 50 %	0 … 255 s
Klirrfaktor Spannung überschritten	Voltage distortion factor exceeded	3 … 50 %	0 … 255 s
Scheitelfaktor überschritten	Peak factor exceeded	1 … 2.55	0 … 255 s
Formfaktor überschritten	Form factor exceeded	1 … 2.55	0 … 255 s

1) **ANSI-Definition:**
Verhältnis des größten Unterschiedes der Phasen zum Mittelwert der Phasen.

IEC-Definition:
Verhältnis des größten Unterschiedes der Phase zur höchstbelasteten Phase.

1) **ANSI-Definition:**
Ratio of the largest difference between the phases and the average of all 3 phases.

IEC-Definition:
Ratio of the largest difference between the phases and the most heavily loaded phase.

Über- bzw. unterschreitet einer dieser Parameter den für ihn eingestellten Wert, wird nach Ablauf der eingestellten Verzögerung über den **Cubicle**BUS eine Meldung ausgegeben.

Die Einstellung der Parameter kann erfolgen über:

- die Prüfbuchse mit dem BDA
- den PROFIBUS-DPmit einem PC und der PC-Software „powerconfig“ → (Seite 27-3)
- das Grafikdisplay (ETU76B).

If one of these parameters exceeds or falls below its default settings, the overcurrent release is tripped after the adjusted delay through the **Cubicle**BUS.

The parameters can be adjusted through:

- the test socket with the BDA
- the PROFIBUS-DP with a PC and the PC-software “powerconfig” → (page 27-2)
- the graphical display (ETU76B)

Messfunktion *PLUS*

Die Messfunktion *Plus* bietet neben den Grundfunktionen

- zwei unabhängige Kurvenformspeicher sowie
- eine harmonische Analyse

Die zwei unabhängigen Kurvenformspeicher können zur Analyse der Strom- und Spannungswerte zur Zeit eines Ereignisses genutzt werden.

Sind die Kurvenformspeicher auf „Aufzeichnung“ (Standardeinstellung) parametriert, so erfolgt eine fortwährende Aufzeichnung bis zum Eintreffen eines zuvor definierten Ereignisses. Dann wird die Aufzeichnung gestoppt und man kann über eine Visualisierung (Grafikdisplay, Laptop bzw. PC) die Kurvenverläufe des Stroms bzw. der Spannung zur Zeit des Ereignisses betrachten. Das Zeitfenster beträgt eine Sekunde. Die Auflösung beträgt 1649 Werte / Sekunde.

Werte, die jeweils für einen der Kurvenformspeicher ausgewählt werden können:

Einstellgrößen für Kurvenformspeicher	
Ströme	I_{L1}, I_{L2}, I_{L3}, I_{LN}, I_g
Spannungen	U_{L1}, U_{L2}, U_{L3}

Die Kurvenformspeicher können auch über Kommunikationskanäle (PROFIBUS-DP, **Cubicle**BUS) einzeln gestartet bzw. gestoppt werden.

Die Parametrierung der Kurvenformspeicher kann erfolgen über:

- die Prüfbuchse mit dem BDA
- den PROFIBUS-DP mit einem PC und der PC-Software „powerconfig“ → (Seite 27-3)
- das Grafikdisplay (ETU76B).

Metering function *PLUS*

In addition to the basic functions, the metering function *PLUS* offers:

- two independent waveform memories
- harmonic analysis

The two independent waveform memories can be used to analyse the current and voltage values at the time of the event.

If the waveform memories are programmed to “recording” (standard setting), continuous recording takes place until a previously defined event occurs. Then, the recording is stopped, and the current or voltage waveforms at the time of the event can be observed through a visual display (graphical LCD, laptop or PC).
The time window is one second; the resolution is 1649 values/ second.

The values that can be selected for one of the waveform memories are:

Settings for waveform buffers memory	
Currents	I_{L1}, I_{L2}, I_{L3}, I_{LN}, I_g
Voltages	U_{L1}, U_{L2}, U_{L3}

The waveform memories can also be started or stopped individually through the communication channels (PROFIBUS-DP, **Cubicle**BUS).

The waveform memories can be parameterized via:

- the test socket with the BDA
- the PROFIBUS-DPwith a PC and the PC-software “powerconfig” → (page 27-2)
- the graphical display (ETU76B)

Nachrüsten

WARNUNG

Vor dem Arbeiten an diesem Gerät, Anlage unbedingt spannungsfrei schalten sowie das Gerät erden.



- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Einschubschalter in Wartungsstellung ziehen → (Seite 24-4)
- Bedienpult abnehmen → (Seite 24-11)
- Überstromauslöser ausbauen → (Seite 9-72)

Retrofitting

WARNING

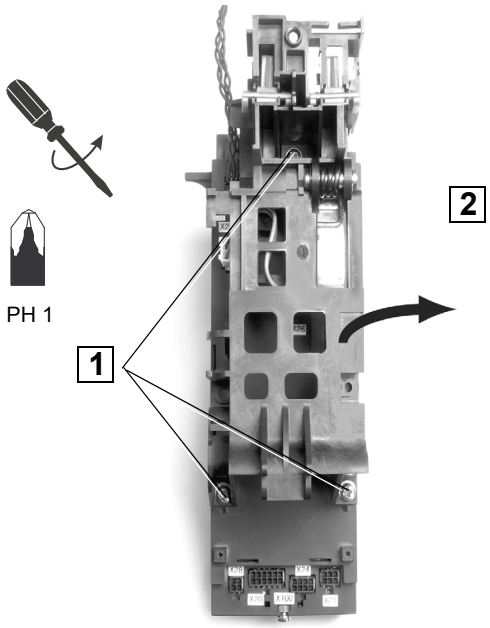
Always de-energize and ground equipment before working on this equipment.

- Switch off and discharge the storage spring → (page 24-3)
- Move draw-out circuit breaker to maintenance position → (page 24-4)
- Remove front panel → (page 24-11)
- Remove overcurrent release → (page 9-72)

Hinweis	**Note**
Wird die Messfunktion *PLUS* nachgerüstet, beträgt die Messgenauigkeit für Strom- und Spannungswerte 3%. Entsprechend ändert sich die Genauigkeit der anderen Messgrößen. Ist eine Messgenauigkeit von 1% erforderlich, muss der Überstromauslöser zusammen mit der Messfunktion *PLUS* zum Kalibrieren an den Hersteller eingeschickt werden.	If the metering function PLUS is retrofitted, the current and voltage accuracy is 3% and the accuracy of the other measured values changes accordingly. If an accuracy of 1% is required, the overcurrent release must be submitted to the manufacturer for calibration, together with the metering function *PLUS*.

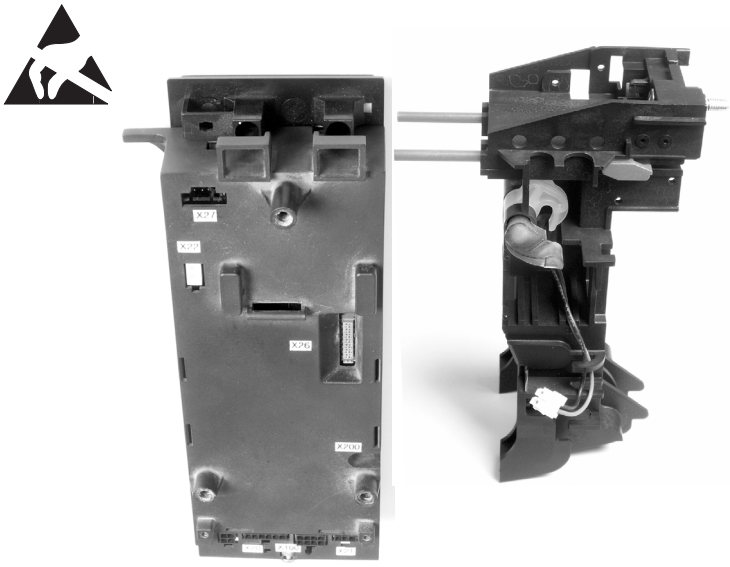
Auslösermechanik vom elektronischen Überstromauslöser abbauen

Ggf. bestehende Leitungsfixierungen lösen und Anschlussstecker des Auslösemagneten abziehen.



Removing tripping mechanism from electronic overcurrent release

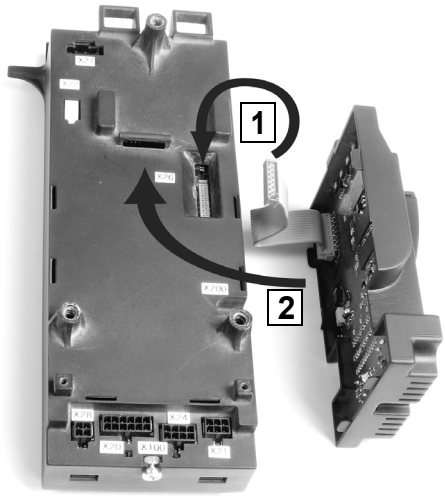
If applicable, undo existing cable fixings and unplug connector of tripping solenoid

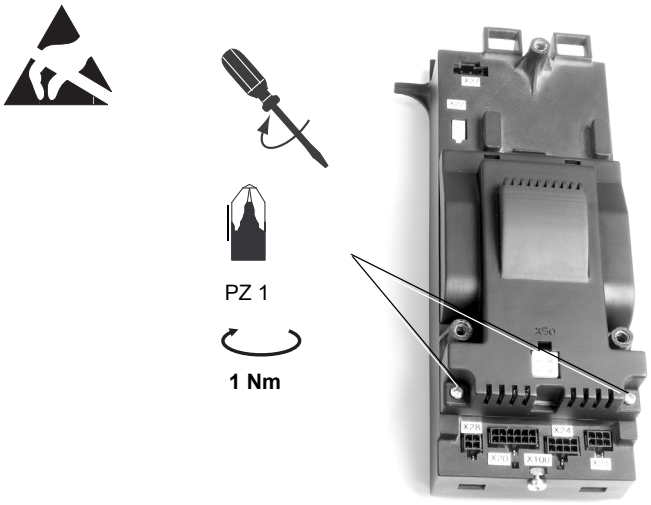


Messfunktion aufstecken und verschrauben

Installing metering function and screwing tight

VORSICHT	CAUTION
Selbstschneidende Schraube vorsichtig anziehen!	Tighten self-tapping screw carefully!

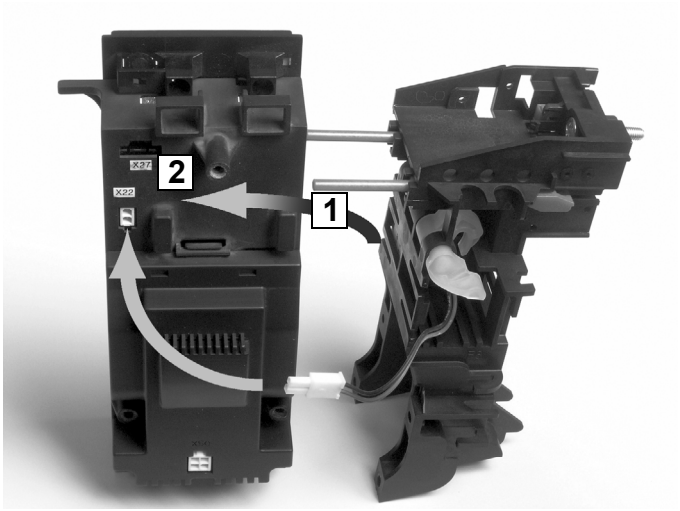


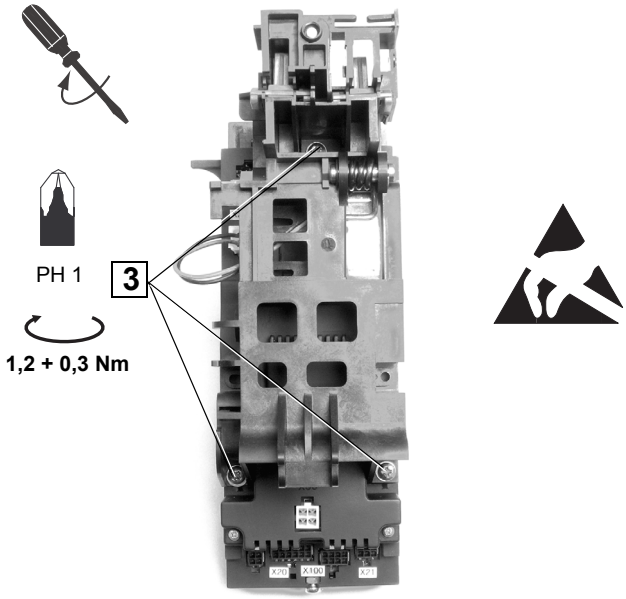


Mechanik anbauen und Anschlussstecker für Auslösemagneten stecken

Installing mechanism and plugging connector for tripping solenoid

VORSICHT	CAUTION
Verdrehung der Schwingmetalle vermeiden! Anziehdrehmoment beachten!	Avoid distorsion of anti-vibration rubber, pay attention to tightening torque.





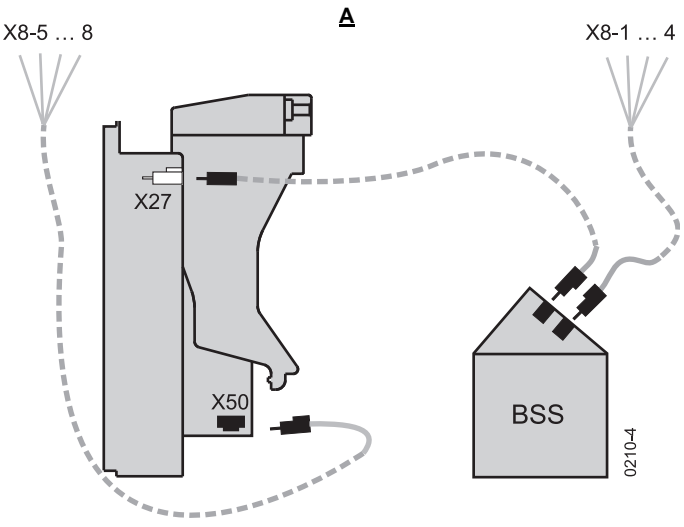
Vorkonfektionierte Leitungen anschließen

Connecting pre-assembled cables

Hinweis	Note
Ggf. fehlende Hilfsstromanschlüsse nachrüsten (Messerleiste, Hilfsstromstecker, Schleifkontaktmodul für Einschubrahmen). → (Seite 5-15)	If necessary missing auxiliary terminals may be retrofitted (receptacle, auxiliary connectors and sliding contact module for guide frames). → (page 5-15)

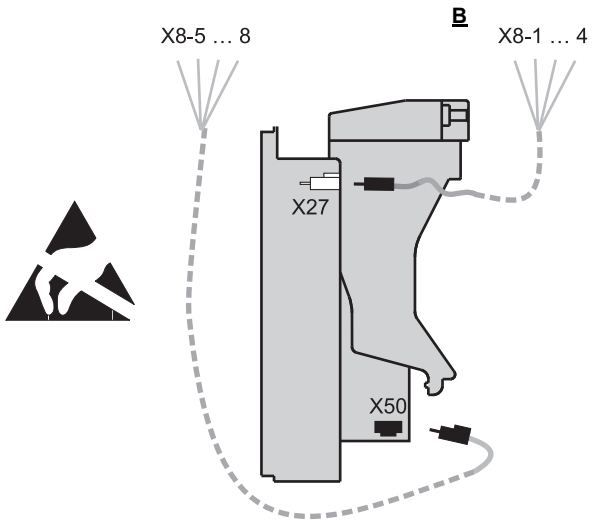
Anschlussvariante A: mit BSS

Variant A: with BSS



Anschlussvariante B: ohne BSS

Variant B: without BSS



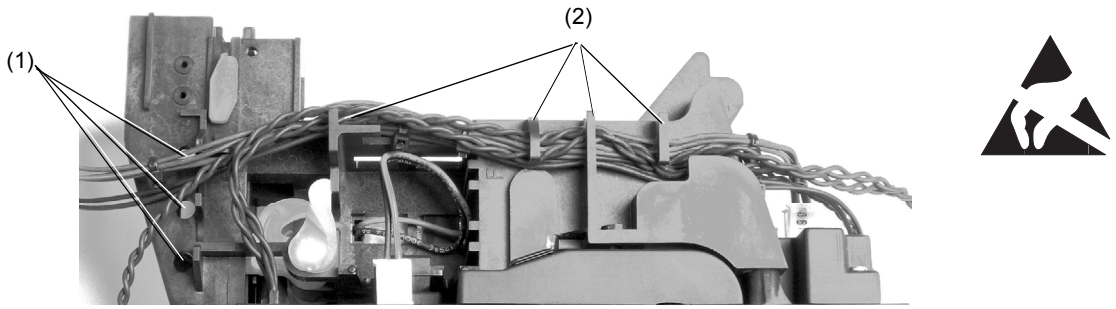
Anschlussbelegung	
X50	externer Spannungswandler
X27	**Cubicle**BUS

Terminal assignment	
X50	External voltage transformer
X27	**Cubicle**BUS

Hinweis	Note
Werden keine externen **Cubicle**BUS-Module an X8-1 und X8-2 angeschlossen, ist an diese Klemmen der Abschlusswiderstand anzuschließen. Anderenfalls kann es zu Fehlfunktionen der Elektronik kommen.	If no external **Cubicle**BUS modules are connected to X8-1 and X8-2, this terminals must be equipped with the end resistor. Otherwise there may be malfunctions in the electronic system.

Leitungen verlegen und fixieren

Laying and fixing the cables



(1) 3 Bohrungen als Fixierpunkte
(2) Fixierhilfen

Alle Leitungen wie oben gezeigt sorgfältig verlegen und mit Kabelbindern an den Fixierpunkten befestigen. Leitungen um die Fixierhilfen führen und unmittelbar links und rechts daneben mit Kabelbindern fixieren.

Anschließend:

- Überstromauslöser einbauen → (Seite 9-72)
- Leitungen an X8 anschließen
- Bedienpult aufsetzen → (Seite 24-25)

(1) 3 holes as fixing points
(2) Fixing aids

Lay all cables carefully as shown above and fix them with cable straps at the fixing points. Lead the cables around the fixing aids and fix them directly on the left and right of the aids with cable straps.

Then:

- Install overcurrent release → (page 9-72)
- Connect cables to X8
- Install front panel → (page 24-25)

9.2.2.5 Nachrüsten des PROFIBUS - Kommunikationsanschlusses

Der Leistungsschalter kann mit dem „PROFIBUS Nachrüstkit“ nachträglich befähigt werden, Daten über den PROFIBUS-DP auszutauschen.

- Einbau des Breaker Status Sensors (BSS) → (Seite 9-82)
- Einbau des COM15-Moduls → (page 9-86)
- Austausch des Überstromauslösers ETU15B, ETU25B oder ETU27B gegen ETU45B oder ETU76B → (Seite 9-72)

9.2.2.5 Retrofitting of the PROFIBUS - communication

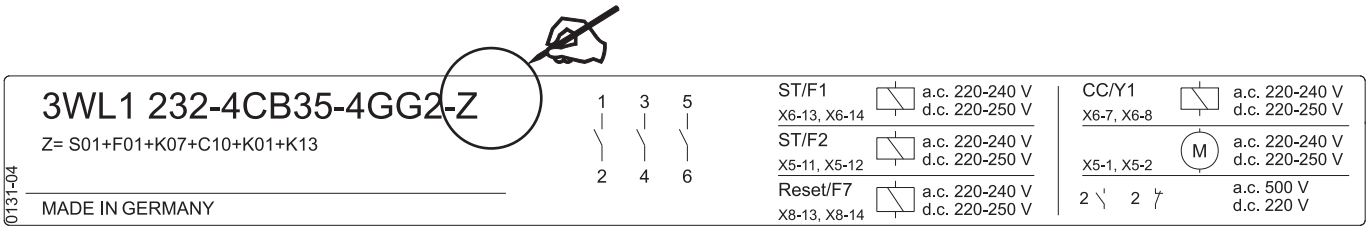
Additional the circuit breaker can be qualified with the "PROFIBUS retrofitting kit", to exchange data via PROFIBUS-DP.

- Mounting breaker status sensor (BSS) → (page 9-82)
- Mounting COM15-module → (page 9-86)
- Exchanging overcurrent release ETU15B, ETU25B or ETU27B against ETU45B or ETU76B → (page 9-72)

9.2.2.6 Schilder aktualisieren

Hinweis
Nach dem Einbau zusätzlicher Komponenten sind folgende Angaben mit einem weißen Permanentstift bzw. mit Aufklebern aus dem beiliegenden Etikettenbogen zu aktualisieren! Davor ist es ggf. notwendig die zu korrigierenden Zeichen mit einem schwarzen Permanentstift zu füllen.

Ausstattungsschild des Leistungsschalters



9.2.2.6 Updating the options label

Note
After installing additional components, add the following data using a white and indelible ink pen or the appropiate label from the set of labels supplied! If necessary the signs which need to be corrected have to be filled with a black permanent pen before.

Options label of the circuit breaker

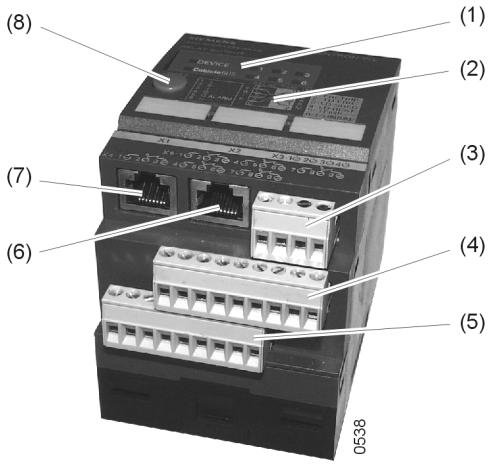
	Bestell-Nr. Order no.	**Z ergänzen Add. Z**
Messfunktion *PLUS* (ohne Spannungswandler) Metering function *PLUS* (without voltage transformer)	3WL9111-0AT04-0AA0	F05
Breaker Status Sensor (BSS)	3WL9111-0AT16-0AA0	F01
Nachrüstkit „PROFIBUS-Kommunikationsanschluss“ Retrofit kit „PROFIBUS-communication“	3WL9111-0AT12-0AA0	F02
COM15 - Modul / COM15 - module	3WL9111-0AT15-0AA0	
COM16 - Modul / COM16 - module	3WL9111-0AT18-0AA0	F12

9.2.3 Externe CubicleBUS-Module

9.2.3.1 Allgemeines

Verwendung

Externe **Cubicle**BUS-Module dienen der Kommunikation des Leistungsschalters SENTRON WL mit Sekundärgeräten im Leistungsschalterfeld. Mit ihrer Hilfe lassen sich z. B. Analoganzeigen ansteuern, Auslösestatus und Auslösegrund des Leistungsschalters übertragen und zusätzliche Steuersignale einlesen. Mit Hilfe eines dieser Module kann des weiteren eine zeitverkürzte Selektivitätssteuerung für den Kurzschlussschutz realisiert werden.



(1) Anzeige-LED
(2) Drehkodierschalter
(3) Anschluss X3: **Cubicle**BUS
(4) Anschluss X5: Ein- bzw. Ausgänge
(5) Anschluss X4: Ein- bzw. Ausgänge
(6) Anschluss X2: **Cubicle**BUS
(7) Anschluss X1: **Cubicle**BUS
(8) Taste „TEST“

Montage

Die externen **Cubicle**BUS-Module werden im Schaltfeld auf eine standardmäßige 35 mm-Hutschiene aufgeschnappt. Dabei ist zu beachten, dass die Länge der Anschlussleitung des ersten Moduls zum Leistungsschalter maximal 2 m beträgt.

Verbindungsaufbau

Für die Verbindung der **Cubicle**BUS-Module untereinander und zum Leistungsschalter sind ausschließlich die mitgelieferten vorkonfektionierten Leitungen zu verwenden. Über diese Leitungen erfolgt auch die Spannungsversorgung der **Cubicle**BUS-Module mit 24 V DC. Werden mehr als 2 **Cubicle**BUS-Module angeschlossen, muss die Versorgung mir 24 V DC über eine separate Leitungsverbindung von Modul zu Modul erfolgen.

9.2.3 External CubicleBUS-modules

9.2.3.1 General

Application

External **Cubicle**BUS-modules are used for communication between the circuit breaker SENTRON WL and the secondary equipment in the circuit breaker panel. They are provided to control analog indications, transmit the circuit breaker tripping status and the tripping reason, and to read additional control signals. Furthermore, with one of these modules it is possible to implement a zone selective interlocking for short-circuit protection.

(1) Indication LED
(2) Rotary coding switch
(3) Connection X3: **Cubicle**BUS
(4) Connection X5: Inputs or outputs
(5) Connection X4: Inputs or outputs
(6) Connection X2: **Cubicle**BUS
(7) Connection X1: **Cubicle**BUS
(8) “TEST” button

Installation

The external **Cubicle**BUS-modules are snapped onto a standard 35-mm DIN-rail inside the switchgear panel. It must be ensured that the length of the connecting cable of the first module to the circuit breaker does not exceed 2 m.

Connection setup

The **Cubicle**BUS modules must only be connected to each other and to the circuit breaker using the pre-assembled cables supplied. These cables are also used for the 24 V DC voltage supply of the **Cubicle**BUS-modules. If more than two **Cubicle**BUS modules are connected, the 24 V DC voltage supply must be fed via a separate cable from module to module.

Hinweis	Note
Ggf. fehlende Hilfsstromanschlüsse nachrüsten (Messerleiste, Hilfsstromstecker, Schleifkontaktmodul für Einschubrahmen). → (Seite 5-15)	If necessary missing auxiliary terminals may be retrofitted (receptacle, auxiliary connectors and sliding contact module for guide frames). → (page 5-15)

An einen Leistungsschalter ist immer nur ein **Cubicle**BUS -Modul direkt anzuschließen. Der Anschluss weiterer Module hat immer von Modul zu Modul zu erfolgen. Stichleitungen sind nicht zulässig!

Falls vorhanden, ist das ZSI-Modul immer das erste Modul und muß direkt an den Leistungsschalter angeschlossen werden.

Am letzten Modul ist die **Cubicle**BUS -Leitung am Anschluss X3 mit einem 120 Ω-Widerstand abzuschließen. Dieser liegt jedem Modul bei.

Die Gesamtlänge der **Cubicle**BUS -Leitungen darf vom Leistungsschalter, Hilfstromstecker X8, bis zum letzten **Cubicle**BUS -Modul 10 m nicht überschreiten.

Leistungsschalter ohne COM15-Modul

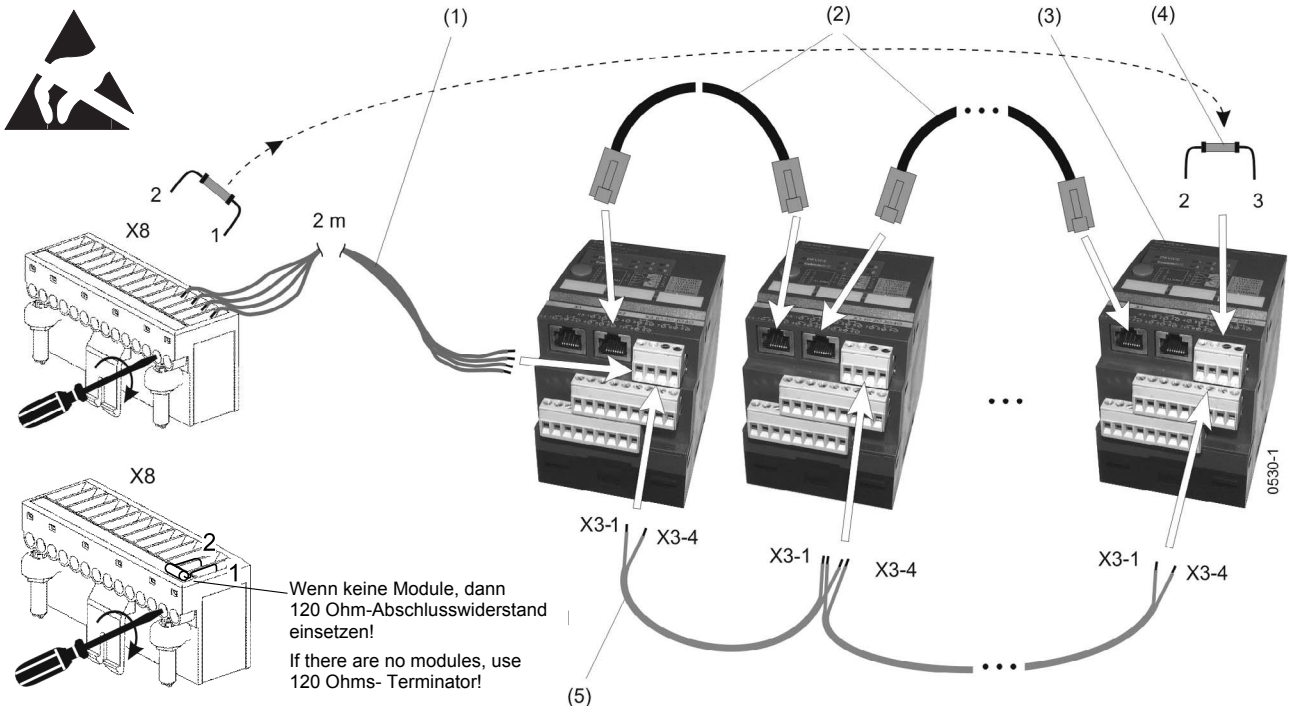
Only one **Cubicle**BUS -module can be connected directly to a circuit breaker. Further modules must be connected from module to module. Spur lines are not permissible!

If provided, the ZSI-module is always the first module, and must be connected directly to the circuit breaker.

The **Cubicle**BUS cable must be connected to the X3 connection of the last module with a 120 Ω resistor, which is integrated in a Western plug and is supplied with each module.

The total length of the **Cubicle**BUS cables must not exceed 10 m from the circuit breaker – auxiliary current plug X8 – up to the last **Cubicle**BUS -module.

Circuit Breaker without COM15-module

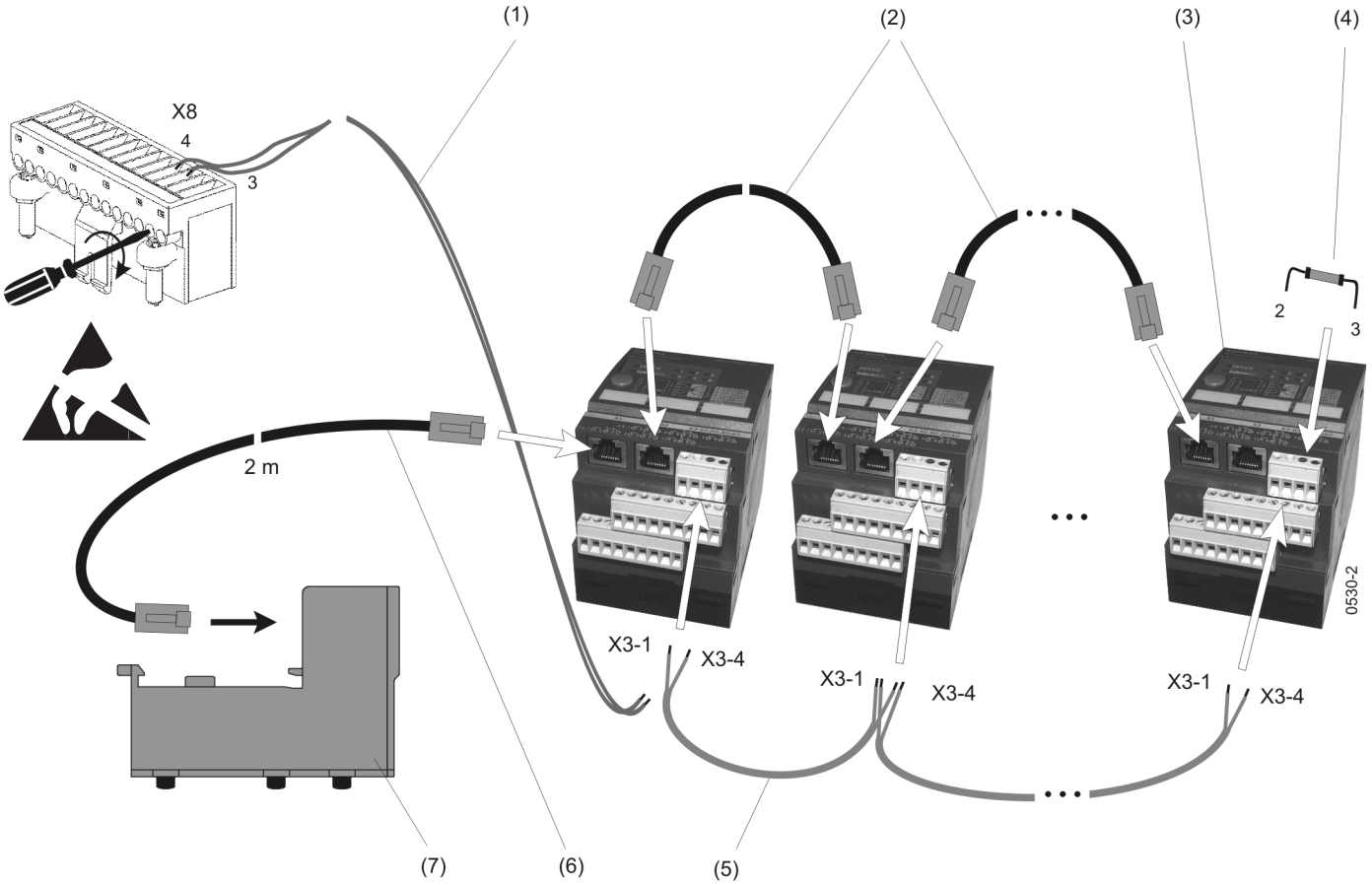


(1) Anschlussleitung zum 1. Modul (4 adrig, Adern X8-4 / X3-1 mit X8-3 / X3-4 und X8-1 / X3-2 mit X8-2 / X3-3 jeweils verdrillt)
(2) Verbindungsleitungen zwischen den Modulen
(3) **Cubicle**BUS -Module
(4) Abschlusswiderstand 120 Ω 0,5 W am letzten Modul
(5) Leitungsverbindung zur Spannungsversorgung mit 24 V DC

(1) Connecting cable to 1st module (4-core, cores X8-4/X3-1 twisted with X8-3/X3-4 and X8-1/X3-2 twisted with X8-2/X3-3
(2) Connecting cables between modules
(3) **Cubicle**BUS -modules
(4) Terminating resistor 120 Ω, 0.5 W
(5) Cable connection for 24 V DC voltage supply

Leistungsschalter mit COM15-Modul

Circuit Breaker with COM15-module



(1) **Nur bei mehr als 2 Cubicle**BUS **-Modulen:** Verbindungsleitungen zwischen X8 und dem ersten **Cubicle**BUS -Modul zur Spannungversorgung mit 24 V DC
(2) Verbindungsleitungen zwischen den **Cubicle**BUS -Modulen
(3) **Cubicle**BUS -Module
(4) Abschlusswiderstand 120 Ω, 0,5 W am letzten Modul
(5) Verbindungsleitungen zwischen den **Cubicle**BUS -Modulen zur Spannungsversorgung 24 V DC
(6) Verbindungsleitung zwischen COM15 und 1. **Cubicle**BUS -Modul (mit zwei Western-Steckern)
(7) COM15

(1) **Only if there are more than 2 Cubicle**BUS **-modules:** Connecting cables between the X8 and the first **Cubicle**BUS module for 24 V DC voltage supply
(2) Connecting cables between **Cubicle**BUS -modules
(3) **Cubicle**BUS -modules
(4) Terminating resistor 120 Ω, 0.5 W
(5) Connecting cables between **Cubicle**BUS -modules for 24 V DC voltage supply
(6) Connecting cable between COM15 and the first **Cubicle**BUS -module (with two western plugs)
(7) COM15

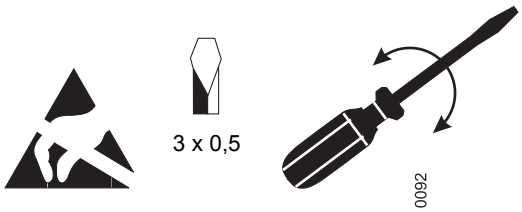
Anzeigen

LED	Anzeige	Bedeutung
DEVICE	grün	Modul in Betrieb
	gelb	Modul im Testmodus
	rot	Modul gestört
CubicleBUS	grün	Verbindung zum **Cubicle**BUS besteht
	aus	keine Verbindung zum **Cubicle**BUS
alle anderen LED	gelb	Option eingestellt bzw. Meldung vorhanden
	aus	Option nicht eingestellt bzw. keine Meldung vorhanden

Indications

LED	Indication	Significance
DEVICE	green	Module in operation
	yellow	Module in test mode
	red	Module faulty
CubicleBUS	green	Connection to **Cubicle**BUS available
	off	no connection to **Cubicle**BUS
All other LED's	yellow	Option set or signal available
	off	Option not set or no signal available

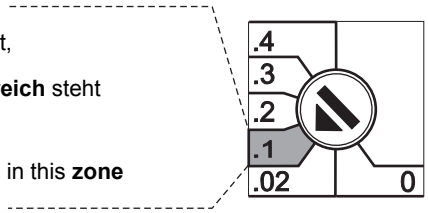
Einstellprinzip



Setting principle

Der Wert 0,1 ist eingestellt,
wenn der Drehschalter
in diesem **Drehwinkelbereich** steht

The value 0.1 is set if the
rotary switch is positioned in this **zone**



Modultest

VORSICHT	CAUTION
Bei der Anlagenprojektierung und Selektivitätsbetrachtung ist sicherzustellen, dass der Leistungsschalter nicht Ströme führen kann, die oberhalb der im Katalog angegebenen Schaltleistungswerte liegen. Übergeordnete Schutzgeräte sind so einzustellen, dass diese Fehlerfälle sicher abgeschaltet werden.	When planning a project and considering selectivity it has to be ensured loads carried by the circuit-breaker will not exceed the breaking capacity stated in the 3WL catalogue. Upstream protection equipment has to be set in a way, that these faults are interrupted safely.

Module test

Die korrekte Funktion der **Cubicle**BUS -Module kann im Test-Modus überprüft werden.

Einmaliges Betätigen der Taste „TEST“ startet den Test-Modus.

Alle Ausgänge und die dazu gehörenden LEDs werden ausgeschaltet. Die Farbe der DEVICE-LED wechselt von grün auf gelb.

The correct operation of the **Cubicle**BUS -modules can be verified in the test mode.

The test mode is started by pushing the “TEST” button once.

All outputs and the associated LED's are switched off. The colour of the DEVICE LED changes from green to yellow.

Prüfen der Ein- und Ausgänge

Betätigen der Taste „TEST“	Wirkung
2 x kurz hintereinander	- LED 1 und Ein- / Ausgang 1 ein
Nach Pause, 2 x kurz hintereinander	- LED 1 und Ein- / Ausgang 1 aus, - LED 2 und Ein- / Ausgang 2 ein
Nach Pause, 2 x kurz hintereinander	- LED 2 und Ein- / Ausgang 2 aus, - LED 3 und Ein- / Ausgang 3 ein
...	...
Nach Pause, 2 x kurz hintereinander	- LED 5 und Ein- / Ausgang 5 aus, - LED 6 und Ein- / Ausgang 6 ein
Nach Pause, 1x	Ein- / Ausgang 6 aus, alle LEDs ein
1x	Test-Modus beginnt von vorn, alle Ein- / Ausgänge und die dazu gehörenden LEDs sind aus

Testing inputs and outputs

Pressing the “TEST” Button	Reaction
Twice quickly	- LED 1 and Input/output 1 on
After a pause, twice quickly	- LED 1 and input/output 1 off, - LED 2 and Input/output 2 on
After a pause, twice quickly	- LED 2 and input/output 2 off, - LED 3 and Input/output 3 on
...	...
After a pause, twice quickly	- LED 5 and input/output 5 off, - LED 6 and Input/output 6 on
After a pause, once	Input/output 6 off, all LEDs on
Once	Test mode starts again, all inputs/ouputs and the associated LED‘s are off

Mehrmaliges Betätigen der Taste „TEST“ kurz hintereinander bewirkt bei eingeschalteter LED abwechselndes Ein- und Ausschalten des jeweiligen Ein- / Ausgangs.

Pushing the "TEST" button several times in quick succession when an LED is on switches the respective input/output on and off alternately.

Prüfen nur der LEDs

Bei mehrmaligem Betätigen der Taste „TEST“ mit einer Pause dazwischen werden nur die LEDs einzeln nach einander eingeschaltet. Nach der letzten LED werden alle LED eingeschaltet.

Abermaliges Betätigen der Taste „TEST“ startet den Test-Modus von vorn und alle LEDs sowie Ein- / Ausgänge werden ausgeschaltet.

Testing LED's only

Pushing the "Test" button several times with pauses in between switches the LEDs on successively. After the last LED, all LEDs are switched on.

Repeated pushing the “TEST” button starts the test mode again, and all LEDs, inputs and outputs are switched off.

Test-Modus verlassen

Taste „TEST“ ca. 30 s nicht betätigen.
Sind alle LEDs eingeschaltet, wird der Test-Modus bereits nach ca. 1 s verlassen.

9.2.3.2 ZSI-Modul

Funktion

Die Kombination des Leistungsschalters mit einem ZSI-Modul (**Z**eitverzögerte **S**elektivitäts-**S**teuerung) erlaubt es, in Schaltanlagen mit mehreren Staffelebenen einen auftretenden Kurzschluss genau zu lokalisieren.

Dazu werden alle Leistungsschalter über ihr ZSI-Modul miteinander verbunden.

Im Kurz- und/oder Erdschlussfall fragt jeder vom Kurzschlussstrom durchflossene Leistungsschalter die ihm direkt nachgeordneten Leistungsschalter ab, ob der Kurz- und/oder Erdschluss auch in der nächsten untergeordneten Staffelebene auftritt. Es löst nur der, in Energieflussrichtung gesehen, nächstgelegene, dem Kurz- und/oder Erdschluss vorgeordnete Leistungsschalter aus.

Eine eingestellte Verzögerungszeit t_{sd} für die Kurzschlussauslösung wird auf 50 ms gesetzt bei Schalterstellung am ZSI-Modul „S“ oder „S+G“, wenn der Leistungsschalter im Kurzschlussfall kein Blockiersignal ZSI-IN von einem nachgeordneten Leistungsschalter erhält. Bei einem erkannten Kurzschluss wird ein Blockiersignal ZSI-OUT an die vorgeordneten Leistungsschalter ausgegeben. Die Kurzschlussauslösung erfolgt jedoch frühestens nach 50 ms, typisch sind 80 … 90 ms.

Eine eingestellte Verzögerungszeit t_g für die Erdschlussauslösung wird auf 100 ms gesetzt bei Schalterstellung am ZSI-Modul „G“ oder „S+G“, wenn der Leistungsschalter im Erdschlussfall kein Blockiersignal ZSI-IN von einem nachgeordneten Leistungsschalter erhält. Bei einem erkannten Erdschluss wird ein Blockiersignal ZSI-OUT an die vorgeordneten Leistungsschalter ausgegeben. Die Erschlussauslösung erfolgt jedoch frühestens nach 100 ms, typisch sind 130 ... 140 ms.
Zur Sicherheit wird nach längstens 3 s ein ausgegebenes Blockiersignal ZSI-OUT beendet.

Das ZSI-Modul des Leistungsschalters SENTRON WL ist mit dem ZSI-Modul der Leistungsschalter 3WN und 3WS sowie SENTRON VL funktionskompatibel.

Montage

→ (Seite 9-99)

Anschluss

→ (Seite 9-99)

Es kann pro Leistungsschalter nur ein ZSI-Modul angeschlossen werden.

Wird das ZSI-Modul zusammen mit anderen **Cubicle**BUS -Modulen verwendet, muss das ZSI-Modul direkt an das COM15- oder COM16-Modul bzw. den Handstecker X8 angeschlossen werden.

Quitting the test mode

Do not press the “TEST” button for approximately 30 seconds.
If all LED's are on, the test mode is already quitted after about 1 s.

9.2.3.2 ZSI-module

Function

If the circuit breaker is combined with a ZSI-module, a short-circuit occurring in systems with several grading levels can be localised precisely.

For this purpose, all circuit breakers are interconnected via their ZSI-modules.

When a short-circuit or ground-fault occurs, each circuit breaker affected by the short-circuit or ground-fault current queries its downstream circuit breaker to determine whether the short-circuit or ground-fault is present in the next downstream grading level. In the direction of the energy flow, only the circuit breaker nearest to the short-circuit or ground-fault in the upstream direction is tripped.

A possible delay time setting t_{sd} for the short-circuit tripping is set to 50 ms if "S" or "S+G" is selected on the ZSI module and if in the event of short-circuit the circuit breaker does not receive a blocking signal ZSI-IN sent from its downstream circuit breaker. In case of a detected short-circuit a blocking signal ZSI-OUT will be sent to the preceeding circuit breakers. The trip does take place after 50 ms. It typically delays between 80 and 90 ms.

A possible delay time setting for the ground-fault tripping is set to 100 ms if "G" or "S+G" is selected on the ZSI module and if in the event of ground-fault the circuit breaker does not receive a blocking signal ZSI-IN sent from its downstream circuit breaker.
In case of a detected ground-fault a blocking signal ZSI-OUT will sent to the preceeding circuit breakers. The trip does take place after 100 ms. It typically delays between 130 and 140 ms.

For safety reason after a maximum delay time of 3 s a given blocking signal ZSI-OUT is terminated.

The ZSI-module of the circuit breaker SENTRON WL is function-compatible with the ZSI-module of the circuit breakers 3WN and 3WS as well as the MCCB SENTRON VL.

Installation

→ (page 9-99)

Connection

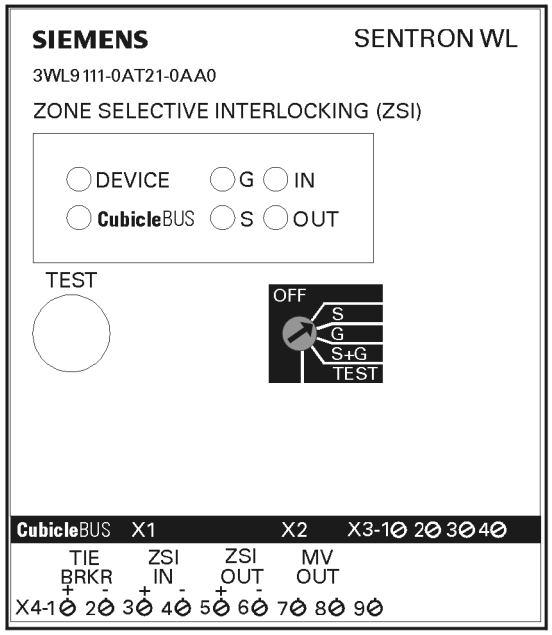
→ (page 9-99)

Only one ZSI-module can be connected per circuit breaker.

If the ZSI-module is used together with other **Cubicle**BUS -modules, the ZSI-module must be connected directly to the COM15 or COM16 module or hand plug X8.

Anschlussbelegung

Terminal assignment





Klemme	Anschluss
TIE BRKR	Nur für spezielle Anwendungsfälle; Erlaubt die volle ZSI-Funktionalität in Schaltanlagen mit Koppel- bzw. Brückenschalter ohne Zusatzkomponenten
ZSI IN	ZSI-Module von Leistungsschaltern der untergeordneten Ebene
ZSI OUT	ZSI-Module von Leistungsschaltern der übergeordneten Ebene
MV OUT	Meldung an die Mittelspannungsebene

Beim Anschließen ist die angegebene Polarität zu beachten, Plus auf Plus und Minus auf Minus!

Die maximale Leitungslänge der ZSI-Verdrahtung beträgt bei einem Leitungsquerschnitt von 0.75 mm^2 (2-Draht-Leitung) max. 400 m. Bei ZSI-Verbindungen ausschließlich zwischen WL-Schaltern sind, bei Erhöhung des Leiterquerschnittes auf 2,5 mm^2, auch Leitungslängen bis zu 1000 m zulässig.

Die ZSI-Verbindungen sind paarweise verdrillt oder mit abgeschirmter Leitung auszuführen.

Das ZSI-Modul gestattet den Anschluss von bis zu:

- 8 Leistungsschaltern an den Eingang ZSI IN und
- 20 Leistungsschaltern an den Ausgang ZSI OUT.

Terminal	Connection
TIE BRKR	Only for special applications; Allows complete ZSI-functionality in systems with buscouplers without additional components
ZSI IN	ZSI-modules of lower-level circuit breakers
ZSI OUT	ZSI-modules of higher-level circuit breakers
MV OUT	Signal to the medium-voltage level

Observe the specified polarity when connecting: plus to plus and minus to minus!

The maximum wire length of the ZSI wiring is 400 m for a wire size of AWG 18 (2-wire conductor).
For ZSI connections between WL circuit breakers only, wire lengths of up to 1000 m are permissible if the conductor size is increased to AWG 13.

The ZSI connections must consist of twisted pair cables or shielded cables.

The ZSI-module allows connection of up to:

- 8 circuit breakers at the ZSI IN input and
- 20 circuit breakers at the ZSI OUT output

Einstellungen

→ Einstellprinzip (Seite 9-102)

Einstellungen ZSI-Modul	
OFF	ZSI-Funktion deaktiviert
S	ZSI-Modul wirksam nur für kurzverzögerten Kurzschluss
G	ZSI-Modul wirksam nur für Erdschlussschutz
S + G	ZSI-Modul wirksam für kurzverzögerten Kurzschluss und Erdschlussschutz
TEST	Testposition zur Überprüfung der ZSI-Funktionalität

Anzeigen

→ (Seite 9-101)

Testen

→ (Seite 9-102)

Settings

→ Setting principle (page 9-102)

Settings ZSI - module	
OFF	ZSI-function deactivated
S	ZSI module effective for short-time delayed short-circuits only
G	ZSI module effective for ground-fault protection only
S + G	ZSI module effective for short-time delayed short-circuits and ground-fault protection
TEST	Test position for checking the ZSI functionality

Indications

→ (page 9-101)

Testing

→ (page 9-102)

9.2.3.3 Digitales Eingangsmodul

Funktion

Mit dem digitalen Eingangsmodul können bis zu 6 zusätzliche binäre Signale (DC 24 V) an das System angeschlossen werden.

Diese Eingangssignale werden über den **Cubicle**BUS auf den PROFIBUS-DP übertragen und können entsprechend ausgewertet werden.

Für den Überstromauslöser ETU76B ist es alternativ möglich, ein solches Eingangssignal am Eingang 1 für die Umschaltung zwischen den ggf. vorgehaltenen, zwei unterschiedlichen Schutzparametersätzen zu nutzen.

Montage

→ (Seite 9-99)

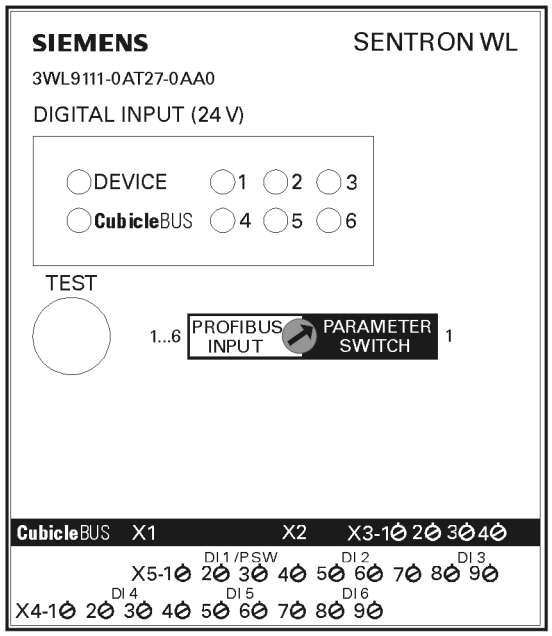
Anschluss

→ Verbindungsaufbau (Seite 9-99)

Es können maximal zwei digitale Eingangsmodule gleichzeitig am **Cubicle**BUS betrieben werden

- 1 Modul mit der Einstellung „PROFIBUS-DP INPUT“
- 1 Modul mit der Einstellung „PARAMETER SWITCH“

Anschlussbelegung



Anschlussbelegung digitales Eingangsmodul	
X4	Eingänge 4-6
X5	Eingänge 1-3

Einstellungen

→ Einstellprinzip (Seite 9-102)

9.2.3.3 Digital input module

Function

With the digital input module, up to 6 additional binary signals (DC 24 V) can be connected to the system.

These input signals are transferred to the PROFIBUS-DP via the **Cubicle**BUS and can be evaluated accordingly.

For the overcurrent release ETU76B, it is possible as an alternative to use an input signal of this type as input 1 to switch between two different sets of protection parameters (if provided).

Installation

→ (page 9-99)

Connection

→ Connection setup (page 9-99)

A maximum of two digital input modules can be operated on the **Cubicle**BUS at the same time

- 1 module with the setting “PROFIBUS-DP INPUT”
- 1 module with the setting “PARAMETER SWITCH”

Terminal assignment

Terminal assignment of digital input module	
X4	Inputs 4-6
X5	Inputs 1-3

Settings

→ Setting principle (page 9-102)

Einstellungen digitales Eingangsmodul	
PROFIBUS-DP INPUT	Eingänge 1-6 sind aktiv. Bei Anliegen eines Eingangssignals wird über das COM15-Modul eine entsprechende Meldung auf den PROFIBUS-DP ausgegeben.
PARAMETER SWITCH	Eingang 1 wird zur Parametersatz-Umschaltung genutzt, alle anderen Eingänge sind funktionslos. Kein Eingangssignal (LED 1 leuchtet nicht): Anforderung Parametersatz A aktiviert Eingangssignal liegt an (LED 1 leuchtet): Anforderung Parametersatz B aktiviert

Settings of digital input module	
PROFIBUS-DP INPUT	Inputs 1-6 are active. If there is an input signal present, a corresponding message is transmitted to the PROFIBUS-DP.
PARAMETER SWITCH	Input 1 is used for parameter switchover. All other inputs have no function. No input signal (LED 1 not lights up): Parameter set A actived Input signal present (LED 1 lights up): Parameter set B actived

Hinweis	Note
Die Anforderungen zur Parameterumschaltung kann durch eine Anforderung über die PROFIBUS-Kommunikation, den BDA oder über das Grafikdisplay überstimmt werden. Weitere Einzelheiten siehe „SENTRON 3WL / 3VL kommunikationsfähige Leistungsschalter - PROFIBUS-DP“	The parameter switchover query can be overruled by a query via the PROFIBUS communication, the BDA or the graphical display. For further details please refer to the "SENTRON 3WL / 3VL Circuit Breakers with communication capability - PROFIBUS-DP”.

Anzeigen

→ (Seite 9-101)

Testen

→ (Seite 9-102)

9.2.3.4 Digitale Ausgangsmodule

Funktion

Mit digitalen Ausgangsmodulen können bis zu 6 Meldungen ausgegeben werden.

Meldet der Überstromauslöser ein Ereignis, leuchtet nach Ablauf der eingestellten Verzögerungszeit die zum Ereignis gehörende LED auf und das Modul setzt ein Signal am entsprechenden Ausgang.

Digitale Ausgangsmodule stehen in folgenden Ausführungen zur Verfügung:

- mit Drehkodierschalter und Relaisausgängen
- konfigurierbar und mit Relaisausgängen.

Montage

→ (Seite 9-99)

Anschluss

→ Verbindungsaufbau (Seite 9-99)

Sollen digitale Ausgangsmodule mit Drehkodierschalter und konfigurierbare digitale Ausgangsmodule gemeinsam an einem Leistungsschalter angeschlossen werden, können pro Leistungsschalter angeschlossen werden:

- 1 digitales Ausgangsmodul mit Drehkodierschalter und Ausgangsbelegung 1
- 1 digitales Ausgangsmodul mit Drehkodierschalter und Ausgangsbelegung 2
- 1 konfigurierbares digitales Ausgangsmodul

Indications

→ (page 9-101)

Testing

→ (page 9-102)

9.2.3.4 Digital output modules

Function

With digital output modules, up to 6 signals can be transmitted.

If the overcurrent release signals an event, the corresponding LED lights up after the adjusted delay time has elapsed, and the module sets a signal at the corresponding output.

Digital output modules are available in the following versions:

- with rotary coding switch and relay outputs
- configurable and with relay outputs

Installation

→ (page 9-99)

Connection

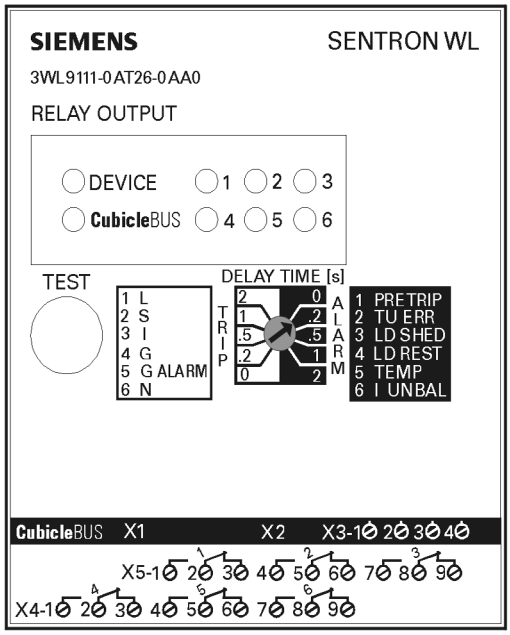
→ Connection setup (page 9-99)

If a combination of digital output modules with rotary coding switch and configurable digital outputs is to be connected to a circuit-breaker, the following can be connected per circuit breaker:

- 1 digital output module with rotary coding switch and output assignment 1
- 1 digital output module with rotary coding switch and output assignment 2
- 1 configurable digital output module

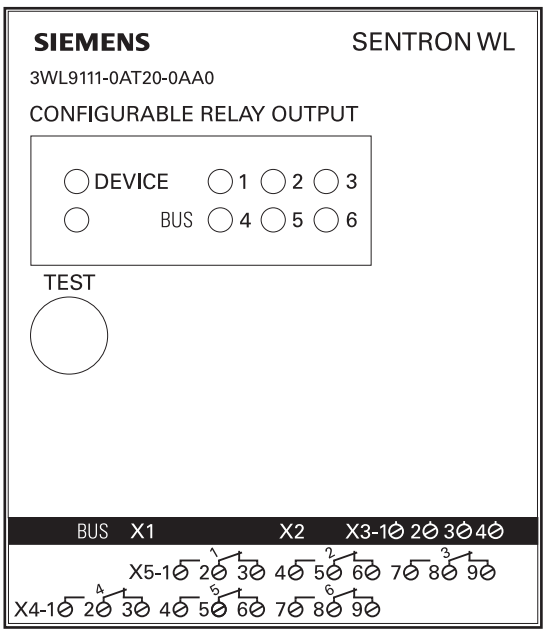
Anschlussbelegung

Digitale Ausgangsmodule mit Drehkodierschalter



(1) Ausgangsbelegung 1
(2) Einstellung der Verzögerungszeit
(3) Ausgangsbelegung 2

Konfigurierbare digitale Ausgangsmodule



Anschlussbelegung digitales Ausgangsmodul	
X4	Ausgänge 4-6
X5	Ausgänge 1-3

Digitale Ausgangsmodule mit Relaisausgang stellen an ihren Ausgängen Wechsler zur Verfügung.

Terminal assignment

Digital output modules with rotary coding switch

(1) Output assignment 1
(2) Delay time setting
(3) Output assignment 2

Configurable digital output modules

Terminal assignment of digital output module	
X4	Outputs 4-6
X5	Outputs 1-3

Digital output modules with relay output provide changeover contacts at their outputs.

Belastbarkeit der Ausgänge	
Relaisausgang	250 V AC, 6 A 24 V DC, 2 A 250 V DC, 0,2 A

Current carrying capacity of the outputs	
Relay output	250 V AC, 6 A 24 V DC, 2 A 250 V DC, 0.2 A

Einstellungen

Digitale Ausgangsmodule mit Drehkodierschalter

→ Einstellprinzip (Seite 9-102)

Ausgangsbelegung 1 (TRIP)	
L	Meldekontakt Überlastauslösung
S	Meldekontakt kurzverzögerte Kurzschlussauslösung
I	Meldekontakt unverzögerte Kurzschlussauslösung
G	Meldekontakt Erdschlussauslösung
G ALARM	Meldekontakt Erdschlussalarm
N	Meldekontakt Neutralleiterauslösung

Einstellung Verzögerungszeit	
TRIP	0 … 2 s
ALARM	0 … 2 s

Die Einstellung der Verzögerungszeit bestimmt, wie lange ein Signal vom Überstromauslöser anliegen muss, bevor die zur Meldung gehörende LED aufleuchtet und die Meldung an den entsprechenden Ausgang gesetzt wird.

Ausgangsbelegung 2 (ALARM)	
PRE TRIP	Meldekontakt voreilende Meldung Überlastauslösung (Verzögerungszeit 0 s)
TU ERR	Meldekontakt ETU-Fehler
LD SHED	Meldekontakt Lastabwurf (Verzögerungszeit 0 s)
LD REST	Meldekontakt Lastaufnahme (Verzögerungszeit 0 s)
TEMP	Meldekontakt Temperaturalarm
I UNBAL	Meldekontakt Phasenunsymmetrie Strom

Konfigurierbare digitale Ausgangsmodule

Die Einstellung der konfigurierbaren digitalen Ausgangsmodule kann erfolgen über:

- die Prüfbuchse des Überstromauslösers mit dem BDA
- den PROFIBUS-DP / Modbus mit einem PC und der PC-Software „powerconfig“ → (Seite 27-3)

Anzeigen

→ (Seite 9-101)

Testen

→ (Seite 9-102)

Settings

Digital output modules with rotary coding switch

→ Setting principle (page 9-102)

Terminal assignment 1 (TRIP)	
L	Signaling contact overload tripping
S	Signaling contact short-time delayed short-circuit tripping
I	Signaling contact instantaneous short-circuit tripping
G	Signaling contact ground-fault tripping
G ALARM	Signaling contact ground-fault alarm
N	Signaling contact neutral conductor tripping

Delay time setting	
TRIP	0 … 2 s
ALARM	0 … 2 s

The delay time setting determines how long a signal of the overcurrent release must be present until the corresponding LED lights up and the signal is set at the corresponding output.

Output assignment 2 (ALARM)	
PRE TRIP	Signaling contact leading signal overload tripping (delay time 0 s)
TU ERR	Signaling contact ETU error
LD SHED	Signaling contact load shedding (delay time 0 s)
LD REST	Signaling contact load restore (delay time 0 s)
TEMP	Signaling contact temperature alarm
I UNBAL	Signaling contact phase unbalance current

Configurable digital output modules

Configurable digital output modules can be adjusted through:

- the test socket of the overcurrent release with the BDA
- the PROFIBUS-DP/Modbus with a PC and the PC-software “powerconfig” → (page 27-2)

Indications

→ (page 9-101)

Testing

→ (page 9-102)

9.2.3.5 Analoges Ausgangsmodul

Funktion

Mit dem analogen Ausgangsmodul lassen sich analoge Messwerte ausgeben, die z. B. mit Hilfe von Drehspulinstrumenten an der Schaltschranktür angezeigt werden können. Es stehen insgesamt 4 Ausgänge zur Verfügung.

Für das Ausgangssignal sind zwei unterschiedliche Formate wählbar:

- 4 ... 20 mA, Ausgabe über Messerleiste X5
- 0 ... 10 V, Ausgabe über Messerleiste X4.

Montage

→ (Seite 9-99)

Anschluss

→ Verbindungsaufbau (Seite 9-99)

Es können maximal 2 analoge Ausgangsmodule angeschlossen werden, deren Drehkodierschalter jedoch unterschiedlich eingestellt sein müssen (Modul 1 bzw. Modul 2).

Anschlussbelegung

9.2.3.5 Analog output module

Function

With the analog output module, analog measured-values can be transmitted, which can be shown on the cubicle door by means of moving-coil instruments. A total of 4 outputs is available.

For the output signal, two different formats can be selected:

- 4 ... 20 mA, output via receptacle X5
- 0 ... 10 V, output via receptacle X4

Installation

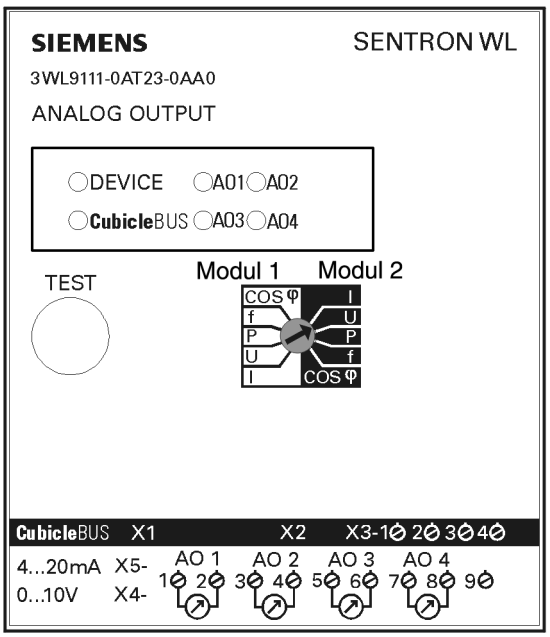
→ (page 9-99)

Connection

→ Connection setup (page 9-99)

A maximum of 2 analog output modules can be connected; the rotary coding switches of these modules must, however, have different settings (module 1/module 2).

Terminal assignment





Einstellungen

→ Einstellprinzip (Seite 9-102)

Mit dem Drehkodierschalter werden die auszugebenden Messgrößen bestimmt. Diese liegen immer an beiden Klemmenleisten in dem entsprechenden Format an.

An den Ausgängen stehen folgende Messgrößen zur Verfügung:

Ausgangsbelegung				
Stellung	**AO 1**	**AO 2**	**AO 3**	**AO 4**
I	I_{L1}	I_{L2}	I_{L3}	I_N
U	U_{L12}	U_{L23}	U_{L31}	U_{L1N}
P	P_{L1}	P_{L2}	P_{L3}	S_{total}
f	f	U_{LLavg}	P_{total}	cos φ_{avg}
cos φ	cos φ_{L1}	cos φ_{L2}	cos φ_{L3}	Phasenunsymmetrie Strom in %

Anzeigen

→ (Seite 9-86)

Testen

→ (Seite 9-105)

9.2.3.6 Bestellnummern

Jedes **Cubicle**BUS-Modul wird mit einem Abschlusswiderstand 120 Ω, integriert in einen Westernstecker, und mit einem Verbindungskabel 0,2 m für den **Cubicle**BUS-Anschluss ausgeliefert.

Settings

→ Setting principle (page 9-102)

The measured-values to be signalled are adjusted using the rotary coding switch. They are always present on the two terminal strips in the corresponding format.

The following values are available at the outputs:

Output Assignment				
Position	**AO 1**	**AO 2**	**AO 3**	**AO 4**
I	I_{L1}	I_{L2}	I_{L3}	I_N
U	U_{L12}	U_{L23}	U_{L31}	U_{L1N}
P	P_{L1}	P_{L2}	P_{L3}	S_{total}
f	f	U_{LLavg}	P_{total}	cos φ_{avg}
cos φ	cos φ_{L1}	cos φ_{L2}	cos φ_{L3}	Phase unbalance current in %

Indications

→ (page 9-86)

Testing

→ (page 9-105)

9.2.3.6 Order numbers

Each **Cubicle**BUS-module is supplied with a terminating resistor 120 Ω, integrated in a western plug, and with a connecting cable 0.2 m for connection to the last **Cubicle**BUS-module.

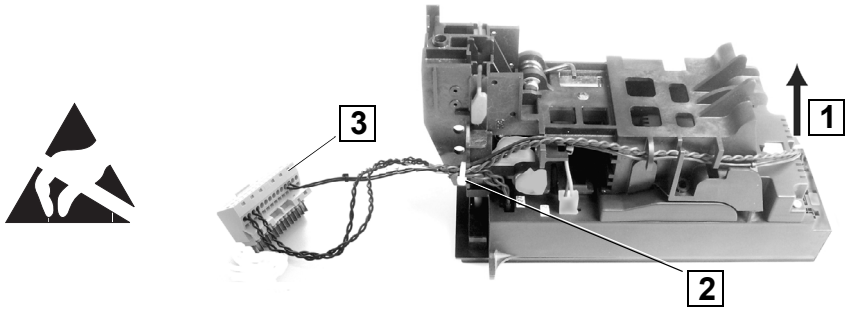
CubicleBUS-Modul **Cubicle**BUS-Module	Bestell-Nr. Order no.
ZSI-Modul ZSI-module	3WL9111-0AT21-0AA0
Analoges Ausgangsmodul Analog output module	3WL9111-0AT23-0AA0
Digitales Ausgangsmodul mit Relaisausgang Digital output module with relay output	3WL9111-0AT26-0AA0
Digitales Ausgangsmodul mit Relaisausgang parametrierbar Digital output module with relay output, parameterizable	3WL9111-0AT20-0AA0
Digitales Eingangsmodul Digital input module	3WL9111-0AT27-0AA0
Vorkonfektioniertes Kabel 1 m Pre-assembled cable 1 m	3WL9111-0BC02-0AA0
Vorkonfektioniertes Kabel 2 m Pre-assembled cable 2 m	3WL9111-0BC03-0AA0
Vorkonfektioniertes Kabel 0,2 m Pre-assembled cable 0.2 m	3WL9111-0BC04-0AA0

9.3 Wandler

9.3.1 Internen N-Wandler nachrüsten

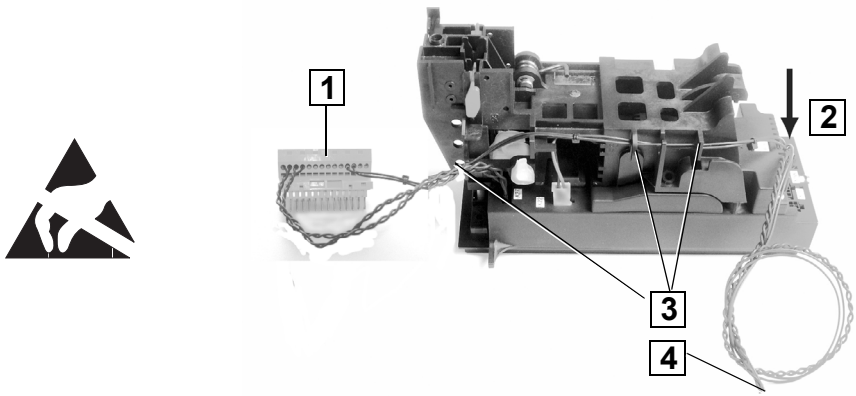
- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Festeinbauschalter ausbauen → (Seite 5-1) bzw. Schalter aus Einschubrahmen entnehmen → (Seite 24-4)
- Bedienpult abnehmen → (Seite 24-11)
- Überstromauslöser ausbauen → (Seite 9-72)

Kabelbaum vom Überstromauslöser abbauen



1 Stecker von X24 abziehen
2 Kabelfixierungen auftrennen
3 Kabel von Klemmen 9 bis 12 der Messerleiste X8 lösen

Neuen Kabelbaum am Überstromauslöser anbauen



1 Adern X8-11 und X8-12 an Klemmen 11 und 12 der Messerleiste X8 anklemmen
2 Stecker an X24 stecken
3 Kabel mit Kabelbindern fixieren
4 Stecker mit N-Wandler im Schalter verbinden

9.3 Transformers

9.3.1 Retrofitting the internal neutral CT

- Switch off the breaker and discharge the storage spring → (page 24-3))
- Dismount the fixed breaker → (page 5-1) or remove the drawout breaker from its guide frame → (page 24-4)
- Take off the front panel → (page 24-11)
- Remove the ETU → (page 9-72)

Disconnecting the cable harness from ETU

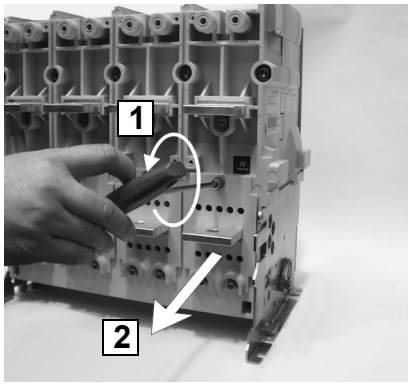
1 Unplug connector from X24
2 Remove cable binders
3 Disconnect cables from terminals 9 to 12 of receptacle X8

Connecting new cable harness to ETU

1 Connect cable terminals X8-11 and X8-12 to terminals 11 and 12 of receptacle X8
2 Plug connector to X24
3 Use cable ties to secure the cables
4 Connect the connector to the neutral CT in the circuit-breaker

Wandlerabdeckung am N-Leiteranschluss abbauen

Removing rear cover of neutral CT compartment





Gr. / Size

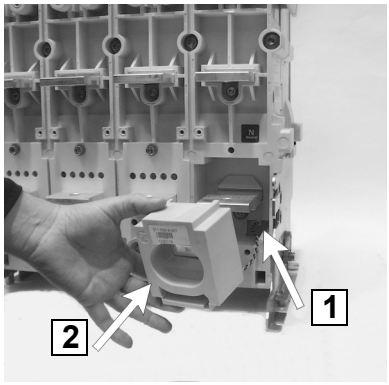
5

1 Schrauben lösen
2 Wandlerabdeckung abnehmen

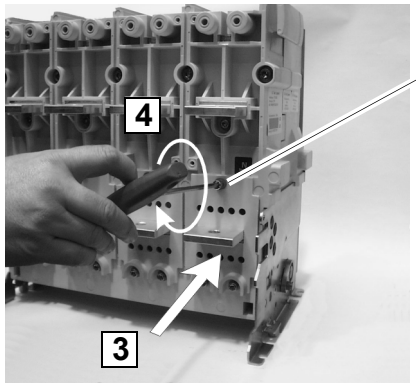
1 Remove screws
2 Take off the rear cover

N-Wandler einsetzen

Inserting neutral CT







*)



Gr. / Size

5



10 Nm
*) 5 Nm

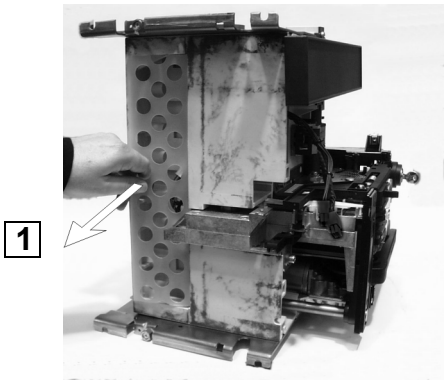
1 Stecker vom Wandleranschluss in den Kabelraum einführen
2 Wandler einsetzen
3 Wandlerabdeckung aufsetzen
4 Mit Schrauben befestigen
***) Selbstschneidende Schraube nur 5 Nm**

1 Push the CT terminal plug into the cable duct
2 Insert CT
3 Replace rear cover of CT compartment
4 Fasten the screws
***) self tapping screw 5 Nm only**

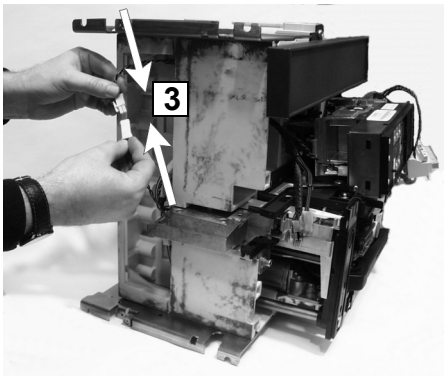
VORSICHT	**CAUTION**
Beim Verwenden selbstschneidender Schrauben Gewindegänge nicht zerstören! Schraube wie folgt eindrehen: - Schraube ansetzen - von Hand entgegen dem Uhrzeigersinn drehen, bis sich Gewindegänge treffen - eindrehen - mit Drehmomentschlüssel auf 5 Nm festziehen.	**By using self tapping screws do not damage threads!** Tight the screw as follows: - insert the screw - by hand with slight inward pressure, rotate the screw counter clockwise until the threads match - tighten by hand till snug - tighten to a torque of 5 Nm with torquing tool.

N-Wandler anschließen

Schalter auf die rechte Seite legen



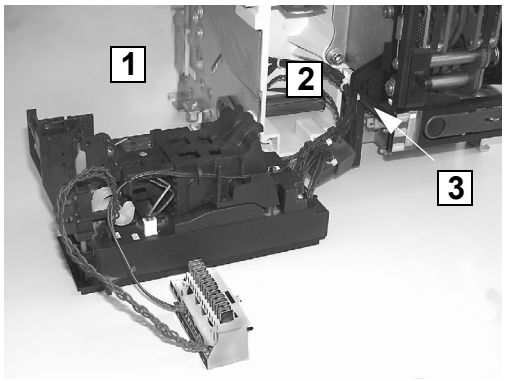
1 Kabelkanalabdeckung abnehmen
2 Überstromauslöser in geeigneter Weise ablegen und freien Stecker des neuen Kabelbaums in den Kabelkanal einführen



3 Stecker des Kabelbaums mit Stecker des N-Wandlers verbinden
4 Verbundene Stecker im Kabelkanal platzieren und Kabelkanalabdeckung aufsetzen

Anschlüsse am Überstromauslösser stecken

Überstromauslöser fixieren und Schalter auf die Füße stellen.

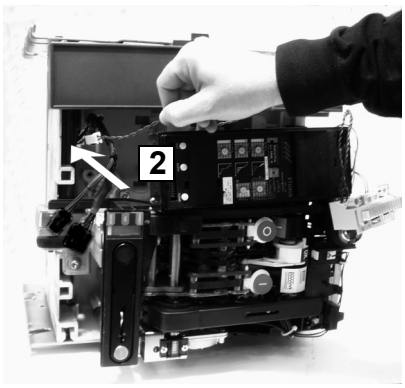


1 Überstromauslöser vor dem Schalter ablegen
2 Stecker an X20 und X21 stecken
3 Kabel mit Kabelbinder fixieren

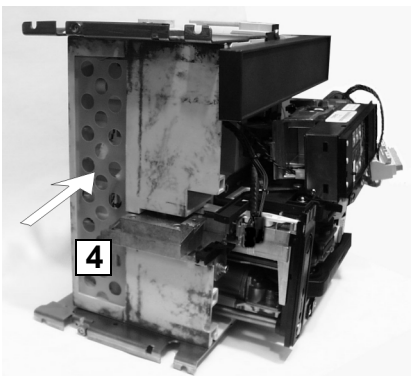
Anschließend: (bitte wenden)

Connecting the neutral CT

Lay the breaker on its right hand side.



1 Take off the cable duct cover
2 Place the ETU suitably and push the free connector of the cable harness into the cable duct



3 Plug the connector of the cable harness into the connector of the neutral CT
4 Place the connectors so-joined in the cable duct and replace the cover on the cable duct

Connecting the ETU

Fix the ETU and place the breaker upright.

1 Place the ETU in front of the breaker as shown
2 Plug the connectors to X20 and X21
3 Fasten the cables with the binders

Then: (please turn over)

Anschließend:

- Überstromauslöser anbauen → (Seite 9-72)
- Bedienpult anbauen → (Seite 24-25)
- Festeinbauschalter einbauen → (Seite 5-1) bzw. Schalter in Einschubrahmen einsetzen und in Betriebsstellung verfahren → (Seite 6-1)

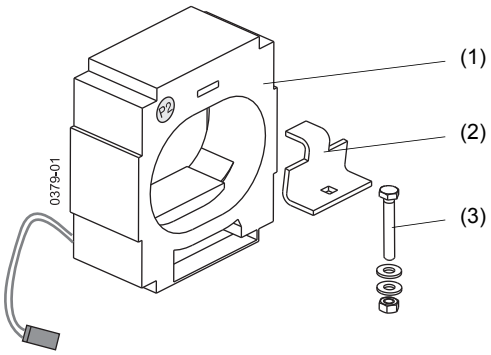
Then:

- Remount the ETU → (page 9-72)
- Remount the front panel → (page 24-25)
- Install the fixed breaker → (page 5-1) or place the drawout breaker in its frame guide and rack into connected position → (page 6-1)

9.3.2 Externer Wandler für Neutralleiter

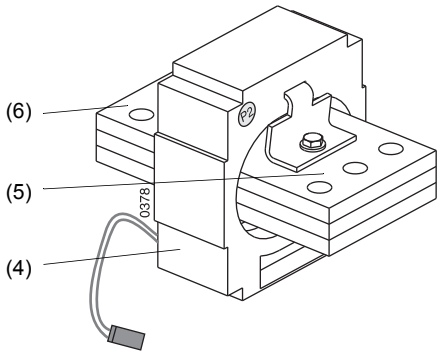
9.3.2 External transformer for neutral conductor

Hinweis	Note
Die Sekundäranschlussleitungen vom Neutralleiter-Wandler zum 3WL-Leistungsschalter sind zu verdrillen!	The secondary wiring from the neutral CT to the 3WL circuit breaker must be twisted!



(1) Ausführung für anlagenseitige Kupferschiene
(2) Montagewinkel
(3) Schraube M6 mit Scheiben und Mutter
(4) Ausführung mit Kupferanschlussstücken
(5) Anschluss P2
(6) Anschluss P1

→ Maßbilder (Seite 7-13)



(1) Version for copper bar on switchgear side
(2) Mounting bracket
(3) Screw M6 with washers and nut
(4) Version with copper connectors
(5) Terminal P2
(6) Terminal P1

→ Dimension drawings (page 7-13)

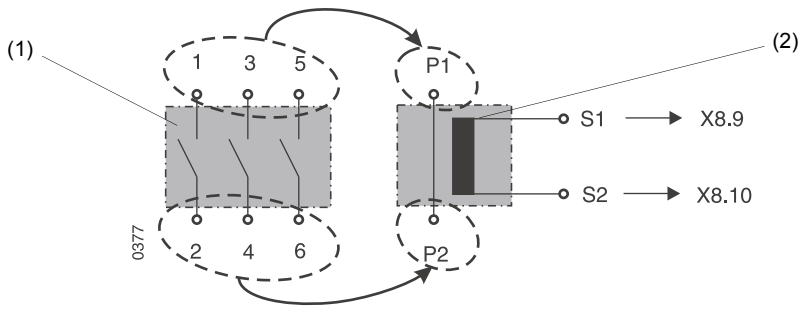
Zuordnung der Anschlüsse

Terminal assignment

Hinweis	Note
Ggf. fehlende Hilfsstromanschlüsse nachrüsten (Messerleiste, Hilfsstromstecker, Schleifkontaktmodul für Einschubrahmen). → (Seite 5-15)	If necessary missing auxiliary terminals may be retrofitted (receptacle, auxiliary connectors and sliding contact module for guide frames). → (page 5-15)

Anschlußwiderstand X8.9 - X8.10 entfernen!

Remove the link X8.9 - X8.10!



(1) Hauptstrombahn
(2) Externer N-Wandler

Durch diese Zuordnung wird gleiche Stromflussrichtung im Schalter und im externen N-Wandler gewährleistet.

(1) Power circuit
(2) External sensor for neutral CT

This arrangement ensures the same direction of the current flow for the circuit breaker and the external neutral CT

9.3.3 Spannungswandler

Spannungswandler werden für die Messung der Spannungen durch die Messfunktion benötigt.

Die Spannungswandler ab Seriennummer 980102XXXXXX haben intern primär- und sekundärseitig einen Sternpunkt und sekundär eine elektronische Sicherung.

Der Spannungswandler kann auf eine standardmäßige 35-mm-Hutschiene im Schaltfeld aufgeschnappt werden. Dabei ist eine waagerechte oder senkrechte Gebrauchslage möglich.

Bei vertikaler Gebrauchslage wird durch die Montage eines Endhalters (z. B. SIEMENS 8WA1 805) ein Verrutschen des Spannungswandlers auf der Schiene verhindert.

9.3.3 Voltage transformers

Voltage transformers are required for voltage measuring by the metering function.

Voltage transformers from serial numbers 980102XXXXXX on upwards are connected internally in star on both primary and secondary side. They are equipped with a secondary current protection.

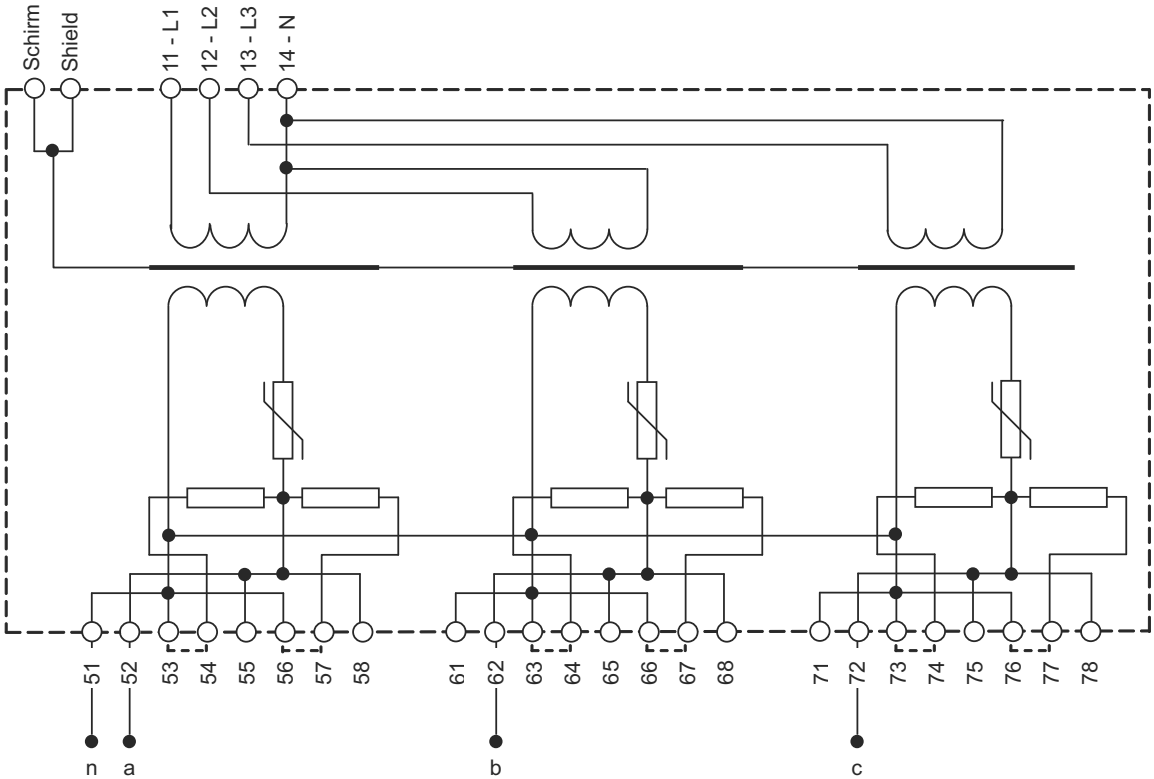
Voltage transformer can be snapped to a standard 35-mm DIN-rail in the switchgear panel. It is possible to assemble it either horizontally or vertically.

The use of an end retainer (e.g. SIEMENS 8WA1 805) will prevent the voltage transformer slipping in case of vertical assembly.

Verdrahtungsplan

Wiring plan

Hinweis	Note
Im Folgenden wird der Anschluß von Siemens-Spannungswandlern in Netzen mit Neutralleiter beschrieben. Ohne Neutralleiter können diese Spannungswandler nicht verwendet werden. Für diesen Fall sind geeignete Spannungswandler → (Seite 9-119) primär in Dreieckschaltung anzuschließen	Below the wiring of Siemens-voltage transformers using the neutral conductor is described. Without neutral conductor these voltage transformers can not be used. In this case suitable voltage transformers → (page 9-119) need to be used in delta connection.



Die Genauigkeit der Spannungswandler ist von der Anzahl der angeschlossenen Messfunktionen pro Spannungswandler abhängig:

- Klasse 0,5 für 1 - 3 Messfunktionen
- Klasse 3 für 4 - 6 Messfunktionen

Diese Angaben gelten für Umgebungstemperaturen von 30 - 50 °C und einer primärseitigen Spannung von 80 - 120% U_e für die Dauer von einem Jahr.

The accuracy of the voltage measurement depends on the number of metering functions connected per voltage transformer:

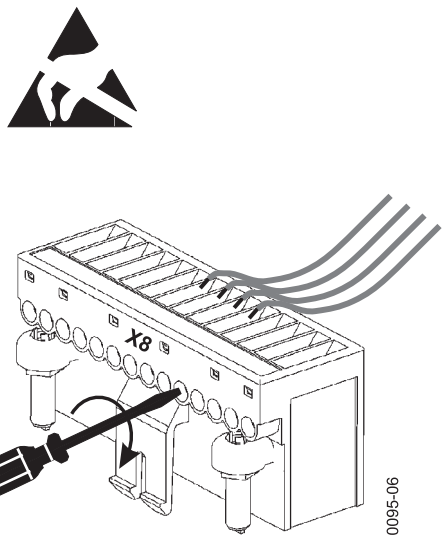
- class 0,5 for 1 - 3 metering functions
- class 3 for 4 - 6 metering functions

This data applies to ambient temperatures from 30 to 50 °C and a primary voltage of 80 to 120% U_e for one year.

VORSICHT	CAUTION
Vor der Durchführung von Isolationsprüfungen in der Schaltanlage sind die Spannungswandler primärseitig vom Netz zu trennen.	Before performing insulation tests in the panel, the voltage transformers must be disconnected from the power supply on the primary side.

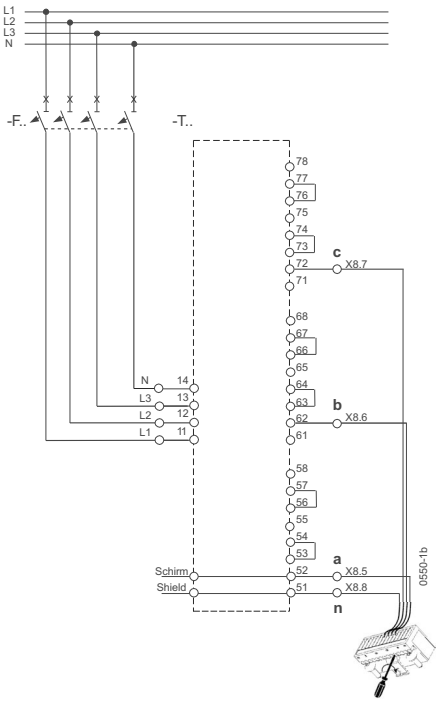
Bezeichnung / designation Spannung (Leiter-Leiter) / Voltage (Phase-Phase) 380 … 690 V AC	**Primär / primary** Klemme / terminal	**Sekundär / secondary** Klemme / terminal
Phase L1 / a	11	52
Phase L2 / b	12	62
Phase L3 / c	13	72
N / n	14	51, 61, 71
Schirm / shield Schirm des Spannungswandlers an den Erdungspunkt (PE-Potential) der Anlage anschließen (Mindestquerschnitt = 2,5 mm^2) Shield of the voltage transformer must be connected to the earth point of the gear (PE potential), by a minimum cross section of 2,5 mm^2.	S	

Beschaltungsbeispiele



X8.5: Phase L1/a
X8.6: Phase L2/b
X8.7: Phase L3/c
X8.8: N/n

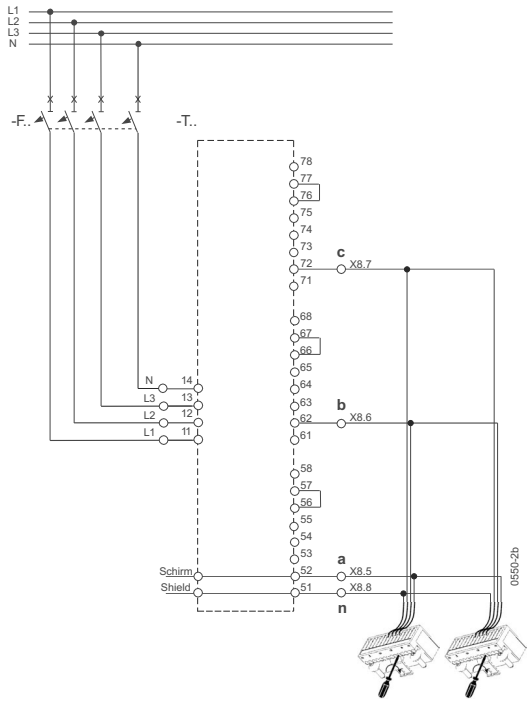
Connection examples

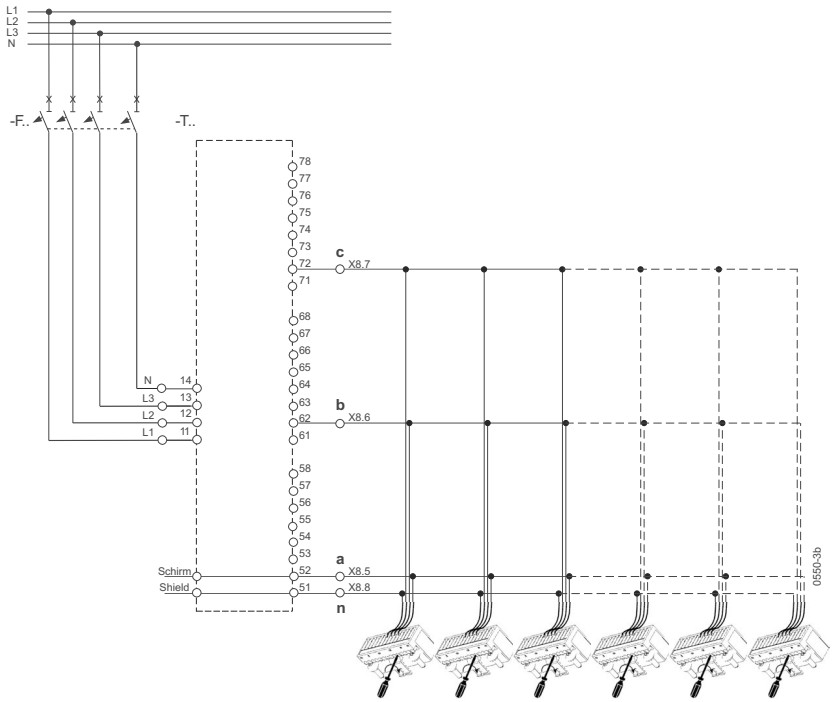


	Phase L1 / a	**Phase L2 / b**	**Phase L3 / c**
Anzahl der Messfunktionen / number of metering functions	Brücken / connections	Brücken / connections	Brücken / connections
1 (Variante / variant 1)	53-54 56-57	63-64 66-67	73-74 76-77
2 (Variante / variant 2)	56-57	66-67	76-77
3-6 (Variante / variant 3)	-	-	-

Variante 1: primärseitig (L-L) 380 V ... 690 V AC sekundärseitig Anschaltung einer Messfunktion

Variant 1: primary (L-L) 380 ... 690 V AC one metering function connected on secondary side





Variante 2: primärseitig (L-L) 380 V ... 690 V AC
sekundärseitig Anschaltung zweier Messfunktionen

Variant 2: primary (L-L) 380 V ... 690 V AC
two metering functions connected on secondary side

Variante 3: primärseitig (L-L) 380 V ... 690 V AC
sekundärseitig Anschaltung von
drei bis zu sechs Messfunktionen

Variant 3: primary (L-L) 380 V ... 690 V AC
three to six metering functions connected on
secondary side

Parametrieren der Messfunktion PLUS

Die Messfunktion muss anschließend parametriert werden.

Die Parametrierung erfolgt über:

- das Grafikdisplay (ETU76B),
- die Prüfbuchse mit dem BDA oder
- den PROFIBUS-DP mit einem PC und der Software „powerconfig“ → (Seite 27-3)

Folgende Einstellungen sind vorzunehmen (am Beispiel mit ETU76B):

Über **PARAMETER ÄNDERN / System Konfig. / Spannungswandler** sind folgende Daten des Spannungswandlers einzugeben:

- Primär: 400 V (Werkseinstellung)
- Sekundär: 100 V (Werkseinstellung)
- Schaltg.: Stern Y (Werkseinstellung)

Über **PARAMETER ÄNDERN / System Konfig. / Leistungsfluss** ist einzugeben:

- Oben nach Unten (Werkseinstellung) oder
- Unten nach Oben

Über **PARAMETER ÄNDERN / System Konfig. / Phasendrehsinn** ist einzugeben:

- L1 - L2 - L3 (Werkseinstellung) oder
- L1 - L3 - L2

Parameterizing the metering function PLUS

The metering function must be parameterized subsequently to match the voltage transformer.

Parameterizing can be performed using:

- the graphical display (ETU76B),
- the test socket with the BDA or
- the PROFIBUS-DP with a PC and the software "powerconfig" → (page 27-2)

The following settings need to be done (e.g. with ETU76B):

By **CHANGE PARAMETERS / System Config. / PT Config** the following voltage transformer data must be fed:

- Primary: 400 V (factory adjustment)
- Secondary: 100 V (factory adjustment)
- Wiring: Ypsilon Y (factory adjustment)

By **CHANGE PARAMETERS / System Config. / Power Direction** must be fed:

- Downward (factory adjustment) or
- Upward

By **CHANGE PARAMETERS / System Config. / Phase Rotation** must be fed:

- L1 - L2 - L3 (factory adjustment) or
- L1 - L3 - L2

Übersetzungsverhältnis und Bestellnummer

Transmission ratio and order number

Übersetzungsverhältnis / Transmission ratio			Bestell-Nr. / Order no.
Primär	/ primary:	380 - 690 V	3WL9111-0BB68-0AA0
Sekundär	/ secondary:	95 - 172,5 V	
Verhältnis	/ ratio:	4 : 1	
Abmessungen	/ dimensions:	→ (7-13)	

Kundenseitige Beistellung der Spannungswandler

Die kundenseitige Beistellung des Spannungswandlers ist unter folgender Beachtung möglich:

- Bemessungsausgangsspannung 100 V ... 120 V
- Ausgangsbelastung mit 100 kΩ je angeschlossener Messfunktion
- Für eine Messgenauigkeit von 1% sind Wandler der Klasse 0,5 erforderlich.

Die Spannungswandler sind wie in den gezeigten Beschaltungsbeispielen zu verdrahten und sowohl primärseitig als auch sekundärseitig abzusichern.

Customers' own voltage transformers

Customers can use their own voltage transformers, if the following data are complied with:

- rated output voltage 100 V ... 120 V
- output load with 100 kΩ per metering function connected
- to achieve an accuracy of 1%, class 0.5 voltage transformers are required.

The voltage transformers have to be wired according to the circuit examples above and must be fuse-protected both on the primary and the secondary side.

Hinweis für Dreieckschaltung

Ohne Neutralleiter sind die Spannungswandler primär in Dreieckschaltung anzuschließen. Die oben genannten sind dazu nicht geeignet.

Geeignete Spannungswandler sind z.B.:
Fa. Ritz, Typ KSZR 100/1 oder
Fa. Ritz, Typ KSZR 70

Die Parametrierung erfolgt über:

- das Grafikdisplay (ETU76B),
- die Prüfbuchse mit dem BDA oder
- den PROFIBUS-DP mit einem PC und der Software „powerconfig“ → (Seite 27-3)

Note concerning delta connection

Without neutral conductor the voltage transformers need to be wired in delta connection on the primary side. The transformers listed above are not applicable.

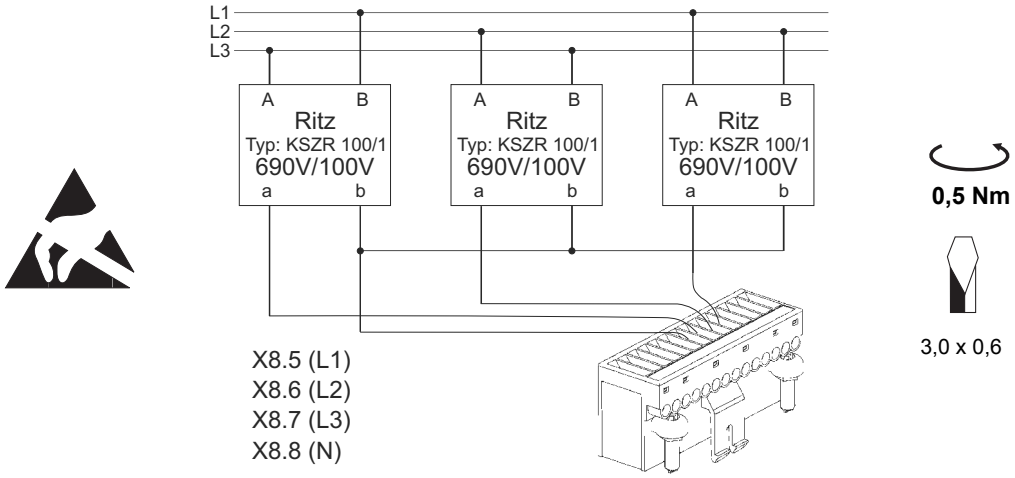
Suitable voltage transformers are for instance:
Co. Ritz, Type KSZR 100/1 or
Co. Ritz, Type KSZR 70

Parameterizing can be performed using:

- the graphical display (ETU76B),
- the test socket with the BDA or
- the PROFIBUS-DP with a PC and the software "powerconfig" → (page 27-2)

Beispiel für Phasendrehsinn L1 - L2 - L3 mit U_e= 690 V

Example for phase rotation L1 - L2 - L3 with U_e= 690 V



Folgende Einstellungen sind vorzunehmen (Beispiel mit ETU76B):

Über **PARAMETER ÄNDERN / System Konfig. / Spannungswandler** sind folgende Daten des Spannungswandlers einzugeben:

- Primär: 690 V (Beispiel, je nach Spannungswandler)
- Sekundär: 100 V (Werkseinstellung)
- Schaltg.: Dreieck Δ

Über **PARAMETER ÄNDERN / System Konfig. / Leistungsfluss** ist einzugeben:

- Oben nach Unten (Werkseinstellung) oder
- Unten nach Oben

Über **PARAMETER ÄNDERN / System Konfig. / Phasendrehsinn** ist einzugeben:

- L1 - L2 - L3 (wie im Beispiel, Werkseinstellung) oder
- L1 - L3 - L2

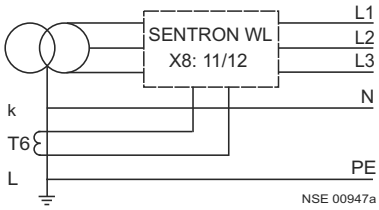
9.3.4 Externer G-Wandler

Für die Gewährleistung der Schutzfunktion vor unzulässigen Erdschlussströmen kann auch ein handelsüblicher externer Stromwandler mit folgenden Eigenschaften verwendet werden:

- Primär-Bemessungsstromstärke: 1200 A
- Sekundär-Bemessungsstromstärke: 1 A
- Klassengenauigkeit: Klasse 1
- Schalterinterne Bürde: 0,11 Ω

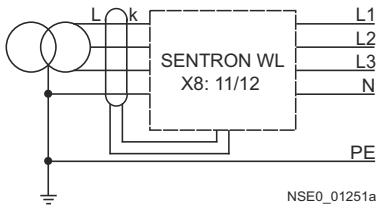
Beispiele

3-poliger Leistungsschalter mit Stromwandler im geerdeten Sternpunkt des Transformators



3-pole circuit breaker with current transformers “Y” connected with the star point of the transformer grounded

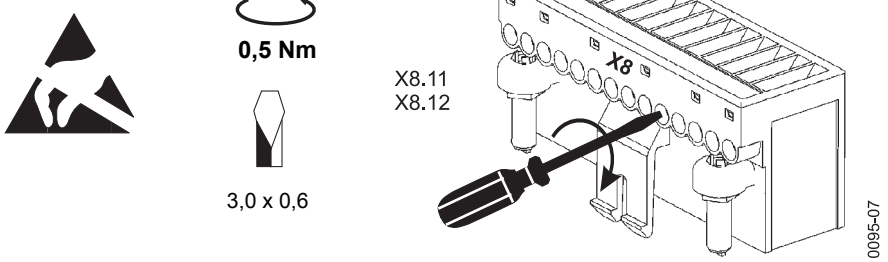
4-poliger Leistungsschalter mit Summenstromwandler



4-pole circuit breaker summation current transformer

Anschließen

Hinweis	Note
Ggf. fehlende Hilfsstromanschlüsse nachrüsten (Messerleiste, Hilfsstromstecker, Schleifkontaktmodul für Einschubrahmen). → (Seite 5-15)	If necessary missing auxiliary terminals may be retrofitted (receptacle, auxiliary connectors and sliding contact module for guide frames). → (page 5-15)



9.3.4 External ground-fault current transformer

The ground-fault protection can use an external current transformer with the following properties:

- primary current: 1200 A
- secondary current: 1 A
- ANSI: Class 1
- Breaker internal burden: 0.11 Ω

Examples

Connection

9.4 Externe Spannungsversorgung

Die Grundschutzfunktionen der elektronischen Überstromauslöser benötigen keine Hilfsenergie.

Sollen die zusätzlichen Funktionen der Überstromauslöser ETU45B … 76B genutzt werden, die einen Datenaustausch über den **Cubicle**BUS erfordern, muss eine externe 24 V DC-Spannungsversorgung angeschlossen werden.

9.4.1 Anschluss

Variante A: Anschluss an den Handstecker X8 (Vorzugsvariante)
Variante B: Anschluss an ein beliebiges **Cubicle**BUS-Modul

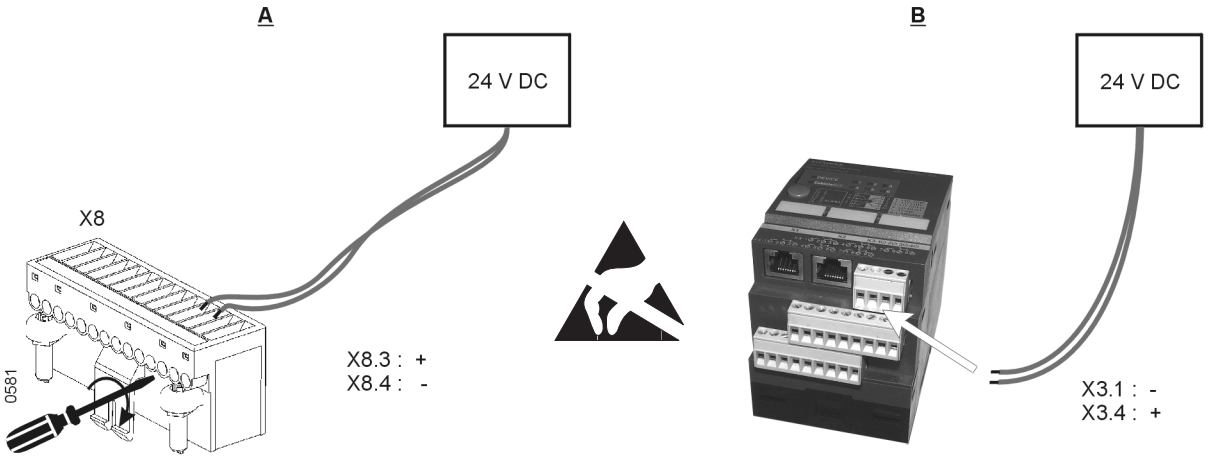
9.4 External voltage supply

The basic functions of the electronic overcurrent releases do not require auxiliary power supply.

To use the extended functions of the overcurrent releases ETU45B ... 76B requiring data exchange through the **Cubicle**BUS, an external 24 V DC voltage supply must be connected.

9.4.1 Connection

Version A: Connection to hand plug X8 (preferred version)
Version B: Connection to any **Cubicle**BUS-module X8



9.4.2 Anforderungen

Die externe Spannungsversorgung mit 24 V DC muss mindestens den Anforderungen der DIN 19240 / EN 61131 genügen.

Für die Versorgung eines Leistungsschalters mit der maximal möglichen Anzahl externer **Cubicle**BUS-Module kann das unten aufgeführte Siemens-Netzteil verwendet werden. Soll ein zweiter Leistungsschalter versorgt werden, ist auch ein zweites Netzteil erforderlich.

Bei Verwendung von Spannungsversorgungen eines anderen Herstellers sollten folgende Bedingungen erfüllt werden:

- Primär getaktetes Schaltnetzteil
- 24 V DC, ± 3 %
- Stromnennwert: 5 A pro Leistungsschalter mit der maximal möglichen Anzahl externer **Cubicle**BUS-Module

9.4.2 Requirements

The external voltage supply with 24 V DC must comply at least with the requirements of DIN 19240 / EN 61131.

To supply power to a circuit breaker equipped with the maximum number of external **Cubicle**BUS-modules possible, the Siemens power supply unit mentioned below can be used. If a second circuit breaker must be fed, a second power supply unit will be necessary, too.

When using voltage supply units from other manufacturers, the following conditions must be fulfilled:

- Primary-switched-mode power supply unit
- 24 V DC, ± 3 %
- Current rating: 5 A per circuit breaker with the maximum number of external **Cubicle**BUS-modules possible

9.4.3 Bestellnummer

9.4.3 Order number

Stromversorgung / Power supply	Bestell-Nr. / Order no.
SITOP PSU100S Eingang: AC 120/230 V, Ausgang 24 V DC / 5 A input: AC 120/230 V, output 24 V DC / 5A	6EP1333-2BA20

VORSICHT	CAUTION
Die externe Spannungsversorgung für die elektronischen Komponenten darf nicht zur Stromversorgung des Motorantriebes verwendet werden!	The external power supply, used for electronic components, shall not be used to supply the motor operating mechanism!

9.5 Breaker Data Adapter

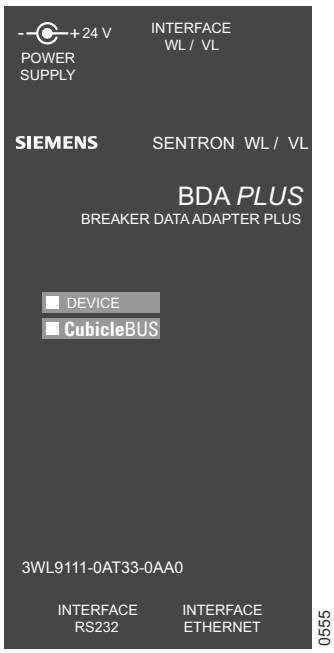
9.5.1 Verwendung

Der Breaker Data Adapter (BDA) ermöglicht es, den Leistungsschalter ohne Zusatzsoftware mit einem browserfähigen Ein- / Ausgabegerät (z. B. Laptop) zu parametrieren, zu bedienen und zu beobachten. Diese Möglichkeit besteht für Leistungsschalter mit einem elektronischen Überstromauslöser der Typen ETU45B ... 76B. Für den Überstromauslöser ETU45B ist es jedoch nicht möglich, die Grundschutzfunktionen zu parametrieren. Diese werden ausschließlich mit den Drehkodierschaltern eingestellt.

Die Kommunikation mit der Elektronik des Leistungsschalters erfolgt über den **Cubicle**BUS . Dazu kann der BDA wahlweise an die Prüfbuchse des Überstromauslösers oder für einen längerfristigen stationären Betrieb an das letzte **Cubicle**BUS -Modul angeschlossen und auf eine 35 mm-Hutschiene aufgeschnappt werden. Die erforderlichen Verbindungskabel werden mitgeliefert.

Der BDA *PLUS* besitzt sowohl einen RS232 und einen Ethernetanschluss.

9.5.2 Ansicht



9.5.3 Anzeigen

LED	Anzeige	Bedeutung
DEVICE	grün	BDA in Betrieb
	gelb	BDA im Testmodus
	rot	BDA gestört
CubicleBUS	grün	Verbindung zum **Cubicle**BUS besteht
	rot	Schwerer Fehler auf dem **Cubicle**BUS ; Verbindungen und **Cubicle**BUS -Module überprüfen
	aus	keine Verbindung zum **Cubicle**BUS

9.5 Breaker Data Adapter

9.5.1 Application

The Breaker Data Adapter (BDA) makes it possible to parameterize, operate and observe the circuit breaker without additional software by means of an input/output unit with browser features (e.g. a laptop). This is possible for circuit breakers equipped with trip unit of the types ETU45B ... 76B. On the trip unit ETU45B, however, the basic protective functions cannot be parameterized. These are exclusively adjusted with the rotary coding switches.

Communications with the electronic system of the circuit breaker takes place through the **Cubicle**BUS . For this purpose, the BDA can be optionally connected to the test socket of the trip unit, or – in case of longer stationary operation – to the last **Cubicle**BUS -module, and snapped on a 35 mm DIN-rail. The required connection cables are supplied with the unit.

The BDA *PLUS* is equipped with a RS232 as well as an Ethernetconnection

9.5.2 View

9.5.3 Indications

LED	Indication	Significance
DEVICE	green	BDA in operation
	yellow	BDA in test mode
	red	BDA faulty
CubicleBUS	green	Connection to **Cubicle**BUS available
	red	Heavy fault on the **Cubicle**BUS ; check connections and **Cubicle**BUS -modules
	off	No connection to **Cubicle**BUS

9.5.4 Anschlussvarianten

Der Anschluss des BDA erfolgt abhängig vom jeweiligen Verwendungszweck in unterschiedlicher Art und Weise.

Hinweis	Note
Um Fehlfunktionen zu vermeiden, die Spannungsversorgung immer zuletzt anschließen.	To avoid malfunctions, connect the voltage supply at last.

Offlinemodus

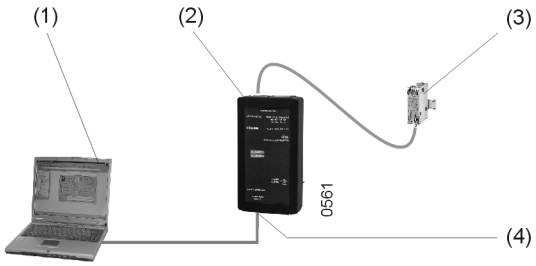
Alle Parameter des Leistungsschalters können eingegeben und z. B. auf einem Notebook gespeichert werden, ohne dass mit dem Leistungsschalter kommuniziert werden muss. Nachdem eine Verbindung zum Leistungsschalter hergestellt wurde, können diese Daten übertragen und der Leistungsschalter somit automatisch parametriert werden.

9.5.4 Connection versions

The BDA is connected in different ways according to the corresponding application.

Offline mode

All circuit breaker parameters can be entered and saved e.g. on a notebook, without the need to communicate with the circuit breaker. When the connection to the circuit breaker is established, this data can be transmitted and the circuit breaker can be parameterized automatically.



(1) Browserfähiges Ein- / Ausgabegerät (z. B. Notebook)
(2) BDA *PLUS*
(3) Spannungsversorgung 24 V DC
(4) RS232- bzw. Ethernet-Schnittstelle

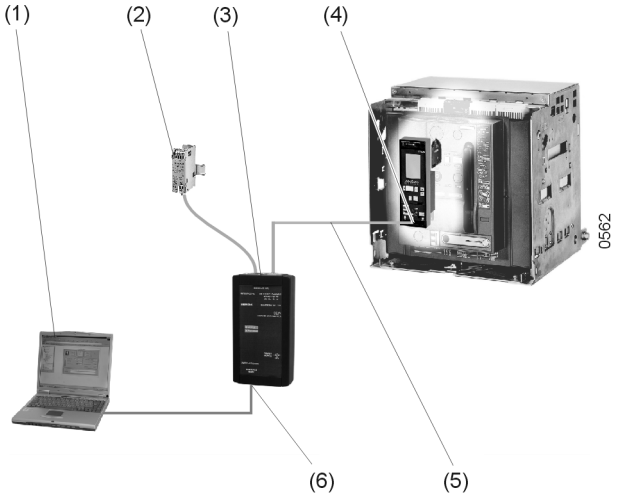
(1) Input/output unit with browser feature (e.g. notebook)
(2) BDA *PLUS*
(3) Voltage supply 24 V DC
(4) RS232 resp. Ethernet-interface

Vorortbedienung

Der Leistungsschalter wird direkt vor Ort manuell parametriert. Weiterhin können die Parametereinstellungen auf dem Notebook gespeichert und Diagnosedaten des Leistungsschalters ausgelesen werden.

Local operation

The circuit breaker is parameterised directly at site. Furthermore, the parameter settings can be saved on the notebook, and the circuit breaker diagnosis data can be read.



(1) Browserfähiges Ein- / Ausgabegerät (z. B. Notebook)
(2) Spannungsversorgung 24 V DC, sofern keine Spannungsversorgung über den **Cubicle**BUS
(3) BDA oder BDA *PLUS*
(4) Prüfbuchse des Überstromauslösers (40polig)
(5) Verbindungskabel SUB-D 15polig (BDA) auf Buchsenleiste 40-polig
(6) RS232-Schnittstelle SUB-D 9-polig

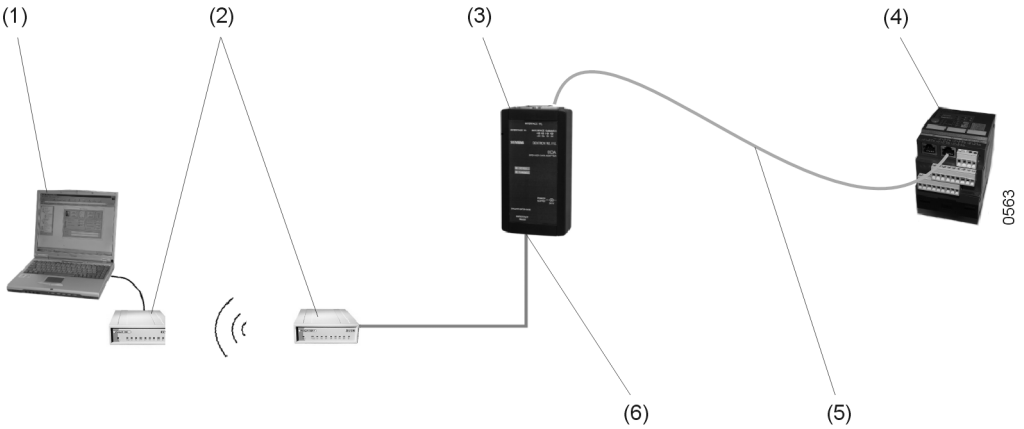
(1) Input/output unit with browser feature (e.g. notebook)
(2) Voltage supply 24 V DC, if there is no voltage supply via the **Cubicle**BUS
(3) BDA or BDA *PLUS*
(4) Test socket of the overcurrent release (40-pole)
(5) Connection cable SUB-D, 15-pole (BDA) to socket connector, 40-pole
(6) RS232 interface SUB-D, 9-pole

Fernzugriff über Modem

Der Zugriff auf die Daten des Leistungsschalters einschl. Parametrierung erfolgt von einem beliebig weit entfernten Ort.

Remote access via modem

The circuit breaker data incl. parameterization can be accessed from any remote location.



(1) Browserfähiges Ein- / Ausgabegerät (z. B. Notebook)
(2) Modem
(3) BDA oder BDA *PLUS*
(4) Externes **Cubicle**BUS-Modul
(5) Verbindungskabel SUB-D 15-polig (BDA) auf RJ45 Westernstecker (**Cubicle**BUS-Anschluss)
(6) RS232-Schnittstelle SUB-D 9-polig

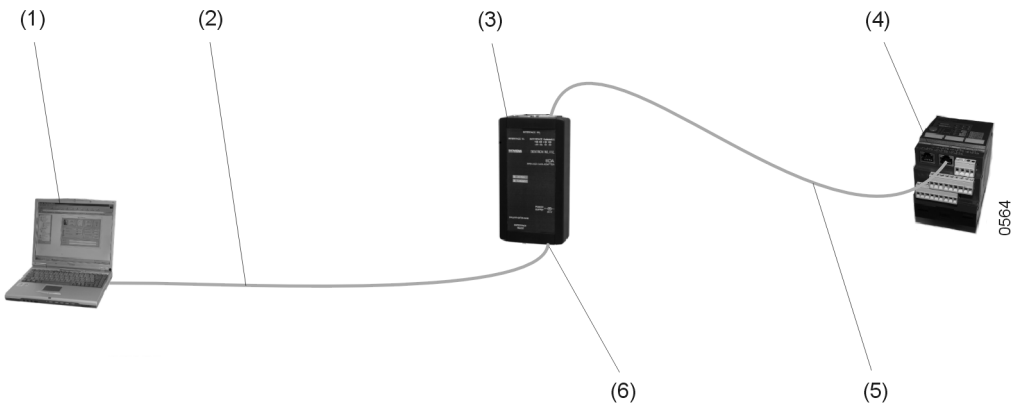
(1) Input/output unit with browser feature (e.g. notebook)
(2) Modem
(3) BDA or BDA *PLUS*
(4) External **Cubicle**BUS-module
(5) Connection cable SUB-D, 15-pole (BDA) to RJ45 western plug (**Cubicle**BUS-connection)
(6) RS232 interface SUB-D, 9-pole

Fernzugriff über Ethernet

Der Zugriff auf die Daten des Leistungsschalters einschl. Parametrierung erfolgt über das kundenseitige Ethernet. Diese Anschlussvariante steht nur für den BDA *PLUS* zur Verfügung.

Remote access via Ethernet

The circuit breaker data incl. parameterization is accessed via the customer-side Ethernet. This connection is only possible in the BDA *PLUS* version.



(1) Browserfähiges Ein- / Ausgabegerät (z. B. Notebook)
(2) Ethernet-Kabel
(3) BDA *PLUS*
(4) Externes **Cubicle**BUS-Modul
(5) Verbindungskabel SUB-D 15polig (BDA) auf RJ45 Westernstecker (**Cubicle**BUS-Anschluss)
(6) Ethernet-Anschluss

(1) Input/output unit with browser feature (e.g. notebook)
(2) Ethernet cable
(3) BDA PLUS
(4) External **Cubicle**BUS-module
(5) Connection cable SUB-D, 15-pole (BDA) to RJ45 western plug (**Cubicle**BUS-connection)
(6) Ethernet connection

9.5.5 Spannungsversorgung

Der BDA benötigt eine Spannungsversorgung von 24 V DC. Diese kann erfolgen über:

- ein separates handelsübliches Steckernetzteil oder
- den **Cubicle**BUS mit der externen Spannungsversorgung der Leistungsschalterelektronik.

9.5.5 Voltage supply

The BDA requires a voltage supply of 24 V DC. This can be applied through:

- a separate customary plug-type power supply unit or
- the **Cubicle**BUS with the external voltage supply of the circuit breaker electronics.

9.5.6 Bestellnummern

9.5.6 Order numbers

	Bestell-Nummer / Order no.
BDA *PLUS*	3WL9111-0AT33-0AA0

9.6 Handprüfgerät

Das Handprüfgerät dient der Überprüfung der korrekten Funktion des Überstromauslösers, der Energie- und Stromwandler, des Auslösemagneten F5 sowie der Messwertanzeige.

9.6 Test device

The handheld test device is used to verify the proper operation of the trip unit, the energy transformers and current transformers as well as the tripping solenoid F5 and the data display

GEFAHR

Gefährliche elektrische Spannung!

Kann Tod, schwere Personenschäden sowie Schäden an Geräten und Ausrüstung bewirken.

Vor dem Arbeiten an diesem Gerät, Anlage unbedingt spannungsfrei schalten.



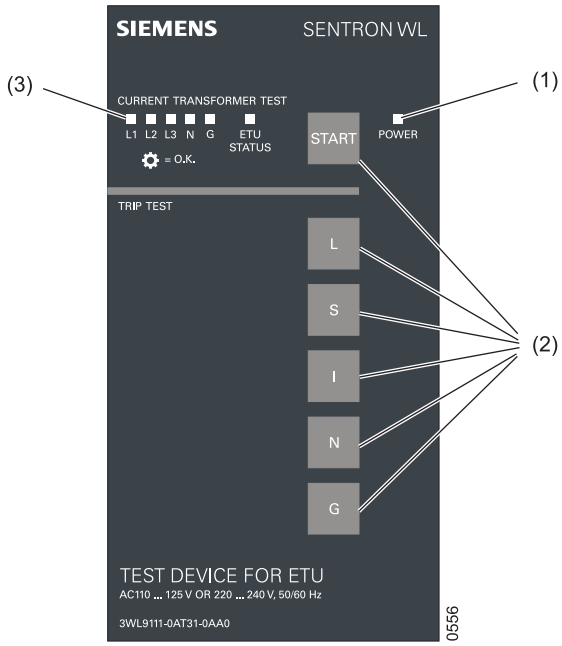
DANGER

Hazardous voltage!

Will cause death, serious personal injury, or equipment / property damage.

Disconnect power before working on this equipment.

9.6.1 Ansicht



(1) LED für die Betriebsspannungsanzeige
(2) Bedientasten
(3) 6 LED für die Anzeige der Testergebnisse

9.6.2 Vorbereitende Arbeiten

- Leistungsschalter aus- und freischalten
- Federspeicher entspannen
- Einstellwerte des Überstromauslösers dokumentieren
- Erdschlussschutz, wenn vorhanden, am Überstromauslöser ausschalten (I_g = OFF)
- Einstellwert I_R = 1,0 I_n
- Externe Spannungsversorgung für die Elektronik, wenn vorhanden, unterbrechen
- Abdeckkappe von der Prüfbuchse X25 der ETU entfernen

9.6.1 View

(1) LED for operating voltage indication
(2) Control buttons
(3) 6 LED's to show test results

9.6.2 Preparations

- Push open button and isolate the circuit breaker
- discharge the storage spring
- Note the setting values of the overload release
- Switch off the ground-fault protection at the trip unit, if available (I_g = OFF)
- Setting value I_R = 1.0 I_n
- Interrupt external voltage supply for the electronic system, if available
- Remove the cap from the test connector X25 of the trip unit

VORSICHT		CAUTION
Die Verwendung des Handprüfgerätes bei eingeschaltetem Leistungsschalter kann zu Fehlauslösungen und Zerstörung des Handprüfgerätes führen. Den Leistungsschalter vor dem Testen in die Trennposition verfahren, oder in der Stellung „AUS“ testen.		Using the Hand-Held test unit with circuit breaker closed can cause nuisance tripping of the circuit breaker and will destroy the test unit. Rack the circuit breaker to the DISCONNECT position (draw-out style) or switch the circuit breaker OFF before testing.

9.6.3 Spannungsversorgung

Das Handprüfgerät wird aus einem Wechselspannungsnetz 220 … 240 V oder 110 … 125 V, 50/60 Hz versorgt. Werksseitig sind 220 … 240 V eingestellt.

Der Umschalter befindet sich auf der Leiterplatte im Inneren des Handprüfgerätes.

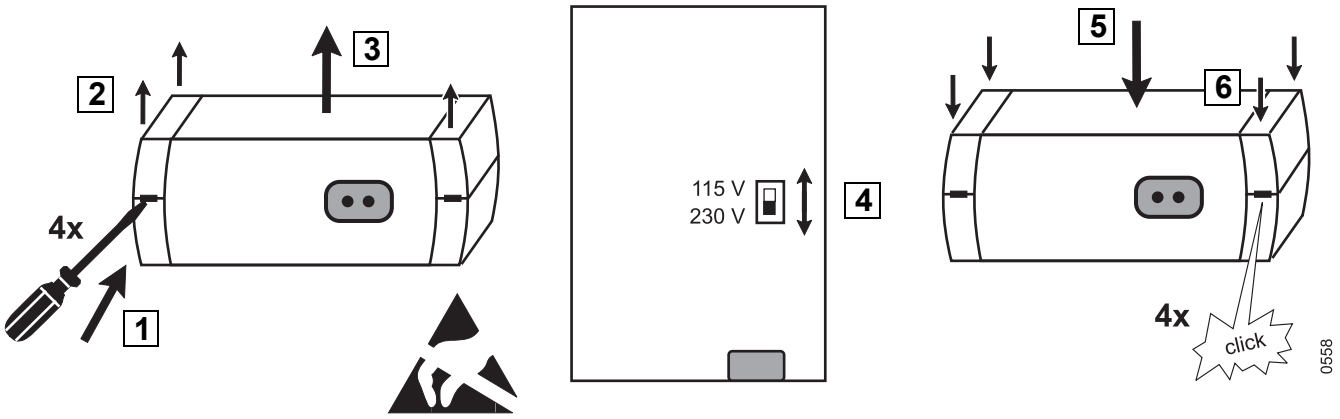
9.6.3 Voltage supply

The test device is supplied by an AC power system 220 ... 240 V or 110 ... 125 V, 50/60 Hz. The factory setting is 220 ... 240 V.

The changeover switch is located on the printed circuit board inside the test device.

Netzspannung umschalten

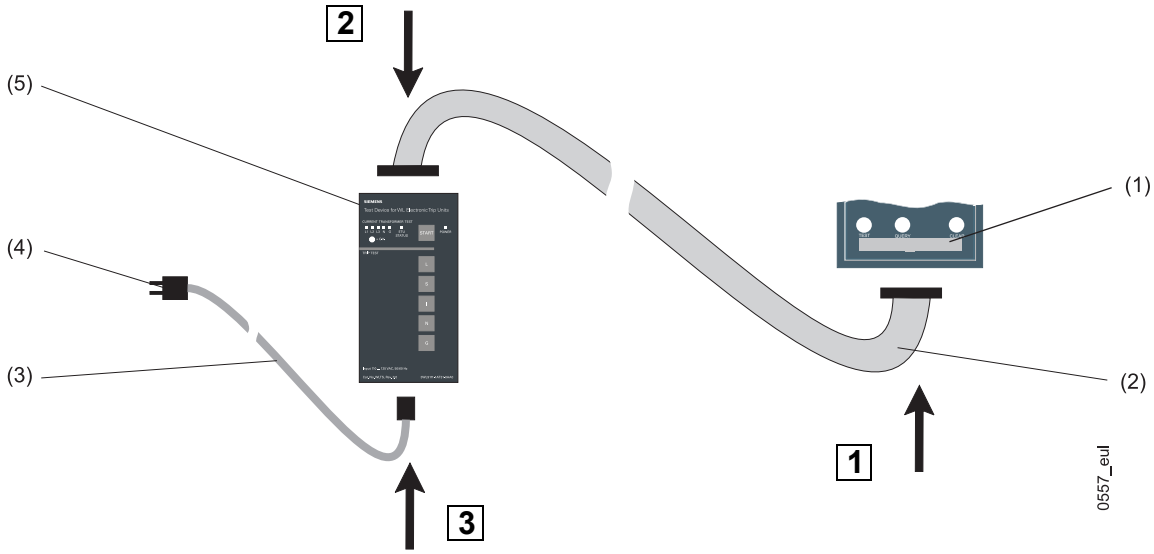
Mains voltage reconnection



9.6.4 Anschließen

9.6.4 Connection

Hinweis	Note
Reihenfolge beim Anschließen beachten! Anderenfalls kommt es zu Fehlfunktionen und falschen Prüfergebnissen.	Please observe the connecting sequence! Otherwise there may be false tripping and false results.



(1) Prüfbuchse am Überstromauslöser
(2) SUB-D 40polig (Handprüfgerät) auf Buchsenleiste 40polig bzw. ab ETU-Release 2: SUB-D 40polig (Handprüfgerät) auf Stiftleiste 40polig
(3) Spannungsversorgung
(4) Stecker
(5) Handprüfgerät

(1) Test socket at the overcurrent release
(2) SUB-D, 40-pole (test device) to socket connector, 40-pole or, with ETU release 2 and higher, SUB-D, 40-pole (test device) to plug connector, 40-pole
(3) Voltage supply
(4) plug
(5) Test device

9.6.5 Bedienung

Nach dem Anschluss der Spannungsversorgung startet automatisch die Statusprüfung. Dabei werden verschiedene Komponenten und Parameter des Überstromauslösers abgefragt. Verlief die Statusprüfung erfolgreich, leuchtet die LED „ETU STATUS“ mit Dauerlicht. Anderenfalls ist der Überstromauslöser oder eine seiner Komponenten (z. B. das Bemessungstrommodul) defekt oder nicht vorhanden.

Anzeige	Bedeutung
1 x kurz, Pause	Prüfgerät defekt
2 x kurz, Pause	Überstromauslösers defekt
4 x kurz, Pause	- Parameter nicht korrekt eingestellt
	- Stromwandler nicht korrekt angeschlossen
	- falsches Bemessungsstrommodul
	- Bemessungsstrommodul fehlt
5 x kurz, Pause	- Auslösemagnet F5 nicht korrekt angeschlossen
	- Auslöser defekt

Der Statustest kann jederzeit durch längeres (mehr als 3 s) Betätigen der Taste „START“ wiederholt werden. Prinzipiell ist auch die Prüfung eines bereits aktivierten, z. B. eines von einer externen Spannungsquelle versorgten Überstromauslösers möglich. Dabei ist zu beachten, dass im Ergebnis der Statusprüfung die LED „ETU STATUS“ durchaus 2 x kurz blinken kann, ohne dass ein Fehler vorliegt. Sicherheitshalber sollte der Statustest bei abgeschalteter externer Spannungsversorgung des Überstromauslösers wiederholt werden.

Der Statustest wird von den Überstromauslöser des Typs ETU25B mit einer Ident-Nr. kleiner als 253030xxxxxx / 273030xxxxxx / 150704xxxxxx nicht unterstützt. Durch Drücken der Taste „L“ für ca. 3 Sekunden beim Anlegen der Versorgungsspannung an das Prüfgerät kann der Statustest für diese Typen übersprungen werden. In diesem Fall muss die korrekte Funktion des Überstromauslösers vor dem Start weiterer Tests mit dem Prüfgerät sichergestellt werden, z. B. durch die Funktion „Aktivierung des Überstromauslösers“ und Prüfung der LED-Anzeigen am Überstromauslöser.

Prüfen der Stromwandler

Zum Prüfen der Strom- und Energiewandler kurz (weniger als 2 s) die Taste „START“ betätigen.



Eine leuchtende LED bestätigt die korrekte Funktion des entsprechenden Wandlers. Blinkt eine LED, ist der entsprechende Wandler nicht vorhanden, nicht korrekt angeschlossen oder defekt.

Ergebnis N-Wandler-Prüfung (bei ETU Release 2)

Ein Blinken (1 s an, 1 s aus) signalisiert einen Fehler im Bereich des Messwandlers des Neutralleiters. Ursache dafür ist entweder ein fehlender Messwandler (z. B. kein externer Neutralleiter-Wandler angeschlossen), eine fehlerhafte Verbindung zum Messwandler oder ein defekter Messwandler.

9.6.5 Operation

The status test starts immediately after connecting the voltage supply and queries the various components and parameters of the trip unit. If the status test is successful, the “ETU STATUS” LED will light up. Otherwise, the “ETU STATUS” LED will flash. It is possible to draw conclusions about the fault cause from the way in which it flashes.

Indication	Meaning
1 x briefly, pause	Test device defective
2 x briefly, pause	Trip unit defective
4 x briefly, pause	- Parameters not set correctly
	- Current sensor not properly connected
	- wrong rating plug
	- Missing rating plug
5 x briefly, pause	- Tripping solenoid F5 not properly connected
	- Solenoid defective

The status test can be repeated any time by pressing the “START” button for at least three seconds. It is basically also possible to test a trip unit that is already activated, e.g. supplied by an external voltage source. However, it must be taken into account that the “ETU STATUS” LED may briefly flash twice when the status test result is displayed even if there have not been any faults. As a precaution, the status test should be repeated without external voltage supply of the trip unit.

The status test is not supported by the trip unit type ETU25B with an identification number less than 253030xxxxxx / 273030xxxxxx / 150704xxxxxx. By pressing the “L” button for approximately 3 seconds while switching on the test device power supply, the status test can be skipped for these types. In that case the accurate function of the trip unit has to be ensured before further tests will be done with the test device, e.g. by function “Activation of trip unit” and checking the LED on the trip unit.

Testing the current transformers

To test the current sensors and energy transformers, press the “START” button less than two seconds.



A lit-up LED confirms the proper operation of the corresponding transformer. If an LED flashes, the corresponding transformer/transducer is not available, not properly connected or defective.

Result of neutral CT check (for ETU release 2)

A flashing light (1 second on, 1 second off) indicates an error in the area of the transducer of the neutral conductor. The cause of this will either be a missing transducer (e.g. no external neutral CT connected), a missing connection to the transducer or a faulty transducer.

Ein schnelles Blinken (0,5 s an, 0,5 s aus) signalisiert einen Fehler im Bereich des Energiewandlers für den Neutralleiter. Ursache dafür ist entweder ein fehlender Energiewandler (z. B. bei Anschluss eines externen Neutralleiter-Wandlers), eine fehlerhafte Verbindung zum Energiewandler oder ein defekter Energiewandler.

A rapid flashing light (0.5 seconds on, 0.5 seconds off) indicates an error in the area of the energy transformer of the neutral conductor. The cause of this will either be a missing energy transformer (e.g. if an external neutral CT is connected), a missing connection to the energy transformer or a faulty energy transformer.

Prüfen der Auslösefunktion

Testing the tripping function

HINWEIS	NOTICE
Überstromauslöser der Typen ETU25B bzw. ETU27B mit einer Ident-Nr. kleiner als 250205 xxxxxx bzw. 270206xxxxxx reagieren nur auf die Prüfung der L-Auslösung.	Overcurrent releases type ETU25B resp. ETU27B with an identification number smaller than 250205 xxxxxx resp. 270206xxxxxx do only react to a test of the L-tripping function.

- Federspeicher per Hand spannen
- Einschalten

Zum Prüfen der Auslösefunktion eine der Tasten „L“, „S“, „I“, „N“ oder „G“ betätigen.



Der Leistungsschalter löst nach der eingestellten Verzögerungszeit zuzüglich 2 Sekunden aus. Der Auslösegrund kann über die Taste „QUERY“ am Überstromauslöser abgefragt werden. Dazu muss der Überstromauslöser mindestens 10 Minuten lang aktiviert gewesen sein. Anderenfalls verfügt der Überstromauslöser nicht über die entsprechende Schutzfunktion oder ist defekt.

- Charge the storage spring by hand
- Close

To test the tripping function, press one of the buttons “L”, “S”, “I”, “N” or “G”.



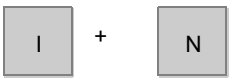
The circuit breaker trips after the time delay plus 2 seconds. The tripping reason can be inquired through the “QUERY” button at the trip unit. The trip cause storage function is available only, if the trip unit had been activated for least 10 min before tripping. Otherwise, the trip unit doesn't have the corresponding protective function or is defective.

Prüfen der Messwertanzeige

Nach einem durchgeführten Auslösetest ist bei nicht aktivierter ETU die Funktion der Speicherfähigkeit der Auslösegründe über die Query Taste zu prüfen.

Verfügbar ab Seriennummer des Handprüfgerätes E10403xxxxxx und E30403xxxxxx.

Zum Prüfen der Messwertanzeige im Display oder per Fernübertragung gleichzeitig die Tasten „I“ und „N“ betätigen.



Für die Dauer von 30 s wird über die Messwandler nacheinander ein Strom in L1, L2, L3, N und G simuliert. Dabei blinkt die LED des jeweiligen Wandlers. Der Test gilt als erfolgreich, wenn an entsprechender Stelle ein Strom angezeigt wird.

Testing the display of the measured values

Once a tripping test has been carried out, if the ETU is not activated, the storage capability of the tripping reasons must be checked using the Query button.

Available at test devices with serial number E10403xxxxxx and E30403xxxxxx or higher.

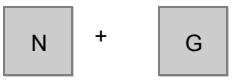
To check the correctness of the measured values in the display or via remote transmission press the “I” and “N” keys simultaneously



A current is successively simulated via the measuring transformers in L1, L2, L3, N and G for 30 sec. The LED of the respective transformer will flash. The test can be considered successful if current is indicated in the corresponding position.

Aktivieren des Überstromauslösers

Zum Aktivieren des Überstromauslösers gleichzeitig die Tasten „N“ und „G“ betätigen.



Der Überstromauslöser bleibt bis zum Drücken einer anderen Taste aktiviert.

Mit dieser Funktion kann z. B. die Anzeige der „T.U.-Error“-LED überprüft werden, wenn der Statustest mit dem Fehler „Überstromauslöser defekt“ beendet wurde.

9.6.6 Nachbereitende Arbeiten

- Notierte Einstellwerte wieder herstellen
- Abdecklappe auf X25 setzen

9.6.7 Bestellnummer

Activation of trip unit

To activate the trip unit press the “N” and “G” keys simultaneously



The trip unit is activated up to pressing another key.

With this function the “T.U.-Error”-LED can be checked, if the status test had finished with the error “Trip unit defective”.

9.6.6 Finishing

- Restore the noticed settings
- Mount the Cover on X25

9.6.7 Order number

	Bestell-Nr. **Order no.**
Handprüfgerät Test device	3WL9111-0AT32-0AA0

10 Wiedereinschaltsperre zurücksetzen

10.1 Manuelle Rücksetzung

10 Reset reclosing lockout

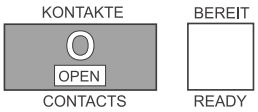
10.1 Manual reset reclosing lockout

1

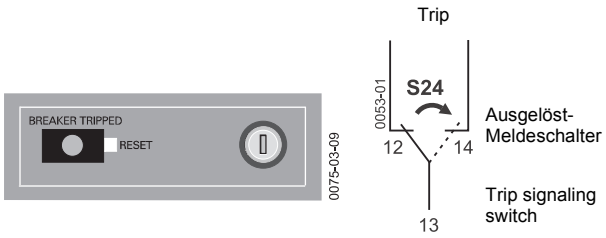
Schalter schaltet **aus** durch Überstromauslösung
Circuit Breaker is **tripped** by overcurrent

2

Zustandsanzeigen / Indications

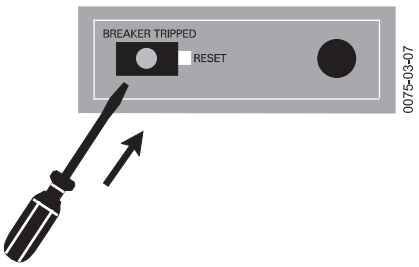


Meldungen / Signals



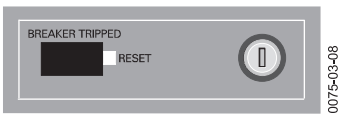
3

Manuelle Rücksetzung / Manual reset

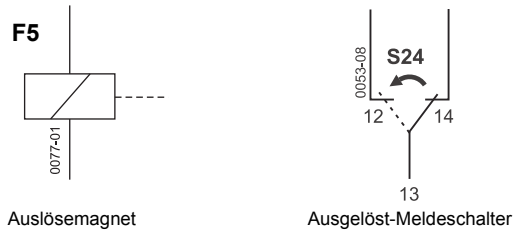


Ausgelöst-Anzeige (roter Stößel) drücken, bis sie einrastet
Press tripped indicator (red pin), till it latches

4



Ausgelöst-Anzeige zurückgesetzt
Tripped indicator reset



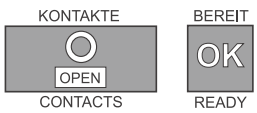
Auslösemagnet

Ausgelöst-Meldeschalter

Auslösemagnet und Ausgelöst-Meldung werden zurückgesetzt.
Tripping solenoid and tripped signal are reset.

5

Zustandsanzeigen / Indications



Schalter ist wieder einschaltbereit, sofern Federspeicher gespannt und keine Verriegelung aktiv
Circuit Breaker is ready to close again, if spring is charged and no interlock is active

10.2 Automatische Rücksetzung

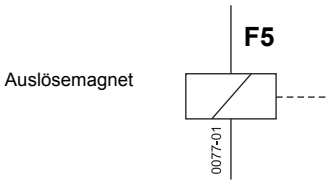
10.2 Automatic reset

1

Schalter schaltet **aus** durch Überstromauslösung
Circuit Breaker is **tripped** by overcurrent

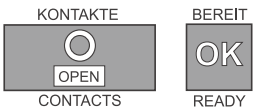
2

Automatische Rücksetzung / Automatic reset



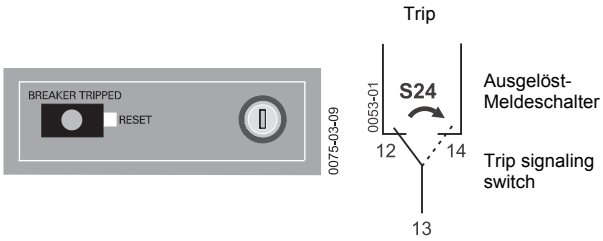
3

Zustandsanzeigen / Indications



Schalter ist **sofort** wieder einschaltbereit, sofern Federspeicher gespannt
Circuit Breaker is **immediately** ready to close again, if spring storage is charged

Meldungen / Signals



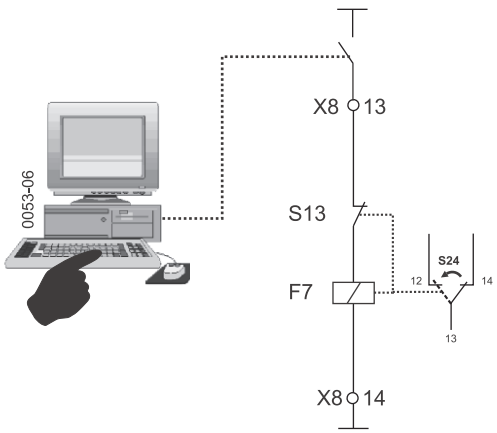
4

Rücksetzen von Ausgelöst-Anzeige und Ausgelöst-Meldung
Reset tripped indicator and tripped signal

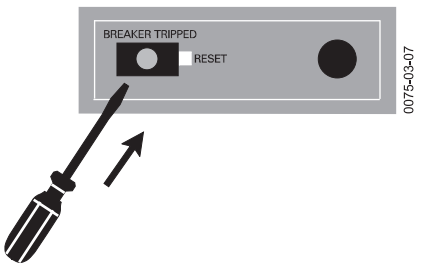
Fernrücksetzung / Remote reset

Option: Fernrücksetzen der Ausgelöst-Anzeige und der Ausgelöst-Meldung durch einen Fern-Rücksetzmagneten → (Seite 10-5)

Option: Remote reset of the tripped indicator and the tripped signal by means of a remote reset magnet → (page 10-5)

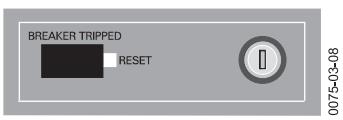


Manuelle Rücksetzung / Manual reset

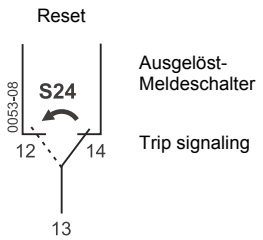


Ausgelöst-Anzeige (roter Stößel) drücken, bis sie einrastet
Press tripped indicator (red pin), till it latches

5



Ausgelöst-Anzeige zurückgesetzt
Tripped indicator reset



Ausgelöst-Meldung zurückgesetzt
Tripped signal reset

10.3 Automatische Rücksetzung nachrüsten

Mit der automatischen Rücksetzung der Wiedereinschaltsperre wird nach einer Kurzschluß- oder Überlastauslösung des elektronischen Überstromauslösers der Leistungsschalter sofort wieder einschaltbereit. Gegebenenfalls ist die elektrische Schalteransteuerung anzupassen. Die Ausgelöst-Anzeige und die Ausgelöst-Meldung müssen separat entweder manuell vor Ort oder mit dem Fernrücksetzmagneten zurückgesetzt werden.

⚠ WARNUNG

Verletzungsgefahr!

Die Schaltmechanik kann Personenschäden verursachen, wenn das Bedienpult abgenommen ist.
Vor dem Abbauen des Bedienpultes Ausschalten und Federspeicher entspannen → (Seite 24-3):

- Entfernen des Handsteckers X5
- AUS-Taste betätigen
- EIN-Taste betätigen
- AUS-Taste nochmals betätigen.



⚠ WARNUNG

Kann Tod oder Personenschäden verursachen.

Vor dem Entfernen jeglicher Abdeckungen oder des Bedienpults unbedingt die Speicherfeder des Leistungsschalters entspannen → (Seite 24-3)

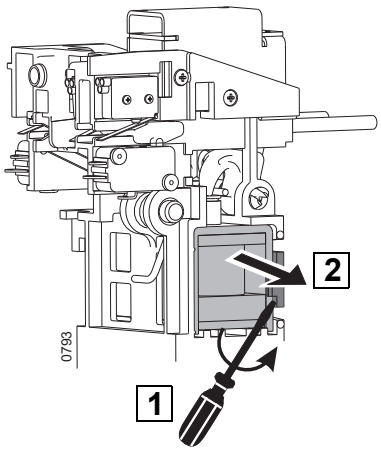


- Bedienpult abnehmen → (Seite 24-11)
- Überstromauslöser ausbauen → (Seite 9-72)

10.3.1 Rücksetzmechanik einbauen

Auslösemagnet F5 ausbauen

Überstromauslöser auf Systemträger



1 Schnapphaken zurückdrücken
2 Auslösemagnet herausnehmen

10.3 Retrofitting automatic reset

With the automatic reset of the closing lock-out the circuit breaker is ready to close again immediatly after tripping because of a short-circuit or overcurrent fault. Therefore it may be necessary to change the electrical control settings. The tripped indication and the tripped signal must be reset either manually on the overcurrent release or by means of the remote reset magnet.

⚠ WARNING

Mechanical hazard!

Mechanism can cause severe injury when cover is removed.

Switch off and discharge the storage spring before removing cover → (page 24-3):

- Remove hand plug X5
- Push OPEN button
- Push CLOSE button
- Push OPEN button again.

⚠ WARNING

May result in death or serious injury.

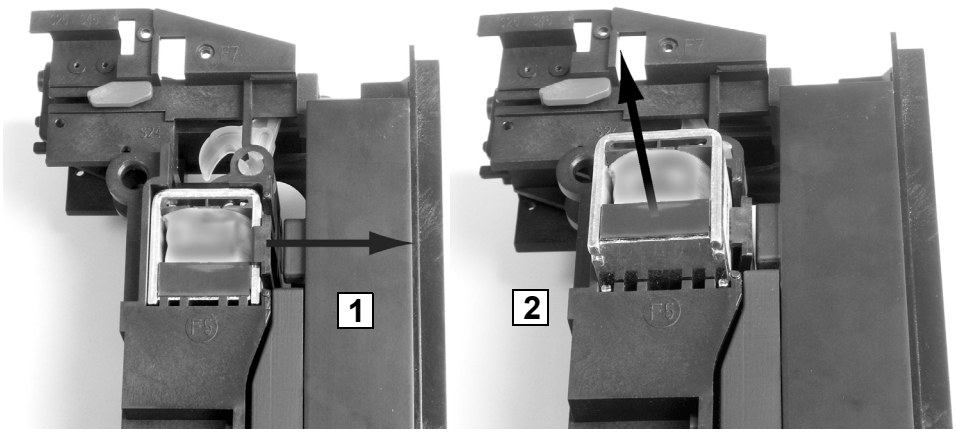
Discharge storage spring before removing barriers / covers → (page 24-3).

- Remove front panel → (page 24-11)
- Remove overcurrent release → (page 9-72)

10.3.1 Installing reset mechanism

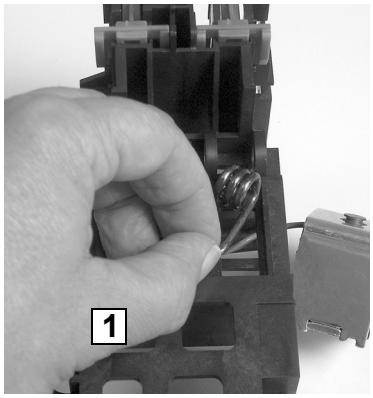
Removing tripping solenoid F5

Trip unit on system carrier



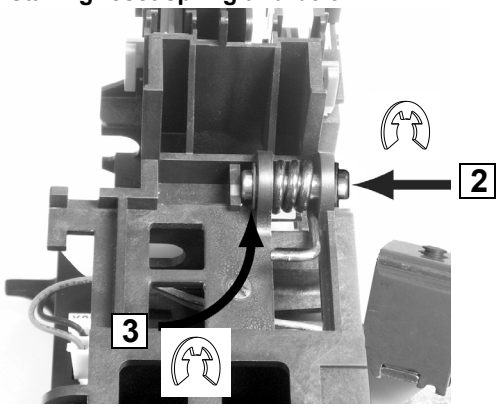
1 Push snap-action hook back
2 Remove tripping solenoid

Rücksetzfeder und Bolzen einbauen



1 Rücksetzfeder einsetzen
2 Bolzen mit Sicherungsscheibe einsetzen
3 Bolzen mit zweiter Sicherungsscheibe sichern

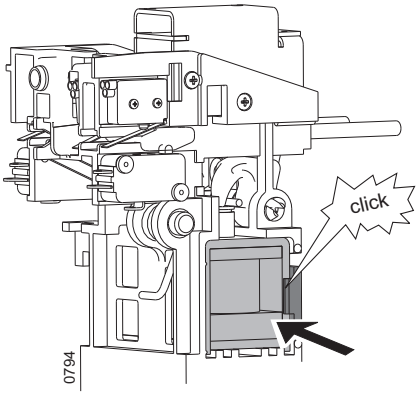
Installing reset spring and bolt

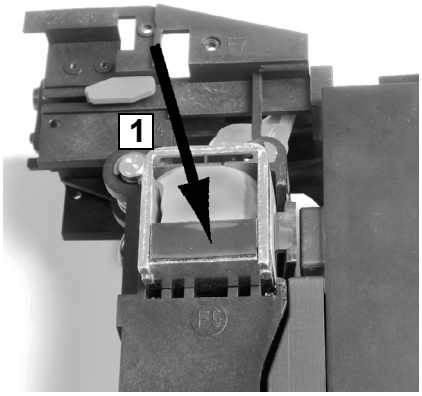


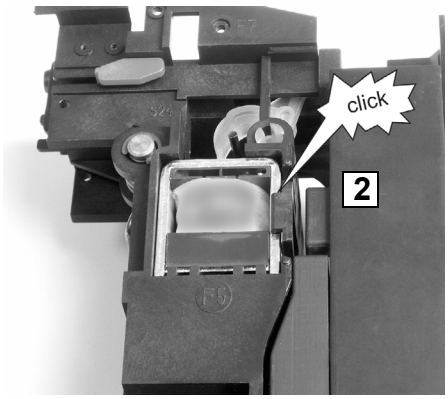
1 Fit reset spring
2 Fit bolt with lock washer
3 Secure the bolt with second lock washer

Auslösemagnet F5 einbauen

VORSICHT		CAUTION
Während der Installation nicht die Adern des Auslösemagneten einklemmen.		Do not pinch the wires of the tripping solenoid during installation







1 Auslösemagnet einsetzen

Anschließend

- Überstromauslöser einbauen → (Seite 9-72)
- Bedienpult anbauen → (Seite 24-25)

10.3.2 Schilder aktualisieren

Hinweis	Note
Nach dem Einbau zusätzlicher Komponenten sind folgende Angaben mit einem weißen Permanentstift bzw. mit Aufklebern aus dem beiliegenden Etikettenbogen zu aktualisieren! Davor ist es ggf. notwendig die zu korrigierenden Zeichen mit einem schwarzen Permanentstift zu füllen.	After installing additional components, add the following data using a white and indelible ink pen or the appropiate label from the set of labels supplied! If necessary the signs which need to be corrected have to be filled with a black permanent pen before.

1 Fit tripping solenoid

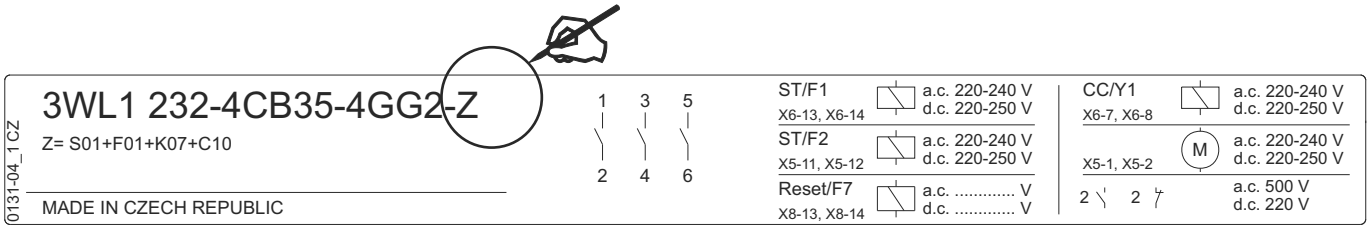
Then

- Install overcurrent release → (page 9-72)
- Install front panel → (page 24-25)

10.3.2 Updating the options label

10.3.2.1 Ausstattungsschild des Leistungsschalters

10.3.2.1 Options-label of the circuit breaker



10.3.2.2 Bestellnummern / Z-Zusätze

10.3.2.2 Order numbers / Z-options

	Bestell-Nr. / Order no.	Z ergänzen / Add. Z
Automatische Rücksetzung der Wiedereinschaltsperre für ETU-Träger in Kunststoffausführung Automatic reset of the reclosing lock-out for trip unit system carrier, made of plastics	3WL9111-0AK21-0AA0	K01
Automatische Rücksetzung der Wiedereinschaltsperre für ETU-Träger in Metallausführung (bis etwa Baujahr 2006) Automatic reset of the reclosing lock-out for trip unit system carrier made of metal (up to approx. year 2006)	3WL9111-0AK01-0AA0	K01

10.4 Fern-Rücksetzoption nachrüsten

Nur für Fernrücksetzen der Ausgelöst-Anzeige und Ausgelöst-Meldung.

10.4 Installing the remote reset option

Only for remote reseting of tripped indicator and trip signaling switch.

VORSICHT	CAUTION
Nur bei automatischer Rücksetzung der Wiedereinschaltsperre verwendbar! Anderenfalls wird Fernrücksetzmagnet überlastet und zerstört.	Can only be used with automatic reclosing lockout reset! The remote reset solenoid will otherwise be overloaded and destroyed.

10.4.1 Einbau

10.4.1 Mounting

WARNUNG		WARNING
Verletzungsgefahr! Die Schaltmechanik kann Personenschäden verursachen, wenn das Bedienpult abgenommen ist. Vor dem Abbauen des Bedienpultes Ausschalten und Federspeicher entspannen → (Seite 24-3): - Entfernen des Handsteckers X5 - AUS-Taste betätigen - EIN-Taste betätigen - AUS-Taste nochmals betätigen.		**Mechanical hazard!** Mechanism can cause severe injury when cover is removed. Switch off and discharge the storage spring before removing cover → (page 24-3): - Remove hand plug X5 - Push OPEN button - Push CLOSE button - Push OPEN button again.

- Bedienpult abnehmen → (Seite 24-11)
- Überstromauslöser ausbauen → (Seite 9-72)

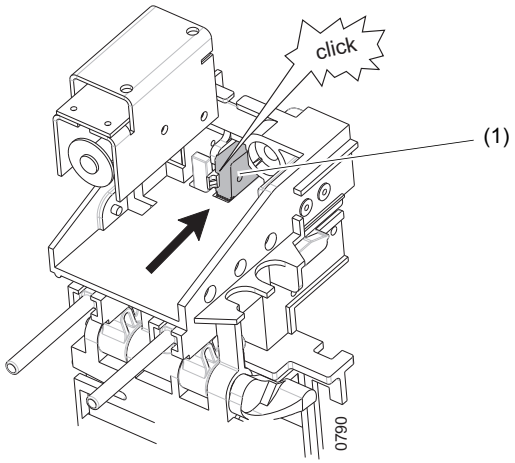
- Remove front panel → (page 24-11)
- Remove overcurrent release → (page 9-72)

Abstellschalter für Fern-Rücksetzmagneten montieren

Mounting the cut-off switch for remote reset coil

Überstromauslöser Systemträger in Kunststoffausführung (schwarz):

Carrier of overcurrent system, plastic made (black color):

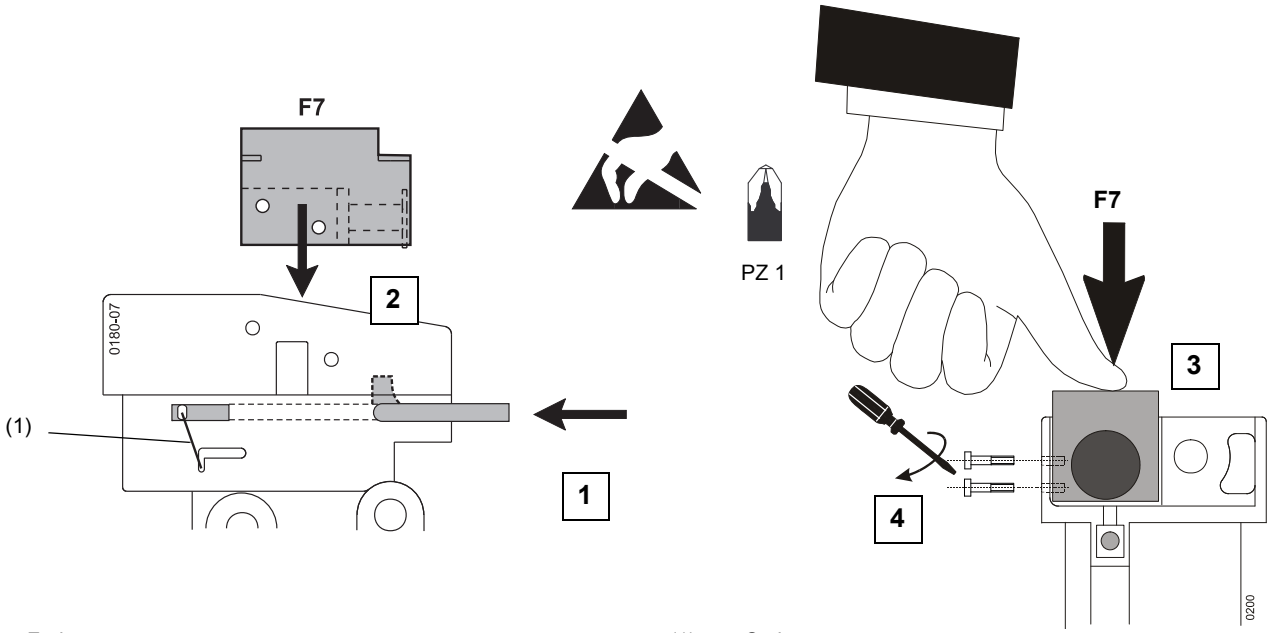


(1) Abstellschalter S13

(1) Cut-off switch S13

Fern-Rücksetzmagnet montieren

Mounting remote reset coil



(1) Feder
Für Überstromauslöser Systemträger in Kunststoffausführung (schwarz) nicht erforderlich.

(1) Spring
Not necessary for carrier of over current system, plastic made (black colour).

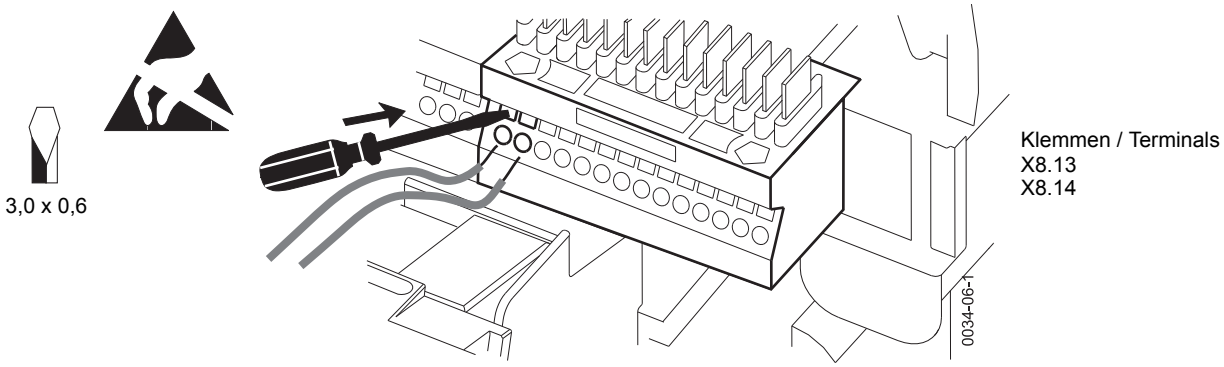
10.4.2 Leitungen anschließen

→ Schaltpläne (Seite 8-1)

Hinweis	Note
Ggf. fehlende Hilfsstromanschlüsse nachrüsten (Messerleiste, Hilfsstromstecker, Schleifkontaktmodul für Einschubrahmen). → (Seite 5-15)	If necessary missing auxiliary terminals may be retrofitted (receptacle, auxiliary connectors and sliding contact module for guide frames). → (page 5-15)

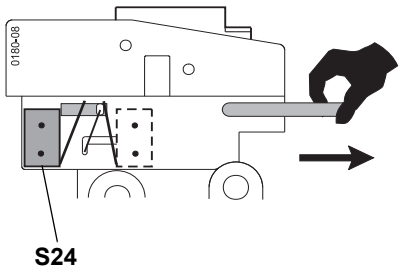
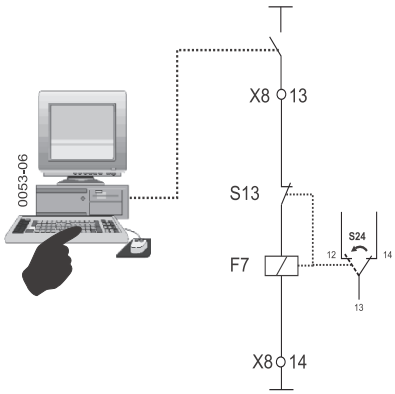
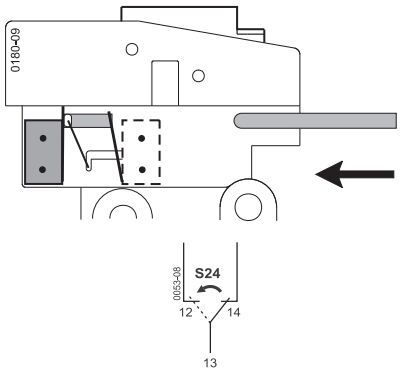
10.4.2 Connecting wires

→ Circuit diagrams (page 8-1)



10.4.3 Funktionstest

10.4.3 Function test

1	2	3
		

Anschließend

- Überstromauslöser einbauen → (Seite 9-72)
- Bedienpult anbauen → (Seite 24-25)

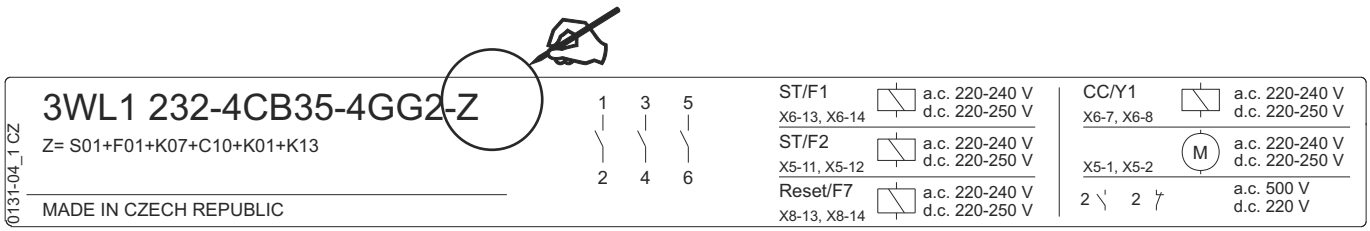
Then

- Install overcurrent release → (page 9-72)
- Install front panel → (page 24-25)

10.4.4 Ausstattungsschild aktualisieren

10.4.4 Updating the options label

Hinweis	Note
Nach dem Einbau zusätzlicher Komponenten sind folgende Angaben mit einem weißen Permanentstift bzw. mit Aufklebern aus dem beiliegenden Etikettenbogen zu aktualisieren! Davor ist es ggf. notwendig die zu korrigierenden Zeichen mit einem schwarzen Permanentstift zu füllen.	After installing additional components, add the following data using a white and indelible ink pen or the appropiate label from the set of labels supplied! If necessary the signs which need to be corrected have to be filled with a black permanent pen before.



10.4.4.1 Bestellnummern / Z-Zusätze

10.4.4.1 Order numbers / Z-options

	Spannung / Voltage	Bestell-Nr. / Order no.	Z ergänzen / Add. Z
Fern-Rücksetzmagnet / Remote reset coil	24 V DC	3WL9111-0AK03-0AA0	K10
	48 V DC	3WL9111-0AK04-0AA0	K11
	110 - 125 V AC / DC	3WL9111-0AK05-0AA0	K12
	208 - 250 V AC / DC	3WL9111-0AK06-0AA0	K13

11 Hilfsauslöser

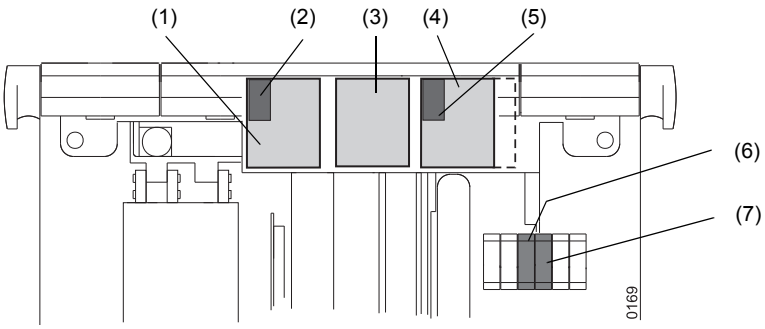
WARNUNG

Kann Tod oder Personenschäden verursachen.

Vor dem Entfernen jeglicher Abdeckungen oder des Bedienpults unbedingt die Speicherfeder des Leistungsschalters entspannen → (Seite 24-3)

11.1 Übersicht

Einbauplätze



(1) Erster Spannungsauslöser F1
(2) Meldeschalter S22
(3) Einschaltmagnet Y1
(4) Zweiter Spannungsauslöser F2
oder Unterspannungsauslöser (unverzögert) F3
oder Unterspannungsauslöser (verzögert) F4
(5) Meldeschalter S23 **oder** S43
(6) Abstellschalter S14 für Spannungsauslöser 5 % ED (übererregt)
(7) Abstellschalter S15 für Einschaltmagnet Y1 5 % ED (übererregt)

Spannungsauslöser mit 100 % ED können als elektrische Einschaltsperre genutzt werden.

VORSICHT

Sicherstellen, dass der Einschaltmagnet mit 5% ED nur angesteuert werden kann, wenn sich der Leistungsschalter in einschaltbereitem Zustand befindet.
Anderenfalls wird der Einschaltmagnet zerstört.

11 Auxiliary releases

WARNING

May result in death or serious injury.

Discharge storage spring before removing barriers / covers → (page 24-3).

11.1 Overview

Mounting locations

(1) 1st shunt trip F1
(2) Signaling switch S22
(3) Closing coil Y1
(4) 2nd shunt trip F2
or undervoltage release (instantaneous) F3
or undervoltage release (time-delayed) F4
(5) Signaling switch S23 **or** S43
(6) Cut-off switch S14 for shunt trip 5% D (overexcited)
(7) Cut-off switch S15 for closing coil Y1 5% D (overexcited)

Shunt trips with 100% D may be used as an electrical closing lockout.

CAUTION

Make sure that the closing coil with 5% operating time is only activated when the circuit breaker is ready for closing.

Otherwise the closing coil will be destroyed.

11.2 Hilfsauslöser nachrüsten

WARNUNG

Verletzungsgefahr!

Die Schaltmechanik kann Personenschäden verursachen, wenn das Bedienpult abgenommen ist.
Vor dem Abbauen des Bedienpultes Ausschalten und Federspeicher entspannen → (Seite 24-3):

- Entfernen des Handsteckers X5
- AUS-Taste betätigen
- EIN-Taste betätigen
- AUS-Taste nochmals betätigen.



11.2 Installing auxiliary releases

WARNING

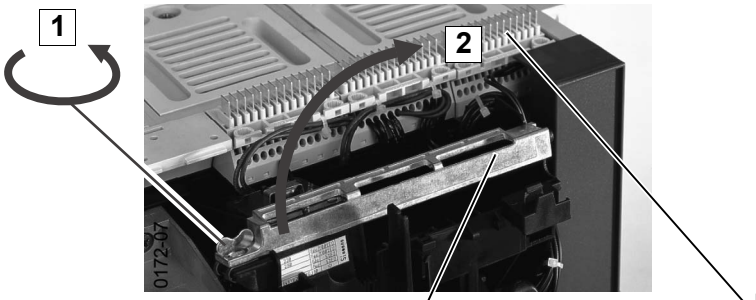
Mechanical hazard!

Mechanism can cause severe injury when cover is removed.

Switch off and discharge the storage spring before removing cover → (page 24-3):

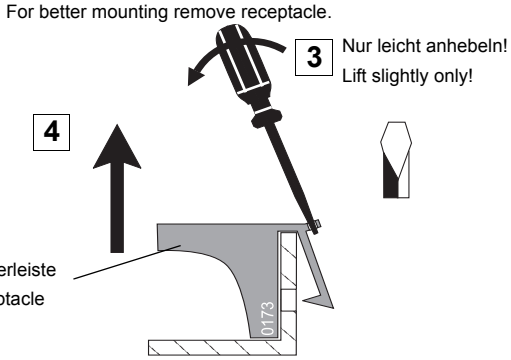
- Remove hand plug X5
- Push OPEN button
- Push CLOSE button
- Push OPEN button again.

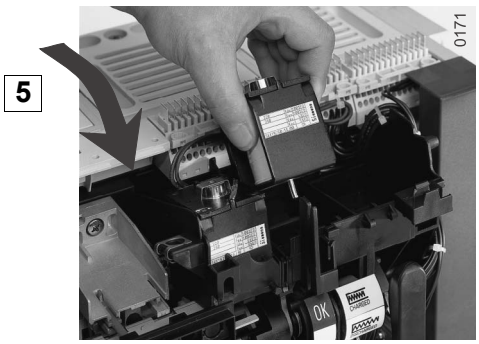
- Bedienpult abnehmen → (Seite 24-11)



- Remove front panel → (page 24-11)

Für besseres Montieren Messerleiste abnehmen
For better mounting remove receptacle.



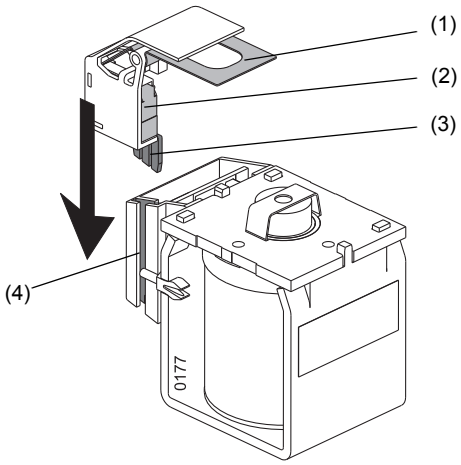


6 Haltebügel wieder aufsetzen und arretieren
Replace retaining bracket and fix.

11.3 Optionale Meldeschalter am Hilfsauslöser anbringen

Meldet den Betriebszustand des Hilfsauslösers
als S43 an den BSS **oder**
als S22/S23 → (Seite 8-1) und folgende.

Einrasten **Snap-In**



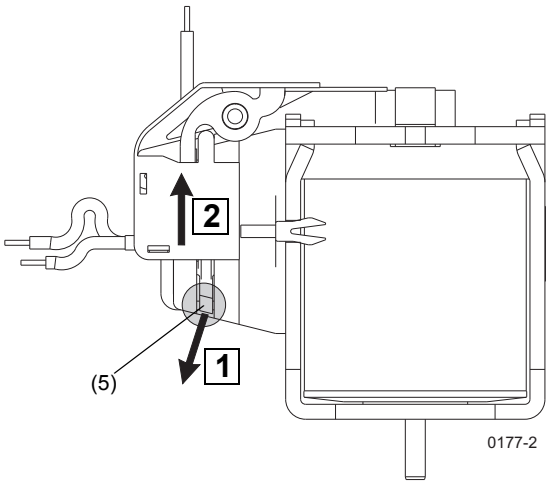
(1) Wippe
(2) Meldeschalter
(3) Führung
(4) Nut
(5) Rasthaken

1 Rasthaken ziehen
2 Meldeschalter herausziehen

11.3 Installing optional signaling switches on auxiliary releases

Signals the operating status of the auxiliary release
as S43 to the BSS **or**
as S22/S23 → (page 8-1) and following.

Abbauen **Disassembly**



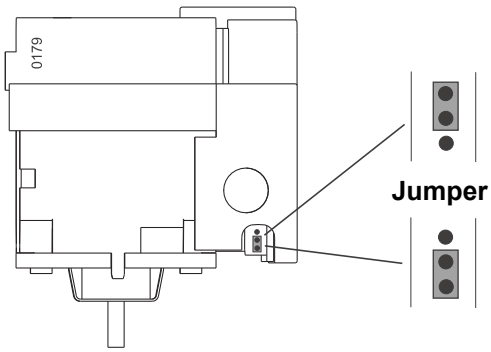
(1) See-saw
(2) Signaling switch
(3) Guide
(4) Groove
(5) Snap-fit

1 Disengage the snap-fit
2 Pull-out the signaling switch assembly

11.4 Verzögerungszeiten am Unterspannungsauslöser einstellen

Unverzögerter Auslöser F3

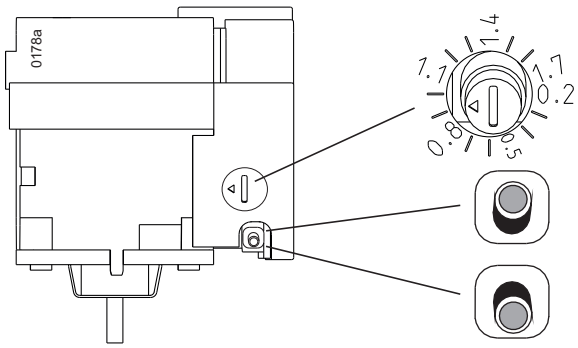




kurzzeitverzögert:
short-time delayed: t_d < 200 ms

unverzögert:
instantaneous: t_d < 80 ms
(Auslieferzustand)
(delivery condition)

Verzögerter Auslöser F4





3 x 0,5

Verzögerungszeit t_d / Delay time t_d

t_d = (0.2 / 0.3 / 0.4 ... 1.7 s) + 1.6 s

t_d = 0.2 / 0.3 / 0.4 ... 1.7 s

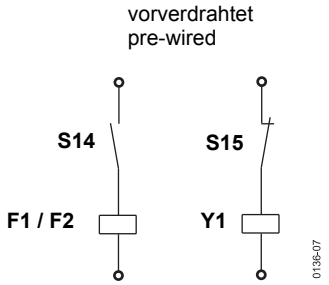
11.4 Setting delay times at Under-voltage release

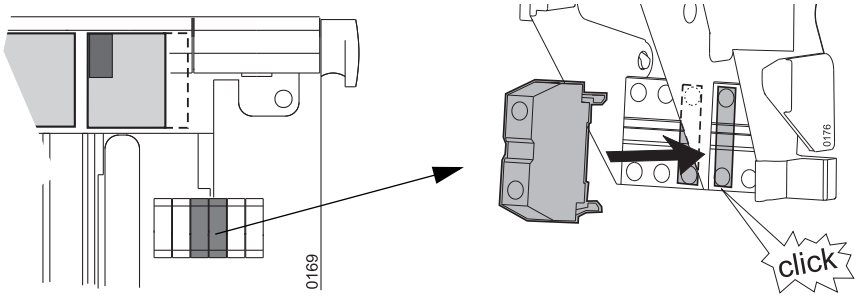
Instantaneous release F3

Time-delayed release F4

11.5 Abstellschalter für übererregte Hilfsauslöser und Einschaltmagneten einbauen

11.5 Installing cut-off switch for overexcited shunt trip and closing coil



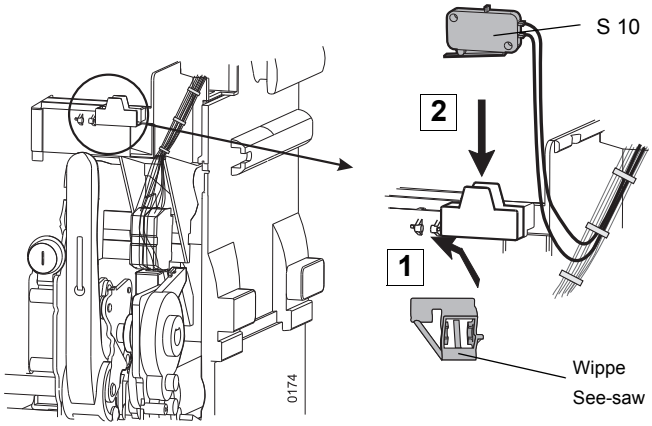


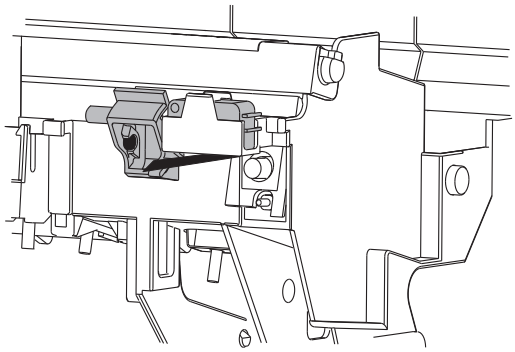
11.6 Elektrisch EIN nachrüsten

11.6 Installing electrical ON

Mikroschalter einsetzen

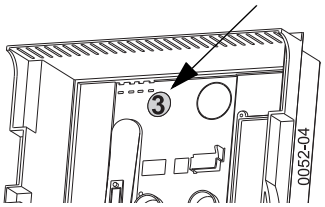
Installing micro-switch

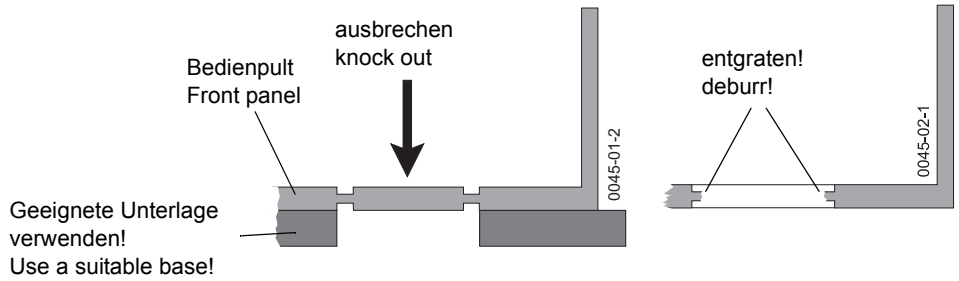


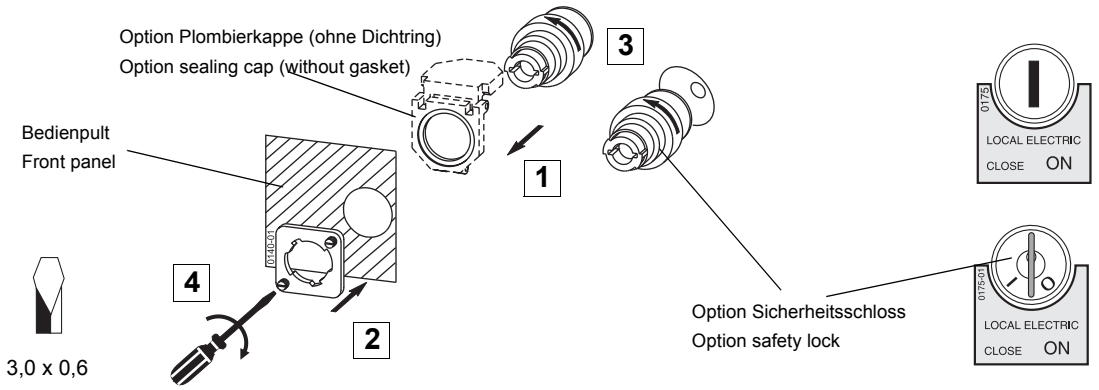


Taster einsetzen

Inserting push-button







11.7 Mechanische Funktionsprüfung

WARNUNG

Verletzungsgefahr!

Die Schaltmechanik kann Personenschäden verursachen.
Nicht hineingreifen

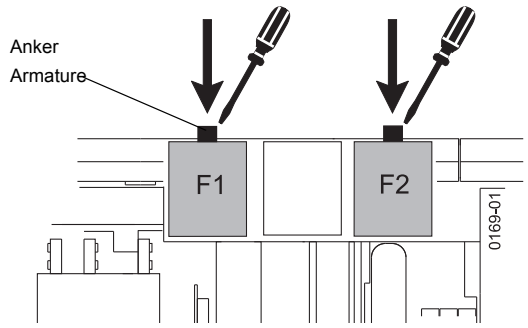
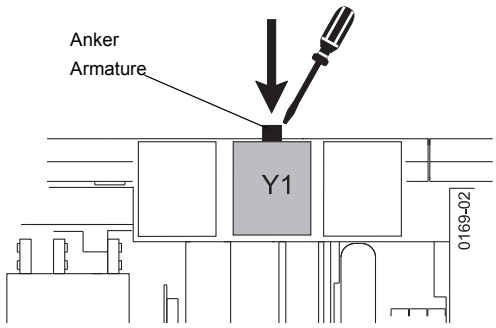
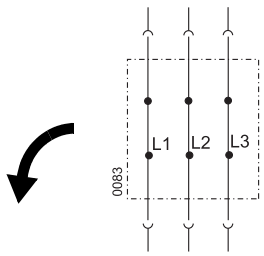
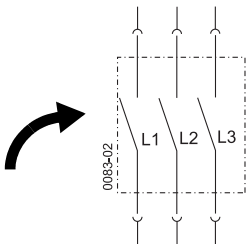


11.7 Mechanical function test

WARNING

Mechanical hazard!

Mechanism can cause severe injury.
Do not reach into the circuit breaker.

	Spannungsauslöser **Shunt trip**	**Einschaltmagnet** **Closing coil**
1	→ Federspeicher per Hand spannen (Seite 6-4) → Charge the spring storage manually (page 6-4)	
2	→ Einschalten (Seite 6-5) → Close circuit breaker (page 6-5)	
3		
4	 Schalter schaltet **aus** Circuit Breaker **opens**	 Schalter schaltet **ein** Circuit Breaker **closes**
5	→ Ausschalten (Seite 6-6) → Switch off (page 6-6)	

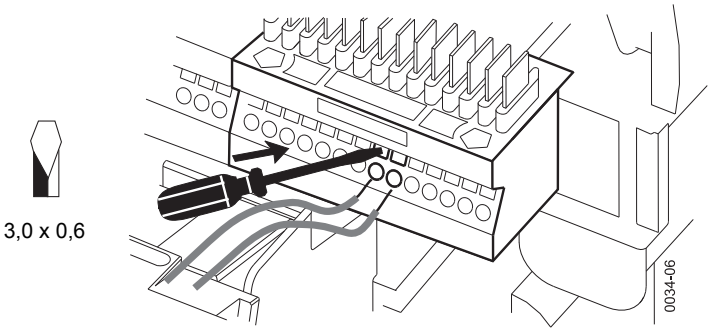
11.8 Leitungen anschließen

→ Schaltpläne (Seite 8-5)

Hinweis	Note
Ggf. fehlende Hilfsstromanschlüsse nachrüsten (Messerleiste, Hilfsstromstecker, Schleifkontaktmodul für Einschubrahmen). → (Seite 5-15)	If necessary missing auxiliary terminals may be retrofitted (receptacle, auxiliary connectors and sliding contact module for guide frames). → (page 5-15)

11.8 Connecting wires

→ Circuit diagrams (page 8-5)



Klemmen / Terminals:

Y1 : X6.7 / X6.8
F1 : X6.13 / X6.14
F2, F3 : X5.11 / X5.12
F4 : X5.11 ... X5.14

S10 : X7.9 / X6.7

11.9 Abschließende Arbeiten

- Bedienpult anbauen → (Seite 24-25)
- Hilfsstromstecker aufsetzen → (Seite 5-19)
- Leitungen an Hilfsstromstecker anschließen → (Seite 5-18)
- Einschubschalter in Prüfstellung verfahren → (Seite 6-2)

11.9 Final work

- Install front panel → (page 24-25)
- Fit auxiliary connectors → (page 5-19)
- Connect wires to auxiliary connector → (page 5-18)
- Move the draw-out circuit breaker into the test position → (page 6-2)

11.10 Elektrische Funktionsprüfung

11.10 Electrical function test

VORSICHT		CAUTION
Diese Funktionsprüfung darf nur bei aufgesetztem Bedienpult erfolgen. Der Einschubschalter darf nicht in der Betriebsstellung stehen.		This function check must only be carried out with the front panel fitted. The draw-out circuit breaker should not be in the connected position.

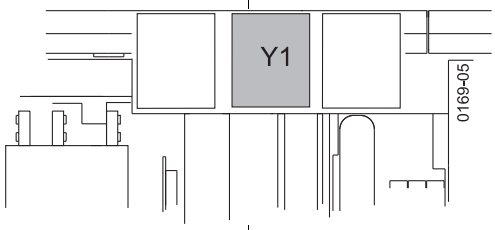
Einschaltmagnet

Closing coil

1

→ Federspeicher spannen (Seite 6-4)
→ Charge the spring storage (page 6-4)

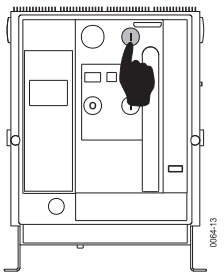
2

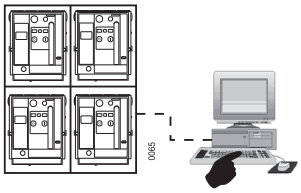


3

Einschaltmagnet betätigen / Actuate the closing coil operation

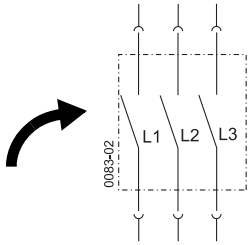
Elektrisch EIN / electrical ON Fernbetätigung / Remote activation





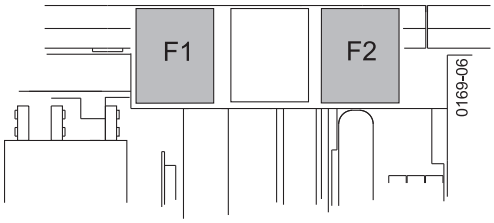
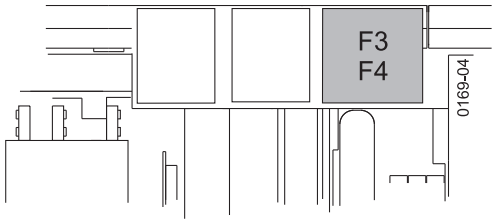
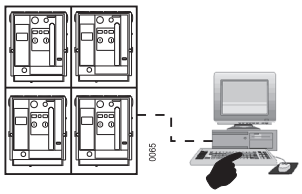
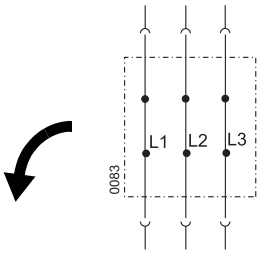


4



Schalter schaltet **ein**
Circuit Breaker **closes**

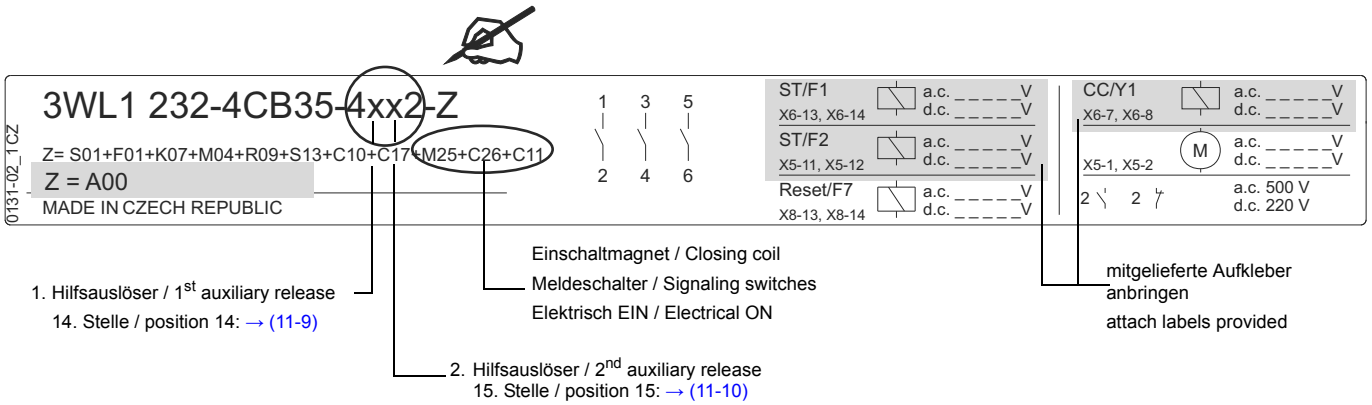
Spannungsauslöser	Shunt trip	Unterspannungsauslöser	Undervoltage release

1	→ Federspeicher spannen (Seite 6-4) / → Einschalten (Seite 6-5)	→ Charge the spring storage (page 6-4) / → Close circuit breaker (page 6-5)
2		
3	**Spannungsauslöser betätigen / Actuate shunt trip** Fernbetätigung / Remote activation 	**Hilfsspannung unterbrechen!** **Interrupt auxiliary voltage!**
4	Schalter schaltet **aus** Circuit Breaker **opens** 	

11.11 Ausstattungsschild aktualisieren

11.11 Updating the options label

Hinweis	Note
Nach dem Einbau zusätzlicher Komponenten sind folgende Angaben mit einem weißen Permanentstift bzw. mit Aufklebern aus dem beiliegenden Etikettenbogen zu aktualisieren! Davor ist es ggf. notwendig die zu korrigierenden Zeichen mit einem schwarzen Permanentstift zu füllen.	After installing additional components, add the following data using a white and indelible ink pen or the appropiate label from the set of labels supplied! If necessary the signs which need to be corrected have to be filled with a black permanent pen before.



11.11.1 Bestellnummern / Z-Zusätze

11.11.1 Order numbers / Z-options

Einschaltmagnet / Closing coil	AC V 50/60 Hz	DC V	Bestell-Nr. / Order no.	Z ergänzen / Add. Z
Einschaltmagnet Y1 (100 % ED, geeignet für Dauerbetrieb) Closing coil Y1 (100% duty, suitable for continuous operation)	-	24	3WL9111-0AD01-0AA0	M21
	-	30	3WL9111-0AD02-0AA0	M22
	-	48	3WL9111-0AD03-0AA0	M23
	-	60	3WL9111-0AD04-0AA0	M24
	110	110	3WL9111-0AD05-0AA0	M25
	230	220	3WL9111-0AD06-0AA0	M26
Übererregter Einschaltmagnet Y1 (5 % ED, nicht geeignet für Dauerbetrieb) Overexcited closing coil Y1 (5% duty, not suitable for continuous operation)	-	24	3WL9111-0AD11-0AA0	M31
	-	48	3WL9111-0AD12-0AA0	M33
	110-127	110-125	3WL9111-0AD13-0AA0	M35
	208-240	220-250	3WL9111-0AD14-0AA0	M36

Meldeschalter / Signaling switches	Bestell-Nr. / Order no.	Z ergänzen / Add. Z
Meldeschalter am ersten Hilfsauslöser / Signaling switch for 1st auxiliary release	3WL9111-0AH02-0AA0	C26
Meldeschalter am zweiten Hilfsauslöser / Signaling switch for 2nd auxiliary release	3WL9111-0AH02-0AA0	C27

Elektrisch EIN / Electrical ON	Bestell-Nr. / Order no.	Z ergänzen / Add. Z
Taster mit Plombierkappe / Button with sealing cap	3WL9111-0AJ02-0AA0	C11
Taster mit Schloss CES / Key-operated button CES	3WL9111-0AJ03-0AA0	C12
Taster mit Schloss IKON / Key-operated button IKON	3WL9111-0AJ05-0AA0	C14

1. Hilfsauslöser / 1st auxiliary release	AC V 50/60 Hz	DC V	Bestell-Nr. / Order no.	14. Stelle ändern in / Modify 14th position
kein 1. Hilfsauslöser / no 1st auxiliary release	-	-	----------	A
Spannungsauslöser F1 (100 % ED, geeignet für Dauerbetrieb) Shunt trip F1 (100% duty, suitable for continuous operation)	-	24	3WL9111-0AD01-0AA0	B
	-	30	3WL9111-0AD02-0AA0	C
	-	48	3WL9111-0AD03-0AA0	D
	-	60	3WL9111-0AD04-0AA0	E
	110-127	110-125	3WL9111-0AD05-0AA0	F
	208-240	220-250	3WL9111-0AD06-0AA0	G
übererregter Spannungsauslöser F1 (5 % ED, nicht geeignet für Dauerbetrieb) Overexcited shunt trip F1 (5% duty, not suitable for continuous operation)	-	24	3WL9111-0AD11-0AA0	
	-	48	3WL9111-0AD12-0AA0	
	110-127	110-125	3WL9111-0AD13-0AA0	
	208-240	220-250	3WL9111-0AD14-0AA0	

2. Hilfsauslöser / 2nd auxiliary release	AC V 50/60 Hz	DC V	Bestell-Nr. / Order no.	15. Stelle ändern in / Modify 15th position
kein 2. Hilfsauslöser / no 2nd auxiliary release	-	-	----------	A
Spannungsauslöser F2 Shunt trip F2	-	24	3WL9111-0AD01-0AA0	B
	-	30	3WL9111-0AD02-0AA0	C
	-	48	3WL9111-0AD03-0AA0	D
	-	60	3WL9111-0AD04-0AA0	E
	110	110	3WL9111-0AD05-0AA0	F
	230	220	3WL9111-0AD06-0AA0	G
Unterspannungsauslöser F3 (unverzögert) Undervoltage release F3 (instantaneous)	-	24	3WL9111-0AE01-0AA0	J
	-	30	3WL9111-0AE02-0AA0	K
	-	48	3WL9111-0AE03-0AA0	L
	-	60	3WL9111-0AE07-0AA0	U
	110-127	110-125	3WL9111-0AE04-0AA0	M
	208-240	220-250	3WL9111-0AE05-0AA0	N
	380-415	-	3WL9111-0AE06-0AA0	P
Unterspannungsauslöser F4 (verzögert) Undervoltage release F4 (time-delayed)	-	48	3WL9111-0AE11-0AA0	Q
	110-127	110-125	3WL9111-0AE12-0AA0	R
	208-240	220-250	3WL9111-0AE13-0AA0	S
	380-415	-	3WL9111-0AE14-0AA0	T

11.12 Kondensator-Speichergerät für Spannungsauslöser

11.12 Capacitor Energy Storage Unit for shunt release



Das Kondensator-Speichergerät 3WL9111-0BA... ist ein Vorschaltgerät für die Spannungsauslöser. Es kann ein Auslöser mit einem dauernd anliegenden AUS-Kommando angesteuert werden. Es ermöglicht mit seinem Energiespeicher, nach einem Ausfall der Betriebsspannung innerhalb der Speicherzeit, ein einmaliges Ausschalten des Leistungsschalters mit dem Spannungsauslöser.

Technische Daten

Betriebsspannung/Operating voltage (+10/-15%):

Speicherzeit: bei Nennspannung = 5 min.

(Max. zulässige Wartezeit zwischen Spannungsausfall und Auslösung des Leistungsschalters mit dem Spannungsauslöser)

Wiederaufladezeit: bei Nennspannung = 15 s

(Ladezeit des Energiespeichers nach einer Auslösung)

Leistungsaufnahme: max. ca. 3 VA, 3 W

(ohne angeschlossenen Spannungsauslöser)

Arbeitstemperaturbereich: -20 bis +70 °C

Gewicht: ca. 0,5 kg

Montage

Das Kondensator-Speichergerät ist getrennt vom Schalter zu befestigen:

- auf einer Hutschiene DIN EN 50022-35
- oder auf ebener Fläche mit beiliegenden Schiebern und 3 Schrauben M4

Zulässige Betriebslage:

- beliebig

The capacitor energy storage unit 3WL9111-0BA... is connected in series with the shunt release. For shunt releases a continuous OFF-command is permissible. If the operating voltage fails within the storage time, it is possible by means of the energy store to initiate one tripping operation of the circuit breaker via the shunt release.

Technical data

Operating voltage (+10/-15%):

Storage time: at rated voltage = 5 min.

(Maximum permissible waiting time between voltage failure and tripping of circuit breaker with the shunt release)

Restored energy time: at rated voltage = 15 s

(Charging time of energy store after tripping)

Power consumption: max. 3 VA, 3 W

(without connected shunt release)

Working temperature range: -20 to +70 °C

Weight: approx. 0.5 kg

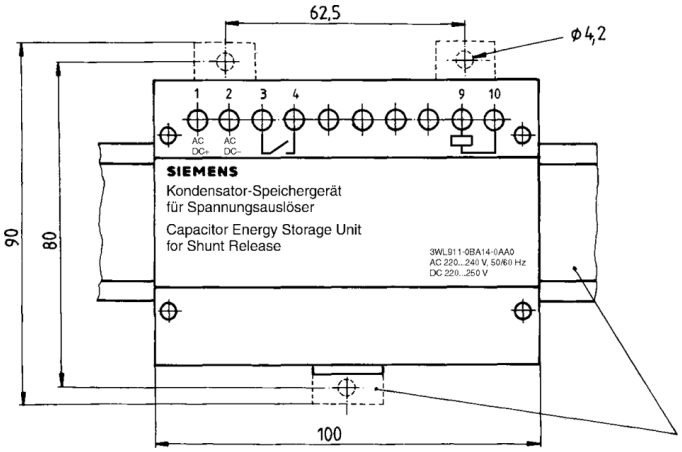
Installation

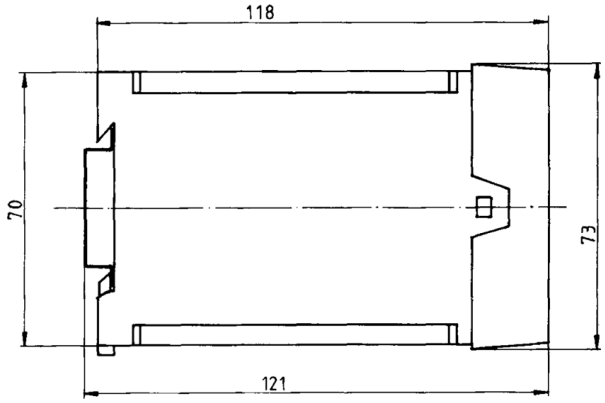
The capacitor energy storage unit must be mounted separately from the circuit breaker:

- on a DIN EN 50022-35 rail
- or on a level surface by means of the clips supplied and three 4 mm diameter bolts

Permissible operating position:

- any





Schraubbefestigung oder
Schnappbefestigung auf Hutschiene DIN EN 50022-35

Anschluss:

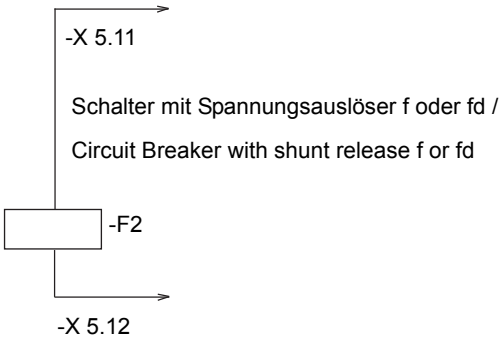
- gemäß Anschlussplan
- Schraubanschlüsse für max. 2 Leitungen 2,5 mm^2 (flexibel mit Aderendhülsen)

screw fixing or
Snap-on mounting on DIN EN 50022-35 rail

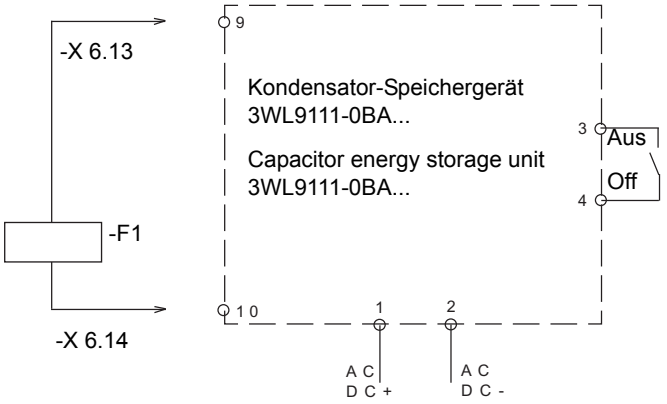
Connections:

- according to connection diagram
- screw terminal for maximum 2 cables 2.5 mm^2 (flexible with wire ferrules)

2. Spannungsauslöser **2nd shunt release**



1. Spannungsauslöser **1st shunt release**



Die Betriebsspannung des Spannungsauslösers muss in Art und Höhe der des Kondensator-Speichergerätes entsprechen.

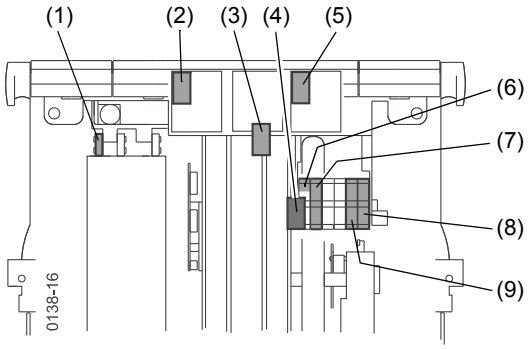
The level and the type of the operating voltage for the shunt release must be equal to the operating voltage of the capacitor-energy storage unit.

Bestellnummern **Order numbers**

Kondensator-Speichergerät / Capacitor Energy Storage Unit	Bestell-Nr. / Order no.
220-240 V AC, 50/60 Hz 220-250 V DC	3WL9111-0BA14-0AA0

12 Hilfsstromschalter

12.1 Schaltergruppe Meldung



(1) Ausgelöst-Meldeschalter S24
(2) Meldeschalter S22 am 1. Hilfsauslöser → (Seite 11-3)
(3) Meldeschalter Einschaltbereitschaft S20
(4) Meldeschalter Speicherzustand S21
(5) Meldeschalter S23 am 2. Hilfsauslöser oder am Unterspannungsauslöser → (Seite 11-3)
(6) Meldeschalter Schaltstellung S1 (Standard)
(7) Meldeschalter Schaltstellung S2 (Standard)
(8) Meldeschalter Schaltstellung S4 **oder** S8
(9) Meldeschalter Schaltstellung S3 **oder** S7

12.1.1 Meldeschalter nachrüsten

WARNUNG

Verletzungsgefahr!

Die Schaltmechanik kann Personenschäden verursachen, wenn das Bedienpult abgenommen ist.
Vor dem Abbauen des Bedienpultes Ausschalten und Federspeicher entspannen → (Seite 24-3):
- Entfernen des Handsteckers X5
- AUS-Taste betätigen
- EIN-Taste betätigen
- AUS-Taste nochmals betätigen.

- Leistungsschalter ausschalten und Federspeicher entspannen → (Seite 24-3)
- Leistungsschalter im Einschubrahmen in Wartungsposition bewegen → (Seite 24-4)
- Bedienpult abnehmen → (Seite 24-11)
- Information über Anschlussklemmenverdrahtung → (Seite 8-1)

12 Auxiliary and control switches

12.1 Signaling switches

(1) Trip signaling switch S24
(2) Signaling switch S22 for 1st shunt trip → (page 11-3)
(3) Signaling switch for ready-to-close S20
(4) Signaling switch for storage spring charged S21
(5) Signaling switch S23 for 2nd shunt trip or under-voltage release → (page 11-3)
(6) Contact position-driven auxiliary switch S1 (standard)
(7) Contact position-driven auxiliary switch S2 (standard)
(8) Contact position-driven auxiliary switch S4 **or** S8
(9) Contact position-driven auxiliary switch S3 **or** S7

12.1.1 Mounting signaling switches

WARNING

Mechanical hazard!

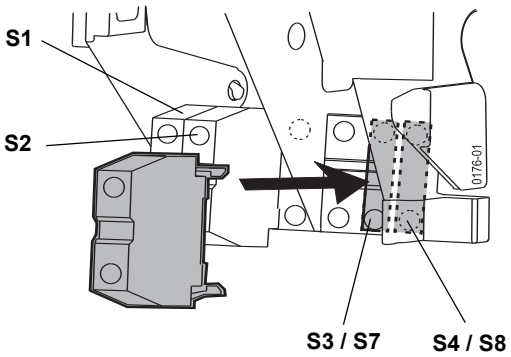
Mechanism can cause severe injury when cover is removed.

Switch off and discharge the storage spring before removing cover → (page 24-3):
- Remove hand plug X5
- Push OPEN button
- Push CLOSE button
- Push OPEN button again.

- OPEN the circuit breaker and discharge the storage spring → (page 24-3)
- Move circuit breaker into maintenance position → (page 24-4)
- Remove front panel → (page 24-11)
- For Terminal wiring information → (page 8-1)

Meldeschalter Schalterstellung

Contact position-driven switches

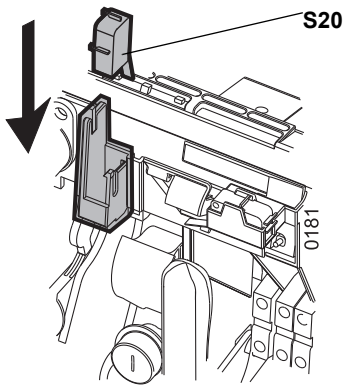


Die Anschlussleitungen der Meldeschalter sind an die Hilfsleiterklemmblöcke X5 und X6 entsprechend dem Verdrahtungsplan → (Seite 8-3) anzuklemmen.

The connecting wires from the signaling switches must be connected to terminals X5 and X6 according to the wiring plan → (page 8-3).

Schnappmontage von Meldeschalter S20 „Einschaltbereitmeldeschalter“

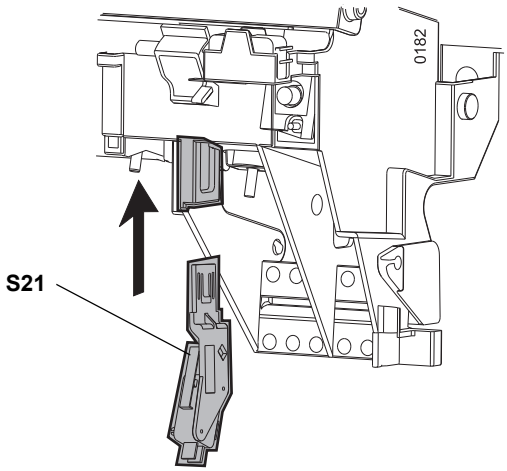
Snap in mounting of signaling switch S20 “ready to close”



Die Anschlussleitungen der Meldeschalter sind an den Klemmblock X6 entsprechend Verdrahtungsplan → (Seite 8-4) anzuschließen.

Schnappmontage von Meldeschalter S21 „Federspeicherzustand“

Snap in mounting of signaling switch S21 “spring charged”

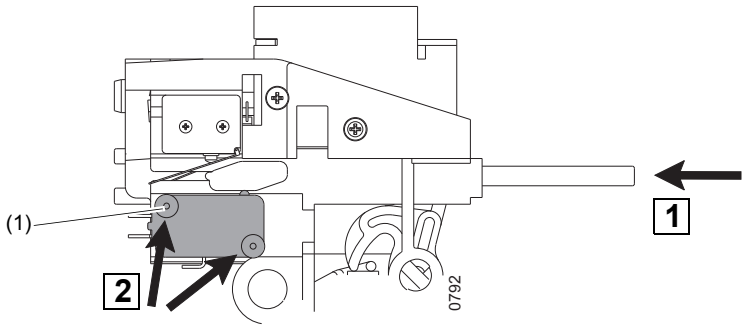


The connecting wires of the signaling switch must be connected to terminal X6 according to the wiring plan → (page 8-4).

12.1.2 Meldeschalter am Überstromauslöser montieren

- Überstromauslöser ausbauen → (Seite 9-72)

Überstromauslöser Systemträger in Kunststoffausführung (schwarz):



(1) 2 Schnappstifte

VORSICHT	CAUTION
Selbstschneidende Schrauben vorsichtig anziehen. Die Meldeschalter dürfen sich bei der Montage nicht verformen.	Tighten self-tapping screws carefully. The signaling switches must not be deformed during installation.

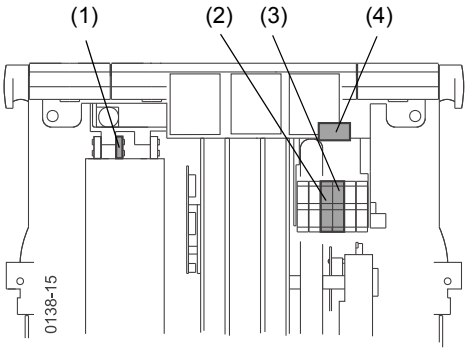
12.1.2 Mounting signaling switches at trip unit

- Remove overcurrent release → (page 9-72)

Trip unit system carrier, made of plastics (black color):

(1) 2 snap pins

12.2 Schaltergruppe Steuerung



(1) Abstellschalter S13 für Fern-Rücksetzung → (Seite 10-6)
(2) Abstellschalter S14 für Spannungsauslöser F1 (übererregt) → (Seite 11-4)
(3) Abstellschalter S15 für Einschaltmagnet Y1 (übererregt) → (Seite 11-4)
(4) Schalter S10 „Elektrisch EIN“ → (Seite 11-4)
oder Motorabstellschalter S12 → (Seite 13-2)

12.3 Schaltergruppe Kommunikation

→ Meldeschalter für den BSS (Seite 9-81)

12.4 Leitungen anschließen

→ Schaltpläne (Seite 8-1)

12.2 Control switches

(1) Cut-off switch S13 for remote-reset → (page 10-6)
(2) Cut-off switch S14 for shunt trip F1 (overexcited) → (page 11-4)
(3) Cut-off switch S15 for closing coil Y1 (overexcited) → (page 11-4)
(4) Switch S10 “Electrical ON“ → (page 11-4)
or motor disconnect switch S12 → (page 13-2)

12.3 Communication switches

→Signaling switches for BSS (page 9-81)

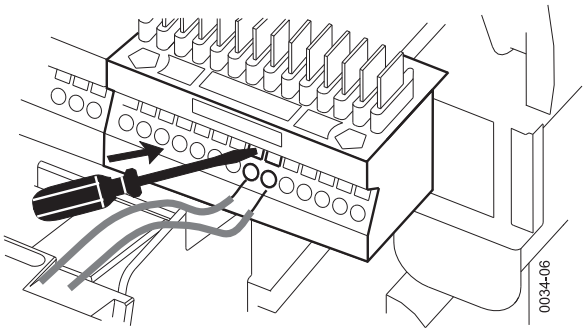
12.4 Connecting wires

→ Circuit diagrams (page 8-1)

Hinweis	Note
Ggf. fehlende Hilfsstromanschlüsse nachrüsten (Messerleiste, Hilfsstromstecker, Schleifkontaktmodul für Einschubrahmen). → (Seite 5-15)	If necessary missing auxiliary terminals may be retrofitted (receptacle, auxiliary connectors and sliding contact module for guide frames). → (page 5-15)



3,0 x 0,6

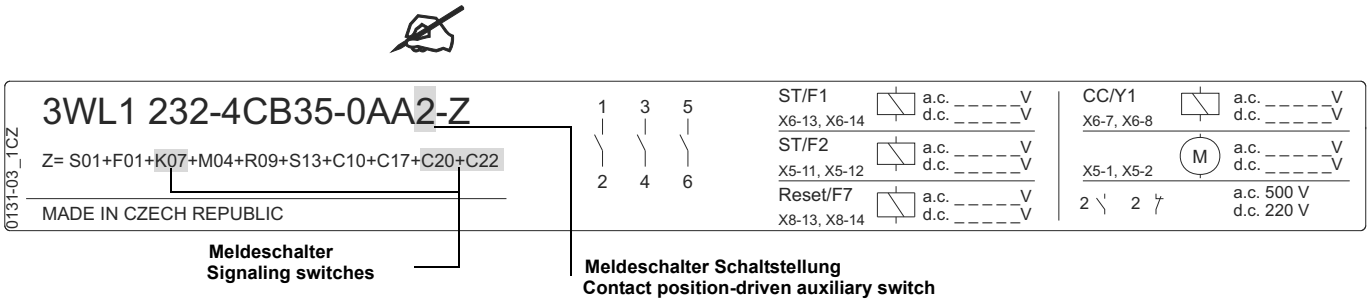


12.5 Ausstattungsschild aktualisieren

Hinweis
Nach dem Einbau zusätzlicher Komponenten sind folgende Angaben mit einem weißen Permanentstift bzw. mit Aufklebern aus dem beiliegenden Etikettenbogen zu aktualisieren! Davor ist es ggf. notwendig die zu korrigierenden Zeichen mit einem schwarzen Permanentstift zu füllen.

12.5 Updating the options label

Note
After installing additional components, add the following data using a white and indelible ink pen or the appropiate label from the set of labels supplied! If necessary the signs which need to be corrected have to be filled with a black permanent pen before.



12.6 Bestellnummern / Z-Zusätze

12.6 Order numbers / Z-options

Meldeschalter / Signaling switches	Bestellnummer / Order number	Z ergänzen / Add. Z
Meldeschalter Speicherzustand S21 Signaling switch for spring charged S21	3WL9111-0AH08-0AA0	C20
Meldeschalter Einschaltbereitschaft S20 Signaling switch for ready-to-close S20	3WL9111-0AH01-0AA0	C22
Ausgelöst-Meldeschalter S24 (1 Wechsler) für ETU-Träger in Metallausführung (bis etwa Baujahr 2006) Trip signaling switch S24 (1 changeover contact) for trip unit system carrier, made of metal (up to approx. year 2006)	3WL9111-0AH04-0AA0	K07
Ausgelöst-Meldeschalter S24 (1 Wechsler) für ETU-Träger in Kunststoffausführung Trip signaling switch S24 (1 changeover contact) for trip unit system carrier, made of plastics	3WL9111-0AH14-0AA0	K07

Zusätzliche Meldeschalter Schaltstellung / Additional contact position-driven auxiliary switches	Bestellnummer / Order number	an Pos. 16 in MLFB „2“ ersetzen durch/ Replace on pos. 16 of MLFB „2“ by
2 S + 2 Ö / 2 NO + 2 NC (S3, S4)	3WL9111-0AG01-0AA0	4
2 S / 2 NO (S7)	3WL9111-0AG02-0AA0	7
1 S + 1 Ö / 1 NO + 1 NC (S8)	3WL9111-0AG03-0AA0	8

13 Motorantrieb

Für automatisches Spannen des Federspeichers. Wird eingeschaltet, wenn Federspeicher entspannt und Steuerspannung vorhanden. Schaltet nach dem Spannen automatisch ab.

13.1 Nachrüsten des Motorantriebs

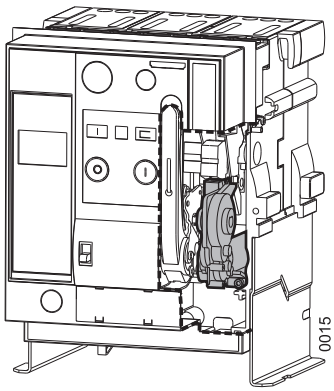
WARNUNG

Verletzungsgefahr!

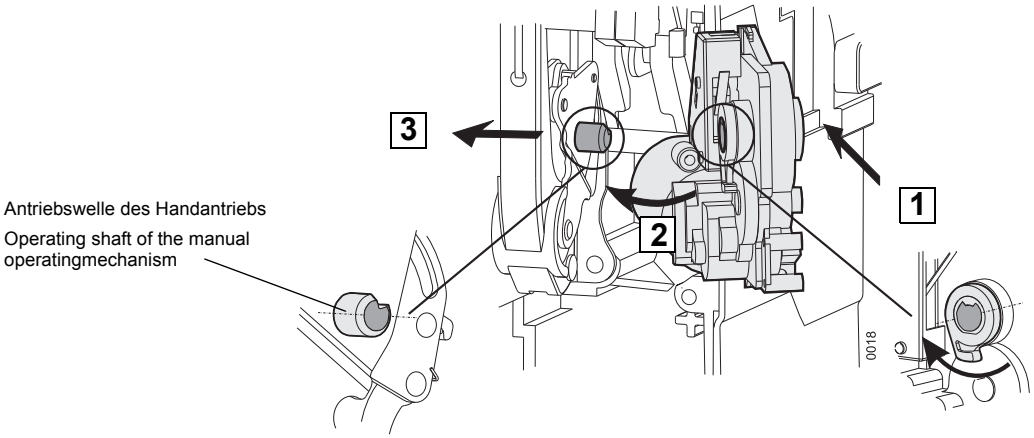
Die Schaltmechanik kann Personenschäden verursachen, wenn das Bedienpult abgenommen ist.
Vor dem Abbauen des Bedienpultes Ausschalten und Federspeicher entspannen → (Seite 24-3):

- Entfernen des Handsteckers X5
- AUS-Taste betätigen
- EIN-Taste betätigen
- AUS-Taste nochmals betätigen.

- Bedienpult abnehmen → (Seite 24-11)



Motor auf Antriebswelle setzen



13 Motor-operated mechanism

For charging the spring storage automatically. It is switched on if the spring storage is discharged and control voltage is applied. The motor-operated mechanism is automatically switched off after the spring storage has been fully charged.

13.1 Retrofitting the motor-operated mechanism

WARNING

Mechanical hazard!

Mechanism can cause severe injury when cover is removed.

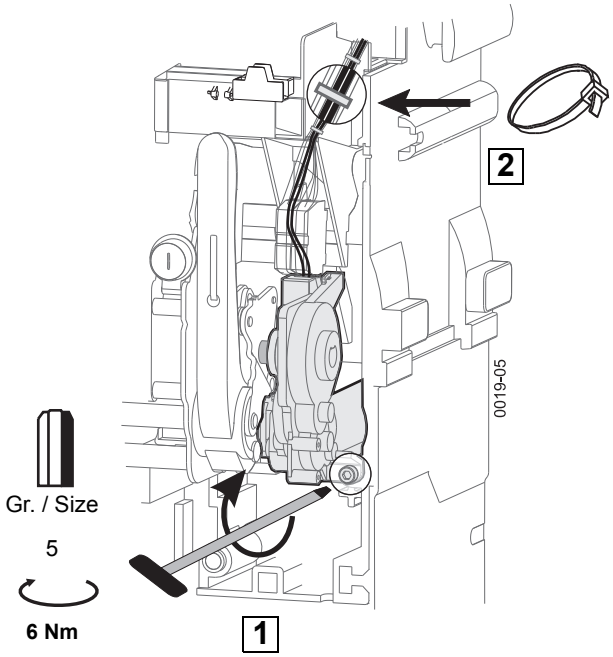
Switch off and discharge the storage spring before removing cover → (page 24-3):

- Remove hand plug X5
- Push OPEN button
- Push CLOSE button
- Push OPEN button again.

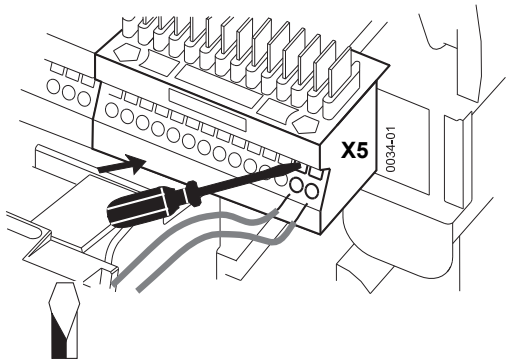
- Remove front panel → (page 24-11)

Mounting the motor on the operating shaft

Motorantrieb befestigen / Leitungen anschließen



Fixing the motor-operated mechanism / connecting wires



3,0 x 0,6

Klemmen / Terminals:
X5.1 (L-) BK / schwarz / black
X5.2 (L+) BN / braun / brown

→ Schaltpläne (Seite 8-6)

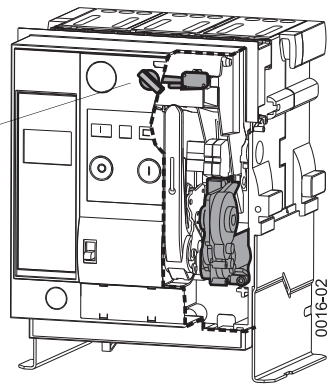
→ Circuit diagrams (page 8-6)

Hinweis	Note
Ggf. fehlende Hilfsstromanschlüsse nachrüsten (Messerleiste, Hilfsstromstecker, Schleifkontaktmodul für Einschubrahmen). → (Seite 5-15)	If necessary missing auxiliary terminals may be retrofitted (receptacle, auxiliary connectors and sliding contact module for guide frames). → (page 5-15)

13.2 Motorabstellschalter am Bedienpult

Option.
Zum Abschalten der Steuerspannung des Motorantriebs.
Lieferung vorkonfektioniert mit einer angelöteten Leitung.

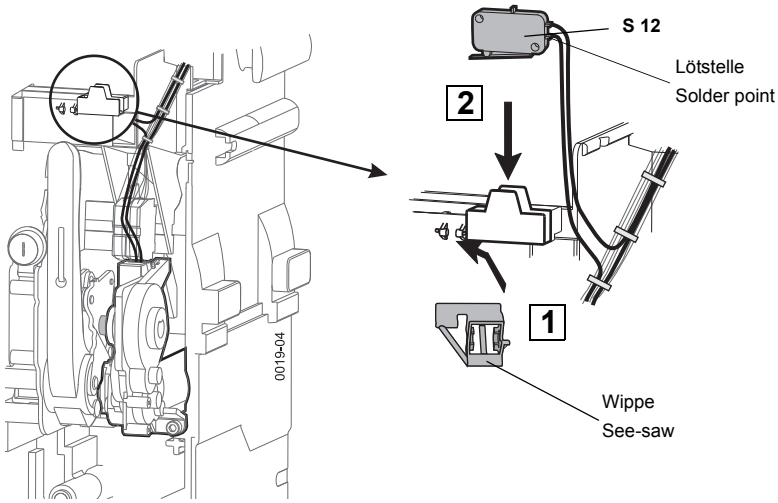
Nicht möglich bei vorhandenem „Elektrisch Ein“
Not possible if “electrical ON” available



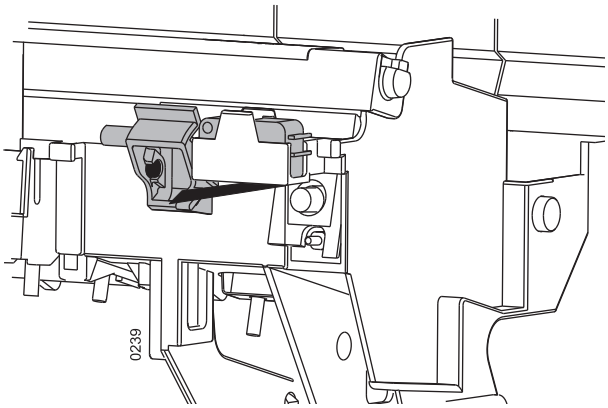
13.2 Motor disconnect switch at the front panel

Option.
For de-energizing the motor-operated mechanism.
Supplied pre-assembled with a soldered wire.

Motorabstellschalter einsetzen



Installing motor disconnect switch



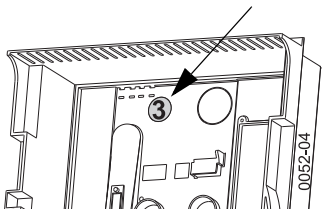
Motorabstellschalter anschließen

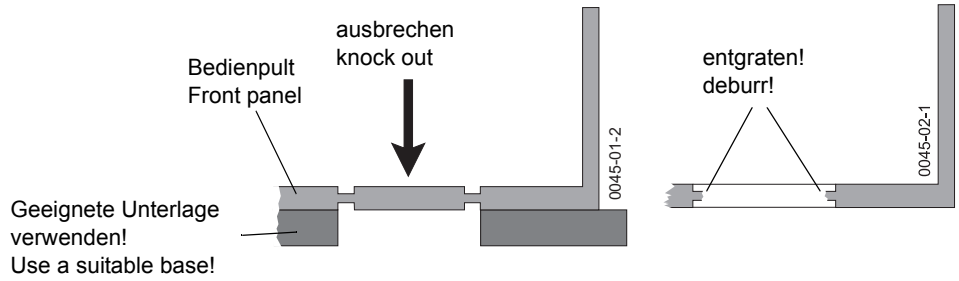
- Schaltplan → (Seite 8-6)
- Klemme X5.1 lösen und Leitung X5-1 (vom Motorantrieb kommend) herausziehen
- Leitung X5-1 vom Abstellschalter S12 an Klemme X5.1 anschließen
- Leitung X5-1 vom Motorantrieb an Anschluss 4 des Abstellschalters anlöten

Connecting motor disconnect switch

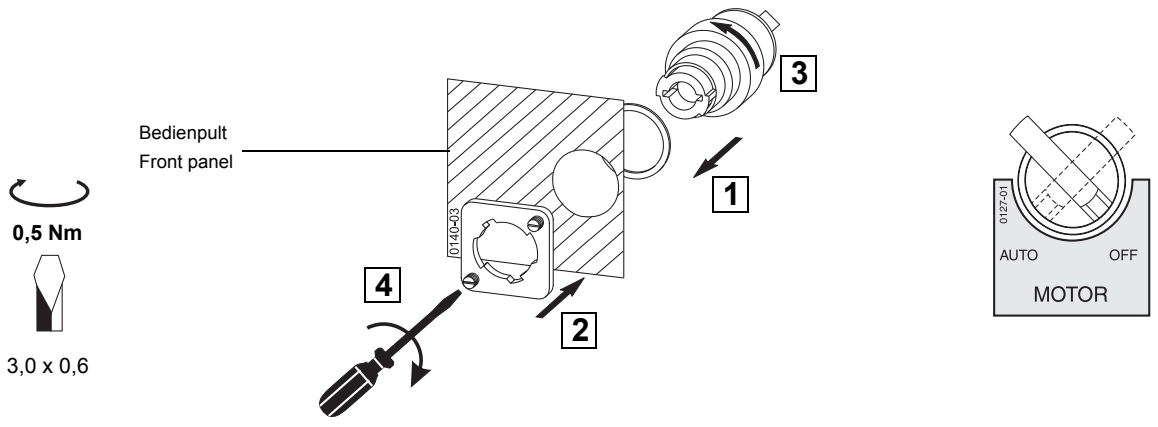
- wiring scheme → (page 8-6)
- Open terminal X5.1 and disconnenct wire X5-1 (wire from motor-operated mechanism)
- Connect wire X5.1 of the disconnect switch S12 to terminal X5.1.
- Solder wire X5-1 of the motor-operated mechanism to connection 4 of the disconnect switch

Knebelschalter einsetzen





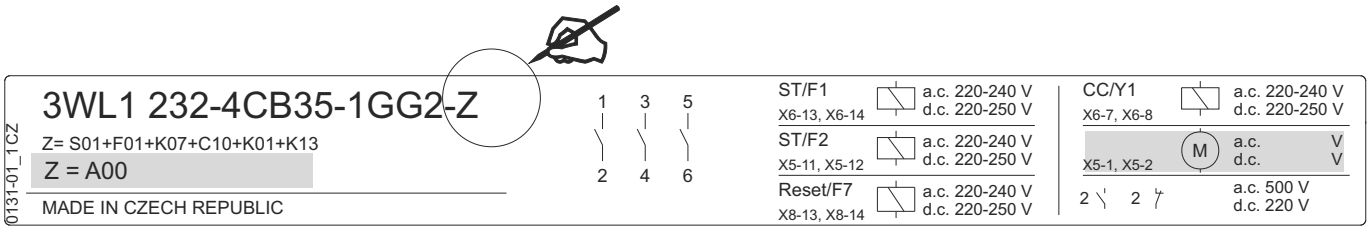
Installing the selector knob



Hinweis	Note
Ggf. fehlende Hilfsstromanschlüsse nachrüsten (Messerleiste, Hilfsstromstecker, Schleifkontaktmodul für Einschubrahmen). → (Seite 5-15)	If necessary missing auxiliary terminals may be retrofitted (receptacle, auxiliary connectors and sliding contact module for guide frames). → (page 5-15)

13.3 Ausstattungsschild aktualisieren

Hinweis	Note
Nach dem Einbau zusätzlicher Komponenten sind folgende Angaben mit einem weißen Permanentstift bzw. mit Aufklebern aus dem beiliegenden Etikettenbogen zu aktualisieren! Davor ist es ggf. notwendig die zu korrigierenden Zeichen mit einem schwarzen Permanentstift zu füllen.	After installing additional components, add the following data using a white and indelible ink pen or the appropiate label from the set of labels supplied! If necessary the signs which need to be corrected have to be filled with a black permanent pen before.



13.3.1 Bestellnummern / Z-Zusatz

13.3.1 Order numbers / Z-option

	Spannung / Voltage	Leistungsaufnahme / Power consumption	Bestell-Nr. / Order no.	Z ergänzen / Add. Z
Motorantrieb / Motor-operated mechanism	24 V DC / 30 V DC	110 W	3WL9111-0AF01-0AA0	M01
	48 V DC / 60 V DC	120 W	3WL9111-0AF02-0AA0	M03
	110-127 V AC / 110-125 V DC	150 W	3WL9111-0AF03-0AA0	M05
	208-240 V AC / 220-250 V DC	130 W	3WL9111-0AF04-0AA0	M06
Motorabstellschalter / Motor disconnect switch			3WL9111-0AJ06-0AA0	S25

14 Anzeige- und Bedienelemente

Zum Nachrüsten stehen zusätzliche Anzeige- und Bedienelemente zur Verfügung.

WARNUNG

Vor dem Arbeiten an diesem Gerät, Anlage unbedingt spannungsfrei schalten sowie das Gerät erden.



WARNING

Always de-energize and ground equipment before working on this equipment.

Bei Nachrüstung:

- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Bedienpult abnehmen → (Seite 24-11)

14.1 Verriegelungsset

Das Verriegelungsset ist erforderlich, wenn die Bedienbarkeit der Taster Mechanisch EIN und AUS durch Nachrüsten verschiedener Zubehörteile an spezielle Erfordernisse des Schaltanlagenbetriebes angepasst werden soll. (z. B. Pilzdrucktaster NOT-AUS, Sicherheitsschlösser, Zugangssperren für Werkzeugbetätigung, Plombierungen)

Lieferumfang:

(1) 2 Stück Zugangssperren → (Seite 17-7)
(2) 2 Stück Plombierkappen zum Verplomben oder Einhängen eines Vorhängeschlosses → (Seite 15-27)
(3) 2 Stück Schlossträger für Sicherheitsschloss zur Schlüsselbetätigung → (Seite 15-1)
(4) 1 Grundplatte

14 Indicators and operating elements

There are additional indicators and operating elements available for retrofitting.

For retrofitting:

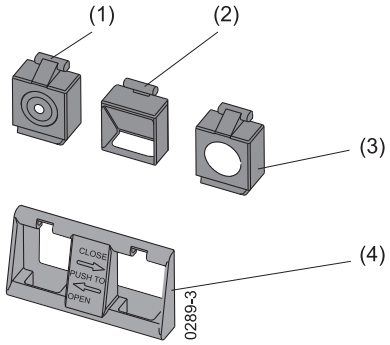
- Switch off and discharge the storage spring → (page 24-3)
- Remove front panel → (page 24-11)

14.1 Locking set

The locking set is required, if the operation of the mechanical ON and OFF buttons has to be adapted to special operational requirements of the switchgear by retrofitting several accessories. (e.g. mushroom button for EMERGENCY OFF, safety locks, access blocks for tool operation, seals)

Contents of supply:

(1) 2 access blocks → (page 17-7)
(2) 2 sealing caps for leads or padlocks → (page 15-27)
(3) 2 safety lock holders → (page 15-1)
(4) 1 base plate

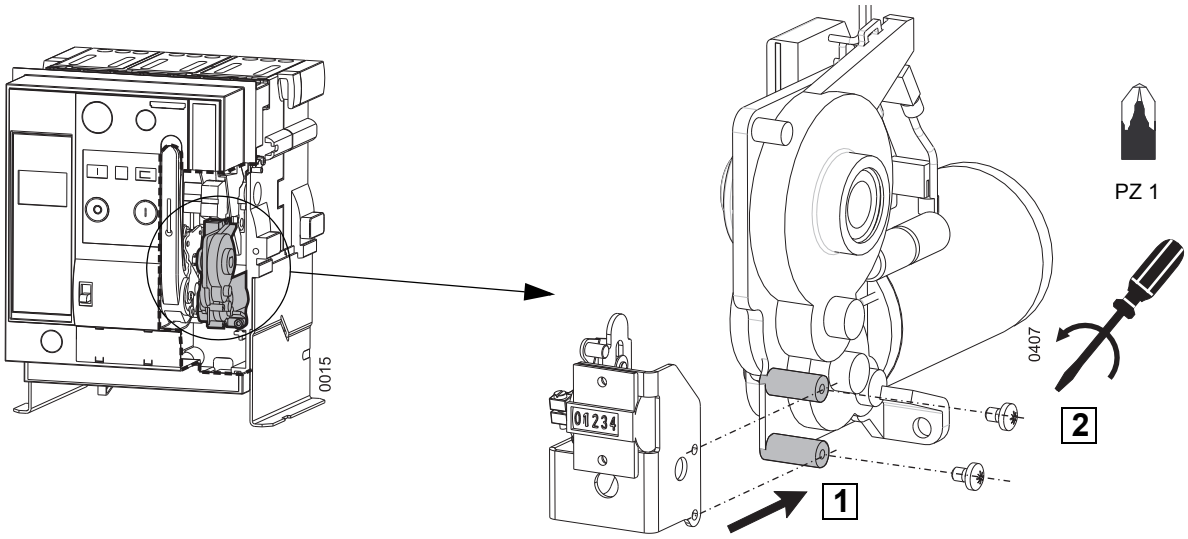


14.2 Mechanischer Schaltspielzähler

Der mechanische Schaltspielzähler kann nachgerüstet werden, wenn der Leistungsschalter mit einem Motorantrieb ausgestattet ist.

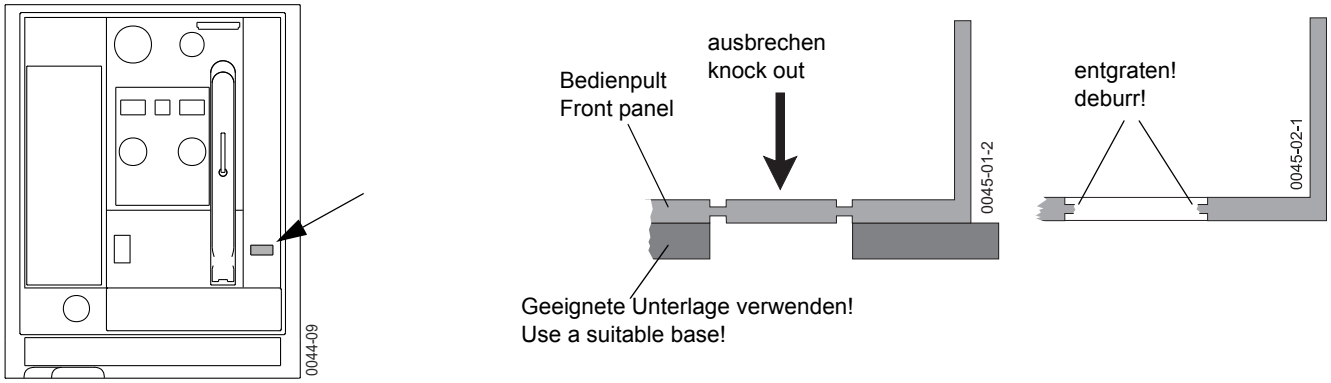
14.2 Mechanical make-break operations counter

The mechanical make-break operations counter can be retrofitted if the circuit breaker is equipped with a motor operating mechanism.



Feld am Bedienpult ausbrechen

Knocking out the field on the front panel



14.3 Motorabstellschalter

→ (Seite 13-2)

14.4 Elektrisch EIN-Taster

→ (Seite 11-4)

14.3 Motor cut-off switch

→ (page 13-2)

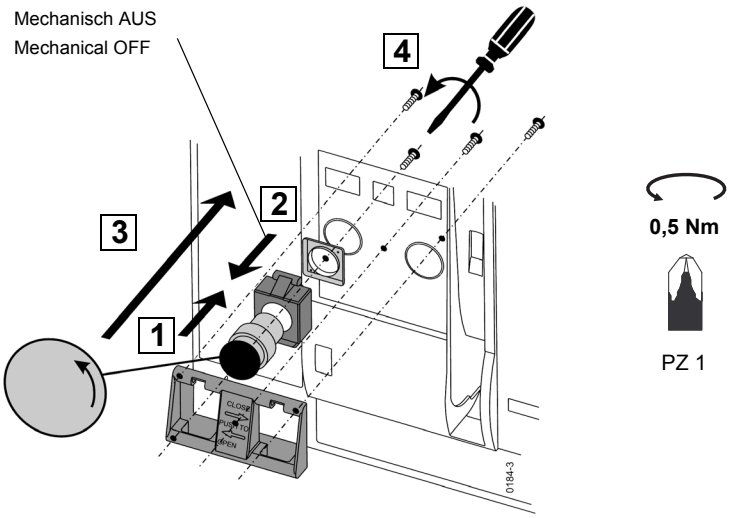
14.4 Electrical ON push-button

→ (page 11-4)

14.5 NOT-AUS Pilzdrucktaster

14.5 EMERGENCY OFF push-button

VORSICHT	CAUTION
Selbstschneidende Schrauben vorsichtig anziehen!	Tighten self-tapping screws carefully!

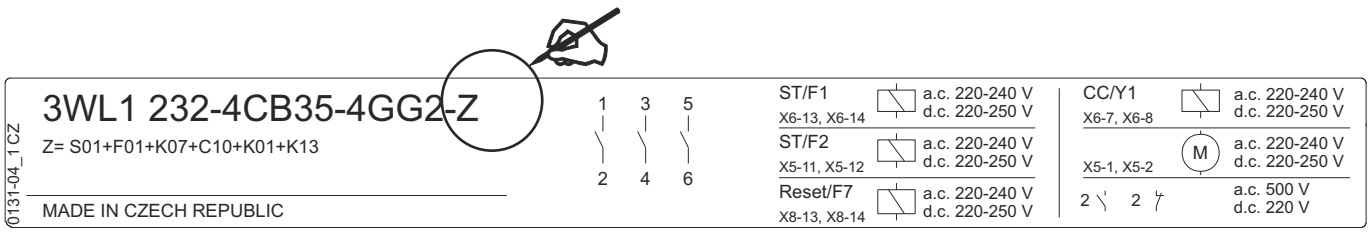


Hinweis	Note
NOT-AUS Pilzdrucktaster wie dargestellt einbauen (Pfeil rechts).	Install the EMERGENCY OFF mushroom pushbutton as shown (arrow on the right side).

14.6 Ausstattungsschild aktualisieren

14.6 Updating the options label

Hinweis	Note
Nach dem Einbau zusätzlicher Komponenten sind folgende Angaben mit einem weißen Permanentstift bzw. mit Aufklebern aus dem beiliegenden Etikettenbogen zu aktualisieren! Davor ist es ggf. notwendig die zu korrigierenden Zeichen mit einem schwarzen Permanentstift zu füllen.	After installing additional components, add the following data using a white and indelible ink pen or the appropiate label from the set of labels supplied! If necessary the signs which need to be corrected have to be filled with a black permanent pen before.



	Bestell-Nr. / Order no.	Z ergänzen / Add. Z
Verriegelungsset / Locking set	3WL9111-0BA21-0AA0	S21
Mechanischer Schaltspielzähler / Make-break operations counter	3WL9111-0AH07-0AA0	C01
NOT-AUS / EMERGENCY OFF	3WL9111-0BA72-0AA0	S24

15 Abschließvorrichtungen

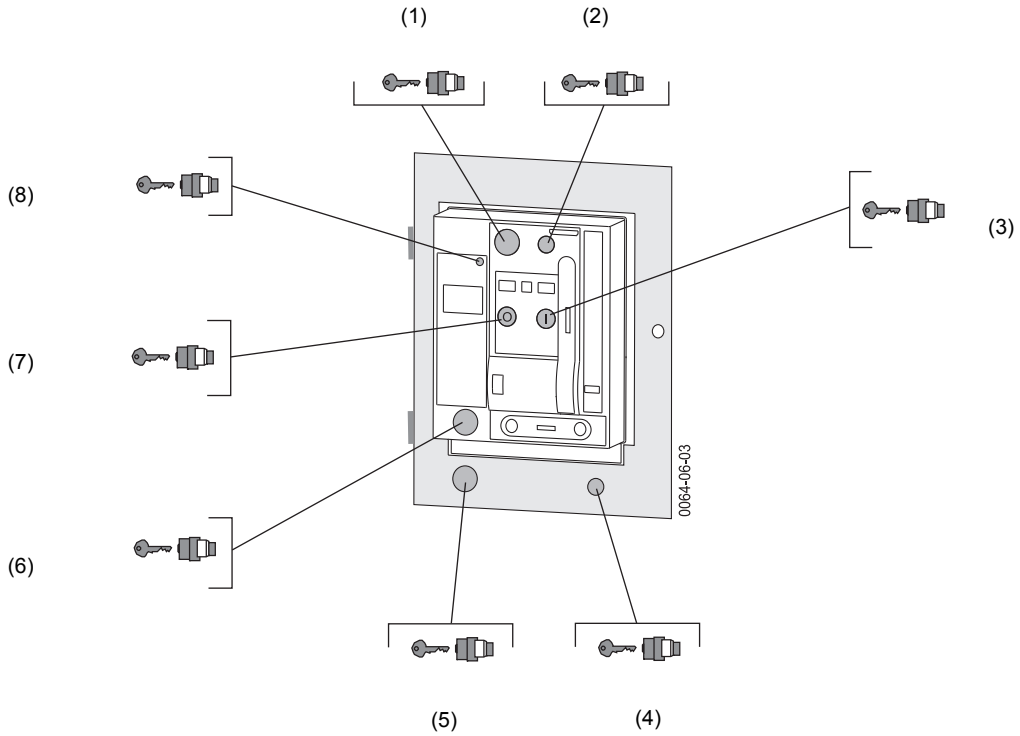
15.1 Sicherheitsschlösser

→ Vorrichtungen für Bügelschlösser (Seite 15-21)

15 Locking devices

15.1 Safety locks

→ Padlocking provisions (page 15-21)



(3); (4); (5) siehe Bestellhinweis, → (Seite 15-19)

Erforderlicher Bauraum für Schlüssel→ (Seite 7-1)

(3); (4); (5) refer to order instruction, → (page 15-19)

Necessary room for key → (page 7-1)

	Sicherheitsschloss **Safety lock**	**Fabrikate** **Manufacturer**	**Wirkung** **Effects**
1	Abschließvorrichtung in AUS-Stellung (Bedienpult) Locking device in OFF position (front panel)	PROFALUX RONIS CES IKON CASTELL KIRK FORTRESS	Mit dieser Funktion wird ein Einschalten des Leistungsschalters verhindert und die Trennerbedingung nach IEC 60 947-2 in AUS-Stellung erfüllt. Diese Abschließung wirkt nur auf diesen Schalter. Nach einem Auswechseln des Leistungsschalters ist das Einschalten nicht mehr verhindert, sofern nicht der neue Leistungsschalter auch gegen unbefugtes Einschalten gesichert ist. Zum Aktivieren der Abschließung muss der Leistungsschalter ausgeschaltet sein. Bei eingeschaltetem Leistungsschalter ist die Abschließvorrichtung blockiert. Die Sperre ist nur bei abgezogenem Schlüssel wirksam. Der Sicherheitsschlüssel ist nur in „AUS“ abziehbar. → (Seite 15-3) This function prevents closing of the circuit breaker and fulfils the disconnecting condition in OFF position according to IEC 60 947-2. This lock only actuates on this circuit breaker. After replacing the circuit breaker, closing is not prevented anymore unless the new circuit breaker is secured against unauthorised closing, too. To activate the locking device, the circuit breaker must be opened. If the circuit breaker is closed, the locking device is blocked. The block is only effective when the key is removed. The safety key can only be removed in “OFF” position. → (page 15-3)
2	Abschließvorrichtung für Elektrisch EIN Locking device for Electrical ON	CES IKON	Verhindert unautorisiertes elektrisches Einschalten am Bedienpult. Mechanisches Einschalten und Ferneinschaltung bleiben möglich. Die Sperre ist nur bei abgezogenem Schlüssel wirksam. → (Seite 15-6) Prevents electrical closing on the front panel. Mechanical closing and remote closing are still possible. The block is only effective if the key is withdrawn. → (page 15-6)

	Sicherheitsschloss Safety lock	Fabrikate Manufacturer	Wirkung Effects
3	Schlüsselbetätigung für Mechanisch EIN Key protected operation for Mechanical ON	CES IKON	Verhindert unautorisiertes mechanisches Einschalten. Der Mechanisch-EIN-Taster kann nur bei gestecktem Schlüssel betätigt werden (Schlüsselbetätigung). Einschalten durch Taster „Elektrisch EIN“ oder Fernschaltung bleiben möglich. Die Sperre ist nur bei abgezogenem Schlüssel wirksam. → (Seite 15-6) Prevents unauthorised mechanical closing. The mechanical ON button can only be pressed if the key is inserted (key operation). Closing via “electrical ON” button and remote closing are still possible. The block is only effective when the key is removed. → (page 15-6)
4	Abschließvorrichtung gegen Verfahren aus der Trennstellung Locking device against moving from the disconnected position	PROFALUX RONIS CES IKON	Verhindert bei Einschubschaltern das Herausziehen der Kurbel in der Trennstellung. Übertragung des Sperrsignals vom Schloss zur Abschließvorrichtung durch Bowdenzug. Ein Schalteraustausch ist nicht möglich. Die Sperre ist nur bei abgezogenem Schlüssel wirksam. → (Seite 15-7) On draw-out circuit breakers, it prevents drawing out of the racking handle in the disconnected position. Transmission of the blocking signal from the lock to the circuit breaker through bowden wire. Circuit breaker replacement is not possible. The block is only effective when the key is removed. → (page 15-7)
5	Abschließvorrichtung in AUS-Stellung (Schaltschranktür) Locking device in OFF position (cubicle door)	PROFALUX RONIS CES IKON KIRK	Mit dieser speziellen Funktion für Einschubschalter wird schalterunabhängig ein Einschalten verhindert und die Trennerbedingung in AUS-Stellung erfüllt. Ein unbefugtes Einschalten ist auch nach dem Auswechseln des Leistungsschalters nicht möglich. Zum Aktivieren der Abschließung muss der Leistungsschalter ausgeschaltet sein. Bei eingeschaltetem Leistungsschalter ist die Abschließvorrichtung blockiert. Die Sperre ist nur bei abgezogenem Schlüssel wirksam. Der Sicherheitsschlüssel ist nur in „AUS“ abziehbar. → (Seite 15-12) This special function for draw-out circuit breakers prevents closing and fulfills the disconnecting condition in OFF position regardless of the circuit breaker. Unauthorised closing is not possible either after circuit breaker replacement. To activate the lock, the circuit breaker must be open. If the circuit breaker is closed, the locking device is blocked. The block is only effective when the key is removed. The safety key can only be removed in “OFF” position. → (page 15-12)
6	Abschließvorrichtung für Handkurbel Locking device for racking handle	PROFALUX RONIS CES IKON KIRK	Verhindert das Herausziehen der Kurbel. Der Schalter ist gegen Verfahren gesichert. Die Sperre ist nur bei abgezogenem Schlüssel wirksam. → (Seite 15-14) Prevents drawing out of the racking handle. The circuit breaker is locked against moving. The block is only effective when the key is removed. → (page 15-14)
7	Schlüsselbetätigung für Mechanisch AUS Key protected operation for Mechanical OFF	CES IKON	Verhindert unautorisiertes mechanisches Ausschalten am Bedienpult. Der Mechanisch-AUS-Taster kann nur bei gestecktem Schlüssel betätigt werden (Schlüsselbetätigung). Fernausschaltung bleibt möglich. Die Sperre ist nur bei abgezogenem Schlüssel wirksam. → (Seite 15-16) Prevents unauthorised mechanical tripping. The mechanical OFF button can only be pressed if the key is inserted (key operation). Remote tripping is still possible. The block is only effective when the key is removed. → (page 15-16)
8	Abschließvorrichtung gegen Rücksetzen der Ausgelöst-Anzeige Locking device against reset trip indicator		Eine abschließbare Abdeckung verhindert das manuelle Rücksetzen der Ausgelöst-Anzeige nach Überstromauslösung. → (Seite 15-17) A lockable cover prevents pressing the reset button after overcurrent tripping. → (page 15-17)

15.1.1 Abschließvorrichtung in AUS-Stellung

Bei abgezogenem Schlüssel ist der Schalter gegen Einschalten gesichert.

Abschließen

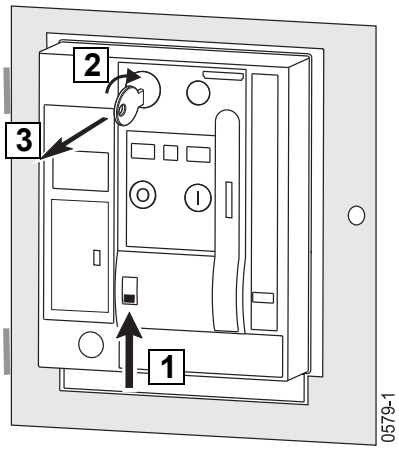
Zum Aktivieren der Abschließung muss der Schalter ausgeschaltet sein.

15.1.1 Locking device in OFF position

If the key is removed, closing the circuit breaker is not possible.

Locking

To activate the lock, the circuit breaker must be open.



Nachrüsten

- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Bedienpult abnehmen → (Seite 24-11)

Retrofitting

- Switch off and discharge the storage spring → (page 24-3)
- Remove front panel → (page 24-11)

Steuerschieber einbauen

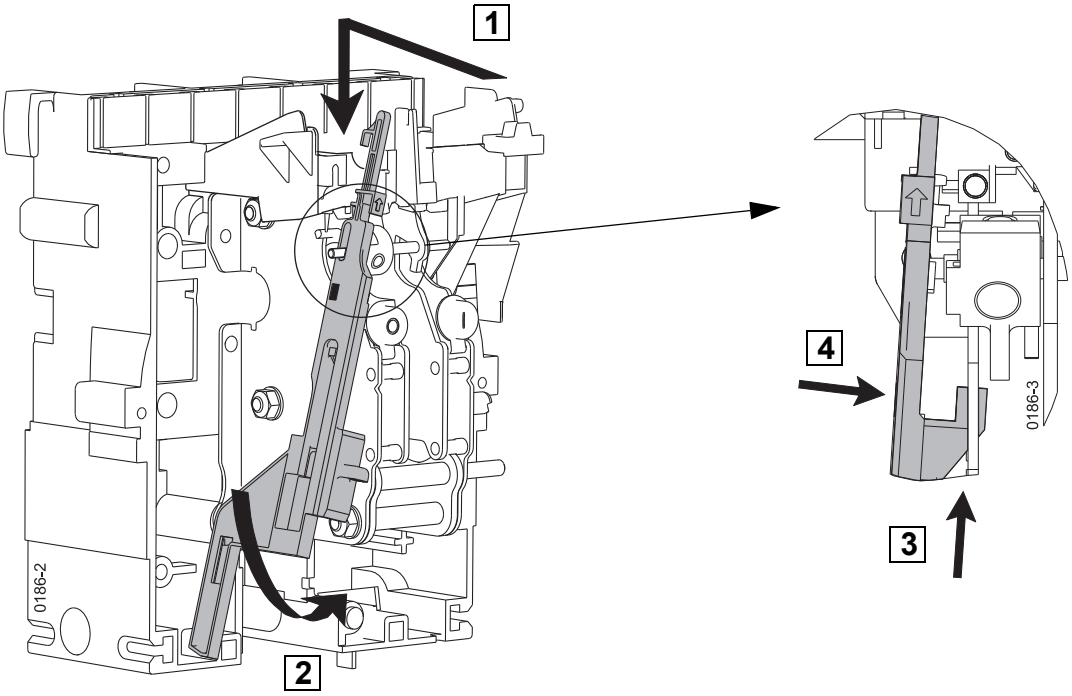
(bei Einschubschaltern immer vorhanden)

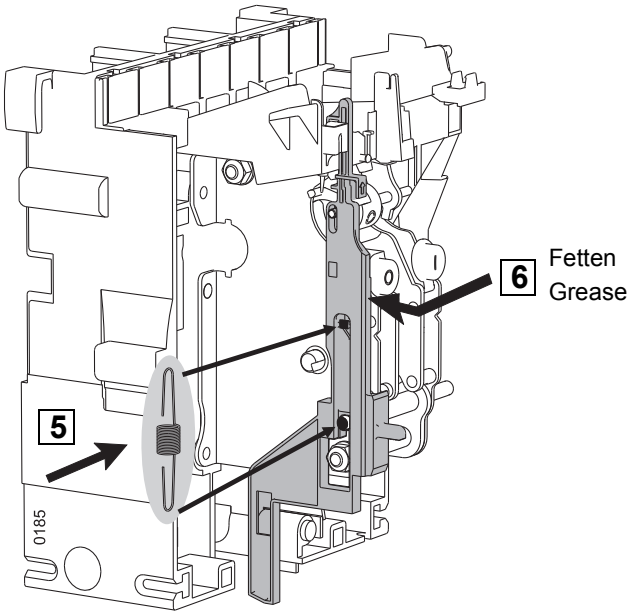
- Überstromauslöser ausbauen → (Seite 9-72)

Fitting control gate

(always available on draw-out circuit breakers)

- Remove overcurrent release → (page 9-72)

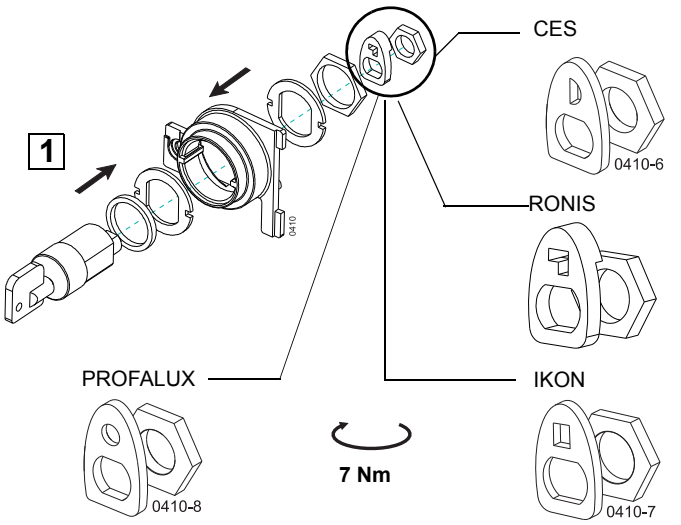


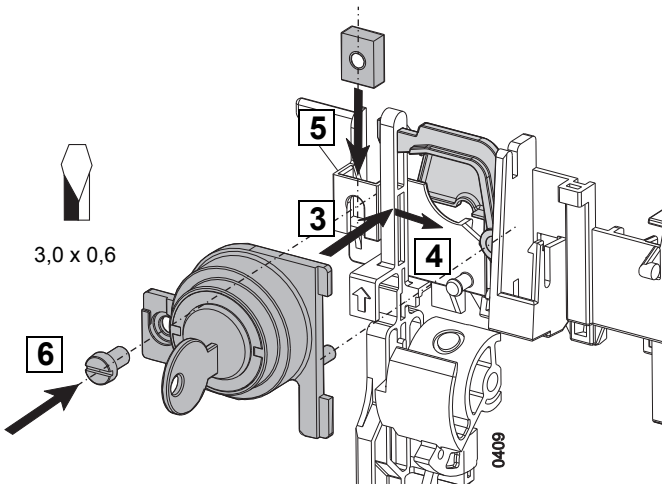


Sicherheitsschloss einbauen

Für Sicherheitsschlösser der Typen:

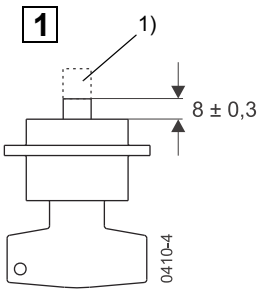
PROFALUX, RONIS, CES, IKON, KIRK

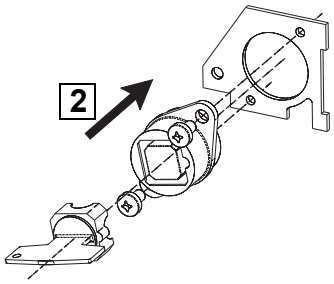




Für Sicherheitsschlösser der Typen:

CASTELL, FORTRESS



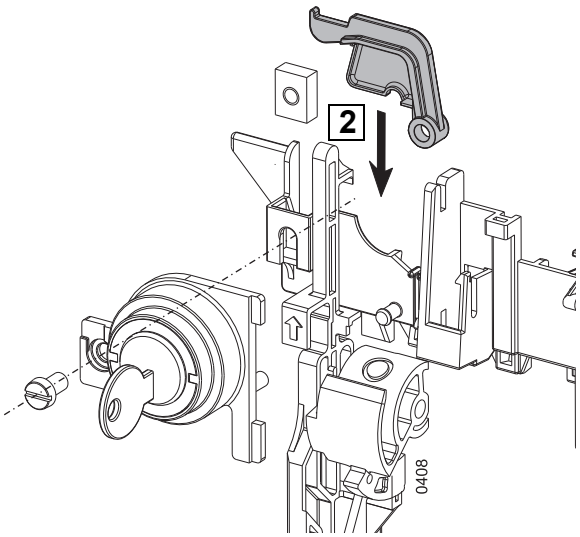


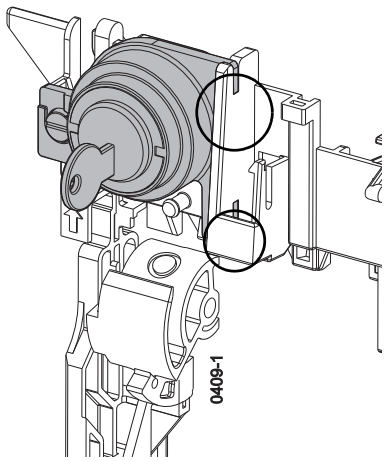
1) Auf 8 ± 0,3 mm kürzen
Shorten to 8 ± 0.3 mm

Installing safety lock

For safety lock types:

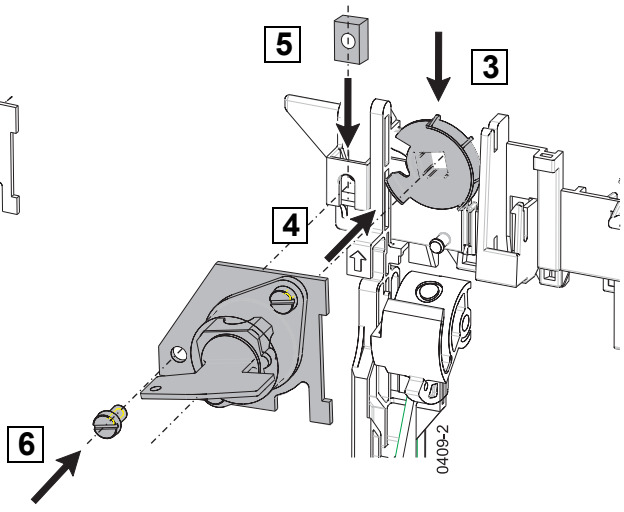
PROFALUX, RONIS, CES, IKON, KIRK



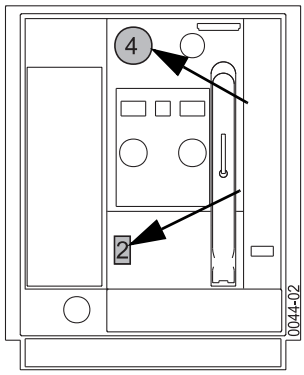


For safety lock types:

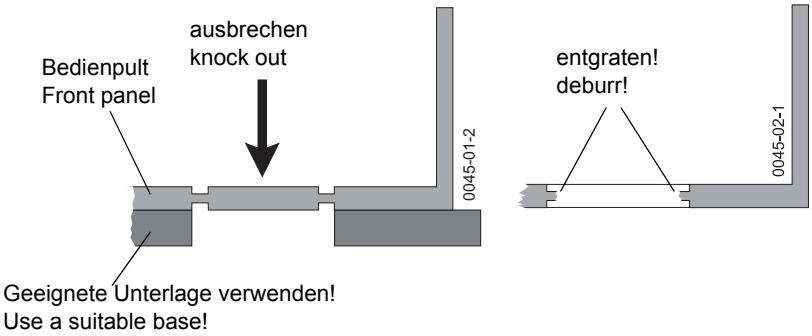
CASTELL, FORTRESS



Felder am Bedienpult ausbrechen



Knocking out the fields on the front panel



Anschließend:

- Überstromauslöser einbauen → (Seite 9-72)
- Bedienpult anbauen → (Seite 24-25)

Then

- Install overcurrent release → (page 9-72)
- Install front panel → (page 24-25)

15.1.2 Sicherheitsschloss Elektrisch EIN nachrüsten

→ Elektrisch EIN nachrüsten (Seite 11-4)

15.1.2 Retrofitting safety lock for electrical ON

→ Installing electrical ON (page 11-4)

15.1.3 Schlüsselbetätigung für Mechanisch EIN nachrüsten

Einbau des Sicherheitsschlosses unter Verwendung des Verriegelungssets. → (Seite 14-1)

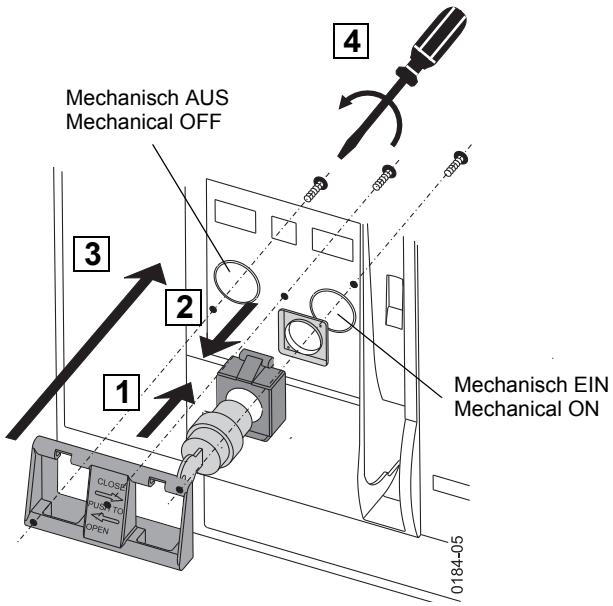
- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Bedienpult abnehmen → (Seite 24-11)

15.1.3 Field installing key protected operation for mechanical ON

Installing the safety lock using the locking set. → (page 14-1)

- Switch off and discharge the storage spring → (page 24-3)
- Remove front panel → (page 24-11)

VORSICHT	CAUTION
Selbstschneidende Schrauben vorsichtig anziehen!	Tighten self-tapping screws carefully!



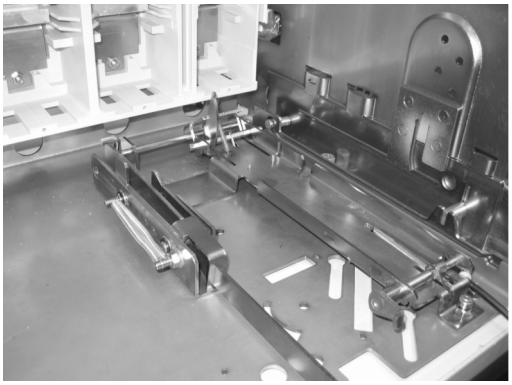
Anschließend:

- Bedienpult anbauen → (Seite 24-25)

Then:

- Install front panel → (page 24-25)

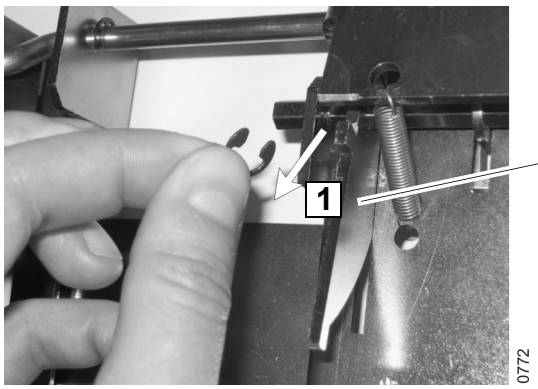
15.1.4 Abschließvorrichtung gegen Verfahren aus der Trennstellung nachrüsten



- →Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Schalter aus dem Einschubrahmen entnehmen → (Seite 24-4)

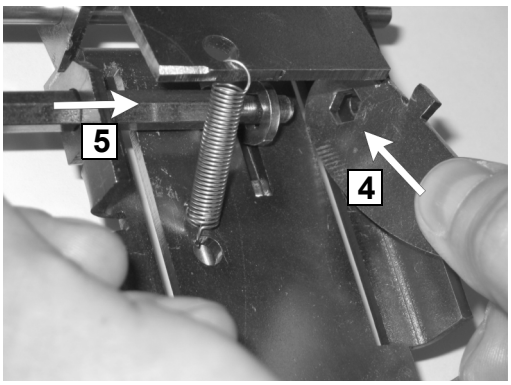
Nur für BG III: Schalter Einschubrahmen:

Umbau der Verriegelungsbaugruppe



(1) Abfrageblech

1 Sicherungsscheibe entfernen
2 Achse herausziehen
3 Abfrageblech entnehmen



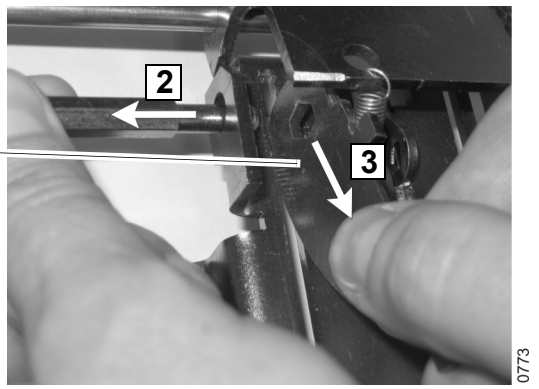
4 Abfrageblech auf der anderen Seite einsetzen
5 Achse einschieben
6 Sicherungsscheibe montieren

15.1.4 Retrofitting locking device against moving from the disconnected position

- Switch off and discharge the storage spring → (page 24-3)
- Remove the breaker from the guide frame → (page 24-4)

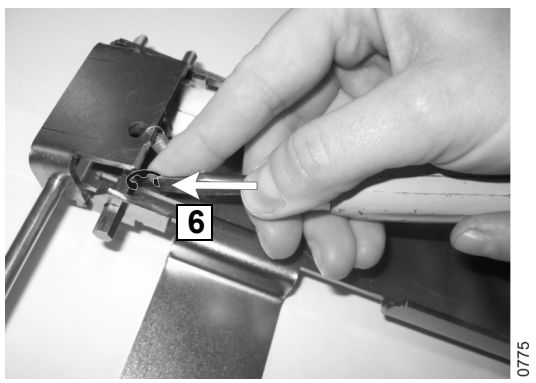
For frame size III only: Changing the query plate

Retrofit of the locking assembly



(1) Query plate

1 Remove the lock washer
2 Pull out the shaft
3 Remove the query plate on the other side

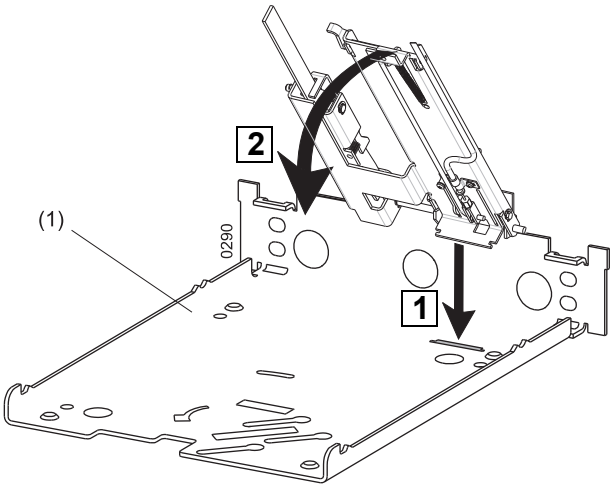


4 Insert the query plate on the other side
5 Pull in the shaft
6 Assemble the lock washer

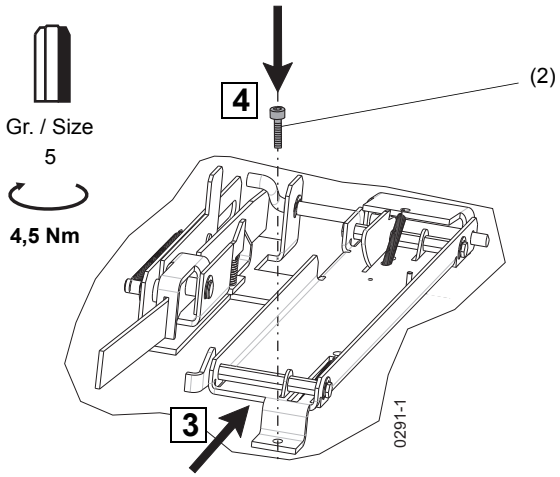
Baugruppe im Einschubrahmen montieren

Assemble unit into guide frame

VORSICHT	CAUTION
Selbstschneidende Schraube vorsichtig anziehen!	Tighten self-tapping screw carefully!



(1) Bodenplatte Einschubrahmen
(2) Selbstschneidende Schraube M6



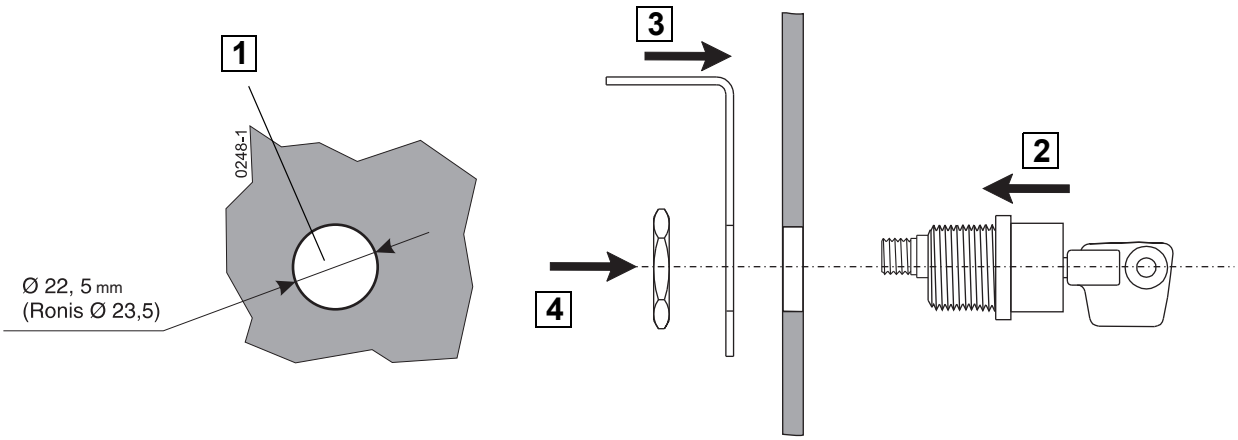
(1) Base of guide frame
(2) Self-tapping screw M6

Schlossbaugruppe einbauen

Unter Beachtung der Länge des Bowdenzuges und der Abmessungen eine geeignete Stelle für die Montage der Schlossbaugruppe am Schaltschrank auswählen.

Installing lock unit

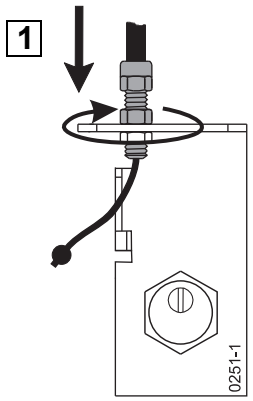
Select a suitable place for installing the lock unit taking the length of the bowden wire at the switchgear cubicle into account.



1 Loch in Schaltschranktür bohren
2 **… 4** Schlossbaugruppe anbauen

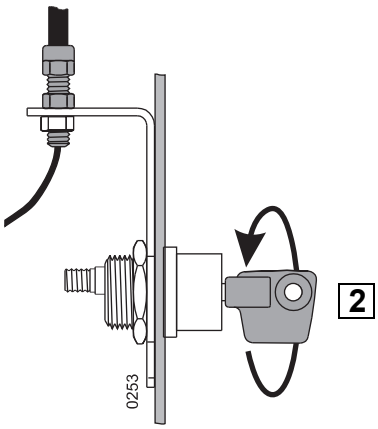
1 Drill hole
2 **… 4** Mount lock unit

Bowdenzug anbauen

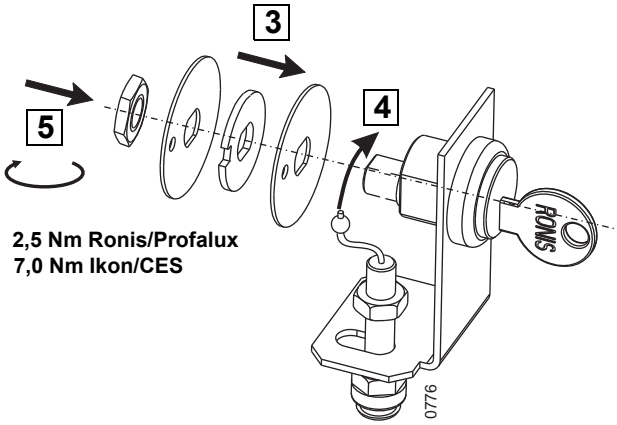


1 Bowdenzug locker am Blech befestigen
2 Schlüssel nach links bis zum Anschlag drehen

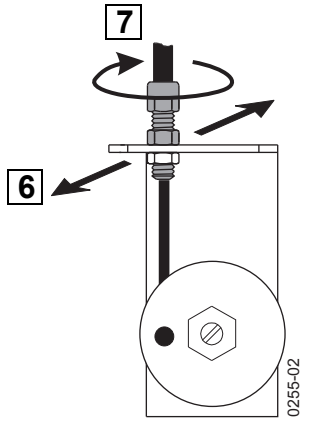
Mounting the bowden wire



1 Mount bowden wire at plate
2 Turn key to the left to the stop position



3 Scheiben auf das Schloss stecken
4 Kugel des Bowdenzuges zwischen die Scheiben in die Aussparungen legen
5 Scheiben mit Mutter befestigen
6 Bowdenzug ausrichten, so dass die Seele ohne Winkelversatz zwischen den Scheiben läuft
7 Bowdenzug festziehen

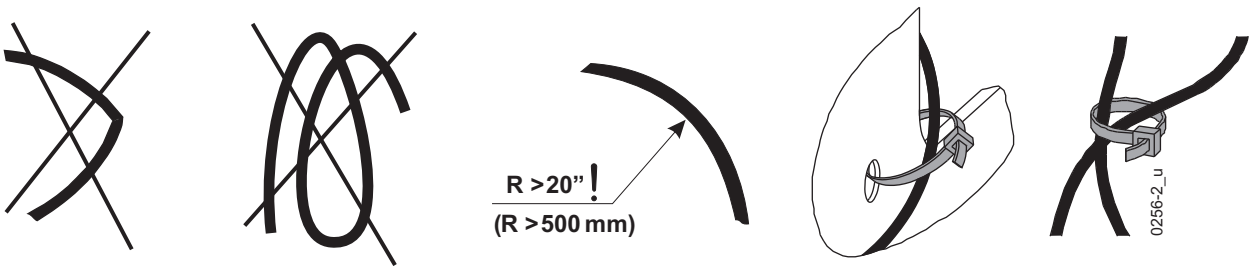


3 Insert washer on the lock
4 Place the ball of the bowden wire in between the washers, using the cut-outs
5 Fix washers by nut
6 Align bowden wire with middle washer

7 Fix nuts of bowden wire

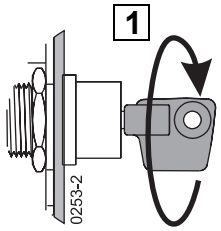
Bowdenzug verlegen

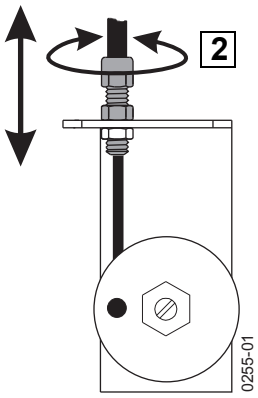
Fix the bowden wire



Bowdenzug justieren

Zum Justieren Schaltschranktür schließen, da sich sonst andere Betätigungswege für den Bowdenzug ergeben!

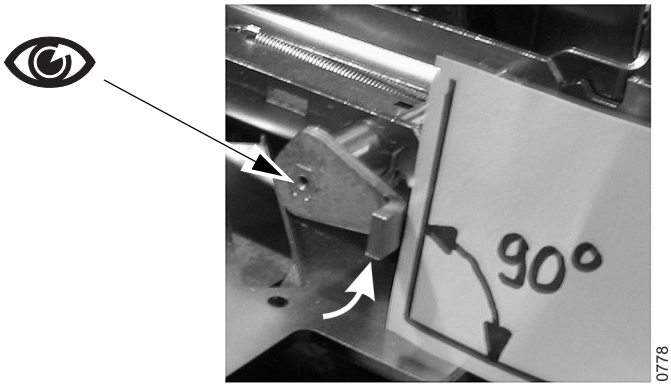




1 Schlüssel nach rechts drehen (abschließen)
2 Bowdenzug so weit verstellen, bis Verriegelung in gezeigter Stellung senkrecht steht

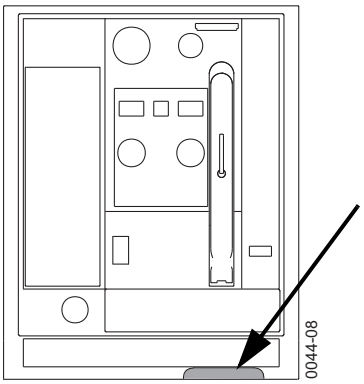
Adjusting the bowden wire

Close the cubicle door for adjustment, because the length of the bowden wire can change by opening the cubicle door!

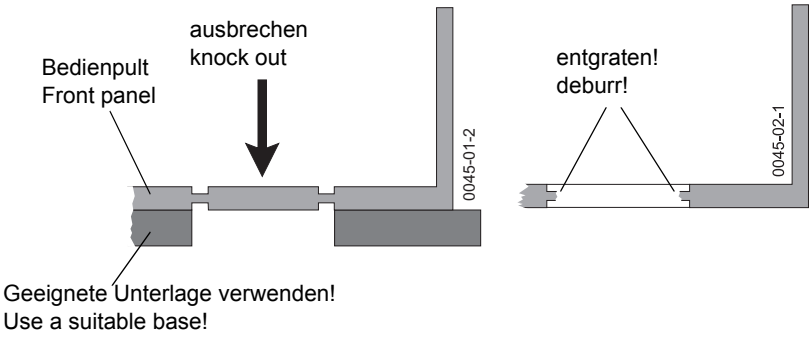


1 Turn key to the right to the close position
2 Adjust the bowden wire, until the interlock surface is in an upright position

Feld aus Bedienpult ausbrechen



Knocking out the field on the front panel



Anschließend:

- Bedienpult anbauen → (Seite 24-25)

Then:

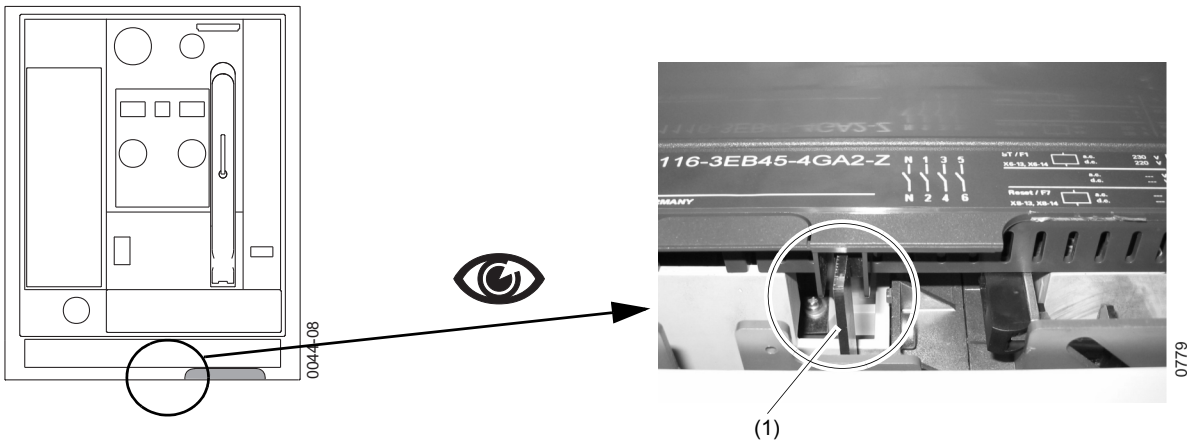
- Install front panel → (page 24-25)

Endkontrolle

- Verriegelung aufschließen
- Leistungsschalter in den Einschubrahmen einsetzen, Leistungsschalter in Trennstellung schieben → (Seite 6-1)

Final inspection

- Unlock the locking device
- Insert the circuit breaker, move the circuit-breake into disconnect position → (page 6-1)



(1) Hebel

- Prüfen, ob sich der Hebel (1) etwa in der Mitte der Aussparung am Bedienpult befindet und sich frei bewegen kann, ggf. Leistungsschalter nochmals entnehmen und Hebel richten
- Schaltschranktür schließen
- Leistungsschalter in Betriebsstellung verfahren

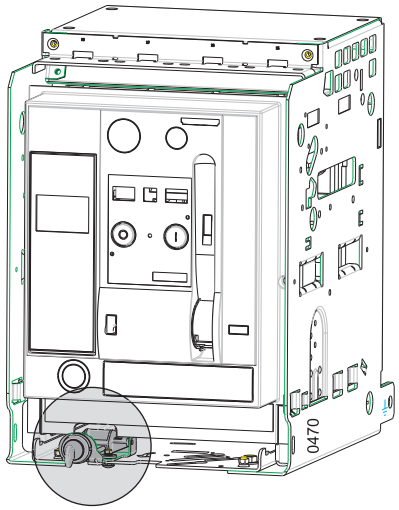
(1) Lever

- Check whether the lever (1) is free to move and nearly in the middle of the front panel cut out. If not, take the breaker out and adjust the lever.
- Close the cubicle door
- Move the circuit breaker into the connect position

HINWEIS	NOTICE
Die Abschließvorrichtung gegen Verfahren aus der Trennstellung kann nur in der Trennstellung oder bei leerem Einschubrahmen aktiviert werden.	The locking device against moving from the disconnected position can only be activated in disconnected position, or when the guide frame is empty
Die Aktivierung erfolgt durch Drehen des Schlüssels im Uhrzeigersinn und anschließendes Abziehen.	Activation is effected by turning the key clockwise and removing the key.
In Test- bzw. Betriebsstellung kann der Schlüssel nicht gedreht und abgezogen werden.	The key cannot be turned and removed in test or connected position.
Bei aktivierter Abschließvorrichtung kann der Leistungsschalter nicht verfahren und nicht aus dem Einschubrahmen entnommen werden. Es ist auch nicht möglich, einen Leistungsschalter in den Einschubrahmen einzusetzen.	When locking device is locked, the breaker can not be moved within nor can it be taken out of the guide frame. It is also not possible to insert a breaker into a locked guide frame.
Zum Aufheben der Verfahrsperre den Schlüssel erst etwas im Schloß bewegen, damit sich die Blockierung im Schloss selbst löst. Dann gegen den Uhrzeigersinn entriegeln.	To open the locking device, first turn the key a little in the lock, so that the block in the lock is released all by itself. Then turn counterclockwise to unlock.

15.1.5 Abschließvorrichtung in AUS-Stellung (Schaltschranktür) nachrüsten

15.1.5 Retrofitting locking device in OFF position (cubicle door)



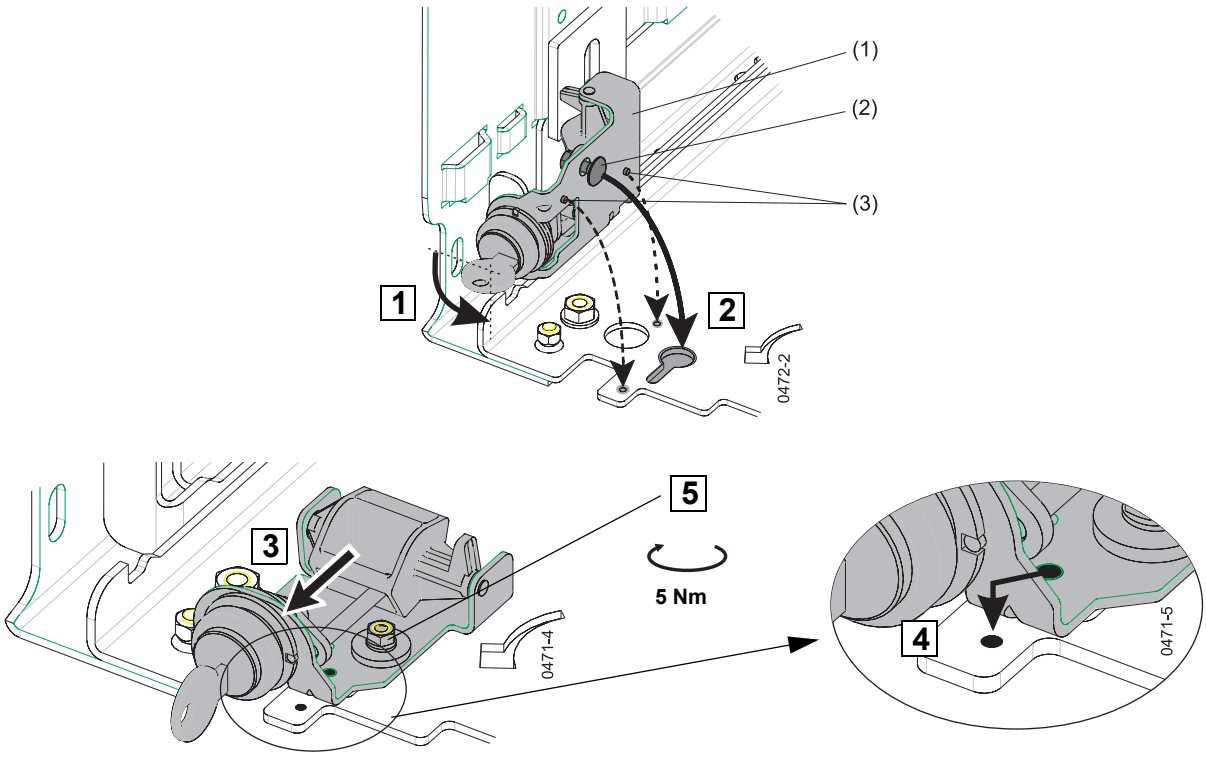
WARNUNG		WARNING
Vor dem Arbeiten an diesem Gerät, Anlage unbedingt spannungsfrei schalten sowie das Gerät erden.		**Always de-energize and ground equipment before working on this equipment.**

- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Leistungsschalter im Einschubrahmen in Wartungsposition bewegen → (Seite 24-4)
- Bedienpult abnehmen → (Seite 24-11)

- Switch off and discharge the storage spring → (page 24-3)
- Move the circuit breaker into maintenance position in the cradle → (page 24-4)
- Remove front panel → (page 24-11)

Schlossbaugruppe einbauen

Fitting locking unit



(1) Schlossbaugruppe
(2) Schlossschraube M5 mit Scheibe und Mutter
(3) 2 Butzen

Anschließend:

- Bedienpult anbauen → (Seite 24-25)

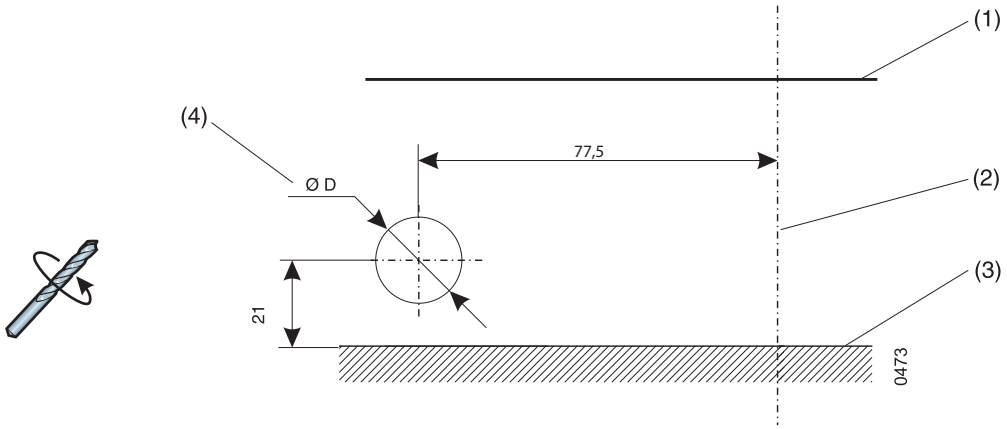
(1) Locking unit
(2) Coach screw M5 with washer and nut
(3) 2 alignment protrusions

Then:

- Install front panel → (page 24-25)

Öffnung in Schaltschranktür bohren

Drill hole into cubicle door



(1) Unterkante Türausschnitt
(2) Mitte Bedienpult
(3) Montageebene des Schalters oder Einschubrahmens
(4) Lochdurchmesser D entsprechend Schlosstyp +1 mm

(1) Lower edge of door cutout
(2) Centre of front panel
(3) Breaker or guide frame mounting surface
(4) Hole diameter D according safety lock type +1 mm

15.1.6 Sicherheitsschloss Handkurbel nachrüsten

WARNUNG

Vor dem Arbeiten an diesem Gerät, Anlage unbedingt spannungsfrei schalten sowie das Gerät erden.



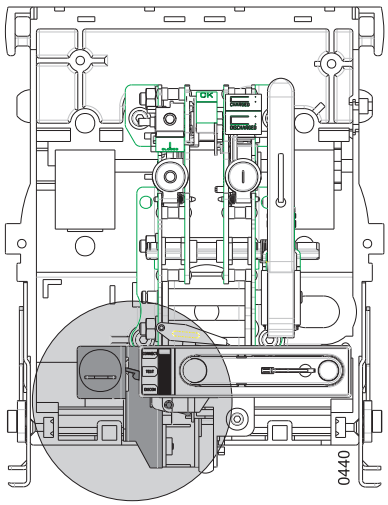
- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Leistungsschalter im Einschubrahmen in Wartungsposition bewegen → (Seite 24-4)
- Bedienpult abnehmen → (Seite 24-11)

15.1.6 Retrofitting safety lock for racking handle

WARNING

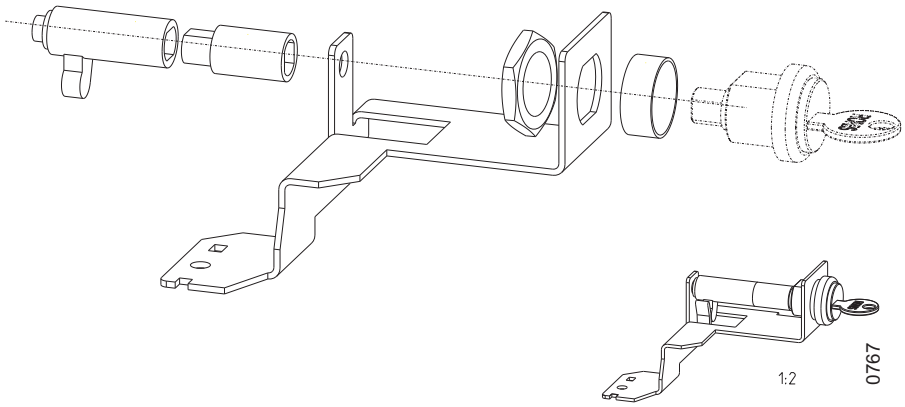
Always de-energize and ground equipment before working on this equipment.

- Switch off and discharge the storage spring → (page 24-3)
- Move the circuit breaker into maintenance position in the cradle → (page 24-4)
- Remove front panel → (page 24-11)



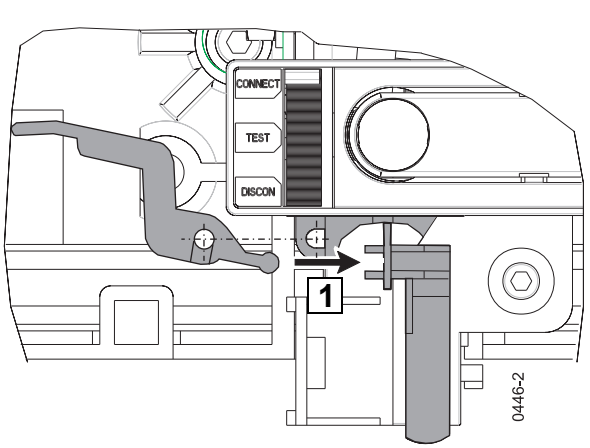
Schlossbaugruppe vormontieren

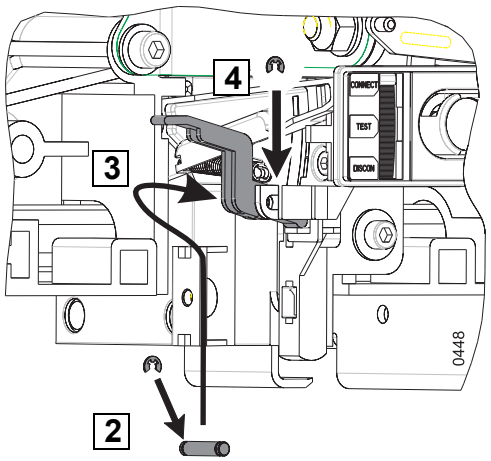
Arranging lock assembly

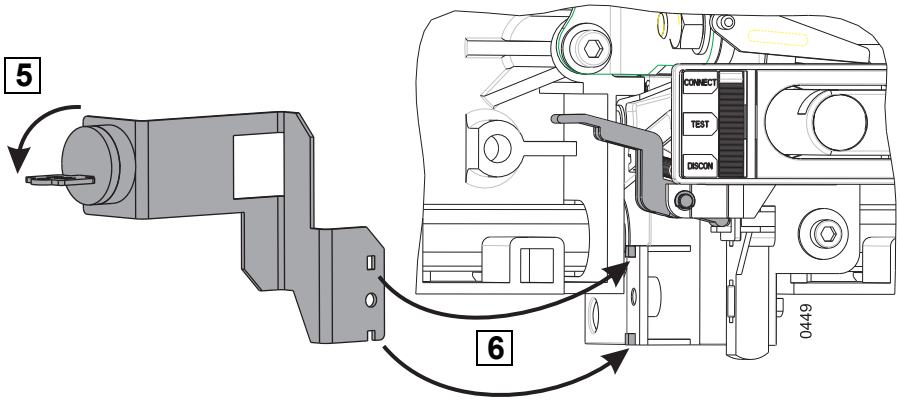


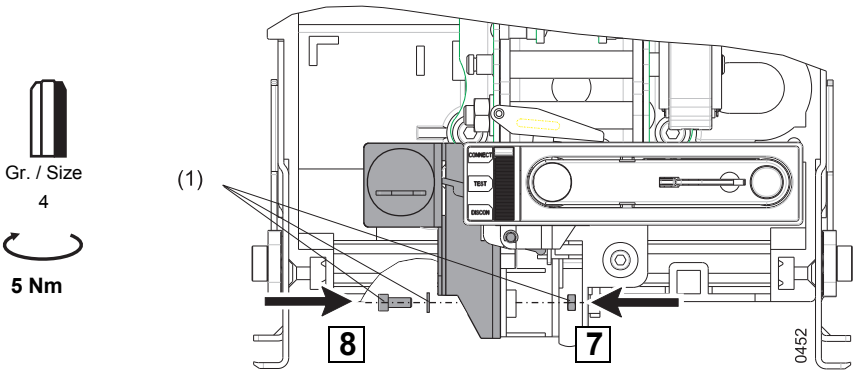
Einbau

Installing



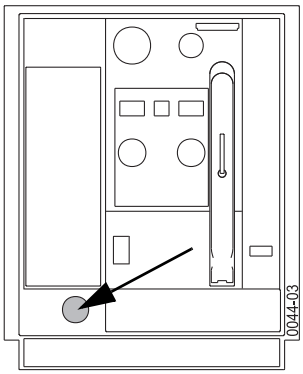






(1) Innensechskantschraube M6 mit Scheibe und Mutter

Feld aus Bedienpult ausbrechen



Anschließend:

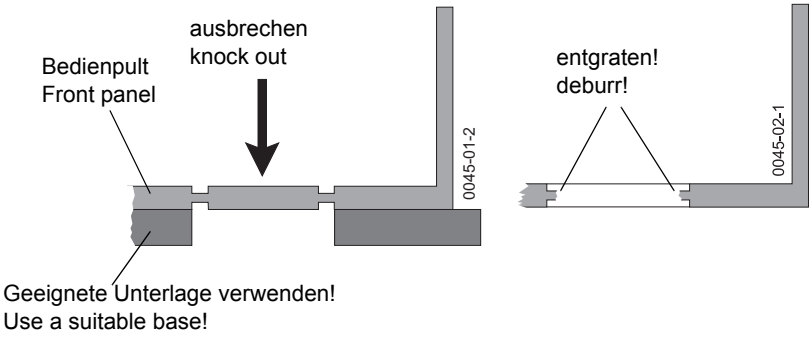
- Bedienpult anbauen → (Seite 24-25)

15.1.7 Sicherheitsschloss Mechanisch AUS nachrüsten

→ Sicherheitsschloss einbauen (Seite 15-5)

(1) Hexagon socket-head screw M6 with washer and nut

Knocking out the field on the front panel



Then:

- Install front panel → (page 24-25)

15.1.7 Retrofitting safety lock for mechanical OFF

→ Installing safety lock (page 15-5)

15.1.8 Sicherheitsschloss Rücksetzknopf nachrüsten

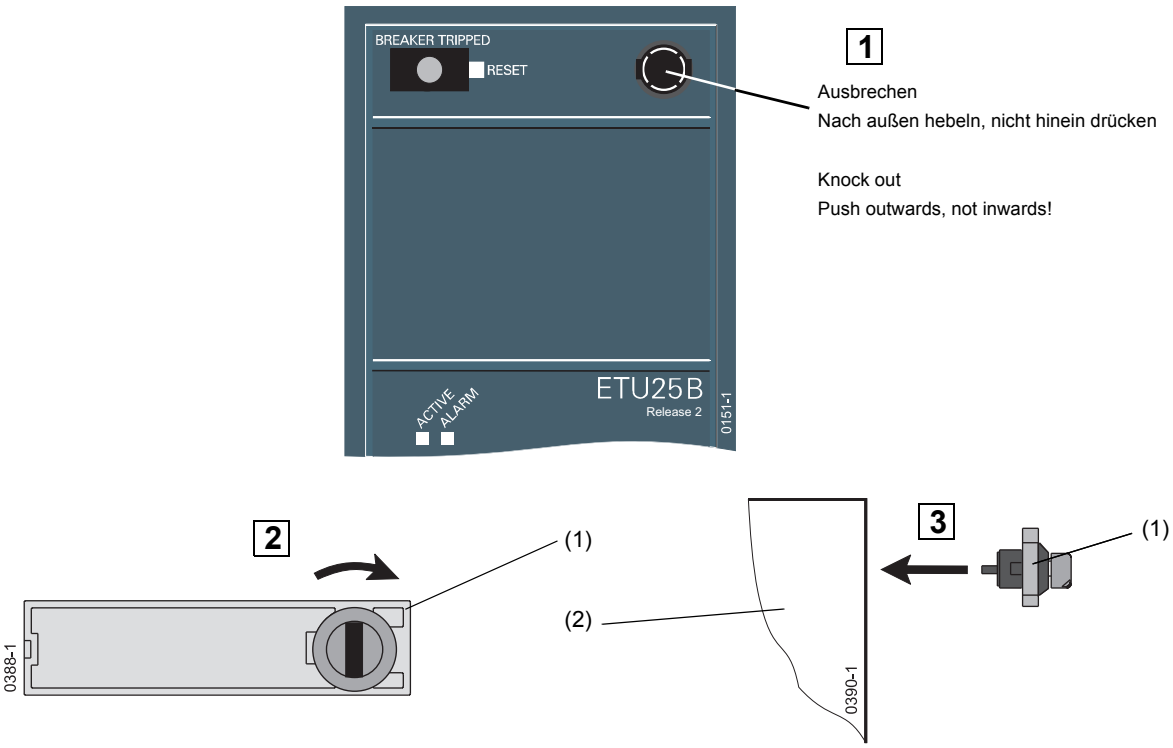
WARNUNG		
Vor dem Arbeiten an diesem Gerät, Anlage unbedingt spannungsfrei schalten sowie das Gerät erden.		

- Ausschalten und Federspeicher entspannen
→ (Seite 24-3)

15.1.8 Retrofitting safety lock for reset button

WARNING
Always de-energize and ground equipment before working on this equipment.

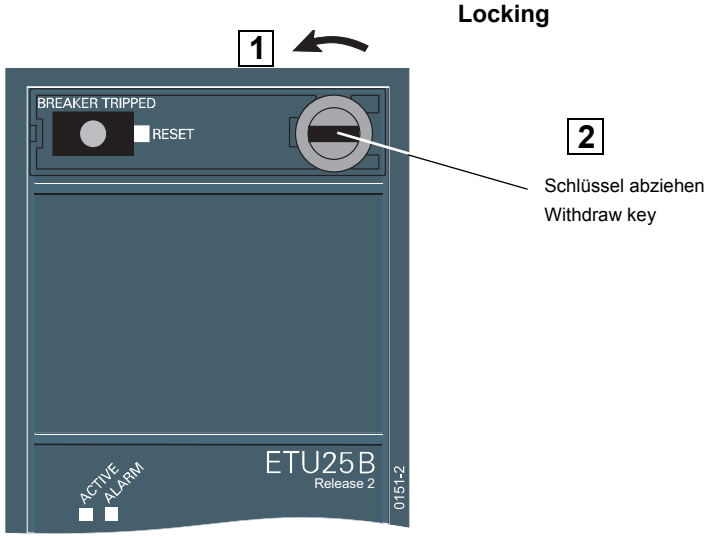
- Switch off and discharge the storage spring
→ (page 24-3)



(1) Abdeckung mit Sicherheitsschloss
(2) Überstromauslöser

(1) Cover with safety lock
(2) Overcurrent release

Abschließen **Locking**



15.1.9 Schilder aktualisieren

15.1.9 Updating the labels

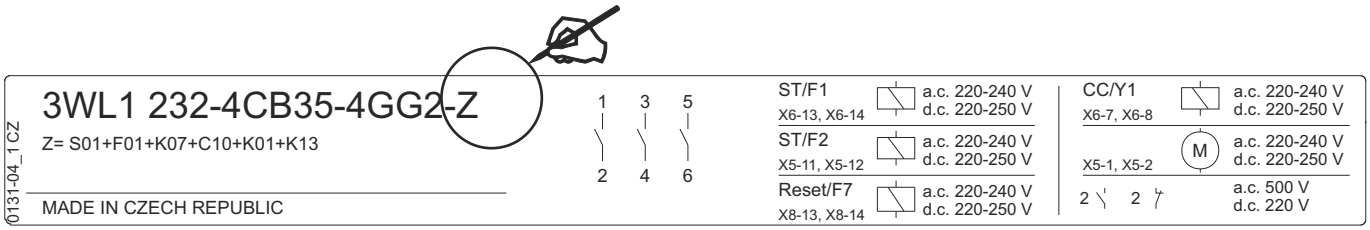
Hinweis	Note
Nach dem Einbau zusätzlicher Komponenten sind folgende Angaben mit einem weißen Permanentstift bzw. mit Aufklebern aus dem beiliegenden Etikettenbogen zu aktualisieren! Davor ist es ggf. notwendig die zu korrigierenden Zeichen mit einem schwarzen Permanentstift zu füllen.	After installing additional components, add the following data using a white and indelible ink pen or the appropiate label from the set of labels supplied! If necessary the signs which need to be corrected have to be filled with a black permanent pen before.

Z-Zusätze → (Seite 15-19) und folgende.

Z-options → (page 15-19) and following.

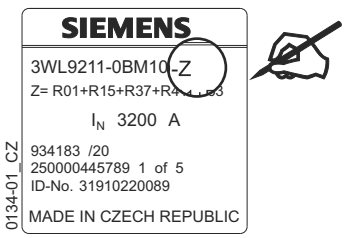
15.1.9.1 Ausstattungsschild des Leistungsschalters

15.1.9.1 Circuit Breaker options label



15.1.9.2 Typschild Einschubrahmen

15.1.9.2 Type label guide frame



15.1.9.3 Bestellnummern / Z-Zusätze

Hinweis

Die folgende Abschließvorrichtung

	Sicherheitsschloss Safety lock	Fabrikate Makes	Bestell-Nr. Order no.	Z ergänzen / Add. Z	
				Schalter / Breaker	Einschubrahmen / Guide frame
4	Abschließvorrichtung gegen Verfahren aus der Trennstellung Locking device against moving from the disconnected position	CES IKON PROFALUX RONIS	3WL9111-0BA81-0AA0 3WL9111-0BA83-0AA0 3WL9111-0BA85-0AA0 3WL9111-0BA86-0AA0		R81 R83 R85 R86

ist **nicht gleichzeitig einsetzbar mit** einer oder allen unten aufgeführten Abschließvorrichtungen / Verriegelungen.

	Sicherheitsschloss Safety lock	Fabrikate Makes	Bestell-Nr. Order no.	Z ergänzen / Add. Z	
				Schalter / Breaker	Einschubrahmen / Guide frame
5	Abschließvorrichtung in AUS-Stellung (Schaltschranktür) Locking device in OFF position (cubicle door)	PROFALUX CES RONIS	3WL9111-0BA50-0AA0 3WL9111-0BA51-0AA0 3WL9111-0BA58-0AA0		R60 R61 R68
	Abschließvorrichtung **Locking device**		**Bestell-Nr.** **Order no.**	**Z ergänzen / Add. Z**	
				Schalter / **Breaker**	**Einschubrahmen /** **Guide frame**
3	Sperrvorrichtung gegen Verfahren bei offener Schaltschranktür für Einschubschalter Locking device to prevent racking with cubicle door open		3WL9111-0BB15-0AA0		R50
5	Türverriegelung für Einschubrahmen Door locking mechanism for guide frame		3WL9111-0BB13-0AA0		R30

Weitere Sicherheitsschlösser auf der Folgeseite.

15.1.9.3 Order numbers / Z-options

Note

The following locking device

	Sicherheitsschloss Safety lock	Fabrikate Makes	Bestell-Nr. Order no.	Z ergänzen / Add. Z	
				Schalter / Breaker	Einschubrahmen / Guide frame
4	Abschließvorrichtung gegen Verfahren aus der Trennstellung Locking device against moving from the disconnected position	CES IKON PROFALUX RONIS	3WL9111-0BA81-0AA0 3WL9111-0BA83-0AA0 3WL9111-0BA85-0AA0 3WL9111-0BA86-0AA0		R81 R83 R85 R86

is **mutually exclusive to** one or all of the below listed locking devices / interlocks.

	Sicherheitsschloss Safety lock	Fabrikate Makes	Bestell-Nr. Order no.	Z ergänzen / Add. Z	
				Schalter / Breaker	Einschubrahmen / Guide frame
5	Abschließvorrichtung in AUS-Stellung (Schaltschranktür) Locking device in OFF position (cubicle door)	PROFALUX CES RONIS	3WL9111-0BA50-0AA0 3WL9111-0BA51-0AA0 3WL9111-0BA58-0AA0		R60 R61 R68
	Abschließvorrichtung **Locking device**		**Bestell-Nr.** **Order no.**	**Z ergänzen / Add. Z**	
				Schalter / **Breaker**	**Einschubrahmen /** **Guide frame**
3	Sperrvorrichtung gegen Verfahren bei offener Schaltschranktür für Einschubschalter Locking device to prevent racking with cubicle door open		3WL9111-0BB15-0AA0		R50
5	Türverriegelung für Einschubrahmen Door locking mechanism for guide frame		3WL9111-0BB13-0AA0		R30

More safety locks on the following page.

Bitte beachten Sie die Einschränkungen bei Abschließvorrichtung 4
→ (Seite 15-19)

Please consider the conditions using locking device 4
→ (page 15-19)

	Sicherheitsschloss Safety lock	Fabrikate Makes	Bestell-Nr. Order no.	Z ergänzen / Add. Z	
				Schalter / Breaker	Einschubrahmen / Guide frame
1	Abschließvorrichtung in AUS-Stellung (Bedienpult) Locking device in OFF position (front panel)	CES IKON FORTRESS / CASTELL [1)] KIRK RONIS PROFALUX	3WL9111-0BA36-0AA0 3WL9111-0BA38-0AA0 3WL9111-0BA31-0AA0 3WL9111-0BA34-0AA0 3WL9111-0BA33-0AA0 3WL9111-0BA35-0AA0	S01 S03 S05 S06 S08 S09	
2	Abschließvorrichtung für Elektrisch EIN Locking device for Electrical ON	CES IKON	3WL9111-0AJ03-0AA0 3WL9111-0AJ05-0AA0	C12 C14	
3	Schlüsselbetätigung für Mechanisch EIN (Schloss mit Verriegelungsset) Key protected operation for Mechanical ON (lock with locking set)	CES IKON	 3WL9111-0BA22-0AA0 3WL9111-0BA24-0AA0	- -	- -
4	Abschließvorrichtung gegen Verfahren aus der Trennstellung Locking device against moving from the disconnected position	CES IKON PROFALUX RONIS	3WL9111-0BA81-0AA0 3WL9111-0BA83-0AA0 3WL9111-0BA85-0AA0 3WL9111-0BA86-0AA0		R81 R83 R85 R86
5	Abschließvorrichtung in AUS-Stellung (Schaltschranktür) Locking device in OFF position (cubicle door)	PROFALUX CES IKON KIRK RONIS	3WL9111-0BA50-0AA0 3WL9111-0BA51-0AA0 3WL9111-0BA53-0AA0 3WL9111-0BA57-0AA0 3WL9111-0BA58-0AA0		R60 R61 R63 R66 R68
6	Abschließvorrichtung für Handkurbel Locking device for racking handle	CES IKON KIRK PROFALUX RONIS	3WL9111-0BA73-0AA0 3WL9111-0BA75-0AA0 3WL9111-0BA80-0AA0 3WL9111-0BA76-0AA0 3WL9111-0BA77-0AA0	S71 S73 S74 S75 S76	
7	Schlüsselbetätigung für Mechanisch AUS (Schloss mit Verriegelungsset) Key protected operation for Mechanical OFF (lock with locking set)	CES IKON	3WL9111-0BA22-0AA0 3WL9111-0BA24-0AA0	- -	- -
8	Abschließvorrichtung gegen Rücksetzen der Ausgelöst-Anzeige und Plombierbare Abdeckung der ETU: Locking device against reset trip indicator and sealable cover of the ETU: ETU15B ... ETU45B ETU76B		 3WL9111-0AT45-0AA0 3WL9111-0AT46-0AA0	-	-

[1)] Einbausatz ohne Schloss; Schloss muss separat beim Hersteller bestellt werden.
FORTRESS: Nicht mit großem T-Schlüssel (708)!

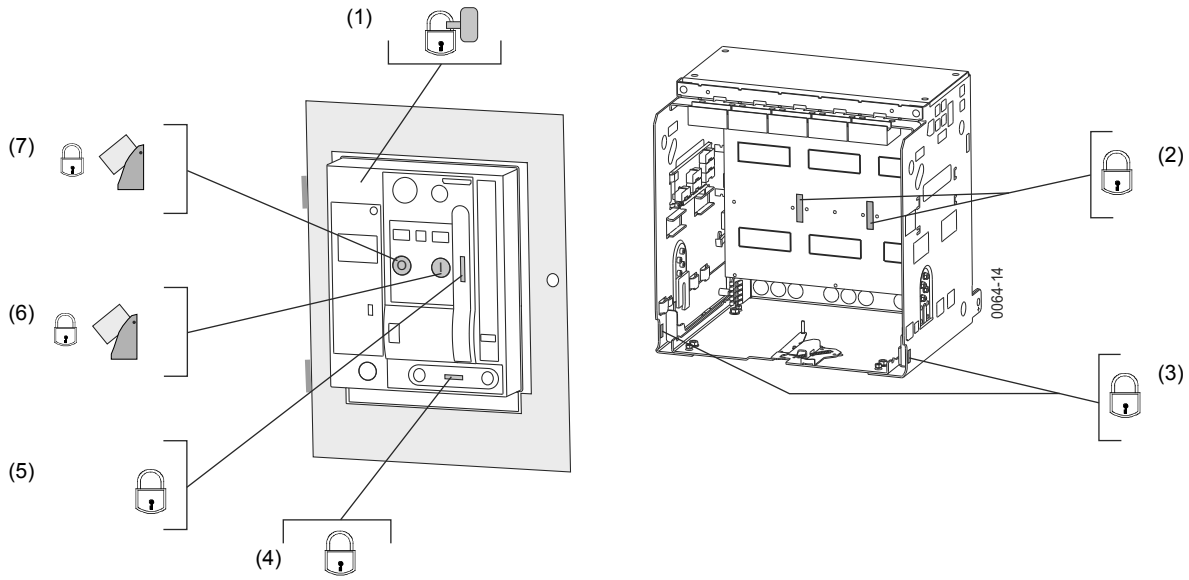
[1)] Assembly kit without lock; the lock must be ordered separately at the manufacturer's.
FORTRESS: Not to use with large T key (708)!

15.2 Vorrichtungen für Bügelschlösser

→ Sicherheitsschlösser (Seite 15-1)

15.2 Padlocking provisions

→ Safety locks (page 15-1)



	Abschließvorrichtung Locking device	Wirkung Effects
1	Verschlussbügel für „AUS“ Locking bracket for “OFF”	Der Verschlussbügel für „AUS“ kann mit bis zu 4 Bügelschlössern Ø 6 mm abgeschlossen werden. Das Einschalten des Leistungsschalters ist nicht möglich und die Trennerbedingung in AUS-Stellung wird erfüllt. → (Seite 15-22) The locking bracket for “OFF” can be locked with up to 4 padlocks Ø 0.25". The circuit breaker cannot be closed and the disconnecting condition in OFF position is fulfilled. → (page 15-22)
2	Shutter	Bei entnommenem Schalter können mit Bügelschlössern verschiedene Shutterpositionen abgeschlossen werden. → (Seite 15-24) If the circuit breaker has been taken out, the shutter can be padlocked in various positions. → (page 15-24)
3	Verfahrschienen Guide rails	Die Verfahrschienen können mit 2 Bügelschlössern abgeschlossen werden, so dass sie nicht mehr herausgezogen werden können. Das Einsetzen eines Schalters in den Einschubrahmen ist nicht möglich. → (Seite 15-25) The guide rails can be locked with 2 padlocks so that they cannot be drawn out anymore. It is not possible to insert a circuit breaker in the guide frame. → (page 15-25)
4	Handkurbel Racking handle	Das Herausziehen der Kurbel kann mit bis zu 3 Bügelschlössern verhindert werden. Der Schalter ist gegen Verfahren gesichert. → (Seite 15-25) Drawing out of the racking handle can be prevented by fitting a maximum of 3 padlocks. The circuit breaker is then locked against moving. → (page 15-25)
5	Antriebshandhebel Spring charging lever	Der Antriebshandhebel kann mit einem Bügelschloss abgeschlossen werden. Ein Spannen des Federspeichers per Hand ist nicht möglich. → (Seite 15-26) The spring charging lever can be padlocked. The storage spring then cannot be charged manually. → (page 15-26)
6	Mechanisch EIN Mechanical ON	Das Betätigen des Tasters Mechanisch EIN kann durch Abschließen der Plombierkappe mit bis zu 3 Bügelschlössern verhindert werden. Einschalten durch Taster „Elektrisch EIN“ oder Ferneinschaltung bleiben möglich. → (Seite 15-27) Operation of the mechanical ON button can be prevented by locking the sealing cap with a maximum of 3 padlocks. Closing via “electrical ON” button and remote closing are still possible. → (page 15-27)
7	Mechanisch AUS Mechanical OFF	Das Betätigen des Tasters Mechanisch AUS kann durch Abschließen der Plombierkappe mit bis zu 3 Bügelschlössern verhindert werden. Fernausschaltung bleibt möglich. → (Seite 15-27) Operation of the mechanical OFF button can be prevented by locking the sealing cap with a maximum of 3 padlocks. Remote tripping is still possible. → (page 15-27)

15.2.1 Verschlussbügel für „AUS“

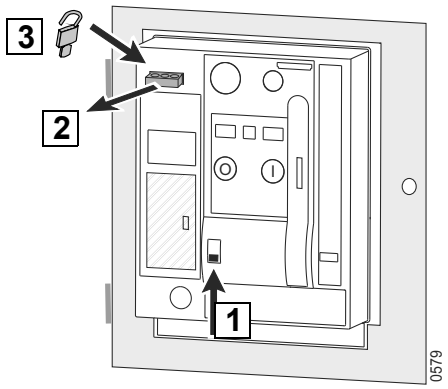
Wenn der Steuerschieber angehoben wird (Schritt 1), kann der Schlossbügel herausgezogen werden und Schlösser eingehangen werden. Mit angebrachten Schlössern kann der Schalter nicht eingeschaltet werden. Die Vorrichtung kann mit bis zu vier Schlössern mit max. 6,0 mm / 0,25" Bügeldurchmesser gleichzeitig bestückt werden.

15.2.1 Locking bracket for “OFF”

When the Control Gate is lifted (Step 1), the padlock provision can be extended, and padlocks installed. With padlocks installed, this circuit breaker cannot be closed. This provision will support up to four padlocks at a time of max. 6.0 mm / 0.25" diameter .

Abschließen

Locking



Nachrüsten

Retrofitting

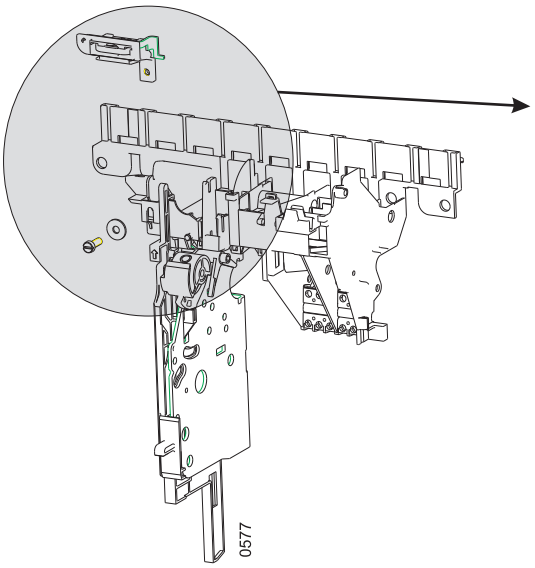
WARNUNG		WARNING
Vor dem Arbeiten an diesem Gerät, Anlage unbedingt spannungsfrei schalten sowie das Gerät erden.		**Always de-energize and ground equipment before working on this equipment.**

- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Leistungsschalter im Einschubrahmen in Wartungsposition bewegen
- Bedienpult abnehmen → (Seite 24-11)
- Steuerschieber einbauen, sofern nicht vorhanden → (Seite 15-4)

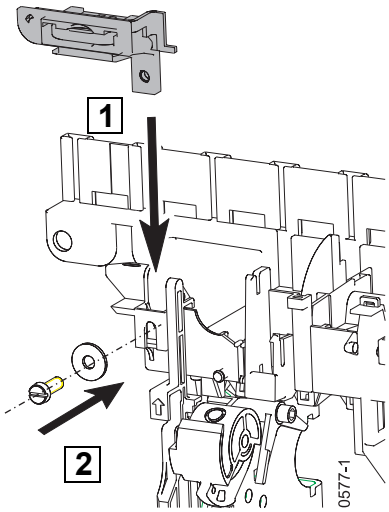
- Switch off and discharge the storage spring → (page 24-3)
- Move the circuit breaker into the maintenance position in the cradle
- Remove front panel → (page 24-11)
- Install control gate if not available → (page 15-4)

WARNUNG		WARNING
Schnell bewegte Teile **Können schwere Personenschäden verursachen.** Vor der Ausführung von Wartungs- und anderen Arbeiten am Leistungsschalter unbedingt den Federspeicher entspannen.		**High speed moving parts.** **Can cause serious personal injury.** Discharge springs before inspection or any work within the circuit breaker.

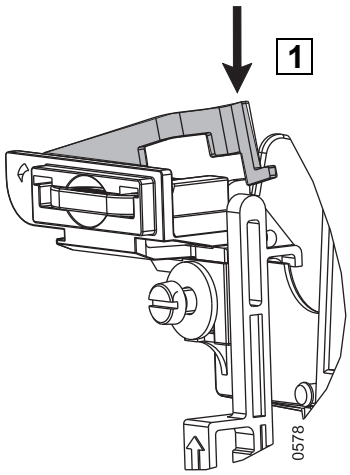
Verschlussbügel anbauen



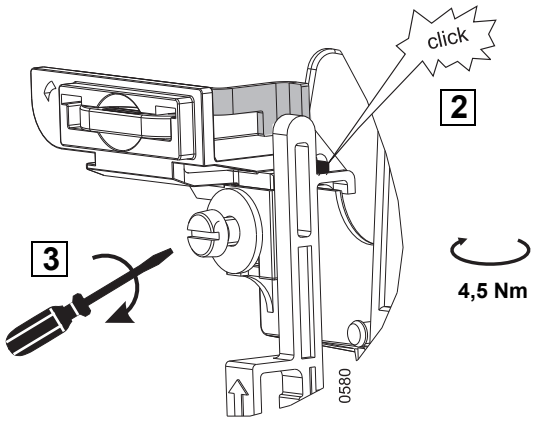
Fitting locking bracket



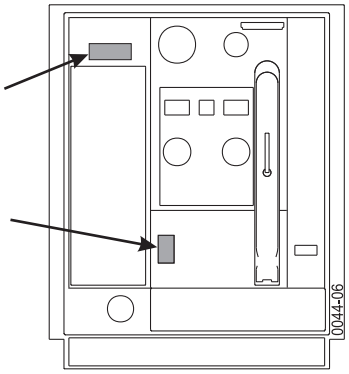
Blech in Steuerschieber einrasten



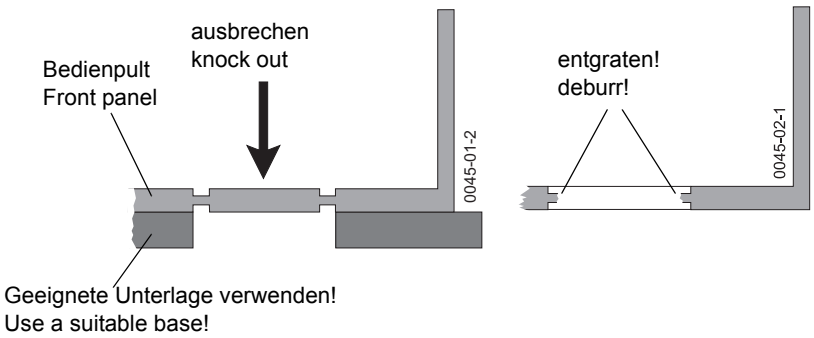
Latching plate in control gate



Feld aus Bedienpult ausbrechen



Knocking out the field on the front panel



Anschließend:

- Bedienpult anbauen → (Seite 24-25)

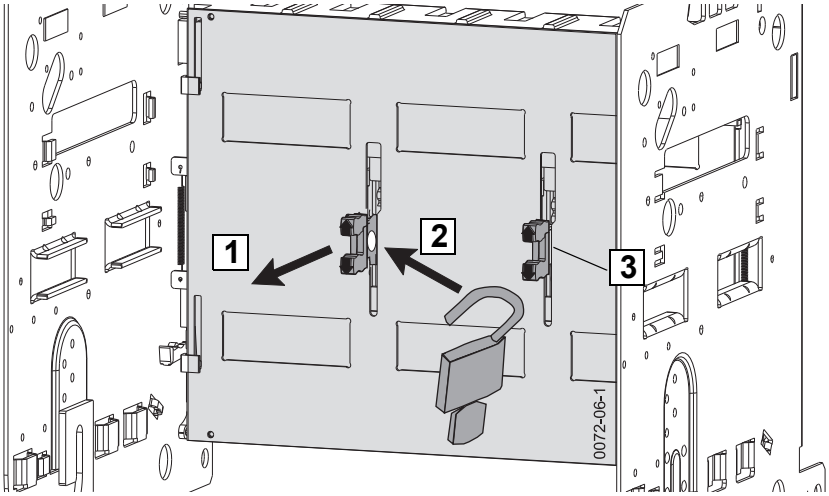
Then:

- Install front panel → (page 24-25)

15.2.2 Abschließvorrichtung Shutter

Mit Bügelschlössern lassen sich verschiedene Positionen des Shutters sichern, wie z. B.:

Shutter komplett geschlossen

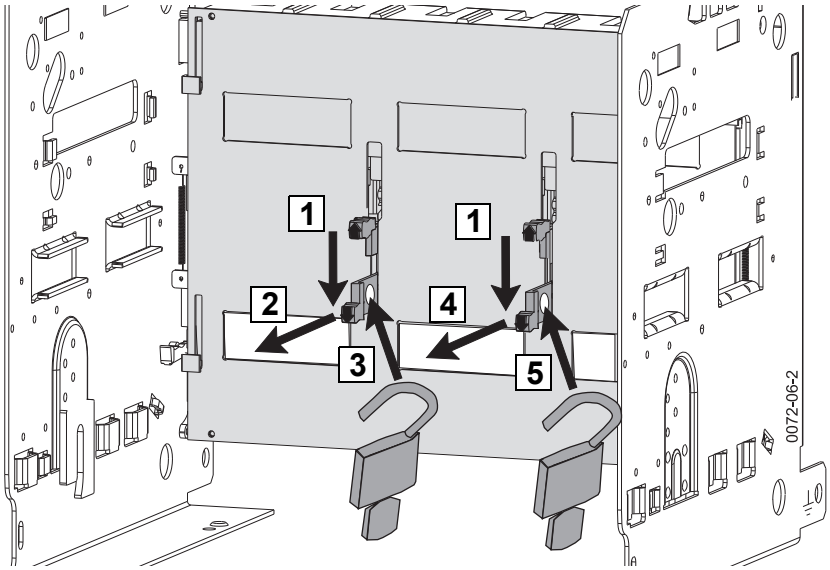


1 Streifenheberpaar vorziehen bis Langloch sichtbar

2 Schloss einhängen und abschließen

3 Mit dem zweiten Streifenheberpaar ebenso verfahren

Shutter unten geöffnet



VORSICHT	CAUTION
Vor dem Einfahren des Schalters in die Betriebsstellung die Bügelschlösser am Shutter entfernen!	Remove the padlocks at the shutter before moving the circuit breaker to the connected position!

→ Shutter nachrüsten (Seite 18-2)

15.2.2 Locking device for shutter

The shutter can be padlocked in various positions, such as e.g.:

Shutter totally closed

1 Pull both strip raisers to the front until the elongated hole is visible

2 Fit padlock and lock

3 Proceed in the same way with the other two strip raisers

Shutter below opened

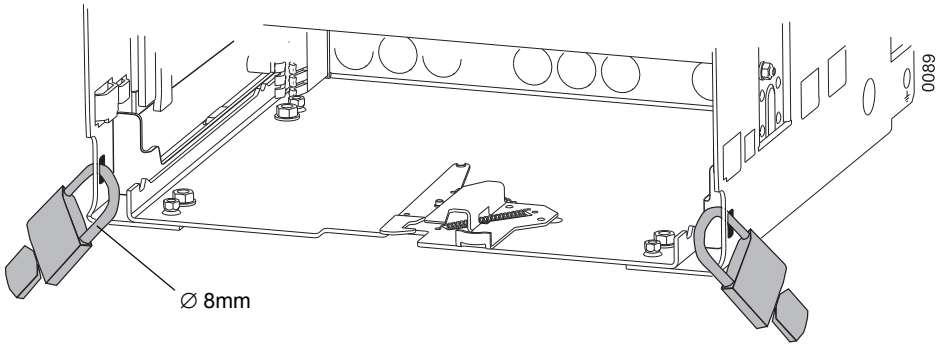
→ Retrofitting shutter (page 18-2)

15.2.3 Abschließvorrichtung Verfahrschienen

Standardmäßig vorhanden.

15.2.3 Locking device for guide rails

Available as standard.

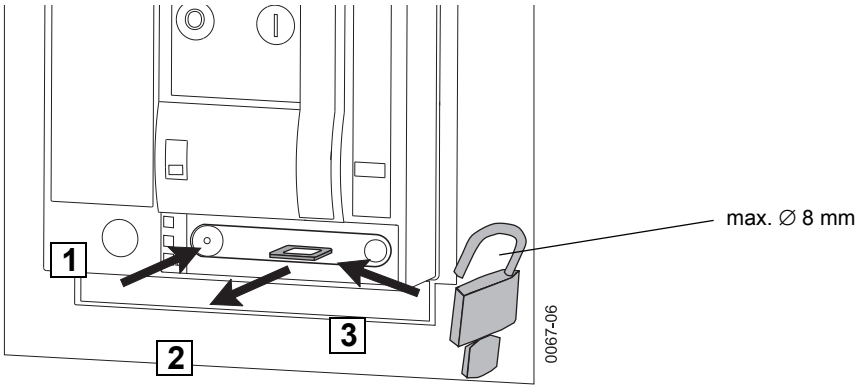


15.2.4 Abschließvorrichtung Handkurbel

Standardmäßig vorhanden.
Bis zu 3 Bügelschlösser möglich.

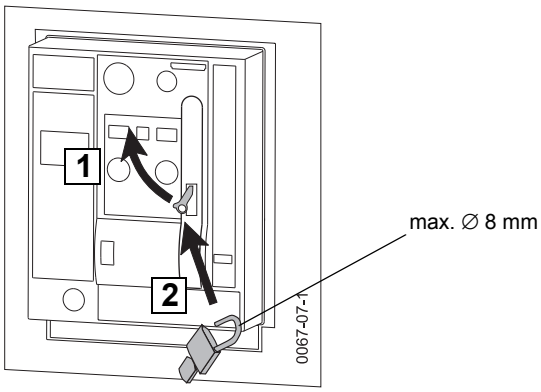
15.2.4 Locking device for racking handle

Available as standard.
Up to 3 padlocks possible.



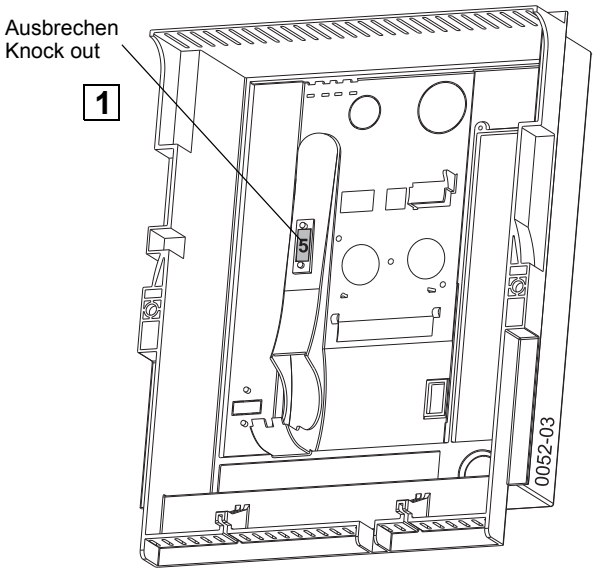
15.2.5 Abschließvorrichtung Antriebshandhebel

15.2.5 Locking device for spring charging lever



Nachrüsten

- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Leistungsschalter im Einschubrahmen in Wartungsposition bewegen → (Seite 24-4)
- Bedienpult abnehmen → (Seite 24-11)

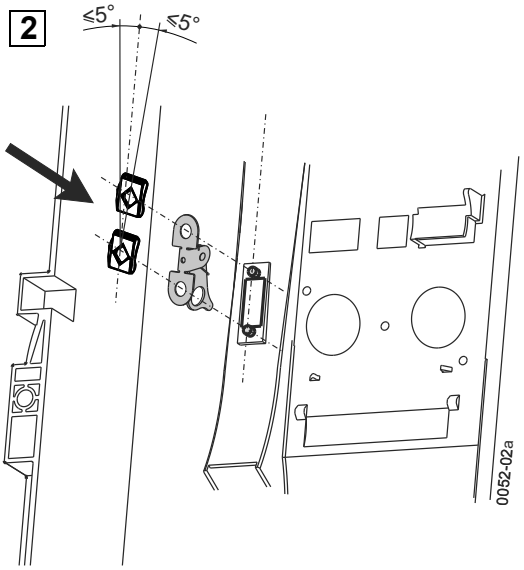


Anschließend:

- Bedienpult anbauen → (Seite 24-25)

Retrofitting

- Switch OFF and discharge the storage spring → (page 24-3)
- Move the circuit breaker into the maintenance position in the cradle → (page 24-4)
- Remove front panel → (page 24-11)



Then:

- Install front panel → (page 24-25)

15.2.6 Abschließvorrichtung für Taster Mechanisch AUS

→ folgender Absatz

15.2.7 Abschließvorrichtung für Taster Mechanisch EIN

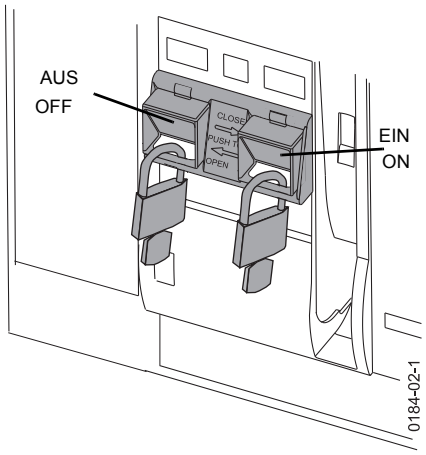
Dieses optionale Zubehör verhindert das EIN- und / oder AUS-Schalten des Leistungsschalters von Hand. Die Klappen vor den Tasten können mit bis zu drei Vorhängeschlössern versehen werden. **Mit angebrachten Vorhängeschlössern kann der Leistungsschalter immer noch elektrisch fernbetätigt EIN- und AUS-Schalten.**

15.2.6 Locking device for Mechanical OFF button

→ following passage

15.2.7 Locking device for Mechanical ON button

The manual closing and / or opening of this circuit breaker can be prevented, when this optional accessory is installed. The covers for the CLOSE button and the OPEN button will accept up to three padlocks each. **With padlocks applied, it is still possible to electrically open and close this circuit breaker.**



Plombierkappe nachrüsten

Retrofitting sealing cover

WARNUNG		**WARNING**
Vor dem Arbeiten an diesem Gerät, Anlage unbedingt spannungsfrei schalten sowie das Gerät erden.		**Always de-energize and ground equipment before working on this equipment.**

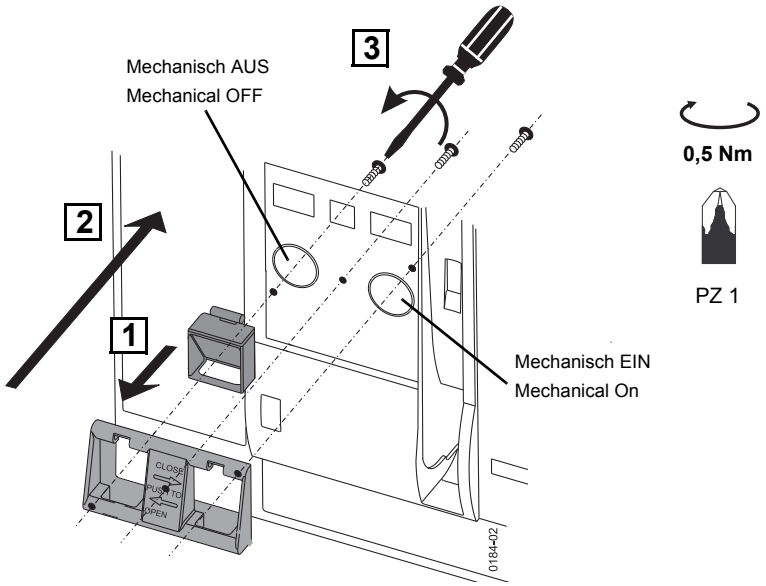
- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Leistungsschalter im Einschubrahmen in Wartungsposition bewegen
- Bedienpult abnehmen → (Seite 24-11)

Siehe auch → Verriegelungsset (Seite 15-1)

- Switch off and discharge the storage spring → (page 24-3)
- Move the circuit breaker into the maintenance position in the cradle
- Remove front panel → (page 24-11)

See also → Locking set (page 15-1)

VORSICHT	**CAUTION**
Selbstschneidende Schrauben vorsichtig anziehen!	Tighten self-tapping screws carefully!



Anschließend:

- Bedienpult anbauen → (Seite 24-25)

Then:

- Install front panel → (page 24-25)

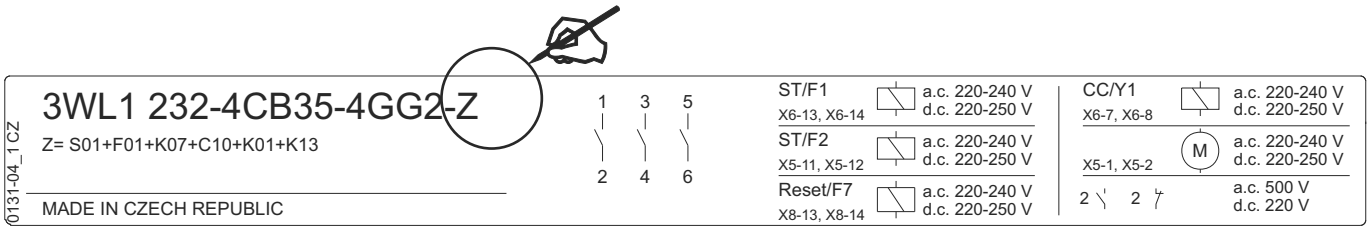
15.2.8 Schilder aktualisieren

15.2.8 Updating the labels

Hinweis	Note
Nach dem Einbau zusätzlicher Komponenten sind folgende Angaben mit einem weißen Permanentstift bzw. mit Aufklebern aus dem beiliegenden Etikettenbogen zu aktualisieren! Davor ist es ggf. notwendig die zu korrigierenden Zeichen mit einem schwarzen Permanentstift zu füllen.	After installing additional components, add the following data using a white and indelible ink pen or the appropiate label from the set of labels supplied! If necessary the signs which need to be corrected have to be filled with a black permanent pen before.

Ausstattungsschild des Leistungsschalters

Circuit Breaker options label



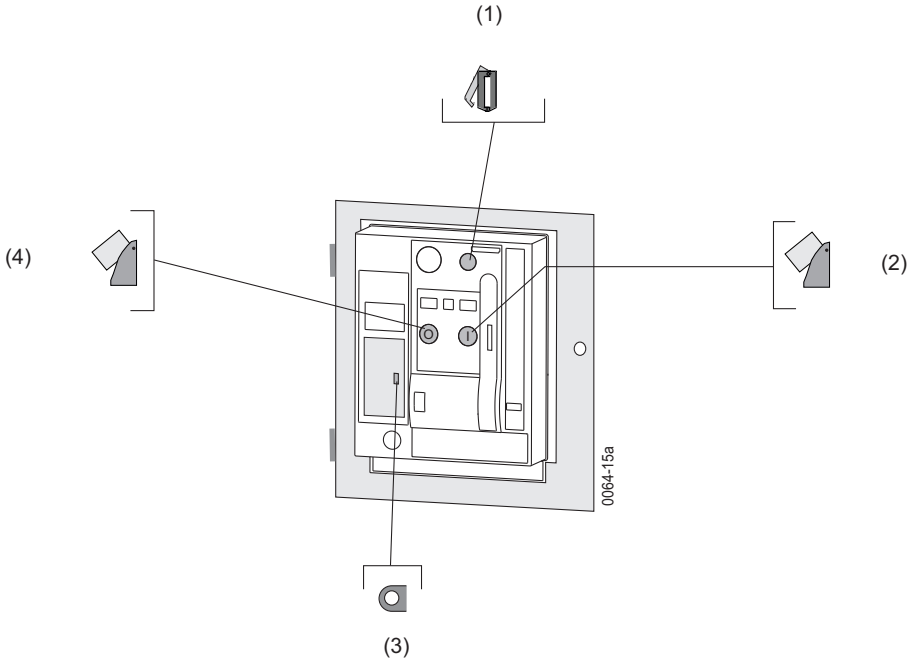
Bestellnummern / Z-Zusätze

Order numbers / Z-options

	Abschließvorrichtung Locking device	Bestell-Nr. Order no.	Z ergänzen / Add. Z	
			Schalter / Breaker	Einschubrahmen / Guide frame
1	Verschlussbügel „AUS“ (mit bis zu 4 Bügelschlössern abschließbar) Locking bracket for “OFF” (lockable with up to 4 padlocks)	3WL9111-0BA41-0AA0	S07	-
6	Abschließvorrichtung für Antriebshandhebel Locking device for spring charging lever	3WL9111-0BA71-0AA0	S33	-

16 Plombiervorrichtungen

16 Sealing facilities



(1) Plombierkappe über Taster Elektrisch EIN
(2) Klappbare Plombierkappe über Taster Mechanisch EIN
(3) Plombiervorrichtung Überstromauslöser
(4) Klappbare Plombierkappe über Taster Mechanisch AUS

Plombierkappe Elektrisch EIN

→ Elektrisch EIN nachrüsten (Seite 11-4)

Plombierkappen Mechanisch EIN und AUS

→ Plombierkappe nachrüsten (Seite 15-27)

Plombiervorrichtung Überstromauslöser

→ Plombier- und Abschließvorrichtung (Seite 9-78)

(1) Sealing cover for Electrical ON button
(2) Hinged Sealing cover for Mechanical ON button
(3) Sealing facility for overcurrent release
(4) Hinged Sealing cover for Mechanical OFF button

Sealing cap for Electrical ON

→ Installing electrical ON (page 11-4)

Sealing cover for Mechanical ON and OFF

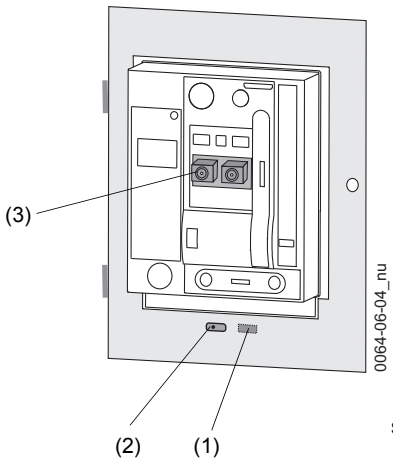
→ Retrofitting sealing cover (page 15-27)

Sealing facility for overcurrent release

→ Sealing and locking device (page 9-78)

17 Sperrvorrichtungen

17 Interlocking devices



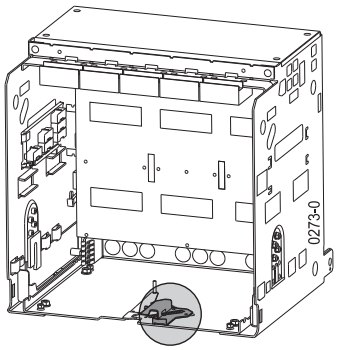
siehe Bestellhinweis, → (Seite 15-19)

refer to order instruction, → (page 15-19)

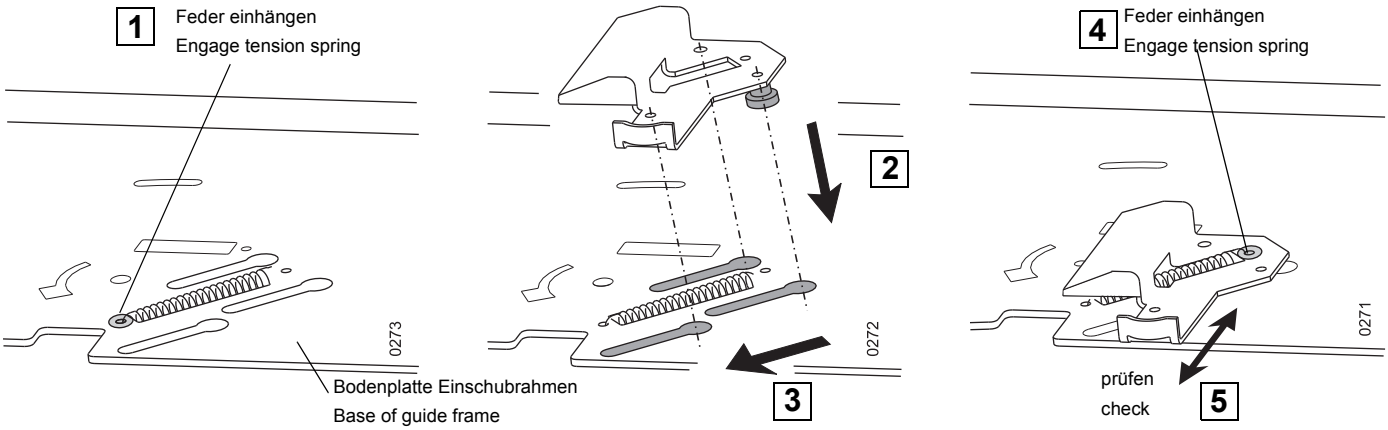
	Sperrvorrichtung **Interlock**	**Wirkung** **Effects**
1	Sperrvorrichtung gegen Verfahren bei offener Schaltschranktür für Einschubschalter Locking device to prevent racking with cubicle door open	Die Handkurbel wird bei offener Schaltschranktür blockiert und kann nicht herausgezogen werden. Ein Verfahren des Einschubschalters ist nicht möglich. Die Sperre wirkt nur auf die eingeschobene Handkurbel. → (Seite 17-2) The racking handle is blocked if the cubicle door is open and it cannot be drawn out. Racking the draw-out circuit breaker is not possible. The block only actuates on the inserted racking handle. → (page 17-2)
2	Verriegelung der Schaltschranktür Cubicle door locking mechanism	Schaltschranktür kann nicht geöffnet werden, wenn der Festeinbauschalter eingeschaltet ist (Übertragung des Sperrsignals mittels Bowdenzug) bzw. sich der Einschubschalter in der Betriebsstellung befindet. → (Seite 17-3) The cubicle door cannot be opened if the fixed-mounted circuit breaker is closed (signal transmission through bowden wire) or if the draw-out circuit breaker is in connected position. → (page 17-3)
3	Zugangssperre über Taster Mechanisch EIN und AUS (Verriegelungsset) Access block over mechanical ON and OFF button (locking set)	Taster Mechanisch EIN und AUS sind jeweils mit einer Kappe abgedeckt, die eine Betätigung nur mit einem Werkzeug zulässt. → (Seite 17-7) The mechanical ON and OFF buttons are each covered in such a way that operation is possible with a tool only. → (page 17-7)

17.1 Sperrvorrichtung gegen Verfahren bei offener Schaltschranktür

- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Schalter aus dem Einschubrahmen entnehmen → (Seite 24-4)



Einbau der Verriegelung



Funktion prüfen

- Schalter in Einschubrahmen einsetzen und in Trennstellung schieben → (Seite 6-1)
- Herausziehen der Handkurbel darf nicht möglich sein

17.1 Interlock to prevent racking with cubicle door open

- Switch off and discharge the storage spring → (page 24-3)
- Remove the breaker from the guide frame → (page 24-4)

Fitting interlocking

Function check

- Insert the circuit breaker in the guide frame and push into disconnected position → (page 6-1)
- It must not be possible to draw out the racking handle

17.2 Verriegelung der Schaltschranktür

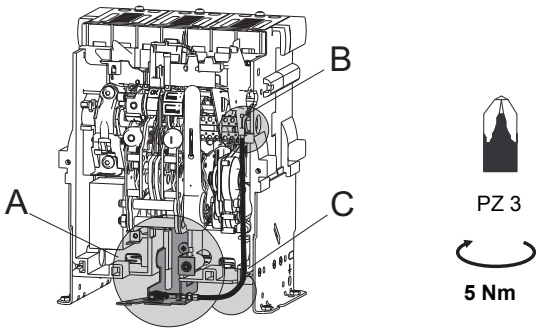
GEFAHR	
Gefährliche elektrische Spannung! **Kann Tod, schwere Personenschäden sowie Schäden an Geräten und Ausrüstung bewirken.** Vor dem Arbeiten an diesem Gerät, Anlage unbedingt spannungsfrei schalten sowie das Gerät erden. Leistungsschalter ausschalten und aus dem Einschubrahmen herausnehmen.	 

17.2.1 Riegel montieren

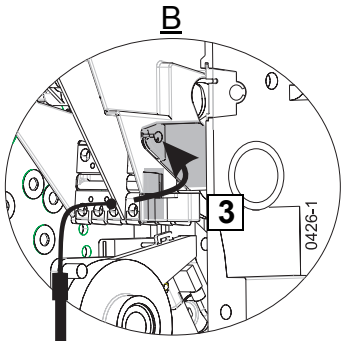
17.2.1.1 Festeinbauschalter

- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Bedienpult abnehmen → (Seite 24-11)

VORSICHT	
Selbstschneidende Schraube vorsichtig anziehen!	



(1) Selbstschneidende Schraube
(2) Bowdenzug



17.2 Cubicle door interlock

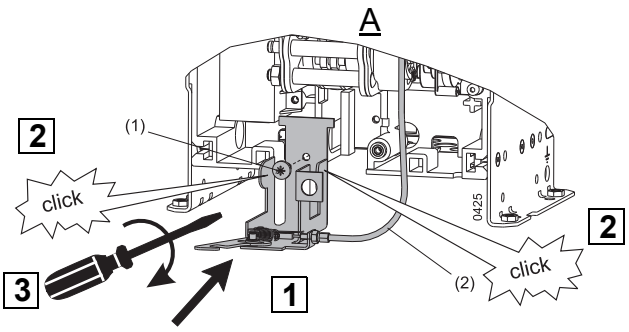
DANGER	
Hazardous voltage! **Will cause death, serious personal injury, or equipment / property damage.** Always de-energize and ground equipment before working on this equipment. Open circuit breaker, and remove from guide frame.	

17.2.1 Fit bolt

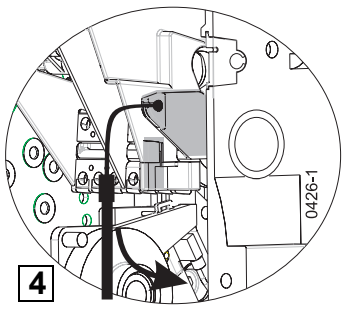
17.2.1.1 Fixed-mounted breaker

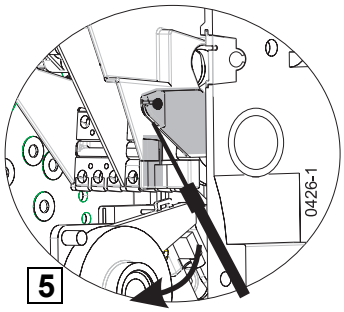
- Switch OFF and discharge the storage spring → (page 24-3)
- Remove front panel → (page 24-11)

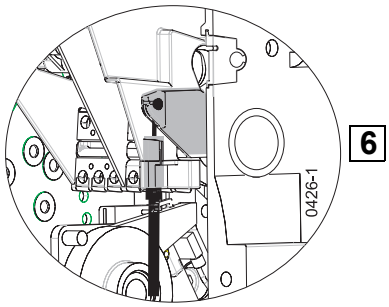
CAUTION
Tighten self-tapping screws carefully!

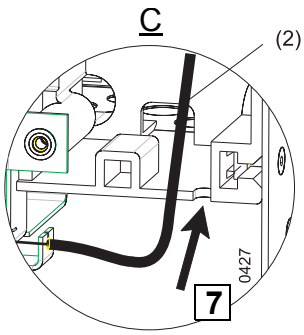


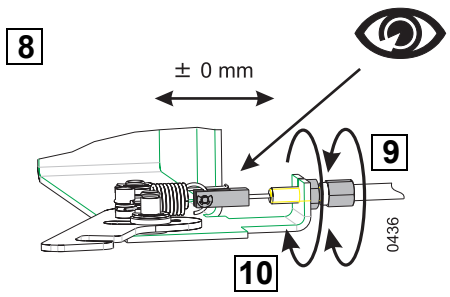
(1) Self-tapping screw
(2) Bowden wire











Einstellung des Bowdenzuges:

8 Schalter einschalten
9 Den Riegel mittels Bowdenzug-Stellschraube in die gerade Position einstellen.
10 Kontermutter am Bowdenzug anziehen.
11 Schalter ausschalten

Anschließend:

- Bedienpult anbauen → (Seite 24-25)

Adjustment of bowden wire:

8 CLOSE the breaker.
9 Adjust latching lever to straight position by adjusting the bowden wire screw.
10 Secure counter nut on bowden wire.
11 OPEN breaker

Then:

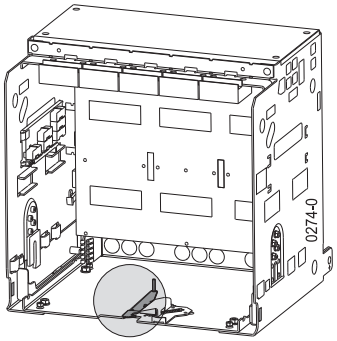
- Attach front panel → (page 24-25)

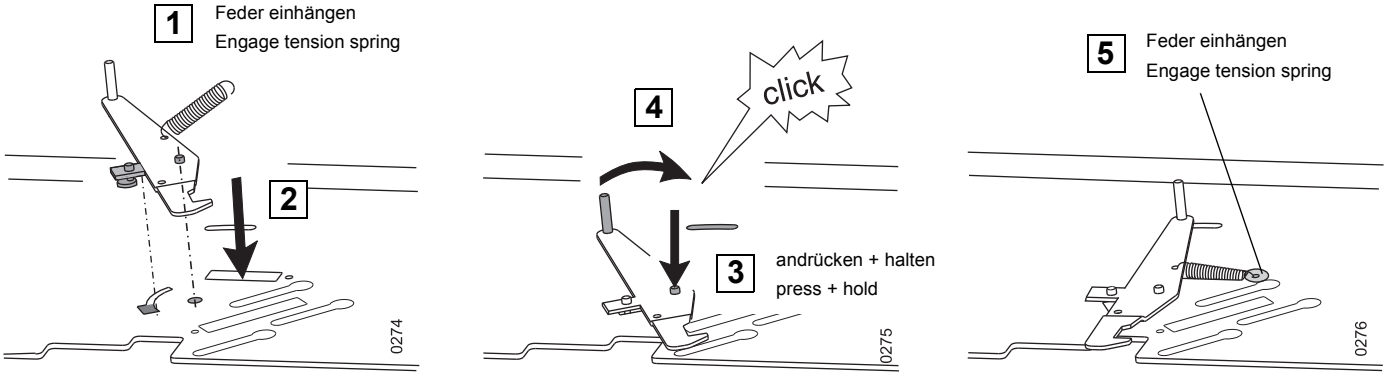
17.2.1.2 Einschubschalter

- Leistungsschalter ausschalten und Federspeicher entspannen → (Seite 24-3)
- Einschubschalter aus Einschubrahmen entnehmen → (Seite 24-4)

17.2.1.2 Draw-out circuit breaker

- OPEN the circuit breaker and discharge the storage spring → (page 24-3)
- Remove the breaker from the guide frame → (page 24-4)





Anschließend:

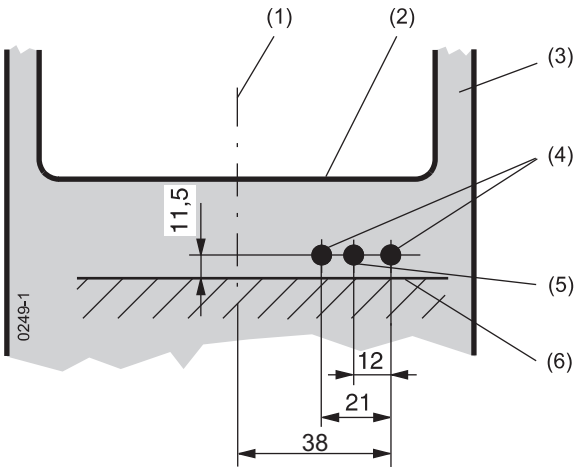
- Einschubschalter in Einschubrahmen einsetzen, in Trennstellung schieben → (Seite 6-1)

Then:

- Insert the draw-out circuit breaker into the guide frame, push into disconnected position → (page 6-1)

17.2.2 Schaltschranktür bohren

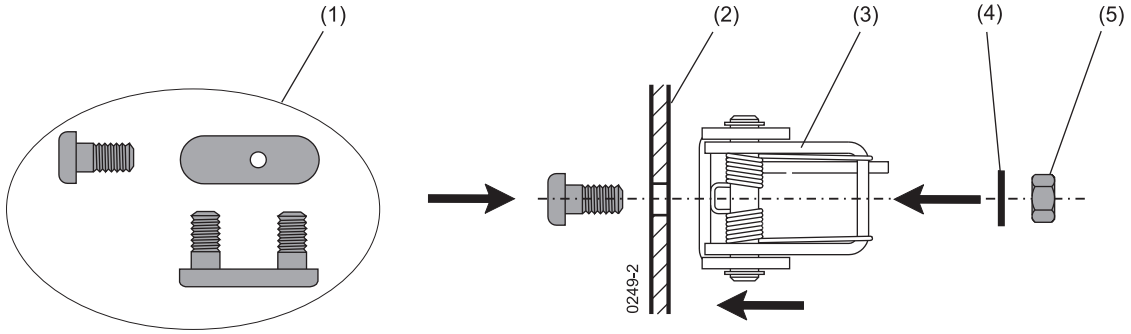
17.2.2 Cubicle door interlock drill pattern



(1) Mitte Bedienpult
(2) Türausschnitt für Bedienpult
(3) Innenseite Schaltschranktür
(4) 2 Befestigungsbohrungen Ø 5,5 mm
(5) Öffnung zum Überlisten Ø 5,5 mm
(6) Montagefläche

(1) Centre of front panel
(2) Door cutout for front panel
(3) Inner side of cubicle door
(4) 2 mounting holes Ø 5.5 mm
(5) Hole for outwitting Ø 5.5 mm
(6) Mounting surface

17.2.3 Falle an Schaltschranktür montieren



(1) Klammer mit Öffnung zum Überlisten
(2) Innenseite Schaltschranktür
(3) Falle
(4) 2 Scheiben ISO7089 - 5
(5) 2 Sechskantmuttern M5 (DIN EN ISO 4032)

17.2.4 Funktionskontrolle

Festeinbauschalter:

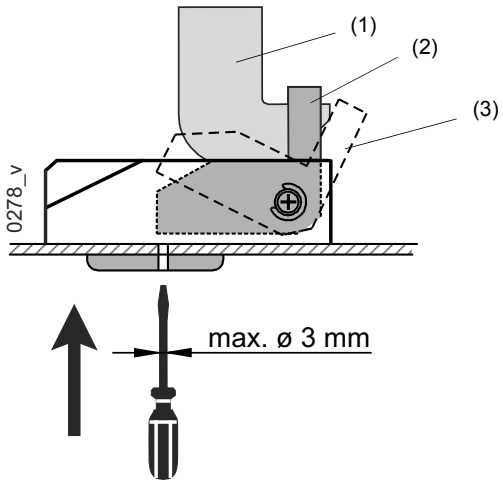
- Schaltschranktür schließen
- Federspeicher spannen
- Einschalten

Einschubschalter:

- Schalter in Betriebsstellung verfahren
- Schaltschranktür schließen

Tür muss jetzt verriegelt sein.

Prüfen der „Überlistungsmöglichkeit“:



(1) Riegelstellung bei eingeschaltetem Schalter
(2) Falle in Normallage
(3) Falle im überlisteten Zustand

Anschließend:

- Festeinbauschalter:
  Federspeicher entspannen → (Seite 24-3)

17.2.3 Installing catch on cubicle door

(1) Clip with hole for outwitting
(2) Inner side of cubicle door
(3) Catch
(4) 2 washers ISO7089 - 5
(5) 2 Hexagonal nuts M5 (DIN EN ISO 4032)

17.2.4 Function check

Fixed-mounted circuit breaker:

- Close cubicle door
- Charge the spring storage
- Close

Draw-out circuit breaker

- Rack the circuit breaker into connected position
- Close the cubicle door

The door must be locked now.

Checking the outwitting function:

(1) Lock position with circuit breaker closed
(2) Trap in normal position
(3) Trap in bypassed position

Then:

- Fixed-mounted circuit breaker:
  discharge the spring storage → (page 24-3)

17.3 Zugangssperre über Taster Mechanisch EIN und AUS nachrüsten

(Werkzeugbetätigung)

Diese Sperre begrenzt den Zugang zu den manuellen EIN und / oder AUS-Tasten des Leistungsschalters. Die Sperre erlaubt nur Zugang zu den Tasten mittels eines Dornes (3 mm bzw. 1/8" Durchmesser).

17.3 Retrofitting access block over mechanical ON and OFF button

(Tool operation)

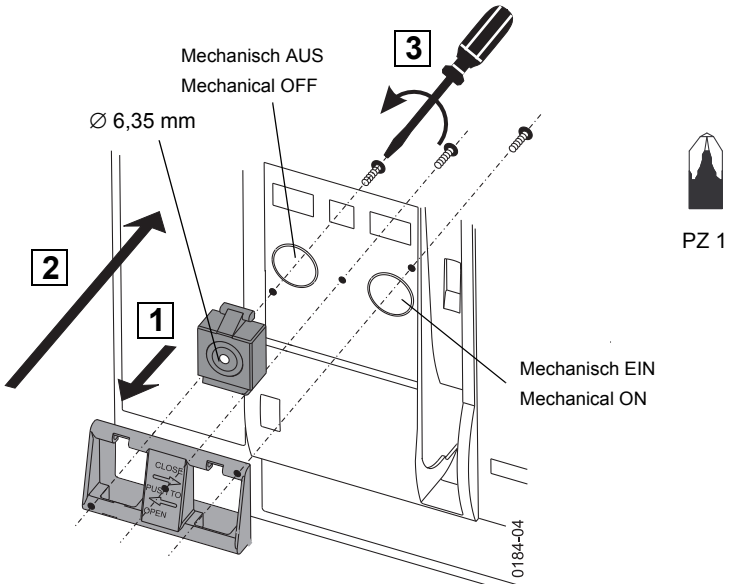
This interlock limits the access to the manual CLOSE and / or OPEN buttons on the circuit breaker. The blocking device only allows access to the manual CLOSE and / or OPEN buttons via a small tool (1/8" resp. 3 mm diameter rod).

WARNUNG		**WARNING**
Vor dem Arbeiten an diesem Gerät, Anlage unbedingt spannungsfrei schalten sowie das Gerät erden.		**Always de-energize and ground equipment before working on this equipment.**

- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Bedienpult abnehmen → (Seite 24-11)

- Switch OFF and discharge the spring storage → (page 24-3)
- Remove front panel → (page 24-11)

VORSICHT	**CAUTION**
Selbstschneidende Schrauben vorsichtig anziehen!	Tighten self-tapping screws carefully!



Anschließend:

- Bedienpult anbauen → (Seite 24-25)

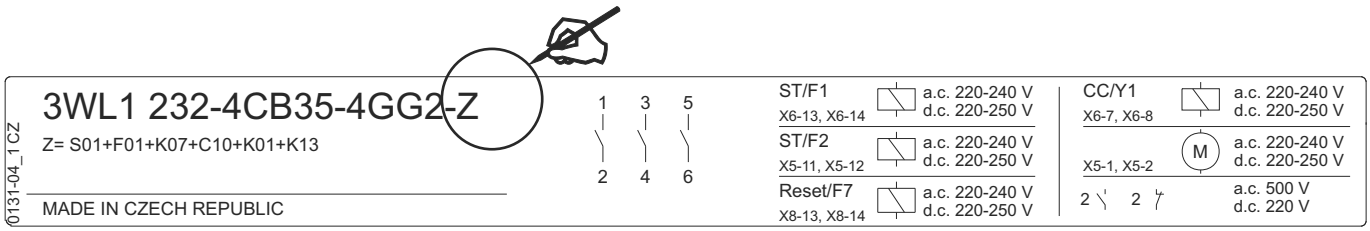
Then:

- Fit front panel → (page 24-25)

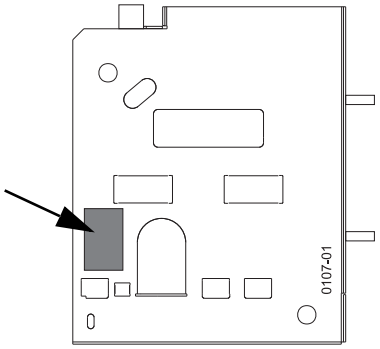
17.4 Schilder aktualisieren

Hinweis
Nach dem Einbau zusätzlicher Komponenten sind folgende Angaben mit einem weißen Permanentstift bzw. mit Aufklebern aus dem beiliegenden Etikettenbogen zu aktualisieren! Davor ist es ggf. notwendig die zu korrigierenden Zeichen mit einem schwarzen Permanentstift zu füllen.

17.4.1 Ausstattungsschild des Leistungsschalters



17.4.2 Typschild Einschubrahmen



Kennzeichen „weitere Optionen“
Supplement „further options“



17.4.3 Bestellnummern / Z-Zusätze

	Sperrvorrichtung / Interlock	Bestellnummern / Order numbers	Z ergänzen / Add. Z	
			Schalter / Breaker	Einschubrahmen / Guide frame
1	Sperrvorrichtung für Einschubschalter gegen Verfahren bei offener Schaltschranktür Locking device to prevent racking with cubicle door open	3WL9111-0BB15-0AA0	-	R50
2	Türverriegelung für Festeinbauschalter Door locking mechanism for fixed-mounted breaker	3WL9111-0BB12-0AA0	S30	-
3	Türverriegelung für Einschubrahmen Door locking mechanism for guide frame	3WL9111-0BB13-0AA0	-	R30
4	Zugangssperre über Taster Mechanisch EIN und AUS (Verriegelungsset) Access block over mechanical CLOSE and OPEN button (locking set)	3WL9111-0BA21-0AA0	-	-

17.4 Updating the labels

Note
After installing additional components, add the following data using a white and indelible ink pen or the appropiate label from the set of labels supplied! If necessary the signs which need to be corrected have to be filled with a black permanent pen before.

17.4.1 Circuit Breaker options label

17.4.2 Type label guide frame

17.4.3 Order numbers / Z-options

18 Zubehör für Einschubrahmen

GEFAHR

Gefährliche elektrische Spannung!

Kann Tod, schwere Personenschäden sowie Schäden an Geräten und Ausrüstung bewirken.

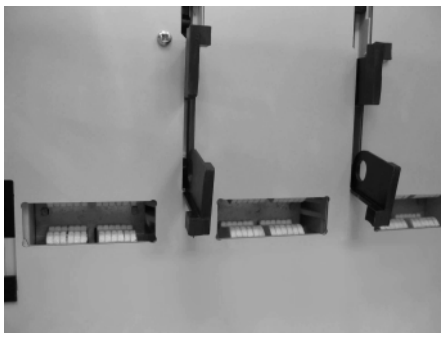
Vor dem Arbeiten an diesem Gerät, Anlage unbedingt spannungsfrei schalten.



Hinweis

Vor dem Einsetzen des Leistungsschalters in den Einschubrahmen müssen die Fenster des Shutters geschlossen sein und die schwarzen Plastik-Streifenheber sich in der Mittelposition befinden, um eine Beschädigung des Shutters zu verhindern und eine sichere Funktion zu gewährleisten

1



1 Für Servicezwecke können die Fenster des Shutters durch die schwarzen Streifenheber geöffnet und fixiert werden.
2 Durch leichtes Betätigen (Drücken) der Streifenheber springen diese in die Grundstellung zurück und schließen die Fenster des Shutters.

18.1 Shutter

Die Verschlussstreifen des Shutters verschließen die Lamellenkontakte des Einschubrahmens, sobald der Einschubschalter in die Position „TEST“ verfahren wurde. Damit wird die Trennerbedingung bereits in der Position „TEST“ erfüllt.

Mit den Streifenhebern können die Verschlussstreifen manuell geöffnet werden.

Die Lage der Streifenheber lässt sich mit Bügelschlössern in verschiedenen Positionen fest fixieren und gegen unbefugtes Verändern sichern. → (Seite 15-24)

18 Options for guide frame

DANGER

Hazardous voltage!

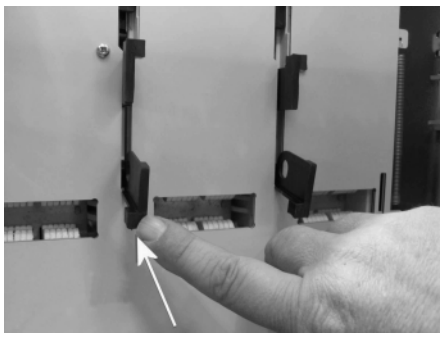
Will cause death, serious personal injury, or equipment / property damage.

Disconnect power before working on this equipment.

Note

Before the breaker will be inserted in the guide frame, the shutter windows must be closed and the black plastic stripe lifters must be in the middle position as shown, to prevent shutter damage and to ensure proper shutter operation.

2



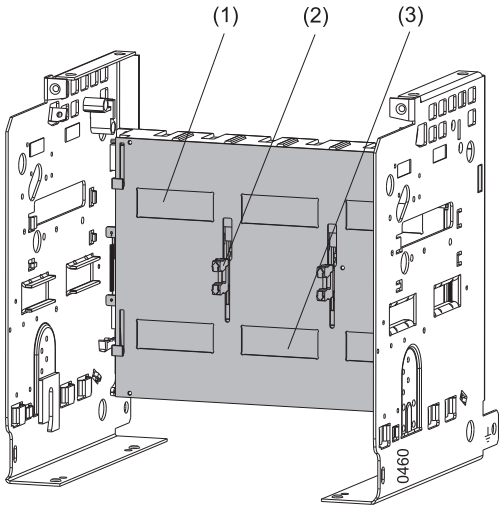
1 The shutter windows can be opened and fixed by the black plastic stripe lifters.
2 The black plastic stripe lifters will move back into the initial position and will close the shutter window by slight pushing on the black plastic stripe lifters as shown.

18.1 Shutter

The shutter locking straps lock the finger contacts of the guide frame as soon as the draw-out circuit breaker is taken in the “TEST” position. So the isolating condition is fulfilled in the “TEST” position.

The locking straps can be lifted manually with the strap lifters.

The strap lifters can be fixed in several positions by means of padlocks and secured against unauthorised changes.
→ (page 15-24)



(1) Verschlussstreifen oben
(2) 4 Streifenheber
(3) Verschlussstreifen unten

(1) Upper locking strap
(2) 4 strap lifters
(3) Lower locking strap

18.1.1 Nachrüsten

WARNUNG

Vor dem Arbeiten an diesem Gerät, Anlage unbedingt spannungsfrei schalten sowie das Gerät erden.

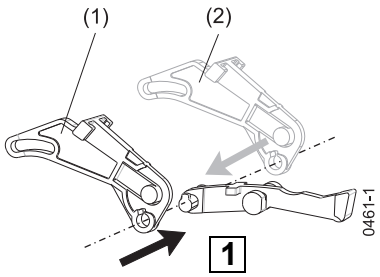


WARNING

Always de-energize and ground equipment before working on this equipment.

- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Einschubschalter aus Einschubrahmen entnehmen → (Seite 24-4)

Betätiger zusammenbauen und mit Feder komplettieren

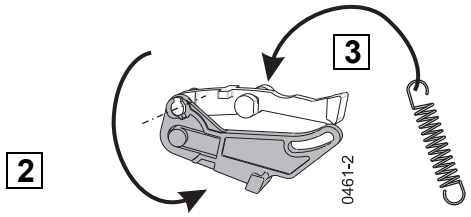


(1) Zusammenbau für rechte Seite
(2) Zusammenbau für linke Seite

18.1.1 Retrofitting

- Switch off and discharge the storage spring → (page 24-3)
- Remove the breaker from the guide frame → (page 24-4)

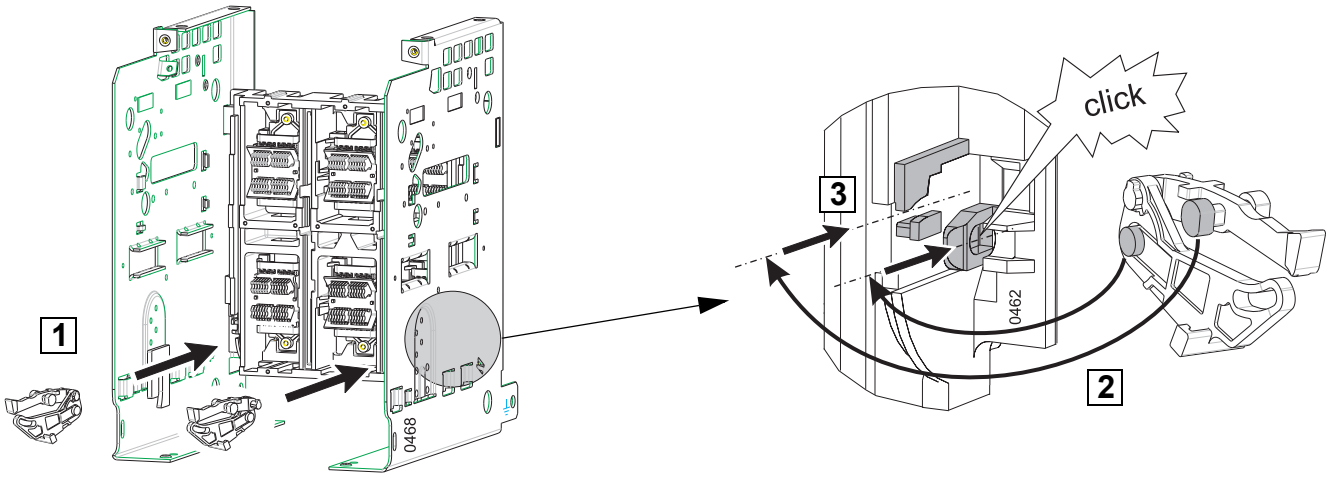
Assembling actuator and completing with spring



(1) Assembly for right-hand side
(2) Assembly for left-hand side

Betätiger einsetzen

Inserting actuator



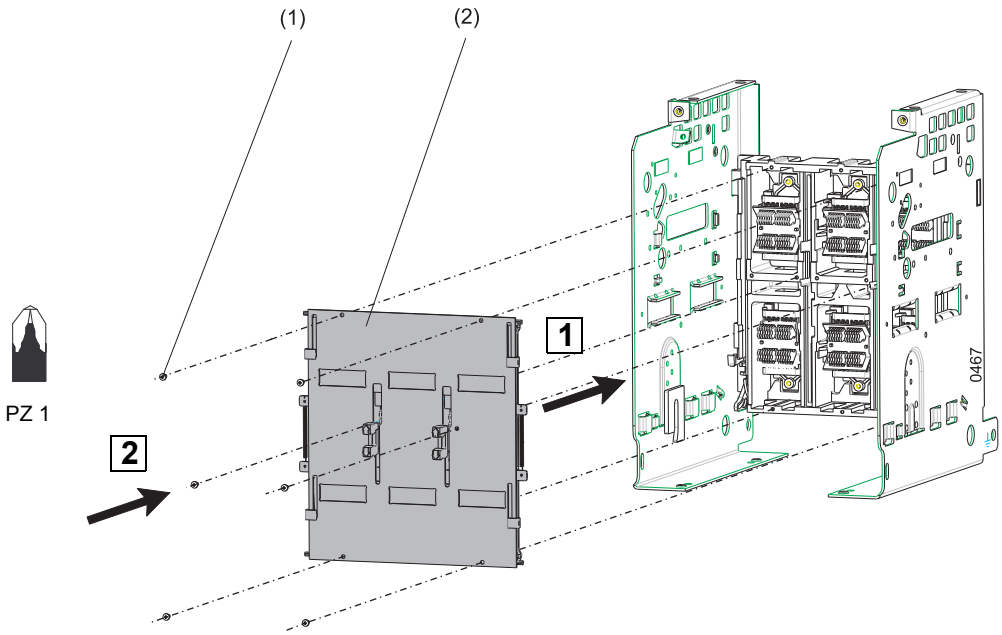
Shutter anbauen

Fitting shutter

Nur für Baugröße I und II

Frame size I and II only

VORSICHT	CAUTION
Selbstschneidende Schrauben vorsichtig anziehen!	Tighten self-tapping screws carefully!



(1) Selbstschneidende Schrauben (Anzahl abhängig von Schalterausführung)

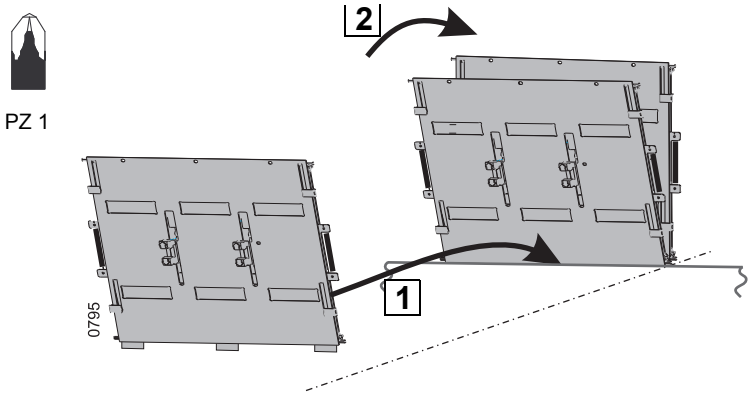
(2) Shutter mit Streifenhebern und Verschlussstreifen

(1) Tighten self-tapping screws (number according to circuit breaker version)

(2) Shutter with strap lifters and locking straps

Nur für Baugröße III:

Frame size III only:



1 Shutter schräg in die Schlitze der unteren Traverse einsetzen

2 Shutter an die Rückwand klappen und mit 5 oder 7 Plastite - Schrauben entsprechend 3- oder 4-poliger Ausführung befestigen

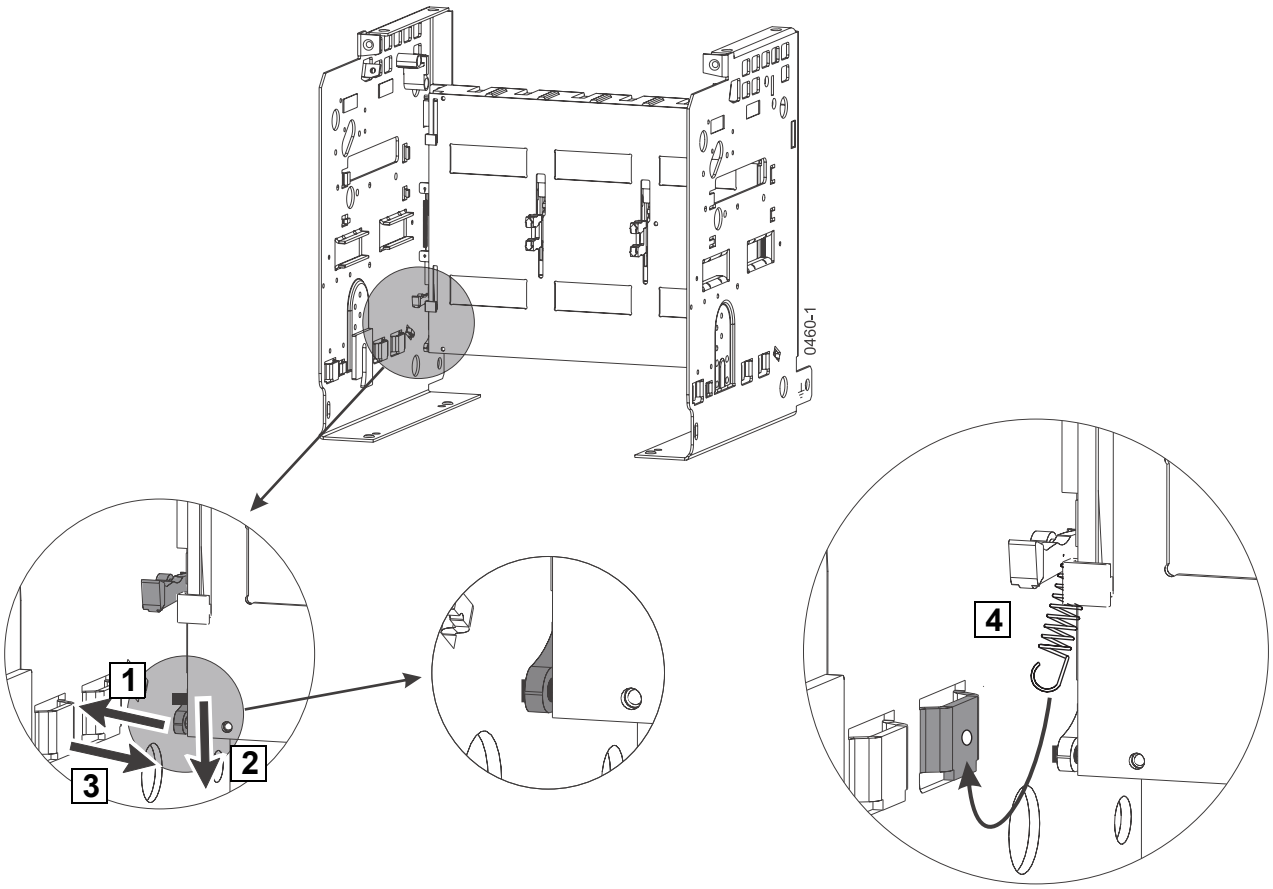
1 Insert shutter plate in the lower slot of sheet metal traverse

2 Turn up shutter plate against rear wall and fasten with self-tapping srews, 5 screws for 3-pol version and 7 screws for 4-pol. version

Hinweis	**Note**
Für den nächsten Arbeitsschritt, Shutter in Betätiger einrasten, kann es vorteilhaft sein, die unteren Schrauben erst nach dem Einrasten einzuschrauben.	For the next step - latching the shutter in the actuator - it may be advantageous to fit the lower screws after latching.

Shutter in Betätiger einrasten und Feder einhängen

Latching shutter in actuator and fitting spring



Wenn nötig verbleibende untere Schrauben einschrauben.

If applicable fit the remaining screws in the lower row.

Hinweis	Note
Sicher stellen, dass Verschlussstreifen nicht klemmen! Dazu nach dem Einbau Verschlussstreifen oben und unten einmal öffnen.	Assure proper operation by moving each locking strap independently.

Anschließend:

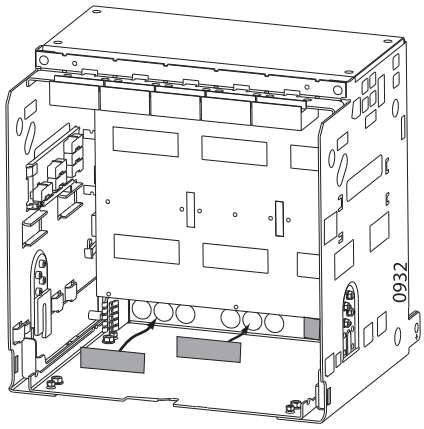
- Schalter in Einschubrahmen einsetzen und in Betriebsstellung verfahren → (Seite 6-1)
- Zugangslöcher verschließen

Zugangslöcher zum Anschließen der frontseitigen Hauptstrombahnen können mit beiliegenden Klebepads verschlossen werden.

Then:

- Insert the circuit breaker in the guide frame and rack into connected position → (page 6-1)
- Closing the access holes

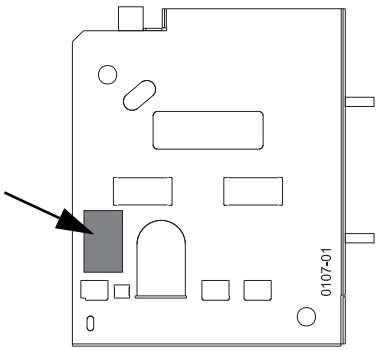
Access holes can be closed after bolting the line side bars by using the enclosed adhesive tapes.



18.1.2 Typschild aktualisieren

18.1.2 Updating the type label

Hinweis	Note
Nach dem Einbau zusätzlicher Komponenten sind folgende Angaben mit einem weißen Permanentstift bzw. mit Aufklebern aus dem beiliegenden Etikettenbogen zu aktualisieren! Davor ist es ggf. notwendig die zu korrigierenden Zeichen mit einem schwarzen Permanentstift zu füllen.	After installing additional components, add the following data using a white and indelible ink pen or the appropiate label from the set of labels supplied! If necessary the signs which need to be corrected have to be filled with a black permanent pen before.



Kennzeichen „weitere Optionen“
Supplement „further options“



18.1.3 Bestellnummer / Z-Zusatz

18.1.3 Order number / Z-option

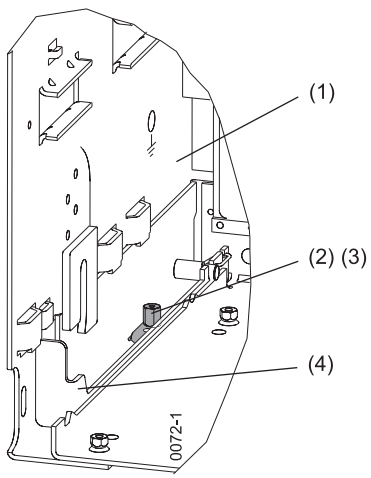
	Polzahl Pole number	Baugröße Frame size		Bestell-Nummer Order number	Z ergänzen Add. Z
Shutter	3	I		3WL9111-0AP04-0AA0	R21
		II		3WL9111-0AP06-0AA0	
			nur für Schaltvermögen C breaking capacity C only	3WL9111-0AP43-0AA0	
		III		3WL9111-0AP07-0AA0	
	4	I		3WL9111-0AP08-0AA0	
		II		3WL9111-0AP11-0AA0	
			nur für Schaltvermögen C breaking capacity C only	3WL9111-0AP44-0AA0	
		III		3WL9111-0AP12-0AA0	

18.2 Kodierung Schalter - Einschubrahmen

18.2.1 Bemessungsstromkodierung

Einschubschalter und Einschubrahmen sind standardmäßig mit einer Bemessungsstromkodierung ausgestattet.

Diese stellt sicher, dass in einen Einschubrahmen nur solche Schalter eingesetzt werden können, deren Kontaktmesser zu den Lamellenkontakten des Einschubrahmens passen.



(1) Einschubrahmen, linke Innenseite; rechte Innenseite analog
(2) Kodierbolzen an der Verfahrschiene im Einschubrahmen
(3) Selbstschneidende Schraube M5 x 12
(4) Verfahrschiene
(5) Einschubschalter, rechte Seite; linke Seite analog;
(6) Kodierbolzen am Einschubschalter
(7) Selbstschneidende Schraube M4 x 16

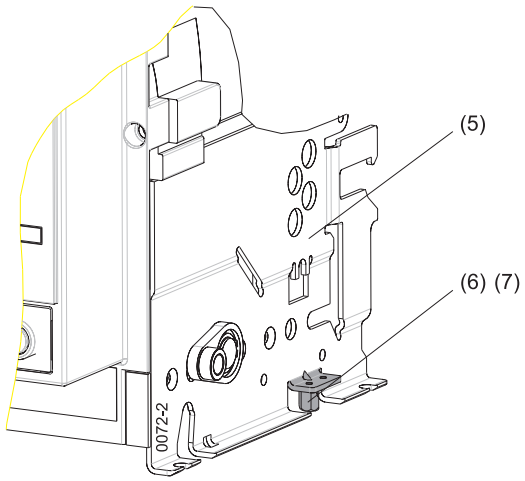
Bei Bestellung eines Einschubschalters mit Einschubrahmen ist die Bemessungsstromkodierung bereits werksseitig eingerichtet. Soll die Umrüstung eines Festeinbauschalters in einen Einschubschalter erfolgen, muss die Bemessungsstromkodierung nachgerüstet werden.

18.2 Coding between circuit breaker and guide frame

18.2.1 Rating current coding

Draw-out circuit breakers and guide frames are equipped with a current coding as standard.

This coding ensures that only those circuit breakers can be inserted in the guide frame whose contact blades fit into the finger contacts of the guide frame.



(1) Guide frame, left inner side, right inner side analogous
(2) Coding bolt on the guide rail in the guide frame
(3) Self-tapping screw M5 x 12
(4) Guide rail
(5) Draw-out circuit breaker, right side; left side analogous;
(6) Coding bolt at the draw-out circuit breaker
(7) Self-tapping screw M4 x 16

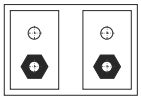
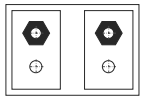
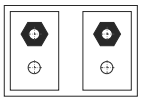
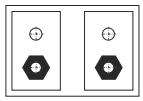
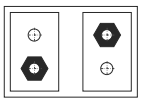
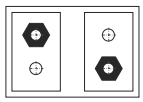
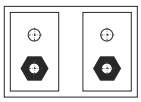
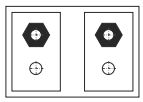
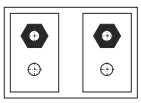
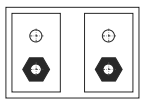
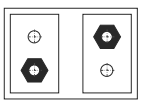
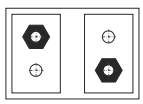
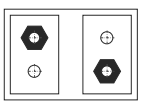
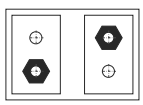
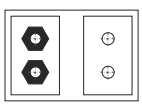
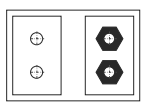
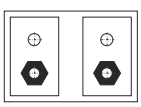
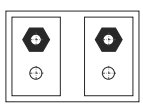
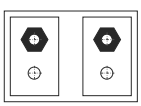
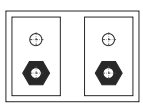
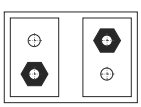
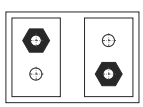
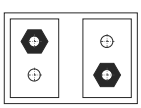
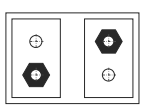
When a draw-out circuit breaker is ordered with the guide frame, the rating current coding is already provided at the factory. If a fixed-mounted circuit breaker has to be converted into a draw-out circuit breaker, the rating current coding must be retrofitted.

Bemessungsstromkodierung nachrüsten

Die Kodierbolzen sind an den Schalterfüßen und an den Verfahrschienen nach folgendem Schema anzubringen:

Retrofitting the rating current coding

Mount the coding bolts at the circuit breaker feet and at the guide rails according to the following scheme:

Baugröße Frame size	Bemessungsstrom Rating current	Kodierung / Coding			
		Schalter Breaker		Einschubrahmen Frame guide	
		links left	rechts right	links left	rechts right
I	1000 A				
	1600 A				
	2000 A Schaltvermögen H / breaking capacity H				
II	2000 A				
	2500 A				
	3200 A				
	4000 A				
	Schaltvermögen C / breaking capacity C				
III	4000 A				
	5000 A				
	6300 A				
	Schaltvermögen C / breaking capacity C				

18.2.2 Ausstattungsabhängige Kodierung

Einschubschalter und Einschubrahmen können nachträglich mit einer ausstattungsabhängigen Kodierung ausgerüstet werden.

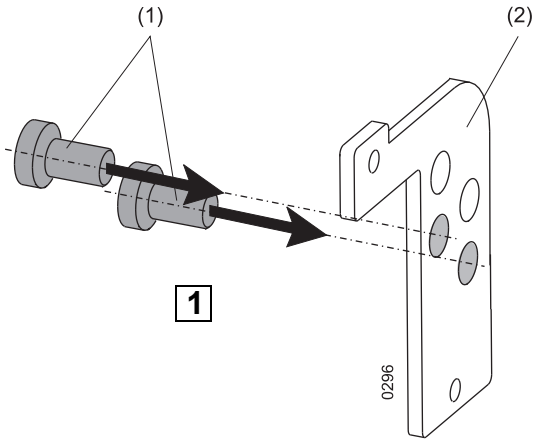
Damit lassen sich Schalter und Einschubrahmen unter Berücksichtigung unterschiedlicher Ausstattungen unverwechselbar zuordnen. Sind Schalter und Einschubrahmen unterschiedlich kodiert, ist das Einfahren des Schalters nicht möglich.

Es gibt 36 wählbare Kodiermöglichkeiten.

Vor dem Einbau:

- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Einschubschalter aus Einschubrahmen entnehmen → (Seite 24-4)

18.2.2.1 Kodierung am Schalter anbringen



(1) Kodierstift
(2) Kodierplatte
(3) Innensechskantschraube M5 mit Spannscheibe und Mutter
(4) Senkkopfschraube M5 mit Vierkantmutter

Für Baugröße III:

- Kodierplatte horizontal gespiegelt montieren
- Zum Befestigen werden nur die beiden Schrauben ohne Muttern und Scheibe benötigt

18.2.2 Option-related coding

Draw-out circuit breakers and guide frames can be retrofitted with a version-related coding.

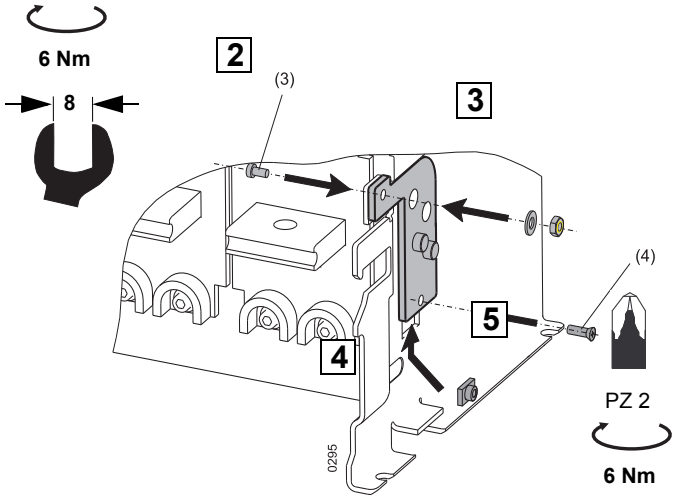
In this way, the circuit breaker and the guide frame can be assigned to each other unmistakably considering different equipment. If the circuit breaker and the guide frame have a different coding, it will not be possible to rack in the circuit breaker.

There are 36 selectable coding possibilities.

Before installation:

- Switch off and discharge the storage spring → (page 24-3)
- Remove the breaker from the guide frame → (page 24-4)

18.2.2.1 Fitting coding on circuit breaker

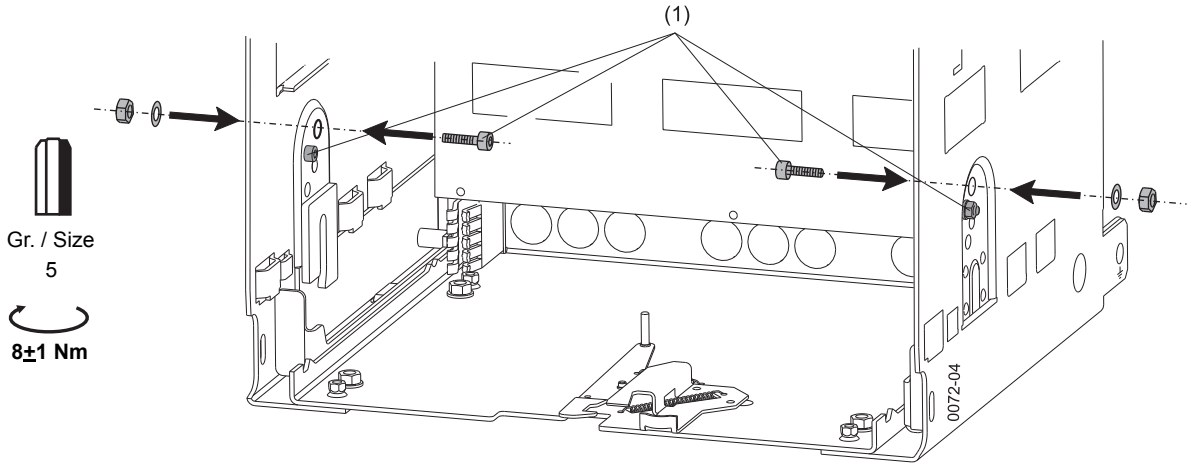


(1) Coding pin
(2) Coding plate
(3) Hexagon socket-head screw M5 with conical spring washer and nut
(4) Countersunk-head bolt M5 with square nut

For frame size III:

- Mount coding plate in horizontally mirrored position
- For fixing, only the two bolts are required without nuts and washer

18.2.2.2 Kodierung am Einschubrahmen anbringen



(1) Max. 4 x Innensechskantschraube M6 mit Spannscheibe und Mutter als Kodierelement

Anschließend:

- Schalter in Einschubrahmen einsetzen und in Betriebsstellung verfahren → (Seite 6-1)

18.2.3 Bestellnummer

Ausstattungsabhängige Kodierung für Option-related coding for	Bestellnummer Order number
BG I / BG II FS I / FS II	3WL9111-0AR12-0AA0
BG III FS III	3WL9111-0AR13-0AA0

Auf den folgenden Seiten kann die Zuordnung von Kodierung und Verwendungszweck festgehalten werden.

18.2.2.2 Fitting coding on guide frame

(1) Max. 4 x Hexagon socket-head screw M6 with conical spring washer and nut as coding element

Then:

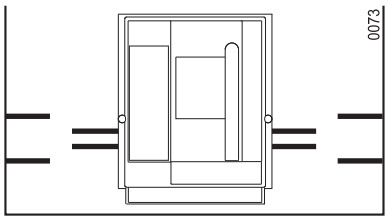
- Insert the circuit breaker in the guide frame and rack into connected position → (page 6-1)

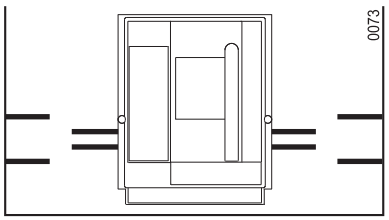
18.2.3 Order number

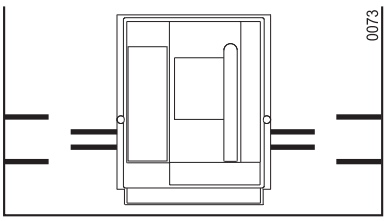
On the following pages the assignment of coding variant and usage may be documented.

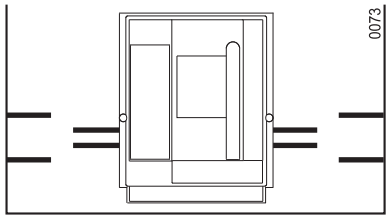
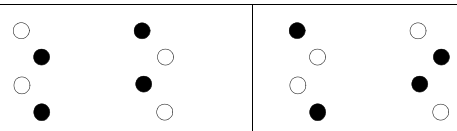
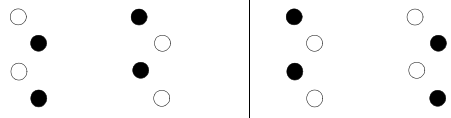
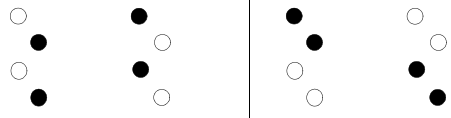
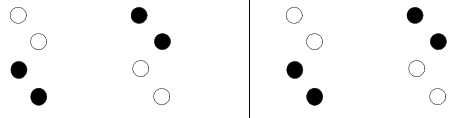
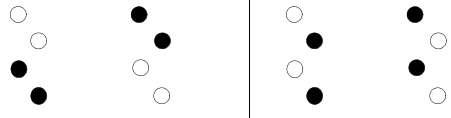
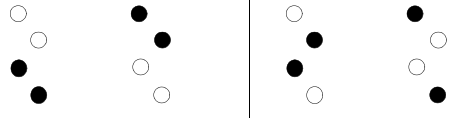
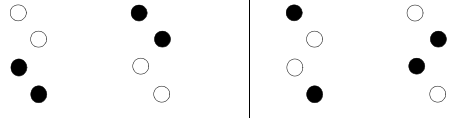
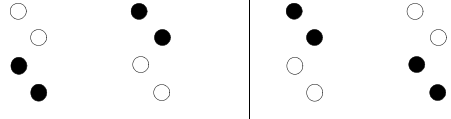
18.2.4 Kodiervarianten

18.2.4 Coding variants

Nr. / No.	 ● = mit Kodierelement ○ = ohne Kodierelement	● = with coding element ○ = without coding element	**Verwendet für:** **Used for:**
1			
2			
3			
4			
5			
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7			
8			
9			

Nr. / No.	 ● = mit Kodierelement ○ = ohne Kodierelement	● = with coding element ○ = without coding element	**Verwendet für:** **Used for:**
10			
11			
12			
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14			
15			
16			
17			
18			

Nr. / No.	 ● = mit Kodierelement ○ = ohne Kodierelement	● = with coding element ○ = without coding element	**Verwendet für:** **Used for:**
19			
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Nr. / No.	 ● = mit Kodierelement ○ = ohne Kodierelement ● = with coding element ○ = without coding element	Verwendet für: Used for:
28		
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18.3 Positionsmeldeschalter für Einschubrahmen

Am Einschubrahmen können Positionsmeldeschalter nachgerüstet werden. Mit deren Hilfe lassen sich die drei Schalterpositionen im Einschubrahmen (Trenn-, Prüf- und Betriebsstellung) kundenseitig auswerten.

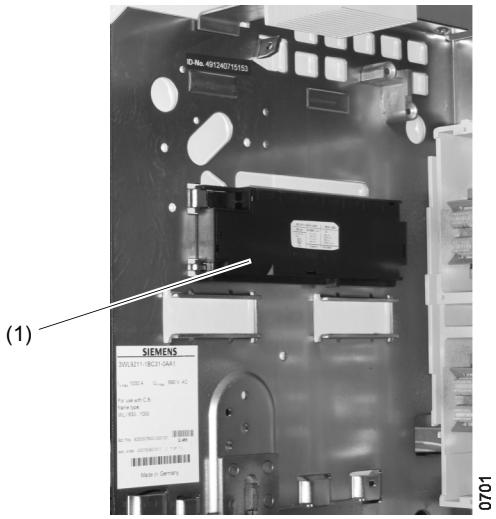
→ Tabelle "Schalterposition und Kontakte" (Seite 18-15)

18.3 Position signaling switches for guide frame

The guide frame can be retrofitted with position signaling switches.

The signal of these switches can be used to identify the circuit breaker position (disconnected / test / connected) in the guide frame.

→ Table "Circuit Breaker position and contact state" (page 18-15)



(1) Positionsmeldeschaltermodul

(1) Position signaling switch module

Es stehen zwei Ausführungen zur Verfügung.

Ausführung 1:

- S30 Meldeschalter für Trennstellung
- S31 Meldeschalter für Prüfstellung
- S34 Meldeschalter für Betriebsstellung

Ausführung 2:

- S30 Meldeschalter für Trennstellung
- S31 / S32 Meldeschalter für Prüfstellung
- S33 / S34 / S35 Meldeschalter für Betriebsstellung

18.3.1 Anschlüsse

Eine Reihe von Zugbügelklemmen für Nennquerschnitte 1 x 0,5 mm^2 bis 1 x 2,5 mm^2.

Two versions are available.

Version 1:

- S30 Signaling switch for disconnected position
- S31 Signaling switch for test position
- S34 Signaling switch for connected position

Version 2:

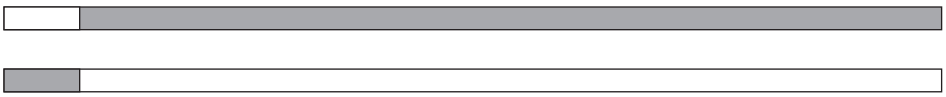
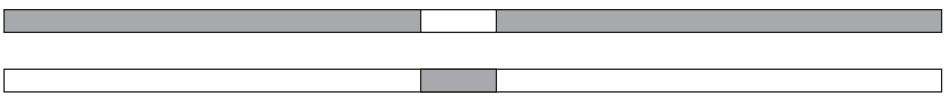
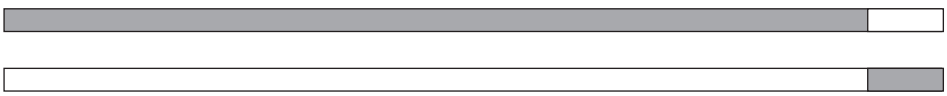
- S30 Signaling switch for disconnected position
- S31 / S32 Signaling switch for test position
- S33 / S34 / S35 Signaling switch for connected position

18.3.1 Terminals

One row of tension spring terminals for cross section 1 x AWG 20 … 1 x AWG 14.

18.3.2 Schalterposition und Kontakte

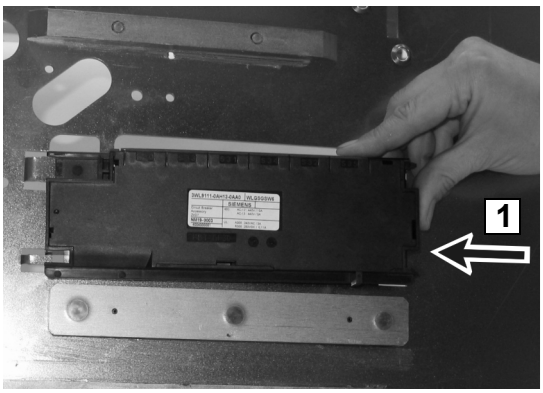
18.3.2 Circuit Breaker position and contact state

Meldeschalter Signaling switch	Kontakte Contacts	Schalterposition / Circuit Breaker position		
		Trennstellung Disconnected position	Prüfstellung Test position	Betriebsstellung Connected position
S30				
S31 / S32				
S33 / S34/ S35				

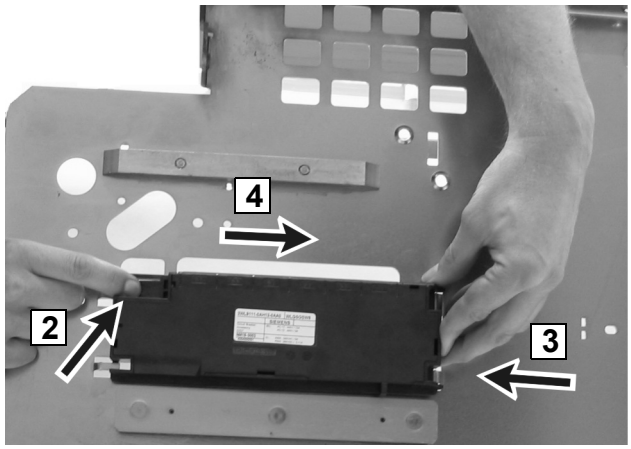
- Kontakt geöffnet
- Kontakt geschlossen

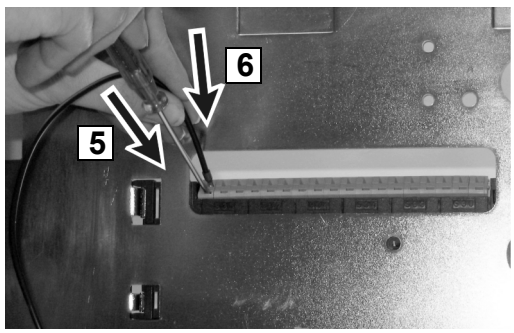
- Contact open
- Contact closed

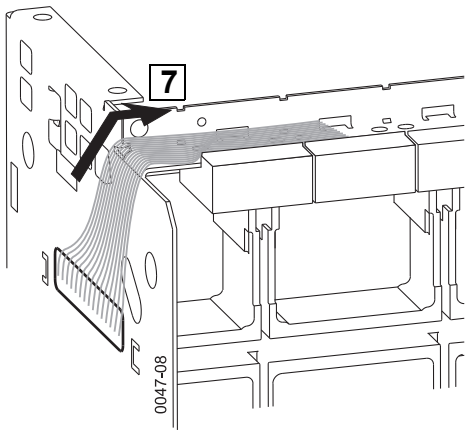
18.3.3 Montage

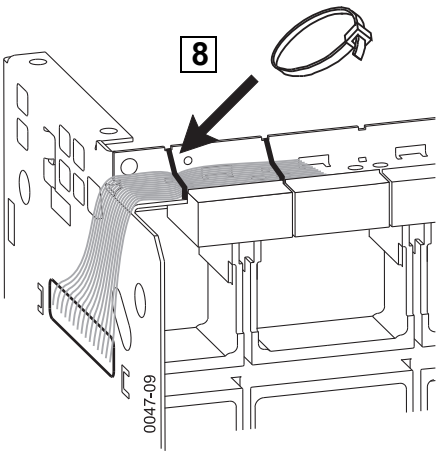


18.3.3 Installation









Anschließend:

- Schalter in Einschubrahmen einsetzen und in Betriebsstellung verfahren → (Seite 6-1)

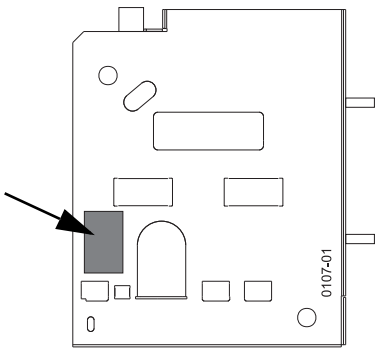
Then:

- Insert the circuit breaker in the guide frame and rack into connected position → (page 6-1)

18.3.4 Typschild aktualisieren

Hinweis	Note
Nach dem Einbau zusätzlicher Komponenten sind folgende Angaben mit einem weißen Permanentstift bzw. mit Aufklebern aus dem beiliegenden Etikettenbogen zu aktualisieren! Davor ist es ggf. notwendig die zu korrigierenden Zeichen mit einem schwarzen Permanentstift zu füllen.	After installing additional components, add the following data using a white and indelible ink pen or the appropiate label from the set of labels supplied! If necessary the signs which need to be corrected have to be filled with a black permanent pen before.

18.3.4 Updating the type label



Kennzeichen „weitere Optionen“
Supplement „further options“



18.3.5 Bestellnummern / Z-Zusatz

18.3.5 Order numbers / Z-option

Ausführung / Version	Bestell-Nr. / Order no.	Z ergänzen / Add. Z
1	3WL9111-0AH11-0AA0	R15
2	3WL9111-0AH12-0AA0	R16

19 Gegenseitige mechanische Verriegelung

19 Mutual mechanical circuit breaker interlocking

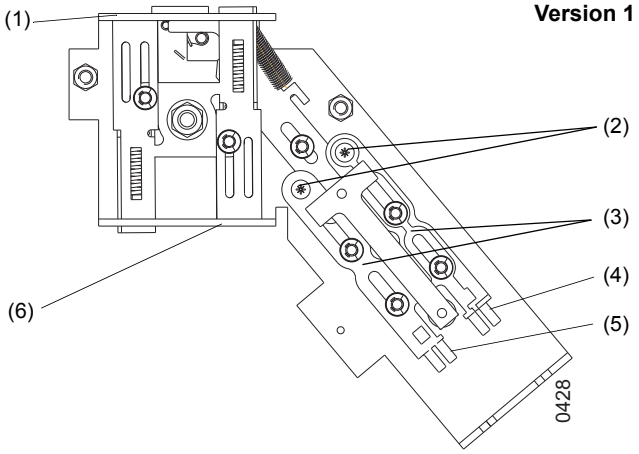
HINWEIS	NOTICE
Für die Funktion der Verriegelung sind in der Schaltanlage Mindestvoraussetzungen zu schaffen: **1** Bowdenzüge sind möglichst gerade, wenig gekrümmt zu verlegen. **2** Biegeradien des Bowdenzuges müssen > 500 mm ausgeführt sein. **3** Im Bowdenzugverlauf darf die Summe aller Krümmungswinkel 540° nicht überschreiten. **4** Bei vertikaler Anordnung zu verriegelnder Leistungsschalter sollen die Verriegelungsmechaniken fluchten. **5** Zu verriegelnde Leistungsschalter müssen so angeordnet sein, dass 2 m, 3 m oder 4,5 m lange Bowdenzüge unter Einhaltung der in den Punkten 1. - 4. genannten Bedingungen optimal verlegt werden können. **6** Die Bowdenzugverlegung muss vor der Justage der Verriegelung fixiert werden (Kabelbinder o.ä.) **7** Durch die Wahl der Schaltanlagenfachbreite muss die Justagefreiheit für die Verriegelung gewährleistet sein. **8** Öffnungen und Durchbrüche in Anlagenelementen sind so zu gestalten, dass durchgeführte Bowdenzüge im Verlauf nicht richtungsorientiert oder behindert werden.	For a proper function of the interlocking device, the following minimum prerequisites have to be met in the switchgear: **1** Bowden wires are to laid out as straight and as unbowed as possible. **2** Bending radii of the bowden wires must exceed > 500 mm. **3** The total curving of the bowden wire must not exceed 540 degrees. **4** When stacking interlocked circuit breakers vertically, the interlocking devices shall be in line with each other. **5** Circuit Breakers intended to be interlocked must be positioned, so that bowden wires of 2 m, 3 m or 4.5 m length can be laid out optimally, while complying with the conditions of paragraphs 1. to 4. **6** Before adjusting the interlocking device, the laying of bowden wires must be fixed, e.g. using cable ties. **7** The width of the switchgear section must be selected as wide as necessary to ensure space for an adjustment of the interlocking device. **8** Openings have to be created in the switchgear components, so that bowden wires are not forced in their orientation or direction and that they are not hindered in their run.

Ermöglicht in der Standardausführung verschiedene Varianten der gegenseitigen Verriegelung von maximal drei Leistungsschaltern.

In the standard design there are various versions for the mutual interlocking system available, comprising a maximum of three circuit breakers.

19.1 Verriegelungsbaustein

Version 1

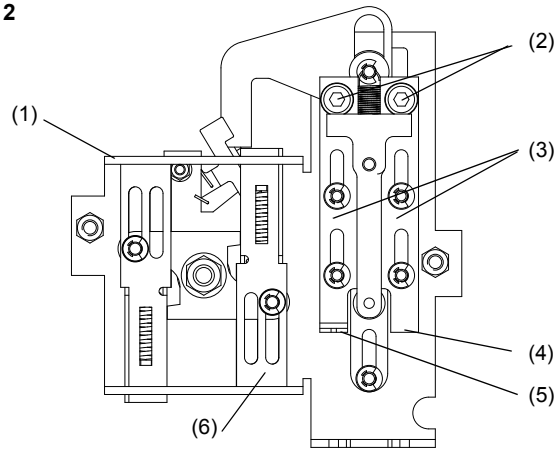


(1) Ausgang 1
(2) Version 1: Bohrung für Plastite Schraube mit Zahnscheibe für die Konfigurierung der gegenseitigen Verriegelung

Version 2: Bohrung mit Setzmutter für Zylinderkopfschraube M6 mit Scheibe für die Konfigurierung der gegenseitigen Verriegelung
(3) Indexbügel
(4) Eingang 1
(5) Eingang 2
(6) Ausgang 2

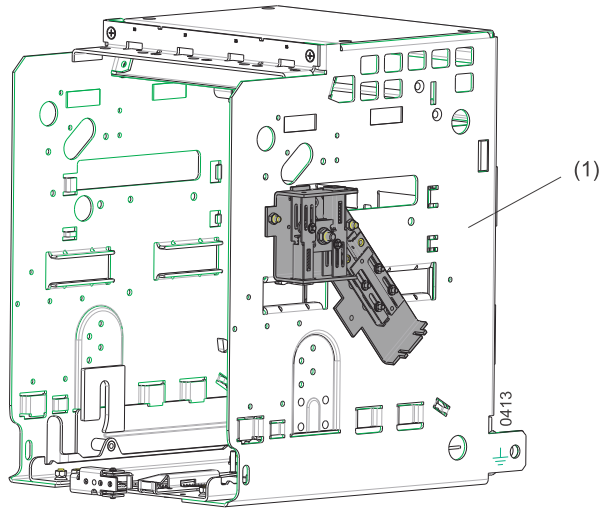
19.1 Mutual mechanical interlocking module

Version 2



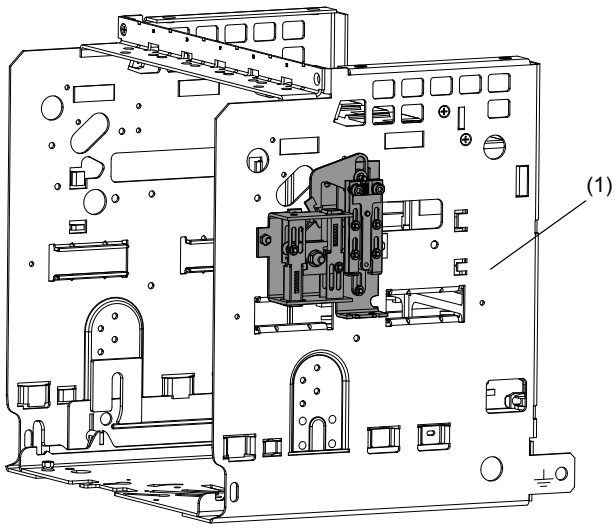
(1) Output 1
(2) Version 1: Holes for plastite screw with toothed lock washer for the configuration of the mutual mechanical circuit breaker interlocking
Version 2: Holes with press nut for cheese-head M6 with washer for the configuration of the mutual mechanical circuit breaker interlocking
(3) Non-interchangeable brackets
(4) Input 1
(5) Input 2
(6) Output 2

19.1.1 Version 1



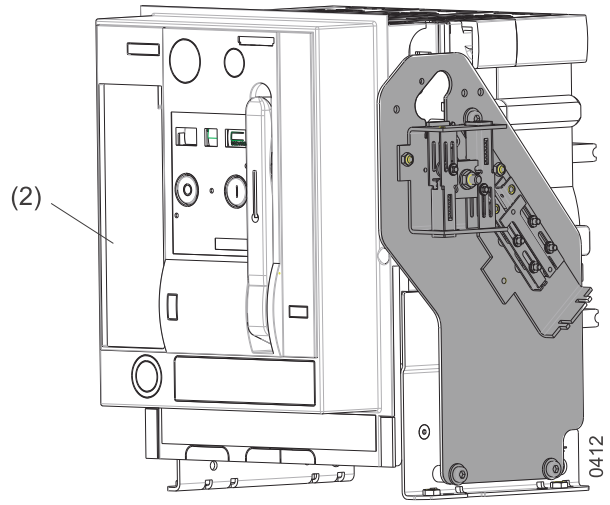
(1) Einschubrahmen
(2) Festeinbauschalter

19.1.2 Version 2



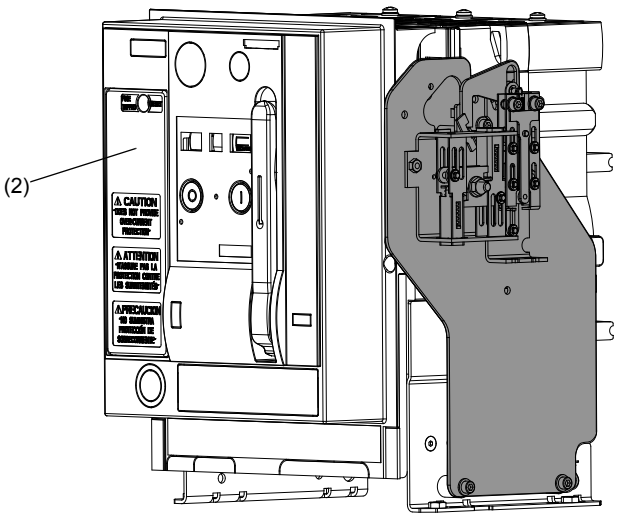
(1) Einschubrahmen
(2) Festeinbauschalter

19.1.1 Version 1



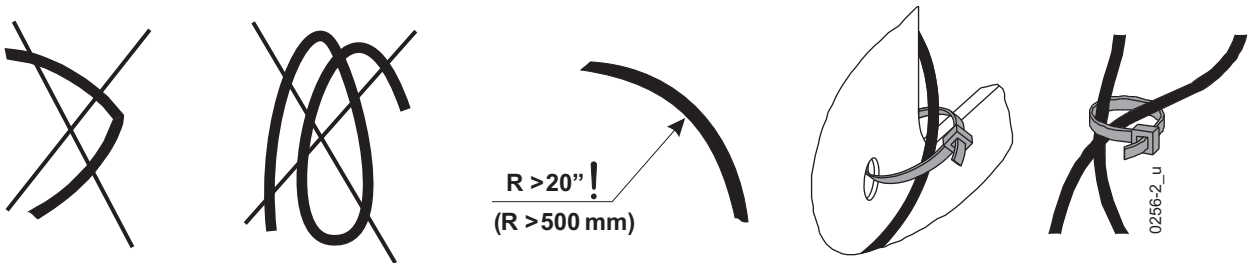
(1) Guide frame
(2) Fixed-mounted breaker

19.1.2 Version 2



(1) Guide frame
(2) Fixed-mounted breaker

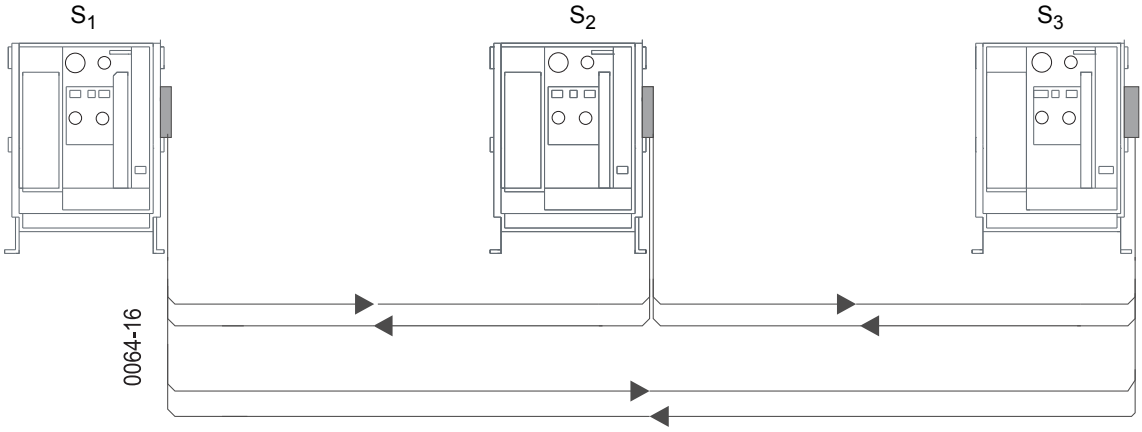
Bowdenzug verlegen



Fixing the bowden wire

19.2 Konfigurationen

19.2.1 Allgemeine Hinweise



In den nachstehenden Konfigurationsanleitungen gelten folgende Bezeichnungen:

A_1 : Ausgangsinformation 1

E_1 : Eingangsinformation 1

S_1 : Leistungsschalter 1

Um z.B. die Ausgangsinformation 1 des Leistungsschalters 1 mit der Eingangsinformation 2 des Schalters 2 zu koppeln, wird im folgenden die Abkürzung $S_1\,A_1$ - $S_2\,E_2$ verwendet.

Die Zustände der Schalter werden im Bedienpult wie folgt angezeigt:

19.2 Configurations

19.2.1 General notes

In the following configuration instructions, the following designations apply:

A_1 : Output information 1

E_1 : Input information 1

S_1 : Circuit breaker 1

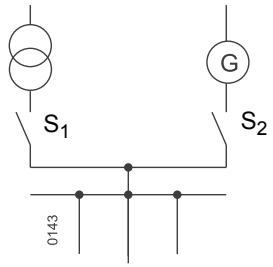
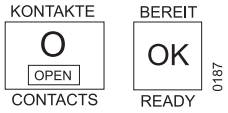
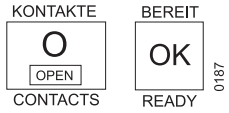
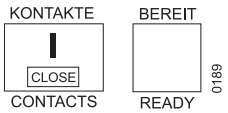
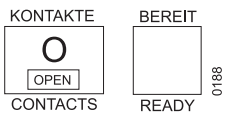
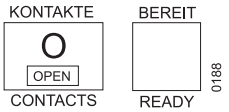
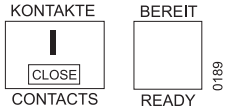
For example, in order to couple the output information 1 of circuit breaker 1 with the input information 2 of circuit breaker 2, the abbreviation $S_1\,A_1$ - $S_2\,E_2$ is used.

The states of the circuit breaker are shown at the front panel:

KONTAKTE I CLOSE CONTACTS BEREIT READY 0189	Schalter eingeschaltet	Circuit breaker closed
KONTAKTE O OPEN CONTACTS BEREIT READY 0188	Schalter ausgeschaltet und nicht einschaltbereit (verriegelt)	Circuit breaker open and not ready to close (interlocked)
KONTAKTE O OPEN CONTACTS BEREIT OK READY 0187	Schalter ausgeschaltet und einschaltbereit (nicht verriegelt)	Circuit breaker open and ready to close (not interlocked)

19.2.2 Zwei Schalter gegeneinander

19.2.2 Two circuit breakers against each other

Beispiel Example	Mögliche Schalterzustände Possible circuit breaker states	
	S_1	S_2
		
		
		

Beschreibung:

Ein Schalter kann jeweils nur dann eingeschaltet werden, wenn der andere ausgeschaltet ist.

Benötigtes Material:

Jeder Schalter hat einen Verriegelungsbaustein sowie einen Bowdenzug.

Bestellnummer → (Seite 19-17)

Anschlüsse der Bowdenzüge:

1. Bowdenzug:	$S_1 A_1$	-	$S_2 E_1$
2. Bowdenzug:	$S_2 A_1$	-	$S_1 E_1$

Bemerkung:

$S_x E_x$

An diesen Anschlüssen sind die Zylinderschrauben mit Spannscheiben in die Indexbügel einzuschrauben.

Description:

A circuit breaker can be closed only if the other is open.

Materials required:

Each circuit breaker has an interlocking module and a bowden wire.

Order no. → (page 19-17)

Connections of bowden wires:

1st bowden wire:	$S_1 A_1$	-	$S_2 E_1$
2nd bowden wire:	$S_2 A_1$	-	$S_1 E_1$

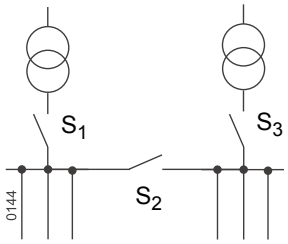
Note:

$S_x E_x$

At these connections the cheese-head screws with conical spring washers must be screwed into the non-interchangeable bracket.

19.2.3 Drei Schalter untereinander

19.2.3 Three circuit breakers among each other

Beispiel Example	Mögliche Schalterzustände Possible circuit breaker states		
	S_1	S_2	S_3
	KONTAKTE O OPEN CONTACTS; BEREIT OK READY 0187	KONTAKTE O OPEN CONTACTS; BEREIT OK READY 0187	KONTAKTE O OPEN CONTACTS; BEREIT OK READY 0187
	KONTAKTE I CLOSE CONTACTS; BEREIT READY 0189	KONTAKTE O OPEN CONTACTS; BEREIT OK READY 0187	KONTAKTE O OPEN CONTACTS; BEREIT OK READY 0187
	KONTAKTE O OPEN CONTACTS; BEREIT OK READY 0187	KONTAKTE I CLOSE CONTACTS; BEREIT READY 0189	KONTAKTE O OPEN CONTACTS; BEREIT OK READY 0187
	KONTAKTE O OPEN CONTACTS; BEREIT OK READY 0187	KONTAKTE O OPEN CONTACTS; BEREIT OK READY 0187	KONTAKTE I CLOSE CONTACTS; BEREIT READY 0189
	KONTAKTE I CLOSE CONTACTS; BEREIT READY 0189	KONTAKTE I CLOSE CONTACTS; BEREIT READY 0189	KONTAKTE O OPEN CONTACTS; BEREIT READY 0188
	KONTAKTE O OPEN CONTACTS; BEREIT READY 0188	KONTAKTE I CLOSE CONTACTS; BEREIT READY 0189	KONTAKTE I CLOSE CONTACTS; BEREIT READY 0189
	KONTAKTE I CLOSE CONTACTS; BEREIT READY 0189	KONTAKTE O OPEN CONTACTS; BEREIT READY 0188	KONTAKTE I CLOSE CONTACTS; BEREIT READY 0189

Beschreibung:

Es können immer zwei beliebige Schalter eingeschaltet werden, wobei der Dritte jeweils verriegelt wird.

Benötigtes Material:

Jeder Schalter hat einen Verriegelungsbaustein sowie einen Bowdenzug. Drei weitere Bowdenzüge sind getrennt zu bestellen.

Bestell-Nr. → (Seite 19-17)

Anschlüsse der Bowdenzüge: (vgl. (19-3))

1. Bowdenzug: $S_1\ A_1$ - $S_2\ E_1$
2. Bowdenzug: $S_1\ A_2$ - $S_3\ E_1$
3. Bowdenzug: $S_2\ A_1$ - $S_1\ E_1$
4. Bowdenzug: $S_2\ A_2$ - $S_3\ E_2$
5. Bowdenzug: $S_3\ A_1$ - $S_1\ E_2$
6. Bowdenzug: $S_3\ A_2$ - $S_2\ E_2$

Description:

Any two circuit breakers can be closed, with the third being interlocked.

Materials required:

Each circuit breaker has an interlocking module and a bowden wire. Three additional bowden wires must be ordered separately.

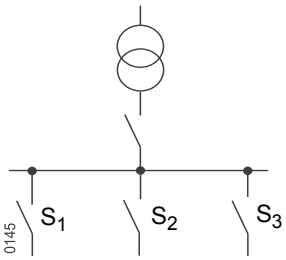
Order no. → (page 19-17)

Connections of bowden wires: (compare (19-3))

1st bowden wire: $S_1\ A_1$ - $S_2\ E_1$
2nd bowden wire: $S_1\ A_2$ - $S_3\ E_1$
3rd bowden wire: $S_2\ A_1$ - $S_1\ E_1$
4th bowden wire: $S_2\ A_2$ - $S_3\ E_2$
5th bowden wire: $S_3\ A_1$ - $S_1\ E_2$
6th bowden wire: $S_3\ A_2$ - $S_2\ E_2$

19.2.4 Drei Schalter untereinander (Einer von Dreien)

19.2.4 Three circuit breakers among each other (1 out of 3)

Beispiel Example	Mögliche Schalterzustände Possible circuit breaker states		
	**S_1**	**S_2**	**S_3**
	KONTAKTE O OPEN CONTACTS; BEREIT OK READY 0187	KONTAKTE O OPEN CONTACTS; BEREIT OK READY 0187	KONTAKTE O OPEN CONTACTS; BEREIT OK READY 0187
	KONTAKTE I CLOSE CONTACTS; BEREIT READY 0189	KONTAKTE O OPEN CONTACTS; BEREIT READY 0188	KONTAKTE O OPEN CONTACTS; BEREIT READY 0188
	KONTAKTE O OPEN CONTACTS; BEREIT READY 0188	KONTAKTE I CLOSE CONTACTS; BEREIT READY 0189	KONTAKTE O OPEN CONTACTS; BEREIT READY 0188
	KONTAKTE O OPEN CONTACTS; BEREIT READY 0188	KONTAKTE O OPEN CONTACTS; BEREIT READY 0188	KONTAKTE I CLOSE CONTACTS; BEREIT READY 0189

Beschreibung:

Wenn ein Schalter eingeschaltet ist, können die beiden Anderen nicht eingeschaltet werden.

Benötigtes Material:

Jeder Schalter hat einen Verriegelungsbaustein sowie einen Bowdenzug. Drei weitere Bowdenzüge sind getrennt zu bestellen.

Bestellnummer → (Seite 19-17)

Anschlüsse der Bowdenzüge: (vgl. (19-3)**)**

1. Bowdenzug:	$S_1 A_1$	-	$S_2 E_1$
2. Bowdenzug:	$S_1 A_2$	-	$S_3 E_1$
3. Bowdenzug:	$S_2 A_1$	-	$S_1 E_1$
4. Bowdenzug:	$S_2 A_2$	-	$S_3 E_2$
5. Bowdenzug:	$S_3 A_1$	-	$S_1 E_2$
6. Bowdenzug:	$S_3 A_2$	-	$S_2 E_2$

Bemerkung:

$S_x E_x$

An diesen Anschlüssen sind die Zylinderschrauben mit Spannscheiben in die Indexbügel einzuschrauben.

Description:

When one circuit breaker is closed, the other two cannot be closed.

Materials required:

Each circuit breaker has an interlocking module and a bowden wire. Three additional bowden wires must be ordered separately.

Order no. → (page 19-17)

Connections of bowden wires: (compare (19-3)**)**

1st bowden wire:	$S_1 A_1$	-	$S_2 E_1$
2nd bowden wire:	$S_1 A_2$	-	$S_3 E_1$
3rd bowden wire:	$S_2 A_1$	-	$S_1 E_1$
4th bowden wire:	$S_2 A_2$	-	$S_3 E_2$
5th bowden wire:	$S_3 A_1$	-	$S_1 E_2$
6th bowden wire:	$S_3 A_2$	-	$S_2 E_2$

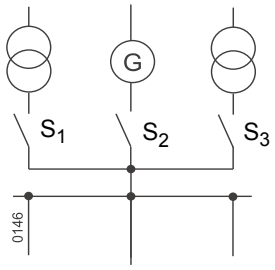
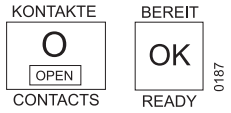
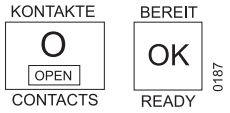
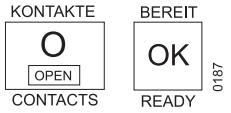
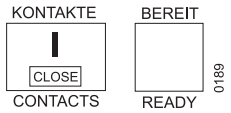
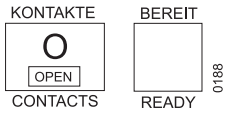
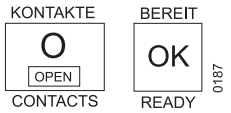
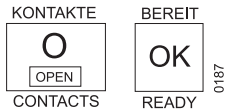
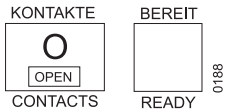
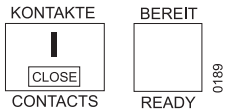
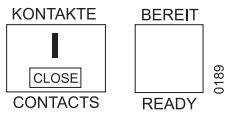
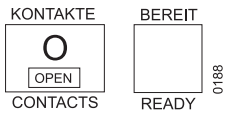
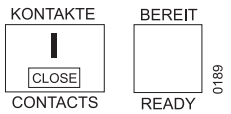
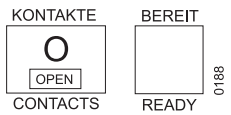
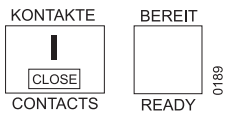
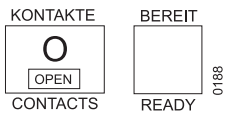
Note:

$S_x E_x$

At these connections, the cheese-head screws must be screwed into the non-interchangeable brackets with conical spring washers.

19.2.5 Drei Schalter gegeneinander

19.2.5 Three circuit breakers against each other

Beispiel Example	Mögliche Schalterzustände Possible circuit breaker states		
	S_1	S_2	S_3
			
			
			
			
			

Beschreibung:

Es können zwei Schalter (S_1, S_3) unabhängig voneinander ein- und ausgeschaltet werden, wobei der Dritte (S_2) nur einschaltbereit ist, wenn die beiden Anderen ausgeschaltet sind. Ist der Dritte eingeschaltet, so können die beiden anderen Schalter nicht eingeschaltet werden.

Benötigtes Material:

Jeder Schalter hat einen Verriegelungsbaustein sowie einen Bowdenzug. Ein Bowdenzug ist getrennt zu bestellen.

Bestellnummer → (Seite 19-17)

Anschlüsse der Bowdenzüge (vgl. (19-3)**)**

1. Bowdenzug:	$S_1\ A_1$ -	$S_2\ E_1$
2. Bowdenzug:	$S_2\ A_1$ -	$S_1\ E_1$
3. Bowdenzug:	$S_2\ A_2$ -	$S_3\ E_1$
4. Bowdenzug:	$S_3\ A_1$ -	$S_2\ E_2$

Bemerkung:

$S_x\ E_x$

An diesen Anschlüssen sind die Zylinderschrauben mit Spannscheiben in die Indexbügel einzuschrauben.

Description:

Two circuit breakers (S_1, S_3) can be independently opened and closed, the third (S_2) being ready to close only if the other two are open. If the third is closed, the other two cannot be closed.

Materials required:

Each circuit breaker has an interlocking module and a bowden wire. A bowden wire must be ordered separately.

Order no. → (page 19-17)

Connections of bowden wires: (compare (19-3)**)**

1st bowden wire:	$S_1\ A_1$ -	$S_2\ E_1$
2nd bowden wire:	$S_2\ A_1$ -	$S_1\ E_1$
3rd bowden wire:	$S_2\ A_2$ -	$S_3\ E_1$
4th bowden wire:	$S_3\ A_1$ -	$S_2\ E_2$

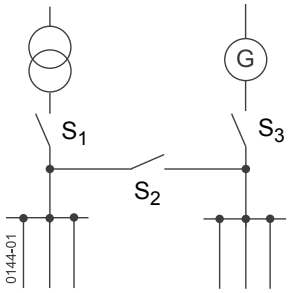
Note:

$S_x\ E_x$

At these connections, the cheese-head screws must be screwed into the non-interchangeable brackets with conical spring washers.

19.2.6 Drei Schalter, zwei davon gegeneinander

19.2.6 Three circuit breakers, two of them against each other

Beispiel Example	Mögliche Schalterzustände Possible circuit breaker states		
	**S_1**	**S_2**	**S_3**
	KONTAKTE O OPEN CONTACTS / BEREIT OK READY 0187	KONTAKTE O OPEN CONTACTS / BEREIT OK READY 0187	KONTAKTE O OPEN CONTACTS / BEREIT OK READY 0187
	KONTAKTE O OPEN CONTACTS / BEREIT OK READY 0187	KONTAKTE I CLOSE CONTACTS / BEREIT READY 0189	KONTAKTE O OPEN CONTACTS / BEREIT READY 0188
	KONTAKTE O OPEN CONTACTS / BEREIT OK READY 0187	KONTAKTE O OPEN CONTACTS / BEREIT READY 0188	KONTAKTE I CLOSE CONTACTS / BEREIT READY 0189
	KONTAKTE I CLOSE CONTACTS / BEREIT READY 0189	KONTAKTE O OPEN CONTACTS / BEREIT OK READY 0187	KONTAKTE O OPEN CONTACTS / BEREIT OK READY 0187
	KONTAKTE I CLOSE CONTACTS / BEREIT READY 0189	KONTAKTE I CLOSE CONTACTS / BEREIT READY 0189	KONTAKTE O OPEN CONTACTS / BEREIT READY 0188
	KONTAKTE I CLOSE CONTACTS / BEREIT READY 0189	KONTAKTE O OPEN CONTACTS / BEREIT READY 0188	KONTAKTE I CLOSE CONTACTS / BEREIT READY 0189

Beschreibung:

Ein Schalter (S_1) kann unabhängig von den beiden Anderen ein- und ausgeschaltet werden. Die beiden anderen Schalter schließen sich gegenseitig aus, d. h. einer kann nur eingeschaltet werden, wenn der Andere ausgeschaltet ist.

Benötigtes Material:

Zwei von drei Schaltern (S_2, S_3) haben je einen Verriegelungsbaustein sowie je einen Bowdenzug.

Bestellnummer → (Seite 19-17)

Anschlüsse der Bowdenzüge: (vgl. (19-3))

1. Bowdenzug:	$S_2\ A_1$ -	$S_3\ E_1$
2. Bowdenzug:	$S_3\ A_1$ -	$S_2\ E_1$

Bemerkung:

$S_x\ E_x$

An diesen Anschlüssen sind die Zylinderschrauben mit Spannscheiben in die Indexbügel einzuschrauben.

Description:

One circuit breaker (S_1) can be opened and closed independently of the two others. The two others cancel each other out, i.e. one can only be closed if the other is open.

Materials required:

Two of the three circuit breakers (S_2, S_3) each have an interlocking module and a bowden wire.

Order no. → (page 19-17)

Connections of bowden wires: (compare (19-3))

1st bowden wire:	$S_2\ A_1$ -	$S_3\ E_1$
2nd bowden wire:	$S_3\ A_1$ -	$S_2\ E_1$

Note:

$S_x\ E_x$

At these connections the cheese-head screws must be screwed into the non-interchangeable brackets with conical spring washers.

19.3 Verriegelung nachrüsten

WARNUNG

Vor dem Arbeiten an diesem Gerät, Anlage unbedingt spannungsfrei schalten sowie das Gerät erden.

- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Einschubschalter aus Einschubrahmen entnehmen → (Seite 24-4)
  bzw. Festeinbauschalter ggf. ausbauen → (Seite 5-1)
- Bedienpult und ggf. rechte seitliche Abdeckung abnehmen → (Seite 24-25)

19.3.1 Zwischenwelle und Kupplung einbauen

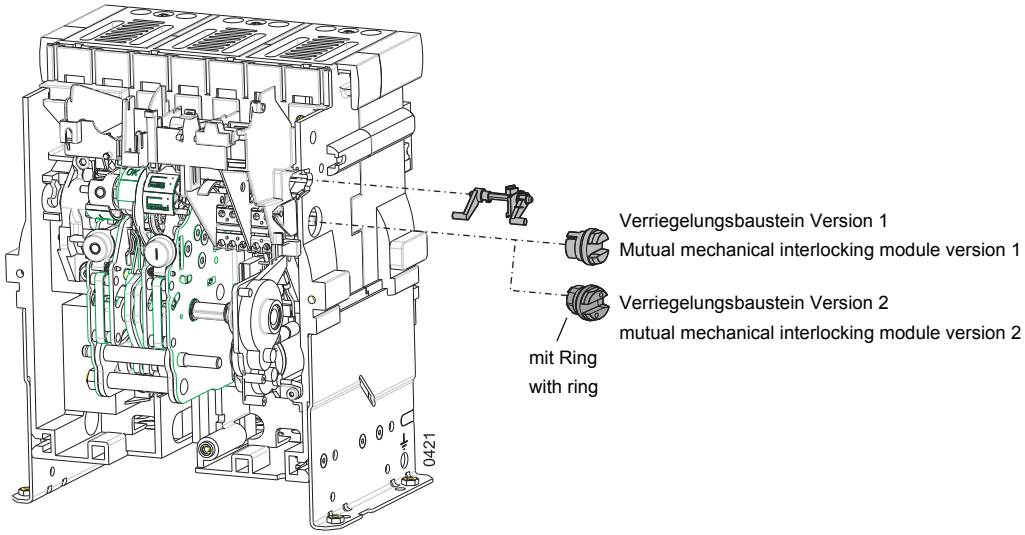
19.3 Retrofitting interlocking module

WARNING

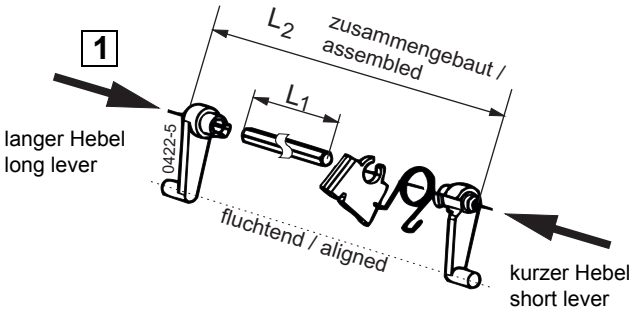
Always de-energize and ground equipment before working on this equipment.

- Switch off and discharge the storage spring → (page 24-3)
- Remove the breaker from the guide frame → (page 24-4)
  or remove the fixed-mounted breaker if necessary → (page 5-1)
- Remove front panel and side cover on the right, if required → (page 24-25)

19.3.1 Installing intermediate shaft and coupling



Einbau



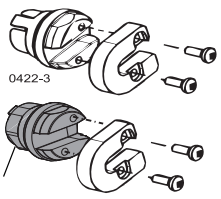
Fitting

Baugröße Frame size	Sechskant Länge L_1 Hexagon shaft length L_1 (mm)	Länge der Baugruppe L_2 Length of assembly L_2 (mm)
I	48	59
II	118	129
III nur Festeinbau fixed-mounted only	232	243

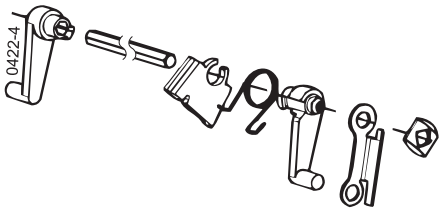
Für Baugröße III, Einschubausführung

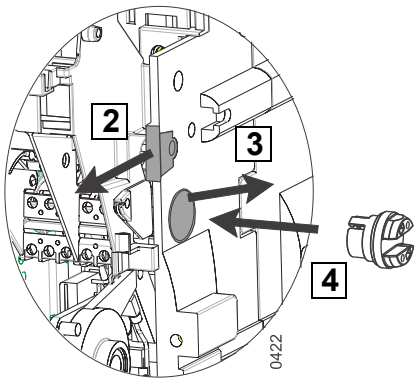
Verriegelungsbaustein Version 1
mutual mechanical interlocking module version 1

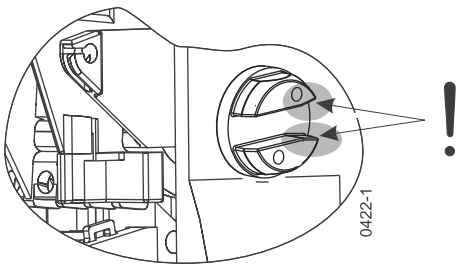
Verriegelungsbaustein Version 2
mutual mechanical interlocking module version 2
mit Ring
with ring

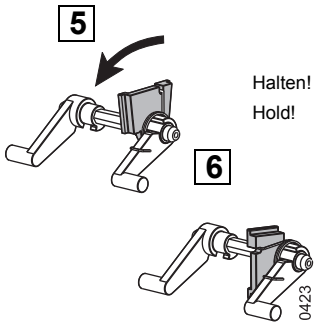


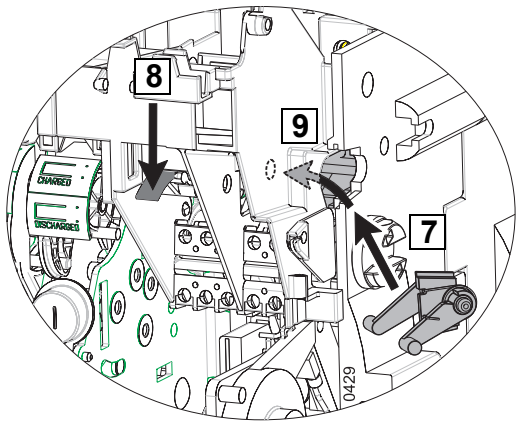
For frame size III, draw out version



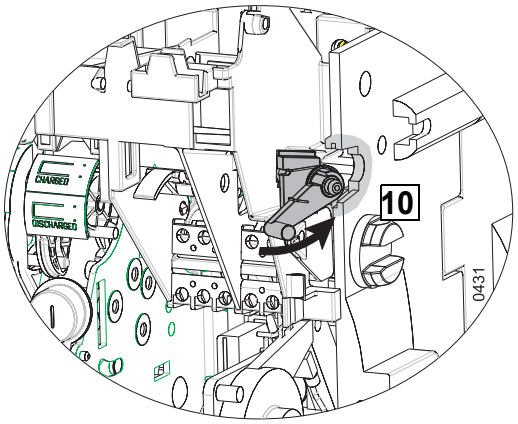


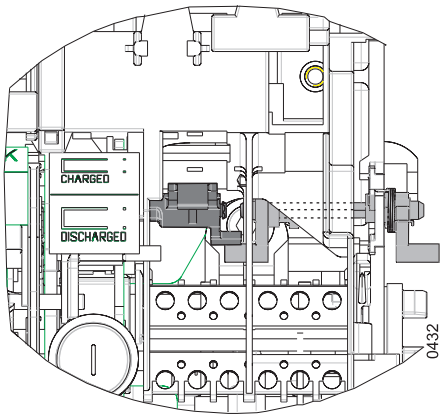






HINWEIS	NOTICE
Im Arbeitsschritt **9** muss die Zwischenwelle in eine Bohrung im Schalterinneren einrasten. Erst dann lässt sich im Arbeitsschritt **10** die Halterung der Zwischenwelle in die Führung der Seitenwand einsetzen.	In working step **9**, the intermediate shaft must engage in a hole inside the circuit breaker. Only then it will be possible - in working step **10** - to fit the support for the intermediate shaft in the guide of the side wall.

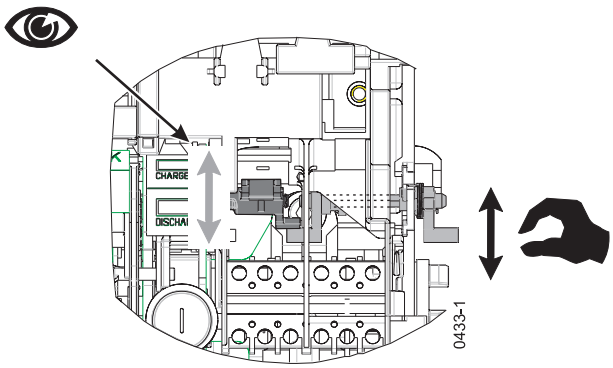


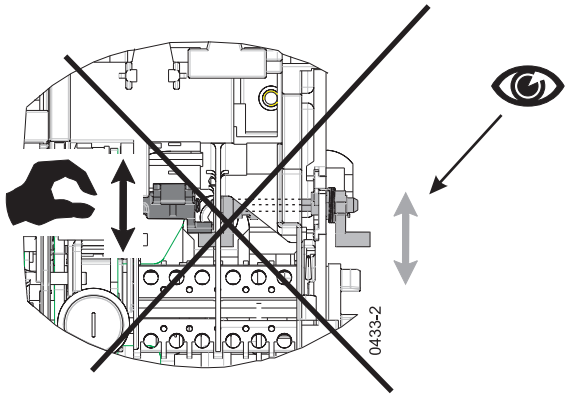


kurzer Hebel aussen
short lever outside

Funktionsprobe

Function check





Anschließend:

- Bedienpult und ggf. rechte seitliche Abdeckung wieder anbauen → (Seite 24-25)

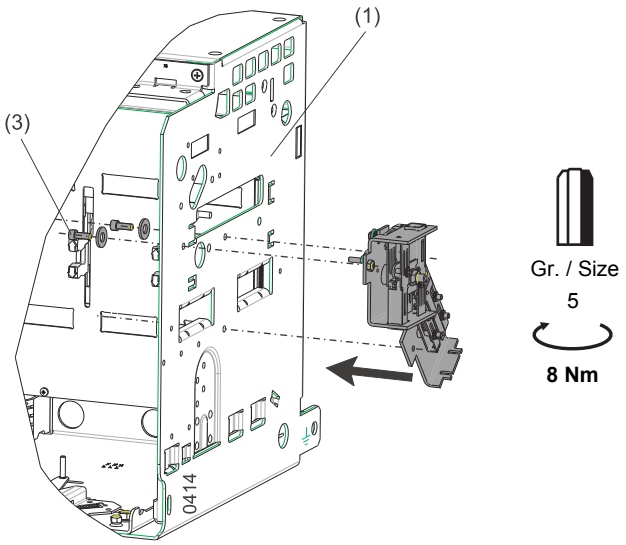
Then:

- Fit back front panel and side cover on the right, if it was removed → (page 24-25)

19.3.2 Verriegelungsbaustein anbauen

HINWEIS
Bei nicht ausreichender Montagefreiheit im Schaltschrank an der rechten Schalterseite kann es vorteilhaft sein, vor dem Anbau des Verriegelungsbausteins die ausgangsseitigen Bowdenzüge vorzumontieren. → (Seite 19-14)

Verriegelungsbaustein Version 1

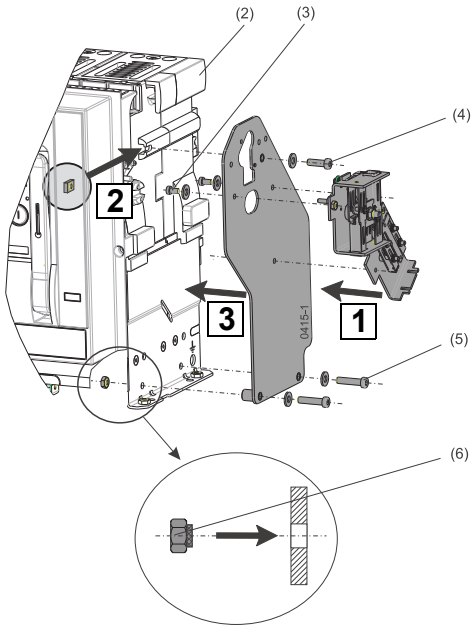


(1) Einschubrahmen
(2) Festeinbauschalter
(3) 2 x Innensechskantschraube M6 x 12 mit Spannscheibe
(4) 1 x Innensechskantschraube M6 x 25 mit Spannscheibe und Vierkantmutter
(5) 2 x Innensechskantschraube M6 x 35 mit Spannscheibe
(6) 2 x Setzmutter; zieht sich beim Festschrauben in den Schalterfuß; ggf. Mutter festhalten

19.3.2 Fitting interlocking module

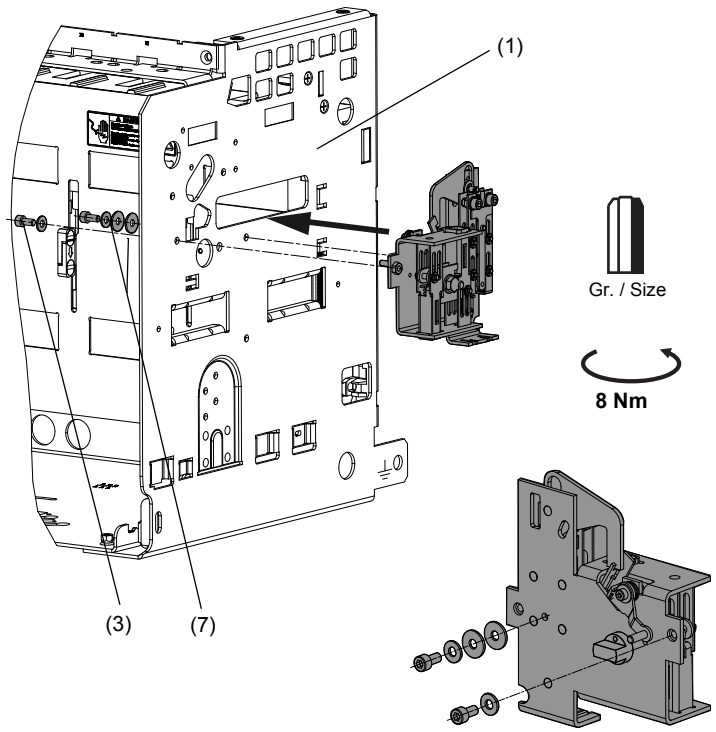
NOTICE
If there isn't enough free space for installation on the right side of the circuit breaker inside the cubicle, it may be advantageous to pre-assemble the bowden wires on the outgoing side before fitting the interlocking module. → (page 19-14)

Mutual mechanical interlocking module version 1



(1) Guide frame
(2) Fixed-mounted breaker
(3) 2 x Hexagon socket-head screw M6 x 12 with conical spring washer
(4) 1 x Hexagon socket-head screw M6 x 25 with conical spring washer and square nut
(5) 2 x Hexagon socket-head screw M6 x 35 with conical spring washer
(6) 2 x press nut; penetrates into mounting foot by tightening; if necessary, prevent press nut from rotating

Verriegelungsbaustein Version 2

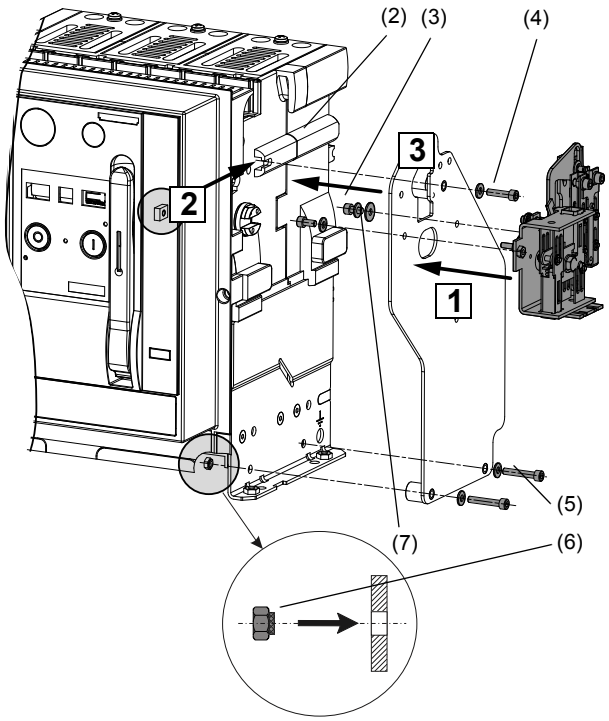


(1) Einschubrahmen
(2) Festeinbauschalter
(3) 2 x Innensechskantschraube M6 x 12 mit Spannscheibe
(4) 1 x Innensechskantschraube M6 x 25 mit Spannscheibe und Vierkantmutter
(5) 2 x Innensechskantschraube M6 x 35 mit Spannscheibe
(6) 2 x Setzmutter; zieht sich beim Festschrauben in den Schalterfuß; ggf. Mutter festhalten
(7) 1 x Unterlegscheibe mit großem Außendurchmesser

Anschließend:

- Festeinbauschalter wieder einbauen → (Seite 5-1)

Mutual mechanical interlocking module version 2



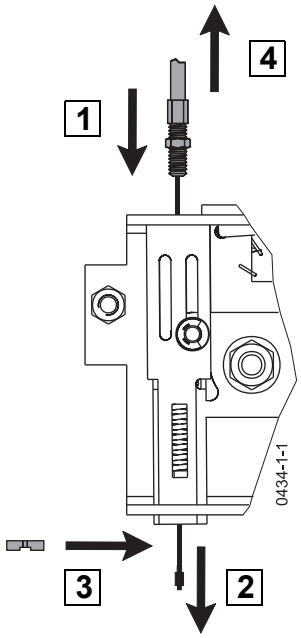
(1) Guide frame
(2) Fixed-mounted breaker
(3) 2 x Hexagon socket-head screw M6 x 12 with conical spring washer
(4) 1 x Hexagon socket-head screw M6 x 25 with conical spring washer and square nut
(5) 2 x Hexagon socket-head screw M6 x 35 with conical spring washer
(6) 2 x press nut; penetrates into mounting foot by tightening; if necessary, prevent press nut from rotating
(7) 1 x washer with large outside diameter

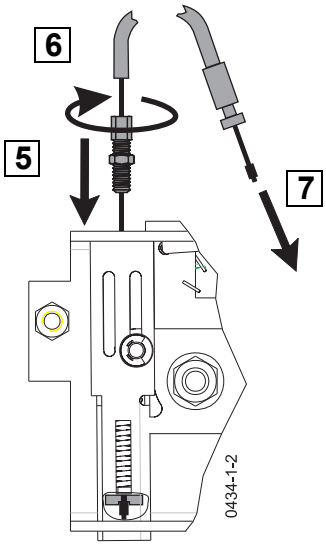
Then:

- Install the breaker again→ (page 5-1)

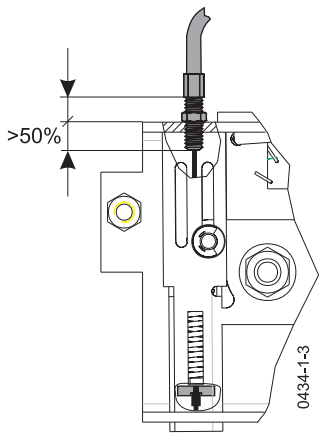
19.3.3 Bowdenzüge montieren

Bowdenzug am Ausgang einbauen

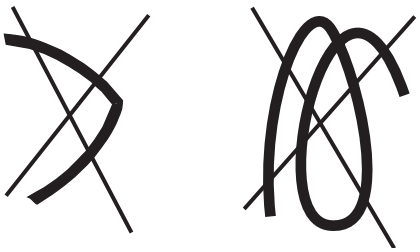


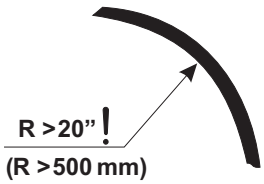


Voll eingeschraubt
fully screwed in

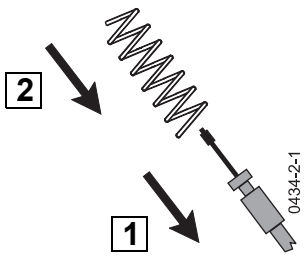


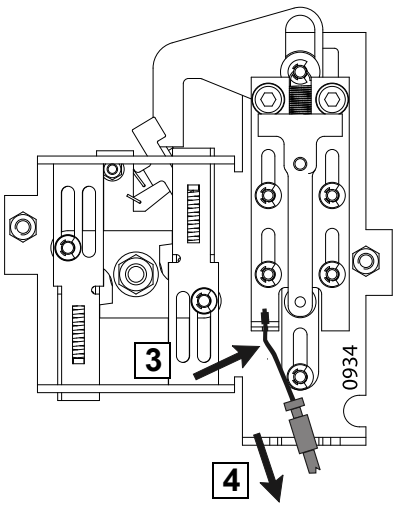
Bowdenzug verlegen





Bowdenzug am Eingang des zu verriegelnden Schalters einbauen

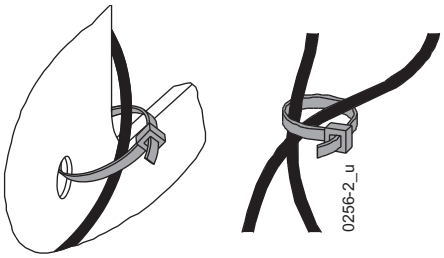




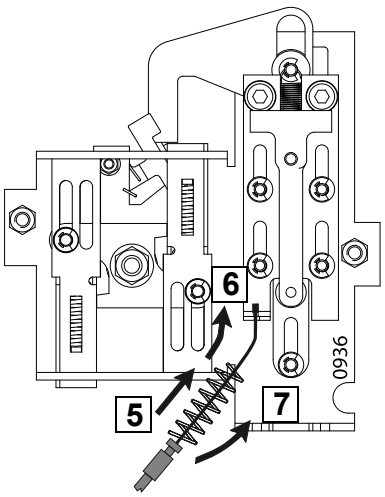
19.3.3 Mounting the bowden wires

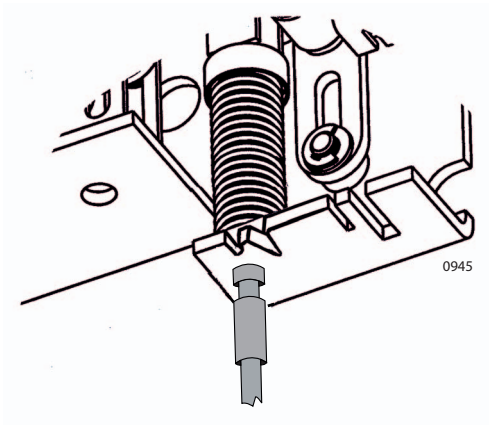
Fitting bowden wire on output site

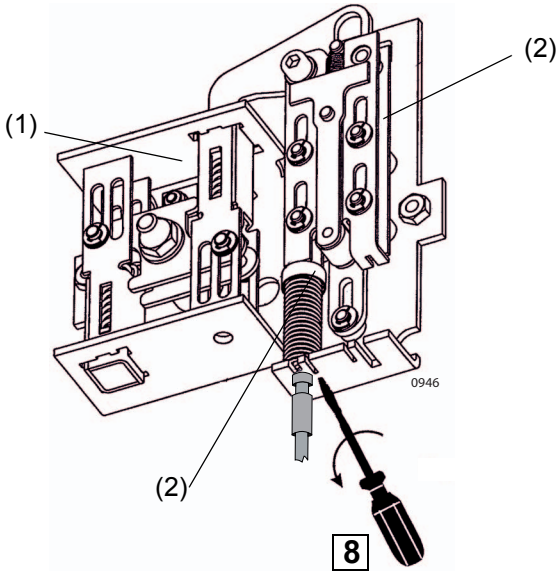
Fixing the bowden wire



Installing the bowden wire at the input of the circuit breaker to be interlocked

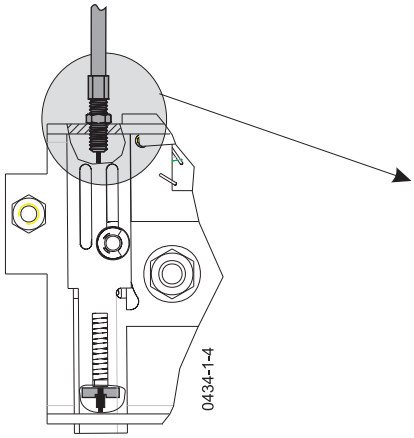


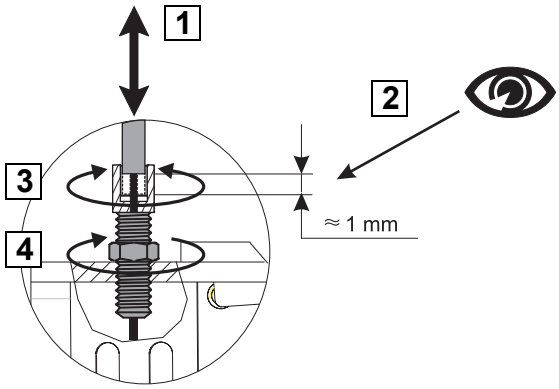




(1) Ausführung mit Indexbügel aus Stahl
(2) Indexbügel

(1) Version with steel index clip
(2) Index clip





Bowdenzug justieren

Adjusting the bowden wire

Anschließend:

- Entsprechend der vorgesehenen Konfiguration der gegenseitigen Schalterverriegelung ggf. Zylinderschrauben mit Scheiben, bzw. Plastite-Schrauben mit Zahnscheiben in die entsprechenden Indexbügel einschrauben → Konfigurationen (Seite 19-3)
- Einschubschalter in Einschubrahmen einsetzen, in Trennstellung schieben, ggf. Schaltschranktür schließen und in Betriebsstellung verfahren → (Seite 6-1)

Funktionstest

- Schaltschranktüren schließen
- Federspeicher der zu verriegelnden Schalter spannen → (Seite 6-4)
- Nacheinander die verschiedenen Möglichkeiten der vorgesehenen Verriegelungskonfiguration testen
- Ggf. Bowdenzüge nachjustieren

Then:

- According to the planned configuration of the mutual circuit breaker interlocking, screw cheese-head bolts with toothed lock washers, respectively plastite-screws with lock washers into the associated index clips if applicable → Configurations (page 19-3)
- Insert the draw-out circuit breaker into the guide frame, push into disconnected position, close the cubicle door if required and rack it into connected position → (page 6-1)

Function check

- Close the cubicle doors
- Charge storage spring of circuit breakers to be interlocked → (page 6-4)
- Test the various possibilities of the planned interlocking configuration one after the other
- Re-adjust bowden wires if necessary

Anschließend:

- Leistungsschalter ausschalten und Federspeicher entspannen → (Seite 24-3)
- Leistungsschalter im Einschubrahmen in Wartungsposition bewegen → (Seite 24-4)
- Bedienpult abnehmen → (Seite 24-25)
- Information über Anschlussklemmenverdrahtung → (Seite 8-1)

Then:

- OPEN the circuit breaker and discharge the storage spring → (page 24-3)
- Move circuit breaker into maintenance position → (page 24-4)
- Remove front panel → (page 24-25)
- For Terminal wiring information → (page 8-1)

HINWEIS	NOTICE
Folgende Wartungshinweise beachten: **1** Die Einstellung der Bowdenzüge muss nach den ersten 100 Schaltoperationen kontrolliert und gegebenenfalls nachjustiert werden! **2** Nach je weiteren 1000 Schaltoperationen oder mindestens nach jedem Jahr muss die Einstellung der Verriegelung kontrolliert und gegebenenfalls nachjustiert werden! **3** Bei der Kontrolle sind die Bowdenzüge auf Knick- und Scheuerstellen, aufgespleißte Drähte der Stahlseele, Beschädigungen der Schlauchfassungen und der Justageeinheit (Schlauchfassung mit Einstellgewinde und Mutter) zu überprüfen und gegebenenfalls auszuwechseln. Außerdem ist die Leichtgängigkeit beweglicher Teile der Verriegelungsmechanik in ihren Lagern zu prüfen. **4** Bei erschwerten Umgebungsbedingungen, z. B. erhöhte Umgebungstemperatur oder starkes Verschmutzungspotential, müssen diese Wartungszyklen angepasst verringert werden! **5** Bei Strombahnwartung der Leistungsschalter, spätestens nach Erreichung der maximal zulässigen elektrischen Lastwechsel der jeweiligen Baugröße, sind die Verschleißteile der Verriegelung zu wechseln. → Tabelle (Seite 19-17).	The following maintenance advises have to be taken into account: **1** The adjustment of the bowden cables needs to be checked after the first 100 switching operations and has to be readjusted if necessary! **2** The adjustment of the mutual interlocking device needs to be checked and if necessary readjusted every 1000 operations or at least once every year! **3** During the inspection, the bowden cables have to be checked against kinks and grinding points, split wires of the steel soul, damages of the tube settings and the adjustment unit (tube setting with thread and nut) and have to be readjusted if necessary! In addition, the movability of movable parts of the interlocking device in their bearings needs to be examined. **4** At aggravated environmental conditions e.g. increased environmental temperature or strong pollution potential the cycles of maintenance have to be reduced! **5** When maintaining the pole assembly of the circuit breaker, but not later than at the maximum number of electrical operations, the wearing parts of the interlocking device have to be replaced. → table (page 19-17).

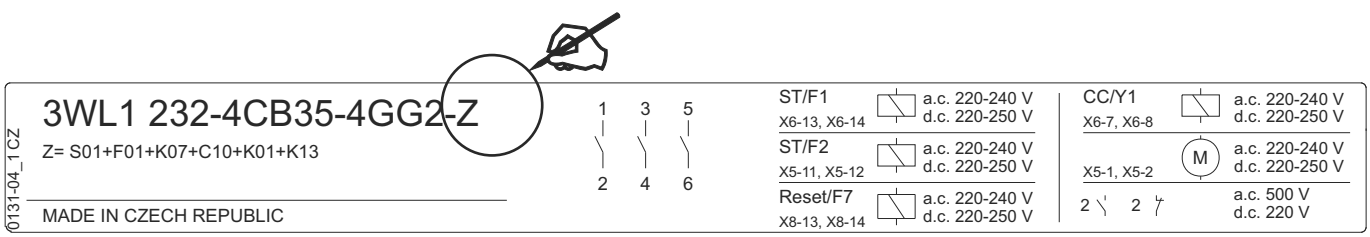
19.3.4 Schilder aktualisieren

19.3.4 Updating labels

Hinweis	Note
Nach dem Einbau zusätzlicher Komponenten sind folgende Angaben mit einem weißen Permanentstift bzw. mit Aufklebern aus dem beiliegenden Etikettenbogen zu aktualisieren! Davor ist es ggf. notwendig die zu korrigierenden Zeichen mit einem schwarzen Permanentstift zu füllen.	After installing additional components, add the following data using a white and indelible ink pen or the appropiate label from the set of labels supplied! If necessary the signs which need to be corrected have to be filled with a black permanent pen before.

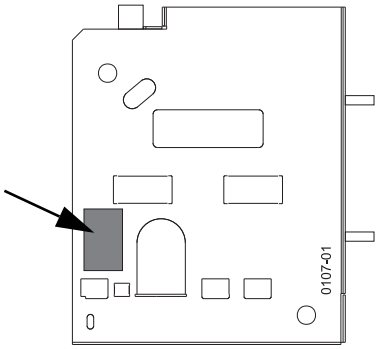
Ausstattungsschild des Leistungsschalters

Circuit Breaker options label



Typschild des Einschubrahmens

Type label guide frame



Kennzeichen „weitere Optionen“
Supplement „further options“



Bestellnummern / Z-Zusätze

Order numbers / Z-options

Gegenseitige mechanische Schalterverriegelung **Mutual mechanical interlocking**		**Bestellnummern** **Order numbers**	**Z ergänzen / Add. Z**	
			Schalter / Breaker	**Einschubrahmen / Guide frame**
Für Festeinbauschalter [1] For fixed-mounted circuit breaker [1]	Version 2 version 2	3WL9111-0BB21-0AA0	S55	-
Für Einschubrahmen [1] For guide frame [1]		3WL9111-0BB22-0AA0	-	R56
Für Einschubschalter For draw-out circuit breaker		3WL9111-0BB23-0AA0	R57	-
Für Einschubpaket [1] For draw-out package [1]		3WL9111-0BB24-0AA0	R55	-
Adapter für Baugröße III, Einschubschalter Adapter for Frame Size III, draw-out circuit breaker		3WL9111-0BB30-0AA0		
Verschleißteile der Verriegelung **Wearing parts of the mutual mechanical interlocking module**				
1 Bowdenzug 2000 mm (M5) 1 Bowden wire 2,000 mm (M5)	für Verriegelungs-baustein Version 1 interlocking module version 1	3WL9111-0BB25-0AA0	-	-
1 Bowdenzug 3000 mm (M5) 1 Bowden wire 3,000 mm (M5)		3WL9111-0BB26-0AA0	-	-
1 Bowdenzug 4500 mm (M5) 1 Bowden wire 4,500 mm (M5)		3WL9111-0BB27-0AA0	-	-
1 Bowdenzug 2000 mm (M8 x 1) 1 Bowden wire 2,000 mm (M8 x 1)	für Verriegelungs-baustein Version 2 interlocking module version 2	3WL9111-0BB45-0AA0	-	-
1 Bowdenzug 3000 mm (M8 x 1) 1 Bowden wire 3,000 mm (M8 x 1)		3WL9111-0BB46-0AA0	-	-
1 Bowdenzug 4500 mm (M8 x 1) 1 Bowden wire 4,500 mm (M8 x 1)		3WL9111-0BB47-0AA0	-	-
1 Kupplung am Schalter (mit Ring) 1 Coupling (with ring)		3WL9112-8AH47-0AA0	-	-
Muss ein Verriegelungsbaustein der Version 1 und der Version 2 miteinander in Funktion gebracht werden, sind die dazugehörigen Bowdenzüge (siehe Bestell-MLFB) zu verwenden. If version 1 and version 2 of locking devices should be used in combination, the corresponding bowden cables (see ordering MLFB) have to be used.				

[1] Mit Bowdenzug 2000 mm.

[1] With bowden wire 2000 mm.

20 Phasentrennwände

Als Störlichtbogenbarrieren können vom Anlagenbauer Phasentrennwände aus Isoliermaterial hergestellt werden. An der Rückwand der Festeinbauschalter bzw. der Einschubrahmen sind Führungsnuten und Befestigungslöcher vorhanden.

Verwendbares Material

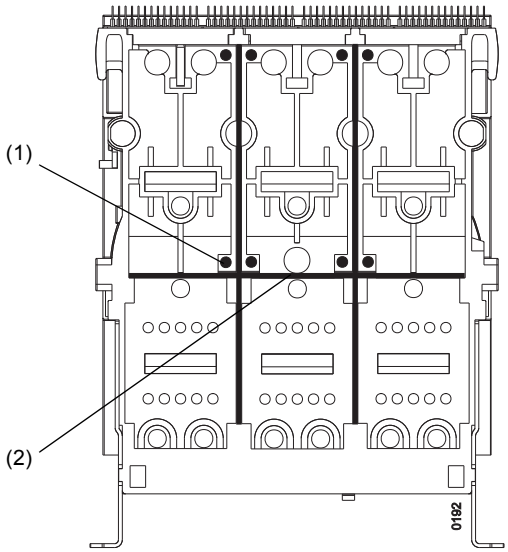
- NEMA GPO-3-Material, mind. 2,3 mm / 0,091",
  max. 4,0 mm / 0,157" dick:
  z.B. G-Etronax PM GPO-3 der Firma Isola AG
- oder vergleichbares Material:
- z.B. Durapol FR-HA2 der Firma Isola AG

20 Phase barriers

The panel manufacturer can provide phase barriers made of insulating material as a short-circuit barrier. The necessary guide slots and fixing points are provided on the rear wall of the fixed-mounted circuit breakers and the guide frames.

Suitable material

- NEMA GPO-3, min. thickness 2.3 mm / 0.091",
  max. thickness 4.0 mm / 0.157"
  e.g. G-Etronax PM GPO-3 manufactured by Isola AG
- or comparable material:
- e.g. Durapol FR-HA2 manufactured by Isola AG

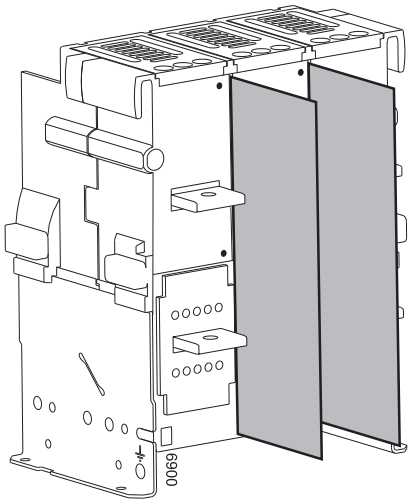


(1) 8 Befestigungslöcher für selbstschneidende Schrauben ∅ 4,2 mm, Einschraubtiefe max. 16 mm
(2) Führungsnut 4 mm breit

(1) 8 mounting holes for self-tapping screw ∅ 4.2 mm, / 0.165“ screw-in depth max. 16 mm / 0.63“
(2) Guide slot 4 mm / 0.157“ wide

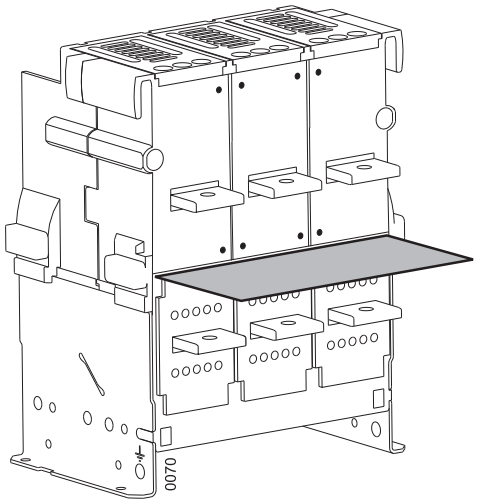
20.1 Festeinbau

Vertikal **Vertical**



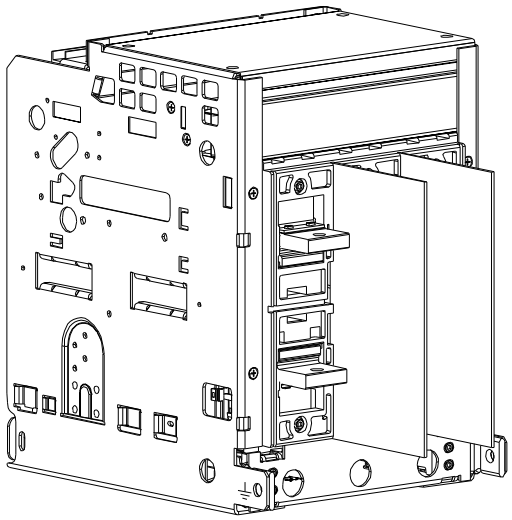
20.1 Fixed version

Horizontal **Horizontal**



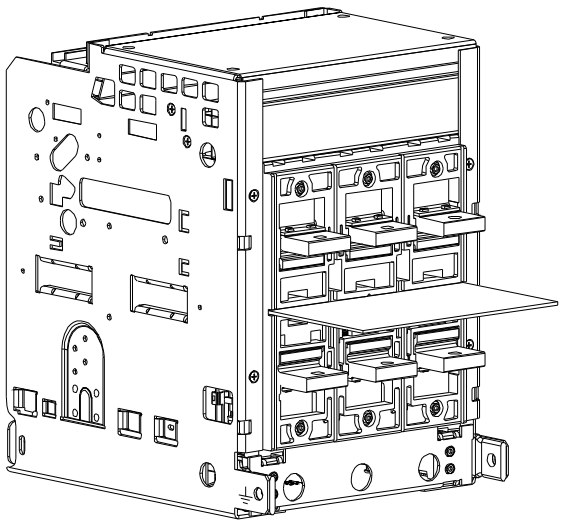
20.2 Einschubtechnik

Vertikal **Vertical**



20.2 Draw out version

Horizontal **Horizontal**



21 Lichtbogenkammerabdeckungen

Die Lichtbogenkammerabdeckung steht als optionale Zusatzausrüstung für Einschubrahmen zur Verfügung.

Sie dient dem Schutz von Schaltanlagenteilen, die sich unmittelbar über dem Leistungsschalter befinden.

21.1 Nachrüsten

GEFAHR

Gefährliche Spannung.

Kann Tod, schwere Personenschäden sowie Schäden an Geräten und Ausrüstung bewirken.

Vor dem Arbeiten an diesem Gerät, Anlage unbedingt spannungsfrei schalten sowie das Gerät erden.

Leistungsschalter ausschalten und aus dem Einschubrahmen herausnehmen.



- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Schalter aus dem Einschubrahmen entnehmen → (Seite 24-4)

21 Arc chute covers

The arc chute cover is an accessory for guide frames.

The cover is provided to protect switchgear components which are located directly above the circuit breaker.

21.1 Retrofitting

DANGER

Hazardous voltages.

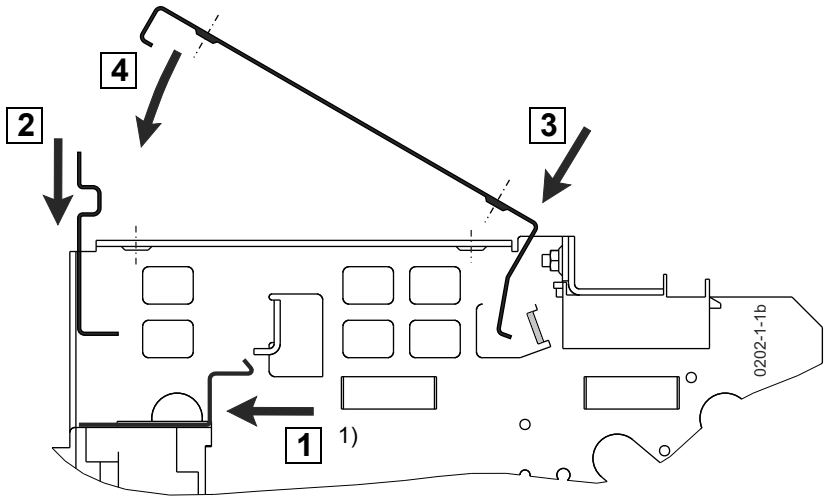
Will cause death, serious personal injury, or equipment/property damage.

Always de-energize and ground equipment before working on this equipment.

Open circuit-breaker, and remove from guide frame.

- Switch off and discharge the spring storage → (page 24-3)
- Remove the breaker from the guide frame → (page 24-4)

21.1.1 Baugröße I und II



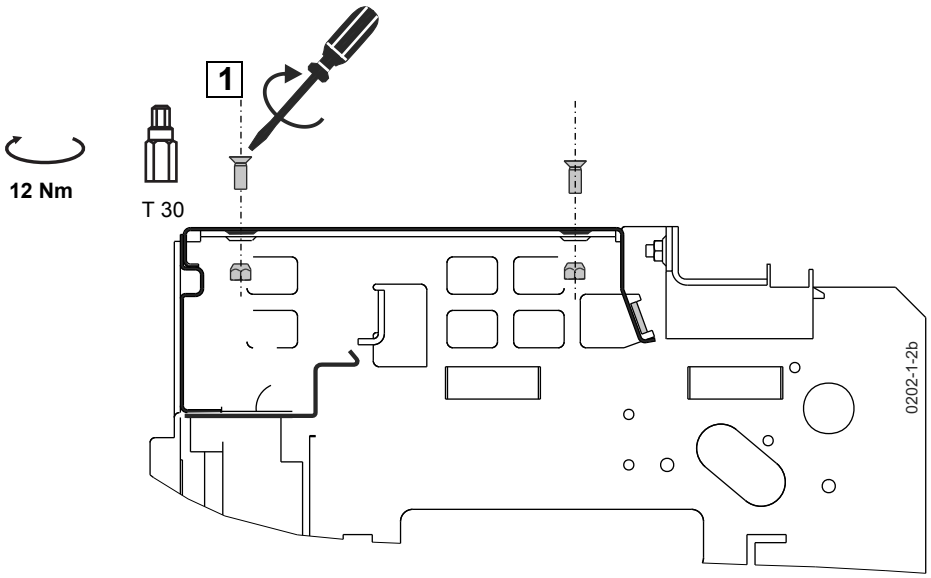
1 Abschottblech auf Kunststoffrückwand auflegen und Konturen ineinander ausrichten.
2 „Haube hinten“ einsetzen
3 „Haube oben“ hinter Befestigungslappen der Seitenwände einführen und
4 auf den Einschubrahmen auflegen

1) Abbildung kann vom Original abweichen

21.1.1 Frame size I and II

1 Insert partition on plastic back and adjust the contours to each other.
2 Insert "rear cover"
3 Insert "upper cover" behind fixing strap of side walls and
4 lay on guide frame

1) Image may differ from original

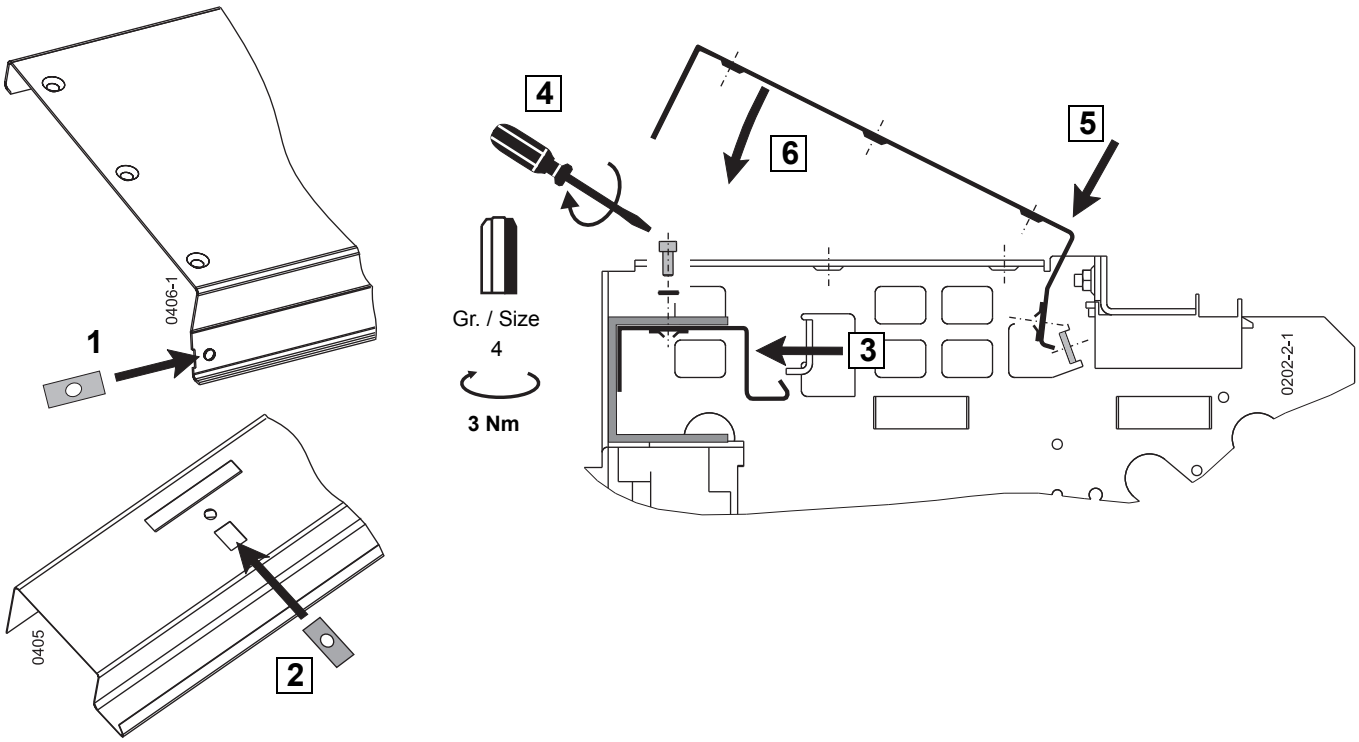


1 „Haube oben“ befestigen:4 x M6 x 16 mit Kegelmutter

1 Fixing „upper cover":4 x M6 x 16 with cone nut

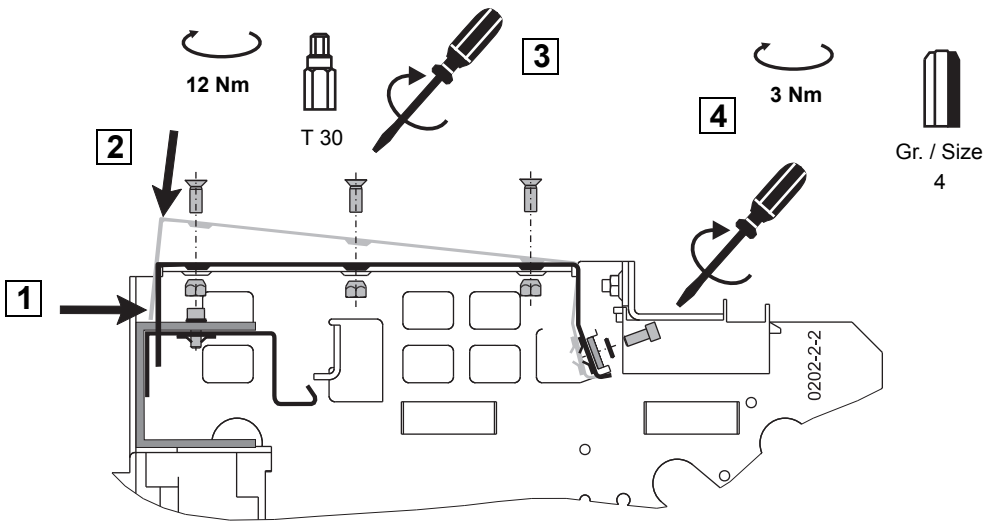
21.1.2 Baugröße III

21.1.2 Frame size III



1 Je ein Befestigungsblech über rechte und linke Befestigungsbohrungen der Haube schieben
2 Befestigungsbleche in Abschottblech einsetzen
3 Abschottblech in den Querträger einlegen
4 und befestigen: 2 x M5 x 12 mit Spannscheibe
5 Haube hinter Befestigungslappen der Seitenwände einführen und
6 absenken

1 Slip one quick nut each over the right-side and left-side fixing holes of the cover
2 Insert quick nuts in partition
3 Lay partition into cross member
4 and fix: 2 x M5 x 12 with conical spring washer
5 Insert cover behind fixing strap of side walls and
6 set down



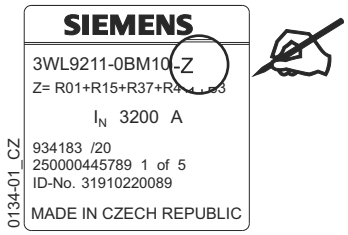
1 Hintere Arretierungszungen der Haube in die Schlitze des Querträgers drücken
2 Haube herunter drücken
3 Haube befestigen:6 x M6 x 16 mit Kegelmutter
4 2 x M5 x 12 mit Spannscheibe

1 Press rear cover retainers into the slots of the cross member
2 Press cover down
3 Fix cover: 6 x M6 x 16 with cone nut
4 2 x M5 x 12 with conical spring washer

21.2 Typschild Einschubrahmen aktualisieren

21.2 Updating the guide frame type label

Hinweis	Note
Nach dem Einbau zusätzlicher Komponenten sind folgende Angaben mit einem weißen Permanentstift bzw. mit Aufklebern aus dem beiliegenden Etikettenbogen zu aktualisieren! Davor ist es ggf. notwendig die zu korrigierenden Zeichen mit einem schwarzen Permanentstift zu füllen.	After installing additional components, add the following data using a white and indelible ink pen or the appropiate label from the set of labels supplied! If necessary the signs which need to be corrected have to be filled with a black permanent pen before.



21.2.1 Bestellnummern / Z-Zusatz

21.2.1 Order numbers / Z-option

	Polzahl No. of poles	Baugröße Frame size	Bestell-Nummer Order number	Z ergänzen Add Z
Lichtbogenkammerabdeckung für Einschubrahmen Arc chute cover for Guide frame	3	I	3WL9111-0AS32-0AA0	R10
		II	3WL9111-0AS36-0AA0	
		III	3WL9111-0AS38-0AA0	
	4	I	3WL9111-0AS42-0AA0	
		II	3WL9111-0AS44-0AA0	
		III	3WL9111-0AS46-0AA0	

22 Türdichtungsrahmen IP41

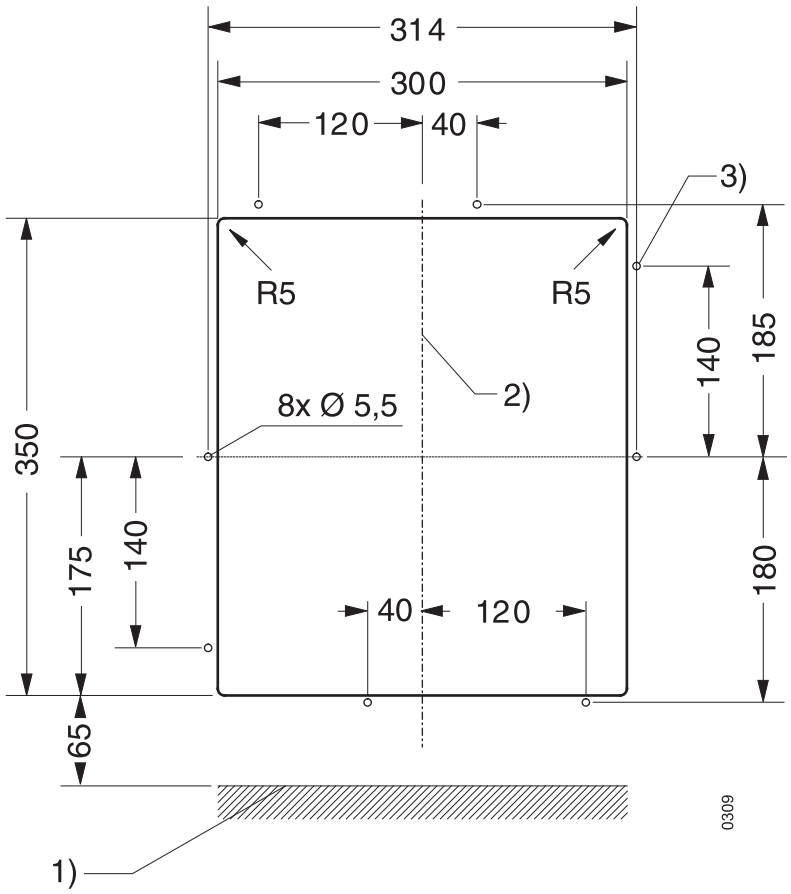
Maßbild des Türausschnittes

Vorderansicht der Schaltschranktür

22 Door sealing frame IP41

Dimension drawing of door cutout

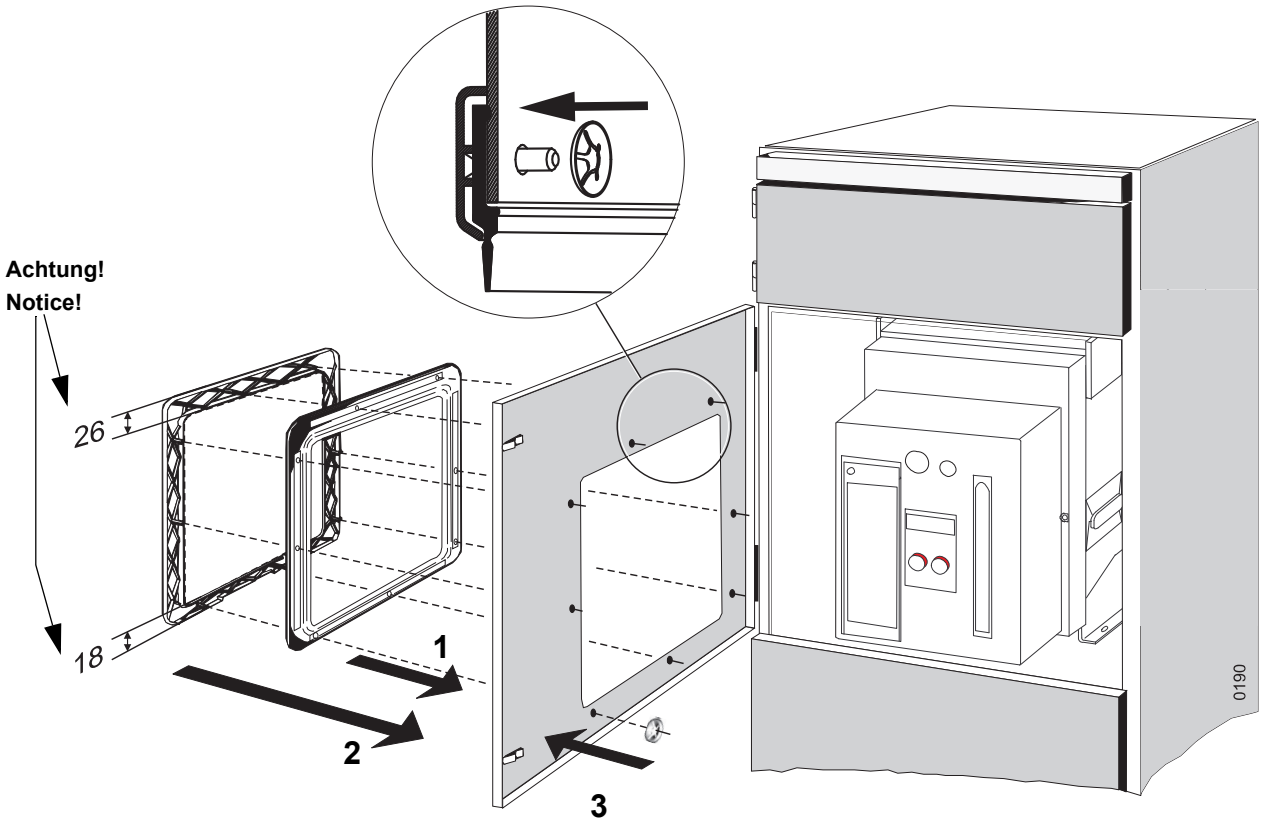
Frontview of the cubicle door



(1) Montagefläche des Schalters oder Einschubrahmens
(2) Mitte Bedienpult
(3) 8 Stück Montagebohrungen für Türdichtungsrahmen

(1) Mounting surface of circuit breaker or guide frame
(2) Centre of front panel
(3) Eight mounting holes for the door sealing frame

Türdichtungsrahmen einbauen **Installing the sealing frame**



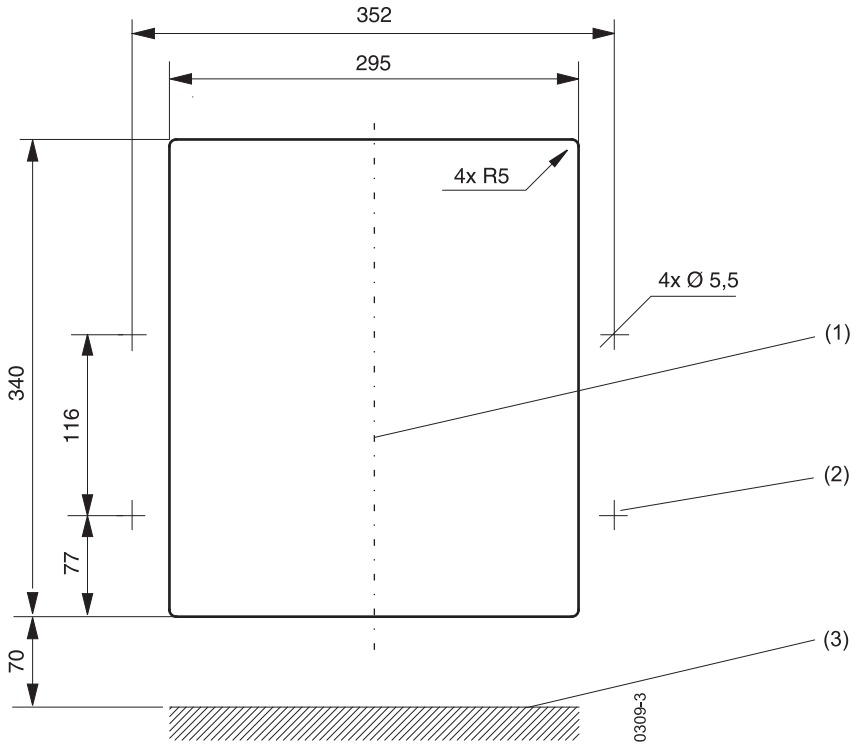
	Bestell-Nummer **Order number**
Türdichtungsrahmen Door sealing frame	3WL9111-0AP01-0AA0

23 Schutzabdeckung IP55

23.1 Ausführung mit Metall-Scharnieren

An der Schaltschranktür mit *zwei* Schrauben auf beiden Seiten der Haube befestigt.

23.1.1 Maßbild für Türausschnitt und Befestigungsbohrungen



(1) Mitte Bedienpult
(2) 4 Montagebohrungen für Scharniere
(3) Montagefläche des Schalters oder des Einschubrahmens

23 Protective cover IP55

23.1 Version with metal hinges

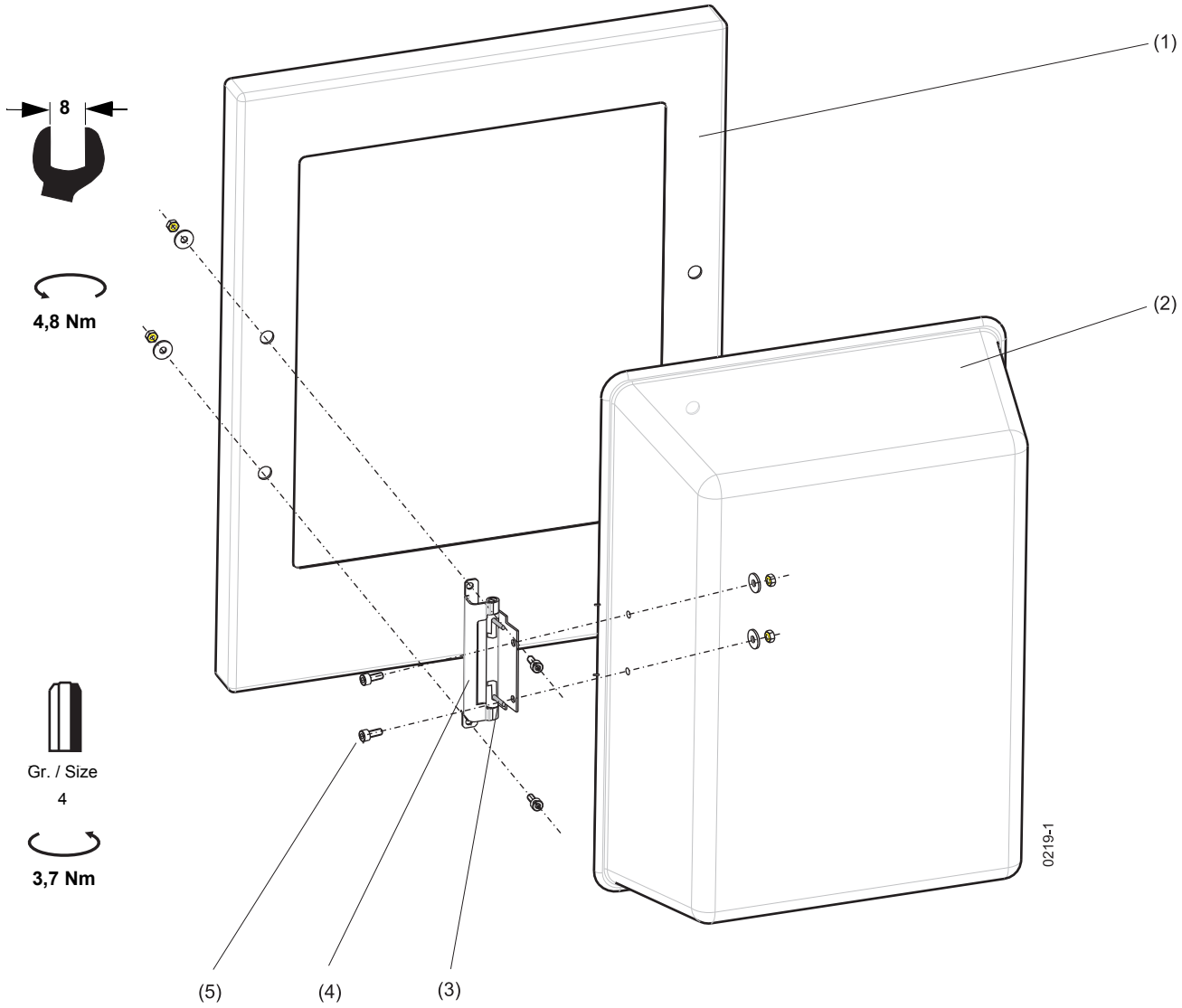
Attached to the cubicle door with *two* bolts on either side of the cover

23.1.1 Dimension drawing for door cutout and mounting holes

(1) Center of breaker front panel
(2) 4 mounting holes for hinges
(3) Mounting surface of circuit breaker or guide frame

23.1.2 Anbau der Schutzabdeckung

23.1.2 Mounting the protective cover



(1) Schaltschranktür mit Türausschnitt
(2) Schutzabdeckung
(3) Verriegelungshebel, 2 x je Scharnier
(4) 2 x Scharnier mit Öffnungsfunktion (rechts und links)
(5) 8 x Innensechskantschraube M5 mit Scheibe und Sicherungsmutter

(1) Cubicle door with door cut out
(2) Shrouding cover
(3) Hinge pin, 2 per hinge
(4) 2 x hinge (right and left) with opening function
(5) 8 x Hexagon socket screw M5 with washer and safety nut

Anbau des Scharniers an der rechten Seite in gleicher Weise.

Installation of the right side hinge in the same fashion.

23.1.3 Handhabung

Zum Öffnen der Haube erst beide Verriegelungshebel (3) eines Scharniers zur Scharniermitte hin entriegeln und die Haube an den Seiten leicht zusammendrücken. Zum Abnehmen der Haube zuerst beide Scharniere entriegeln.

23.1.3 Handling

To open the cover first push both hinge pins (3) towards the hinge-center and press the cover-sides gently together. Release both hinges to remove the cover.

23.1.4 Bestellnummer

23.1.4 Order number

	Bestellnummer / Order number
Schutzabdeckung mit Metall-Scharnieren Protective cover with metallic hinges	3WL9111-0AP03-0AA0

23.2 Ausführung mit Kunststoff-Scharnieren

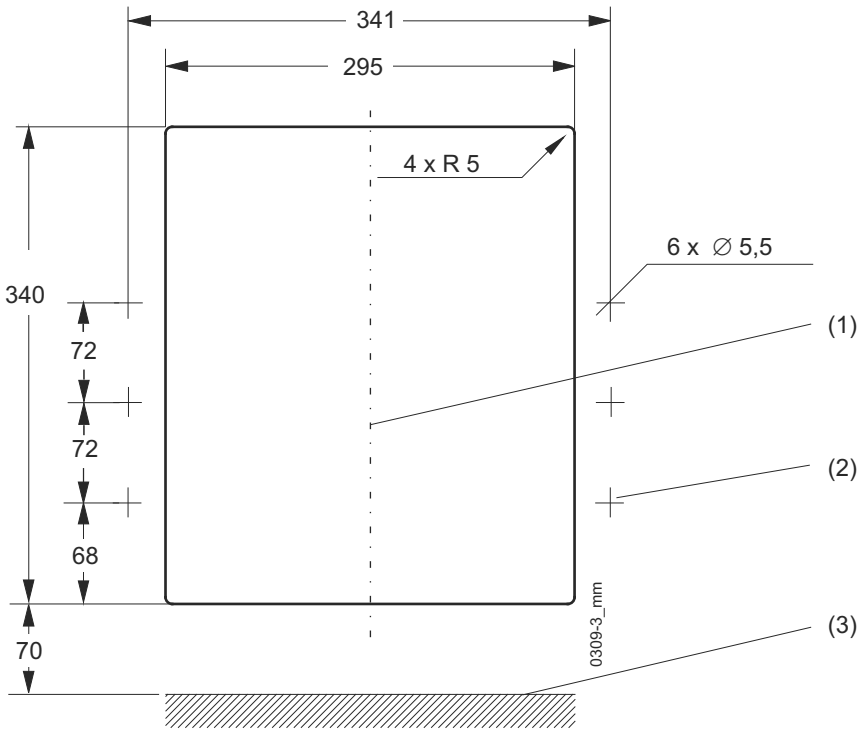
An der Schaltschranktür mit *drei* Schrauben auf beiden Seiten der Haube befestigt.

23.2.1 Maßbild für Türausschnitt und Befestigungsbohrungen

23.2 Version with plastic-hinges

Attached to the cubicle door with *three* bolts on either side of the cover

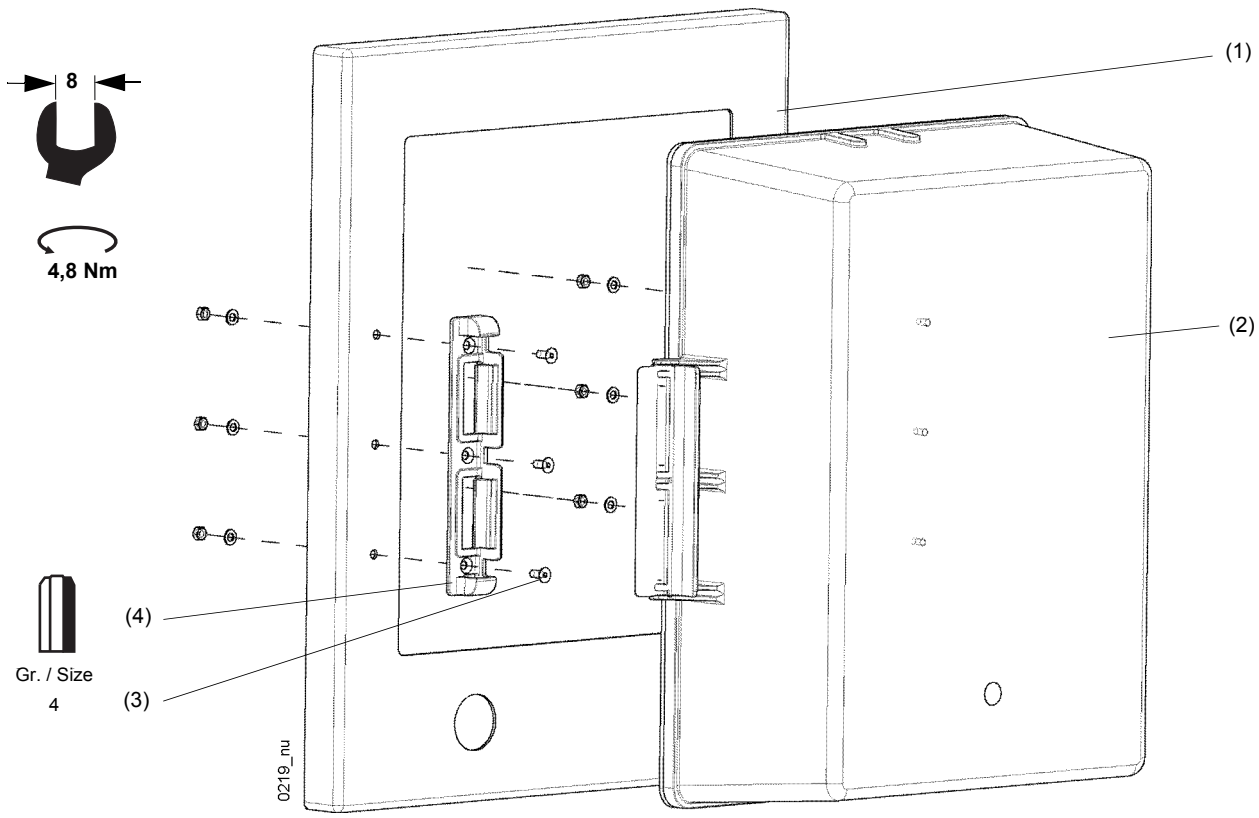
23.2.1 Dimension drawing for door cutout and mounting holes



(1) Mitte Bedienpult
(2) 6 Montagebohrungen für Scharniere
(3) Montagefläche des Schalters oder des Einschubrahmens

(1) Centre of breaker front panel
(2) 6 holes for mounting hinges
(3) Guide frame mounting surface

23.2.2 Anbau der Schutzabdeckung



(1) Schaltschranktür mit Türausschnitt
(2) Schutzabdeckung
(3) 6 x Innensechskantschraube M5 mit Scheibe und Sicherungsmutter
(4) Scharnier mit Öffnungsfunktion (rechts und links)

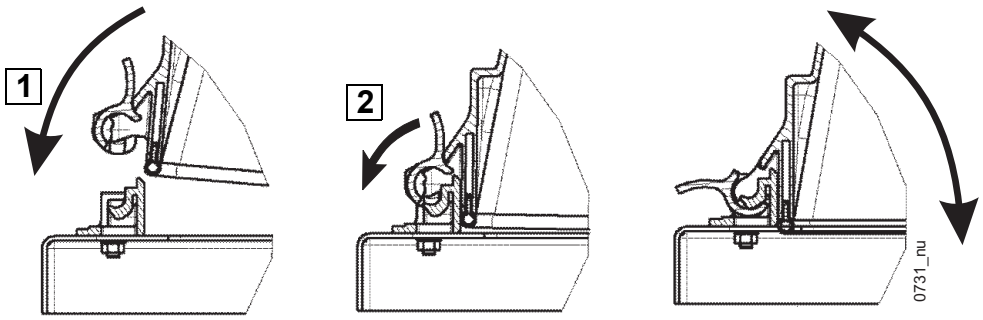
Anbau des Scharniers an der rechten Seite in gleicher Weise.

23.2.2 Mounting the protective cover

(1) Cubicle door with door cutout
(2) Protective cover
(3) 6 x Hexagon socket-head screw M5 with washers and safety nuts
(4) Hinges with opening function (right and left)

Installation of the right side hinge in the same fashion.

23.2.3 Handhabung



23.2.4 Bestellnummer

23.2.4 Order number

	Bestellnummer / Order number
Schutzabdeckung mit Kunststoff-Scharnieren Protective cover with plastic hinges	3WL9111-0AP02-0AA0

24 Wartung

GEFAHR

Beim Betrieb elektrischer Geräte stehen zwangsläufig bestimmte Teile dieser Geräte unter gefährlicher Spannung.
Unsachgemäßer Umgang mit diesen Geräten kann deshalb zu Tod oder schweren Körperverletzungen sowie erheblichen Sachschäden führen.

Beachten Sie daher bei Instandhaltungsmaßnahmen an diesem Gerät alle in diesem Kapitel und auf dem Produkt selbst aufgeführten Hinweise.
Die Instandhaltung darf nur durch entsprechend qualifiziertes Personal erfolgen.
Vor Beginn der Arbeiten muss der spannungsfreie Zustand der Schaltanlage hergestellt und während der Arbeiten sichergestellt werden (gemäß EN 50 110-1, DIN VDE 0105-100 und BGV A2).
Die fünf Sicherheitsregeln sind einzuhalten:

- Freischalten
- Gegen Wiedereinschalten sichern
- Spannungsfreiheit feststellen
- Erden und Kurzschließen
- Benachbarte, unter Spannung stehende Teile abdecken oder abschranken

Das Gerät ist vom Netz zu trennen.
Es dürfen nur vom Hersteller zugelassene Ersatzteile verwendet werden.
Die vorgeschriebenen Wartungsintervalle sowie die Anweisungen für Reparatur und Austausch sind unbedingt einzuhalten, um Schäden an Personen und Anlagen zu vermeiden.











24 Maintenance

DANGER

Hazardous voltages are present in this electrical equipment during operation.

Failure to properly maintain the equipment can result in death, severe personal injury or substantial property damage.

The instructions contained in this chapter and on product labels have to be followed.

Maintenance shall be performed only by qualified personnel.

Before beginning to work, de-energize the panel and secure the de-energized state during work (according to EN 50 110-1, DIN VDE 0105-100 and BGV A2).

Observe the Five Safety Rules.

- Disconnecting
- Securing against reclosing
- Checking safe insolation from supply
- Earthing and short-circuiting
- Covering or providing barriers to adjacent live parts

Disconnect the equipment from the supply.
Use only authorized spare parts in the repair of the equipment.

The inspection intervals as well as the instructions for repair and replacement shall be duly observed, to avert damages from persons and gear.

Qualifiziertes Personal



Qualified Person

im Sinne dieser Bedienungsanleitung bzw. der Warnhinweise auf dem Produkt selbst sind Personen, die mit Aufstellung, Montage, Inbetriebsetzung und Betrieb des Produktes vertraut sind und über die ihrer Tätigkeit entsprechenden Qualifikationen verfügen, wie z. B.:

d) Ausbildung oder Unterweisung bzw. Berechtigung, Stromkreise und Geräte / Systeme gemäß den Standards der Sicherheitstechnik ein- und auszuschalten, zu erden und zu kennzeichnen.
e) Ausbildung oder Unterweisung gemäß den Standards der Sicherheitstechnik in Pflege und Gebrauch angemessener Sicherheitsausrüstung.
f) Schulung in Erster Hilfe.

For the purpose of this instruction manual and product labels, a “qualified person” is one who is familiar with the installation, construction and operation of the equipment and the hazards involved and who, in addition, has the following qualifications:

a) Is trained and authorized to energize, de-energize, clear, earth and tag circuits and equipment in accordance with established safety practices.

b) Is trained in the proper care and use of protective equipment in accordance with established safety practices.

c) Is trained in rendering first aid.

In Abhängigkeit von den jeweiligen Betriebsbedingungen sind die Lichtbogenkammern und das Kontaktsystem zu inspizieren. Insbesondere nach erfolgter Kurzschlussabschaltung ist deren Zustand noch vor dem erneuten Einschalten zu kontrollieren.

Strombahnen sind je nach Zustand zu wechseln, jedoch spätestens nach Anzahl Nennstromabschaltungen gemäß folgender Tabelle.

The arc chutes and contact system must be inspected according to these operation instructions. If a fault condition opens the circuit breaker, the circuit breaker should be inspected before it is put back into service.

Contact assemblies need to be changed according to their condition, but at least after the number of switching operations given in the table.

Maximale Anzahl Nennstromabschaltungen / maximum number of switching operations					
Baugröße Frame size	**Bemessungsbetriebsspannung U_e Rated operational voltage U_e**			**Bemessungsbetriebsspannung U_e Rated operational voltage U_e**	
	bis / up to 690 V AC	**bis / up to 1000 V AC**	**bis / up to 1150 V AC**	**600 V DC**	**1000 V DC**
I	10000 / 7500[a)]	1000	--	--	1000
II	7500 / 4000[b) c)]/ 2000[d)]	1000	500	6000	1000
III	2000 / 1000[e)]	1000	500	--	--

a) Baugröße I, 2000 A, Schaltvermögen H

b) Baugröße II, 3200 A

c) Baugröße II, Schaltvermögen C

d) Baugröße II, 4000 A

e) Baugröße III, Schaltvermögen C

a) Frame Size I, 2000 A, breaking capacity H

b) Frame Size II, 3200 A

c) Frame Size II, breaking capacity C

d) Frame Size II, 4000 A

e) Frame Size III, breaking capacity C

Der Betreiber hat in Abhängigkeit von den Einsatzbedingungen des Schalters Inspektionsintervalle festzulegen:

- mindestes 1 x pro Jahr
- nach schweren Abschaltungen
- nach Auslösen des elektronischen Überstromauslösers
- nachgeschaltete Leistungstrennschalter sind ebenfalls zu prüfen

The switchgear operator has to determine inspection intervals depending on the breaker application conditions:

- min. 1 x per annum
- after interruption of heavy loads
- after trips by the overcurrent release (trip unit)
- down stream connected non-automatic circuit breakers have to be inspected as well

Im Rahmen der Inspektionen und/oder nach 1000 (500 bei 1150 V-Einsatz) Nennstromabschaltungen sind zu kontrollieren:
(max. Schaltspiele entsprechend Katalogangaben)

- Lichtbogenkammern und Kontaktsystem
- elektrische u. mechanische Funktionen des Schalters
- Funktion der mechanischen Ein- und Ausschaltung
- Haupt- und Steuerstromkreise, Funktion und Anschlüsse auf festen Sitz prüfen
- Einstellungen des elektronischen Überstromauslösers sind auf Plausibilität und entsprechend den Anlagenverhältnissen zu überprüfen, ggf. zu korrigieren

During the inspection and/or after 1000 (500 for 1150 V application) switching operations, the following items must be examined:
(max. operations see catalog)

- arc chutes and contact systems
- electrical and mechanical functionality of the breaker
- mechanical on- / off-functionality
- main and auxiliary circuits, function and connecting quality
- plausibility control of trip unit settings and correction, if necessary

Lichtbogenkammerabdeckung am Einschubrahmen sind spätestens nach drei Kurzschlussabschaltungen des Leistungsschalters auszutauschen. Nach Erreichen der Lebensdauer ist die Entsorgung des Schaltgerätes/ ausgetauschter Teile gemäß den geltenden rechtlichen Bestimmungen durch den Betreiber zu veranlassen.

Draw-Out guide frames with arc-chute covers installed, have to be replaced after no more than three short-circuit interruptions of the circuit breaker. If the breaker endurance is exhausted, then the breaker and old spare parts need to be disposed off, according to the effective legal regulations.

Je nach Zustand, spätestens jedoch nach 10 000 Schaltungen sind die Lichtbogenkammern und das Kontaktsystem zu erneuern.

Ebenso kann es abhängig von der Beanspruchung des Leistungsschalters erforderlich sein, das Antriebssystem nach 10 000 Schaltungen auszutauschen.

The arc chutes and the contact system must be replaced depending upon their condition, but latest after 10,000 switching operations.

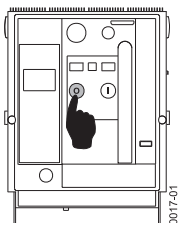
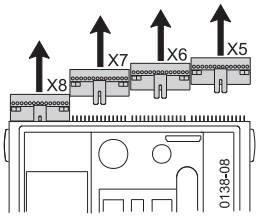
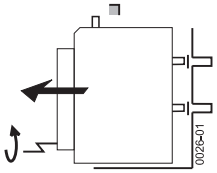
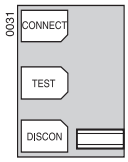
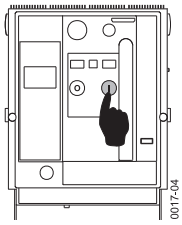
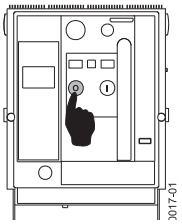
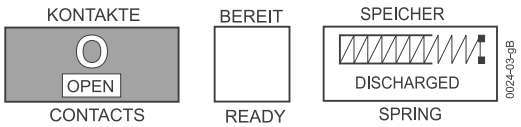
Depending on the circuit breaker stress it may also be necessary to replace the operating system after 10,000 switching operations.

24.1 Vorbereitung von Wartungsarbeiten

24.1.1 Schalter ausschalten und Federspeicher entspannen

24.1 Preparation for maintenance

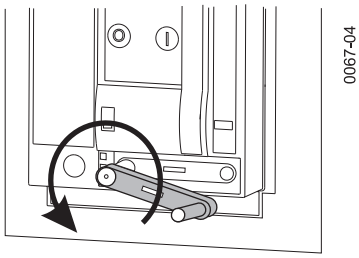
24.1.1 Opening the circuit breaker and discharging the stored energy springs

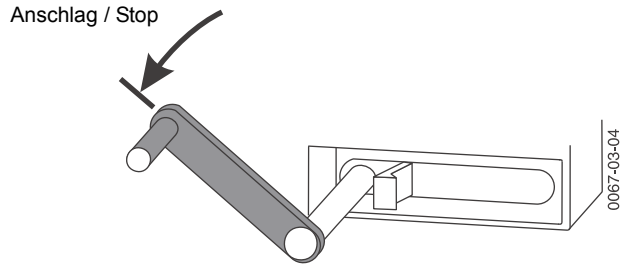
	Festeinbauschalter / Fixed-mounted breaker	Einschubschalter / Draw-out breaker
1 **AUS/** **OFF**		
2 **Hilfstromkreise trennen** **Disconnect auxiliary circuits**		Hilfsstromkreis Auxiliary circuit  Positionsanzeige Position indicator grün green 
3 **EIN/** **ON**		
4 **AUS/** **OFF**		
5 **Zustandsanzeigen** **Indications**		

24.1.2 Schalter aus dem Einschubrahmen entnehmen

Schalter in Trennstellung kurbeln

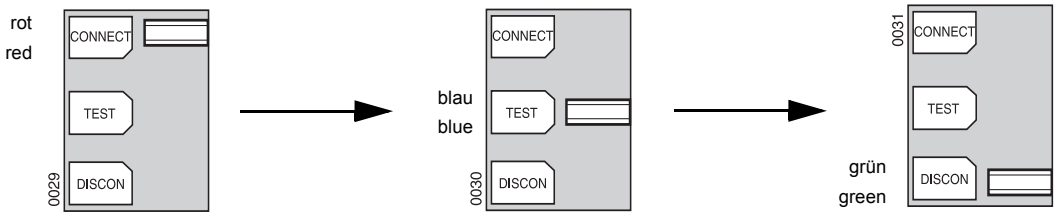
- Ausschalten → (Seite 6-6)
- Handkurbelsperre lösen und Handkurbel herausziehen → (Seite 6-3)



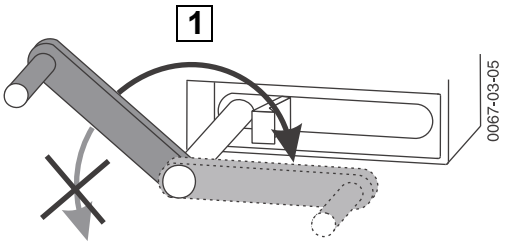


Positionsanzeige

Position indicator



Handkurbel einschieben

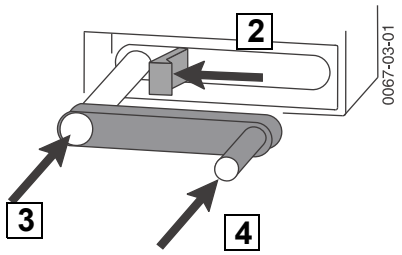


24.1.2 Removing the breaker from the guide frame

Cranking the breaker into the disconnected position

- Switch off → (page 6-6)
- Unlock racking handle / withdraw racking handle → (page 6-3)

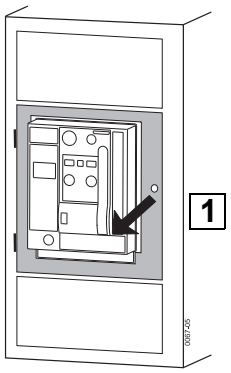
Push in the racking handle



Achtung	Notice
Mögliche Beschädigung durch Handkurbel Überdrehen der Handkurbel über den Anschlag hinaus kann den Einfahrantrieb beschädigen. Wenn der Anschlag erreicht ist, ist die Handkurbel *im Uhrzeigersinn* bis in die Position zu drehen, in der sie eingeschoben werden kann.	Possible damage using the racking handle Turn the racking handle beyond the stop may cause damage to the racking mechanism. When the stop is engaged, rotate the handle *clockwise* into a position to allow it to be stowed.

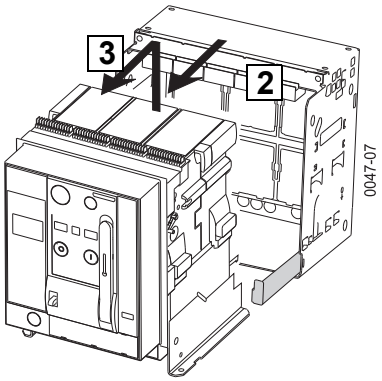
Schaltschranktür öffnen

Opening cubicle door



Schalter in Wartungsstellung ziehen und entnehmen

Pull circuit breaker to maintenance position and remove



24.2 Lichtbogenkammern prüfen

24.2.1 Lichtbogenkammer ausbauen

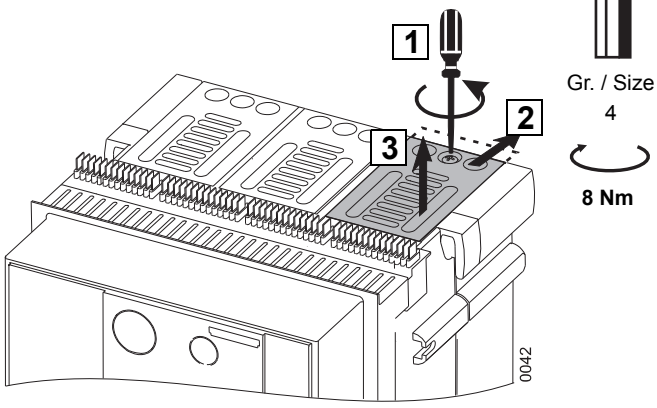
WARNUNG		WARNING
Vor Beginn der Arbeiten muss der spannungsfreie Zustand der Schaltanlage hergestellt und während der Arbeiten sichergestellt werden (gemäß EN 50 110-1, DIN VDE 0105-100 und BGV A2). Die fünf Sicherheitsregeln sind einzuhalten: - Freischalten - Gegen Wiedereinschalten sichern - Spannungsfreiheit feststellen - Erden und Kurzschließen - Benachbarte, unter Spannung stehende Teile abdecken oder abschranken Das Gerät ist vom Netz zu trennen.		Before beginning to work, de-energize the panel and secure the de-energized state during work (according to EN 50 110-1, DIN VDE 0105-100 and BGV A2). Observe the Five Safety Rules: - Disconnecting - Securing against reclosing - Checking safe insulation from supply - Earthing and short-circuiting - Covering or providing barriers to adjacent live parts Disconnect the equipment from the supply.

- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Einschubschalter in Wartungsstellung ziehen → (Seite 24-4)

- Switch off and discharge the storage spring → (page 24-3)
- Pull draw-out circuit breaker to maintenance position → (page 24-4)

VORSICHT		CAUTION
Bruchgefahr! Lichtbogenkammer nicht senkrecht auf die Isolierwände abstellen, sondern auf die Seite legen.		Risk of breaking! Do not place the arc chute vertically on the insulating walls, but lay it on the side.

U_e bis 690 V



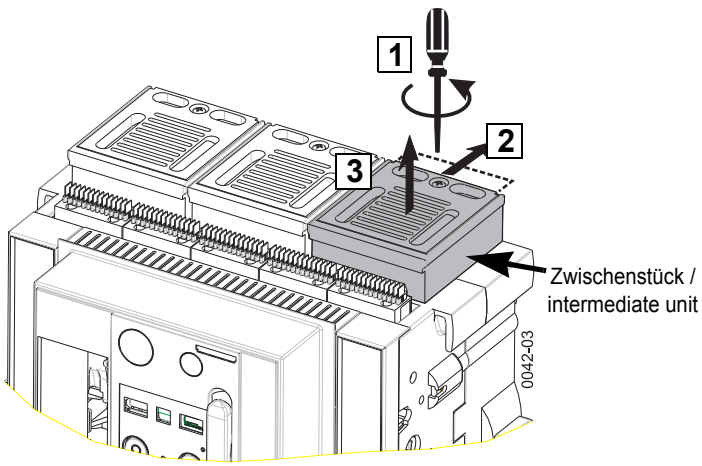
1 Schraube ca. 15 mm herausdrehen, nicht herausnehmen
2 Deckel zurückschieben
3 Lichtbogenkammer herausnehmen
(bei hoher Lichtbogenkammer mit Zwischenstück)

Baugröße I Einschubschalter mit hoher Lichtbogenkammer:

Vor der Entnahme der Zwischenstücke sind die Messerleistenadapter abzuschrauben und abzuziehen (siehe Bild).

U_e up to 690 V

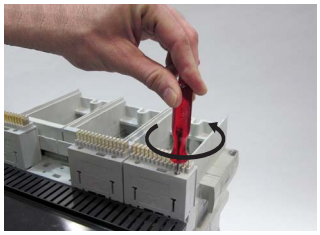
BG II Schaltvermögen C
BG I + II, U_e > 690 V



1 Loosen screw by approx. 15 mm, do not remove it
2 Push the cover back
3 Take out the arc chute
(for high arc chutes with intermediate unit)

Frame size I draw-out circuit breaker with high arc chute:

Before removing the intermediate unit, the receptacle adapters have to be unscrewed and pulled out (see picture).





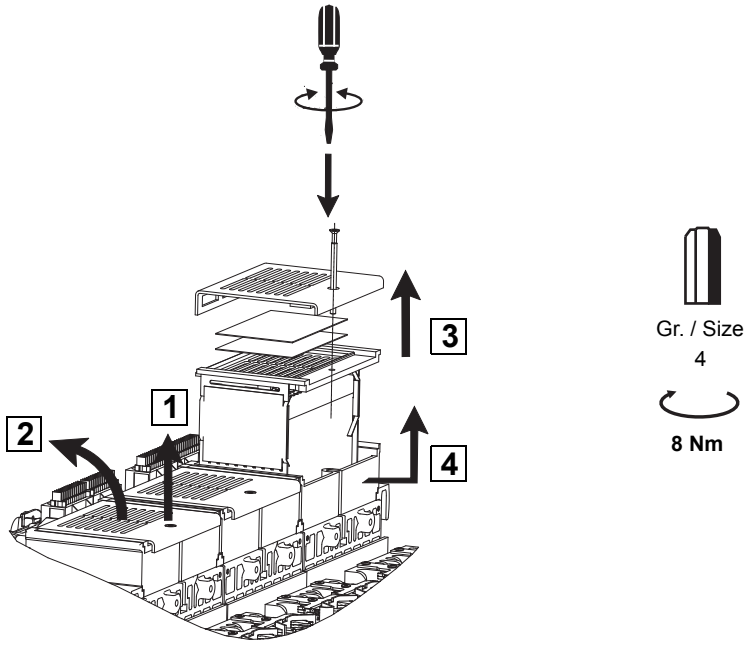
PH 1

FS II breaking capacity C
FS I + II U_e > 690 V

BG III U_e = 1000 V oder Schaltvermögen C

FS III U_e = 1000 V or breaking capacity C

WARNUNG		**WARNING**
Vor Beginn der Arbeiten muss der spannungsfreie Zustand der Schaltanlage hergestellt und während der Arbeiten sichergestellt werden (gemäß EN 50 110-1, DIN VDE 0105-100 und BGV A2). Die fünf Sicherheitsregeln sind einzuhalten: - Freischalten - Gegen Wiedereinschalten sichern - Spannungsfreiheit feststellen - Erden und Kurzschließen - Benachbarte, unter Spannung stehende Teile abdecken oder abschranken Das Gerät ist vom Netz zu trennen.		Before beginning to work, de-energize the panel and secure the de-energized state during work (according to EN 50 110-1, DIN VDE 0105-100 and BGV A2). Observe the Five Safety Rules: - Disconnecting - Securing against reclosing - Checking safe insulation from supply - Earthing and short-circuiting - Covering or providing barriers to adjacent live parts Disconnect the equipment from the supply.



1 Schraube herausdrehen
2 Blechdeckel anheben und abnehmen;
3 Lichtbogenkammer herausnehmen
4 Zwischenstück nach hinten schieben und herausnehmen

1 Unscrew the screw
2 Lift and remove the sheet metal cover
3 Remove the arc chute
4 Push back and remove the intermediate unit

24.2.2 Sichtprüfung vornehmen

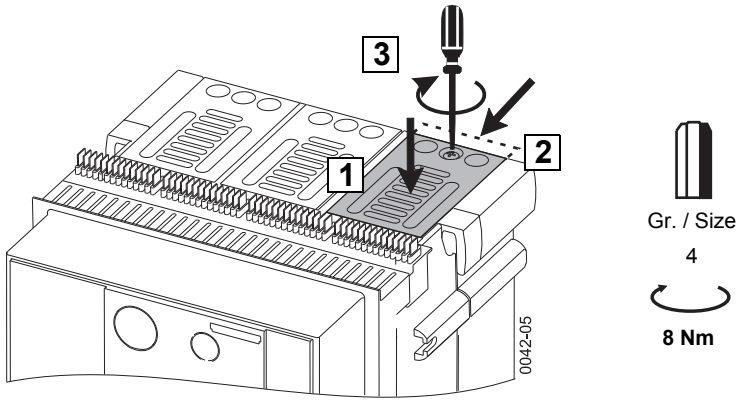
Bei starkem Verschleiß (Ausbrennungen an den Löschblechen) Lichtbogenkammern erneuern.

24.2.2 Visual inspection

In the case of heavy wear (burnout on arc splitter plates), replace the arc chutes.

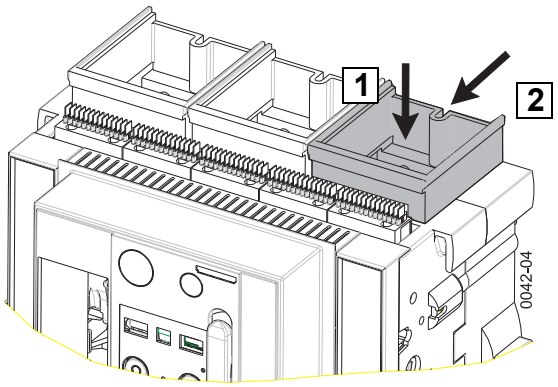
24.2.3 Lichtbogenkammer einbauen

U_e bis 690 V



1 Lichtbogenkammer einsetzen
2 Deckel vorschieben
3 Schraube festziehen

BG I + II mit U_e > 690 V
BG II Schaltvermögen C



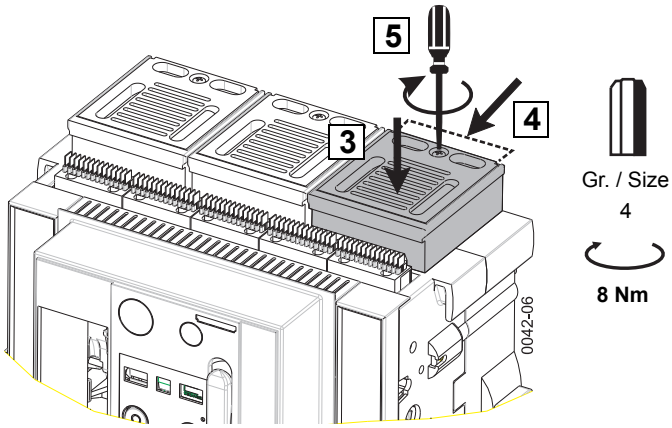
1 Zwischenstück einsetzen
2 Zwischenstück vorschieben
3 Deckel zurückschieben und Lichtbogenkammer einsetzen
4 Deckel vorschieben
5 Schraube festziehen
6 Wenn vorhanden, Messerleistenadapter aufsetzen und festschrauben → (Seite 24-5)

24.2.3 Installing arc chutes

U_e up to 690 V

1 Insert arc chute
2 Slide the cover into place
3 Tighten the screw

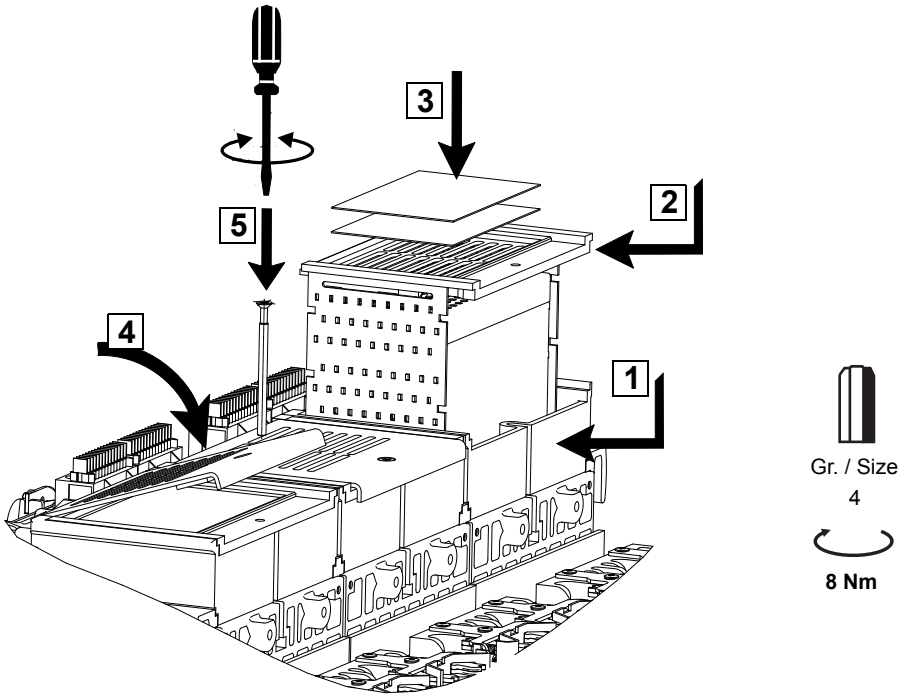
FS I and II with U_e > 690 V
FS II breaking capacity C



1 Install intermediate unit
2 Shift intermediate unit forward
3 Push cover back and insert arc chute
4 Slide the cover into place
5 Tighten the screw
6 If existent, put on the receptacle adapter and screw tight → (page 24-5)

BG III mit U_e = 1000 V oder Schaltvermögen C

FS III with U_e = 1000 V or breaking capacity C



1 Zwischenstück einsetzen und nach vorn schieben
2 Lichtbogenkammer einsetzen und Abdeckung nach vorn schieben
3 Siebe (2x) in Lichtbogenkammerabdeckung einlegen
4 Blechdeckel aufsetzen
5 Schraube einsetzen und festziehen

1 Install intermediate unit and push forward
2 Insert arc chute and push its cover towards the front
3 Insert sieve (2x) into arc chute cover
4 Apply sheet metal to cover
5 Tighten the screw

24.2.4 Bestellnummern

24.2.4 Order numbers

Spannung Voltage	Lichtbogenkammern für Baugröße ... Arc chutes for Frame size ...		Bestell-Nummer Order number
≤ 690 V	I		3WL9111-0AS01-0AA0
		Schaltvermögen H oder 2000 A / breaking capacity H or 2000 A	3WL9111-0AS07-0AA0
	II	Schaltvermögen N/S/H / breaking capacity N/S/H	3WL9111-0AS02-0AA0
		Schaltvermögen C / breaking capacity C	3WL9111-0AS10-0AA0
	III		3WL9111-0AS03-0AA0
1000 V	I	(Einschubausführung / withdrawable version)	3WL9111-0AS08-0AA0
		(Festeinbau / fixed-mounted version) AC (Z=A05 / A16)	3WL9111-0AS09-0AA0
		(Festeinbau / fixed-mounted version) DC (Z=A05)	3WL9111-0AS21-0AA0
1000 V 1150 V	II	Z=A05 / A15	3WL9111-0AS05-0AA0
	III	Z=A05	3WL9111-0AS06-0AA0

24.3 Kontaktabbrand prüfen

GEFAHR

Gefährliche elektrische Spannung!

Kann Tod, schwere Personenschäden sowie Schäden an Geräten und Ausrüstung bewirken.

Vor dem Arbeiten an diesem Gerät, Anlage unbedingt spannungsfrei schalten.



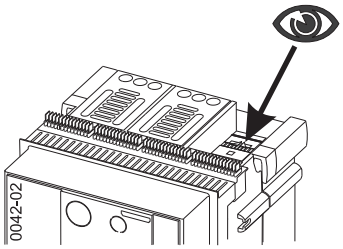
WARNUNG

Kann Tod oder Personenschäden verursachen.

Vor dem Entfernen jeglicher Abdeckungen oder des Bedienpults unbedingt die Speicherfeder des Leistungsschalters entspannen → (Seite 24-3)



- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Einschubschalter in Wartungsstellung ziehen → (Seite 24-4)
- Federspeicher per Hand spannen → (Seite 6-4)
- Einschalten → (Seite 6-6)
- Lichtbogenkammer ausbauen → (Seite 24-5))



(1) Anzeigestift
(2) Anzeigestift sichtbar
(3) Anzeigestift nicht mehr sichtbar

Ist der Anzeigestift nicht mehr sichtbar, muss das Kontaktsystem ausgetauscht werden. Für die Sichtprüfung bei Festeinbauschaltern ggf. einen Spiegel zu Hilfe nehmen.

24.3 Checking contact erosion

DANGER

Hazardous voltage!

Will cause death, serious personal injury, or equipment / property damage.

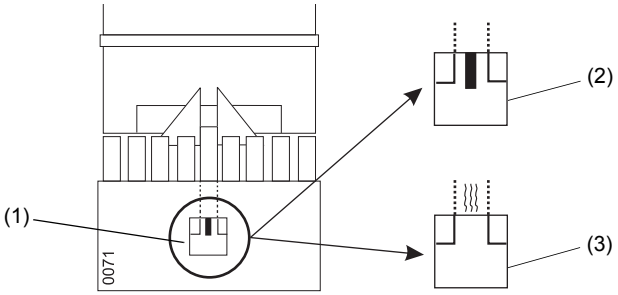
Disconnect power before working on this equipment.

WARNING

May result in death or serious injury.

Discharge storage spring before removing barriers / covers → (page 24-3).

- Switch off and discharge the spring storage → (page 24-3)
- Move the circuit breaker into the maintenance position in the cradle → (page 24-4)
- Charge the storage spring manually → (page 6-4)
- Close → (page 6-6))
- Remove arc chutes → (page 24-5)

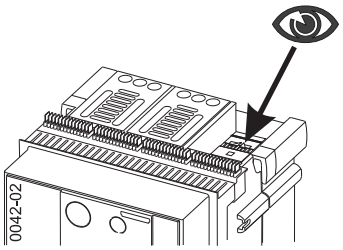


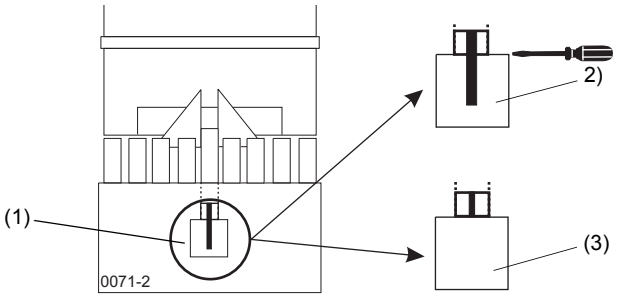
(1) Indicator pin
(2) Indicator pin is visible
(3) Indicator pin is no longer visible

If the indicator pin is no longer visible, the contact system must be replaced. For the visual inspection of fixed-mounted circuit breakers, use a mirror if required.

24.3.1 Verschleißanzeige justieren

- Federspeicher per Hand spannen → (Seite 6-4)
- Einschalten → (Seite 6-6)





(1) Anzeigestift
(2) Anzeigestift ungekürzt
(3) Anzeigestift justiert

Den Anzeigestift (Kunststoff) entlang der oberen Kante der großen Aussparung kürzen. Einen Schraubendreher zum abscheren benutzen.

Ist der Anzeigestift nicht mehr sichtbar, muss das Kontaktsystem ausgetauscht werden.

24.3.1 Adjusting the contact wear indicator

- Charge the storage spring manually → (page 6-4)
- Close → (page 6-6))

(1) Indicator pin
(2) Indicator pin before adjusting
(3) Indicator pin adjusted

Cut the plastic indicator pin along the upper edge of the big recess, using a screwdriver as cutter.

If the indicator pin is no longer visible, the contact system must be replaced.

24.4 Strombahnen wechseln

Bei folgenden Leistungsschaltern dürfen die Strombahnen nur durch den Hersteller ausgetauscht werden:
BG I Schaltvermögen H,
BG I 2000 A,
BG I 690 V(+20%),
BG I 1000 V,
BG II Schaltvermögen C,
BG III Schaltvermögen C!

GEFAHR

Beim Betrieb elektrischer Geräte stehen zwangsläufig bestimmte Teile dieser Geräte unter gefährlicher Spannung.
Unsachgemäßer Umgang mit diesen Geräten kann deshalb zu Tod oder schweren Körperverletzungen sowie erheblichen Sachschäden führen.

Beachten Sie daher bei Instandhaltungsmaßnahmen an diesem Gerät alle in diesem Kapitel und auf dem Produkt selbst aufgeführten Hinweise.
Die Instandhaltung darf nur durch entsprechend qualifiziertes Personal erfolgen.
Vor Beginn der Arbeiten muss der spannungsfreie Zustand der Schaltanlage hergestellt und während der Arbeiten sichergestellt werden (gemäß EN 50 110-1, DIN VDE 0105-100 und BGV A2).
Die fünf Sicherheitsregeln sind einzuhalten:
- Freischalten
- Gegen Wiedereinschalten sichern
- Spannungsfreiheit feststellen
- Erden und Kurzschließen
- Benachbarte, unter Spannung stehende Teile abdecken oder abschranken

Das Gerät ist vom Netz zu trennen.
Es dürfen nur vom Hersteller zugelassene Ersatzteile verwendet werden.
Die vorgeschriebenen Wartungsintervalle sowie die Anweisungen für Reparatur und Austausch sind unbedingt einzuhalten, um Schäden an Personen und Anlagen zu vermeiden.











- Ausschalten und Federspeicher entspannen → (Seite 24-3)
- Schalter aus dem Einschubrahmen entnehmen → (Seite 24-4)
- Festeinbauschalter ausbauen

24.4.1 Bedienpult abnehmen

24.4 Replacing internal contact assemblies

For the circuit breakers listed below the internal contact assemblies may be replaced by the manufacturer only:
FS I breaking capacity H,
FS I 2000 A,
FS I 690 V(+20%),
FS I 1000 V,
FS II breaking capacity C,
FS III breaking capacity C!

DANGER

Hazardous voltages are present in this electrical equipment during operation.

Failure to properly maintain the equipment can result in death, severe personal injury or substantial property damage.

The instructions contained in this chapter and on product labels have to be followed.

Maintenance shall be performed only by qualified personnel.

Before beginning to work, de-energize the panel and secure the de-energized state during work (according to EN 50 110-1, DIN VDE 0105-100 and BGV A2).

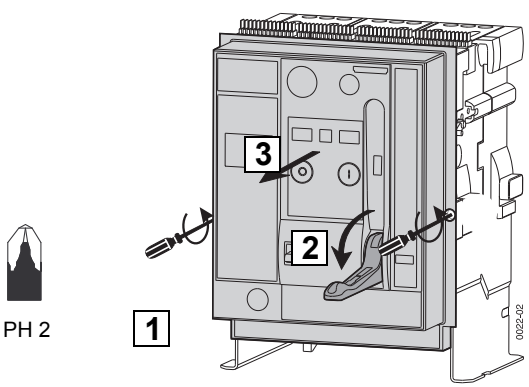
Observe the Five Safety Rules.
- Disconnecting
- Securing against reclosing
- Checking safe insolation from supply
- Earthing and short-circuiting
- Covering or providing barriers to adjacent live parts

Disconnect the equipment from the supply.
Use only authorized spare parts in the repair of the equipment.

The inspection intervals as well as the instructions for repair and replacement shall be duly observed, to avert damages from persons and gear.

- Switch off and discharge the spring storage → (page 24-3)
- Remove the circuit breaker from the guide frame → (page 24-4)
- Remove fixed-mounted breaker

24.4.1 Removing front panel



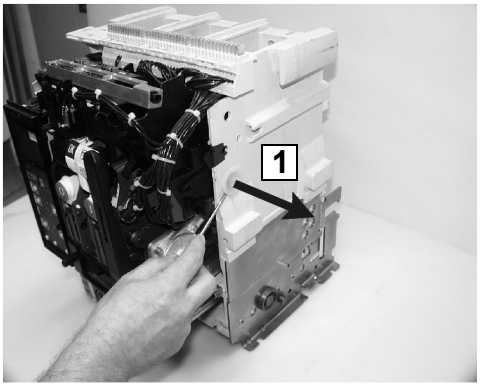
24.4.2 Lichtbogenkammern ausbauen

→ (Seite 24-5)

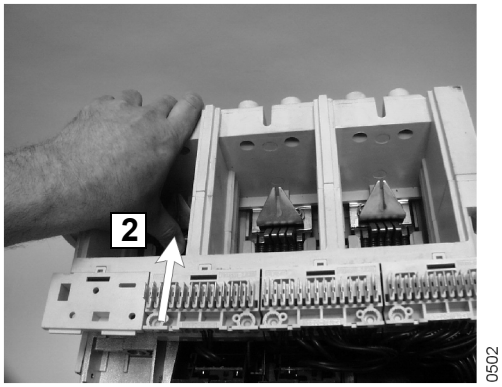
24.4.3 Strombahnen ausbauen

Schaltwellenhalter anbauen bei BG I und II

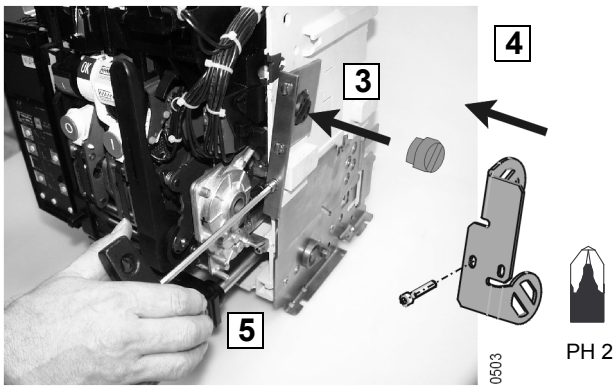
VORSICHT	CAUTION
Schaltwelle mit Schaltwellenhalter arretieren! Sonst wird das Antriebssystem dejustiert und Reparatur in Siemens-Fachwerkstatt erforderlich.	Block main shaft with main shaft retainer! Otherwise the operating system will be de-adjusted and it will be necessary to have it repaired in a Siemens workshop.



1 Abdeckkappe entfernen
2 Kontakte zusammendrücken und halten



1 Remove cover
2 Press contacts together and hold them



PH 2

3 4 5 Schaltwellenhalter ansetzen und befestigen

3 4 5 Mount and fix main shaft support

24.4.2 Remove arc chutes

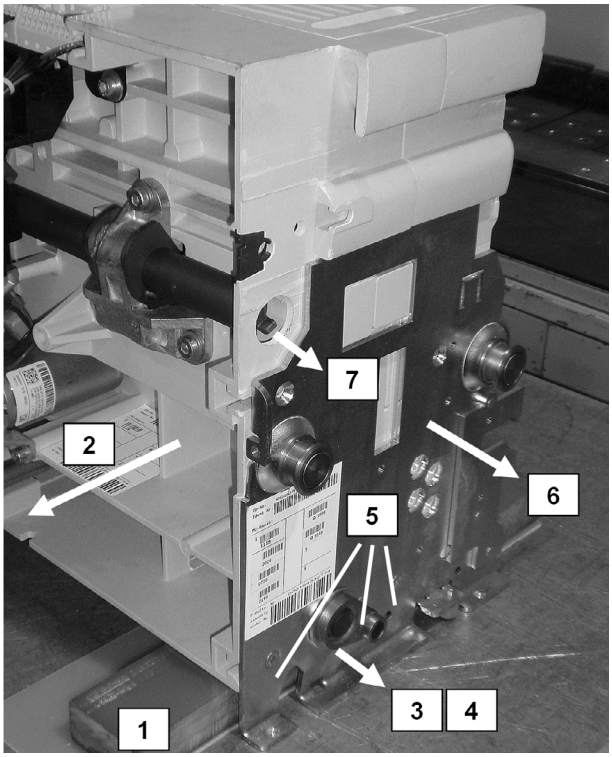
→ (page 24-5)

24.4.3 Removing pole assemblies

Mounting main shaft retainer for FS I and II

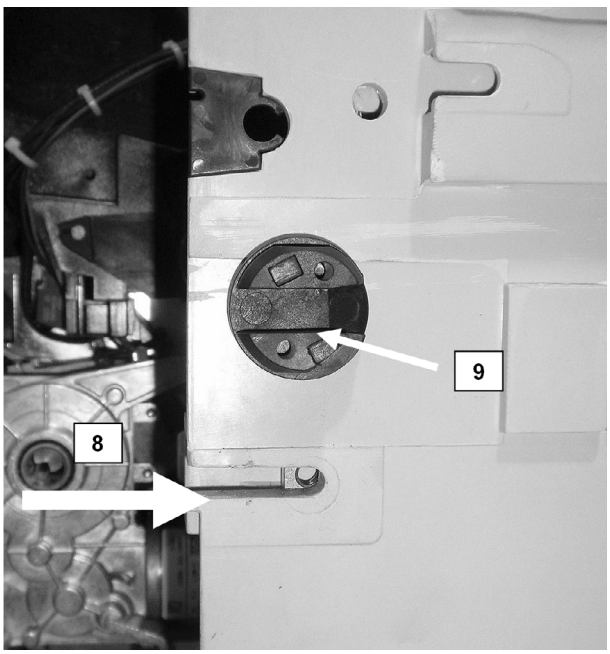
Schaltwellenhalter anbauen bei BG III

Mounting main shaft retainer for FS III



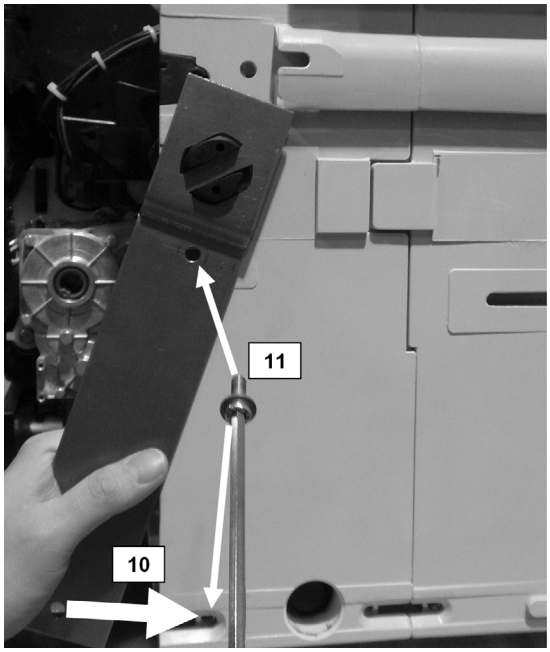
1 Schalter mit geeigneter Unterlage gegen Umfallen sichern
2 Bedienpult demontieren
3 Sicherungsring entfernen
4 Kurbel abnehmen
5 Schrauben herausdrehen
6 Schalterfuß abnehmen
7 Abdeckkappe entfernen

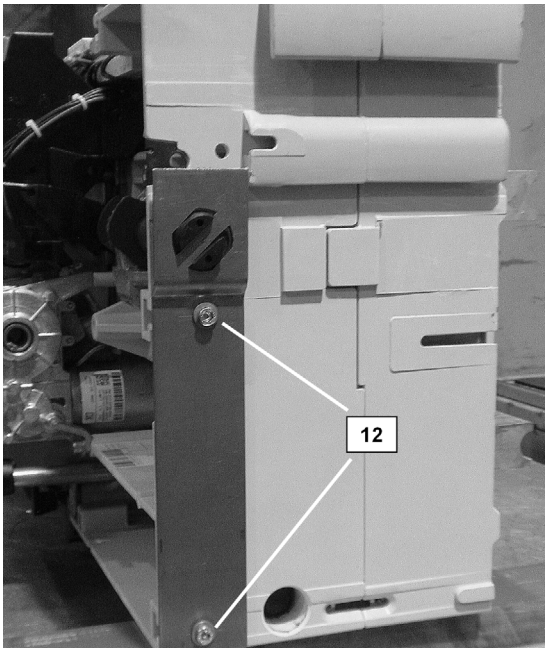
1 Secure circuit breaker with suitable support against tipping over
2 Dismount front panel
3 Remove retaining ring
4 Remove crank
5 Loose and remove screws
6 Remove circuit breaker foot
7 Remove cover



8 Einlegemutter in das Gehäuse schieben
9 Kupplung auf die Schaltwelle drücken

8 Put the insert nut into the front housing
9 Push the clutch onto the main shaft







10 Hilfswerkzeug auf Kupplung stecken und in vertikale Position drehen
11 Hilfswerkzeug mit Schrauben M6x20 an den gezeigten Positionen fixieren
12 Beide Befestigungspunkte zur Fixierung des Hilfswerkzeuges

10 Put the auxiliary tool on the clutch and rotate it into a vertical position
11 Fix the auxiliary tool with screws M6x20 at the shown positions
12 Both fastening points to fix the auxiliary tool

HINWEIS

Zum Lösen der Schaltwelle die Schritte 1 bis 12 in umgekehrter Reihenfolge ausführen.

Anziehdrehmoment:

Schalterfuß = 10 Nm
Bedienpult = 2,5 Nm

NOTICE

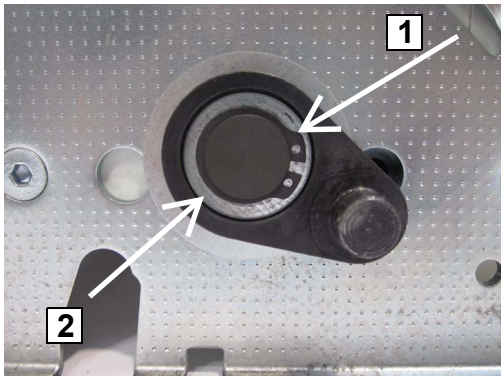
To release the main shaft, please perform steps 1 to 12 in reverse order.

Tightening torque:

Circuit Breaker foot = 10 Nm
Front panel = 2.5 Nm

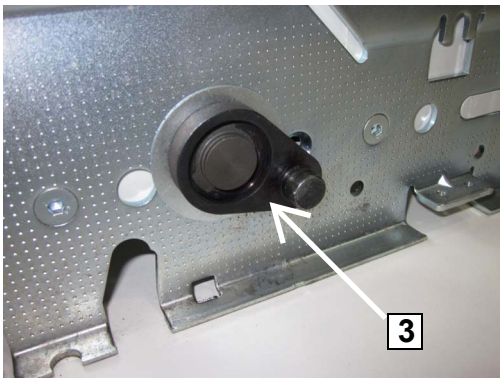
Nur für Einschubschalter:
Einfahrwelle ausbauen

For draw-out circuit breaker only:
Removing racking shaft



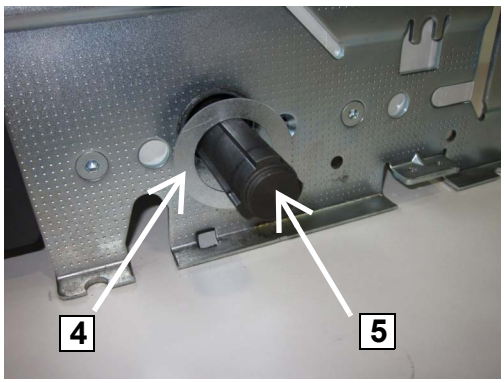
1 Sicherungsring entfernen
2 Wenn vorhanden, Ausgleichsscheibe Ø 30,1 x Ø 45 x 0,5 entnehmen

1 Remove retaining ring
2 If existent, remove spacer washer Ø 30,1 x Ø 45 x 0,5



3 Kurbel abnehmen

3 Remove crank



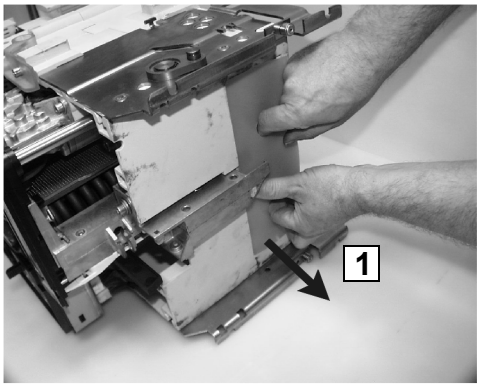
4 Wenn vorhanden, Stützscheiben Ø 17,2 x Ø 26 x entnehmen
5 Einfahrwelle herausziehen

4 If existent, remove supporting washer Ø 17,2 x Ø 26 x ...

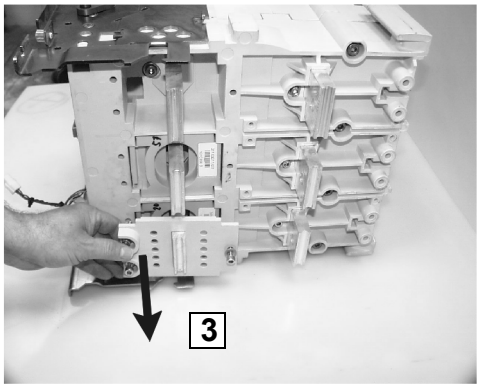
5 Pull out racking shaft

Wandler ausbauen

Schalter auf die Seite legen



1 Kabelkanalabdeckung abnehmen
2 Steckverbindungen trennen



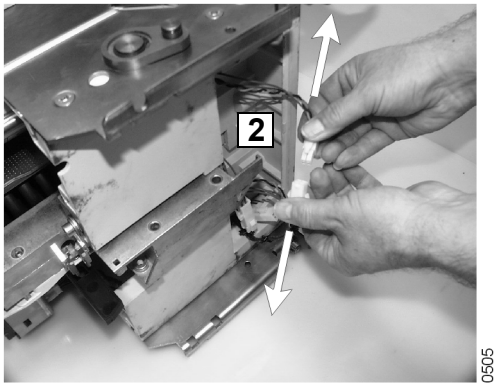


Gr. / Size
5

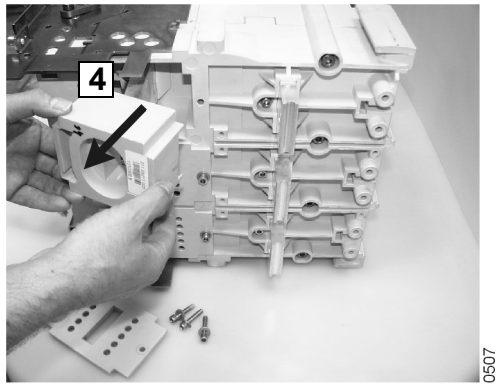
3 Wandlerabdeckungen abschrauben
4 Wandler entnehmen

Removing current transformers

Lay circuit breaker on the side



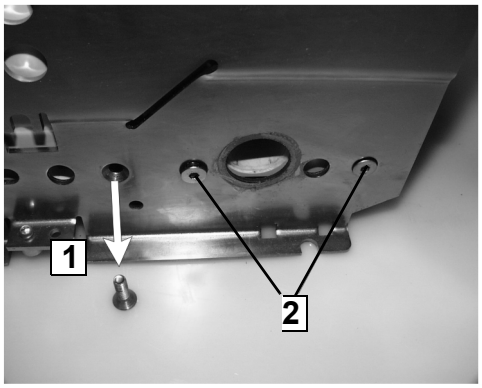
1 Remove cover of cable duct
2 Detach connectors



3 Remove current transformer covers
4 Remove current transformers

Baugröße I und II: Schalterfüße lösen

Frame size I and II: unfix the circuit breaker feet





Gr. / Size
4

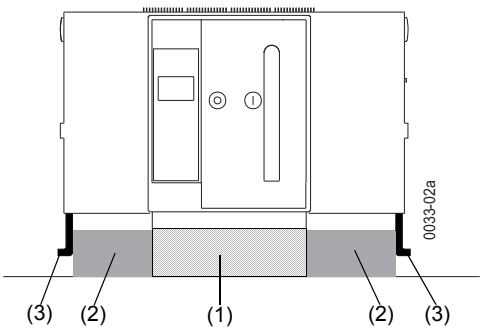
1 Schalter aufrichten, Schraube entfernen
2 Diese Schrauben nur lösen!
Baugröße I: nur 1 Schraube vorhanden

1 Place circuit breaker in upright position, remove screw
2 Loosen these screws only!
Frame size I: there is only one screw

Baugröße III: Schalterfüße abbauen

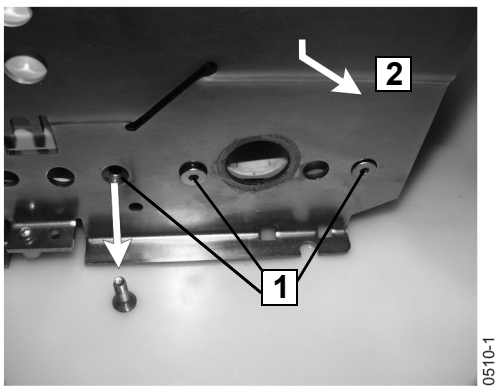
Frame size III: Remove circuit breaker feet

VORSICHT	CAUTION
Vor dem Entfernen der Schrauben Schalter auf geeignete Auflage stellen, sodaß die Füße entlastet sind.	Before removing the screws put the breaker on a suitable support plate to make shure that circuit breaker feet are free.



(1) Frei zu lassender Bereich
(2) Geeignete Unterlage
(3) Schalterfüße

1 Schrauben entfernen
2 Schalterfüße abnehmen

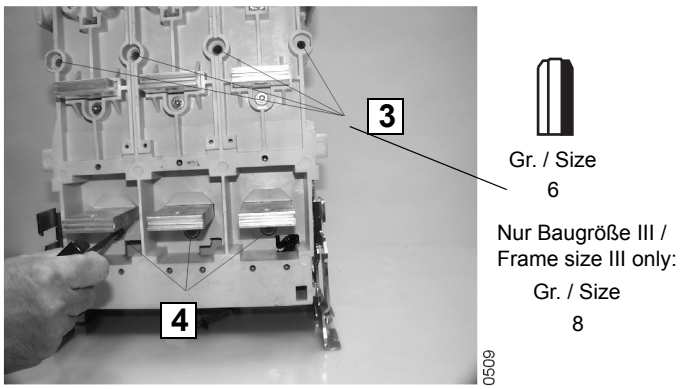


(1) Space to be left free
(2) Suitable support
(3) Circuit breaker feet

1 Remove screws
2 Remove circuit breaker feet

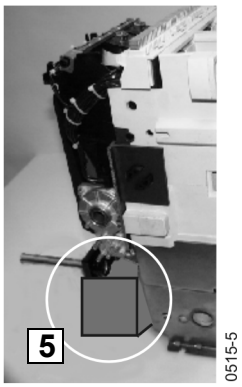
Rückwand abbauen

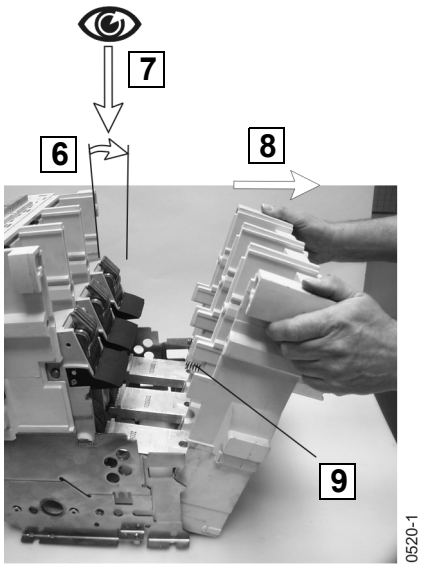
Removing rear wall



3 Schrauben oben entfernen
4 Schrauben unten entfernen

3 Remove upper screws
4 Remove lower screws

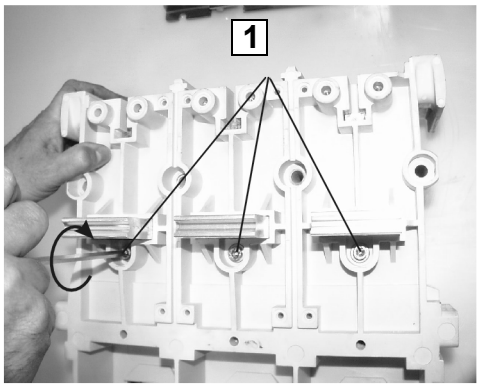




5 Schalter abstützen
6 Rückwand vorsichtig etwas abziehen, bis Endlagenhaltefedern sichtbar
7 Position der Endlagenhaltefedern merken
8 Rückwand abnehmen
9 Endlagenhaltefedern entnehmen

5 Support circuit breaker
6 Draw off rearwall carefully until the endposition retaining springs appear
7 Note the position of the end position retaining springs
8 Draw off rearwall
9 Remove end position retaining springs

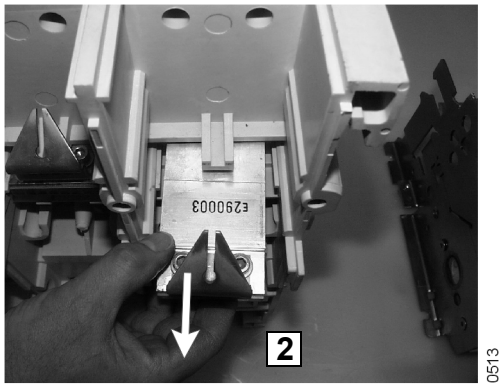
Obere Festkontakte ausbauen





1 Schrauben und Muttern entfernen
2 Festkontakt herausziehen

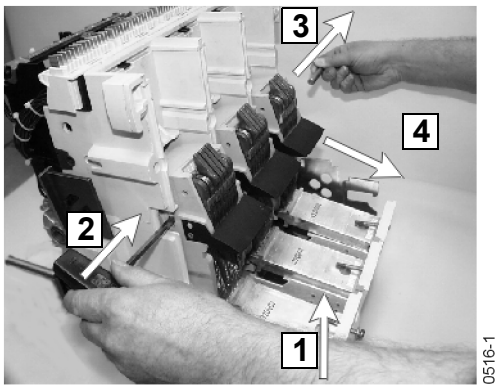
Removing upper fixed contacts



1 Remove bolts and nuts
2 Remove fixed contact

Untere bewegliche Kontakte ausbauen

1 Anschluss-Schienen abstützen
2 Koppelbolzen herausdrücken
3 Koppelbolzen entnehmen
4 Strombahnen abnehmen

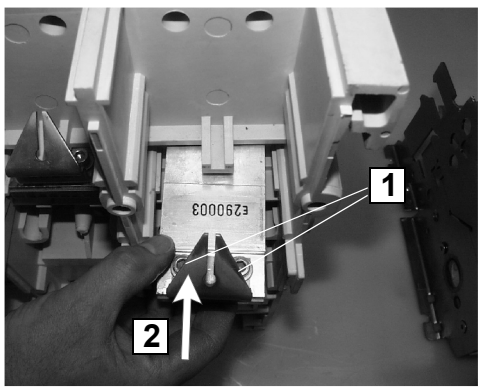


Removing lower moving contacts

1 Support connecting bars
2 Push out coupling bolt
3 Take coupling bolt out
4 Remove pole assemblies

24.4.4 Strombahnen einbauen

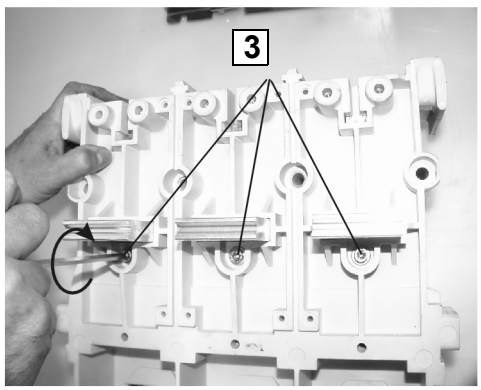
Obere Festkontakte in Rückwand einbauen



1 **Nur Baugröße I**: Schrauben der Leithörner lösen
2 Kontakt einsetzen und Vierkantmutter in Ausnehmung einlegen
3 Kontakte befestigen;
Schrauben der Leithörner mit 10 Nm nachziehen;
Nur Baugröße I: Leithorn andrücken und mit 15 Nm festziehen

24.4.4 Installing pole assemblies

Installing upper fixed contacts in rear wall





1 **Only frame size I**: Undo screws of guide horns
2 Mount contact and insert square nut in recess
3 Fix contacts
Re-tighten screws of guide horns with 10 Nm;
Only frame size I: press guide horn tight and tighten with 15 Nm

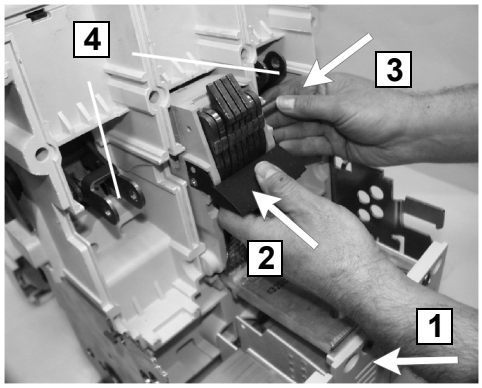
Untere bewegliche Kontakte einbauen

Lagerstellen und Koppelbolzen vor dem Zusammenbau reinigen und fetten. (Fett: Isoflex Topas NB 52, Fa. Klüber Lubrication München SE & Co. KG)

Installing lower moving contacts

Clean and grease bearings and coupling bolts before assembly. (Grease: Isoflex Topas NB 52, Co. Klüber Lubrication München SE & Co. KG)

1 Anschluss-Schienen abstützen
2 Mittlere Strombahn ansetzen
3 Koppelbolzen einschieben
4 Äußere Strombahnen anbauen



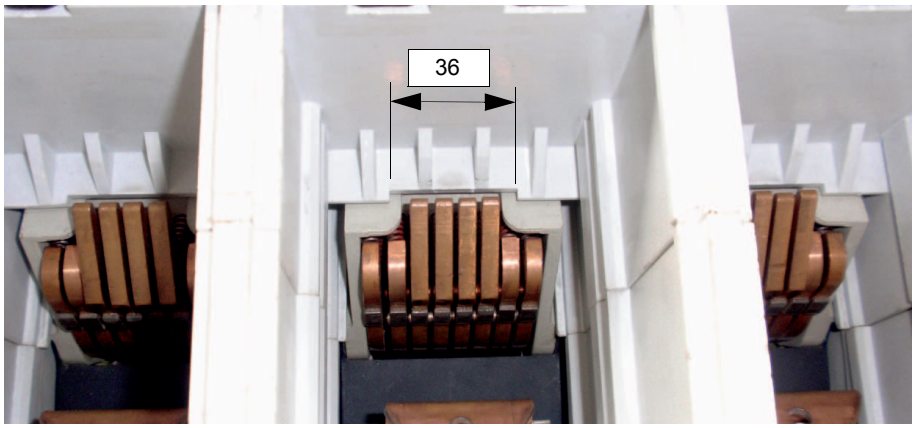
1 Mount supports for connecting bars
2 Mount central pole assembly
3 Insert coupling bolt
4 Mount external pole assemblies

Beim Wechseln von Strombahnen der BG I (3 / 4-pol) vor dem Fertigungszeitpunkt Aug.2003 ist an der Gehäusevorderwand die Ausnehmung entsprechend der Abbildung zu vergrössern

Gehäuse **alter Bauart** mit kurzen Kontakthebeln

In order to replace the current path of the FS I (3 / 4-pole) before production date Aug. 2003 the cutout on the front housing needs rework according to the image.

Old stile housing with short contact levers

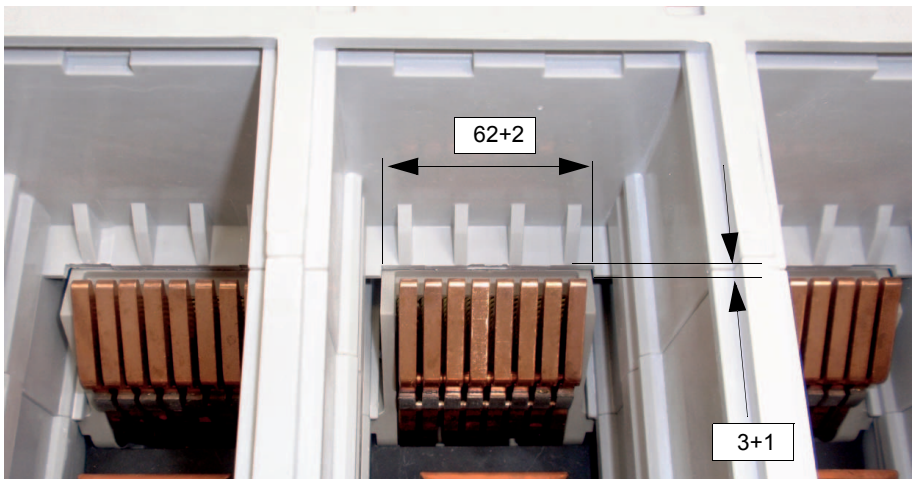


Aussparung von 36 mm auf 62+2 mm nacharbeiten.

Gehäuse **neuer Bauart** mit langen Kontakthebeln

Rework the cutout from 36 mm to 62+2 mm.

Housing in **new stile** with long contact levers

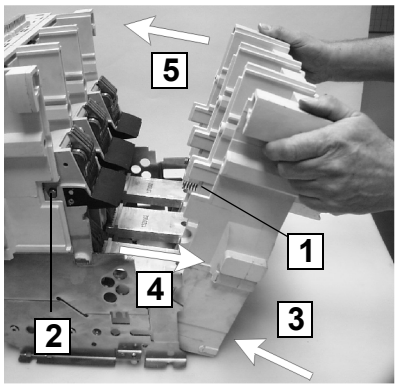


Rückwand anbauen

(Vorher Abstützungen der Strombahnen entfernen.)

ACHTUNG	NOTICE
Leitungen des Wandlerkabelbaumes nicht einklemmen!	Do not pinch the cables of the transformer cable harness!

1 Endlagenhaltefedern einsetzen
2 Auf mittigen Sitz der Koppelbolzen achten
3 Rückwand ansetzen
4 Anschluss-Schienen einführen
5 Rückwand mit Schaltergehäuse zusammenführen



Installing rear wall

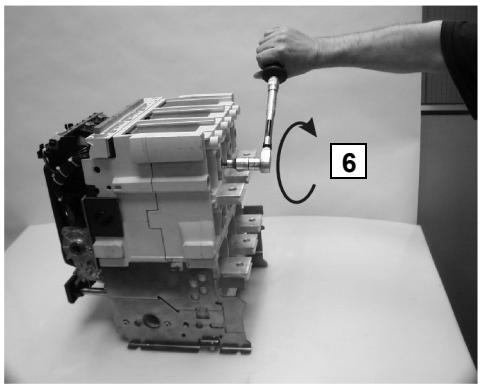
(First, remove supports for pole assemblies)

1 Insert end position retaining springs
2 Inspect to ensure that the coupling bolts are centered
3 Attach rear wall
4 Insert connecting bars
5 Place rear wall and circuit breaker housing together

Baugröße I / II
Frame size I / II:

Oben / Upper
18 Nm
Gr. / Size 6

Unten / Lower
12 Nm
Gr. / Size 6



Baugröße III /
Frame size III:

Oben / Upper
25 Nm
Gr. / Size 8

Unten / Lower
18 Nm
Gr. / Size 6

6 Erst unten verschrauben, beginnend in der Mitte; kurze Schrauben unten, lange Schrauben oben

6 Screw tight at the bottom first, starting in the middle; short screws lower, long screws upper

Funktionsprobe:

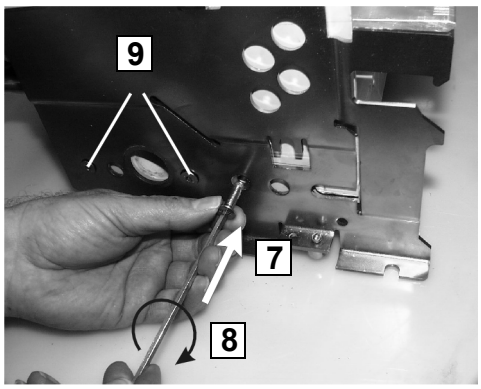
Die Kontakte müssen sich vollständig zusammendrücken lassen und selbsttätig in ihre Ausgangslage zurückkehren. Anderenfalls Rückwand lösen und korrekten Sitz der Endlagenfedern überprüfen.

Function test:

It must be possible to press the contacts completely together, and they must return independently to their original position. If this is not the case, loosen the rear wall and check that the end position retaining springs are properly in place.

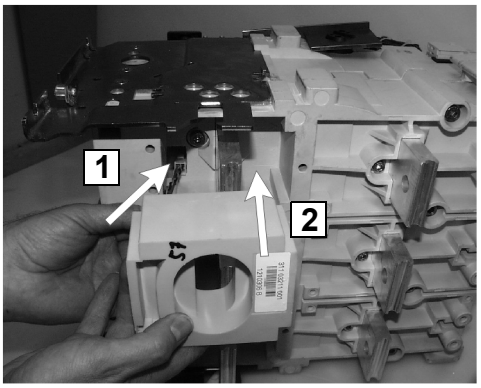
Schalterfüße anbringen

Attaching the circuit breaker feet



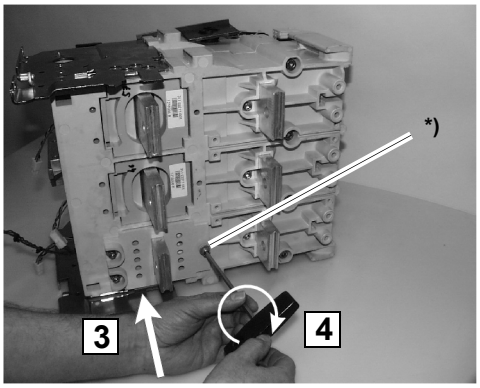
Gr. / Size 4
10 Nm

Wandler einbauen



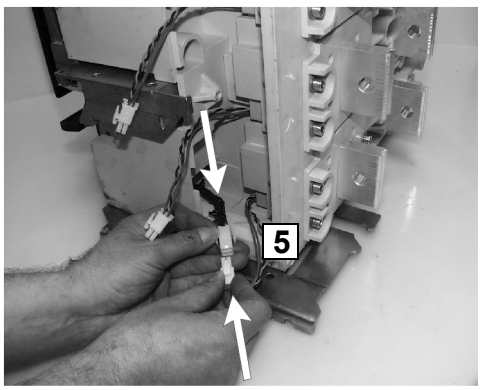
1 Schalter auf die Seite legen, Anschlussleitung einführen
2 Wandler einsetzen
3 Wandlerabdeckungen aufsetzen
4 Mit Schrauben befestigen
***) Selbstschneidende Schraube nur 5 Nm**

Installing current transformers

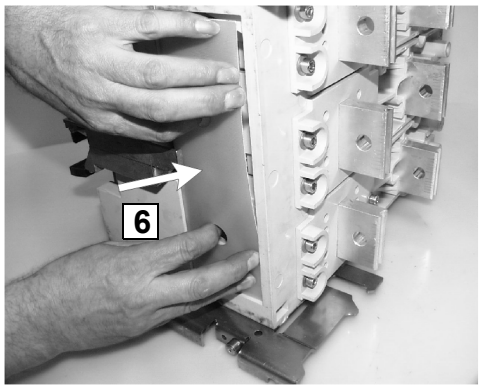


1 Lay circuit breaker on its side, insert connecting wire
2 Insert current transformer
3 Fit transformer covers
4 Fasten the screws
***) self tapping screw 5 Nm only**

VORSICHT	**CAUTION**
Beim Verwenden selbstschneidender Schrauben Gewindegänge nicht zerstören! Schraube wie folgt eindrehen: - Schraube ansetzen - von Hand entgegen dem Uhrzeigersinn drehen, bis sich Gewindegänge treffen - eindrehen - mit Drehmomentenschlüssel auf 5 Nm festziehen	**When using self-tapping screws, do not damage existing threads!** Tightening of the screw: - insert screw - rotate the screw counter-clockwise by hand until the thread fits - tighten by hand till snug - tighten to a torque of 5 Nm



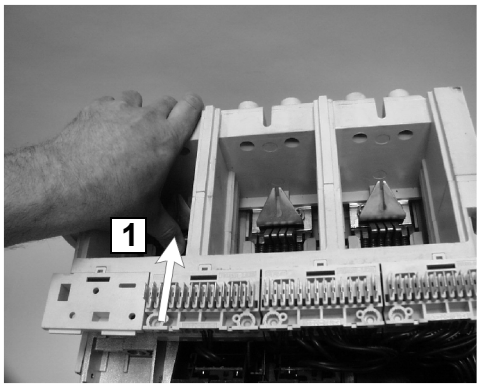
5 Steckverbindungen herstellen
6 Kabelkanalabdeckung anbringen



5 Establish plug connections
6 Mount cable duct covers

VORSICHT	**CAUTION**
Die Vollständigkeit und der feste Sitz der Steckverbindungen ist zu gewährleisten! Dies ist nur bei richtigem Kontakt der Steckverbindungen gegeben.	**The completeness and reliable seat of plug and socket connection has to be ensured!** The protective function of the circuit breaker depends on a good contact of the plug and socket connection.

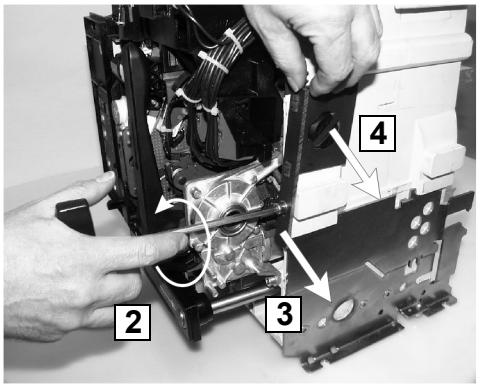
Schaltwellenhalter abbauen



1 Schalter aufrichten, Kontakte zusammendrücken und halten

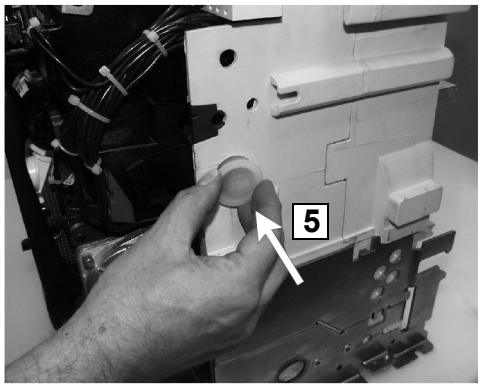
2 Schaltwellenhalter abschrauben
3 Schaltwellenhalter abnehmen
4 Kupplung abnehmen

Removing main shaft retainer



PH 2

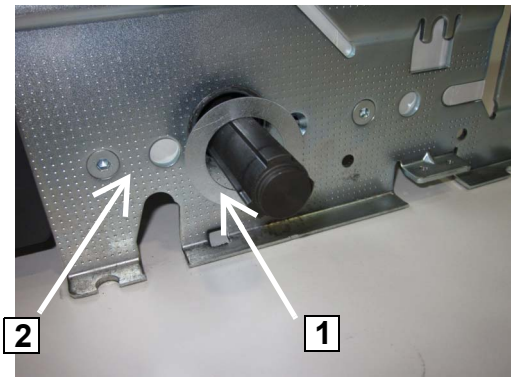
1 Place circuit breaker in an upright position, press and hold the contacts together
2 Unscrew the main shaft retainer
3 Remove the main shaft retainer
4 Remove the coupling



5 Abdeckkappe aufstecken

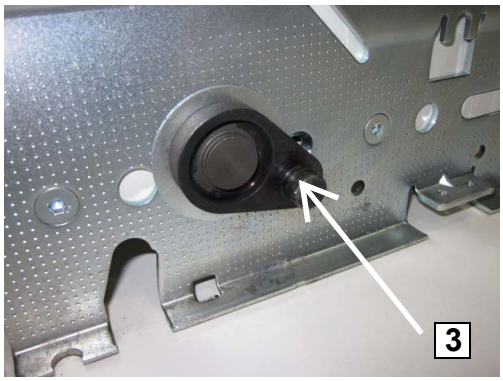
5 Attach the cover

Nur für Einschubschalter:
Einfahrwelle einbauen



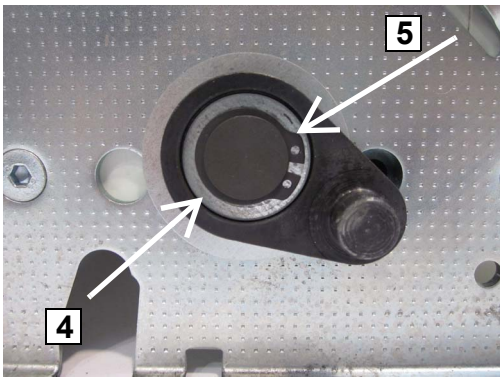
1 Einfahrwelle einschieben
2 Wenn vorhanden, Ausgleichsscheibe Ø 30,1 x Ø 45 x 0,5 einsetzen
3 Kurbel aufsetzen

For draw-out circuit breaker only:
Installing racking shaft



1 Insert racking shaft
2 If existing, insert spacer washer Ø 30,1 x Ø 45 x 0,5

3 Fit crank



4 Wenn vorhanden, Stützscheiben Ø 17,2 x Ø 26 x ... einsetzen

5 Kurbel mit Sicherungsring DIN 471-17x1 sichern

4 If existing, insert supporting washer Ø 17,2 x Ø 26 x ...

5 Secure crank with retaining ring DIN 471-17x1.

24.4.5 Bestellnummern

Strombahn für einen Hauptkontakt:

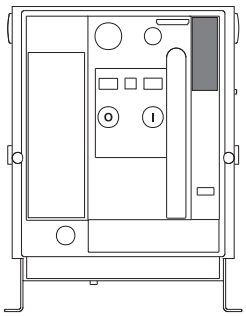
24.4.5 Order numbers

Pole assembly for a single main contact

Baugröße **Frame size**	**Max. Bemessungsnennstrom** **Max. circuit breaker rated current** **$I_{n\ max}$ (A)**	**Ausschaltvermögen bei 440 V** **Rated breaking capacity at 440 V** **I_{cu} (kA)**	**Bestell-Nummer** **Order number**	**PKG** **PS**
I	1000 / 1250 / 1600	50 / 65	3WL9111-0AM9**0** L1Y [1)]	1 st 1 pc
II	2000	55 / 80 / 100	3WL9111-0AM9**1** L1Y [1)]	1 st 1 pc
	2500 / 3200 / 4000	55 / 80 / 100	3WL9111-0AM9**2** L1Y [1)]	1 st 1 pc
III	4000 / 5000 / 6300	100	3WL9111-0AM9**3** L1Y [1)]	1 st 1 pc

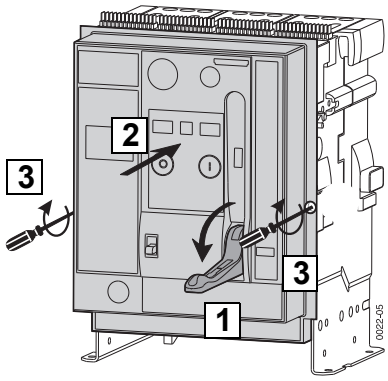
1) Bitte bei Bestellung Ident.-Nr. des Leistungsschalters in Klartext angeben.

1) Please give also Ident-no. of the circuit breaker when ordering.

Hinweis		**Note**
Ersatzstrombahnen können nur über die oben genannte Bestellnummern mit zusätzlicher Angabe der Identnummer des zu wartenden Leistungsschalters bestellt werden! Die Identnummer befindet sich auf dem Typschild oben rechts am Bedienpult. Die Anzahl der benötigten Ersatzstrombahnen entspricht der Polzahl des zu wartenden Leistungsschalters.		Spare parts of pole assemblies will be ordered by means of the order numbers given in the table above in conjuction with the ID-No. of the circuit breaker which needs a maintenance of pole assemblies! The ID-No. is stated on the type label located on the right side of the front cover. The number of spare parts required is equivalent to the number of poles.

24.4.6 Bedienpult aufsetzen





24.4.7 Mechanische Funktionsprüfung

- Federspeicher per Hand spannen → (Seite 6-4)
- Einschalten → (Seite 6-6)
- Ausschalten → (Seite 6-6)

24.4.8 Lichtbogenkammern einbauen

→ (Seite 24-7)

24.5 Antriebssystem austauschen

Der Austausch des Antriebssystem des Leistungsschalters ist von Siemens-Fachpersonal durchzuführen.

24.4.6 Attaching the front panel

24.4.7 Mechanical function test

- Charge the storage spring manually → (page 6-4)
- Close → (page 6-6)
- Switch off → (page 6-6)

24.4.8 Installing the arc chutes

→ (page 24-7)

24.5 Replacing operating system

The circuit breaker system must be replaced by Siemens after sales service specialists.

25 Entsorgung

25.1 Entsorgung von Niederspannungs-Leistungsschaltern

Siemens Niederspannungs-Leistungsschalter sind umweltverträgliche Erzeugnisse, die überweigend aus recycle-fähigen Materialien bestehen.

Zur Entsorgung empfehlen wir die Demontage/Trennung in folgende Werkstoff-Fraktionen:

- **Metalle:**
  zur Weitergabe als Misch-Schrott an den Verwerter
- **Kunststoffe:**
  Entsorgung als Gewerbeabfall zur thermischen Verwertung
- **Elektronik, isolierte Kabel, Motore:**
  Recycling über Elektroschrott-Entsorger

Aufgrund der langen Lebensdauer der Siemens Niederspannungs-Leistungsschalter sind die Entsorgungshinweise bei Außerbetriebnahme möglicherweise nicht mehr aktuell oder nationale Regelungen sehen andere Entsorgungswege vor.

Die örtlichen Kundendienststellen stehen für die Beantwortung von Entsorgungsfragen jederzeit zur Verfügung.

25 Disposal

25.1 Low-voltage circuit breakers disposal

Siemens low-voltage circuit breakers are environmentally friendly products, which predominantly consist of recyclable materials.

For disposal, we recommend disassembly and separation into the following material components:

- **Metals:**
  to be transferred as mixed scrap metal to the recycling company
- **Plastics:**
  disposal as commercial waste for thermal recycling
- **Electronics, insulated cables, motors:**
  recycling via electronics scrap disposal company

Caused by the long lifetime of Siemens low-voltage circuit breakers, the disposal guidelines may be inaccurate or replaced by other national regulations when taking the breakers out of service.

The local customer service is available at any time to answer disposal-related questions.

26 Abkürzungen

A	Einstellwert Erdschlussschutz
A 1/2	Ausgangsinformation 1/2 (Gegenseitige mechanische Schalterverriegelung)
AC	Alternating current = Wechselstrom
AMP	AMP Incorporated, Harrisburg
ANSI	Standardisierungs Organisation in den USA
AWG	Amerikanische Leiterquerschnittsgrößen
B	Einstellwert Erdschlussschutz
BDA	Breaker Data Adapter
BG	Baugröße
BSS	Breaker Status Sensor
C	Einstellwert Erdschlussschutz
CC	Closing coil, Einschaltmagnet
COM15	Kommunikationsmodul
COMM.	Kommunikation
CONNECT	Betriebsstellung
CSA	Canadian Standards Association (Prüforganisation)
CT	Stromwandler
CUB -	**Cubicle**BUS - Anschluss, **-**
CUB +	**Cubicle**BUS - Anschluss, **+**
D	Einstellwert Erdschlussschutz
(D)	Duty cycle → ED (Einschaltdauer)
DC	Direct current = Gleichstrom
DIN	Deutsches Institut für Normung e.V.
DISCON	Trennstellung
E	Einstellwert Erdschluss-Schutz
E 1/2	Eingangsinformation 1/2 (Gegenseitige mechanische Schalterverriegelung)
ED	Einschaltdauer
EGB	Elektrostatisch gefährdetes Bauelement englisch: → ESD
EN	Europäische Norm
(ESD)	(Electrostatic-sensitive device) → EGB (Elektrostatisch gefährdetes Bauelement)
ETU	Electronic trip unit = Elektron. Überstromauslöser
EXTEND.	Erweiterte Schutzfunktion
F1	Erster Spannungsauslöser
F2	Zweiter Spannungsauslöser
F3	Unterspannungauslöser → (11-3)
F4	Unterspannungauslöser mit Verzögerung → (11-3)
F5	Auslösemagnet
F7	Fern-Rücksetzmagnet

26 Abbreviations

A	Set current for ground-fault protection
A 1/2	Output information 1/2 (Mutual mechanical interlocking)
AC / a.c.	Alternating current
AMP	AMP Incorporated, Harrisburg
ANSI	American National Standard Institute
AWG	American Wire Gauge
B	Set current for ground-fault protection
BDA	Breaker Data Adapter
(BG)	Baugröße → FS (Frame size)
BSS	Breaker Status Sensor
C	Set current for ground-fault protection
CC	Closing coil
COM15	Communication interface
COMM.	Communication
CONNECT	Connected position
CSA	Canadian Standards Association
CT	current transformer
CUB -	**Cubicle**BUS -
CUB +	**Cubicle**BUS +
D	Set current for ground-fault protection
D	Duty cycle
DC / d.c.	Direct current
DIN	German Institute for Standardization
DISCON	Disconnected position
E	Set current for ground-fault protection
E 1/2	Input information 1/2 (Mutual mechanical interlocking)
(ED)	Einschaltdauer → D (Duty cycle)
(EGB)	Elektrostatisch gefährdetes Bauelement → ESD (Electrostatic-sensitive device)
EN	European Standard
ESD	Electrostatic-sensitive device german: → EGB
ETU	Electronic trip unit (Overcurrent release)
EXTEND.	Extended (additional) protection function
F1	1st shunt trip
F2	2nd shunt trip
F3	Under-voltage release → (11-3)
F4	Under-voltage release with time delay → (11-3)
F5	Tripping solenoid
F7	Remote reset coil

(FS)	Frame size → BG (Baugröße)	**FS**	Frame size
G-Alarm	Ground-fault alarm = Erdschlussalarm	**G-alarm**	Ground-fault alarm
G-Auslösung	Erdschluss-Auslösung	**G-tripping**	Tripping on ground-fault
I / O	Ein- und Ausgangsmodul	**I / O**	Input / Output module
I^2t	Stromabhängigkeit der Verzögerungszeit, nach einer Formel bei der das Produkt aus der Zeit und dem Quadrat des Stromes konstant ist	**I^2t**	Delay time-current relationship based on formula I^2t = constant
I^2t_g	Einstellwert der stromabhängigen Verzögerungszeit der Erdschlussauslösung bei I^2t_g = const	**I^2t_g**	Delay time for ground-fault based on formula I^2t_g = constant
I^2t_{sd}	Einstellwert der stromabhängigen Verzögerungszeit der Kurzschlussauslösung bei I^2t_{sd} = const	**I^2t_{sd}**	Delay time for S tripping based on formula I^2t_{sd} = constant
I^4t	Stromabhängigkeit der Verzögerungszeit, nach einer Formel bei der das Produkt aus der Zeit und dem Wert des Stromes in der vierten Potenz konstant ist	**I^4t**	Delay time-current relationship based on formula I^4t=constant
I-Auslösung	Unverzögerte Kurzschlussauslösung	**I-tripping**	Instantaneous tripping (short-circuit)
I_{ab}	Ansprechwert Lastabwurf	**I_{ab}**	Operating value for load shedding
I_{an}	Ansprechwert Lastaufnahme	**I_{an}**	Operating value for load restore
I_{avg}	Momentaner Mittelwert des Stromes	**I_{avg}**	Present average of current
I_{avglt}	Langzeitmittelwert des Stromes	**I_{avglt}**	Long term average of current
I_{cm}	Bemessungs-Kurzschlusseinschaltvermögen	**I_{cm}**	Rated service short-circuit making capacity
I_{cs}	Bemessungs-Betriebskurzschlussausschaltvermögen	**I_{cs}**	Rated service short-circuit breaking capacity
I_{cu}	Bemessungs-Grenzkurzschlussausschaltvermögen	**I_{cu}**	Rated ultimate short-circuit breaking capacity
I_{cw}	Bemessungs-Kurzzeitstromfestigkeit	**I_{cw}**	Rated short-time withstand current
ID	Ident-Nummer	**ID**	Identification number
IEC	Internationale Elektrotechnische Kommission	**IEC**	International Electrotechnical Commission
I_g	Ansprechwert Erdschluss-Schutz	**I_g**	Current setting value for G-tripping
I_i	Einstellwert der unverzögerten Kurzschlussauslösung	**I_i**	Set current for I tripping
I_{IT}	Einpoliger Kurzschlussprüfstrom (IT-Systeme)	**I_{IT}**	Single-pole short-circuit test current (IT systems)
I_N	Einstellwert N-Leiter-Schutz	**I_N**	Current setting value for N-tripping
I_n	Bemessungsstrom (Wert des Bemessungsstrommoduls)	**I_n**	Rated current (value of rating plug)
$I_{n\ max}$	maximal möglicher Bemessungsstrom	**$I_{n\ max}$**	Max. possible rated current
I_R	Einstellwert der stromabhängig verzögerten Überlastauslösung	**I_R**	Current setting value for L-tripping
I_{sd}	Einstellwert der kurzzeitverzögerten Kurzschlussauslösung	**I_{sd}**	Current setting value for S-tripping
I_{THD}	Klirrfaktor Strom	**I_{THD}**	Distortion factor of current
L1	Phase 1	**L1**	Phase 1
L2	Phase 2	**L2**	Phase 2
L3	Phase 3	**L3**	Phase 3
L-Auslösung	stromabhängig verzögerte Überlastauslösung	**L-tripping**	Long-time delayed tripping (overload)
LED	Licht emittierende Diode	**LED**	Light emitting diode
M	Motor	**M**	Motor
MLFB	Maschinenlesbare Fabrikatebezeichnung	**MLFB**	(Machine-Readable Product Designation)
N	Neutralleiter	**N**	Neutral pole
N 117	Approbationszeichen Australien	**N 117**	Approval label code for Australia

(NC)	Normally closed contact → Ö (Öffner)	**NC**	Normally closed contact
(NEMA)	National Electrical Manufacturers Association (USA)	**NEMA**	National Electrical Manufacturers Association (USA)
(NO)	Normally open contact → S (Schließer)	**NO**	Normally open contact
NIOSH	National Institute for Occupational Safety and Health (USA), Arbeitssicherheitsbehörde	**NIOSH**	National Institute for Occupational Safety and Health (USA)
N-Auslösung	Auslösung wegen Überstrom im N-Leiter	**N-tripping**	Neutral (overload) tripping
Ö	Öffner	**(Ö)**	Öffner → NC (Normally closed contact)
OSHA	Occupational Safety and Health Administration (USA)	**OSHA**	Occupational Safety and Health Administration (USA)
PIDG	Crimpösen der Firma AMP	**PIDG**	Ring lug style (Trademark of AMP)
PZ 3...6	Crimpzangen der Firma Weidmüller, Detmold	**PZ 3...6**	Crimping tool (Weidmüller GmbH)
S	Schließer	**(S)**	Schließer → NO (Normally open contact)
S $_{1/2/3}$	Leistungsschalter $_{1/2/3}$ (Gegenseitige mechanische Schalterverriegelung)	**S $_{1/2/3}$**	Circuit breaker $_{1/2/3}$ (Mutual mechanical interlocking)
S1	Meldeschalter Schaltstellung	**S1**	Contact position-driven auxiliary switch
S2	Meldeschalter Schaltstellung	**S2**	Contact position-driven auxiliary switch
S3	Meldeschalter Schaltstellung	**S3**	Contact position-driven auxiliary switch
S4	Meldeschalter Schaltstellung	**S4**	Contact position-driven auxiliary switch
S7	Meldeschalter Schaltstellung	**S7**	Contact position-driven auxiliary switch
S8	Meldeschalter Schaltstellung	**S8**	Contact position-driven auxiliary switch
S10	Elektrisch EIN → (11-4)	**S10**	Switch Electrical ON → (11-4)
S11	Motorendlagenschalter	**S11**	Motor cut-off switch
S12	Motorabstellschalter	**S12**	Motor disconnect switch
S13	Abstellschalter für Fern-Rücksetzung	**S13**	Cut-off switch for remote-reset
S14	Abstellschalter für Spannungsauslöser F1 (übererregt) → (11-4)	**S14**	Cut-off switch for overexcited shunt trip F1 (fast operation) → (11-4)
S15	Abstellschalter für Einschaltmagnet Y1 (übererregt) → (11-4)	**S15**	Cut-off switch for overexcited closing coil Y1 (fast operation) → (11-4)
S20	Meldeschalter Einschaltbereitschaft	**S20**	Signaling switch for “ready-to-close”
S21	Meldeschalter Speicherzustand	**S21**	Signaling switch for “storage spring charged”
S22	Meldeschalter am 1. Hilfsauslöser	**S22**	Signaling switch for 1st shunt trip
S23	Meldeschalter am 2. Hilfsauslöser	**S23**	Signaling switch for 2nd shunt trip
S24	1. Ausgelöst-Meldeschalter	**S24**	1st Trip signaling switch / Bell switch alarm
S25	2. Ausgelöst-Meldeschalter	**S25**	2nd Trip signaling switch / Bell switch alarm
S30	Meldeschalter für Trennstellung	**S30**	Signaling switch for disconnected position
S31	Meldeschalter für Prüfstellung	**S31**	Signaling switch for test position
S32	Meldeschalter für Prüfstellung	**S32**	Signaling switch for test position
S33	Meldeschalter für Betriebsstellung	**S33**	Signaling switch for connected position
S34	Meldeschalter für Betriebsstellung	**S34**	Signaling switch for connected position
S35	Meldeschalter für Betriebsstellung	**S35**	Signaling switch for connected position
S40	**Cubicle**BUS -seitiger Meldeschalter Einschaltbereitschaft	**S40**	**Cubicle**BUS signaling switch for “ready-to-close”
S41	**Cubicle**BUS -seitiger Meldeschalter Speicherzustand	**S41**	**Cubicle**BUS signaling switch for “storage spring charged”
S43	**Cubicle**BUS -seitiger Meldeschalter am zweiten Hilfsauslöser F2 oder F3 oder F4	**S43**	**Cubicle**BUS signaling switch for 2nd shunt trip F2 or F3 or F4

S44	**Cubicle**BUS -seitiger Meldeschalter Schaltstellung Hauptkontakte (EIN / AUS)	**S44**	**Cubicle**BUS signaling switch for “main contacts ON/OFF”
S45	**Cubicle**BUS -seitiger Ausgelöst-Meldeschalter	**S45**	**Cubicle**BUS tripped signaling switch
S46	**Cubicle**BUS -seitiger Meldeschalter für Betriebsstellung	**S46**	**Cubicle**BUS signaling switch for connected position
S47	**Cubicle**BUS -seitiger Meldeschalter für Prüfstellung	**S47**	**Cubicle**BUS signaling switch for test position
S48	**Cubicle**BUS -seitiger Meldeschalter für Trennstellung	**S48**	**Cubicle**BUS signaling switch for disconnected position
S-Auslösung	kurzzeitverzögerte Kurzschlussauslösung	**S-tripping**	Short-time delayed tripping
SIGUT	Siemens Zugbügelklemme	**SIGUT**	Siemens trademark for termination technique
ST	Spannungsauslöser (shunt trip)	**ST**	Shunt trip
T.U. ERROR	Fehler im Überstromauslöser	**T.U. ERROR**	Trip unit error
TEST	Prüfstellung	**TEST**	Test position
t_g	Verzögerungszeit der Erdschlussauslösung	t_g	Delay time for G-tripping
t_R	Verzögerungszeit der Überlastauslösung (definiert bei 6 x I_R)	t_R	Delay time for L-tripping (defined at 6 x I_R)
TRIP G	Grund der letzten Auslösung war Erdschluss	**TRIP G**	Trip cause was ground-fault
TRIP I	Grund der letzten Auslösung war Kurzschluss (unverzögert)	**TRIP I**	Trip cause was short-circuit (instantaneous)
TRIP L	Grund der letzten Auslösung war Überlast in einem Hauptleiter	**TRIP L**	Trip cause was overload
TRIP N	Grund der letzten Auslösung war Überstrom im N-Leiter	**TRIP N**	Trip cause was neutral pole overload
TRIP S	Grund der letzten Auslösung war Kurzschluss (verzögert)	**TRIP S**	Trip cause was short-circuit (short-time delayed)
t_{sd}	Verzögerungszeit der Kurzschlussauslösung	t_{sd}	Delay time for S-tripping
t_x	Verzögerungszeit Lastüberwachung	t_x	Delay time for load monitoring
U_c	Bemessungsbetätigungsspannung	U_c	Rated control voltage
U_e	Bemessungsbetriebsspannung	U_e	Rated operational voltage
U_i	Bemessungsisolationsspannung	U_i	Rated insulation voltage
U_{imp}	Bemessungs-Stossspannungsfestigkeit	U_{Imp}	Rated impulse withstand voltage
U_{THD}	Klirrfaktor Spannung	U_{THD}	Distortion factor of voltage
UVR	Unterspannungsauslöser (unverzögert)	**UVR**	Undervoltage release (instantaneous)
UVR td	Unterspannungsauslöser (verzögert)	**UVR td**	Undervoltage release (delayed)
VDE	Verband Deutscher Elektrotechniker	**VDE**	German Association for Electrical, Electronic & Information Technologies
VT	Spannungswandler	**VT**	Voltage transformer
WAGO	WAGO Kontakttechnik, München	**WAGO**	WAGO Kontakttechnik, München
X	Klemmenbezeichnung nach DIN	**X**	Terminal designation according to DIN
Y1	Einschaltmagnet	**Y1**	Closing coil
Z =...	Ergänzung der Bestell-Nr. „weitere Optionen“	**Z =...**	Order number supplement “further options”
(ZSI)	Zone Selective Interlocking (deutsch: → ZSS)	**ZSI**	Zone Selective Interlocking
ZSS	Zeitverkürzte Selektivitätssteuerung (engl. ZSI)	**(ZSS)**	(Zeitverkürzte Selektivitätssteuerung, english → ZSI)

27 Begriffe

Antriebshandhebel

Durch mehrere Pumpbewegungen wird der Federspeicherantrieb gespannt.

Ausgelöst-Meldeschalter

Sammelmeldung von Überlast-, Kurzschluss- und Erdschlussauslösung durch Mikroschalter

Ausstattungsabhängige Kodierung

Um zu vermeiden, daß innerhalb einer Schaltanlage Schalter gleicher Baugröße aber mit unterschiedlicher Ausstattung beim Einsetzen in den Einschubrahmen vertauscht werden, können Leistungsschalter und Einschubrahmen mit einer Kodiervorrichtung ausgerüstet werden.

Automatische Rücksetzung

Für die sofortige Herstellung der Einschaltbereitschaft nach einer Überstromauslösung wird als Option eine automatische mechanische Rücksetzeinrichtung angeboten.

Bemessungsstromkodierung → (Seite 18-6)

Eine Bemessungsstromkodierung erfolgt werkseitig, d.h. jeder Leistungsschalter läßt sich nur in einen Einschubrahmen mit gleichem Bemessungsstrom einsetzen.

Bemessungsstrommodul / „Rating Plug“

Dieses Modul legt z.B. den Einstellbereich des Überlastschutz fest.

BSS - Modul

Breaker Status Sensor - für das Sammeln von Informationen über den Zustand des Leistungsschalters mittels Meldeschalter und deren Übertragung auf den **Cubicle**BUS .

COM15 - Modul

Kommunikationsmodul

Schnittstellenadapter für:

- Umsetzung der **Cubicle**BUS -Signale auf PROFIBUS-DP-Signale und umgekehrt
- Bereitstellung von drei potentialfreien Ausgängen für Steuerungsfunktionen (EIN, AUS, 1x frei verfügbar)
- einen Eingang, frei verwendbar für Informationen aus der Schaltanlage.

Zusatzfunktion bei Verwendung für Einschubschalter:

- Erfassen der Position des Leistungsschalters im Einschubrahmen mit den Meldeschaltern S 46, S 47 und S 48.

CubicleBUS → (Seite 9-79)

Datenbussystem im Schalternahbereich und zum Feldbus (PROFIBUS-DP)

Einschaltmagnet

Elektrischer Abruf der Federspeicherenergie

Elektrisch EIN

Elektrischer Abruf der Speicherenergie über den Einschaltmagneten

27 Glossary

Automatic reset

To re-establish the ready-to-close state immediately after an overcurrent tripping, an automatic mechanical reset is offered as an option.

Auxiliary releases

There are undervoltage releases and shunt trips available.

Breaking capacity (IEC 60947-2)

N	= Circuit breaker with ECO-breaking capacity	= 2
S	= Circuit breaker with standard-breaking capacity	= 3
H	= Circuit breaker with high breaking capacity	= 4
C	= Circuit breaker with very high breaking capacity	= 5
DC	= Circuit breaker with DC-breaking capacity	= 8

Position 8 in MLFB 3WL1???-#

BSS module

Breaker Status Sensor - for collecting circuit breaker status information via signalling switches and transmitting these data to the **Cubicle**BUS .

Closing coil

Electrical activation of stored energy

Coding of auxiliary connectors

To prevent interchanging the auxiliary wiring connections by mistake, the auxiliary connectors are coded.

COM15 Module

Communications module

Interface adapter for:

- converting **Cubicle**BUS signals to PROFIBUS-DP signals and vice versa
- providing three potential-free outputs for control functions (ON, OFF, 1 freely available)
- one input, freely usable for control informations from the switchgear.

Additional function for draw-out circuit breakers:

- detecting the circuit breaker position in the guide frame by means of signalling switches S 46, S 47 and S 48.

CubicleBUS → (page 9-79)

Bus system in the vicinity of the circuit breaker and to the FieldBus (PROFIBUS-DP)

Electrical closing lockout...

For electrical interlocking of two or more circuit breakers (closing interlock). The electrical closing lockout can block closing the circuit breaker with a sustained signal.

Electrical ON

Electrical activation of the stored energy through the closing coil

Energy transformer

Power supply for the overcurrent release.

Elektrische Einschaltsperre

Zur elektrischen Verriegelung von zwei oder mehreren Schaltern (Einschaltverriegelung). Die elektrische Einschaltsperre dient zum Sperren gegen Einschalten des Leistungsschalters mit einem Dauersignal.

Energiewandler

Energiequelle für Eigenversorgung des Überstromauslösers

Federspeicherantrieb

Baueinheit mit Feder als Energiespeicher. Die Feder wird mittels Antriebshandhebel oder Motorantrieb gespannt und durch Verklinkungen in gespanntem Zustand gehalten. Durch Freigeben dieser Verklinkungen wird die Speicherenergie auf den Schaltpol geleitet, der Schalter schaltet ein.

Fern-Rücksetzung

Mittels des optionalen Fern-Rücksetzmagneten werden die elektrische Meldung des Ausgelöst-Meldeschalters und der rote Resetknopf zurückgesetzt.

Gegenseitige mechanische Verriegelung

Ermöglicht verschiedene Varianten der gegenseitigen Verriegelung von Leistungsschaltern.

Hilfsauslöser

Es stehen Unterspannungsauslöser und Spannungsauslöser (= Arbeitsstromauslöser) zur Verfügung.

Kodierung Handstecker

Um ein Vertauschen der Hilfsleiteranschlüsse zu verhindern wurden die Handstecker kodierbar gestaltet.

Lamellenkontakte

Verbinden die Hauptanschlüsse des Leistungsschalters mit den Hauptanschlüssen des Einschubrahmens.

Mechanische Wiedereinschaltsperre

Nach einer Überstromauslösung ist der Schalter gegen Wiedereinschalten gesperrt, bis die mechanische Wiedereinschaltsperre von Hand zurückgesetzt wird.

Meldeschalter Schaltstellung

Die Betätigung dieser Hilfsstromschalter erfolgt in Abhängigkeit vom Schaltzustand des Leistungsschalters.

Motorantrieb

Durch den Motorantrieb wird der Federspeicher automatisch gespannt, sobald Spannung an den Hilfsstromanschlüssen anliegt. Nach einer Einschaltung wird der Federspeicherantrieb automatisch für die nächste Einschaltung gespannt.

Nennstromkodierung → Bemessungsstromkodierung

Positionsanzeige

Zur Anzeige der Schalterposition im Einschubrahmen

Positionsmeldeschalter

Zur Fernanzeige der Schalterposition im Einschubrahmen

Finger contacts

Connects the main terminals of the circuit breaker with the main terminals of the guide frame.

Guide rail

Used for placing the circuit breaker in the guide frame.

Motor-operated mechanism

The motor charges the spring storage automatically as soon as voltage is applied to the auxiliary connections. After closing, the spring storage is automatically charged for the next closing operation.

Mechanical reclosing lockout

After tripping, the circuit breaker cannot be reclosed until the mechanical reclosing lockout has been reset by hand.

Mutual mechanical interlocking

There are various versions for the mutual interlocking system available, comprising a maximum of three circuit breakers.

Option-related coding

To prevent circuit breakers of the same size but different equipment from being inserted in incorrect guide frames, the circuit breakers and the guide frames can be equipped with a coding facility.

Position indicator

To show the circuit breaker position in the guide frame.

Position signaling switch

For remote signaling of the circuit breaker position in the guide frame.

Powerconfig

Software for commissioning and service, free of charge available at:
www.siemens.com/powerconfig-download
powerconfig (from Version 2.2) is used as a shared commissioning and maintenance tool for the SENTRON VL and SENTRON WL circuit breakers with communication capability. It offers a standardized interface and a uniform operator control concept for the activities to be carried out, such as

- Parameterizing
- Operating
- Monitoring, and
- Diagnosing.

powerconfig currently supports German and English.
“SENTRON communication handbook”
→ http://support.automation.siemens.com

Rated current coding → (Seite 18-6)

The rated current is coded at the factory, i.e. each and every circuit breaker can only be inserted in a guide frame with the same rated current.

Rating plug

This module defines e.g. the setting range of the overload protection.

Remote reset

The electrical signal of the triped signaling switch and the red reset button are reset by the optional remote reset magnet.

Powerconfig

Inbetriebnahme- und Service Software, kostenlos verfügbar unter:
www.siemens.com/powerconfig-download
powerconfig (ab Version 2.2) dient als gemeinsames Inbetriebnahme- und Wartungs-Werkzeug für die kommunikationsfähigen SENTRON VL- und SENTRON WL-Leistungsschalter. Es bietet eine einheitliche Oberfläche und ein einheitliches Bedienkonzept bei den durchzuführenden Aktivitäten wie

- parametrieren
- bedienen
- beobachten sowie
- diagnostizieren.

Aktuell unterstützt *powerconfig* die Sprachen Deutsch und Englisch.
s. „SENTRON Kommunikationshandbuch“
→ http://support.automation.siemens.com

Schaltvermögen (IEC 60947-2)

N	= Leistungsschalter mit ECO-Schaltvermögen	= 2
S	= Leistungsschalter mit Standardschaltvermögen	= 3
H	= Leistungsschalter mit hohem Schaltvermögen	= 4
C	= Leistungsschalter mit sehr hohem Schaltvermögen	= 5
DC	= Leistungsschalter mit DC-Schaltvermögen	= 8

Position 8 in MLFB 3WL1???-#

Shutter

Shutter sind Isolierstoffplatten zum Abdecken spannungsführender Hauptstrombahnen im Einschubrahmen (Berührungsschutz).

Sicheres AUS

Mit dieser zusätzlichen Funktion wird ein Einschalten des Leistungsschalters verhindert und die Trennerbedingung in AUS-Stellung nach IEC 60947-2 erfüllt:

- „Mechanisch AUS“-Taster wurde gedrückt
- die Hauptkontakte sind geöffnet
- bei Einschubschaltern ist die Kurbel eingezogen
- die verschiedenen Verriegelungsbedingungen sind erfüllt

Spannungsauslöser

Zum Fernausschalten des Leistungsschalters und Sperren gegen Einschalten

Unterspannungsauslöser

Zum Fernausschalten und Verriegeln des Leistungsschalters. Einsatz des Leistungsschalters in NOT-AUS Kreisen (nach EN 60 204 Teil 1 / DIN VDE 0113 Teil 1) zusammen mit einer getrennt angeordneten NOT-AUS-Einrichtung, kurzzeitige Spannungseinbrüche sollen nicht zum Ausschalten des Leistungsschalters führen.

Unterspannungsauslöser (verzögert)

Zum Fernausschalten und Verriegeln des Leistungsschalters. Spannungseinbrüche sollen nicht zum Ausschalten des Leistungsschalters führen.

Verfahrschiene

Dient zum Aufnehmen des Leistungsschalters im Einschubrahmen.

Werkzeugbetätigung

Durch eine Abdeckung mit Loch (∅ 6,35 mm) können Taster nur mit einem Dorn betätigt werden.

Safe OFF

This additional function prevents closing the circuit breaker and fulfils the disconnecting condition in OFF position as per IEC 60947-2:

- "Mechanical Off" button pressed
- main contacts open
- crank handle of draw-out circuit breakers removed
- the various interlocking conditions are fulfilled.

Shunt trip

For remote circuit breaker tripping and locking against closing

Shutter

Shutters are insulation plates for covering live main circuits in the guide frame (shock protection).

Signaling switch for switch position

These auxiliary switches operate according to the circuit breaker switch position.

Spring charging lever

The spring storage is charged manually by several pumping operations.

Spring storage

Module containing a spring as an energy store. The spring is charged by means of a hand-operated lever or a motor, and is latched in its charged state. When the latches are released, the stored energy is transmitted to the pole, the circuit breaker closes.

Tool operation

A cover with a hole (∅ 6,35) means that buttons can only be pressed using a rod.

Trip signaling switch

Group signal for overload, short-circuit and ground-fault tripping by microswitches.

Undervoltage release

For remote tripping and interlocking of the circuit breaker. Circuit breaker application in emergency OFF circuits (as per EN 60 204 Part 1 / DIN VDE 0113 Part 1) together with an emergency OFF facility to be arranged separately. The circuit breaker shall not be tripped by short-time voltage drops (e.g. motor start-up).

Undervoltage release (time delayed)

For remote tripping and interlocking of the circuit breaker. The circuit breaker shall not be tripped by voltage drops (e.g. system transfers).

28 Index - deutsch

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29 Formulare

29.1 Kennwerte

Verschiedene Einstellungen werden auf folgenden Seiten festgehalten:

→ Bemessungsstromkodierung (Seite 18-7)

→ Ausstattungsabhängige Kodierung (Seite 18-10)

→ ETU-Einstellungen (Seite 29-4)

29.2 Checklisten

→ Checkliste für Inbetriebnahme (Seite 6-5)

→ Störungsbeseitigung (Seite 6-10)

29 Forms

29.1 Parameters

Various parameters may be put down on the following pages

→ Rating current coding (page 18-7)

→ Option-related coding (page 18-10)

→ ETU-settings (page 29-5)

29.2 Checklists

→ Checklist for commissioning (page 6-5)

→ Troubleshooting (page 6-12)

HINWEIS	NOTICE
Die Formulare auf den folgenden Seiten kopieren, nicht die Seiten entfernen.	Copy the forms on the following pages. Do not remove them.

Leistungsschalter 3WL1

Austausch oder Ersatz der ETU

Meldung über Leistungsschalter-Umbau

Siemens AG **Technical Assistance** **https://support.industry.siemens.com**

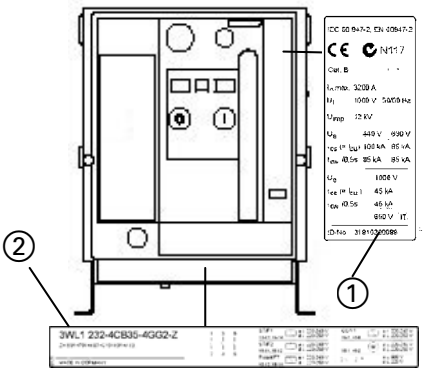
Kunde:

Leistungsschalter 3WL:

Ident-Nummer:	①	
MLFB:	②	3WL
Ident-Nummer der ETU:	③	

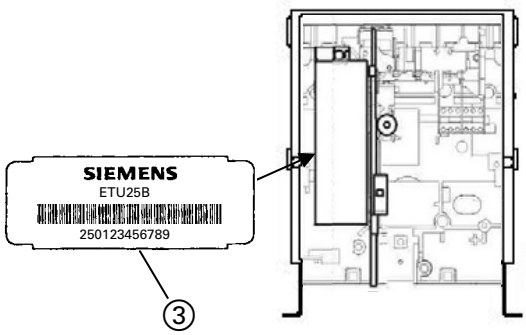
Ersatz durch ETU:

Ident-Nummer der ETU:	③



Funktionsprüfung:

		Prüfung bestanden: Ja / Nein [Prüfgerät, MLFB 3WL9111-0AT32-0AA0]
Wandlertest	L1	
	L2	
	L3	
	N	
	G	
Auslösetest	L	
	S	
	I	
	N	
(Einstellung: Ig= OFF erforderlich)	G	



Name:	Dienststelle:
Geschult am:	Schulungsort:
Datum:	Unterschrift:

Circuit-breaker 3WL1

Change or replacement of the ETU

Announcement of circuit-breaker modification

Siemens AG	
Technical Assistance	**https://support.industry.siemens.com**

Customer:

Circuit-breaker 3WL:

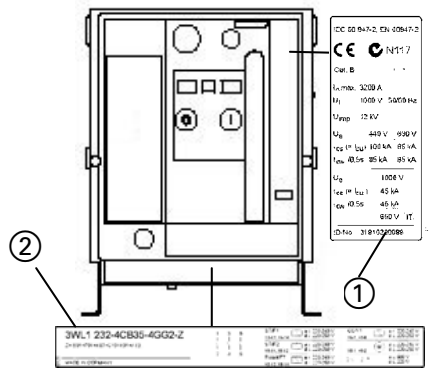
ID No.:	①	
MLFB:	②	3WL
ID No. of the ETU:	③	

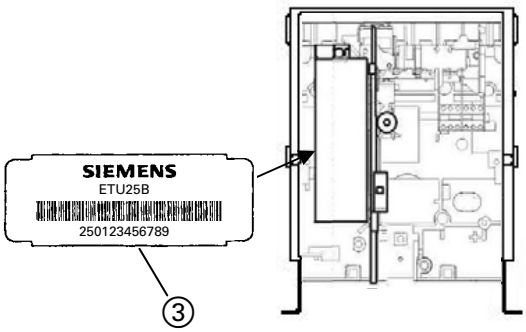
Replaced by ETU:

ID No. of the ETU:	③

Function test:

	Test passed: Yes / No [Test device, MLFB 3WL9111-0AT32-0AA0]
Transformer test	L1
	L2
	L3
	N
	G
Trip out test	L
	S
	I
	N
(Settings: Ig= OFF necessary)	G

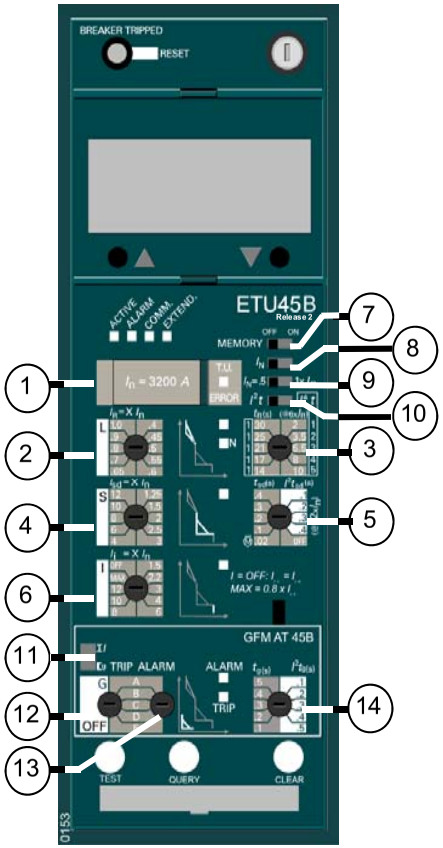




Name:	Department:
Date of training:	Place of 3WL assembly training:
Date:	Signature:

SENTRON WL

ID-Nummer:



Bsp. ETU45B mit GFM AT 45B und Display

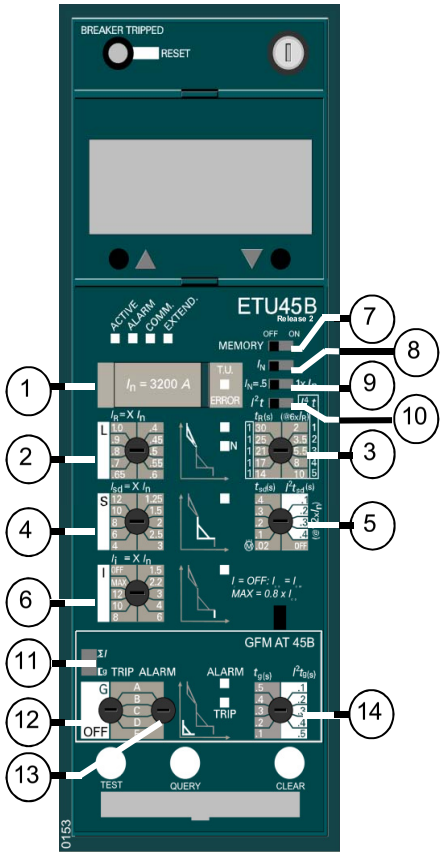
	siehe (x)	ETU15B	ETU25B	ETU27B	ETU45B	Einstellwerte	
Bemessungsstrom	1	$I_{n\,max}$	✓	✓	✓	I_n=	A
L Überlast-Schutz							
Einstellwert	2	✓	✓	✓	✓	I_R =	x I_n
Verzögerung	3	fix	fix	fix	✓	t_R =	s
Charakteristik	10				✓	❒ I^2t	❒ I^4t
Thermisches Gedächtnis	7				✓	❒ OFF	❒ ON
S Kurzschluss-Schutz, kurzzeitverzögert							
Einstellwert	4		✓	✓	✓	I_{sd} =	x I_n
Verzögerung, fix oder	5		✓	✓	✓	t_{sd} =	s
Verzögerung, I^2t_{sd}	5				✓	t_{sd} =	s
ZSI-Modul 3WL9111-0AT21-0AA0	extern				o	❒ JA	❒ NEIN
I Kurzschluss-Schutz, unverzögert							
Einstellwert	6	✓	fix	fix	✓	I_i =	x I_n
N Neutralleiter-Schutz							
aktive / inaktiv	8			✓	✓	❒ OFF	❒ ON
Einstellwert	9				✓	I_N =	x I_n
G Erdschluss-Schutz							
Art der Stromerfassung	11				o	❒ Σ I	❒ ext.Wandler
Einstellwert TRIP	12			✓	o	I_g =	A
Einstellwert ALARM	13				o	I_g =	A
Verzögerung, fix oder	14			✓	o	t_g =	s
Verzögerung, I^2t_g	14				o	t_g =	s

✓ ... Standard
o ... Option

Stand 2003-09-18

SENTRON WL

ID-number:



e.g. ETU45B with GFM AT 45B and Display

	see (x)	ETU15B	ETU25B	ETU27B	ETU45B	setting values	
rated current	1	$I_{n\,max}$	✓	✓	✓	I_n=	A
L Overload protection							
Current settings	2	✓	✓	✓	✓	I_R =	x I_n
Delay	3	fix	fix	fix	✓	t_R =	s
Characteristic	10				✓	❒ I^2t	❒ I^4t
Thermal memory	7				✓	❒ OFF	❒ ON
Fixed instantaneous, short time delay							
S Fixed instantaneous, short time delay							
Current settings	4		✓	✓	✓	I_{sd} =	x I_n
Short time delay, fix or	5		✓	✓	✓	t_{sd} =	s
Short time delay, I^2t_{sd}	5				✓	t_{sd} =	s
ZSI-module 3WL9111-0AT21-0AA0	extern				o	❒ YES	❒ NO
I Instantaneous short-circuit protection							
Current settings	6	✓	fix	fix	✓	I_i =	x I_n
N Neutral conductor protection							
active / inactive	8			✓	✓	❒ OFF	❒ ON
Current settings	9				✓	I_N =	x I_n
G Earth-fault protection							
Method of current detection	11				o	❒ Σ I	❒ ext.transformer
Current settings TRIP	12			✓	o	I_g =	A
Current settings ALARM	13				o	I_g =	A
Short time delay, fix or	14			✓	o	t_g =	s
Short time delay, I^2t_g	14				o	t_g =	s

✓ ... Standard
o ... Option

WEB: https://support.industry.siemens.com

Technische Änderungen vorbehalten. Zum späteren Gebrauch aufbewahren.
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Bestell-Nr. / Order No.:
3ZX1812-0WL00-0AN4

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Deutsch/English

FREQCON

FAT Test Protocol

20FT PCS Container

(Factory Acceptance Test)

Imprint

Software development

Hardware development and production

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Bürgerwiesenweg 5
D-27336 Rethem, Germany

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Email:
info@freqcon.com

Contact information

For further information, please call us or send an e-mail to info@freqcon.com.
Visit our website http://www.freqcon.com for more information about our products and solutions.

Identification

Product and type designation

Container type
40FT BESS

Serial No.
FRQ-53396000001

Document number
23A2007_240706_FAT_20FT_PCS_Container_EN_v2.0

Name and address of the manufacturer

Manufacturer of the product
FREQCON GmbH
Bürgerwiesenweg 5
D-27336 Rethem, Germany

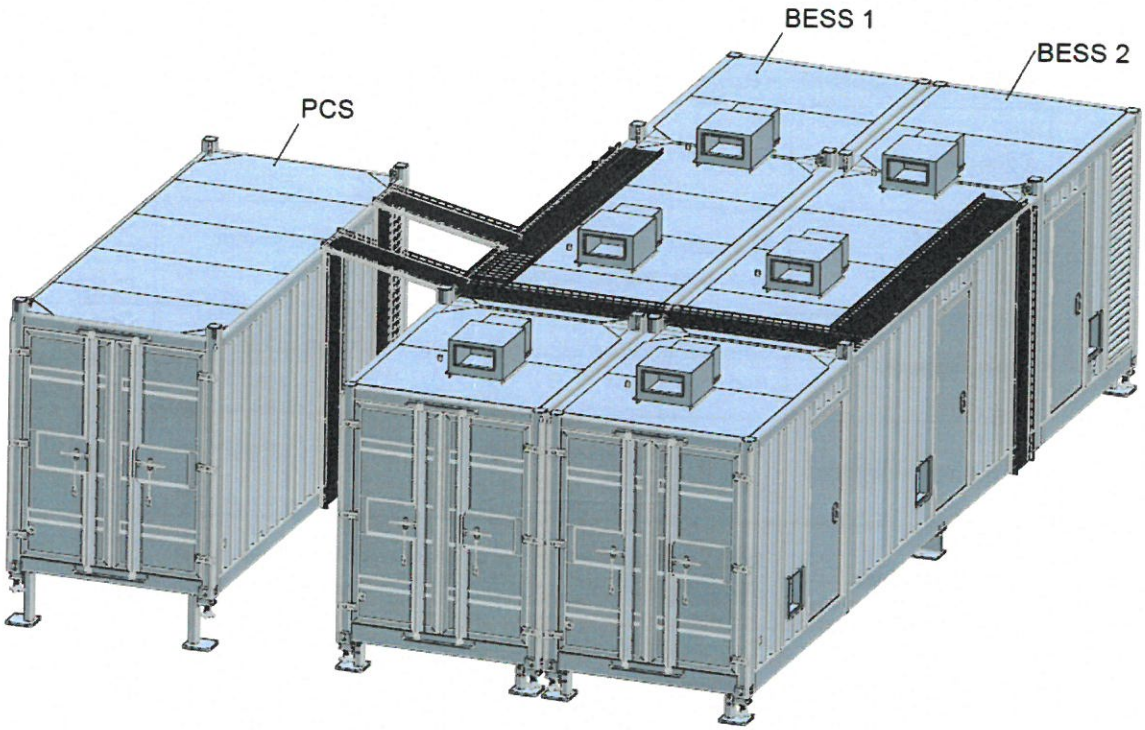
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Original document

This document is an original document of FREQCON GmbH.

3 General Arrangement



4 Container Inspection

4.1 Prerequisites

The following documents must be available in electronic form or as a printout for the FAT:

1. CAD of containers

Remarks:

4.3 Container Visual Inspection

Check all system parts, including external parts, to ensure that they are in perfect condition. Document the qualification results in the following table.

Examination		Result
Accessibility	The clearances in the container correspond to the CAD. All enclosure doors are in the correct position and accessible	☒ OK ☐ Defects ☐ N/A
Light/sockets	Sufficient lighting is available. There are service sockets (230 V) in the container interior. The sockets and lighting are usable and easily accessible.	☒ OK ☐ Defects ☐ N/A
Air conditioning	The air conditioning units are in the correct position and at least one control unit for the air conditioning units is present. The air conditioning units are functional and can cool the room to a satisfactory level.	☒ ☐ OK ☐ Defects ☐ N/A
Personal security	All steps in the container (if present) are marked in signal colours (yellow/black). There are no sharp edges in the container.	☐ OK ☒ Defects ☐ N/A
Installation of components and cables in the container	All components such as switch cabinets, cable trays, air conditioning units, etc. are properly installed and cannot fall or tip over.	☐ OK ☒ Defects ☐ N/A
Cable bushings	All cable ducts are present (possibly not fitted) and comply with the client's specification. Covers, cable bushings or similar are available for all openings in the container	☒ OK ☐ Defects ☐ N/A

Remarks and description in case of defects:
- Missing yellow/black marking on step entry door - Missing cable ladders on back door in transformer area for HV. AC side cables

6 Examination and authorisation

The test report becomes the factory acceptance report as soon as the individual test reports have been completed and labelled with a test date. The factory acceptance report is sent to the customer for confirmation and the results must be documented in the TR8 test report.

TR8	Examination and authorisation of execution
Checking the test results and original data. Final assessment for factory acceptance	
☒ PASSED	☐ NOT PASSED
If there are any deviations, please complete the following section.	
Evaluate whether or not the existing deviation has an influence on the final factory acceptance test.	
☐ YES	☒ NO

Remark:

SEE OVERALL PUNCH LIST

Carried out by:	C Palou	Date:	18.07.2024
	FREQCON GmbH		DD/MM/YYYY
Authorised by:	[signature]	Date:	18.07.2024
	Customer		DD/MM/YYYY

FREQCON

FAT Test Protocol

20FT PCS Container

(Factory Acceptance Test)

Imprint

Software development

Hardware development and production

Freqcon GmbH
Bürgerwiesenweg 5
D-27336 Rethem, Germany

Phone: +49 (0) 5165 - 291 760 - 0

Email:
info@freqcon.com

Contact information

For further information, please call us or send an e-mail to info@freqcon.com.
Visit our website http://www.freqcon.com for more information about our products and solutions.

Identification

Product and type designation

Container type
40FT BESS

Serial No.
FRQ-53396000001

Document number
23A2007_240706_FAT_20FT_PCS_Container_EN_v2.0

Name and address of the manufacturer

Manufacturer of the product
FREQCON GmbH
Bürgerwiesenweg 5
D-27336 Rethem, Germany

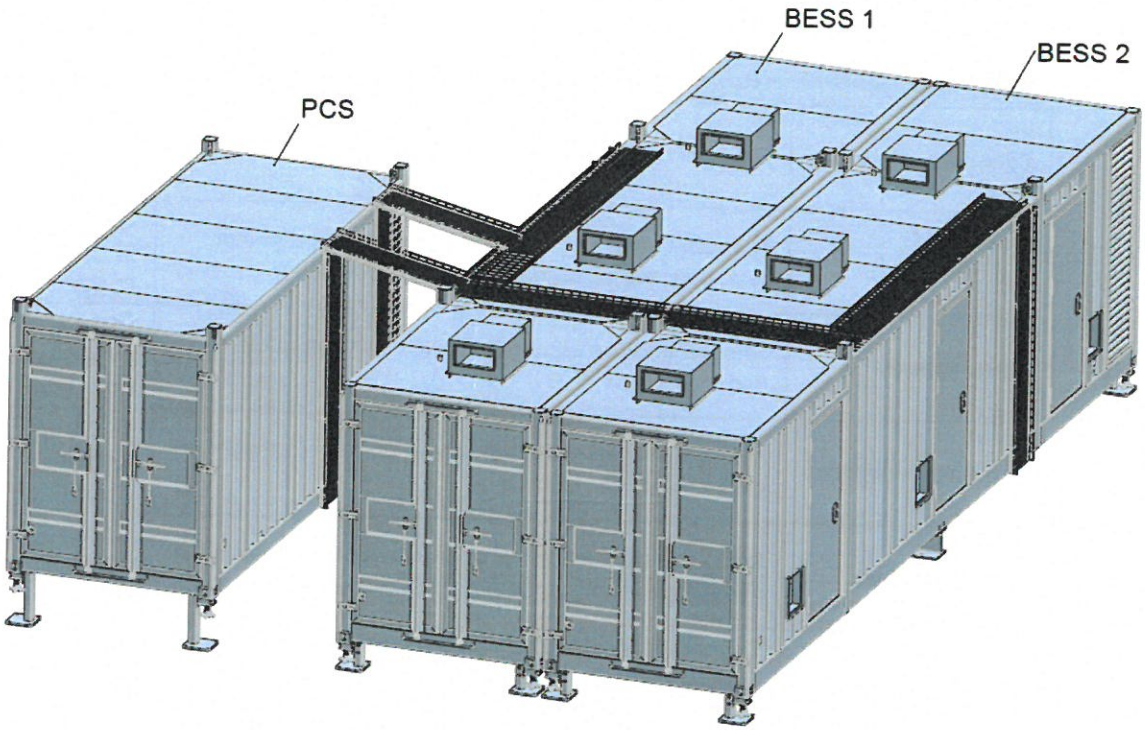
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Original document

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3 General Arrangement



4 Container Inspection

4.1 Prerequisites

The following documents must be available in electronic form or as a printout for the FAT:

1. CAD of containers

Remarks:

4.3 Container Visual Inspection

Check all system parts, including external parts, to ensure that they are in perfect condition. Document the qualification results in the following table.

Examination		Result
Accessibility	The clearances in the container correspond to the CAD. All enclosure doors are in the correct position and accessible	☒ OK ☐ Defects ☐ N/A
Light/sockets	Sufficient lighting is available. There are service sockets (230 V) in the container interior. The sockets and lighting are usable and easily accessible.	☒ OK ☐ Defects ☐ N/A
Air conditioning	The air conditioning units are in the correct position and at least one control unit for the air conditioning units is present. The air conditioning units are functional and can cool the room to a satisfactory level.	☒ ☐ OK ☐ Defects ☐ N/A
Personal security	All steps in the container (if present) are marked in signal colours (yellow/black). There are no sharp edges in the container.	☐ OK ☒ Defects ☐ N/A
Installation of components and cables in the container	All components such as switch cabinets, cable trays, air conditioning units, etc. are properly installed and cannot fall or tip over.	☐ OK ☒ Defects ☐ N/A
Cable bushings	All cable ducts are present (possibly not fitted) and comply with the client's specification. Covers, cable bushings or similar are available for all openings in the container	☒ OK ☐ Defects ☐ N/A

Remarks and description in case of defects:
- Missing yellow/black marking on step entry door - Missing cable ladders on back door in transformer area for HV. AC side cables

6 Examination and authorisation

The test report becomes the factory acceptance report as soon as the individual test reports have been completed and labelled with a test date. The factory acceptance report is sent to the customer for confirmation and the results must be documented in the TR8 test report.

TR8	Examination and authorisation of execution
Checking the test results and original data. Final assessment for factory acceptance	
☒ PASSED	☐ NOT PASSED
If there are any deviations, please complete the following section.	
Evaluate whether or not the existing deviation has an influence on the final factory acceptance test.	
☐ YES	☒ NO

Remark:

SEE OVERALL PUNCH LIST

Carried out by:	C Palou	Date:	18.07.2024
	FREQCON GmbH		DD/MM/YYYY
Authorised by:	[signature]	Date:	18.07.2024
	Customer		DD/MM/YYYY

FREQCON

FAT Test Protocol

40FT BESS Container 1

(Factory Acceptance Test)

Imprint

Software development
Hardware development and production
Freqcon GmbH
Bürgerwiesenweg 5
D-27336 Rethem, Germany

Phone: +49 (0) 5165 - 291 760 - 0

Email:
info@freqcon.com

Contact information
For further information, please call us or send an e-mail to info@freqcon.com.
Visit our website http://www.freqcon.com for more information about our products and solutions.

Identification

Product and type designation

Container type
40FT BESS

Serial No.
FRQ-53406000001

Document number
23A2007_240706_FAT_40FT_BESS_Container_1_EN_v2.0

Name and address of the manufacturer

Manufacturer of the product
FREQCON GmbH
Bürgerwiesenweg 5
D-27336 Rethem, Germany

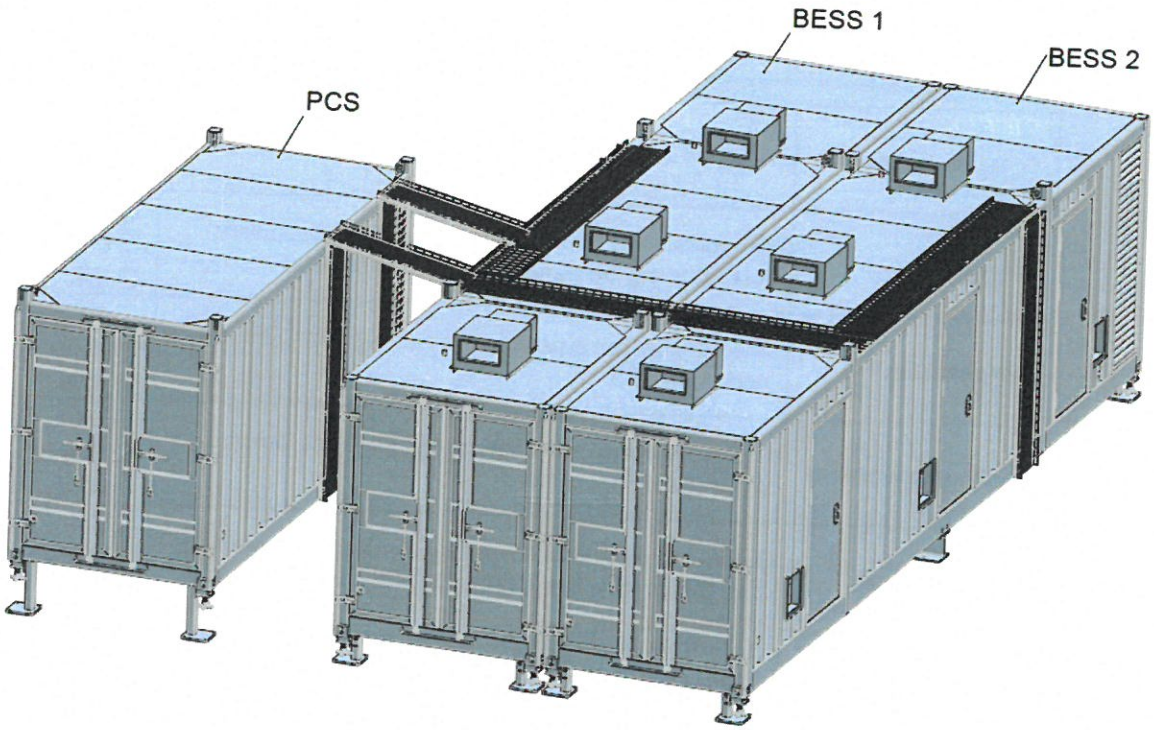
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3 General Arrangement



4 Container Inspection

4.1 Prerequisites

The following documents must be available in electronic form or as a printout for the FAT:

1. CAD of containers

Remarks:

4.3 Container Visual Inspection

Check all system parts, including external parts, to ensure that they are in perfect condition. Document the qualification results in the following table.

Examination		Result
Accessibility	The clearances in the container correspond to the CAD. All enclosure doors are in the correct position and accessible	☒ OK ☐ Defects ☐ N/A
Light/sockets	Sufficient lighting is available. There are service sockets (230 V) in the container interior. The sockets and lighting are usable and easily accessible.	☒ OK ☐ Defects ☐ N/A
Air conditioning	The air conditioning units are in the correct position and at least one control unit for the air conditioning units is present. The air conditioning units are functional and can cool the room to a satisfactory level.	☒ ☐ OK ☐ Defects ☐ N/A
Personal security	All steps in the container (if present) are marked in signal colours (yellow/black). There are no sharp edges in the container.	☐ OK ☒ Defects ☐ N/A
Installation of components and cables in the container	All components such as switch cabinets, cable trays, air conditioning units, etc. are properly installed and cannot fall or tip over.	☒ OK ☐ Defects ☐ N/A
Cable bushings	All cable ducts are present (possibly not fitted) and comply with the client's specification. Covers, cable bushings or similar are available for all openings in the container	☒ OK ☐ Defects ☐ N/A

Remarks and description in case of defects:
Gaskets on emergency doors → to be checked Sealing might be partial "push to open" sticker inside the access doors

6 Examination and authorisation

The test report becomes the factory acceptance report as soon as the individual test reports have been completed and labelled with a test date. The factory acceptance report is sent to the customer for confirmation and the results must be documented in the TR8 test report.

TR8	Examination and authorisation of execution
Checking the test results and original data. Final assessment for factory acceptance	
☒ PASSED	☐ NOT PASSED
If there are any deviations, please complete the following section.	
Evaluate whether or not the existing deviation has an influence on the final factory acceptance test.	
☐ YES	☒ NO

Remark:

SEE OVERALL PUNCHLIST

Carried out by:	CARLOS PALENZUELA	Date:	18.07.2024
	FREQCON GmbH		DD/MM/YYYY
Authorised by:	[signature]	Date:	18.07.2024
	Customer		DD/MM/YYYY

FREQCON

FAT Test Protocol

40FT BESS Container 2

(Factory Acceptance Test)

Imprint

Software development
Hardware development and production
Freqcon GmbH
Bürgerwiesenweg 5
D-27336 Rethem, Germany

Phone: +49 (0) 5165 - 291 760 - 0

Email:
info@freqcon.com

Contact information

For further information, please call us or send an e-mail to info@freqcon.com.
Visit our website http://www.freqcon.com for more information about our products and solutions.

Identification

Product and type designation

Container type
40FT BESS

Serial No.
FRQ-53412000001

Document number
23A2007_240706_FAT_40FT_BESS_Container_2_EN_v2.0

Name and address of the manufacturer

Manufacturer of the product
FREQCON GmbH
Bürgerwiesenweg 5
D-27336 Rethem, Germany

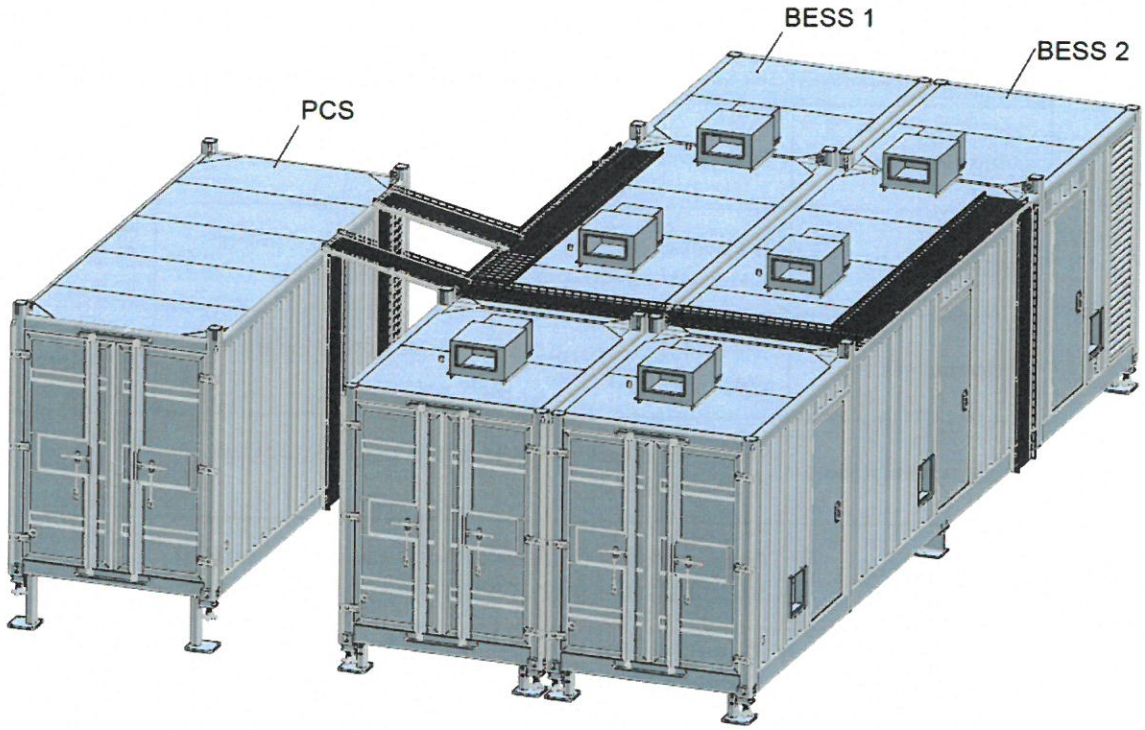
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3 General Arrangement



4 Container Inspection

4.1 Prerequisites

The following documents must be available in electronic form or as a printout for the FAT:

1. CAD of containers

Remarks:

4.3 Container Visual Inspection

Check all system parts, including external parts, to ensure that they are in perfect condition. Document the qualification results in the following table.

Examination		Result
Accessibility	The clearances in the container correspond to the CAD. All enclosure doors are in the correct position and accessible	☒ OK ☐ Defects ☐ N/A
Light/sockets	Sufficient lighting is available. There are service sockets (230 V) in the container interior. The sockets and lighting are usable and easily accessible.	☒ OK ☐ Defects ☐ N/A
Air conditioning	The air conditioning units are in the correct position and at least one control unit for the air conditioning units is present. The air conditioning units are functional and can cool the room to a satisfactory level.	☒ ☐ OK ☐ Defects ☐ N/A
Personal security	All steps in the container (if present) are marked in signal colours (yellow/black). There are no sharp edges in the container.	☐ OK ☒ Defects ☐ N/A
Installation of components and cables in the container	All components such as switch cabinets, cable trays, air conditioning units, etc. are properly installed and cannot fall or tip over.	☒ OK ☐ Defects ☐ N/A
Cable bushings	All cable ducts are present (possibly not fitted) and comply with the client's specification. Covers, cable bushings or similar are available for all openings in the container	☒ OK ☐ Defects ☐ N/A

Remarks and description in case of defects:
Missing marking yellow/black on step Electrical cabinets = no ferrules on all cables no lables on cables & wires identification

6 Examination and authorisation

The test report becomes the factory acceptance report as soon as the individual test reports have been completed and labelled with a test date. The factory acceptance report is sent to the customer for confirmation and the results must be documented in the TR8 test report.

TR8	Examination and authorisation of execution
Checking the test results and original data. Final assessment for factory acceptance	
☒ PASSED	☐ NOT PASSED
If there are any deviations, please complete the following section.	
Evaluate whether or not the existing deviation has an influence on the final factory acceptance test.	
☐ YES	☒ NO

Remark:

SEE OVERALL PUNCHLIST

Carried out by:	CARLOS PALENZUELA	Date:	18.07.2024
	FREQCON GmbH		DD/MM/YYYY
Authorised by:		Date:	18-07-2024
	Customer		DD/MM/YYYY

FREQCON

FAT Test Protocol

Converter & BESS

(Factory Acceptance Test)

Version	Date	Name	Description
1.0	2024-02-29	S. Laudahn	First version
1.1	2024-05-14	C. Palenzuela J. Nitsch	Updated several sections
2.0	2024-07-08	C. Palenzuela	Updated several sections

Table 1: Version overview

	Date	Name
Editor	29.02.2024	S. Laudahn
Checked by		
Released by		

Table 2: Release overview

Imprint

Software development
Hardware development and production
Freqcon GmbH
Bürgerwiesenweg 5
D-27336 Rethem, Germany

Phone: +49 (0) 5165 - 291 760 - 0

Email:
info@freqcon.com

Contact information
For further information, please call us or send an e-mail to info@freqcon.com.
Visit our website http://www.freqcon.com for more information about our products and solutions.

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2.2 Responsibilities of the customer 6
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Identification

Product and type designation

Device type
BESS 1 MW / 5MWh

Circuit diagram version
10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62

Document number
23A2007_240708_FAT_BESS_Converter_EN_v2.0

Name and address of the manufacturer

Manufacturer of the product
FREQCON GmbH
Bürgerwiesenweg 5
D-27336 Rethem, Germany

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Original document

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1 About this document

This acceptance report is used to assess compliance with all design and customer requirements of the tested system.

The factory acceptance test (FAT) is carried out by specialised personnel before delivery of the system and the result is checked by the customer.

2 Responsibilities

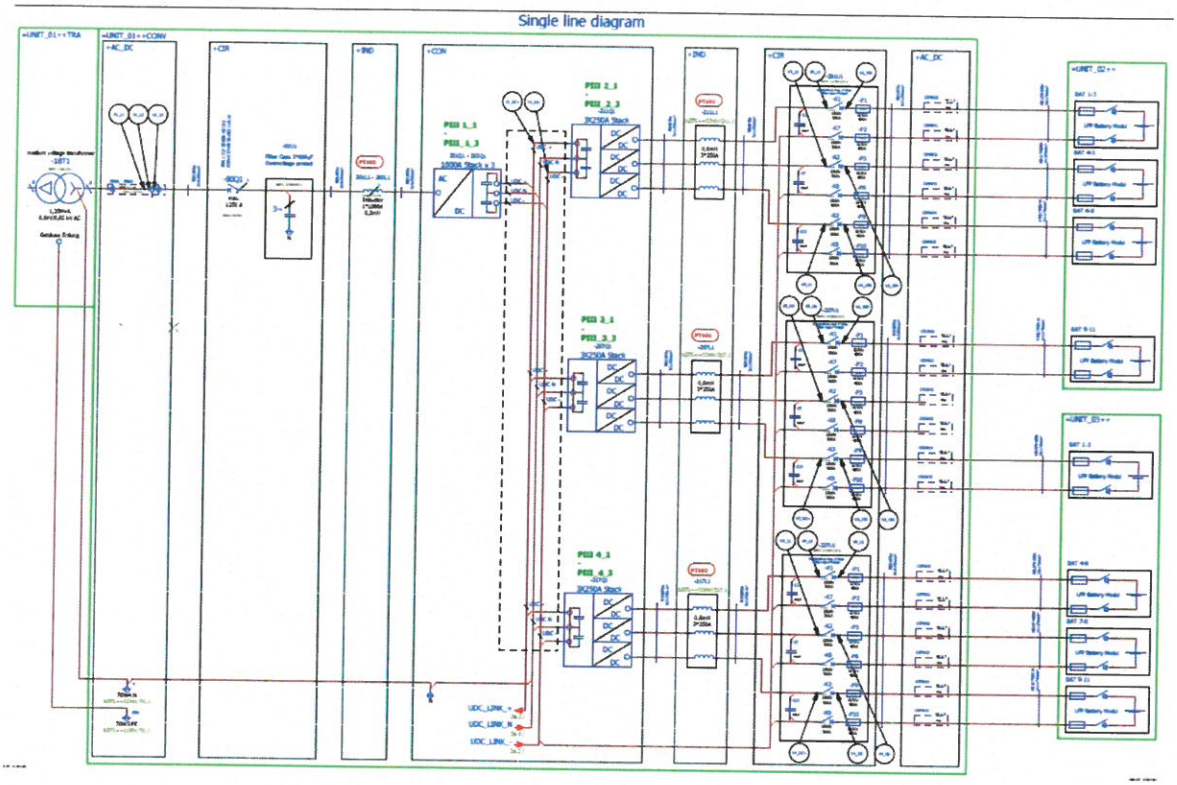
2.1 Responsibilities of FREQCON GmbH

- Preparation and review of the acceptance report
- Carrying out the acceptance test (FAT), documentation of the results
- Elimination of identified deviations
- Preparation and review of the acceptance report

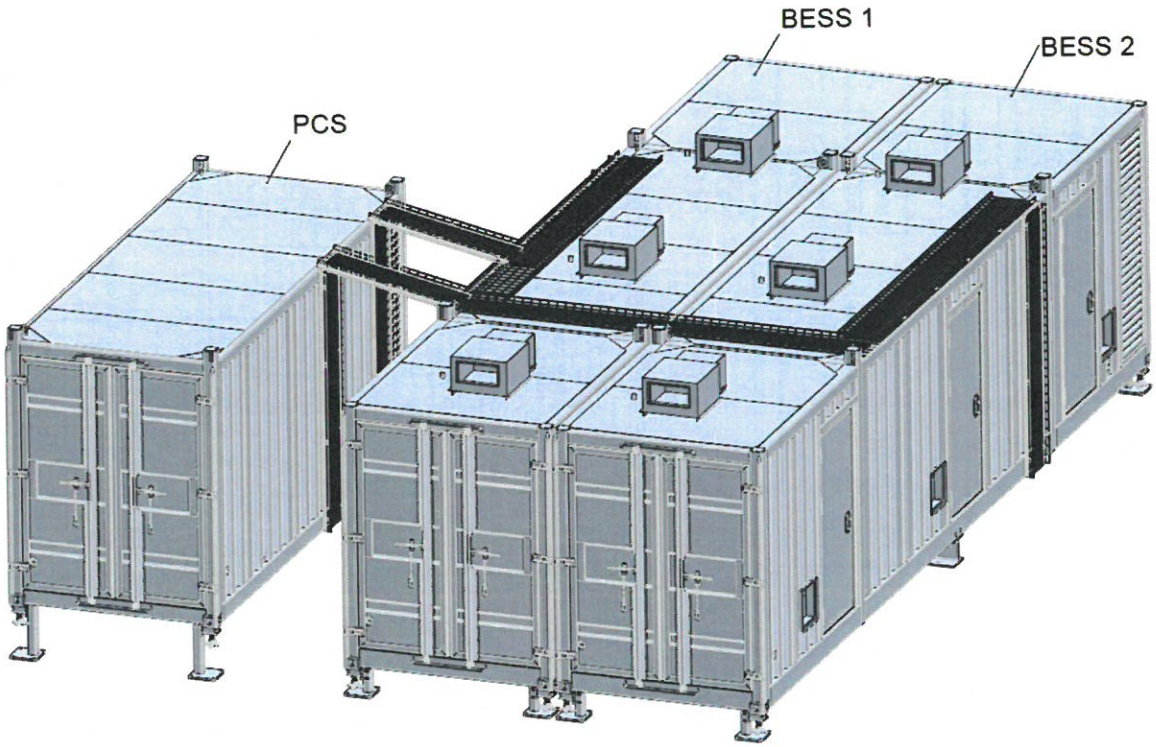
2.2 Responsibilities of the customer

- Dispatch of specialised personnel to FREQCON GmbH, inspection of the acceptance results and documented data by the specialised personnel
- Confirmation of the factory acceptance report by specialised personnel

2.3 Single Line Diagram



2.4 General Arrangement



3 Converter (PCS)

3.1 Reference Documents Converter (PCS)

Document Title	Document Name
Overall Schematics	10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62

3.2 PCS Tests

3.2.1 Prerequisites

The following documents must be available in electronic form or as a printout for the FAT:

1. Circuit diagram of the system
2. Manual in the current version
3. General arrangement overview
4. Interface documentation (if available)

Remarks:

3.2.2 Visual Inspection of Control Cabinet 1

Check all system components, including external ones, to ensure that they are in perfect condition. Document the qualification results in the following table.

TR01	Test		Result
1.1	**Cleanliness**	**Test Layout:** Check covers and cabinet interior for cleanliness and rust.	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: Covers and interior are clean, without dirt or rust.	
1.2	**Metal sheets**	**Test Layout:** Check metal sheets for sharp edges and damages.	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: No sharp edges or recognisable damage present.	
1.3	**Wires and cables** lids cover & tidy cables	**Test Layout:** Visually inspect cable connections and wires inside the control cabinet for perfect condition and loose parts.	☐ OK ☒ Defects ☐ N/A
		Pass Fail Criteria: Cable connections in perfect condition, no loose parts present.	
1.4	**Compliance with circuit diagram** I/O check report	**Test Layout:** • Check if main components of the control cabinet are installed in accordance with the circuit diagram. • Check if labelling of the components in the control cabinet corresponds to the circuit diagram (exemplary test of some components).	☐ OK ☒ Defects ☐ N/A
		Pass Fail Criteria: • Essential parts of the control cabinet are available in accordance with the circuit diagram. • Labelling of the components in the control cabinet corresponds to the circuit diagram. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	
1.5	**Control elements labelling**	**Test Layout:** Check if the operating elements on the control cabinet door are labelled according to the circuit diagram.	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: The operating elements are labelled according to the circuit diagram. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	

1.6	**Control elements description** Missing manual	**Test Layout:** Check if the operating elements are explained in the operating manual. **Pass Fail Criteria:** The operating elements are explained in the operating manual. **Reference document:** 10354_23A2007_YYMMDD_Operating_Manual_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_EN_vx.x	☐ OK ☒ Defects ☐ N/A
1.7	**Data interface** Not clear	**Test Layout:** Check if data interface complies with the schematic. **Pass Fail Criteria:** The data interface corresponds to the circuit diagram. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	☐ OK ☐ Defects ☒ N/A
1.8	**Earthing**	**Test Layout:** Check if the control cabinet is properly earthed in accordance with the circuit diagram. **Pass Fail Criteria:** The control cabinet is properly earthed.	☒ OK ☐ Defects ☐ N/A
1.9	**Power supply**	**Test Layout:** Check the AC connection terminals of the control cabinet. Check if all three phases provide 230 V AC by using a Multimeter. **Pass Fail Criteria:** All three phases of the AC supply provide 230 V AC.	☒ OK ☐ Defects ☐ N/A
1.10	**UPS**	**Test Layout:** Check if the control cabinet is properly earthed in accordance with the circuit diagram. **Pass Fail Criteria:** The UPS complies with the specification. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	☒ OK ☐ Defects ☐ N/A

1.11	**Warnings**	**Test Layout:** Check if the required warning signs are located on the cabinet doors. **Pass Fail Criteria:** The required warning signs are located on the cabinet doors. **Reference document:** FORM_QS002_Warnhinweise_20231013_Rev3-0	☒ OK ☐ Defects ☐ N/A

Remarks:
Change table on control cabinet to CTRL 1 & 2

3.2.3 Visual Inspection of Control Cabinet 2

Check all system components, including external ones, to ensure that they are in perfect condition.
Document the qualification results in the following table.

TR01	Test		Result
1.1	**Cleanliness**	**Test Layout:** Check covers and cabinet interior for cleanliness and rust.	☑ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: Covers and interior are clean, without dirt or rust.	
1.2	**Metal sheets**	**Test Layout:** Check metal sheets for sharp edges and damages.	☑ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: No sharp edges or recognisable damage present.	
1.3	**Wires and cables**	**Test Layout:** Visually inspect cable connections and wires inside the control cabinet for perfect condition and loose parts.	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: Cable connections in perfect condition, no loose parts present.	
1.4	**Compliance with circuit diagram** • Add lable on 24V U1 • Lable on cables	**Test Layout:** • Check if main components of the control cabinet are installed in accordance with the circuit diagram. • Check if labelling of the components in the control cabinet corresponds to the circuit diagram (exemplary test of some components).	☐ OK ☒ Defects ☐ N/A
		Pass Fail Criteria: • Essential parts of the control cabinet are available in accordance with the circuit diagram. • Labelling of the components in the control cabinet corresponds to the circuit diagram. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	
1.5	**Earthing**	**Test Layout:** Check if the control cabinet is properly earthed in accordance with the circuit diagram.	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: The control cabinet is properly earthed. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	
1.6	**Power supply**	**Test Layout:** Check the AC connection terminals of the control cabinet. Check if all three phases provide 230 V AC by using a Multimeter.	☒ OK ☐ Defects ☐ N/A

Is this works on 24V DC

		Pass Fail Criteria: All three phases of the AC supply provide 230 V AC.	
1.8	**Warnings**	**Test Layout:** Check if the required warning signs are located on the cabinet doors.	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: The required warning signs are located on the cabinet doors. **Reference document:** FORM_QS002_Warnhinweise_20231013_Rev3-0	

Remarks and description of defects:

3.2.4 Visual inspection of Converter Cabinets

Check all system components, including external ones, to ensure that they are in perfect condition.
Document the qualification results in the following table.

TR02	Test		Result
2.1	**Cleanliness**	**Test Layout:** Check covers and cabinet interior for cleanliness and rust.	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: Covers and interior are clean, without dirt or rust.	
2.2	**Metal sheets**	**Test Layout:** Check metal sheets for sharp edges and damages	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: No sharp edges or recognisable damage present.	
2.3	**Wires and cables** lables on cables	**Test Layout:** Visually inspect cable connections and wires inside the converter cabinets for perfect condition and loose parts.	☐ OK ☒ Defects ☐ N/A
		Pass Fail Criteria: Cable connections are in perfect condition, no loose parts present.	
2.4	**Compliance with circuit diagram**	**Test Layout:** Visually inspect the following power components for compliance with the circuit diagram: • AC IGBTs • DC IGBTs • AC inductors • DC inductors • AC Filter	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: The power components (IGBT, choke, filter) correspond to the circuit diagram. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	
2.5	**Protective elements** Closure covers are mounted before transport	**Test Layout:** Check correct installation of protective elements according to the circuit diagram.	☒ OK ☒ Defects ✓ ☐ N/A
		Pass Fail Criteria: The protective elements are installed according to the circuit diagram. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	

2.6	**Connection busbars**	Check if connection busbars are installed according to the circuit diagram. **Pass Fail Criteria:** The connection busbars are installed according to the circuit diagram. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	☒ OK ☐ Defects ☐ N/A
2.7	**Earthing**	**Test Layout:** Check control cabinet for proper earthing. Refer to circuit diagram. **Pass Fail Criteria:** The control cabinet is properly earthed according to the circuit diagram. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	☒ OK ☐ Defects ☐ N/A
2.8	**Smoke detectors**	**Test Layout:** Check if smoke detectors are installed in the IGBT cabinet according to the circuit diagram. **Pass Fail Criteria:** Smoke detectors are installed in the IGBT cabinet according to the circuit diagram. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	☒ OK ☐ Defects ☐ N/A
2.9	**Smoke detector test**	**Test Layout:** Use test spray to trigger the sensor. **Pass Fail Criteria:** Alarm signal triggers "301024: Supply: Smoke detector feedback tripped" alarm and is displayed on HMI/WebVisu. Hardware Trigger: Smoke FG1	☒ OK ☐ Defects ☐ N/A

Remarks and description of defects:
Smoke → 178k2 + XT1 3,4 80 Q1 ☒ OK

3.3 Visual inspection of Converter Cooling System

Check the correct installation and connection of the cooling system. Document the qualification results in the following table.

TR03	Test		Result
3.1	**Leakage and connections check**	**Test Layout:** Check the converter water cooling system for proper connection and leaks. Run cooling system and perform visual check of connections and check for leaks	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: All connections are properly connected and no leakage present.	
3.2	**Pressure check** 4,2 bar	**Test Layout:** Check whether the pressure of the cooling system is above 3 bar. Check on the manometer of the converter cooling system cabinet (COSY) and verify value on HMI/WebVisu.	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: Manometer and HMI/WebVisu indicate a pressure of 3 bar.	
3.3	**Water drop check**	**Test Layout:** Check that no drops of water can be seen at the connection points of the coolant hoses.	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: No water on the connection points of coolant hoses.	

Remarks:

- Drain over pressure bottle collection
- Change coolant check coolant at yard

3.4 Function test

Check whether the electrical power and signal transmission meets the agreed requirements. Document the qualification results in the following table.

TR04	Test		Result
4.1	**Supply voltage control cabinet**	**Test Layout:** Switch on the control cabinet by applying the supply voltage or turning on the main switch. The control unit starts up properly.	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: Pass: - Simotion turns on - HMI turns on properly and WebVisualization (WebVisu) access is active - Access to Simotion WebVisu is established and "Run" state of Simotion can be confirmed	
4.2	**Feedback signals**	**Test Layout:** Exemplary control of system feedback and error evaluation, for example by manually triggering fuses. Errors are output correctly.	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: Random sampling: The status is correctly indicated by the red Error LED on the control cabinet 1 door. The error message can be reset by pressing the reset button on the control cabinet.	
4.3	**Smoke detectors**	**Test Layout:** Test the smoke detector in PCS CON-cabinet with test spray.	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: The smoke detectors trigger accordingly and an error (Error level 4) is generated.	

4.4	**Cabinet Fans**	**Test Layout:** Testing the cabinet fans by simulating increased temperature values of the cabinets or direct control of the fans by the control system. **Pass Fail Criteria:** Cabinet fans activate according to temperature threshold set in the control system.	☒ OK ☐ Defects ☐ N/A
4.5	**Converter liquid cooling system** check cooling water level	**Test Layout:** Converter liquid cooling system test: Switch on the cooling system. The cooling system heats the cooling water as required. Check the heat exchangers by simulating the cooling water temperature. **Pass Fail Criteria:** - Heat exchanger switches on and off correctly (Visual check) - **"Preheating"** status is correctly indicated by the **yellow "Preheating** LED" on the control cabinet. - Pump is running (visual check) - Heater is heating up the coolant (check coolant temperature on HMI/WebVisu)	☐ OK ☐ Defects ☐ N/A
4.6	**AC connection**	**Test Layout:** Apply the operating voltage (if not already applied). Check the measured voltages for plausibility with Multimeter at AC connection point. The HMI/WebVisu displays the mains voltage correctly. The measured Multimeter values correspond to the values displayed on the HMI/WebVisu.	☒ OK ☐ Defects ☐ N/A
4.7	**Converter pre-charging**	**Test Layout:** Pre-charging of converter. **Pass Fail Criteria:** - Converter is pre-charged from the mains and the 3WL main circuit breaker (80Q1) switches-on. - **"Ready for Operation"** status is indicated by the **green "Ready for Operation"** LED on the control cabinet door.	☐ OK ☐ Defects ☐ N/A
4.8	**IGBTs**	**Test Layout:** IGBT activation **Pass Fail Criteria:** - IGBTs can be switched on without any problems. - DC link is regulated to the set voltage. - **"Operating"** status is indicated by the green **"Operating"** LED on the control cabinet door.	☐ OK ☐ Defects ☐ N/A
4.9	**Emergency stop**	**Test Layout:** Test of the emergency stop. Switching on the emergency stop or switching off the main switch when the inverter is in operation (DC-link control).	☐ OK ☐ Defects ☐ N/A

		Pass Fail Criteria: - Inverter immediately switches to OFF mode. - Red "Fault" LED starts glowing on control cabinet door. - AC main switch (80Q1) opens.	
4.10	**Back-to-Back Test**	**Duration: After reaching 1000 A duration test of 10 min.** **Test Layout:** Back-to-Back Test: At 400 V AC connection Increase the AC current setpoint value slowly to 1000 A output and keep this value for 10 minutes. - 10 A - 100 A - 200 A - ... - 1000 A ✓ Heat run: Check if temperatures of - IGBTs - Inductors - Coolant of converter cooling system are within the permissible ranges by verifying the temperature values displayed on the HMI/WebVisu.	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: Back-to-Back Test: AC current output of 1000 A is displayed correctly on the HMI/WebVisu according to setpoint. Heat run: IGBT, inductor and converter cooling system coolant temperatures are below the temperature thresholds set in the control system. ✓	
4.10	**DC ports** only 160 A due to connection configuration	**Duration: After reaching 250 A test duration is 10 min.** **Test Layout:** DC-ports connection Increase the DC current setpoint slowly to 250 A and keep this value for 10 minutes. Heat run: Check if temperatures of - IGBTs - Inductors - Coolant of converter cooling system are within the permissible ranges by verifying the temperature values displayed on the HMI/WebVisu.	

Different mode of operation when in the yard
Test will be finally performed after battery modules are installed → SAT

		Pass Fail Criteria: Back-to-Back Test: DC current output of 250 A is displayed on the HMI/WebVisu according to setpoint. Heat run: IGBT, inductor and converter cooling system coolant temperatures are below the temperature thresholds set in the control system.	☒ ok
4.11	**Measurements**	**Test Layout:** Check if the measured values (temperatures, voltages and currents) are properly collected by the Simotion (PCS main controller) and verify by using a multimeter or current clamp at DC and AC side. **Pass Fail Criteria:** Values measured with multimeter are +/- 5% correspond to the values displayed on the HMI/WebVisu.	☐ OK ☐ Defects ☐ N/A
4.12	**Switching-off**	**Test Layout:** Switching off the inverter. The inverter is properly switched off by removing the control bits. **Pass Fail Criteria:** "OFF" state is indicated by the HMI/WebVisu.	☐ OK ☐ Defects ☐ N/A
4.13	**UPS** not perform.	**Test Layout:** Checking the UPS functionality. If the auxiliary supply fails (e.g. by activating the fuse of the AC power supply unit), the control cabinet continues to be supplied by the UPS. **Pass Fail Criteria:** After the defined time, the control cabinet is switched off completely. When the voltage returns, the control unit starts up again and the UPS battery is charged.	☐ OK ☐ Defects ☐ N/A
4.14	**WebVisu/HMI**	**Test Layout:** Check the Web Visualisation (WebVisu) running on the control cabinet HMI for proper functionality **Pass Fail Criteria:** Select each individual HMI (WebVisu) pages and check behaviour (lag during selection or scrolling, correct display of values and system components). The visualisation is functional.	☒ OK ☐ Defects ☐ N/A

Remarks:
Couldn't enter PCS = 0 no light check or physical measurement Test: 4,5; 4,7; 4,8; 4.9; 4.11; 4,12; 4,13

4 BESS 1

4.1 Reference Documents BESS 1

Document Title	Document name
Schematic	10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62

4.2 Battery Cabinets Tests

4.2.1 Prerequisites

The following documents must be available in electronic form or as a printout for the FAT:

1. Circuit diagram of battery cabinets
2. General arrangement overview
3. Interface documentation (if available)

Remarks:

4.2.2 Visual inspection of Battery Cabinets

Check system components of 3 battery cabinets (one cabinet in each container section) inside BESS 1 container, including external ones, to ensure that they are in perfect condition. Document the qualification results in the following table.

TR05	Test		Result
5.1	**Cleanliness**	**Test Layout:** Check covers and cabinet interior for cleanliness and rust. **Pass Fail Criteria:** Covers and interior are clean, without dirt or rust.	☒ OK ☐ Defects ☐ N/A
5.2	**Metal sheets**	**Test Layout:** Check metal sheets for sharp edges and damages **Pass Fail Criteria:** No sharp edges or recognisable damage present.	☒ OK ☐ Defects ☐ N/A
5.3	**Wires and cables**	**Test Layout:** Visually inspect cable connections and wires inside the battery cabinets for perfect condition and no loose parts. **Pass Fail Criteria:** Cable connections are in perfect condition, no loose parts present.	☒ OK ☐ Defects ☐ N/A
5.4	**Protective elements**	**Test Layout:** Check correct installation of protective elements according to circuit diagram. **Pass Fail Criteria:** Protective elements are installed according to the circuit diagram. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	☒ OK ☐ Defects ☐ N/A
5.5	**Earthing** need to connect ⏚ to screens mΩ limit protocols & reading	**Test Layout:** Check battery cabinet for proper earthing. Refer to circuit diagram. **Pass Fail Criteria:** Battery cabinet is properly earthed according to circuit diagram. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	☐ OK ☒ Defects ☐ N/A
5.6	**Smoke detectors**	**Test Layout:** Check if smoke detectors are installed in battery cabinet according to circuit diagram.	

		Pass Fail Criteria: Smoke detectors are installed in battery cabinet according to circuit diagram. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	☒ OK ☐ Defects ☐ N/A
5.7	**Fire extinguishing system (Stat-X)** loose cable	**Test Layout:** Check if Stat-X aerosol cartridges are installed in battery cabinet according to circuit diagram. **Pass Fail Criteria:** Stat-X aerosol cartridges are installed in battery cabinet according to circuit diagram. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	☒ OK ☐ Defects ☐ N/A
5.8	**Control plate** I/O check & QAQC doc	**Test Layout:** Check if control plate in the bottom section of the battery cabinet is installed according to circuit diagram. **Pass Fail Criteria:** Control plate is installed according to circuit diagram. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	☐ OK ☒ Defects ☐ N/A
5.9	**CO Sensor and Alarm Unit**	**Test Layout:** Check if CO Sensor and Alarm Unit are installed according to circuit diagram. **Pass Fail Criteria:** CO Sensor and Alarm Unit are installed according to circuit diagram. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	☒ OK ☐ Defects ☐ N/A
5.10	**Smoke detector test**	**Test Layout:** Use test spray to trigger the sensor. **Pass Fail Criteria:** Alarm signal will trigger "Thermal runaway" procedure and displayed on HMI.	☒ OK ☐ Defects ☐ N/A
5.11	**CO sensor test**	**Test Layout:** Use test spray to trigger the sensor. **Pass Fail Criteria:** Alarm signal will trigger "Thermal runaway" procedure and displayed on HMI.	☒ OK ☐ Defects ☐ N/A

5.12	**H2 Sensor Test**	**Test Layout:** H2 Gas Alarm Test: Simulate trigger value in software from gas sensor and check if exhaust units and fire dampers operate properly. Check if gas alarm feedback is properly transmitted via hardwired signals.	☐ OK ☐ Defects ☒ N/A
		Pass Fail Criteria: After gas alarm the fire dampers open and the exhaust units start venting out the containers. Gas alarm feedback relay has opened. An error message is displayed on the HMI/WebVisu.	

Remarks:
Stat - x - loose cable also extra cable on cabinet control plate - ask from VO certificate we can't certify Cables are only MARKED not labled

5 BESS 2

5.1 Reference Documents BESS 2

Document Title	Document name
Schematic	10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62

5.2 Battery Cabinets Tests

5.2.1 Prerequisites

The following documents must be available in electronic form or as a printout for the FAT:

4. Circuit diagram of battery cabinets
5. General arrangement overview
6. Interface documentation (if available)

Remarks:

5.2.2 Visual inspection of Battery Cabinets

Check system components of 3 battery cabinets (one cabinet in each container section) inside BESS 1 container, including external ones, to ensure that they are in perfect condition. Document the qualification results in the following table.

TR05	Test		Result
6.1	**Cleanliness**	**Test Layout:** Check covers and cabinet interior for cleanliness and rust. **Pass Fail Criteria:** Covers and interior are clean, without dirt or rust.	☑ OK ☐ Defects ☐ N/A
6.2	**Metal sheets**	**Test Layout:** Check metal sheets for sharp edges and damages **Pass Fail Criteria:** No sharp edges or recognisable damage present.	☒ OK ☐ Defects ☐ N/A
6.3	**Wires and cables**	**Test Layout:** Visually inspect cable connections and wires inside the battery cabinets for perfect condition and no loose parts. **Pass Fail Criteria:** Cable connections are in perfect condition, no loose parts present.	☐ OK ☐ Defects ☐ N/A
6.4	**Protective elements**	**Test Layout:** Check correct installation of protective elements according to circuit diagram. **Pass Fail Criteria:** Protective elements are installed according to the circuit diagram. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	☒ OK ☐ Defects ☐ N/A
6.5	**Earthing**	**Test Layout:** Check battery cabinet for proper earthing. Refer to circuit diagram. **Pass Fail Criteria:** Battery cabinet is properly earthed according to circuit diagram. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	☐ OK ☒ Defects ☐ N/A
6.6	**Smoke detectors**	**Test Layout:** Check if smoke detectors are installed in battery cabinet according to circuit diagram.	

		Pass Fail Criteria: Smoke detectors are installed in battery cabinet according to circuit diagram. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	☒ OK ☐ Defects ☐ N/A
6.7	**Fire extinguishing system (Stat-X)**	**Test Layout:** Check if Stat-X aerosol cartridges are installed in battery cabinet according to circuit diagram. **Pass Fail Criteria:** Stat-X aerosol cartridges are installed in battery cabinet according to circuit diagram. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	☒ OK ☐ Defects ☐ N/A
6.8	**Control plate**	**Test Layout:** Check if control plate in the bottom section of the battery cabinet is installed according to circuit diagram. **Pass Fail Criteria:** Control plate is installed according to circuit diagram. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	☐ OK ☒ Defects ☐ N/A
6.9	**CO Sensor and Alarm Unit**	**Test Layout:** Check if CO Sensor and Alarm Unit are installed according to circuit diagram. **Pass Fail Criteria:** CO Sensor and Alarm Unit are installed according to circuit diagram. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	☒ OK ☐ Defects ☐ N/A
6.10	**Smoke detector test**	**Test Layout:** Use test spray to trigger the sensor. **Pass Fail Criteria:** Alarm signal will trigger "Thermal runaway" procedure and displayed on HMI/WebVisu.	☒ OK ☐ Defects ☐ N/A
6.11	**CO sensor test**	**Test Layout:** Use test spray to trigger the sensor. **Pass Fail Criteria:** Alarm signal will trigger "Thermal runaway" procedure and displayed on HMI/WebVisu.	☒ OK ☐ Defects ☐ N/A

6.12	**H2 Sensor Test**	**Test Layout:** H2 Gas Alarm Test: Simulate trigger value in software from gas sensor and check if exhaust units and fire dampers operate properly. Check if gas alarm feedback is properly transmitted via hardwired signals.	☒ N/A
		Pass Fail Criteria: After gas alarm the fire dampers open and the exhaust units start venting out the containers. Gas alarm feedback relay has opened. An error message is displayed in the WebVisu.	

Remarks:

6 Employees Present

Identify each employee involved in the execution of this protocol. Document the person's name, signature, name abbreviation and date in the following table:

Company Name	Employee Name	Employee Signature	Abbreviation	Date
SHELL CLOSS WIND	ALESSANDRO SUTTO			18/7/24
MARTIN TAYLOR	CROSSWIND			18/07/24
ABL	Dominik Mähl			18.07.2024
FREQCON	C. PALENZUELA			18.07.2024

	Yes/No
All persons involved in the factory acceptance test were documented.	☐ Y ☐ N

Remarks:

7 Examination and authorisation

The test report becomes the factory acceptance report as soon as the individual test reports have been completed and labelled with a test date. The factory acceptance report is sent to the customer for confirmation and the results must be documented in the TR8 test report.

TR05	Examination and authorisation of execution
Check the test results and original data. Final assessment for factory acceptance.	
☒ PASSED	☐ NOT PASSED
If there are any deviations, please complete the following section.	
Evaluate whether or not the existing deviation has an influence on the final factory acceptance test.	
☐ YES	☒ NO

Remarks:
SEE OVERALL PUNCHLIST

Carried out by:	CARLOS PALENZUELA FREQCON GmbH	Date:	18.07.2024 DD/MM/YYYY
Authorised by:	FAT Customer	Date:	18.07.2024 DD/MM/YYYY

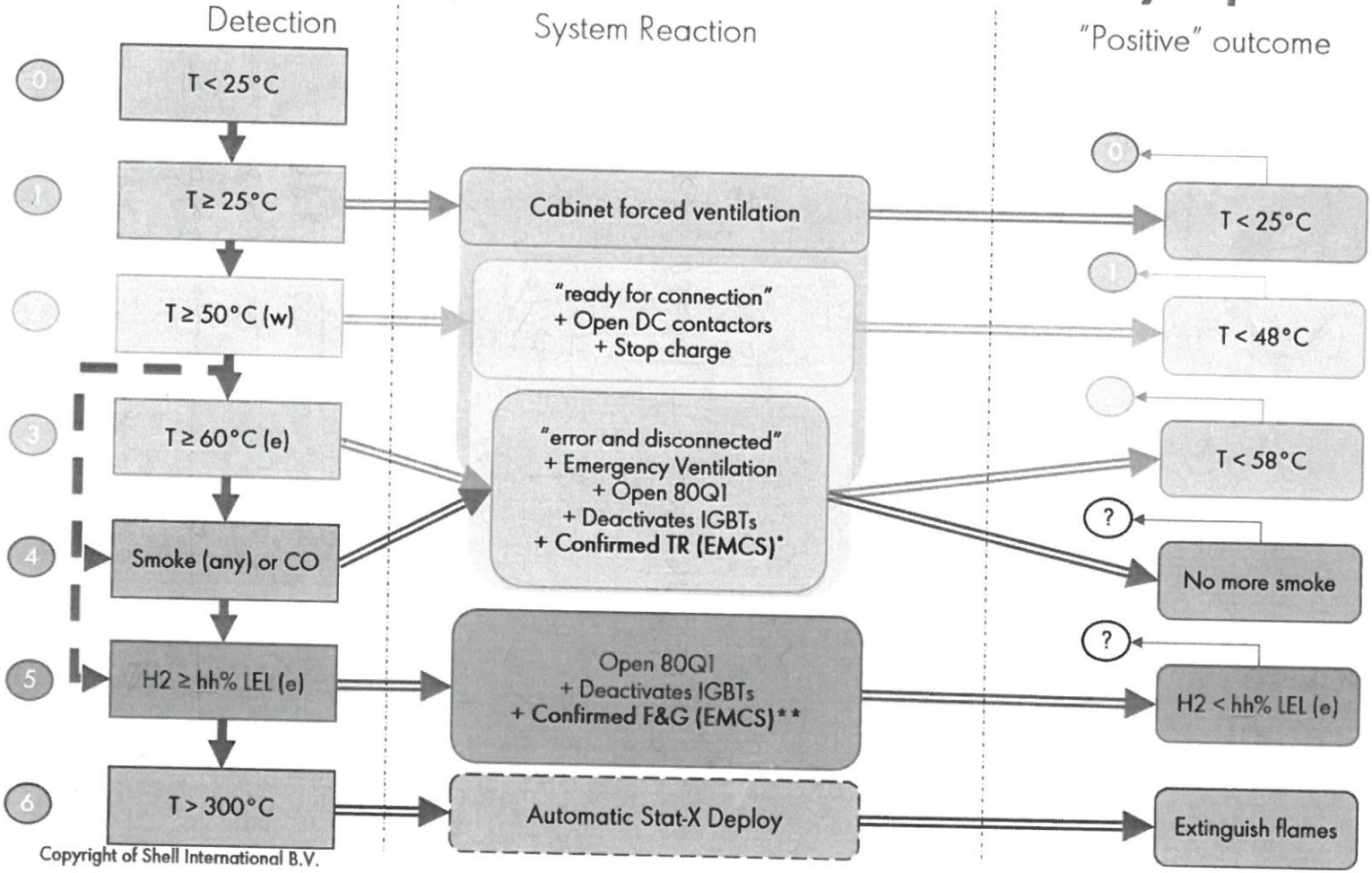
Appendix A - Measurement data for the performance test (if performed)

Insert prepared tables for performance values/times/temperatures/etc.

Smoke FG1 – Smoke PCS → ESD1D
Gas FG2 – H2 Sensor BESS 1&2 → ESD1D
Therm. rise TR – Triggered HH temp (760°C) or CO det or Smoke → ESD1

BMS - Confirmed new Process Fire Safety operations

*Aux still on
**Full platform shut down with H2 blowout



Automatic reset – no operator action needed
Once the temperature is back in the correct range, operation can continue normally. Point 2 will generate a warning log.

Remote reset – operator action needed

*These triggers will also send a message to the EMCS as "**fire alarm**" – Reset To be discussed with EMCS and BLPH*

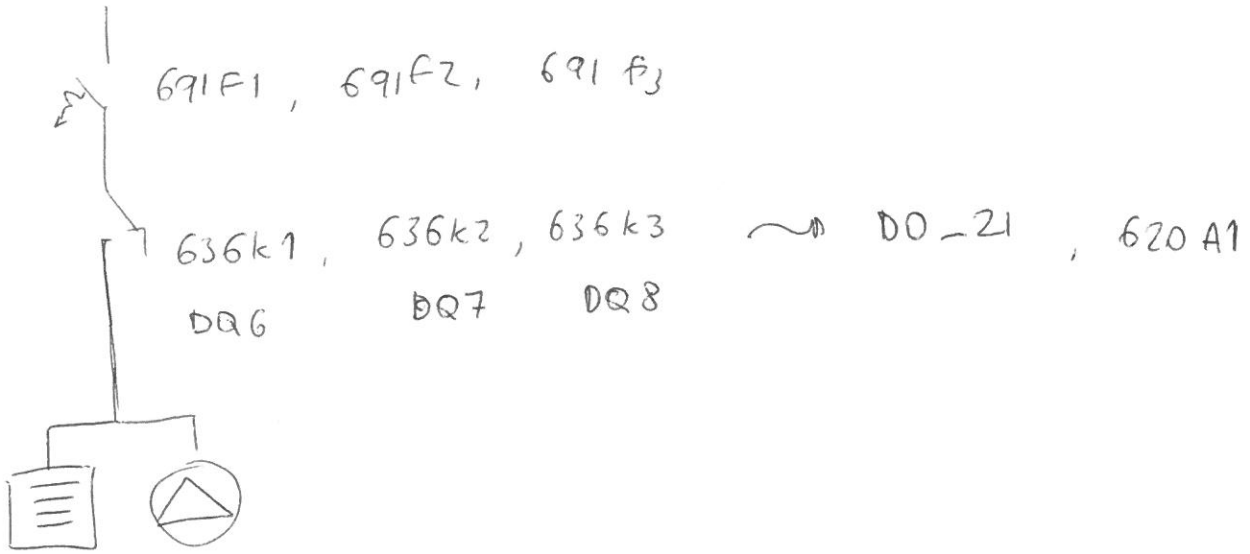
No reset

Copyright of Shell International B.V.

CTRL 1.3 - DO - 04 NO

DQ0 Gas alarm — 138k1 — XT1 1,2
DQ1 Smoke alarm — 138k2 — 3,4
DQ2 PLC fault — 138k3 — 5,6
DQ3 TR — 138k4 — 7,8

PANS



Battery Energy Storage System (BESS)
BASE LOAD POWER HUB

Statron ref. 331497

Project Code: K559-2254
Purchase Order Number: CW-I-WP4-2022-01

Document number:
23A2007_240712_FREQCON_Container_Installation_Manual_v3.0

Document description: Installation Manual

Revision	Date	Name	Description
001	20.06.2024	CPA	First Version

Installation Manual
PCS & BESS Containers

for Base Load Power Hub (BLPH) Project

Classification: confidential

Document no.	PCS & BESS Containers
Document name	Installation Manual
Component / System	BESS
Project code	K559-2254

Version	Date	Name	Description
1.0	2024-06-28	C. Palenzuela	First version
2.0	2024-07-04	C. Palenzuela	Updated several sections
3.0	2024-07-12	C. Palenzuela	Updated several sections

Table 1: Version overview

	Date	Name
Editor	2024-06-28	C. Palenzuela
Checked by	2024-06-29	M.v. Dreuten
Approved by	2024-06-29	C. Palenzuela

Table 2: Approval overview

Imprint

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Contact details

For further information please contact us by phone or send us a mail to **info@freqcon.de**.
You can also visit us on our website **http://www.freqcon.com** to find more information about our products and solutions.

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Identification

Product Version / Document Version

Product version
Prototype

Document release date
July 2024

Doc Code
23A2007_240712_FREQCON_Container_Installation_Manual_v3.0

Name and Address of Manufacturer

Manufacturer of the product
FREQCON GmbH
Bürgerwiesenweg 5
D-27336 Rethem, Germany

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Original document

This document is an original document of FREQCON GmbH.

1 Introduction

1.1 About this Document

This document is part of project phase “Detailed Design Engineering” for the Base Load Power Hub (BLPH) Project (K559-2254). In case of any contradiction resulting by the information or specification given in this document, phase 2 or later documents supersede the information provided in this document.

1.2 Display Elements

Symbol	Meaning
➜	Action with one or several steps for which the sequence is irrelevant.
Step 1 : **Step 2 :**	Action with several steps for which the sequence is relevant.
•	First level of list.
-	Second level of list.

Table 1: Display Elements

1.3 Other Applicable Documents

The following documents are applicable:

Document type	Document Name
PCS drawing	53396 PCS Container
BESS 1 drawing	53406 BESS Container 1
BESS 2 drawing	53412 BESS Container 2
General Arrangement	23A2007 BLPH BESS complete system
PCS container feet drawing	STA010947 RevC
BESS container feet drawing	STA010599 RevC

Table 2: Other applicable documents

1.4 Generic Terms and Abbreviations Used

This following list should help you understand some of the abbreviations used in this document.

Generic Term and Abbreviation	Description
BESS	Battery Energy Storage System
BLPH	Base Load Power Hub
PCS	Power Conversion System

Table 3: Generic terms and abbreviations used

2 Weights

PCS	
Serial No.	FRQ-53396000001
Manufacturer	FREQCON GmbH
Container weight	Approx. 13.7 t

Table 4: PCS weight

BESS 1	
Serial No.	FRQ-53406000001
Manufacturer	FREQCON GmbH
Container weight (without batteries)	Approx. 15 t
Container weight (with batteries)	Approx. 35 t

Table 5: BESS 1 weight

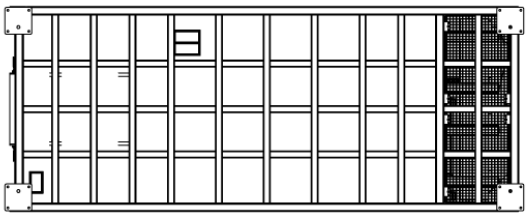
BESS 2	
Serial No.	FRQ-53412000001
Manufacturer	FREQCON GmbH
Container weight (without batteries)	Approx. 15 t
Container weight (with batteries)	Approx. 35 t

Table 6: BESS 2 weight

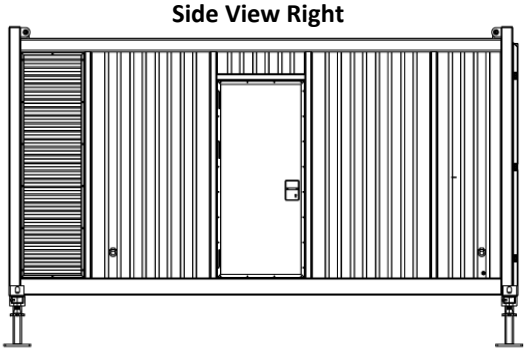
3 Container Dimensions

PCS

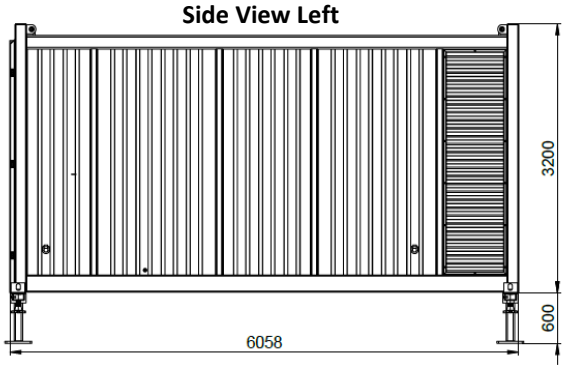
Botton View

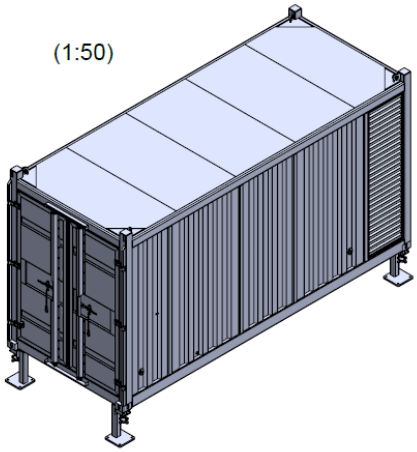


Side View Right

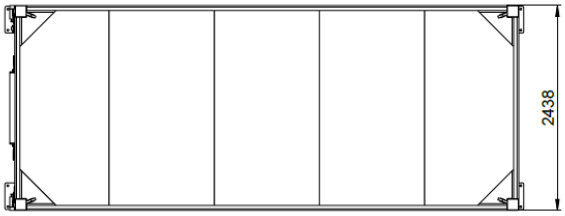


Side View Left



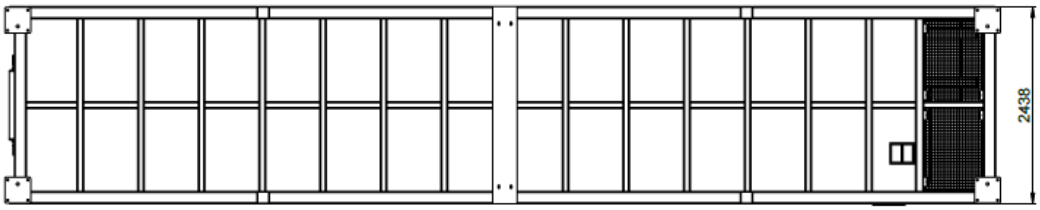


Top View

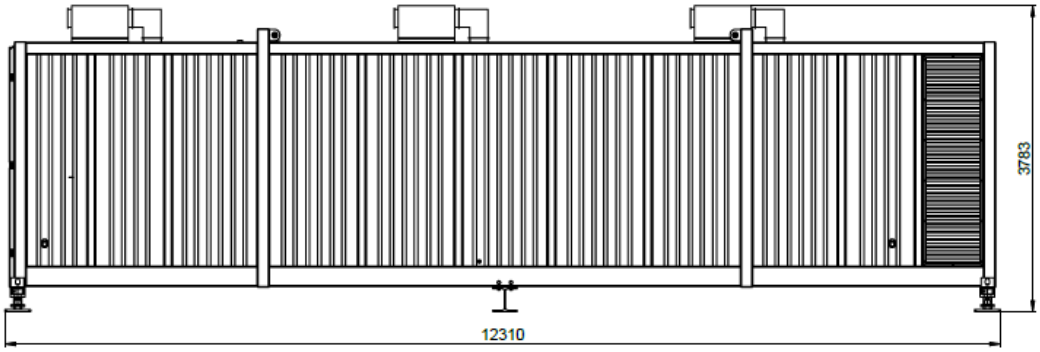


BESS 1

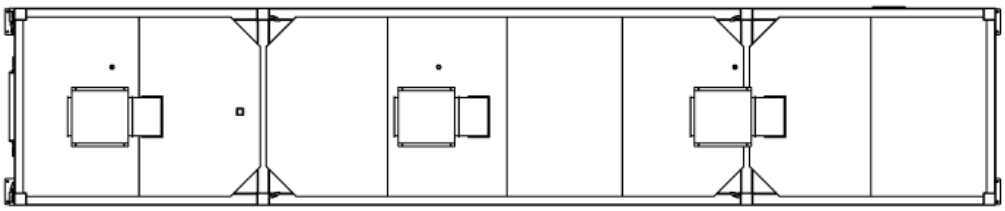
Botton View



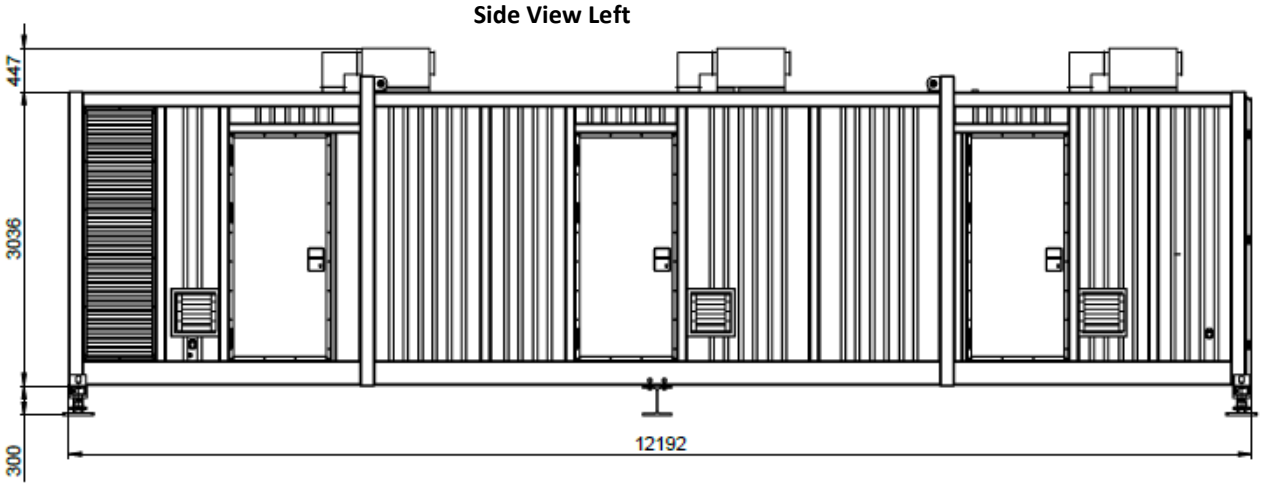
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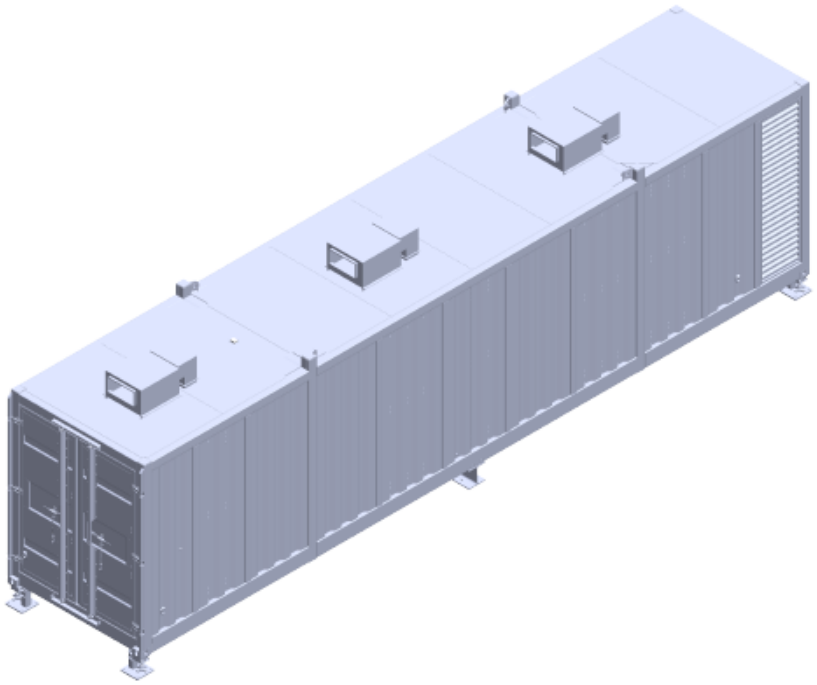


Top View



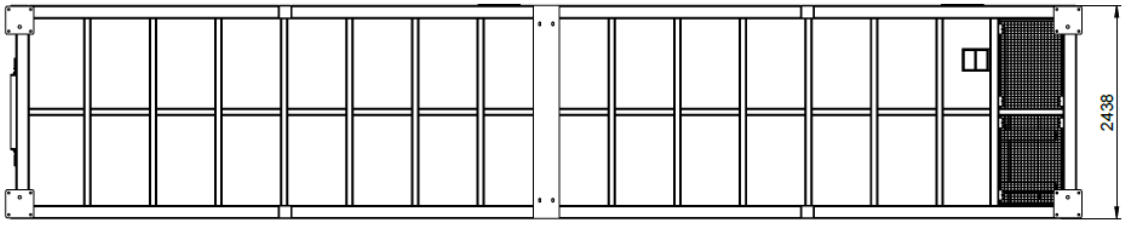
Side View Left



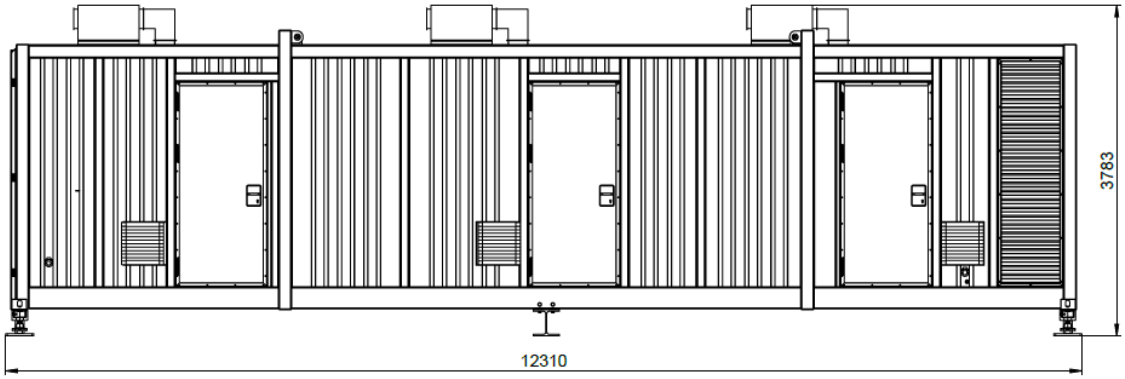


BESS 2

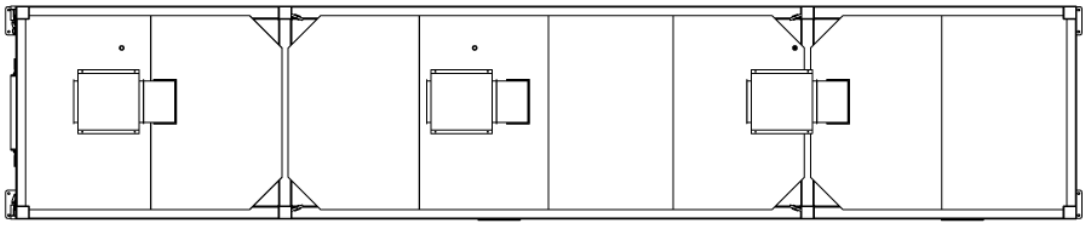
Botton View



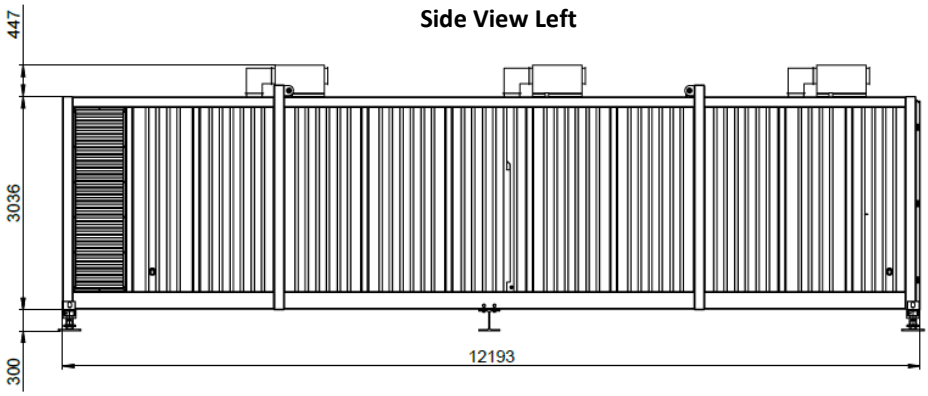
Side View Right

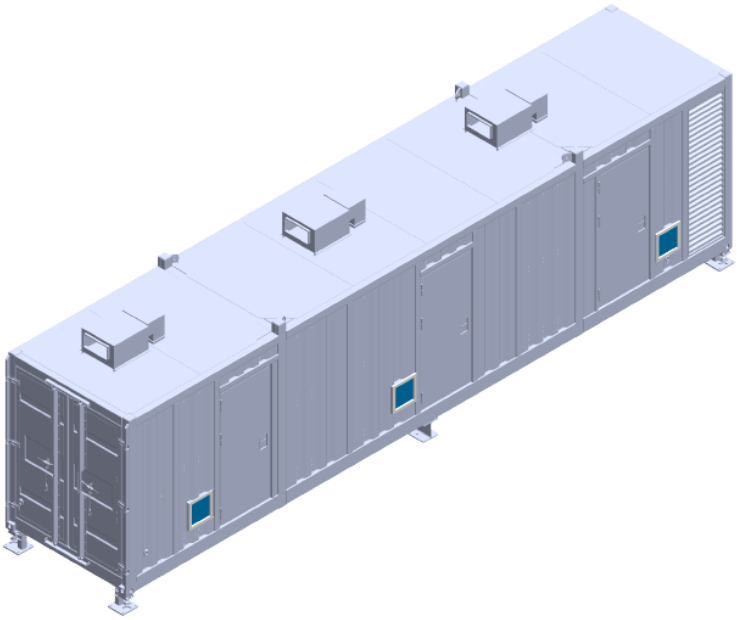


Top View



Side View Left





4 Environmental Conditions

	Stationary Operation	Storage packaging with protected layers	Transportation packaging with protected layers
Relative Humidity	Max. 95% No condensation; Relative Humidity <60% under corrosive atmosphere	Max. 95%	Max. 95%
Pollution level IEC60721-3-3 IEC60721-3-2 IEC60721-3-1	No conductive dust		
	3S2 coated PCB: Chemical Air: 3C2 Solid Particulate: 3S2	1S3 coated PCB: Chemical Air: 1C2 Solid Particulate: 1S3	2S2 coated PCB: Chemical Air: 2C2 Solid Particulate: 2S2
Atmospheric pressure	70 … 106 kPa	70 … 106 kPa	70 … 106 kPa
Vibration amplitude	Max 1 mm (5 … 13.2 Hz)	Max 1 mm (5 … 13.2 Hz)	Max. 3.5 mm (5 … 13.2 Hz)
IEC60068-2	Max. 7 m/s^2 (13.2 … 100 Hz) sinusoidal	Max. 7m/s^2 (13.2 … 100 Hz) sinusoidal	Max. 15 m/s^2 (9 … 200 Hz) sinusoidal
Impact IEC60068-2-29	Impermissible	Max. 100 m/s^2, 11 ms	Max. 100 m/s2, 11 ms
Free-fall	Impermissible	Impermissible	Impermissible

Table 7: Environmental conditions

5 Transport, Storage and Commissioning

Please observe the instructions for transport in section 5.2.

5.1 Unpacking

⚠ CAUTION

Hazard by sharp edges on packaging

Improper handling during unpacking can cause injuries.

➜ Use appropriate safety gloves to protect your hands from possible cuts.

The packaging of the system consists of cardboard, plastic and corrugated board. After usage the packaging must be disposed according to the local regulations for the disposal of paper products (e.g. recycling). After delivery, the delivered units and components must be checked for completeness and damage. If any damage on the delivered units and components have been found, contact the delivery service or FREQCON GmbH immediately.

5.2 Transport

NOTICE

Inadequate transportation of the device and all of its components may cause damage to the installed components.

- ➜ Vibrations and jolts must be avoided during transportation.
- ➜ The container must be transported in a horizontal position (lying down).
- ➜ Make sure to observe the specific national safety precautions for transport by truck, train or ship´.

NOTICE

Do not transport the containers with installed batteries

- ➜ Lifting or moving of BESS containers is not allowed if battery modules are inside the container
- ➜ Remove every battery module from the container before lifting or mowing the container

The containers must be transported to the installation site by instructed personnel.

Make sure that the components can be placed on a level surface.

For information regarding the dimensions and center of gravity of the containers, see section 5.2.2. The container weights are specified in section 2.

Vibrations and jolts must be avoided during transportation. If the system was damaged during transport, you must immediately inform the responsible transport company.

The containers must be transported in a horizontal position (lying down). It is not permitted to tip over the container during transportation or in any other scenario.



5.2.1 Container Lifting

⚠ DANGER	
	**Heavy load** **Improper lifting can result in death, serious injury or property damage.** Never lift the container above people. Use only lifting and personal protective equipment approved by OSHA or other national institutions.

NOTICE
Only use an appropriate crane to lift the container, capable to withstand the loads specified as follows: Weight of containers *see section 2*

NOTICE
Observe the container´s center of gravity during lifting: Observe the container´s center of gravity during lifting with crane, shown in section 5.2.2.

To lift the container with a crane, use the four transport lugs on the top corners of the container (*see following illustration*).

⚠ DANGER	
	**Heavy load** **Improper lifting can result in death, serious injury or property damage.** Never lift the container above people. Use only lifting and personal protective equipment approved by OSHA or other national institutions.

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Observe the container´s center of gravity during lifting: Observe the container´s center of gravity during lifting with crane, shown in section 5.2.2.

To lift the containers with a crane, use the four transport lugs on the top corners of the container (*see following illustration*).

PCS

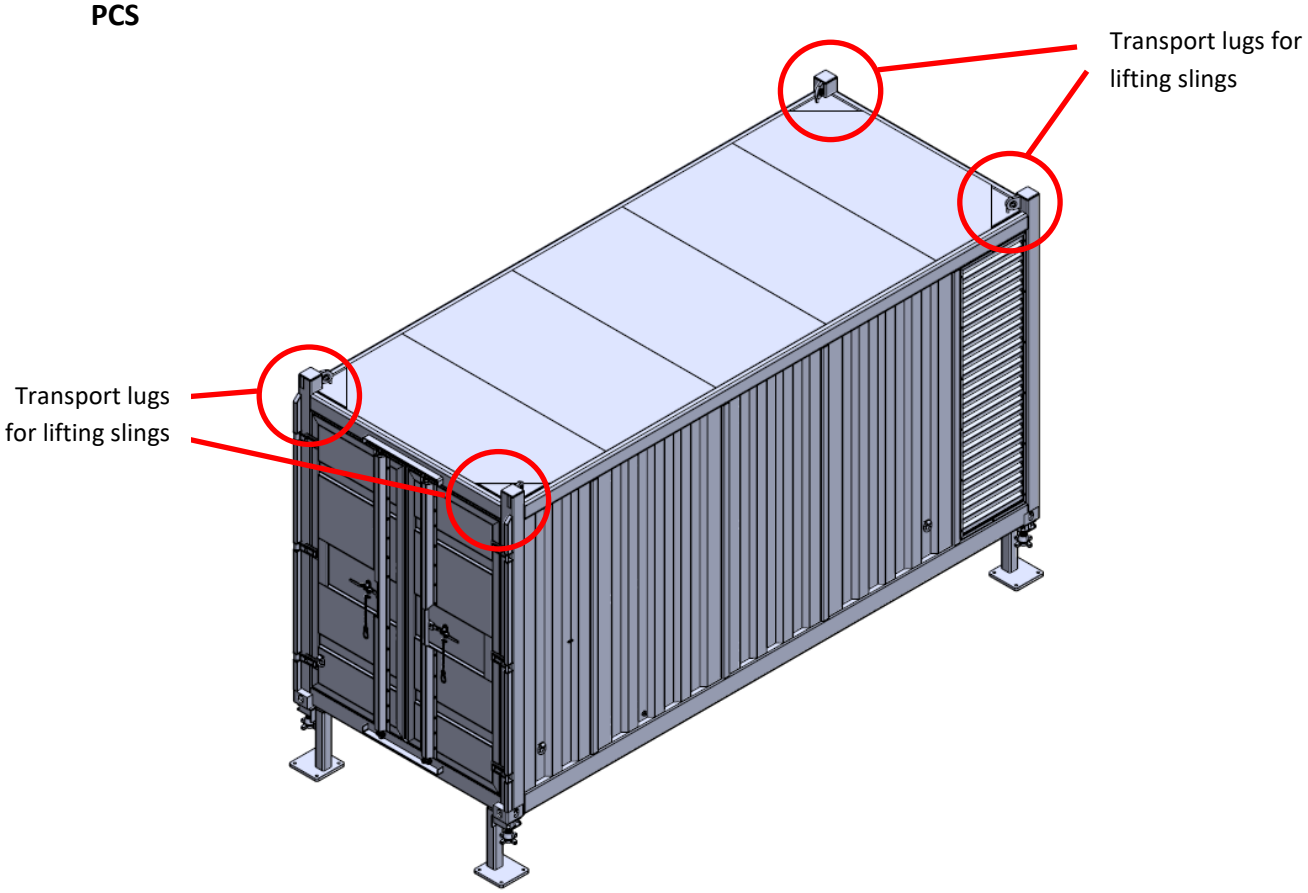


Figure 1: PCS container transport lugs

BESS 1

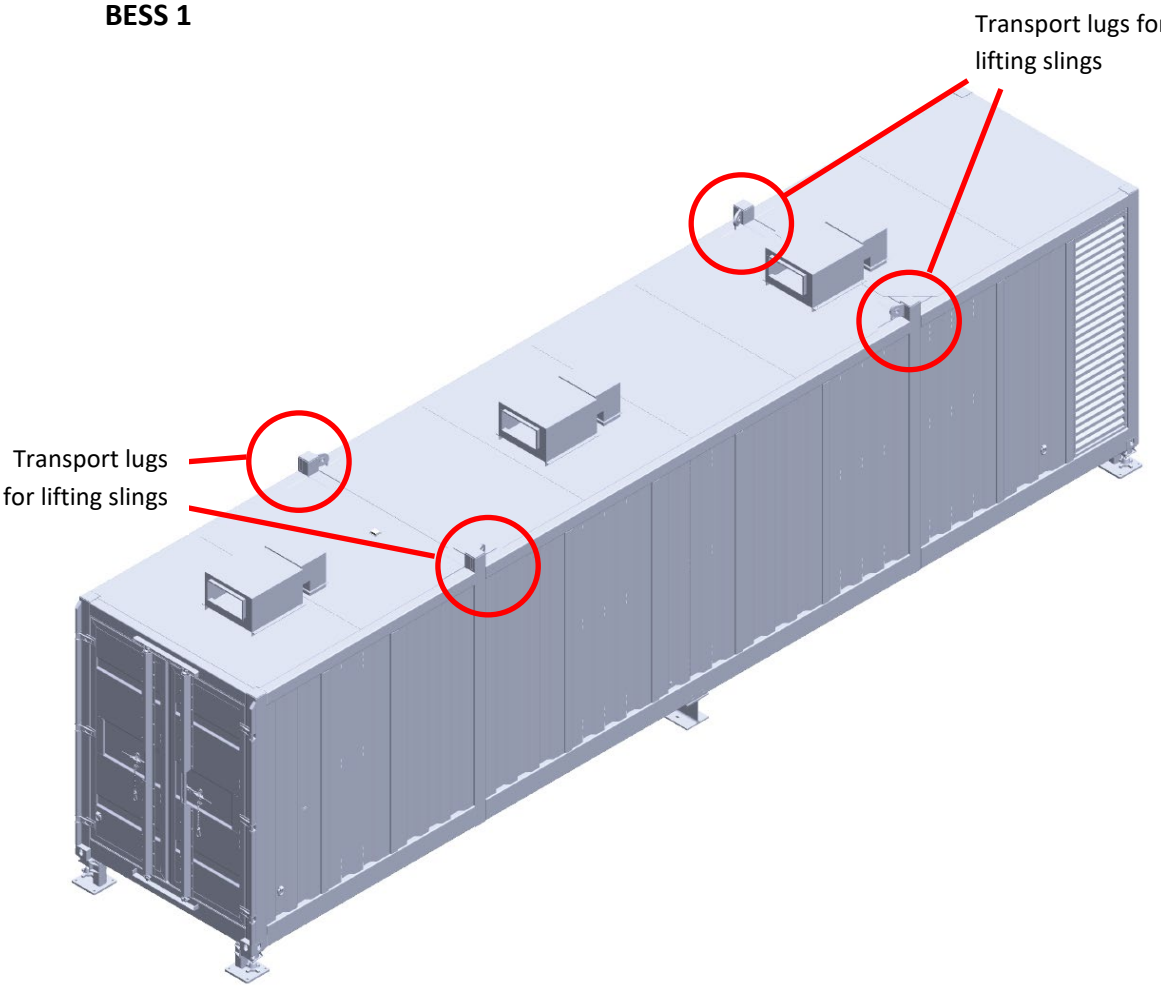


Figure 2: BESS 1 container transport lugs

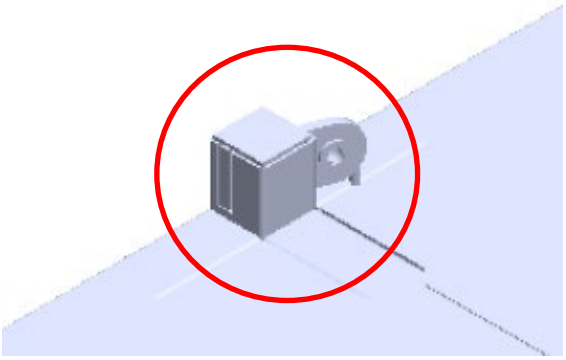


Figure 3: Transport lug

BESS 2

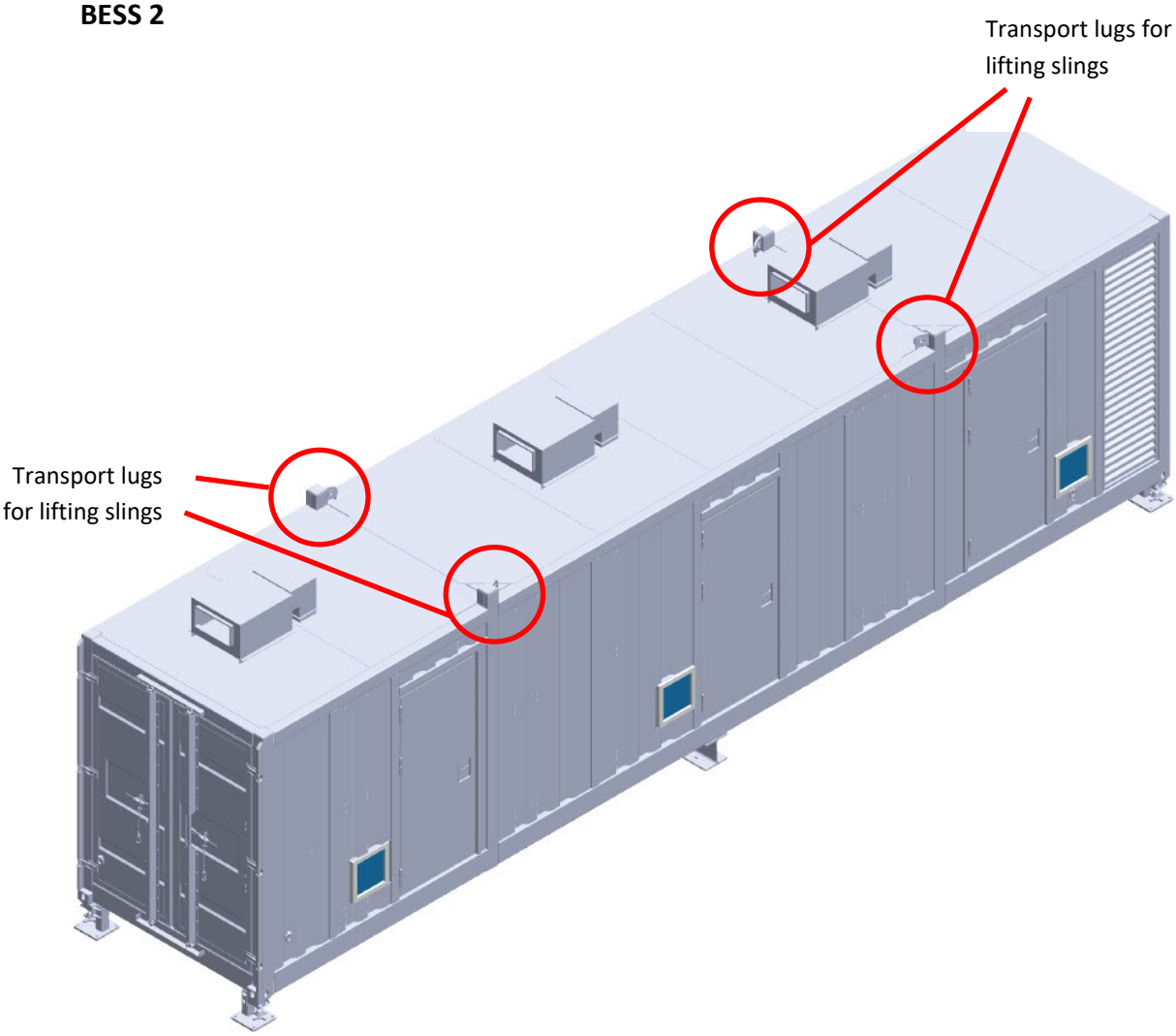


Figure 4: BESS 2 container transport lugs

5.2.2 Sling Angles and Centre of Gravity

PCS

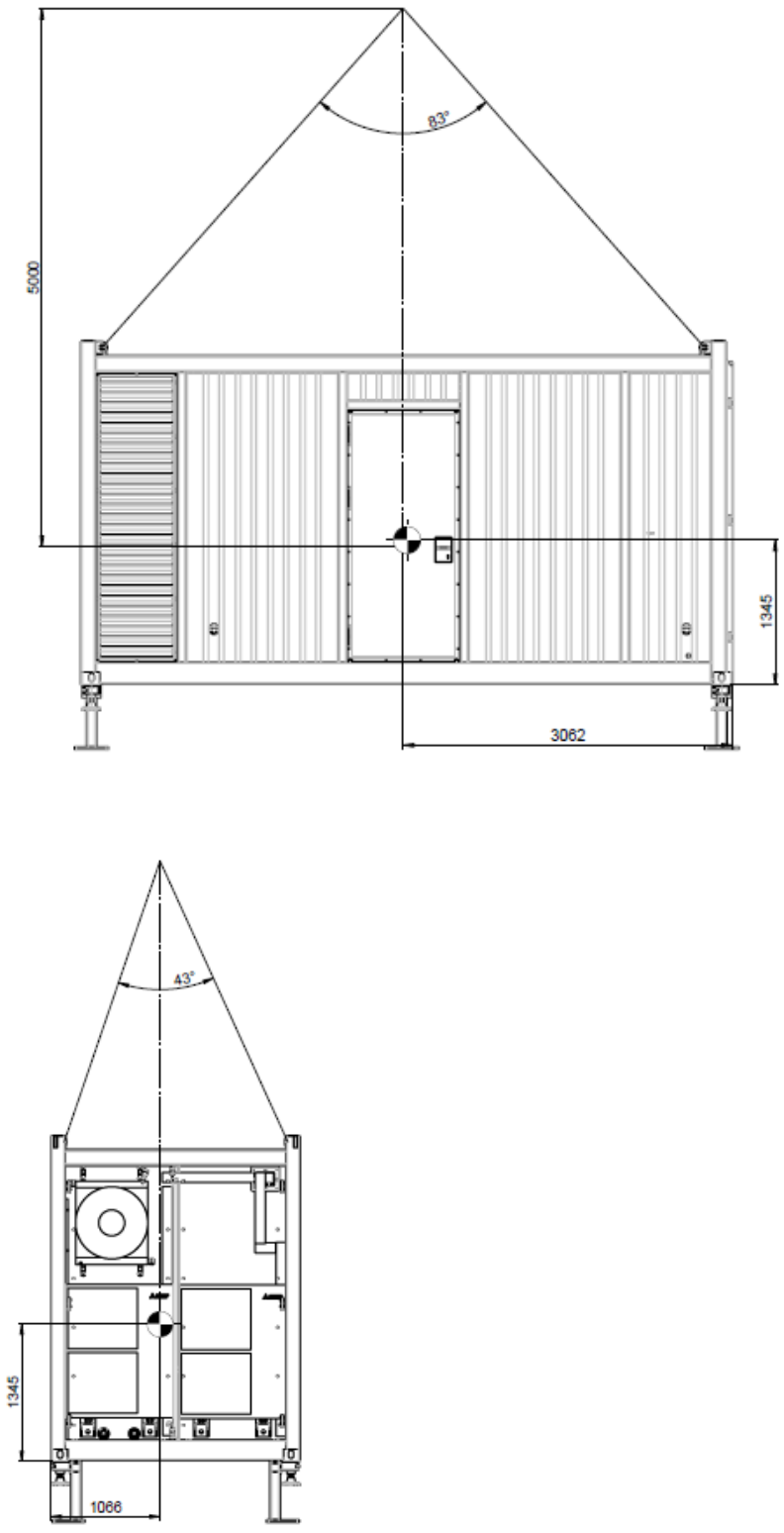
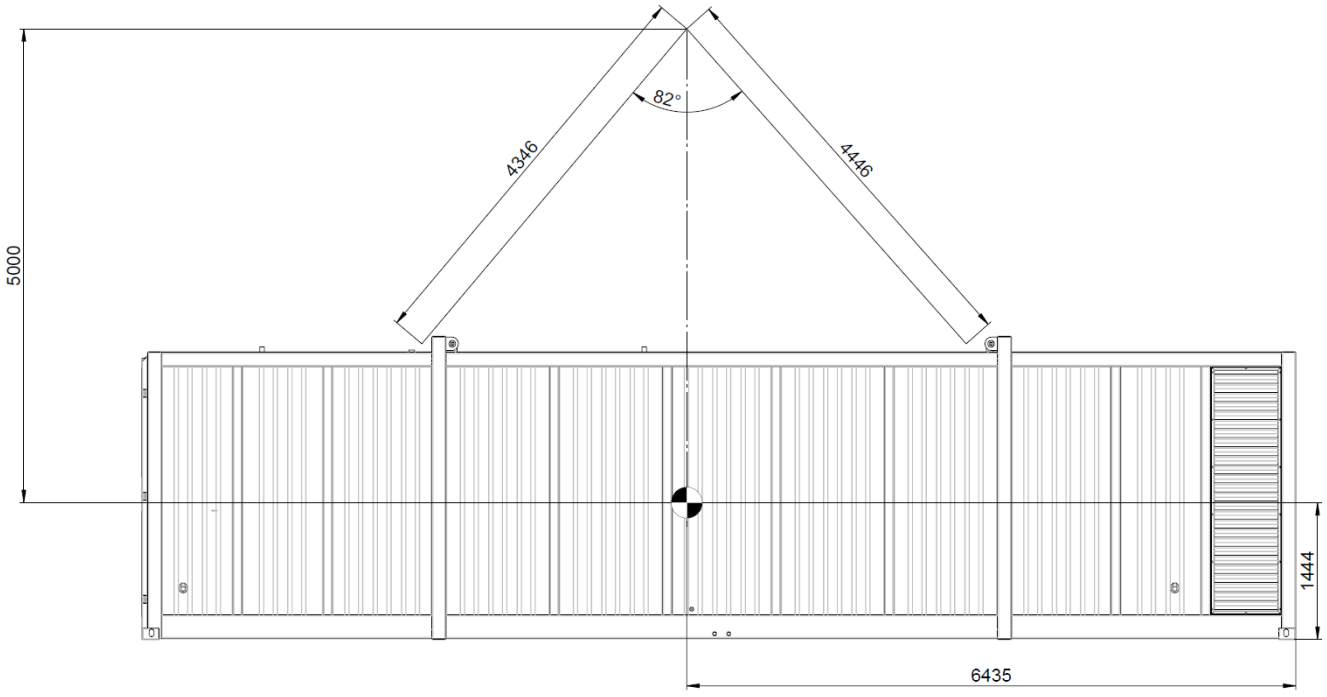


Figure 5: PCS - Sling angles and CoG

BESS 1



NOTE:
Empty container, no batteries installed

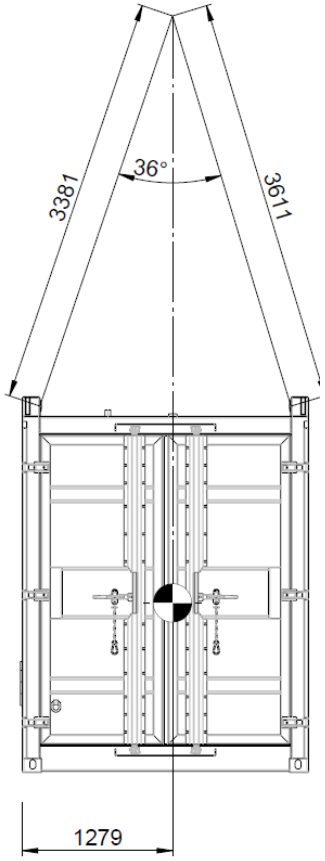
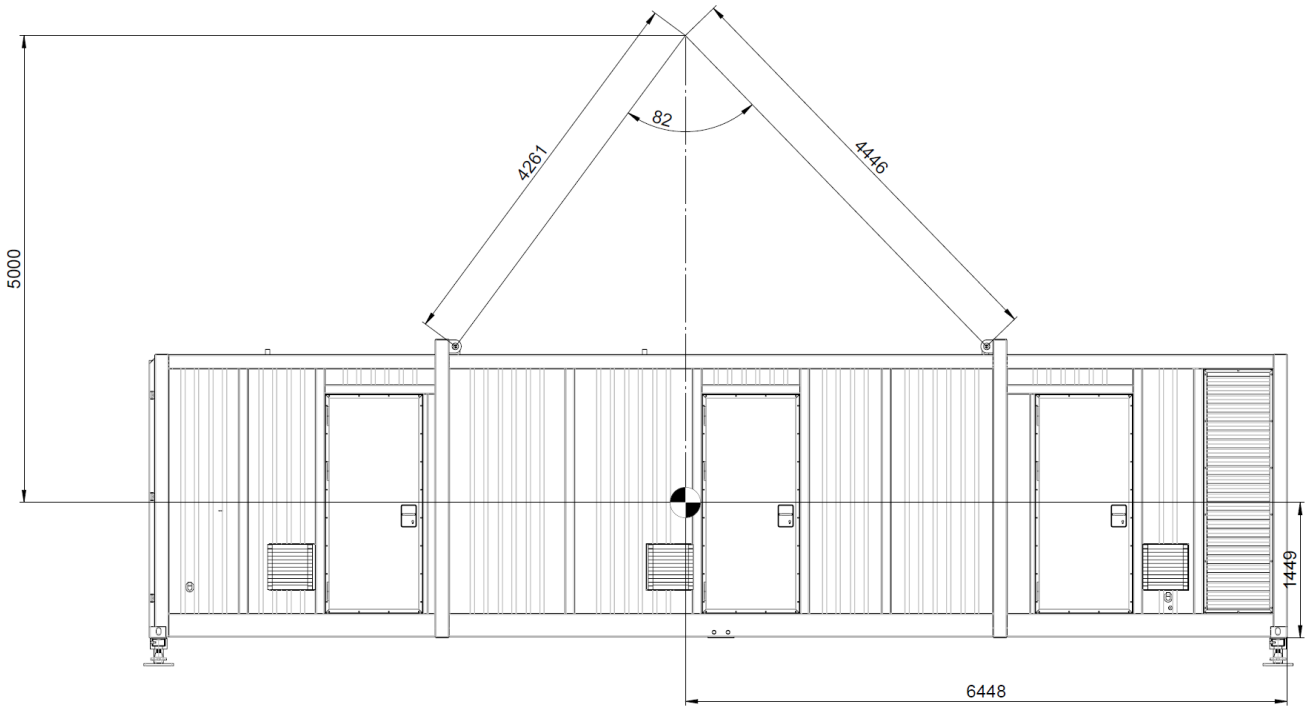


Figure 6: BESS 1 - Sling angles and CoG

BESS 2



NOTE:
Empty container, no batteries installed

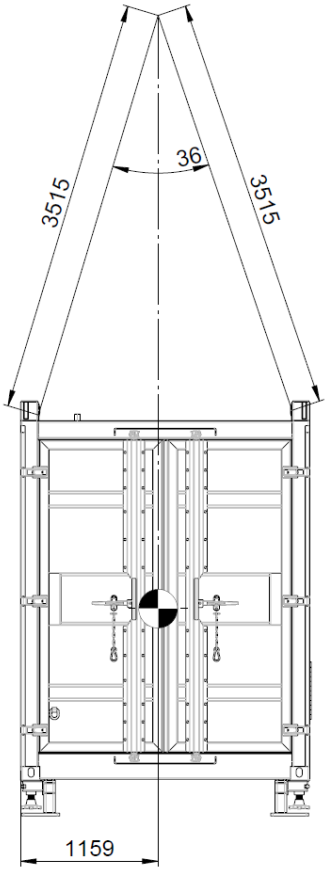


Figure 7: BESS 2 - Dimensions, sling angles and CoG

6 Installation

6.1 Required Tools

Installation personnel must at least have the following tools in reach before starting the installation:

Pos.	Installation Tools	Amount
	Basic Tools	
1.	Flash light	1
2.	Pliers set	1
3.	Ratchet set	1
4.	Torque wrench (1 - 100 Nm)	1
5.	Socket wrench set (with sockets 7 – 19 mm)	1
6.	Wrench set	1
7.	Cross-section screw drivers set	1
8.	Flat-section screw drivers set	1
9.	Allen key / Hex socket key set	1
10.	Cutter	1
11.	First-aid kit	1

Table 8: Installation tools

⚠ DANGER	
	**Electric shock due to low voltage and arcing on loose wires.** Severe irreparable damage to the nervous system, burns and death. ➜ Access to control cabinets and string cabinets only by FREQCON service personnel or by FREQCON instructed and authorized maintenance personnel. ➜ Plant control units may also be opened by instructed persons with the qualification of a qualified electrician. ➜ Work on electrical and electronic components as well as cables of the battery system may only be carried out by FREQCON service personnel or by FREQCON instructed and authorized maintenance personnel.

⚠ DANGER
Make sure that the energy source is locked and tagged and ensure that the isolation is effective before conducting work on the system. After switching-off the voltage supply, some components might still carry a charge. Check all poles using a suitable device.

⚠ WARNING
The electrical connection must be carried out in accordance with the local regulations of the utility company and /or VDE (in Germany).

Do not operate!	Lock and tag power switches and controller devices
	Observe national laws regarding Occupational Safety and Health, as well as Industrial Standards. ➢ DIN VDE 0105-100; VDE 0105-100:2009-10 Operation of electrical installations - General requirements.

6.2 Installation location

⚠ GEFAHR	
	**Danger from and for unauthorized persons** Unauthorized persons are not aware of the dangers in the work area and may endanger themselves and third parties danger. ➜ Keep unauthorized persons away from the work area. ➜ If in doubt, speak to persons and direct them away from the work area. ➜ Interrupt the work as long as unauthorized persons are in the work area. ➜ Always keep the entrance door(s) locked when not performing work on the system to prevent unauthorized persons from entering the container.

⚠ CAUTION	
	**Danger to life due to unsuitable lifting material** While lifting the container and/or battery modules use only suitable lifting equipment and lifting tackle ➜ Make sure that all the material and equipment is designed for the weight and all required inspections have been done. ➜ Make sure that no person is under the container or battery module during lifting.

NOTICE
Equipment damage due to intruding animals Prevent animals from entering the interior of the container from below through the cable glands or recesses. ➜ Secure the container from the outside with suitable protection against the entry of animals.

The PCS & BESS Containers are designed for outdoor installation, on a flat and ground level surface. Make sure that the environmental conditions meet the values of section 4 “Environmental Conditions”.

The entrances to the containers must be accessible from every side to allow for visual inspections or maintenance and repair work, if necessary.

Air inlets and outlets of the container, as well as on the cabinets inside the container, must always be kept free and cleaned of dirt in order to ensure the required air flow of the installed fans.

6.3 General Arrangement

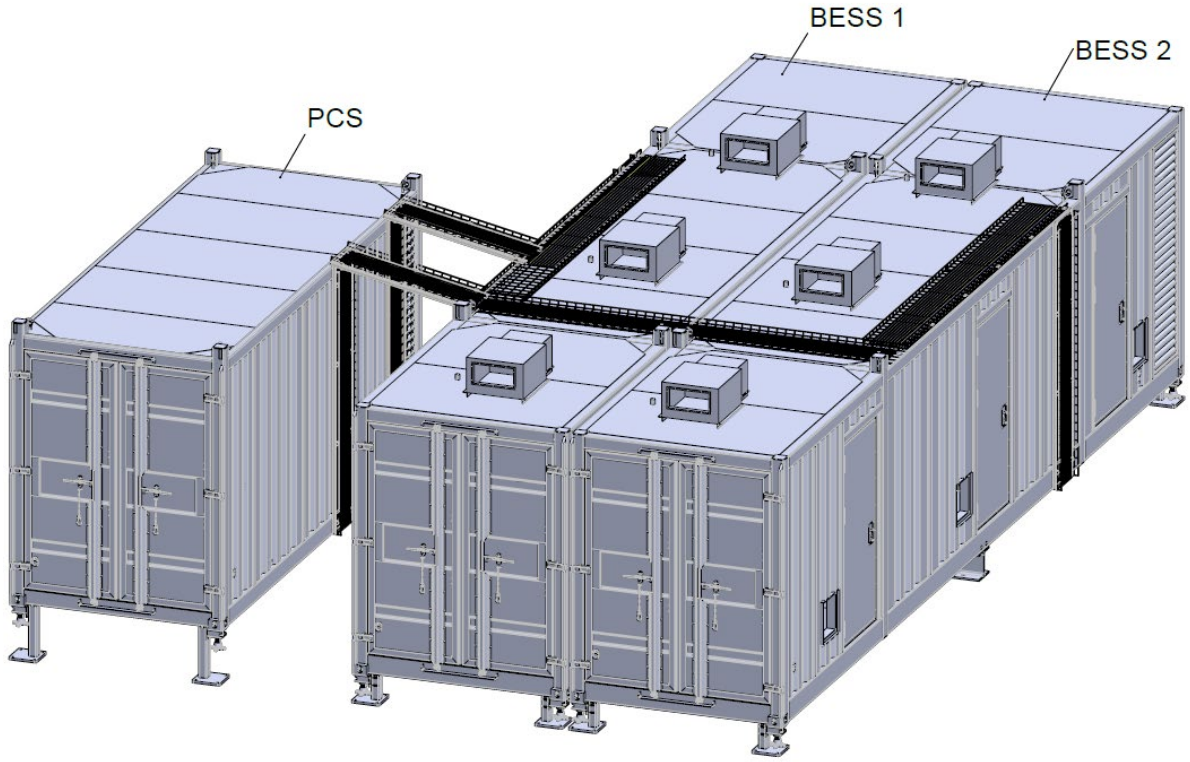
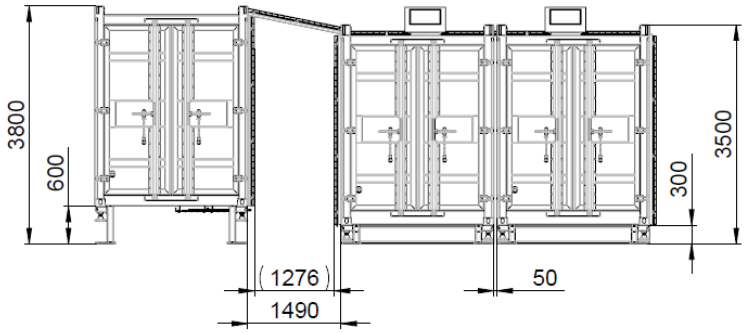
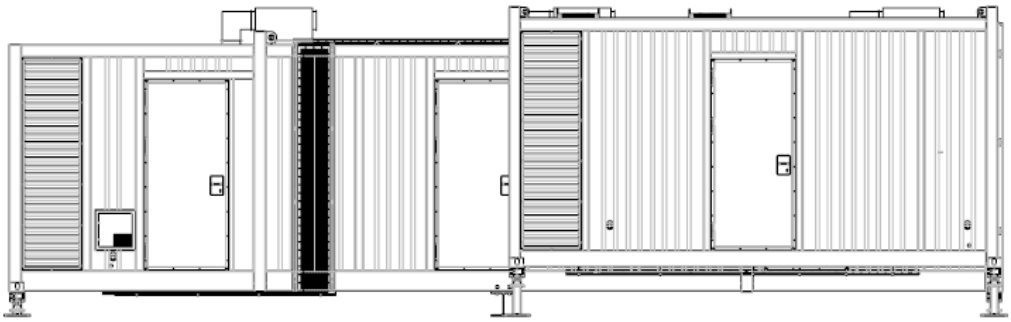


Figure 8: General arrangement

Front view



Side view



Top view

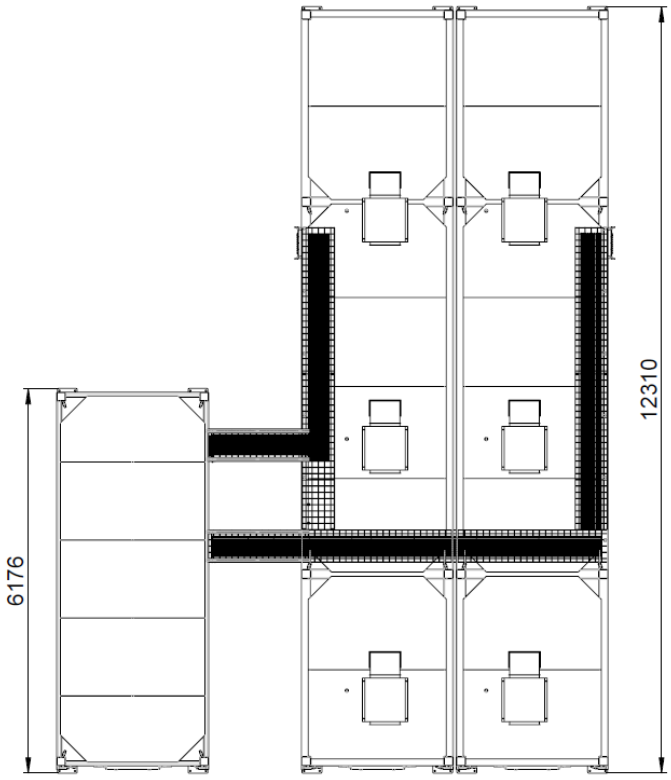


Figure 9: General arrangement with dimensions

6.4 Distances between Containers

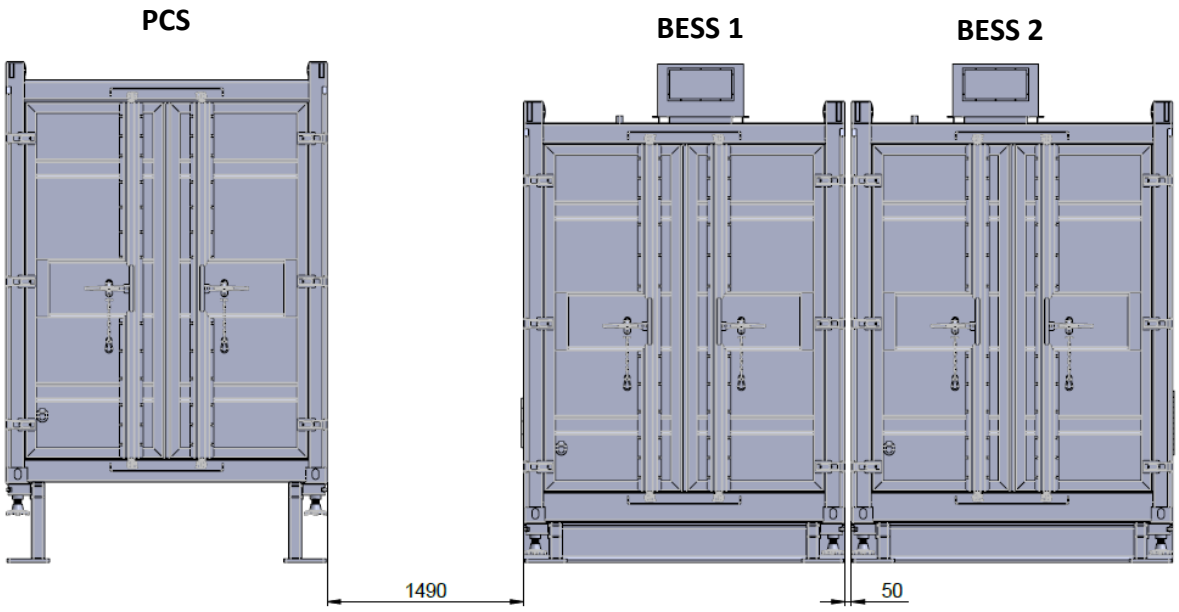
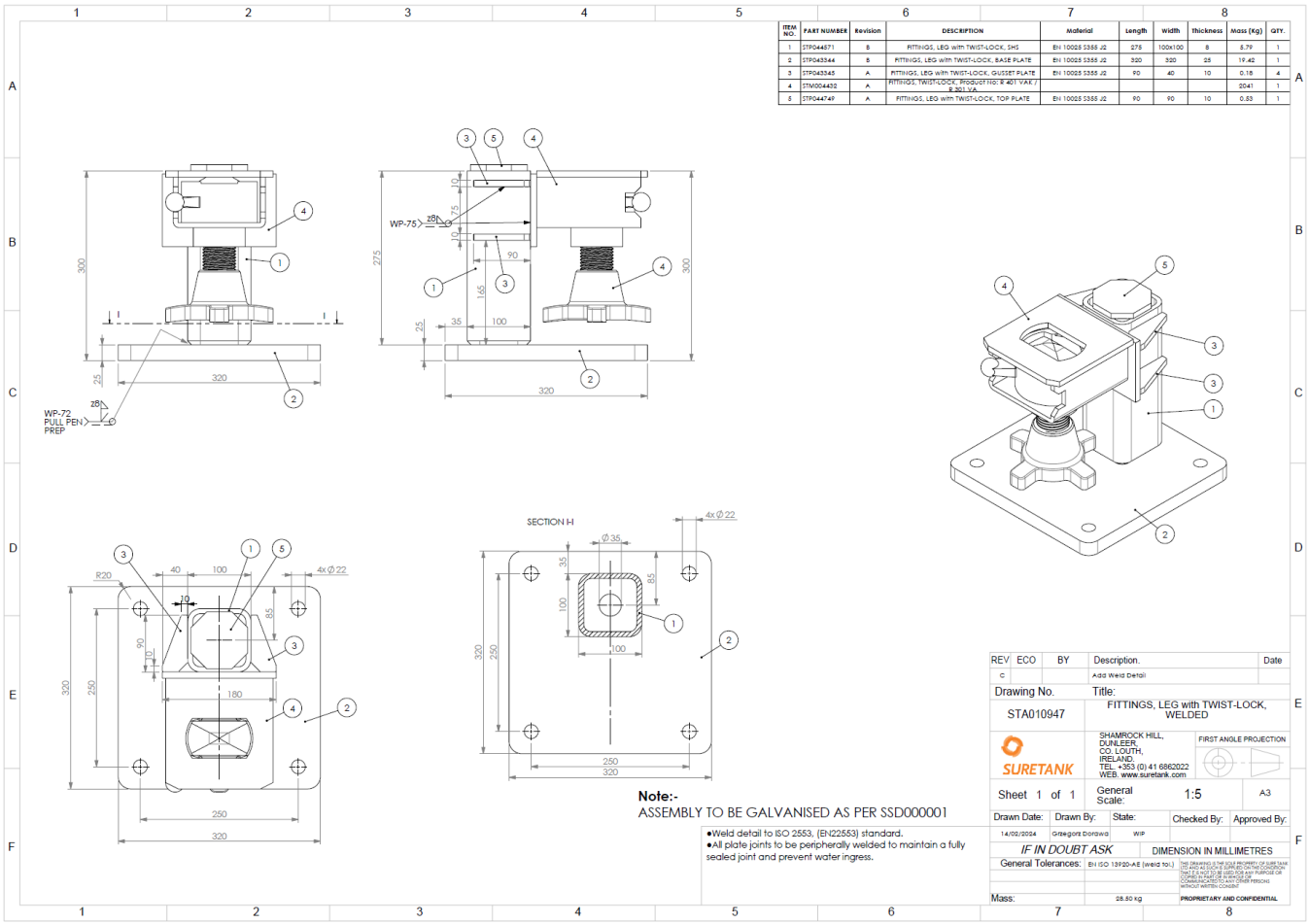


Figure 10: Distances between containers

6.5 Container Feet and T-Beams

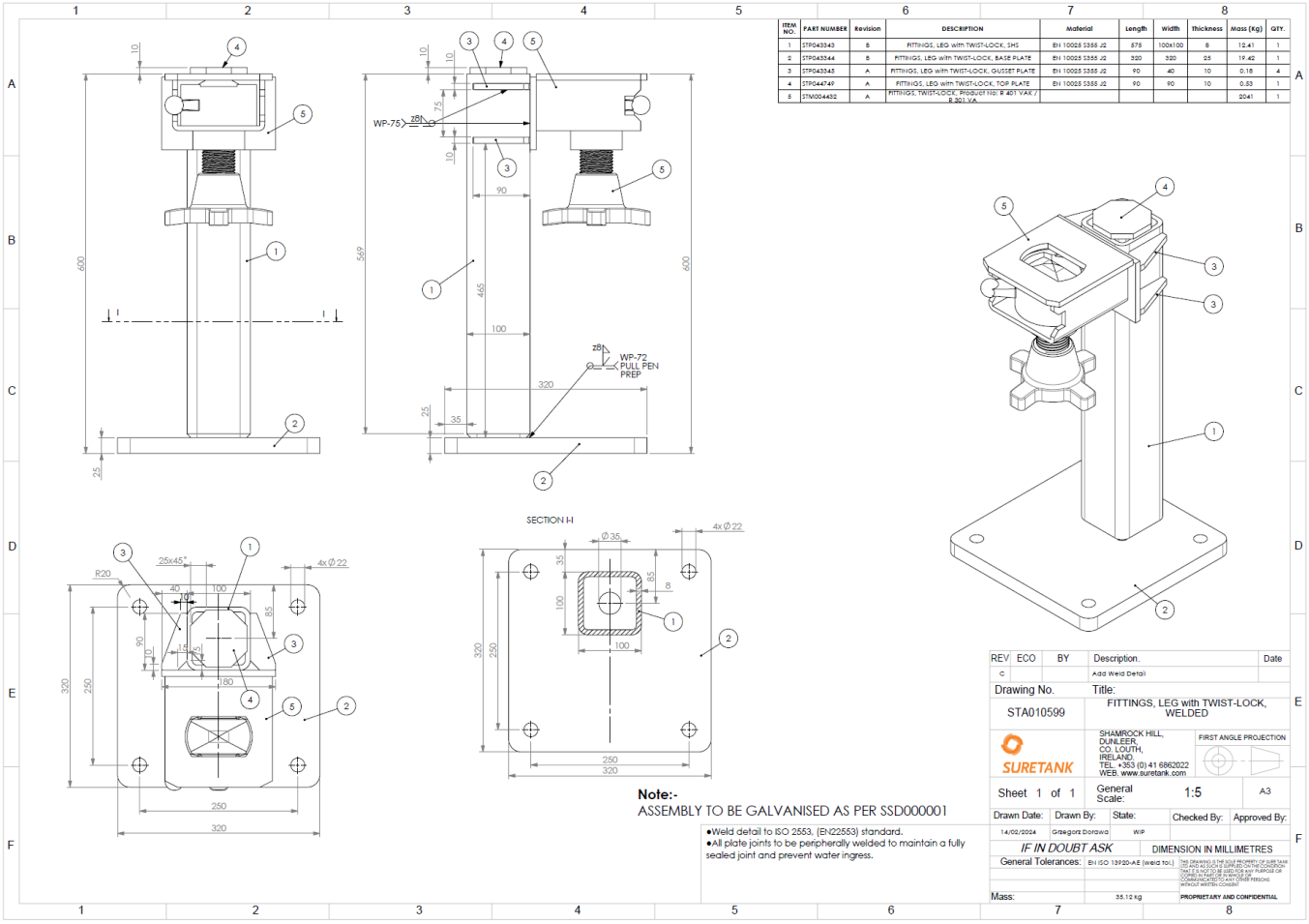
6.5.1 PCS Container Feet

4 container feet must be installed to the bottom corners of the 20FT PCS containers, before placing the container to the final installation location (*see drawing below and 1.3 "Other Applicable Documents"*.



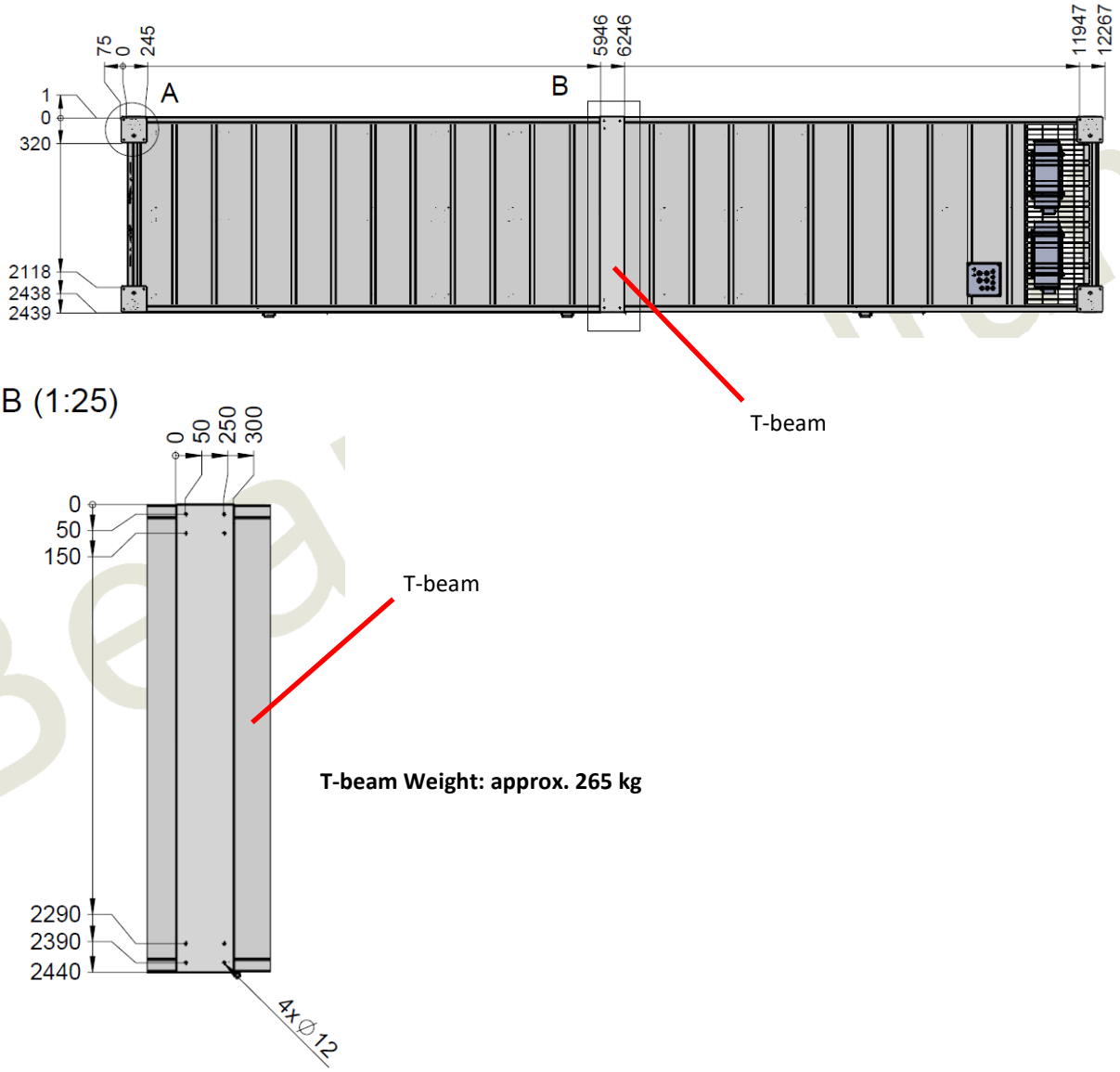
Weight: approx. 28.5 kg

6.5.2 BESS Container Feet



Weight: approx. 35 kg

6.5.3 BESS T-Beams



T-beam Weight: approx. 265 kg

6.6 Mechanical Installation of Containers

6.6.1 PCS

Task 1 **Lift PCS container and place on pedestal.**

Step 1 : Lift the container (*see section 5.2.1*).

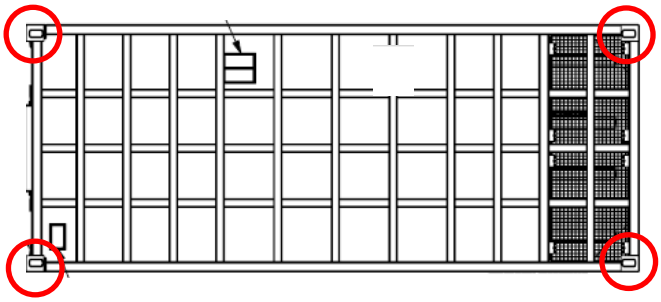
Step 2 : Place the container to several stools suitable to withstand the container load indicated in section 2. Please refer to Figure 13: Suggested stool positions for information on the stool positions.

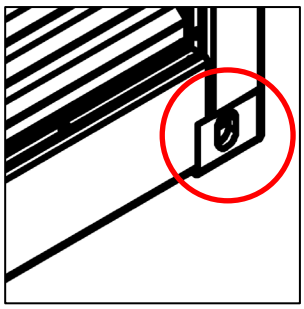
Task 2 **Install the 4 container feet to PCS container.**

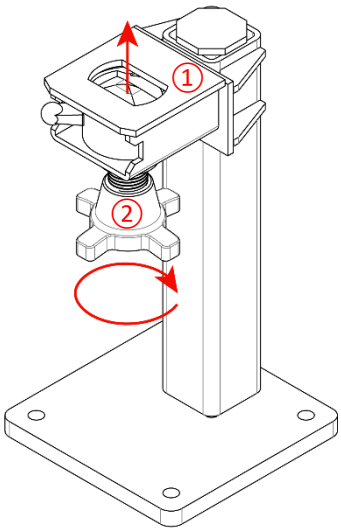
Attach first of the 4 container feet (*see section 6.5.1*).to one of the 4 bottom corner of the container.

Step 1 : Place the top plate (①) from the bottom to the corner of the container.

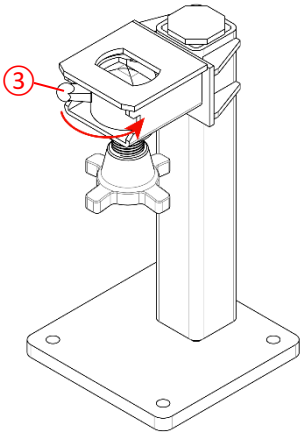
Step 2 : Screw the twist lock head mechanism of the foot (②) by twisting it as indicated in the illustration below. Screw until it has completely penetrated the bottom recess of the foot.

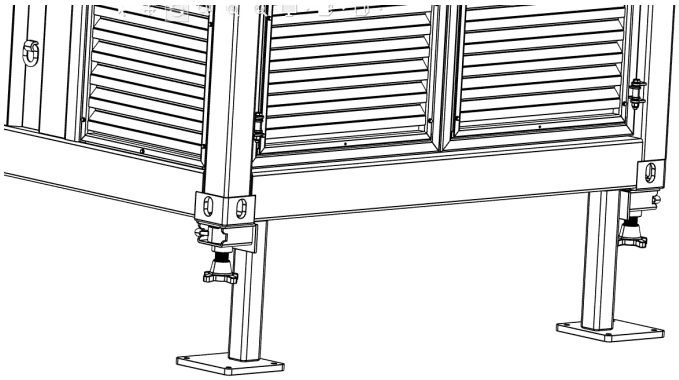






Step 3 : Secure the feet by twisting the twist lock locking mechanism (③) to the position like indicated in the illustration below.





Step 4 : Repeat the steps for the other 3 container feet.

✓ **The container feet have been successfully installed to the PCS container.**

Task 3 **Install cable trays on container bottom**

Step 1 : While the container is still lifted on the stools, drill the bore holes for cable tray installation according to the attached drawing " Mounting cable tray".

Step 2 : Insert blind rivet nuts to the prepared bore holes according to the drawing " Mounting cable Tray".

Step 3 : Fix the cable trays (① - ④) according to drawing " Mounting cable Tray".

Step 4 : Apply a torque to the connections according to drawing " Mounting cable Tray"

Cable trays:

GKX 520x60x2507

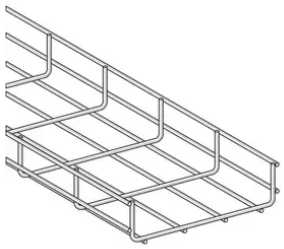


Figure 11: Cable tray V2A_ Gitterrinne GKX

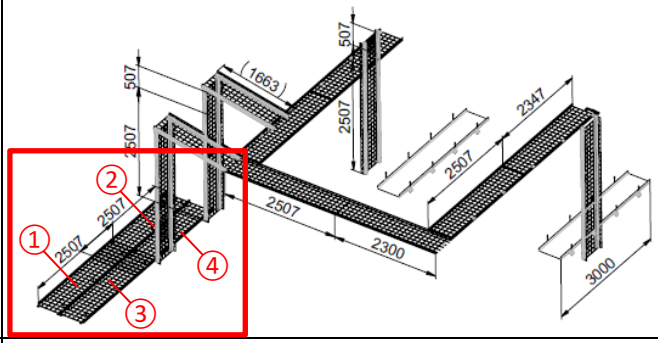


Figure 12: Cable trays for PCS container installation

Specification per cable tray:

Original part no.	Cable tray V2A_ Gitterrinne GKX 520x60x2507
Type	GKX 520x60x2507
Length	2507 mm
Width	520 mm
Height	60 mm

Task 4 **Lift container to installation location and fix to installation location.**

Step 1 : Lift the container (*see section 5.2.1*) and place it to the desired installation location.

Step 2 : Fix the 4 feet to the ground using suitable connection material (welding or bolting).

✓ **The PCS container has been successfully fixed to the installation location.**

6.6.2 BESS 1

Task 1 **Lift BESS container and place on pedestal.**

Step 1 : Lift the container (*see section 5.2.1*).

Step 2 : Place the container to stools suitable to withstand the container load indicated in section 2.

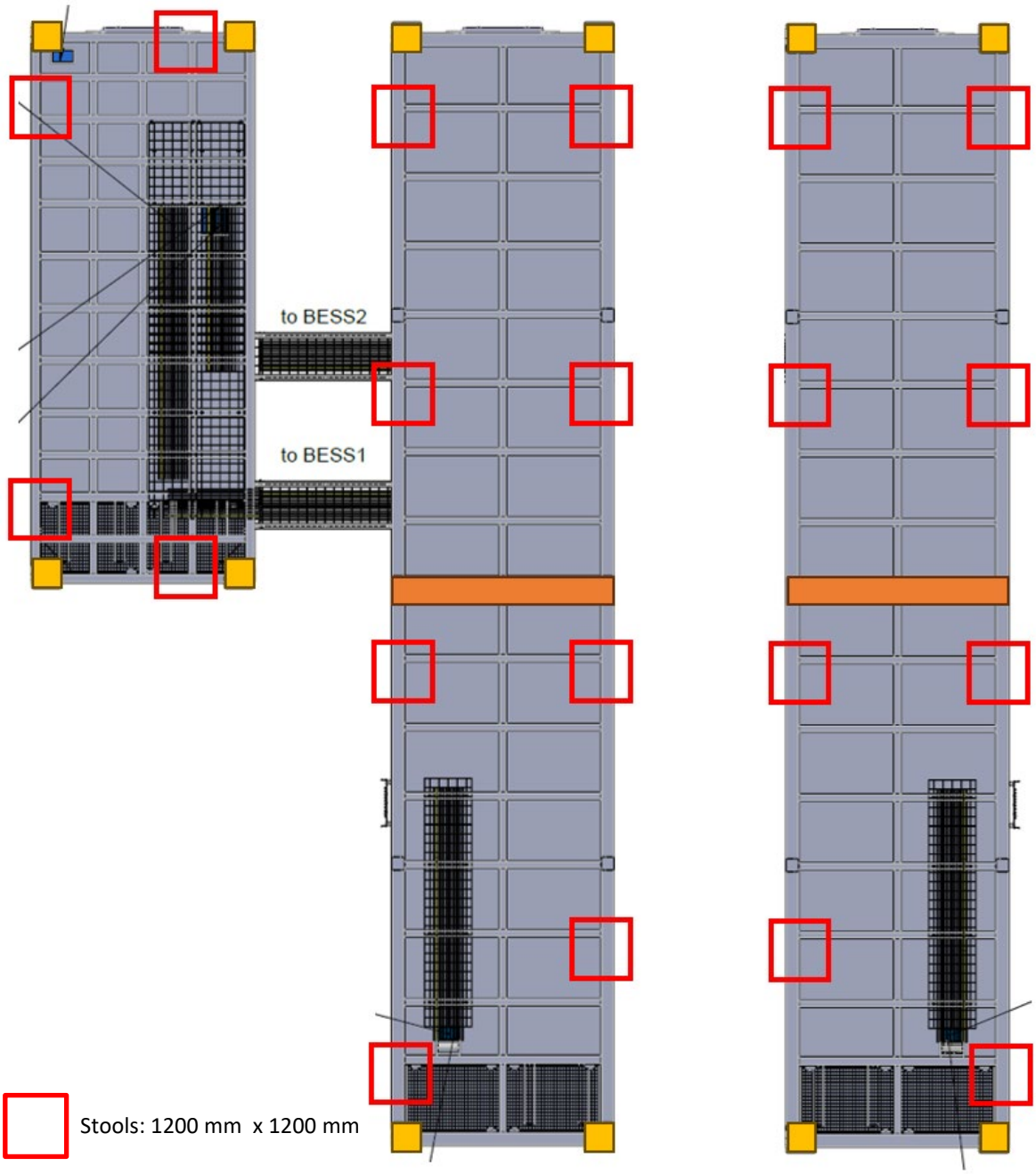


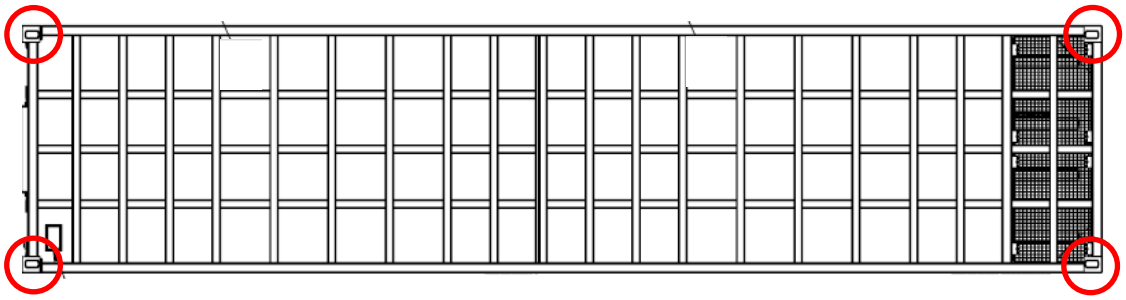
Figure 13: Suggested stool positions

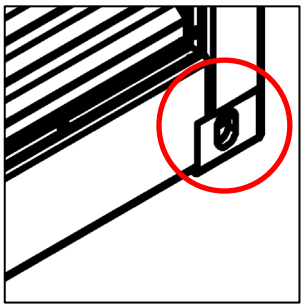
Task 2 **Install the 4 container feet to BESS container.**

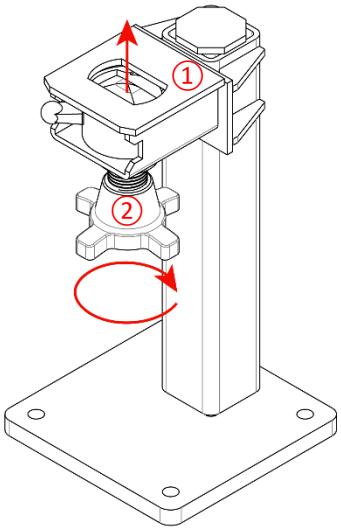
Attach container foot (*see section 6.5.1*) to one of the 4 bottom corner of the container.

Step 1 : Place the top plate (①) from the bottom to the corner of the container.

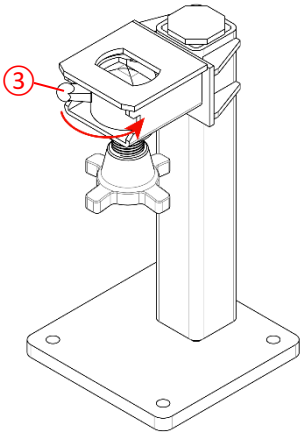
Step 2 : Screw the twist lock head mechanism of the foot (②) by twisting it as indicated in the illustration below. Screw until it has completely penetrated the bottom recess of the foot.

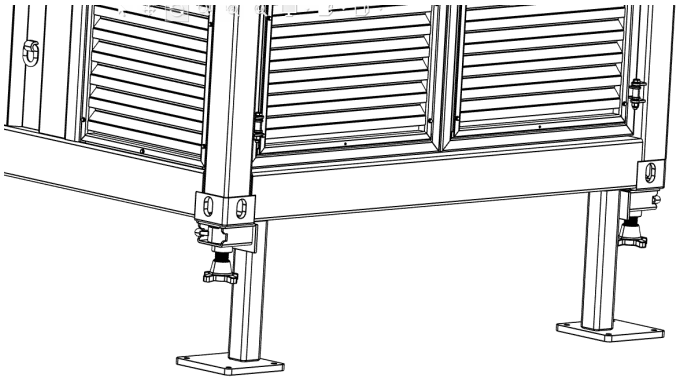






Step 3 : Secure the foot by twisting the twist lock locking mechanism (③) to the position like indicated in the illustration below.





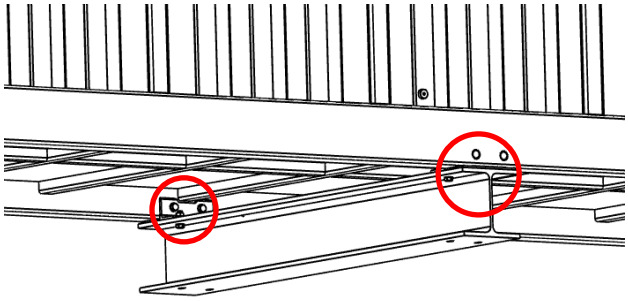
Step 4 : Repeat all the steps of task 2 for the 3 remaining container feet.

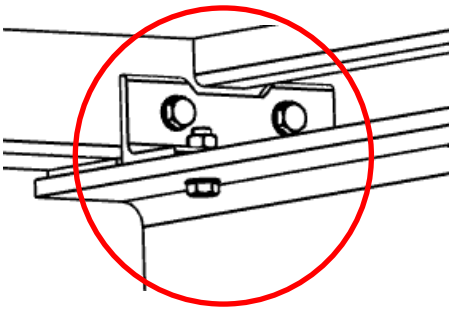
✓ **The container feet have been successfully installed to the BESS container.**

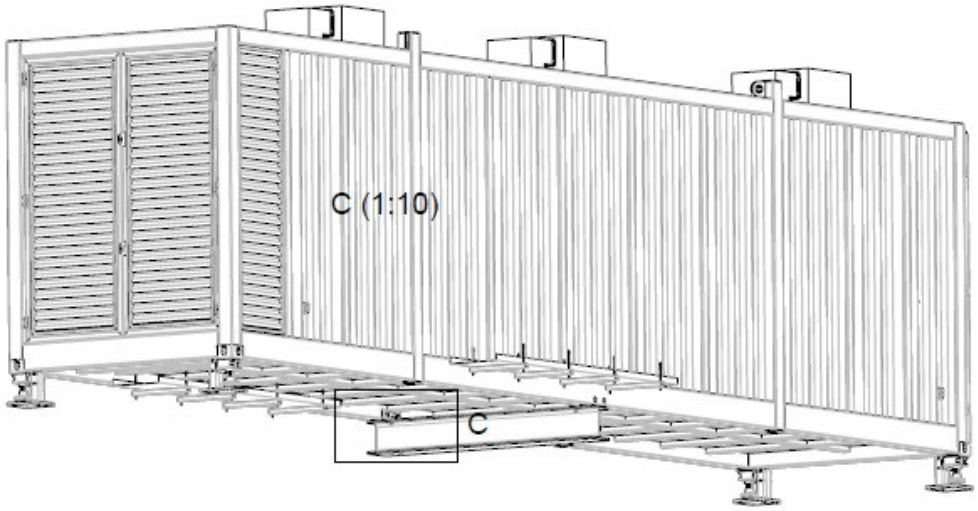
Task 3 **Install the t-beam to BESS container.**

Step 1 : While the container is still lifted on the stools, lift the provided t-beam (④) using a suitable lifting device under the container.
Beam weight approx. 260 kg.
Refer to below drawing for exact positioning of the beam.

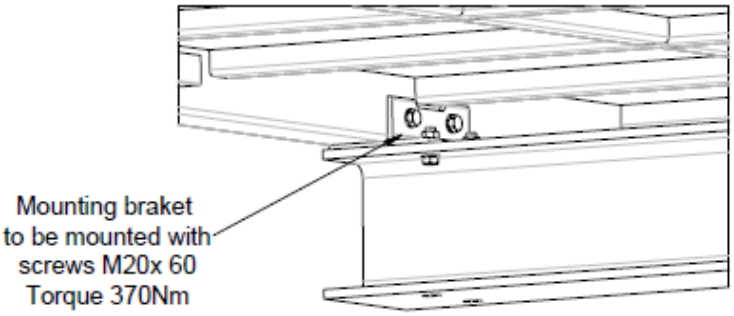
Step 2 : Fix the t-beam to the container using the bore holes underneath the container and provided mounting brackets, nuts and bolts. Apply a torque of 370 Nm to the connections.

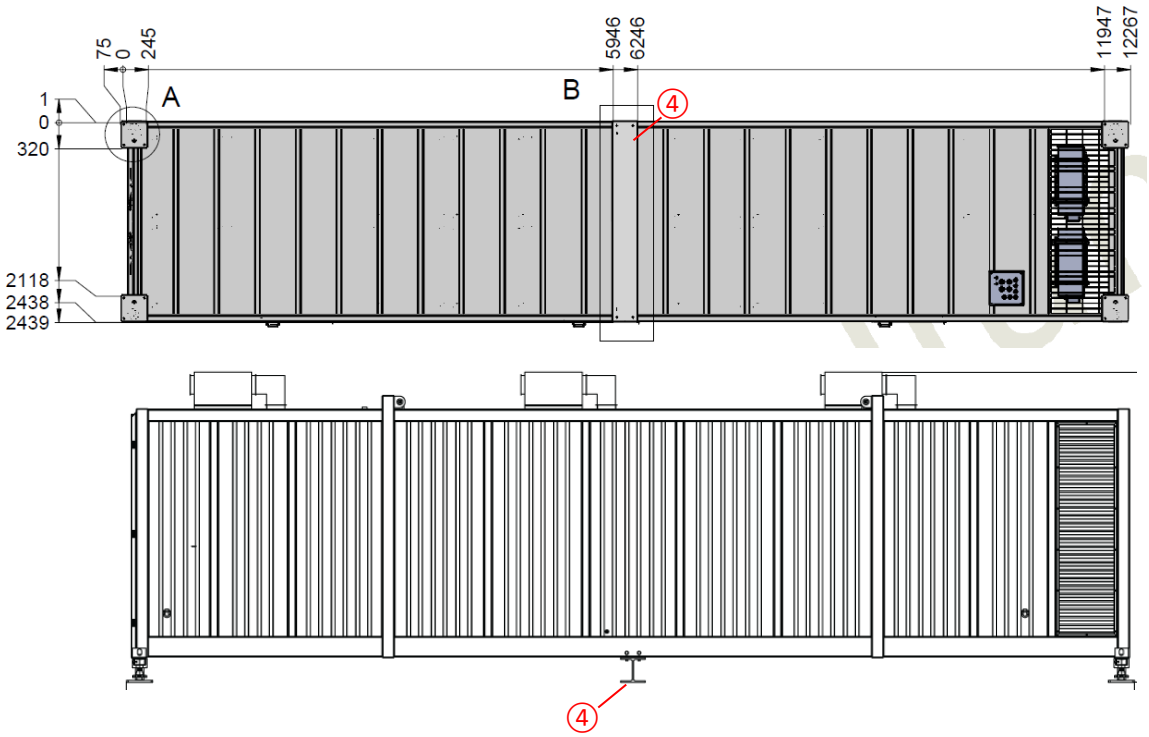


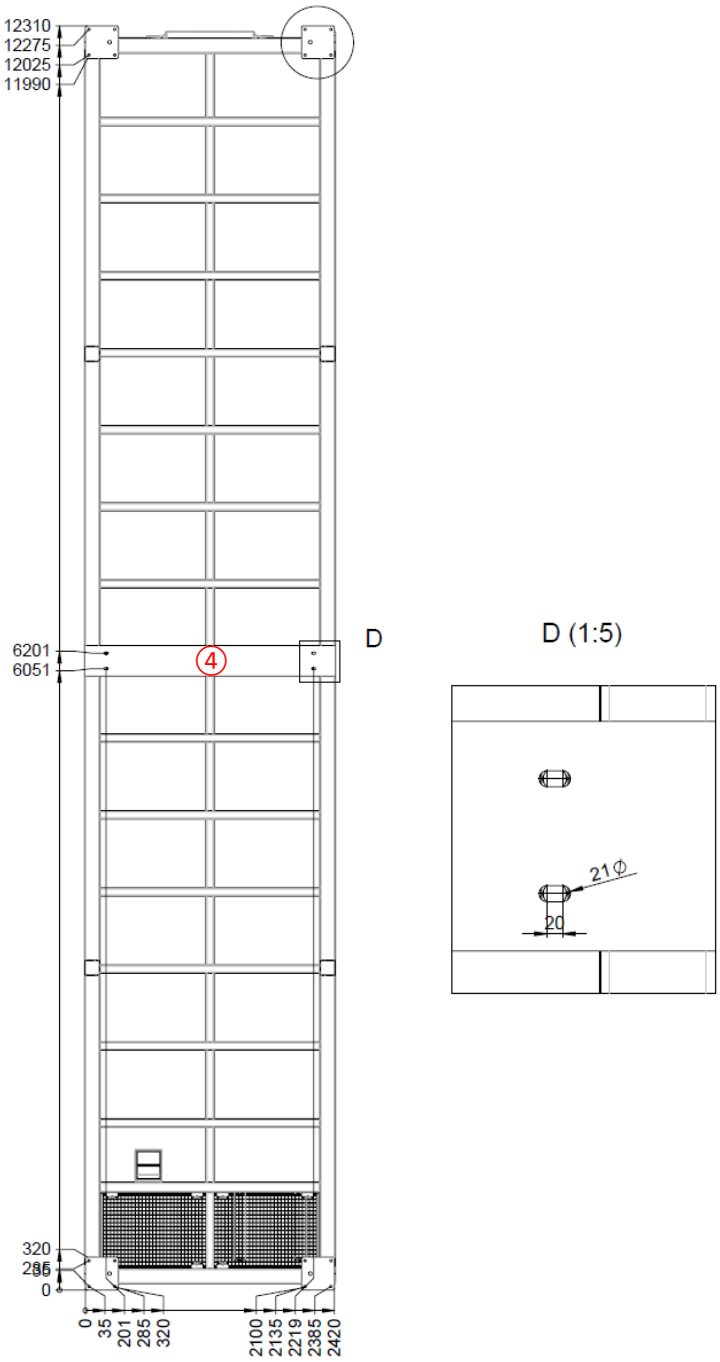



C (1:10)
C

C


Mounting braket
to be mounted with
screws M20x 60
Torque 370Nm


75
0
245
5946
6246
11947
12267
A
B
4
1
0
320
2118
2438
2439
4


12310
12275
12025
11990
6201
6051
4
D
320
285
0
0
35
201
285
320
2100
2135
2219
2385
2420

D (1:5)
21Φ
20

Task 4 **Install cable trays on container bottom**

Step 1 : While the container is still lifted on the stools, drill the bore holes for cable tray installation according to the attached drawing " Mounting cable tray".

Step 2 : Insert blind rivet nuts to the prepared bore holes according to the drawing "Mounting cable Tray".

Step 3 : Fix the cable tray (①) according to drawing "Mounting cable Tray".

Step 4 : Apply a torque to the connections according to drawing "Mounting cable Tray".

Cable trays:

RKS-Magic® 60 A4



Figure 14: Cable tray RKS-Magic® 60 A4

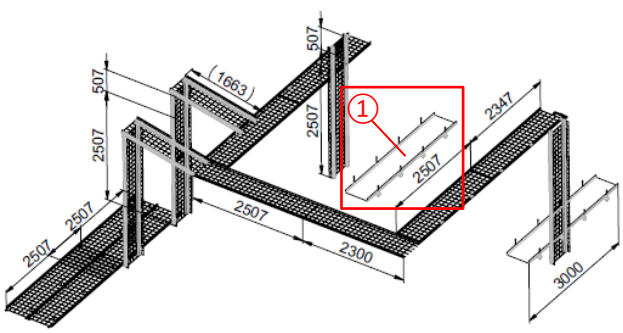


Figure 15: Cable tray for BESS 1 container installation

Specification per cable tray:

Description / name	Cable tray RKS-Magic® 60 A4
Original manufacturer part no.	6047422
Type	RKS-Magic® 60 A4
Length	3000 mm
Width	500 mm
Height	60 mm

Task 5 **Lift container to installation location and fix to installation location.**

Step 1 : Lift the container (*see section 5.2.1*) and place it to the desired installation location.

Step 2 : Fix the 4 feet to the ground using suitable connection material (welding or bolting).

✓ **The PCS container has been successfully fixed to the installation location.**

Task 6 **Lift BESS container with installed feet and T-beam to installation location.**

Step 1 : Lift the container (*see section 5.2.1*) and place it to the desired installation location. If bolting of the container feet is foreseen, make sure the boreholes of the installed container feet and t-beam are aligned with the connection provisions at the ground of the installation site.

Step 2 : Fix the T-beam to the ground using suitable connection material (welding or bolting).

Step 3 : Fix the container feet to the ground using suitable connection material (welding or bolting).

Step 4 : Check connections for tightness.

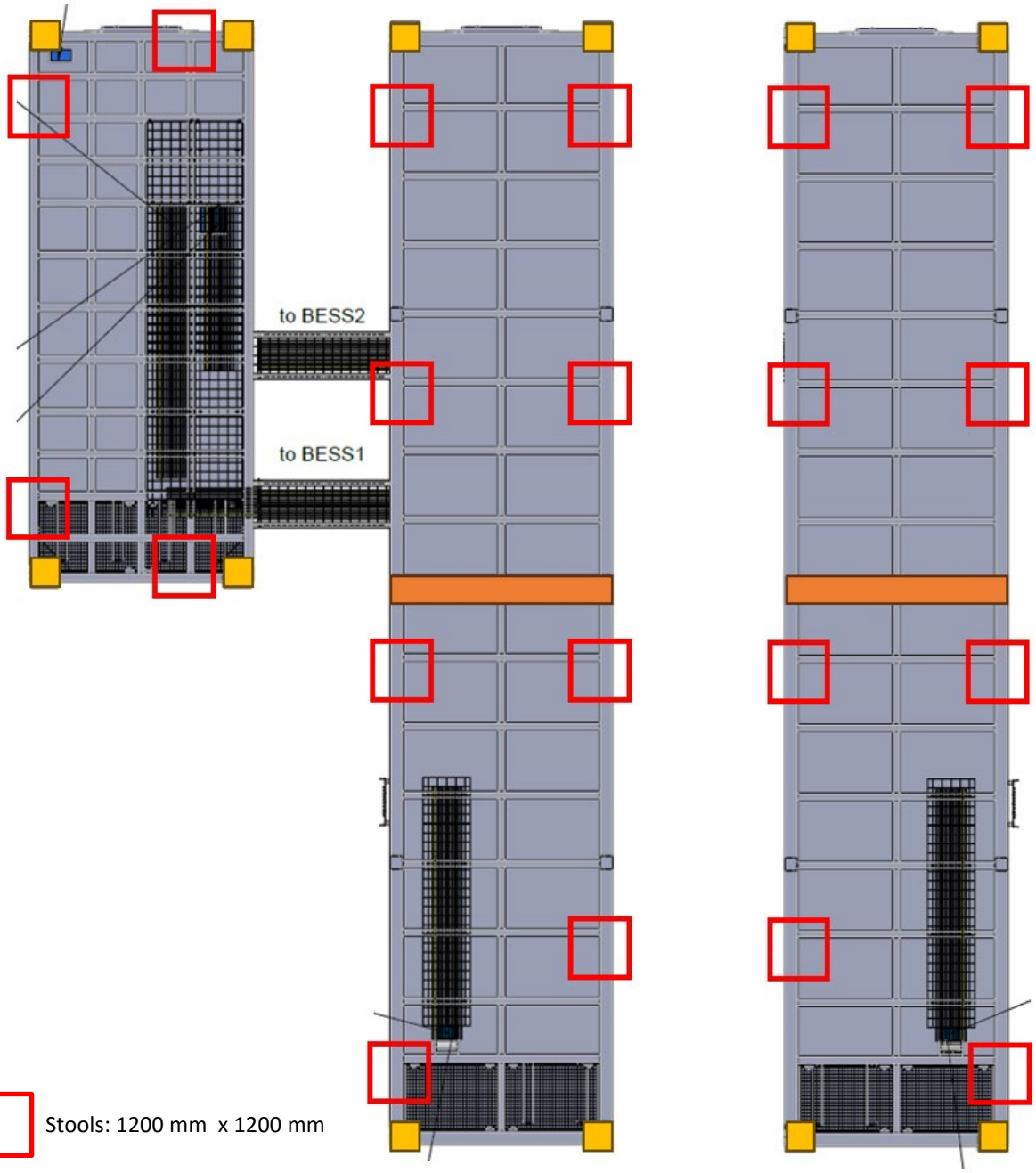
✓ **BESS container has been successfully fixed to the installation location.**

6.6.3 BESS 2

Task 1 **Lift BESS container and place on pedestal.**

Step 1 : Lift the container (*see section 5.2.1*).

Step 2 : Place the container to stools suitable to withstand the container load indicated in section 2. Please refer to below figure for information on the stool positions.



Stools: 1200 mm x 1200 mm

Container foot: 320 mm x 320 mm

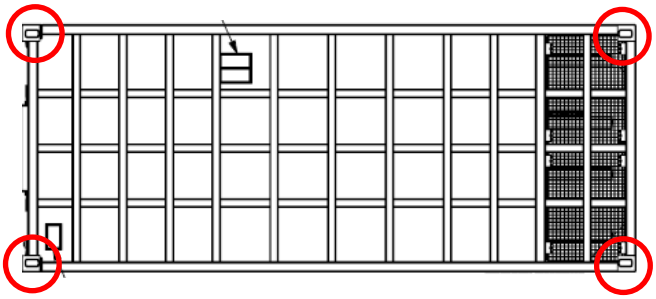
T-beam: 300 mm x 2440 mm

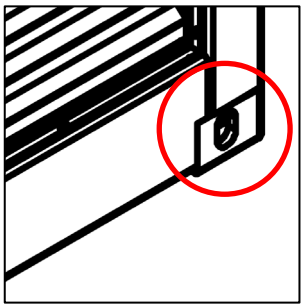
Task 2 **Install the 4 container feet to BESS 1 container.**

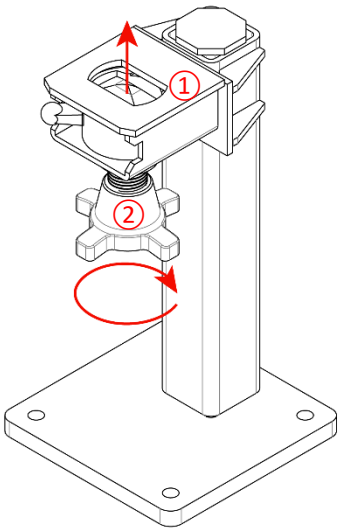
Attach container foot (*see section 6.5.1*) to one of the 4 bottom corner of the container.

Step 1 : Place the top plate (①) from the bottom to the corner of the container.

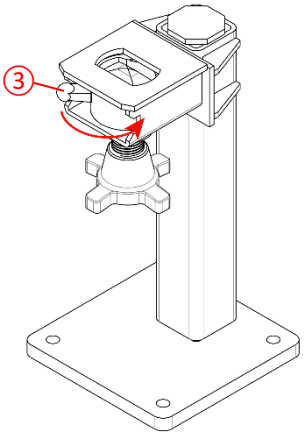
Step 2 : Screw the twist lock head mechanism of the foot (②) by twisting it as indicated in the illustration below. Screw until it has completely penetrated the bottom recess of the foot.

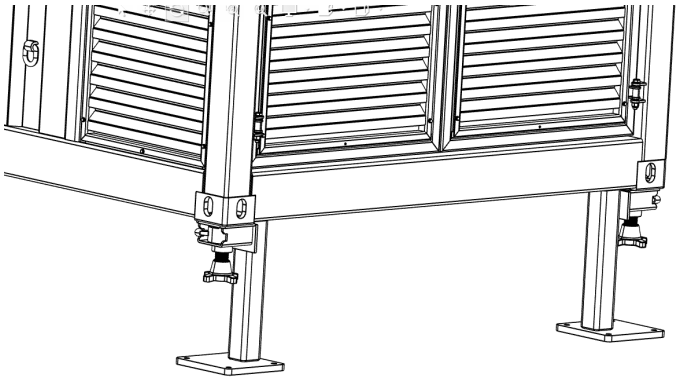






Step 3 : Secure the foot by twisting the twist lock locking mechanism (③) to the position like indicated in the illustration below.





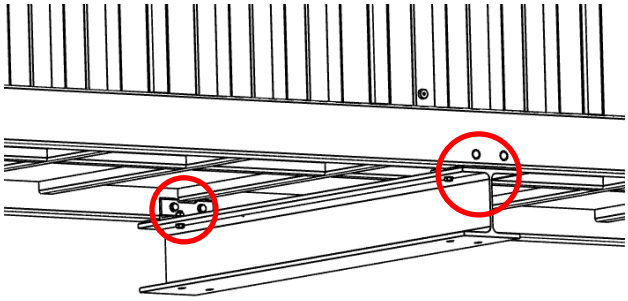
Step 4 : Repeat all the steps of task 2 for the 3 remaining container feet.

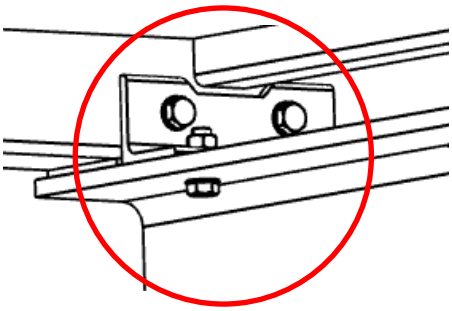
✓ **The container feet have been successfully installed to the BESS container.**

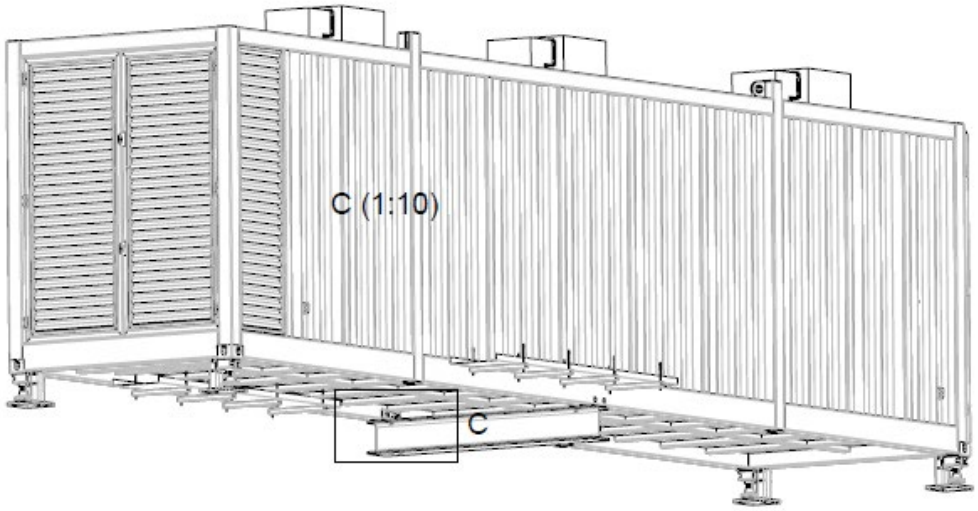
Task 3 **Install the t-beam to BESS container.**

Step 1 : While the container is still lifted on the stools, lift the provided t-beam (④) using a suitable lifting device under the container.
Beam weight approx. 260 kg.
Refer to below drawing for exact positioning of the beam.

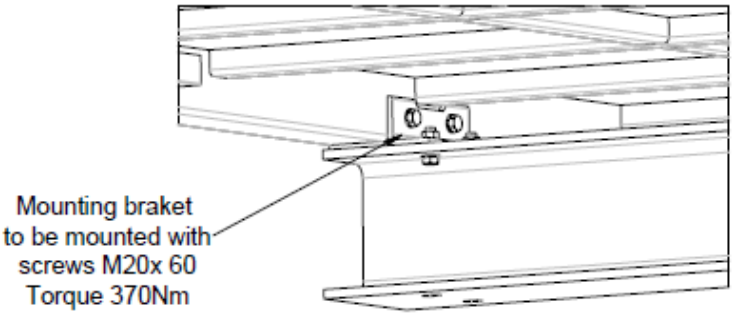
Step 2 : Fix the t-beam to the container using the bore holes underneath the container and provided mounting brackets, nuts and bolts. Apply a torque of 370 Nm to the connections.

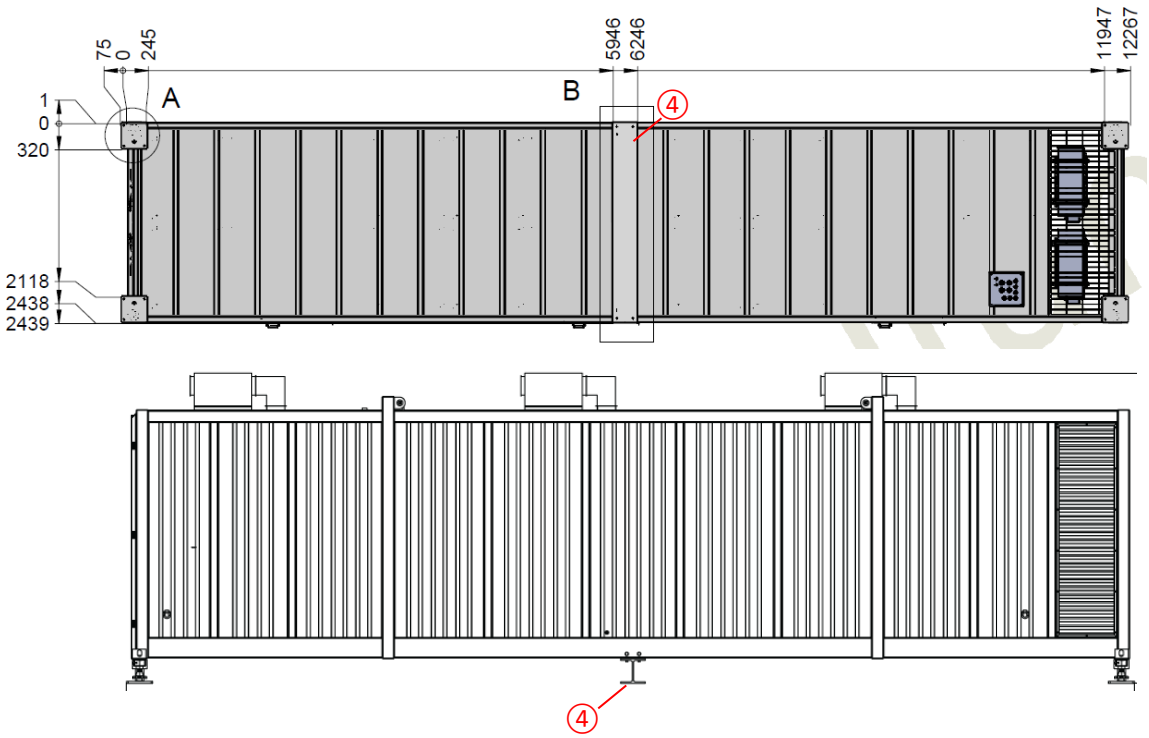


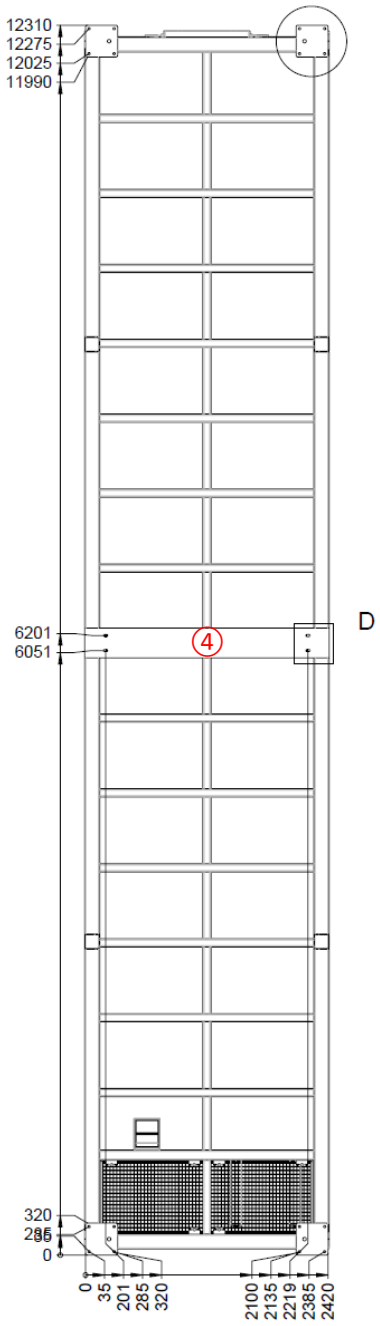


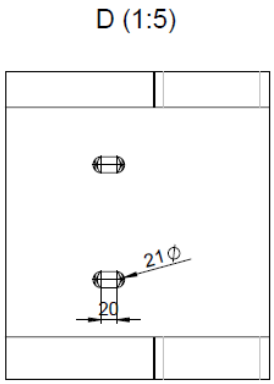

C (1:10)
C

C


Mounting braket
to be mounted with
screws M20x 60
Torque 370Nm


75
0
245
5946
6246
11947
12267
A
B
4
1
0
320
2118
2438
2439
4


12310
12275
12025
11990
6201
6051
4
D
320
285
0
0
35
201
285
320
2100
2135
2219
2385
2420


D (1:5)
21Φ
20

Task 4 **Install cable trays on container bottom**

Step 1 : While the container is still lifted on the stools, drill the bore holes for cable tray installation according to the attached drawing " Mounting cable tray".

Step 2 : Insert blind rivet nuts to the prepared bore holes according to the drawing "Mounting cable Tray".

Step 3 : Fix the cable tray (②) according to drawing "Mounting cable Tray".

Step 4 : Apply a torque to the connections according to drawing "Mounting cable Tray".

Cable trays:

RKS-Magic® 60 A4



Figure 16: Cable tray RKS-Magic® 60 A4

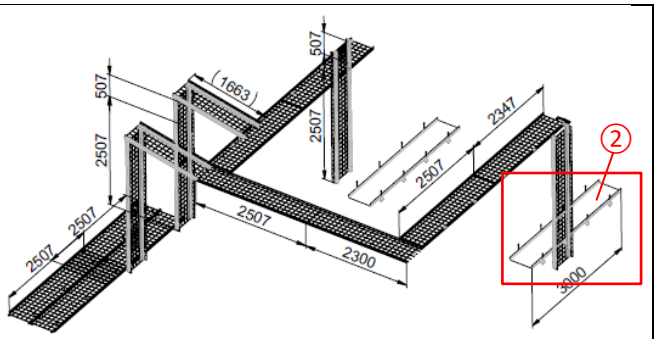


Figure 17: Cable tray for BESS 2 container installation

Specification per cable tray:

Description / name	Cable tray RKS-Magic® 60 A4
Original manufacturer part no.	6047422
Type	RKS-Magic® 60 A4
Length	3000 mm
Width	500 mm
Height	60 mm

Task 5 **Lift BESS container with installed feet to installation location.**

Step 1 : Lift the container (*see section 5.2.1*) and place it to the desired installation location. If bolting of the container feet and T-beam is foreseen, make sure the boreholes of the installed container feet and t-beam are aligned with the connection provisions at the ground of the installation site.

Step 2 : Fix the T-beam to the ground using suitable connection material (welding or bolting).

Step 3 : Fix the container feet to the ground using suitable connection material (welding or bolting).

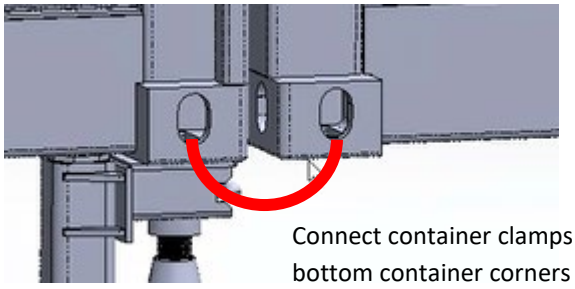
Step 4 : Check connections for tightness.

✓ **BESS container has been successfully fixed to the installation location.**

Task 6 **Fix BESS 1 and 2 containers with container clamps**

Step 1 : Attach container clamps for fixation of BESS 1 and BESS 2 containers like indicated below.

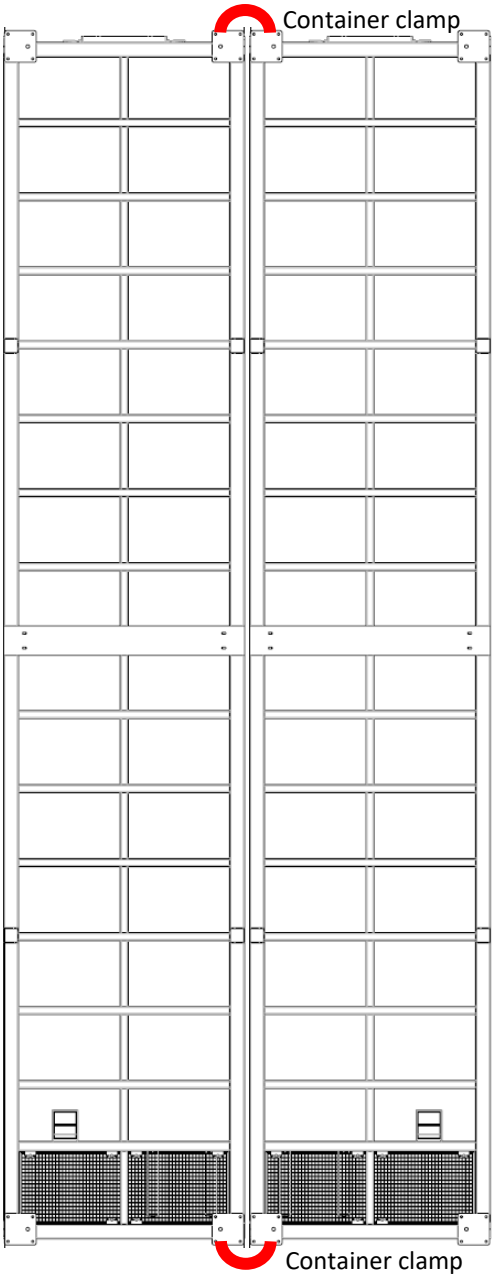
✓ **BESS container 1 and 2 has been successfully installed at the installation location.**



Connect container clamps to bottom container corners

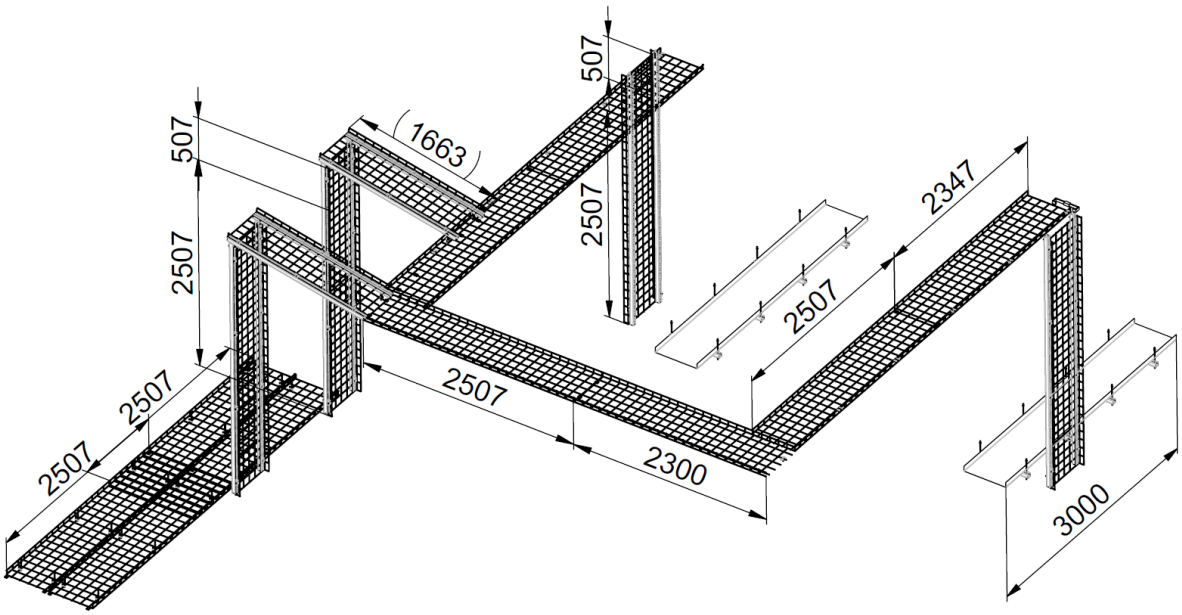


Container clamp

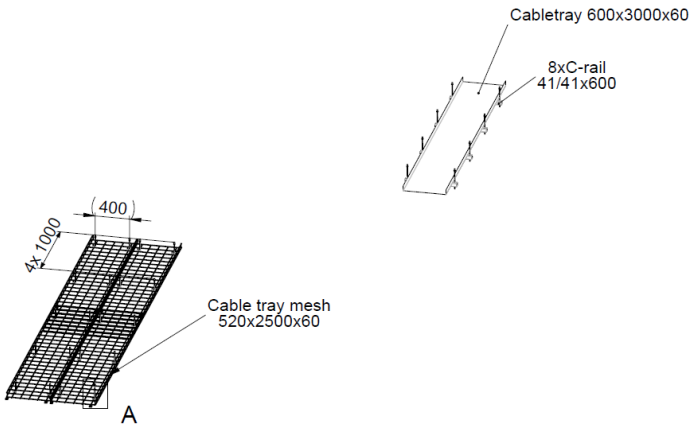


7 Appendix

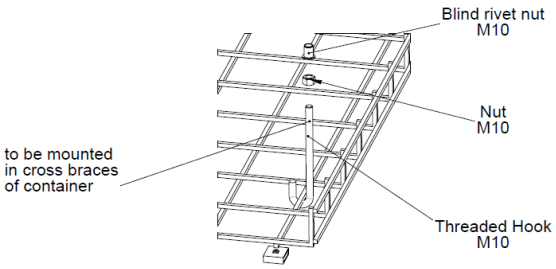
1. Drawing “Mounting cable tray”



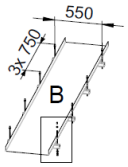
Pos. Nr.	Menge	Bezeichnung	Art.-Nr.	Lieferant	Lieferanten Nr.
1	25	V2A_ Gitterrinne GKX 520x60x2507	52520	Pflitsch	115496 GKX 520x60 V2A
6	6	MS 41-41 VA	54532	Sikla	195796
8	80	Blindnietmutter M10 Flachkopf (0,7-3,5)	505856	Böllhoff	23307100235
9	60	Sperrkantscheibe - Form M - M10	503802	--	--
10	60	Zylinderschraube mit ISK ISO 4762 - M10 x 20 - 8.8 - St.	500865	--	--
11	15	Gewindeplatte VA NT CC41 M10	54544	Sikla	199312
12	6	Befestigungswinkel	54546		
13	50	Sechskantmutter ISO 4032 - M10 - 8	503711	--	--
14	20	Gewindehaken GH	54547	Sikla	101602
15	4	Befestigungswinkel	54549		
16	50	Gewindeplatte CC41-M8	54550	Sikla	195305
17	55	V4A Gitterkanal Verbindungslasche X1	52531	Pflitsch	GK L X1 V4A
18	55	Sperrkantscheibe - Form M - M8	503801	--	--
19	55	Zylinderschraube mit ISK ISO 4762 - M8 x 30 - 8.8 - St.	503670	--	--
20	30	Gitterkanal VerbindungslascheX2	52505	Pflitsch	GK L X2
21	2	Bridge Fitting CL1/50	53388	Plomben.de	TS20003-001
22	16	threaded rod / Gewindestange	---		
23	8	MS 41-41 VA-600	54717	Sikla	195796
24	2	Kabelrinne RKS Magic 60A4	509409	Obo	6047422
25	16	Sperrkantscheibe - Form B - M8	505744	--	--
26	16	Blindnietmutter M8 KSGRSO (e=3,0-4,5)	505060	Böllhoff	34367080045



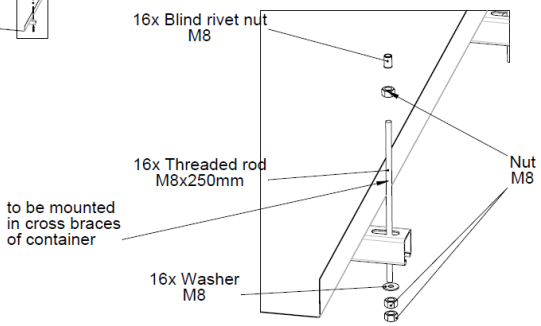
A (1:5)



Torque for all M10: 35Nm

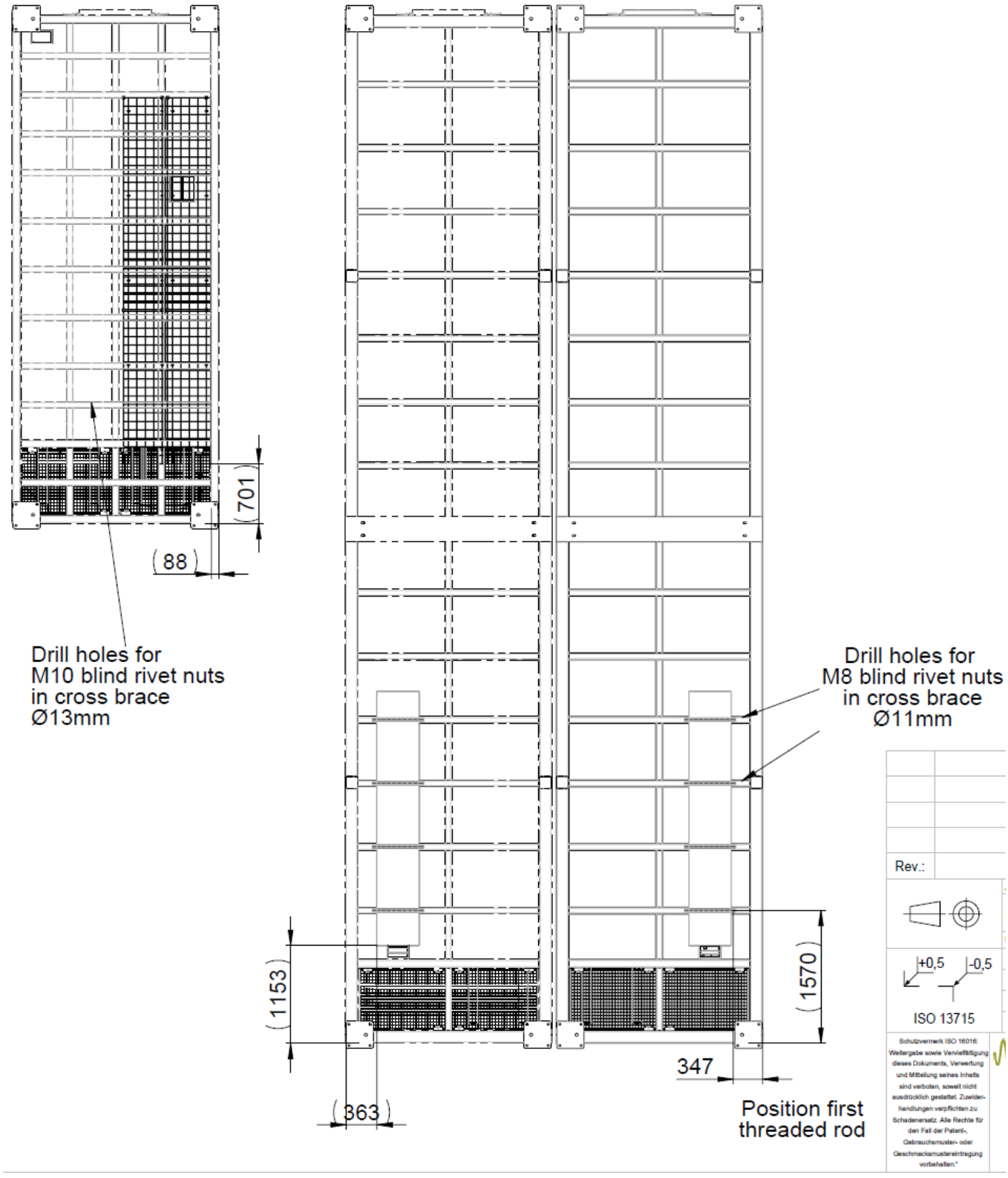


B (1:5)

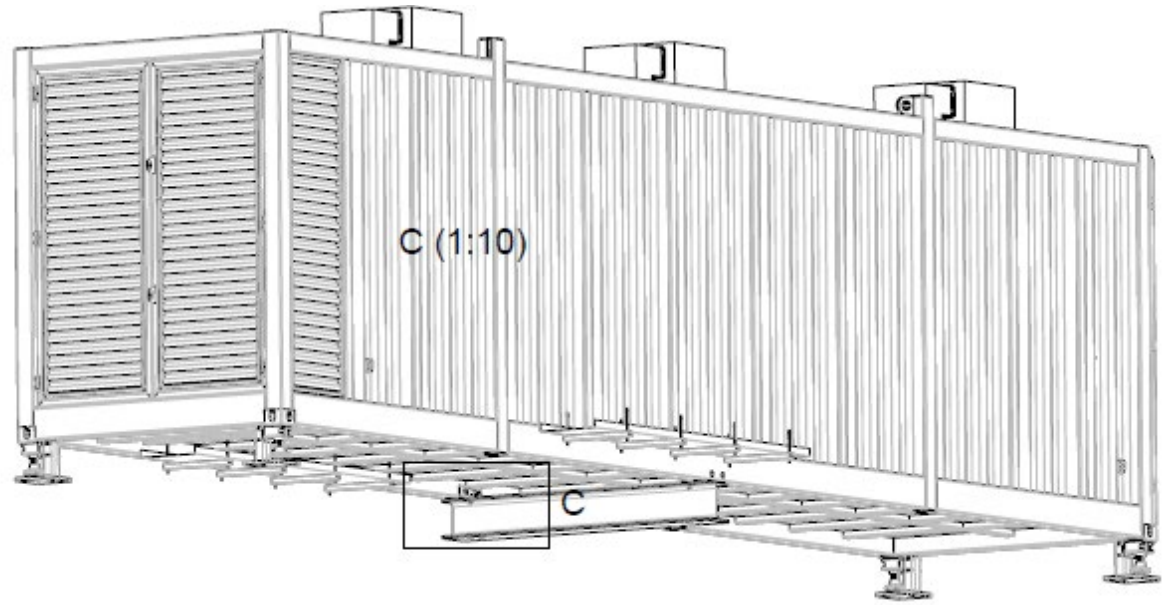


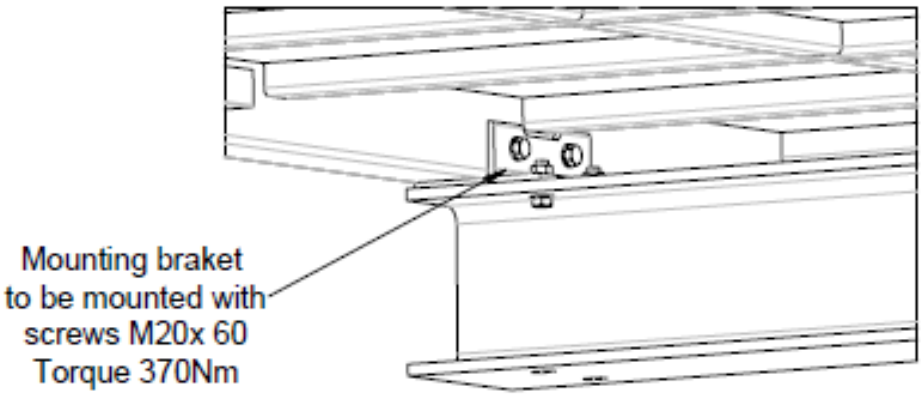
Torque for all M8: 20Nm

Rev.:	Änderung (changes):			Datum (Date):	Name:
Allgemeintoleranzen für Längenmaße DIN ISO 2768-mK				Oberfläche (surface): -	
Genauigkeitsgrad	Abmaße in mm für Nennmaßbereiche: 0.5 ... 3 (m (mittel) ± 0.1); > 3 ... 6 (± 0.1); > 6 ... 30 (± 0.2); > 30 ... 120 (± 0.3); > 120 ... 400 (± 0.5); > 400 ... 1000 (± 0.8); > 1000 ... 2000 (± 1.2)			Werkstoff (material):	176.97 kg
+0,5 -0,5 ISO 13715		Datum (Date):	Name:	Bezeichnung (description):	Scale: 1:40
	Drawn:	03.07.2024	MvD	Cable trays	Sheet: 2 (A3)
	Checked:				2 of: 4
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				Projekt-Nr. & Kunde (project number & customer): 23A2007 Statron	


701
88
Drill holes for
M10 blind rivet nuts
in cross brace
Ø13mm
Drill holes for
M8 blind rivet nuts
in cross brace
Ø11mm
1153
1570
363
347
Position first
threaded rod
Rev.:
+0,5
-0,5
ISO 13715

2. Drawing "Mounting T-Beam"





Battery Energy Storage System (BESS)
BASE LOAD POWER HUB

Statron ref. 331497

Project Code: K559-2254
Purchase Order Number: CW-I-WP4-2022-01

Document number:
23A2007_240712_FREQCON_Container_Installation_Manual_v3.0

Document description: Installation Manual

Revision	Date	Name	Description
001	20.06.2024	CPA	First Version

Installation Manual
PCS & BESS Containers

for Base Load Power Hub (BLPH) Project

Classification: confidential

Document no.	PCS & BESS Containers
Document name	Installation Manual
Component / System	BESS
Project code	K559-2254

Version	Date	Name	Description
1.0	2024-06-28	C. Palenzuela	First version
2.0	2024-07-04	C. Palenzuela	Updated several sections
3.0	2024-07-12	C. Palenzuela	Updated several sections

Table 1: Version overview

	Date	Name
Editor	2024-06-28	C. Palenzuela
Checked by	2024-06-29	M.v. Dreuten
Approved by	2024-06-29	C. Palenzuela

Table 2: Approval overview

Imprint

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You can also visit us on our website **http://www.freqcon.com** to find more information about our products and solutions.

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Identification

Product Version / Document Version

Product version
Prototype

Document release date
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Doc Code
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Name and Address of Manufacturer

Manufacturer of the product
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Original document

This document is an original document of FREQCON GmbH.

1 Introduction

1.1 About this Document

This document is part of project phase “Detailed Design Engineering” for the Base Load Power Hub (BLPH) Project (K559-2254). In case of any contradiction resulting by the information or specification given in this document, phase 2 or later documents supersede the information provided in this document.

1.2 Display Elements

Symbol	Meaning
➜	Action with one or several steps for which the sequence is irrelevant.
Step 1 : **Step 2 :**	Action with several steps for which the sequence is relevant.
•	First level of list.
-	Second level of list.

Table 1: Display Elements

1.3 Other Applicable Documents

The following documents are applicable:

Document type	Document Name
PCS drawing	53396 PCS Container
BESS 1 drawing	53406 BESS Container 1
BESS 2 drawing	53412 BESS Container 2
General Arrangement	23A2007 BLPH BESS complete system
PCS container feet drawing	STA010947 RevC
BESS container feet drawing	STA010599 RevC

Table 2: Other applicable documents

1.4 Generic Terms and Abbreviations Used

This following list should help you understand some of the abbreviations used in this document.

Generic Term and Abbreviation	Description
BESS	Battery Energy Storage System
BLPH	Base Load Power Hub
PCS	Power Conversion System

Table 3: Generic terms and abbreviations used

2 Weights

PCS	
Serial No.	FRQ-53396000001
Manufacturer	FREQCON GmbH
Container weight	Approx. 13.7 t

Table 4: PCS weight

BESS 1	
Serial No.	FRQ-53406000001
Manufacturer	FREQCON GmbH
Container weight (without batteries)	Approx. 15 t
Container weight (with batteries)	Approx. 35 t

Table 5: BESS 1 weight

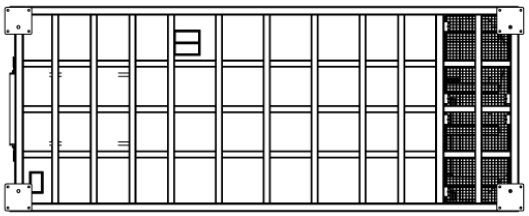
BESS 2	
Serial No.	FRQ-53412000001
Manufacturer	FREQCON GmbH
Container weight (without batteries)	Approx. 15 t
Container weight (with batteries)	Approx. 35 t

Table 6: BESS 2 weight

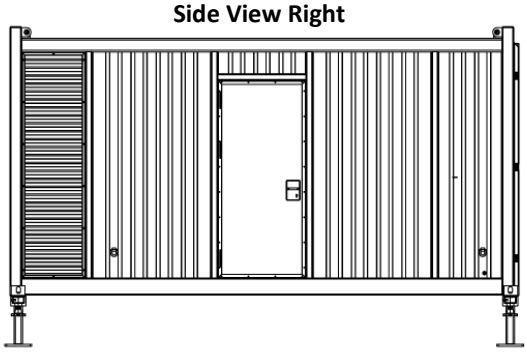
3 Container Dimensions

PCS

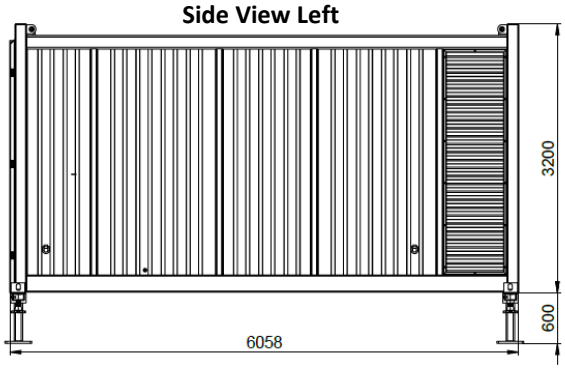
Botton View



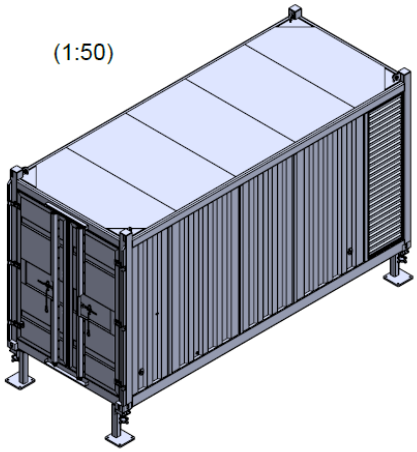
Side View Right



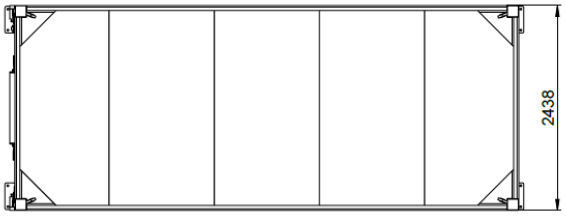
Side View Left



(1:50)

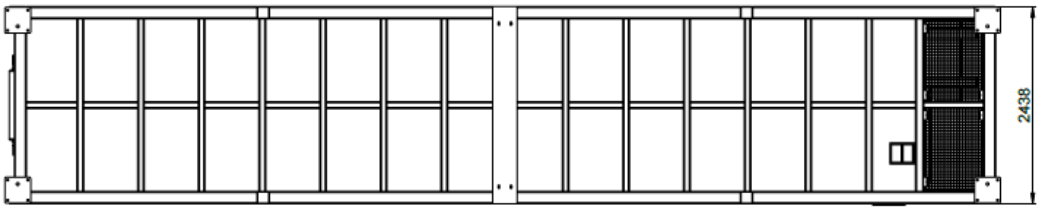


Top View

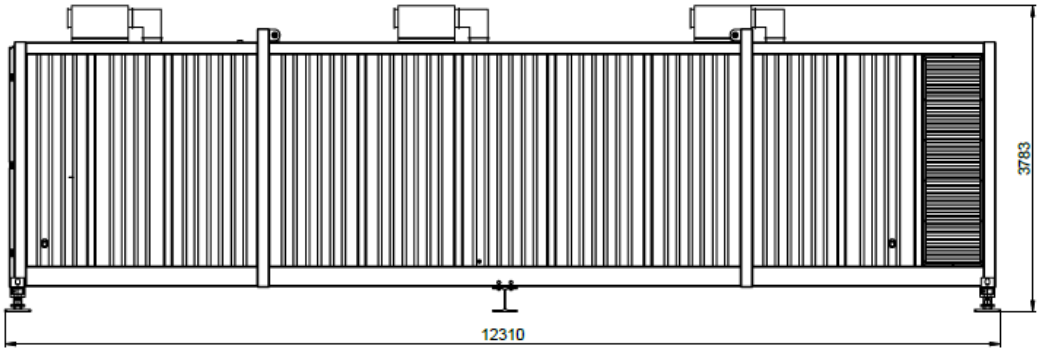


BESS 1

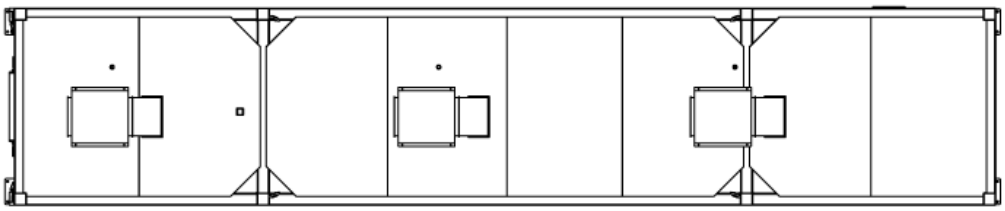
Botton View



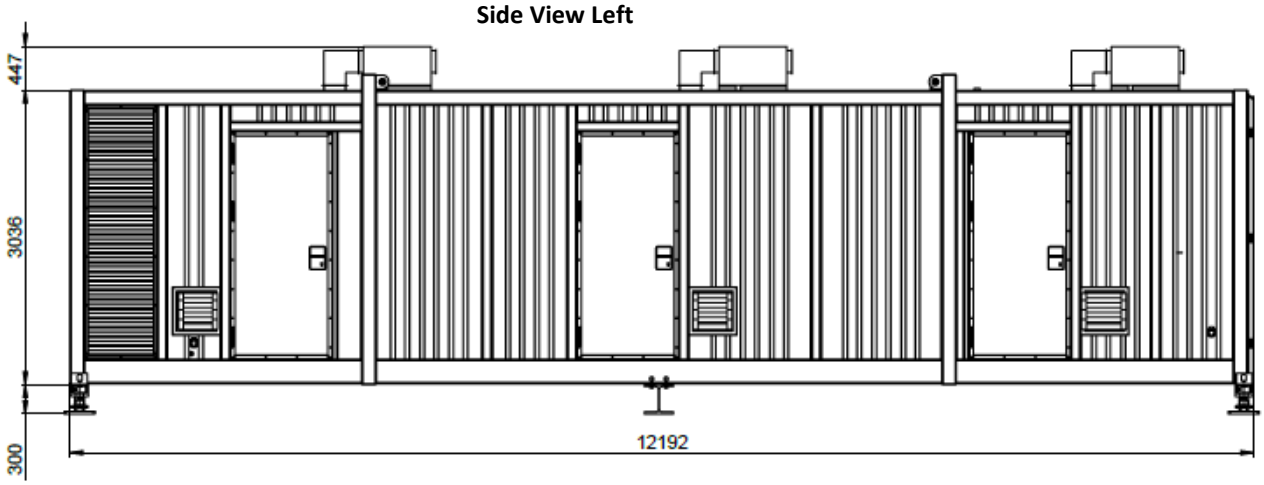
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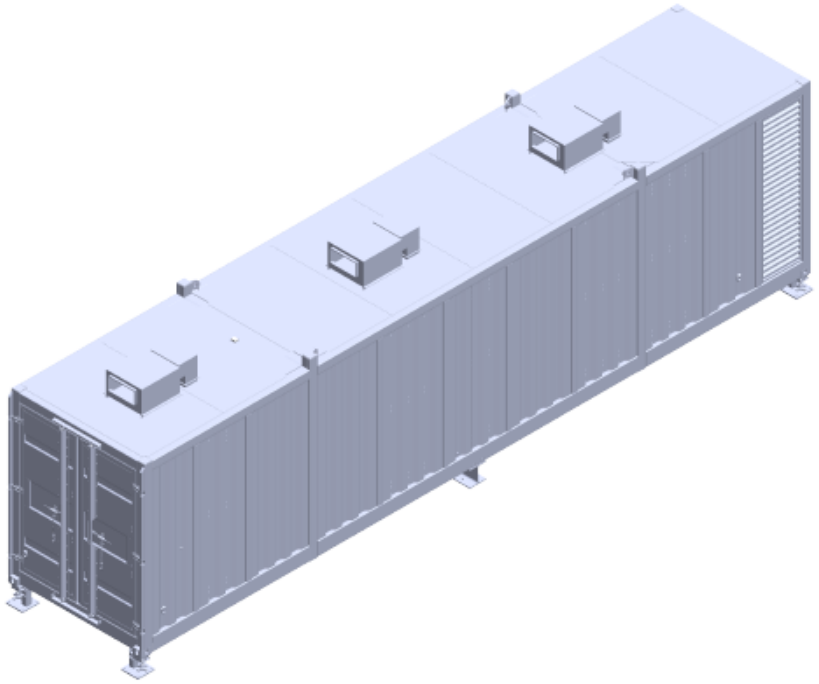


Top View



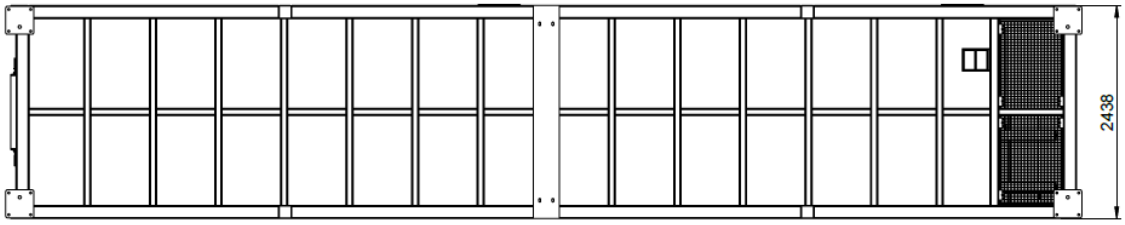
Side View Left



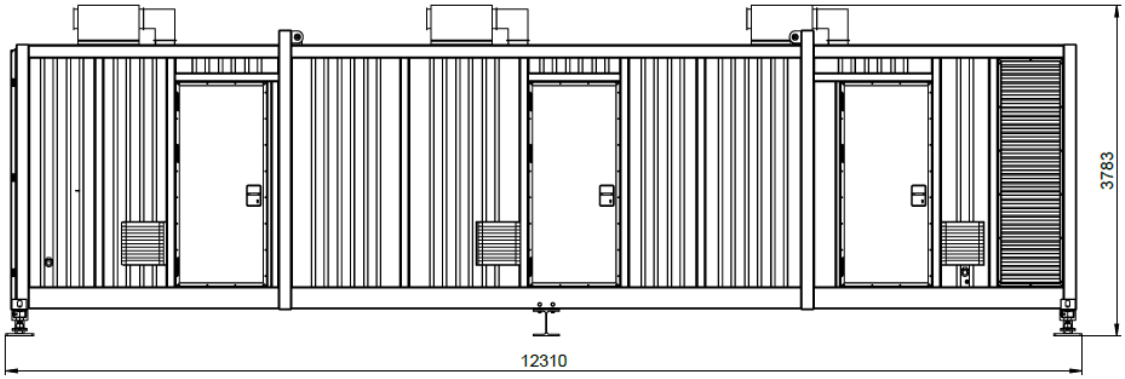


BESS 2

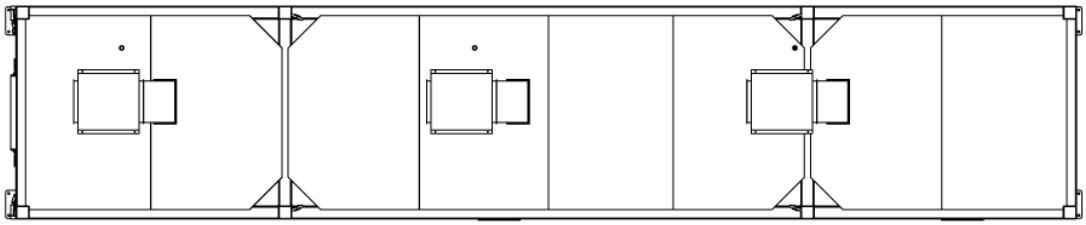
Botton View

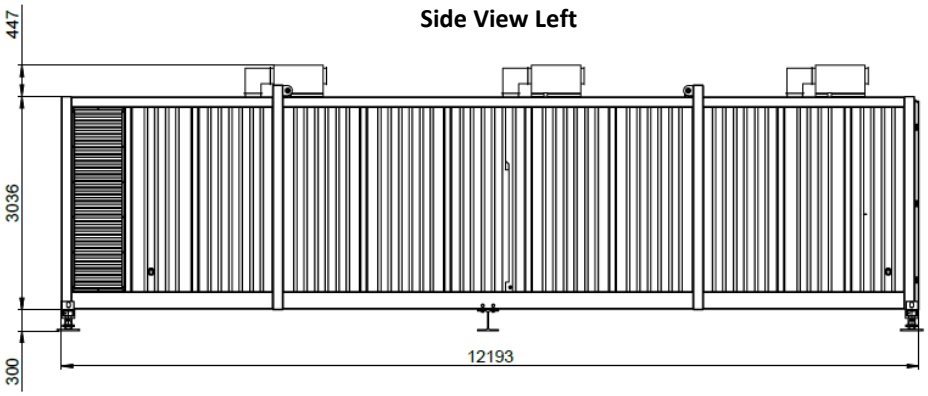


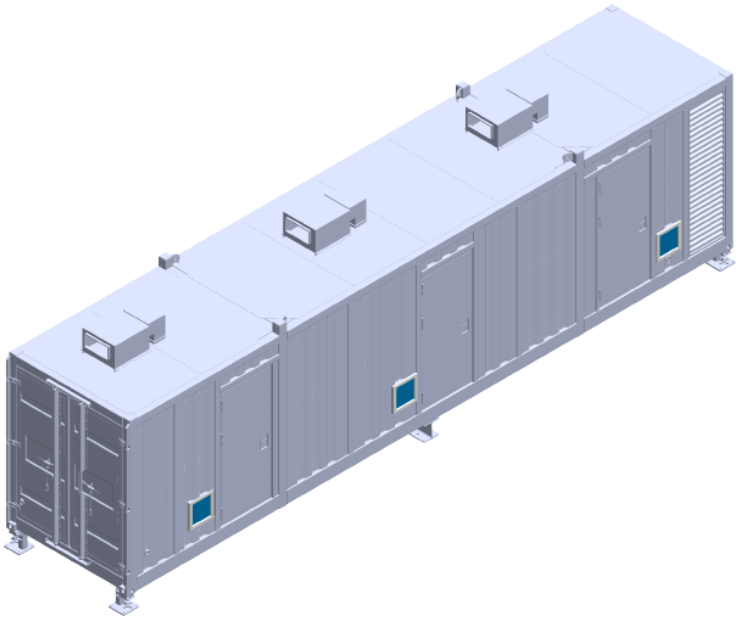
Side View Right



Top View




Side View Left
447
3036
300
12193



4 Environmental Conditions

	Stationary Operation	Storage packaging with protected layers	Transportation packaging with protected layers
Relative Humidity	Max. 95% No condensation; Relative Humidity <60% under corrosive atmosphere	Max. 95%	Max. 95%
Pollution level IEC60721-3-3 IEC60721-3-2 IEC60721-3-1	No conductive dust		
	3S2 coated PCB: Chemical Air: 3C2 Solid Particulate: 3S2	1S3 coated PCB: Chemical Air: 1C2 Solid Particulate: 1S3	2S2 coated PCB: Chemical Air: 2C2 Solid Particulate: 2S2
Atmospheric pressure	70 … 106 kPa	70 … 106 kPa	70 … 106 kPa
Vibration amplitude	Max 1 mm (5 … 13.2 Hz)	Max 1 mm (5 … 13.2 Hz)	Max. 3.5 mm (5 … 13.2 Hz)
IEC60068-2	Max. 7 m/s^2 (13.2 … 100 Hz) sinusoidal	Max. 7m/s^2 (13.2 … 100 Hz) sinusoidal	Max. 15 m/s^2 (9 … 200 Hz) sinusoidal
Impact IEC60068-2-29	Impermissible	Max. 100 m/s^2, 11 ms	Max. 100 m/s2, 11 ms
Free-fall	Impermissible	Impermissible	Impermissible

Table 7: Environmental conditions

5 Transport, Storage and Commissioning

Please observe the instructions for transport in section 5.2.

5.1 Unpacking

⚠ CAUTION

Hazard by sharp edges on packaging

Improper handling during unpacking can cause injuries.

➜ Use appropriate safety gloves to protect your hands from possible cuts.

The packaging of the system consists of cardboard, plastic and corrugated board. After usage the packaging must be disposed according to the local regulations for the disposal of paper products (e.g. recycling). After delivery, the delivered units and components must be checked for completeness and damage. If any damage on the delivered units and components have been found, contact the delivery service or FREQCON GmbH immediately.

5.2 Transport

NOTICE

Inadequate transportation of the device and all of its components may cause damage to the installed components.

- ➜ Vibrations and jolts must be avoided during transportation.
- ➜ The container must be transported in a horizontal position (lying down).
- ➜ Make sure to observe the specific national safety precautions for transport by truck, train or ship´.

NOTICE

Do not transport the containers with installed batteries

- ➜ Lifting or moving of BESS containers is not allowed if battery modules are inside the container
- ➜ Remove every battery module from the container before lifting or mowing the container

The containers must be transported to the installation site by instructed personnel.

Make sure that the components can be placed on a level surface.

For information regarding the dimensions and center of gravity of the containers, see section 5.2.2. The container weights are specified in section 2.

Vibrations and jolts must be avoided during transportation. If the system was damaged during transport, you must immediately inform the responsible transport company.

The containers must be transported in a horizontal position (lying down). It is not permitted to tip over the container during transportation or in any other scenario.



5.2.1 Container Lifting

⚠ DANGER	
	**Heavy load** **Improper lifting can result in death, serious injury or property damage.** Never lift the container above people. Use only lifting and personal protective equipment approved by OSHA or other national institutions.

NOTICE
Only use an appropriate crane to lift the container, capable to withstand the loads specified as follows: Weight of containers *see section 2*

NOTICE
Observe the container´s center of gravity during lifting: Observe the container´s center of gravity during lifting with crane, shown in section 5.2.2.

To lift the container with a crane, use the four transport lugs on the top corners of the container (*see following illustration*).

⚠ DANGER	
	**Heavy load** **Improper lifting can result in death, serious injury or property damage.** Never lift the container above people. Use only lifting and personal protective equipment approved by OSHA or other national institutions.

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To lift the containers with a crane, use the four transport lugs on the top corners of the container (*see following illustration*).

PCS

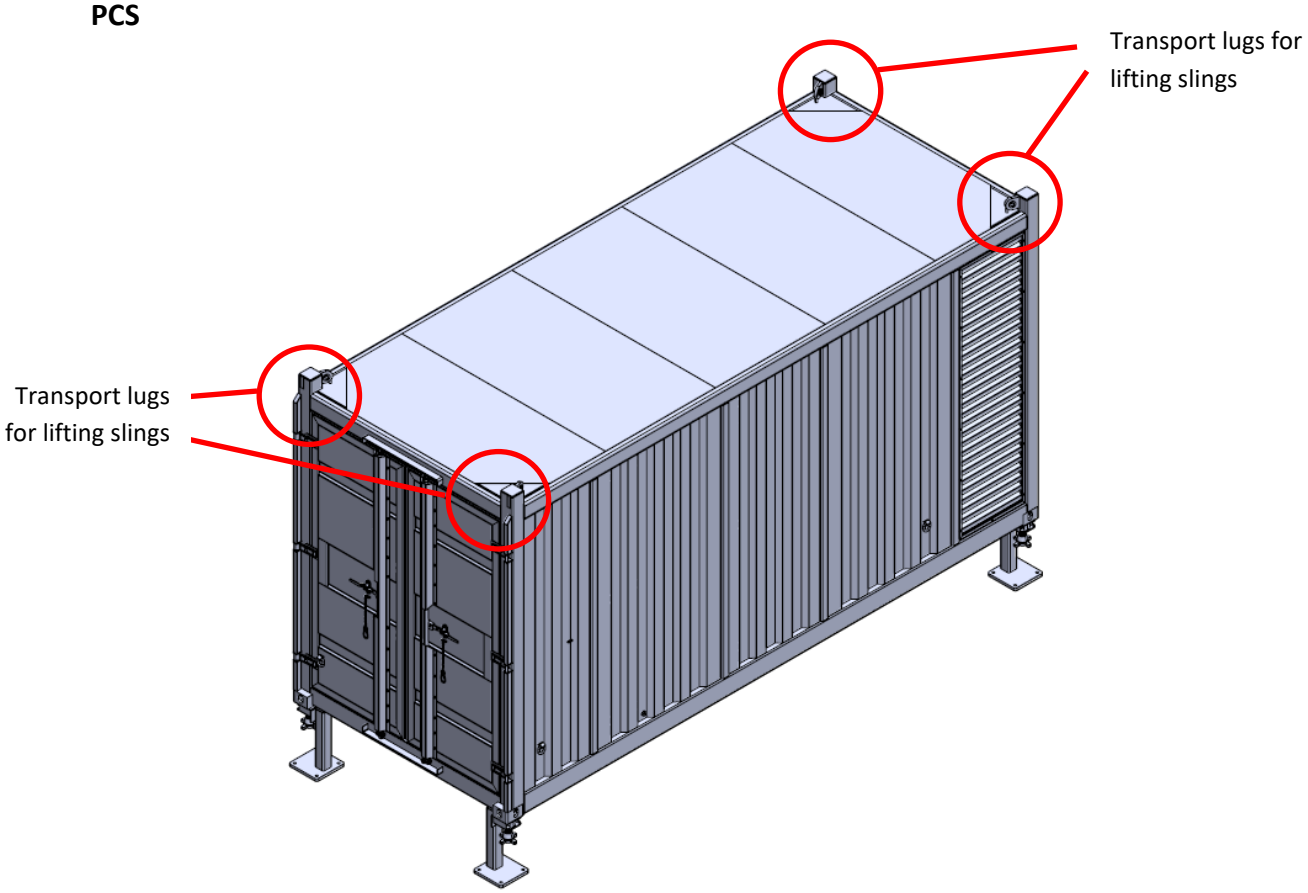


Figure 1: PCS container transport lugs

BESS 1

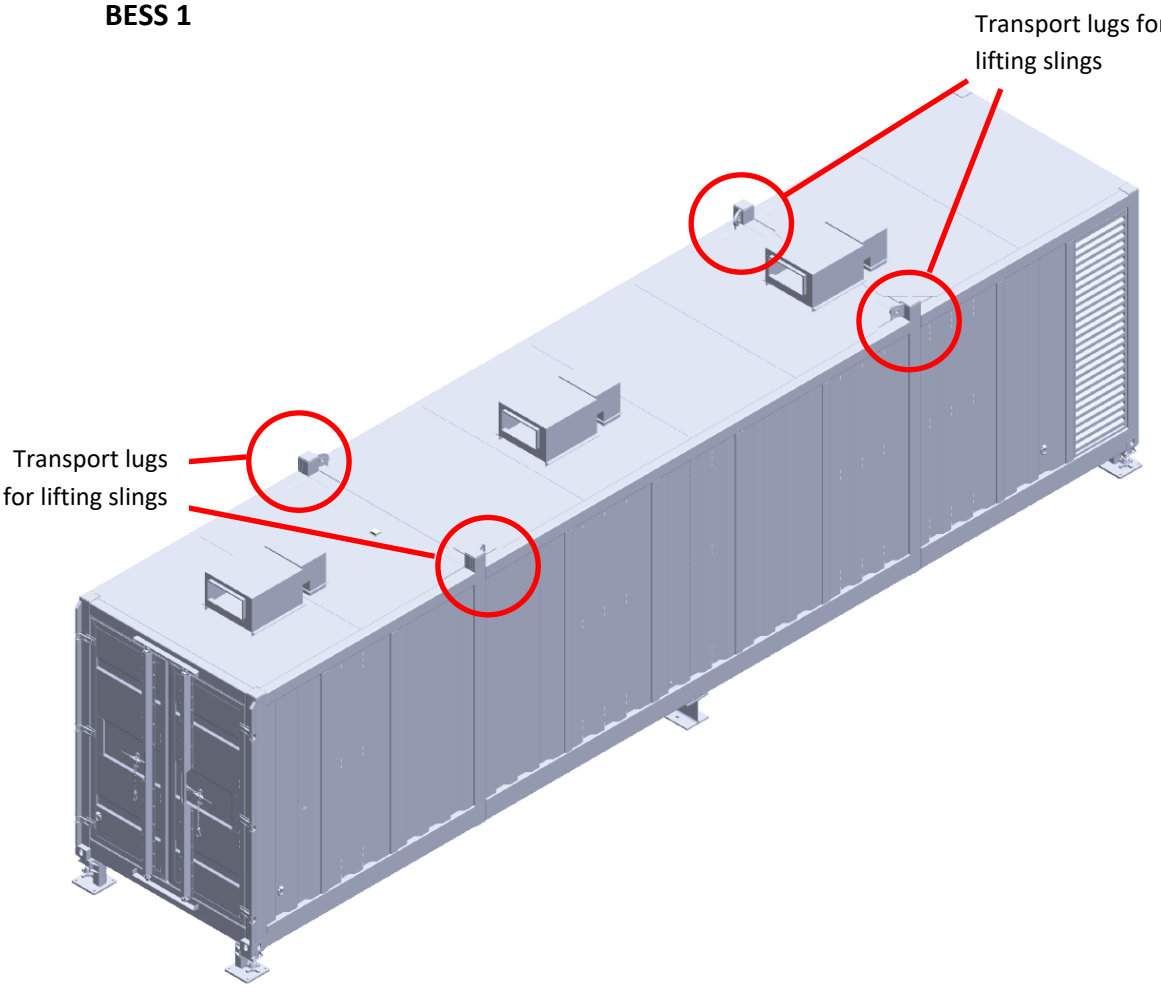


Figure 2: BESS 1 container transport lugs

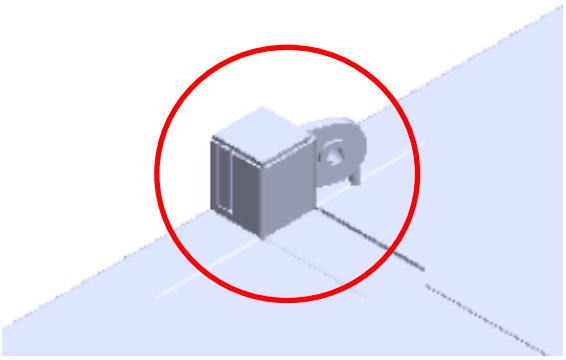


Figure 3: Transport lug

BESS 2

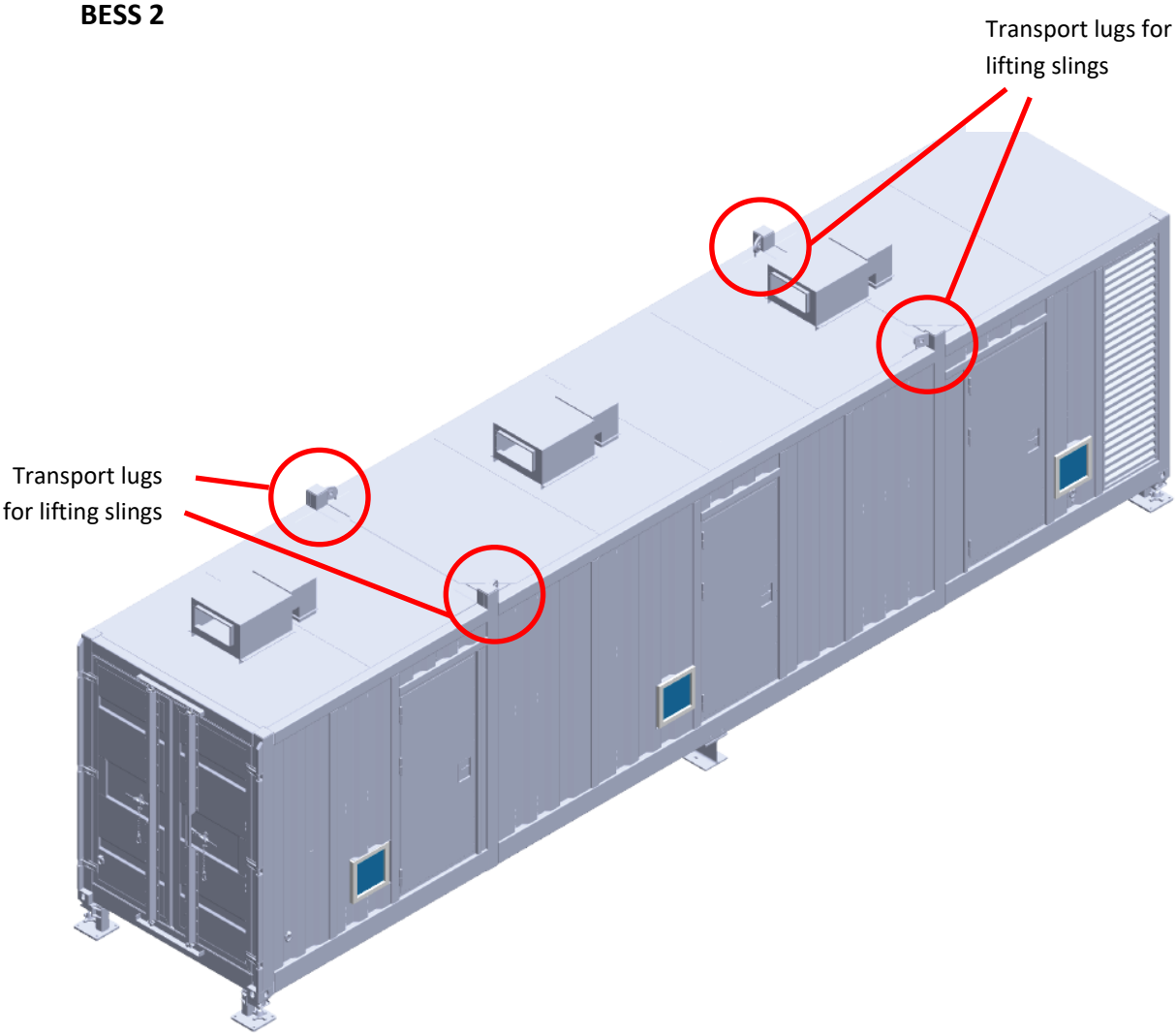


Figure 4: BESS 2 container transport lugs

5.2.2 Sling Angles and Centre of Gravity

PCS

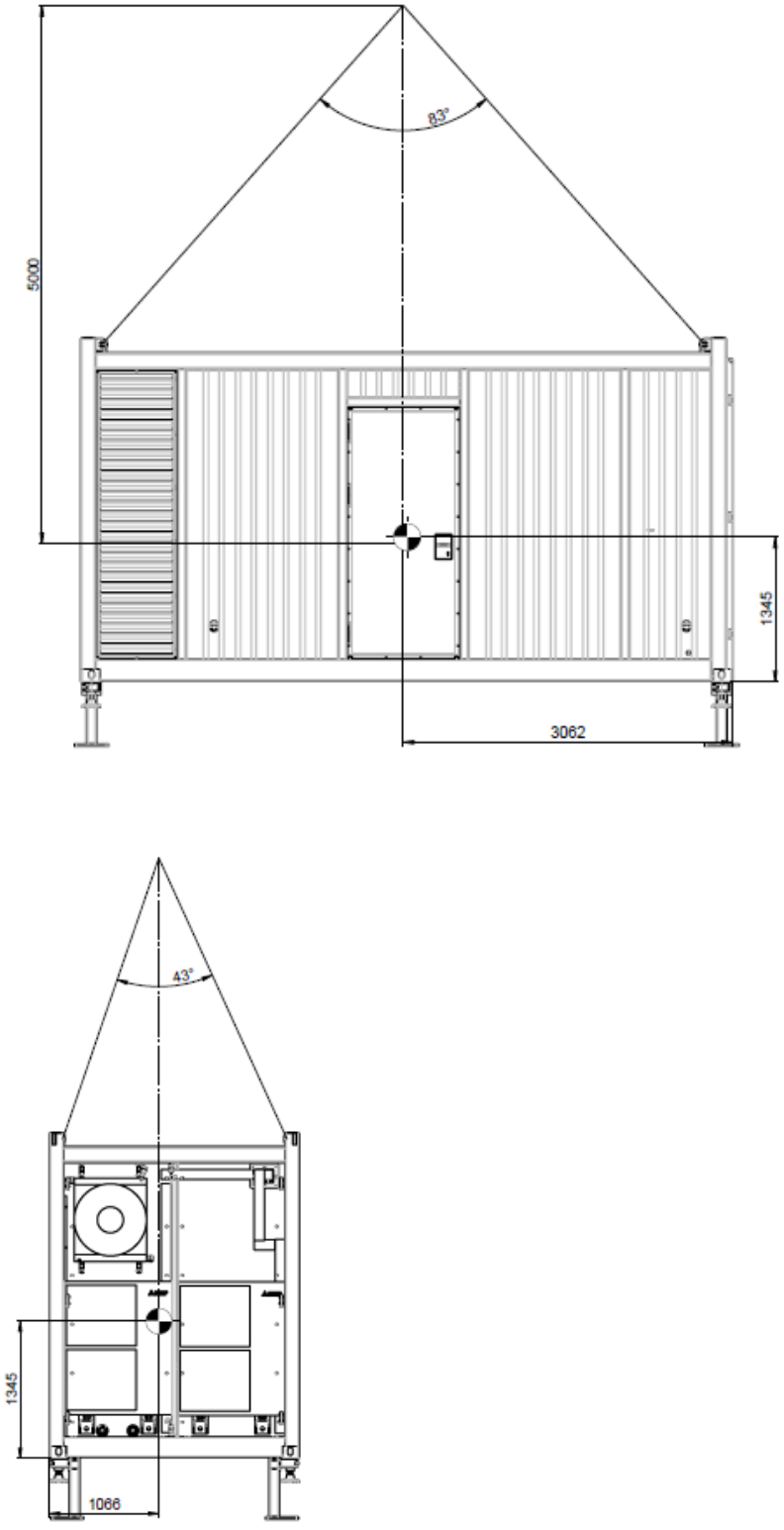
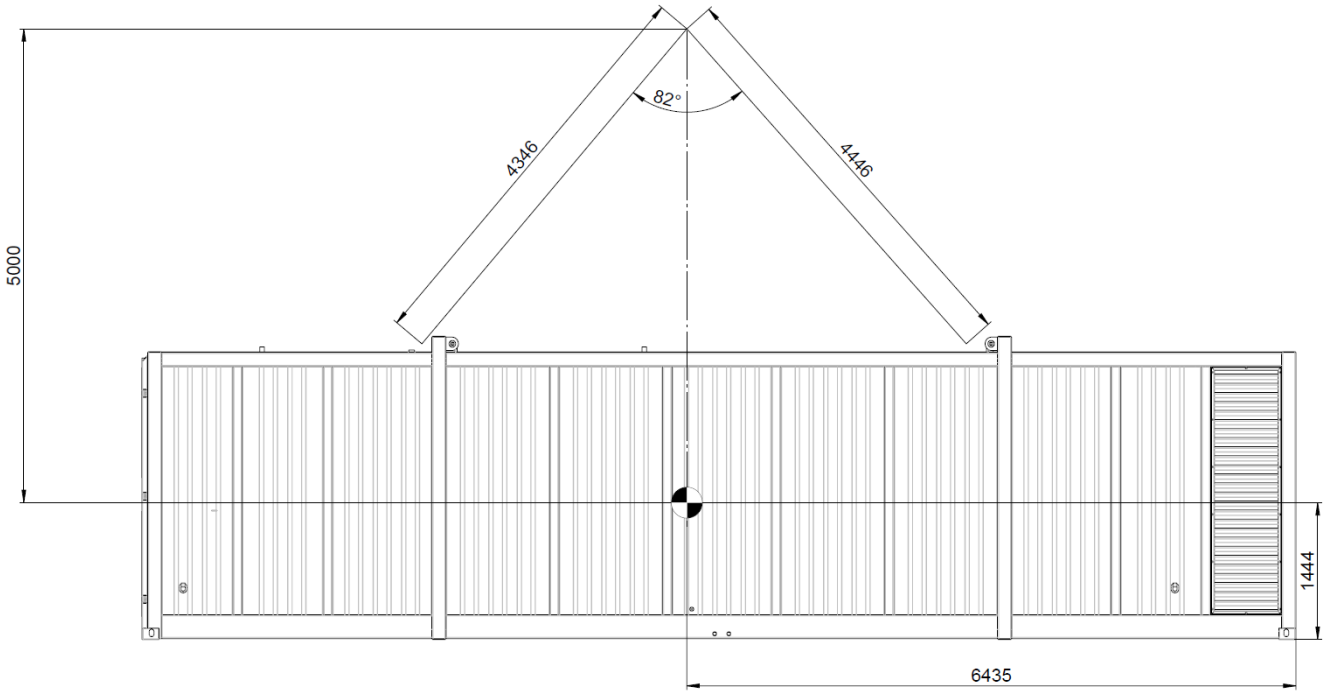


Figure 5: PCS - Sling angles and CoG

BESS 1



NOTE:
Empty container, no batteries installed

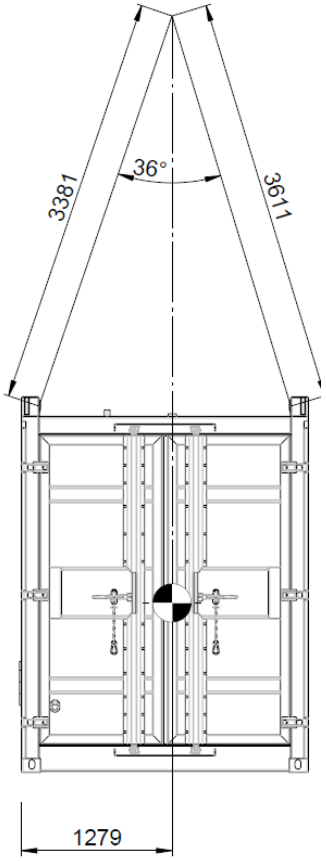
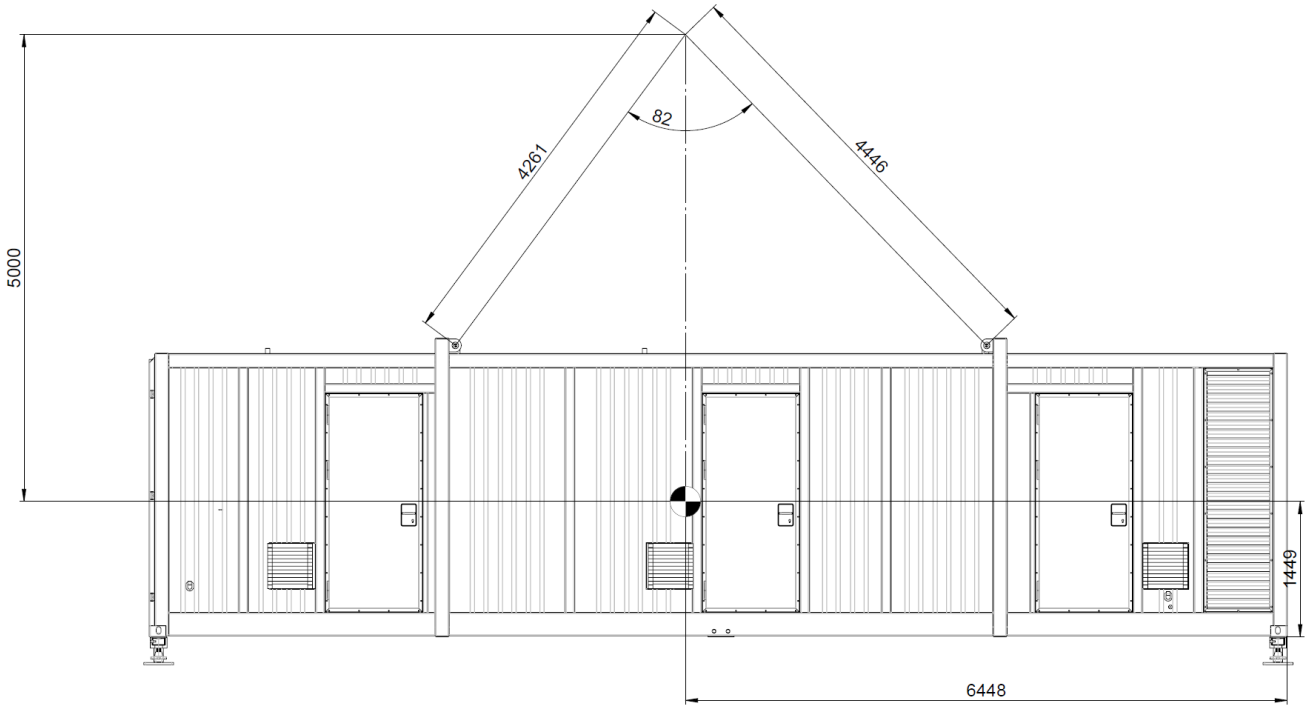


Figure 6: BESS 1 - Sling angles and CoG

BESS 2



NOTE:
Empty container, no batteries installed

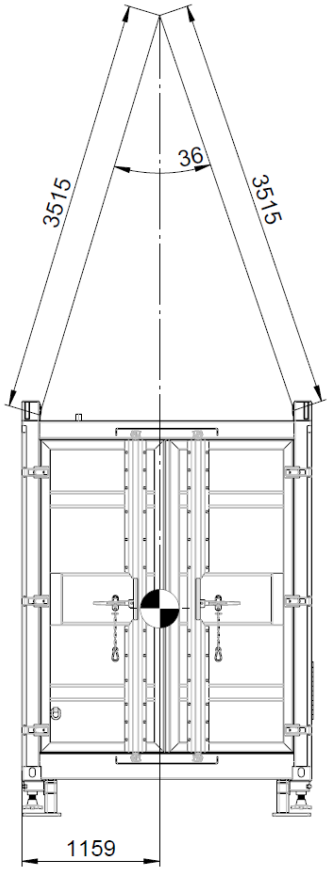


Figure 7: BESS 2 - Dimensions, sling angles and CoG

6 Installation

6.1 Required Tools

Installation personnel must at least have the following tools in reach before starting the installation:

Pos.	Installation Tools	Amount
	Basic Tools	
1.	Flash light	1
2.	Pliers set	1
3.	Ratchet set	1
4.	Torque wrench (1 - 100 Nm)	1
5.	Socket wrench set (with sockets 7 – 19 mm)	1
6.	Wrench set	1
7.	Cross-section screw drivers set	1
8.	Flat-section screw drivers set	1
9.	Allen key / Hex socket key set	1
10.	Cutter	1
11.	First-aid kit	1

Table 8: Installation tools

⚠ DANGER	
	**Electric shock due to low voltage and arcing on loose wires.** Severe irreparable damage to the nervous system, burns and death. ➜ Access to control cabinets and string cabinets only by FREQCON service personnel or by FREQCON instructed and authorized maintenance personnel. ➜ Plant control units may also be opened by instructed persons with the qualification of a qualified electrician. ➜ Work on electrical and electronic components as well as cables of the battery system may only be carried out by FREQCON service personnel or by FREQCON instructed and authorized maintenance personnel.

⚠ DANGER
Make sure that the energy source is locked and tagged and ensure that the isolation is effective before conducting work on the system. After switching-off the voltage supply, some components might still carry a charge. Check all poles using a suitable device.

⚠ WARNING
The electrical connection must be carried out in accordance with the local regulations of the utility company and /or VDE (in Germany).

Do not operate!	Lock and tag power switches and controller devices
	Observe national laws regarding Occupational Safety and Health, as well as Industrial Standards. ➢ DIN VDE 0105-100; VDE 0105-100:2009-10 Operation of electrical installations - General requirements.

6.2 Installation location

⚠ GEFAHR	
	**Danger from and for unauthorized persons** Unauthorized persons are not aware of the dangers in the work area and may endanger themselves and third parties danger. ➜ Keep unauthorized persons away from the work area. ➜ If in doubt, speak to persons and direct them away from the work area. ➜ Interrupt the work as long as unauthorized persons are in the work area. ➜ Always keep the entrance door(s) locked when not performing work on the system to prevent unauthorized persons from entering the container.

⚠ CAUTION	
	**Danger to life due to unsuitable lifting material** While lifting the container and/or battery modules use only suitable lifting equipment and lifting tackle ➜ Make sure that all the material and equipment is designed for the weight and all required inspections have been done. ➜ Make sure that no person is under the container or battery module during lifting.

NOTICE
Equipment damage due to intruding animals Prevent animals from entering the interior of the container from below through the cable glands or recesses. ➜ Secure the container from the outside with suitable protection against the entry of animals.

The PCS & BESS Containers are designed for outdoor installation, on a flat and ground level surface. Make sure that the environmental conditions meet the values of section 4 “Environmental Conditions”.

The entrances to the containers must be accessible from every side to allow for visual inspections or maintenance and repair work, if necessary.

Air inlets and outlets of the container, as well as on the cabinets inside the container, must always be kept free and cleaned of dirt in order to ensure the required air flow of the installed fans.

6.3 General Arrangement

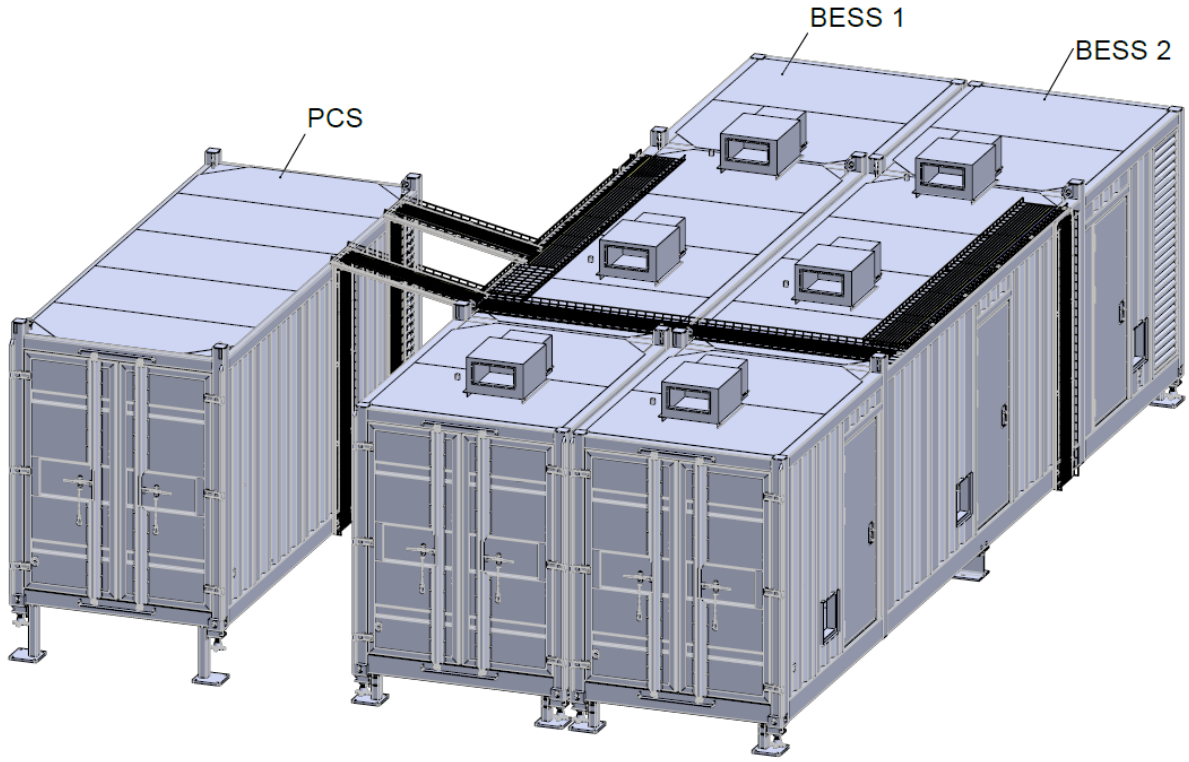
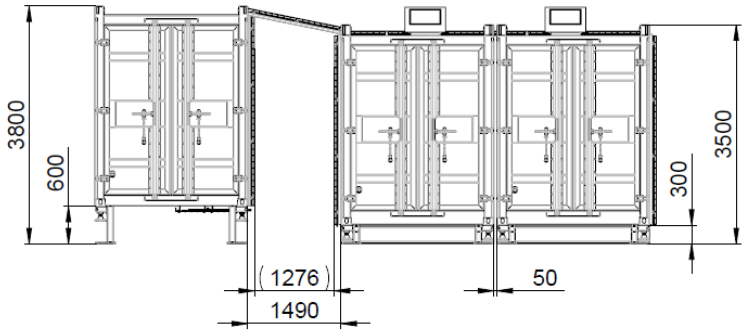
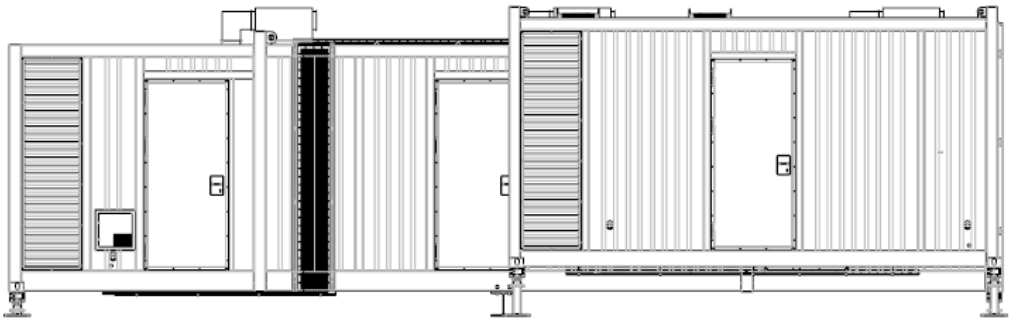


Figure 8: General arrangement

Front view



Side view



Top view

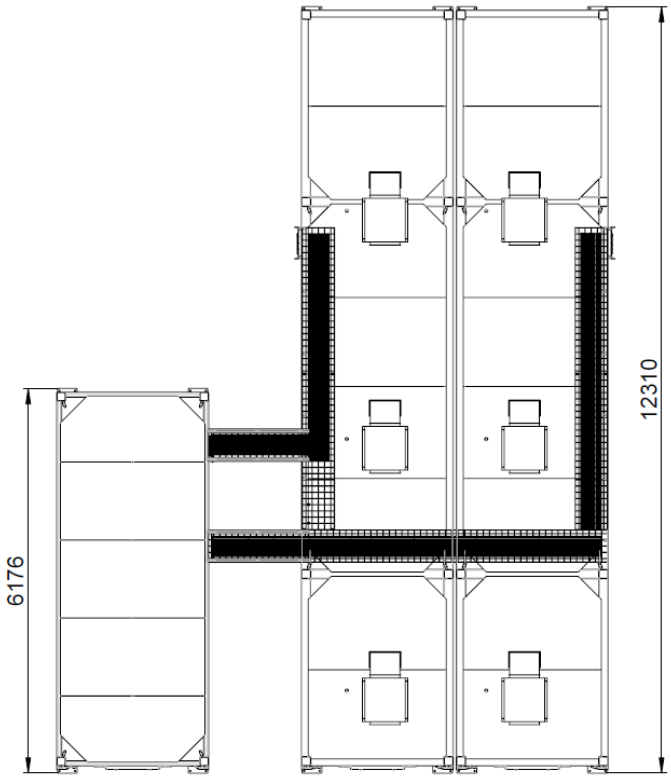


Figure 9: General arrangement with dimensions

6.4 Distances between Containers

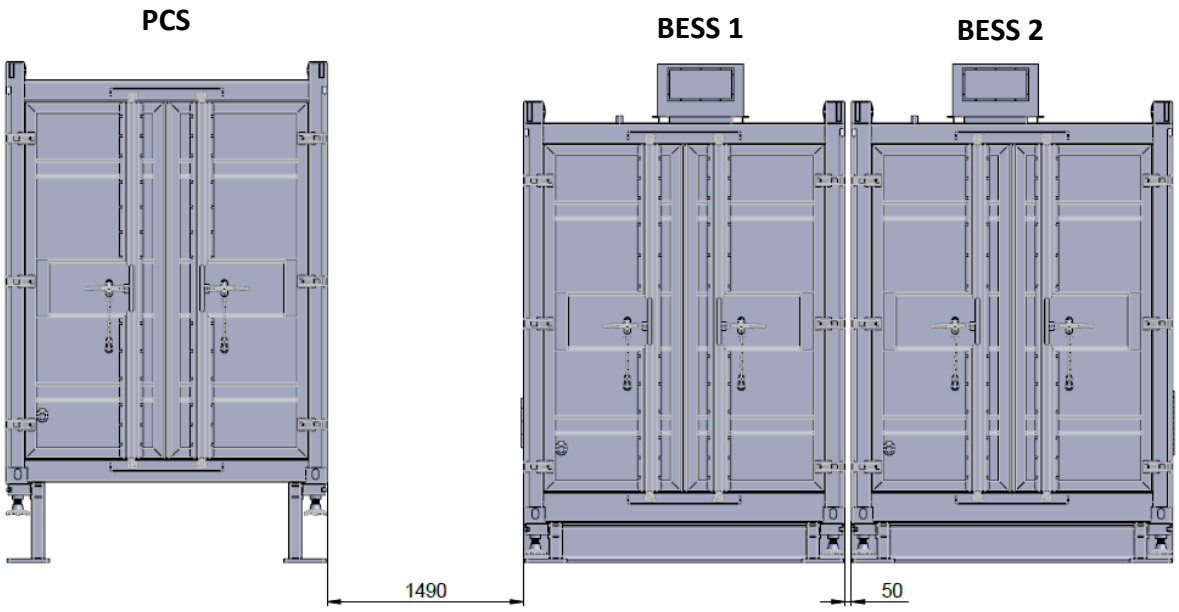
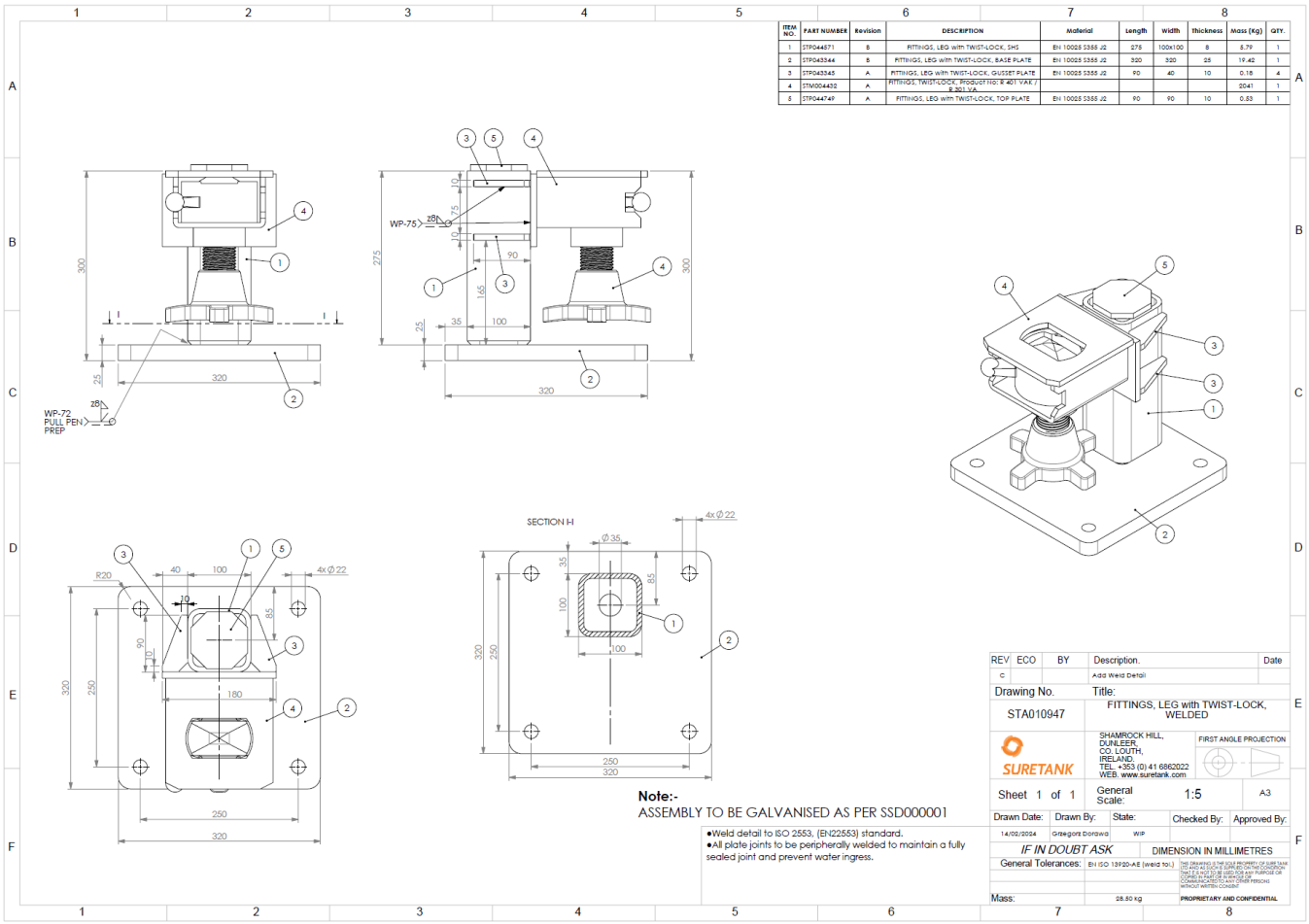


Figure 10: Distances between containers

6.5 Container Feet and T-Beams

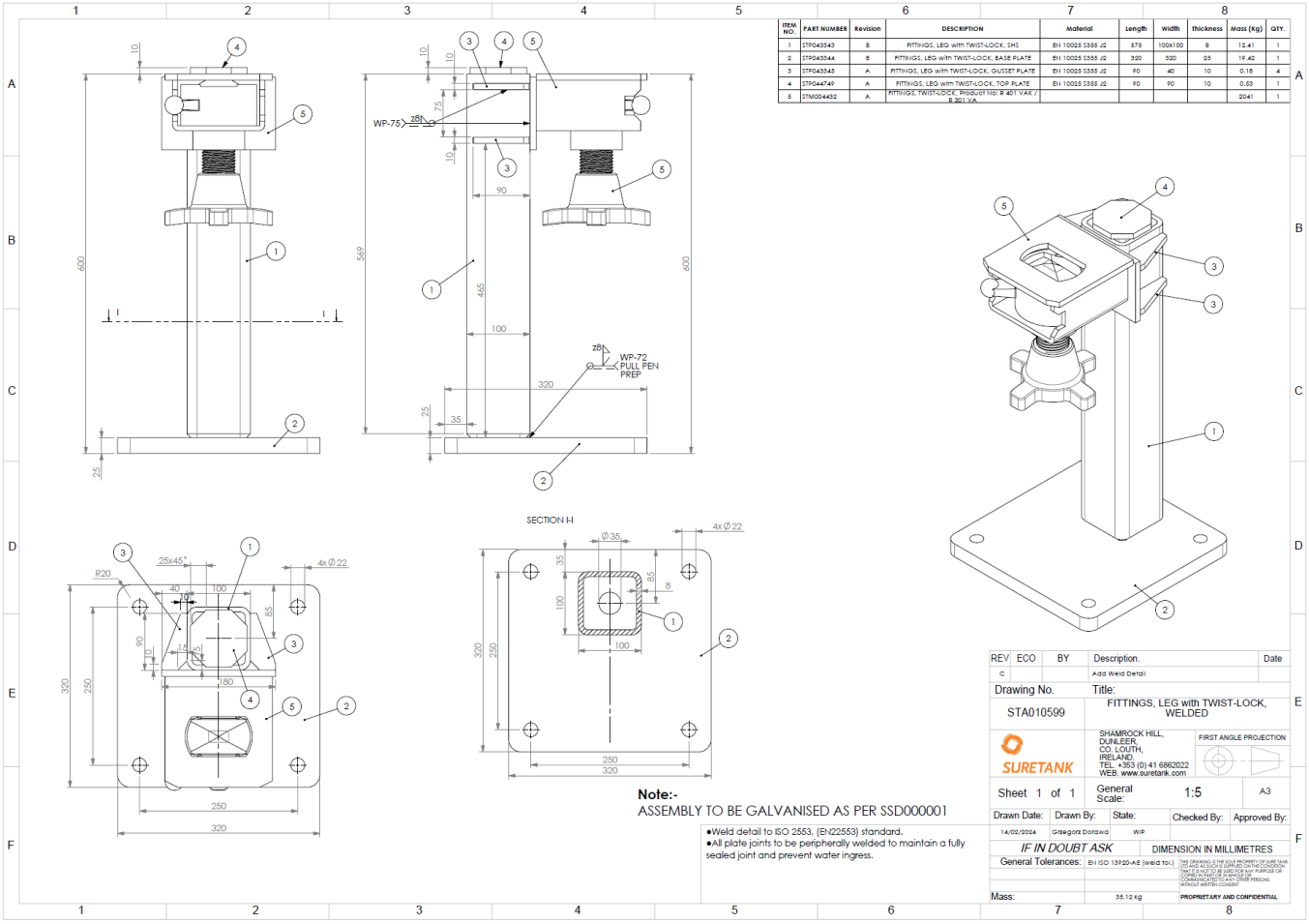
6.5.1 PCS Container Feet

4 container feet must be installed to the bottom corners of the 20FT PCS containers, before placing the container to the final installation location (*see drawing below and 1.3 "Other Applicable Documents"*.



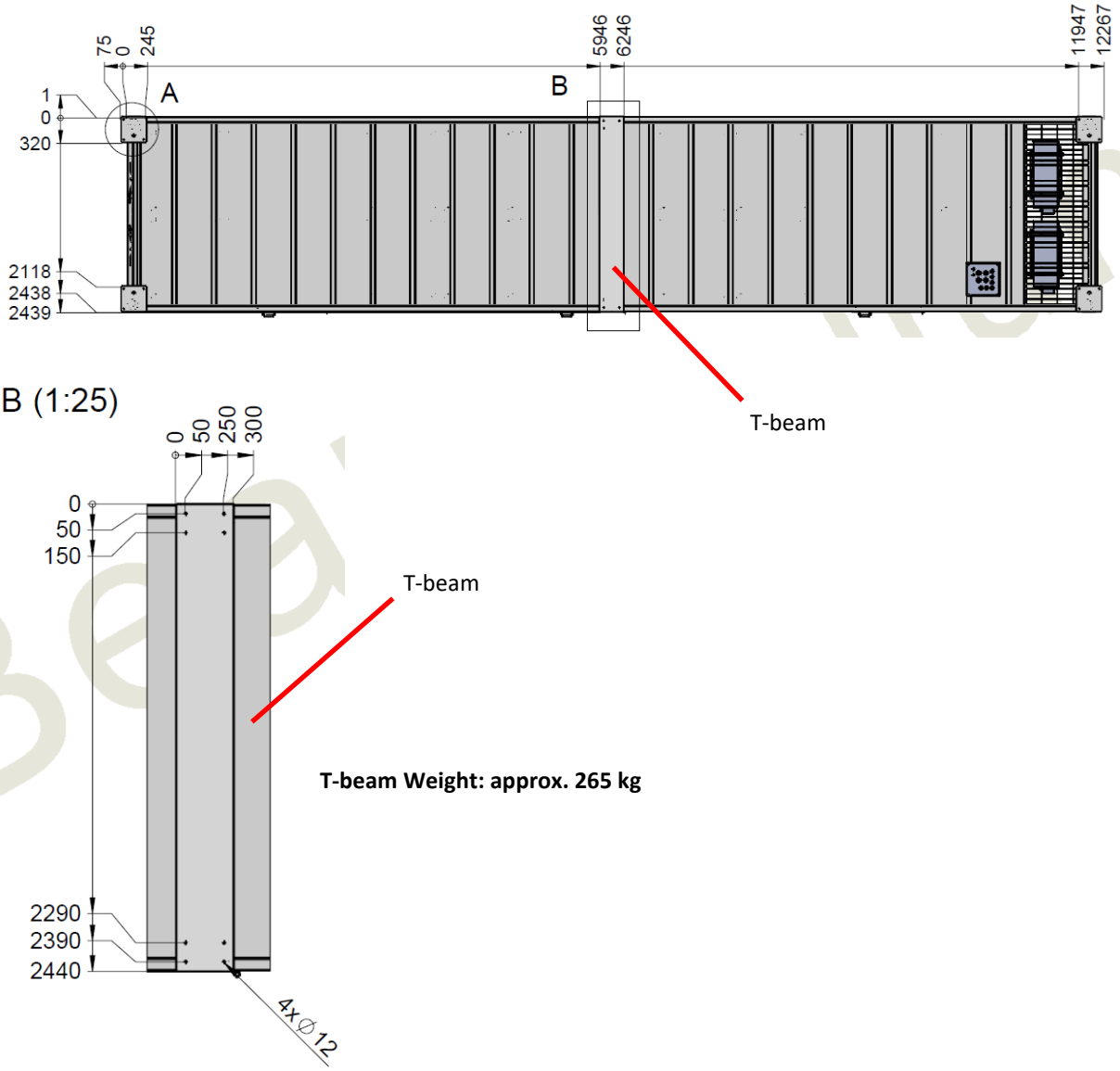
Weight: approx. 28.5 kg

6.5.2 BESS Container Feet



Weight: approx. 35 kg

6.5.3 BESS T-Beams



T-beam Weight: approx. 265 kg

6.6 Mechanical Installation of Containers

6.6.1 PCS

Task 1 **Lift PCS container and place on pedestal.**

Step 1 : Lift the container (*see section 5.2.1*).

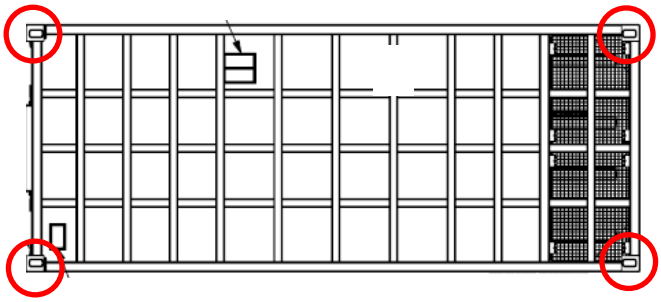
Step 2 : Place the container to several stools suitable to withstand the container load indicated in section 2. Please refer to Figure 13: Suggested stool positions for information on the stool positions.

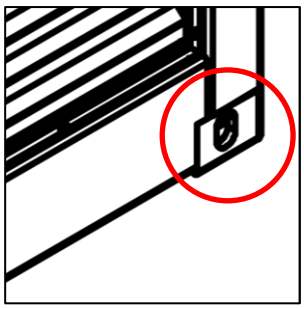
Task 2 **Install the 4 container feet to PCS container.**

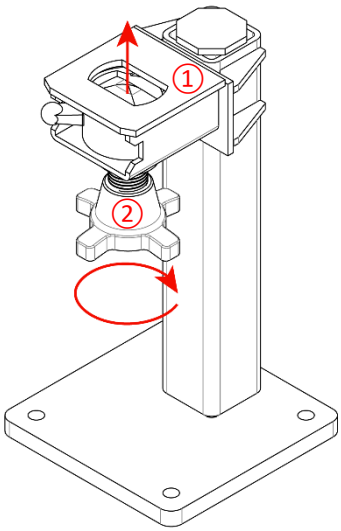
Attach first of the 4 container feet (*see section 6.5.1*).to one of the 4 bottom corner of the container.

Step 1 : Place the top plate (①) from the bottom to the corner of the container.

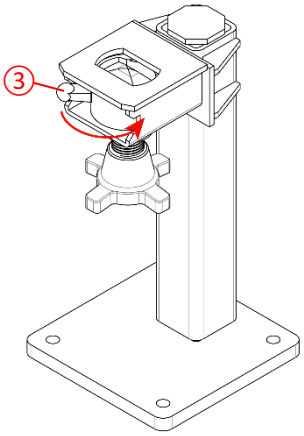
Step 2 : Screw the twist lock head mechanism of the foot (②) by twisting it as indicated in the illustration below. Screw until it has completely penetrated the bottom recess of the foot.

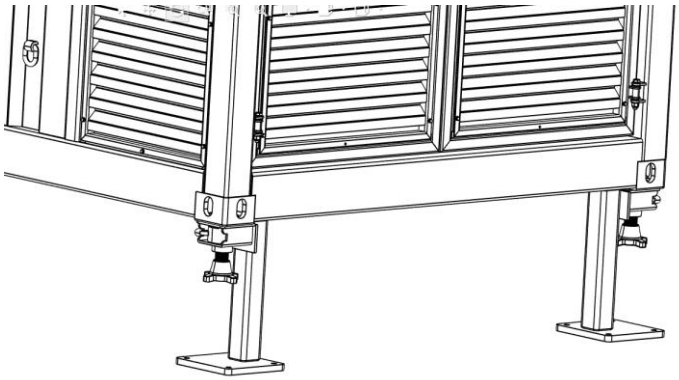






Step 3 : Secure the feet by twisting the twist lock locking mechanism (③) to the position like indicated in the illustration below.





Step 4 : Repeat the steps for the other 3 container feet.

✓ **The container feet have been successfully installed to the PCS container.**

Task 3 **Install cable trays on container bottom**

Step 1 : While the container is still lifted on the stools, drill the bore holes for cable tray installation according to the attached drawing " Mounting cable tray".

Step 2 : Insert blind rivet nuts to the prepared bore holes according to the drawing " Mounting cable Tray".

Step 3 : Fix the cable trays (① - ④) according to drawing " Mounting cable Tray".

Step 4 : Apply a torque to the connections according to drawing " Mounting cable Tray"

Cable trays:

GKX 520x60x2507

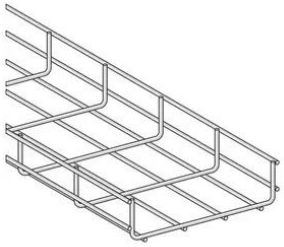


Figure 11: Cable tray V2A_ Gitterrinne GKX

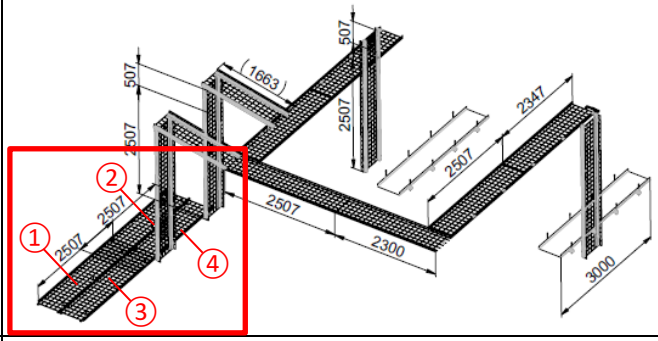


Figure 12: Cable trays for PCS container installation

Specification per cable tray:

Original part no.	Cable tray V2A_ Gitterrinne GKX 520x60x2507
Type	GKX 520x60x2507
Length	2507 mm
Width	520 mm
Height	60 mm

Task 4 **Lift container to installation location and fix to installation location.**

Step 1 : Lift the container (*see section 5.2.1*) and place it to the desired installation location.

Step 2 : Fix the 4 feet to the ground using suitable connection material (welding or bolting).

✓ **The PCS container has been successfully fixed to the installation location.**

6.6.2 BESS 1

Task 1 **Lift BESS container and place on pedestal.**

Step 1 : Lift the container (*see section 5.2.1*).

Step 2 : Place the container to stools suitable to withstand the container load indicated in section 2.

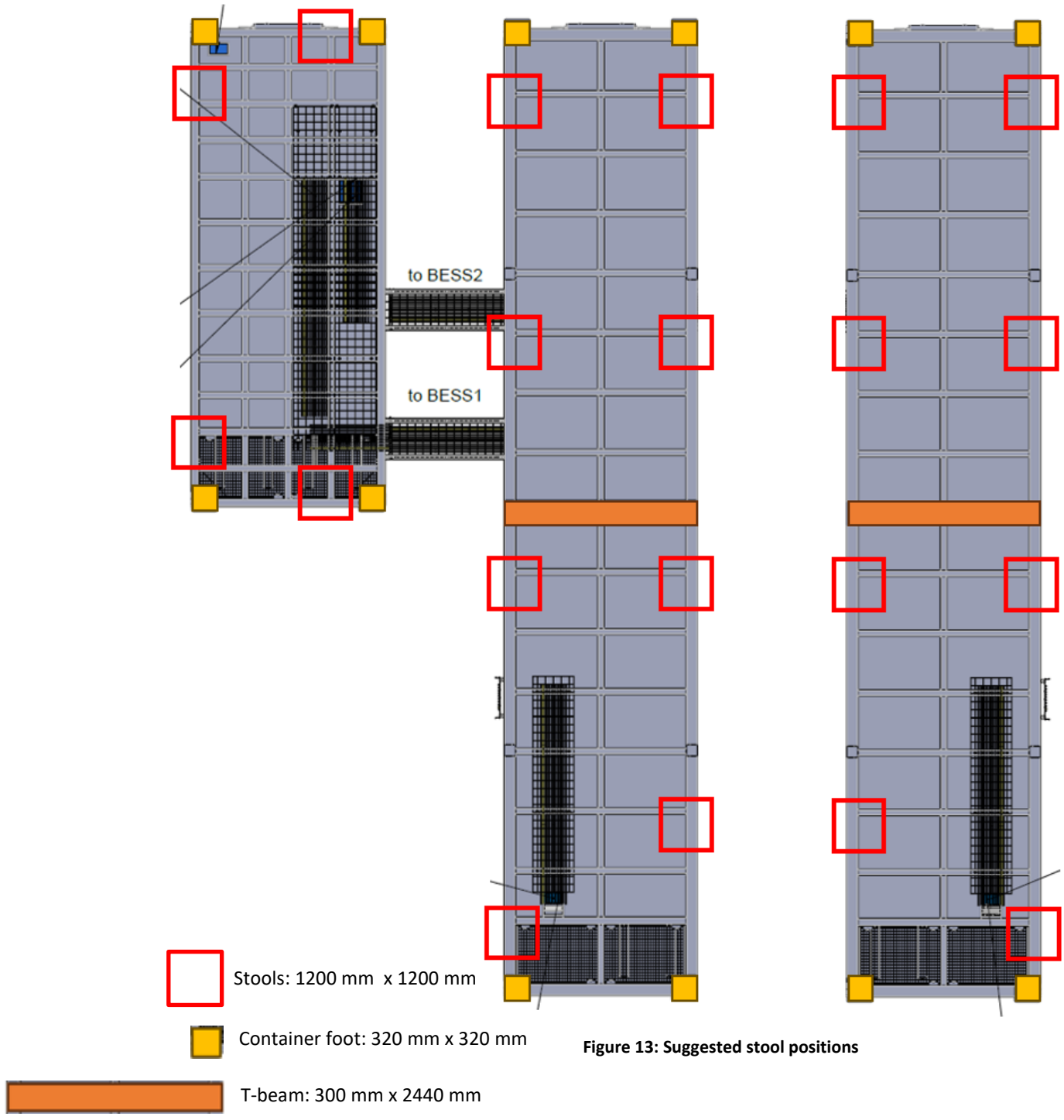


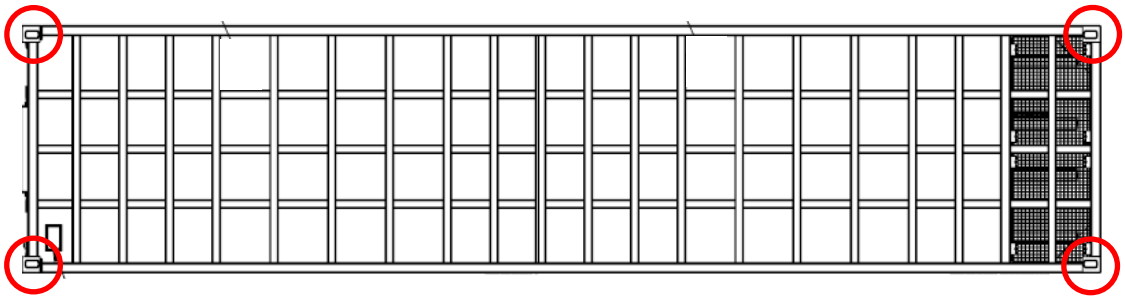
Figure 13: Suggested stool positions

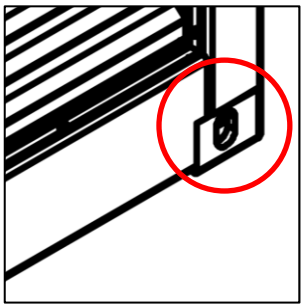
Task 2 **Install the 4 container feet to BESS container.**

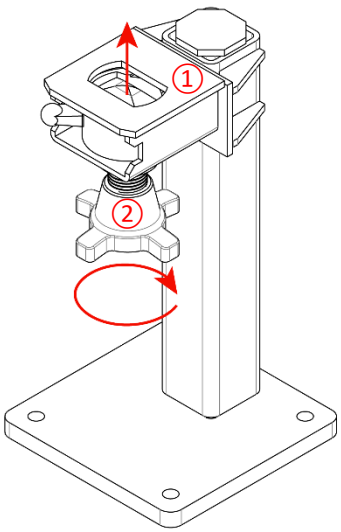
Attach container foot (*see section 6.5.1*) to one of the 4 bottom corner of the container.

Step 1 : Place the top plate (①) from the bottom to the corner of the container.

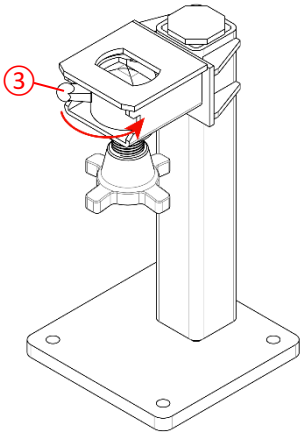
Step 2 : Screw the twist lock head mechanism of the foot (②) by twisting it as indicated in the illustration below. Screw until it has completely penetrated the bottom recess of the foot.

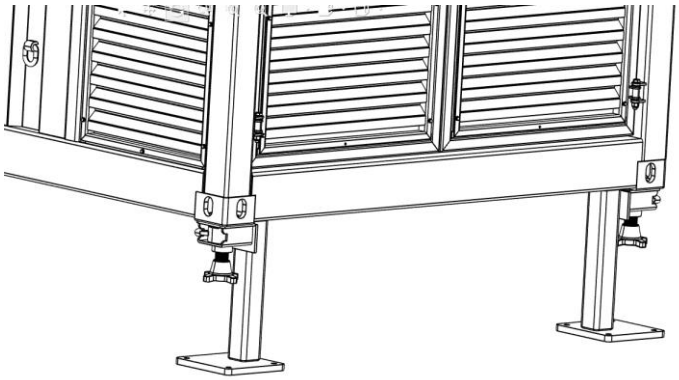






Step 3 : Secure the foot by twisting the twist lock locking mechanism (③) to the position like indicated in the illustration below.





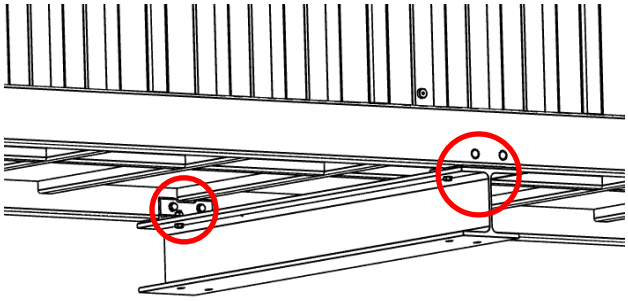
Step 4 : Repeat all the steps of task 2 for the 3 remaining container feet.

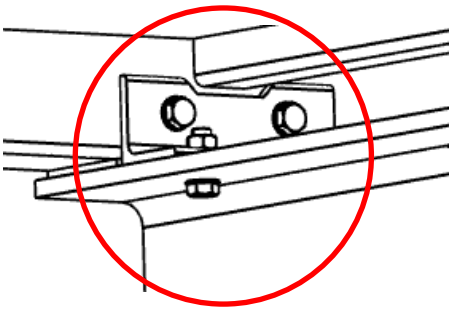
✓ **The container feet have been successfully installed to the BESS container.**

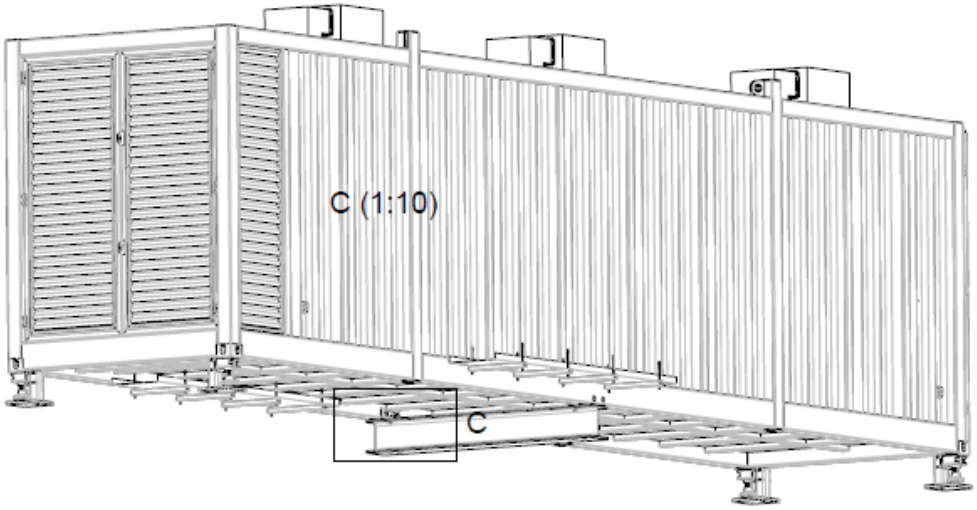
Task 3 **Install the t-beam to BESS container.**

Step 1 : While the container is still lifted on the stools, lift the provided t-beam (④) using a suitable lifting device under the container.
Beam weight approx. 260 kg.
Refer to below drawing for exact positioning of the beam.

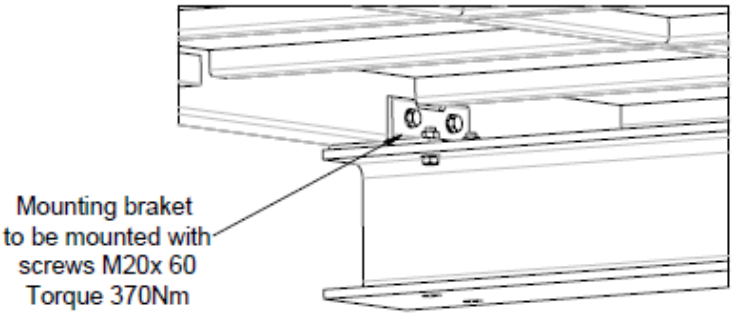
Step 2 : Fix the t-beam to the container using the bore holes underneath the container and provided mounting brackets, nuts and bolts. Apply a torque of 370 Nm to the connections.

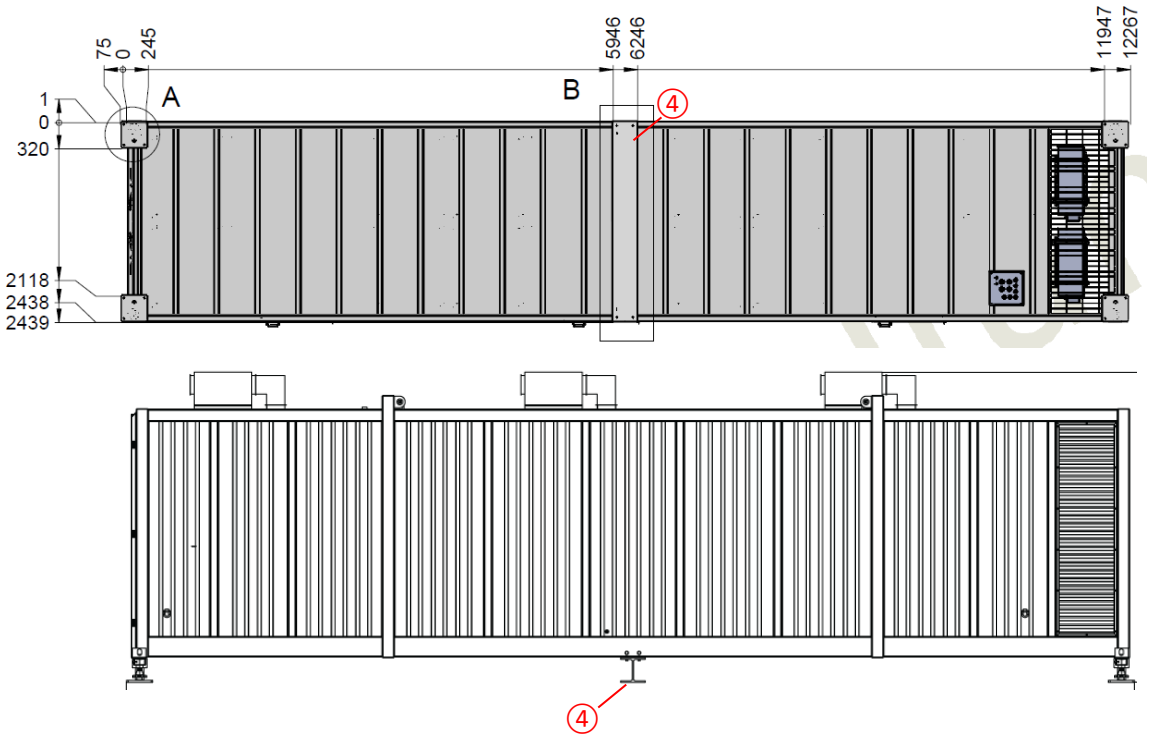


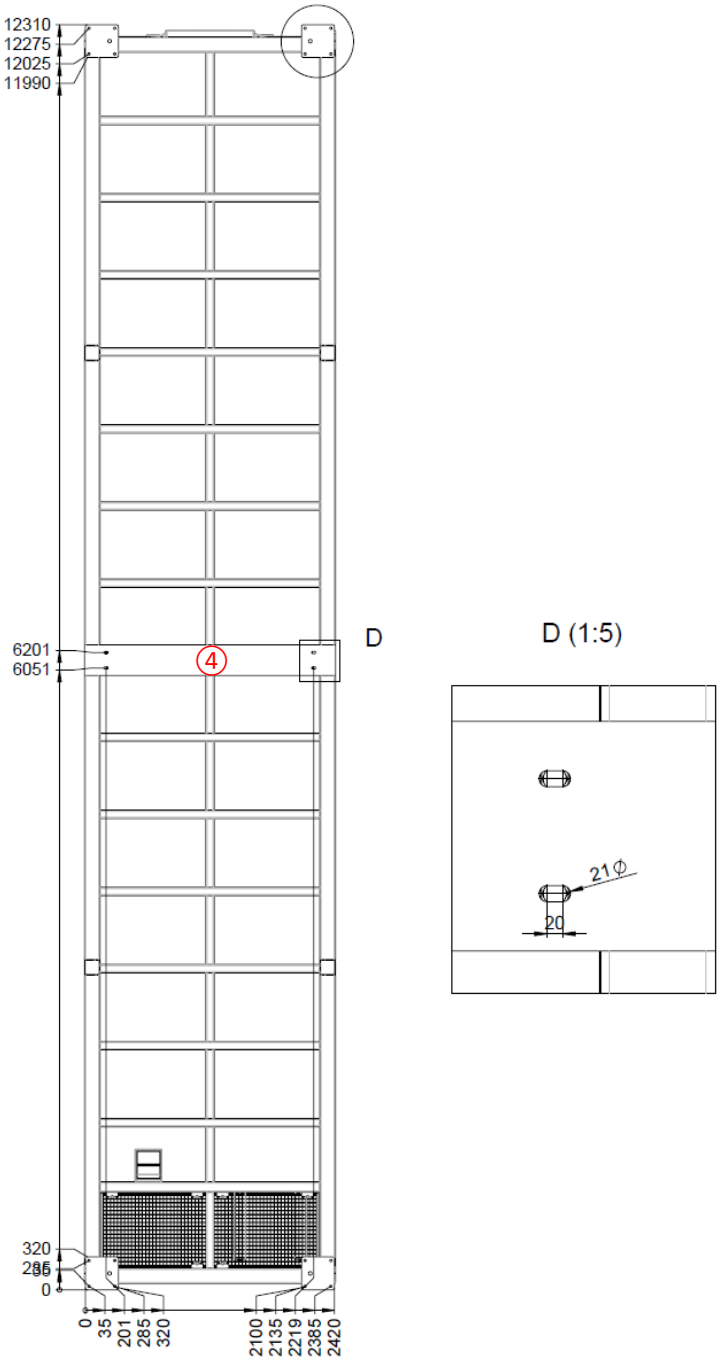



C (1:10)
C

C


Mounting braket
to be mounted with
screws M20x 60
Torque 370Nm


75
0
245
5946
6246
11947
12267
A
B
1
0
320
2118
2438
2439
4
4


12310
12275
12025
11990
6201
6051
4
D
320
285
0
0
35
201
285
320
2100
2135
2219
2385
2420

D (1:5)
21Φ
20

Task 4 **Install cable trays on container bottom**

Step 1 : While the container is still lifted on the stools, drill the bore holes for cable tray installation according to the attached drawing " Mounting cable tray".

Step 2 : Insert blind rivet nuts to the prepared bore holes according to the drawing "Mounting cable Tray".

Step 3 : Fix the cable tray (①) according to drawing "Mounting cable Tray".

Step 4 : Apply a torque to the connections according to drawing "Mounting cable Tray".

Cable trays:

RKS-Magic® 60 A4



Figure 14: Cable tray RKS-Magic® 60 A4

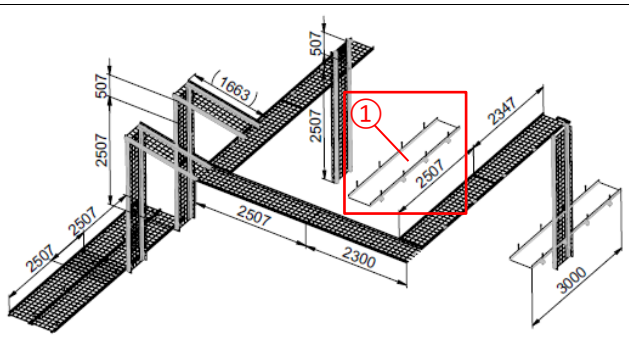


Figure 15: Cable tray for BESS 1 container installation

Specification per cable tray:

Description / name	Cable tray RKS-Magic® 60 A4
Original manufacturer part no.	6047422
Type	RKS-Magic® 60 A4
Length	3000 mm
Width	500 mm
Height	60 mm

Task 5 **Lift container to installation location and fix to installation location.**

Step 1 : Lift the container (*see section 5.2.1*) and place it to the desired installation location.

Step 2 : Fix the 4 feet to the ground using suitable connection material (welding or bolting).

✓ **The PCS container has been successfully fixed to the installation location.**

Task 6 **Lift BESS container with installed feet and T-beam to installation location.**

Step 1 : Lift the container (*see section 5.2.1*) and place it to the desired installation location. If bolting of the container feet is foreseen, make sure the boreholes of the installed container feet and t-beam are aligned with the connection provisions at the ground of the installation site.

Step 2 : Fix the T-beam to the ground using suitable connection material (welding or bolting).

Step 3 : Fix the container feet to the ground using suitable connection material (welding or bolting).

Step 4 : Check connections for tightness.

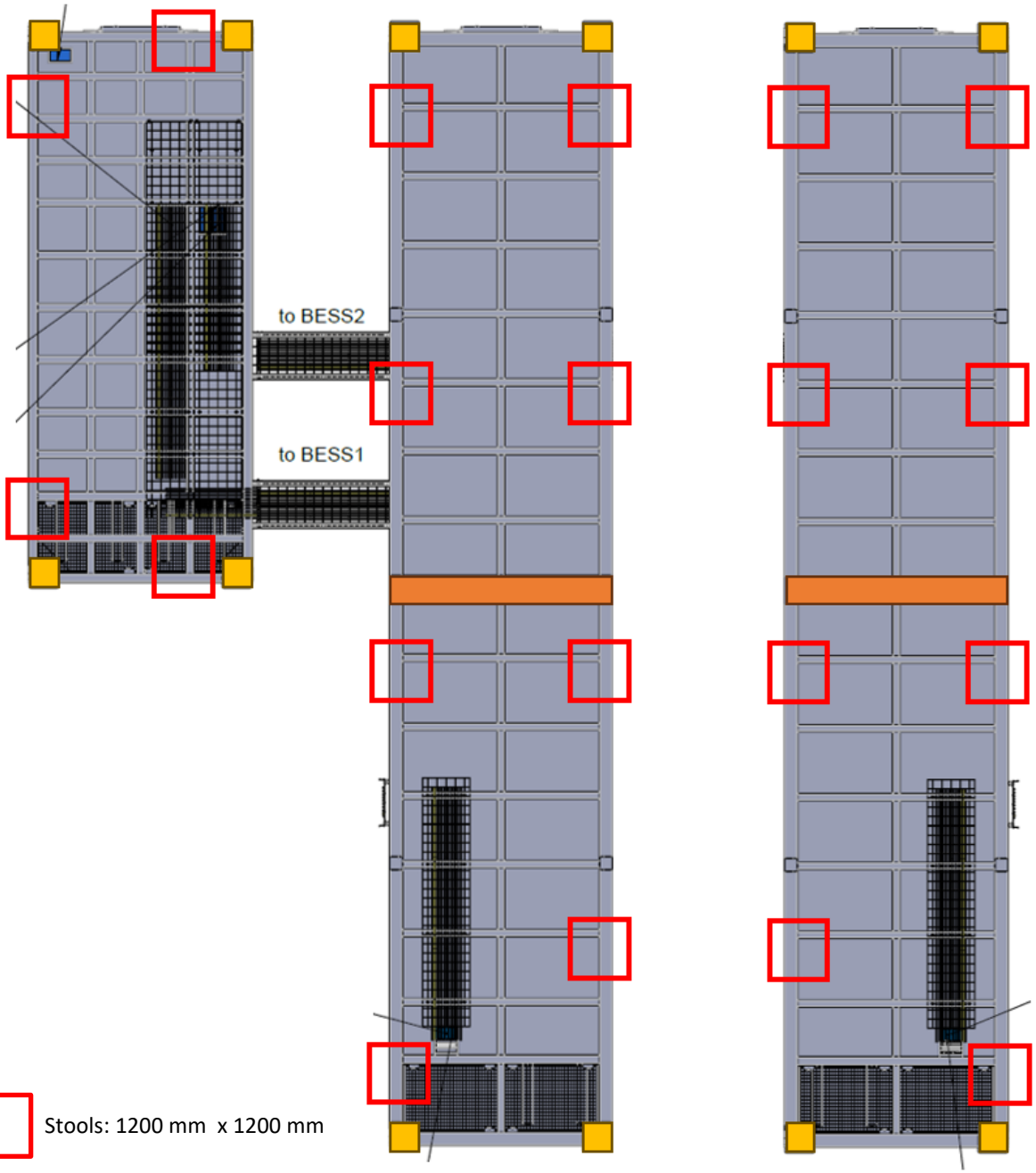
✓ **BESS container has been successfully fixed to the installation location.**

6.6.3 BESS 2

Task 1 **Lift BESS container and place on pedestal.**

Step 1 : Lift the container (*see section 5.2.1*).

Step 2 : Place the container to stools suitable to withstand the container load indicated in section 2. Please refer to below figure for information on the stool positions.



Stools: 1200 mm x 1200 mm

Container foot: 320 mm x 320 mm

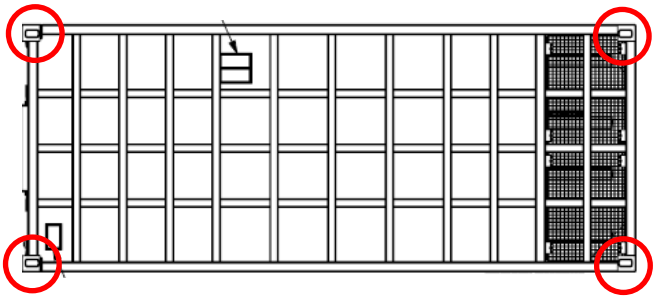
T-beam: 300 mm x 2440 mm

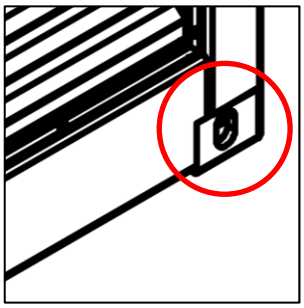
Task 2 **Install the 4 container feet to BESS 1 container.**

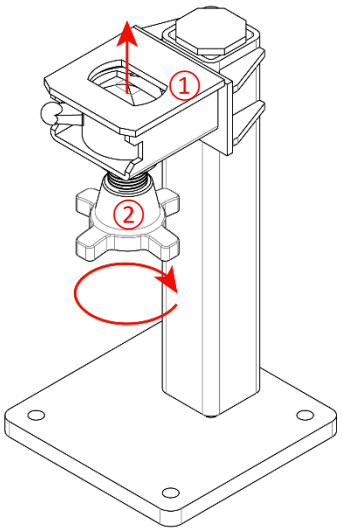
Attach container foot (*see section 6.5.1*) to one of the 4 bottom corner of the container.

Step 1 : Place the top plate (①) from the bottom to the corner of the container.

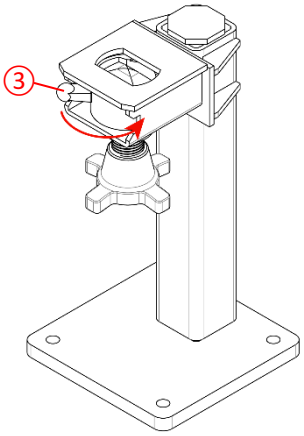
Step 2 : Screw the twist lock head mechanism of the foot (②) by twisting it as indicated in the illustration below. Screw until it has completely penetrated the bottom recess of the foot.

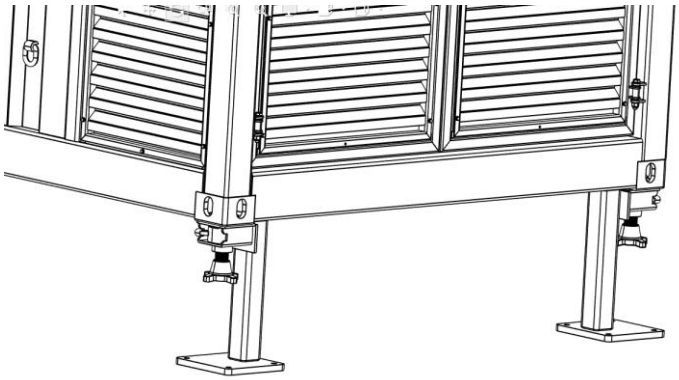






Step 3 : Secure the foot by twisting the twist lock locking mechanism (③) to the position like indicated in the illustration below.





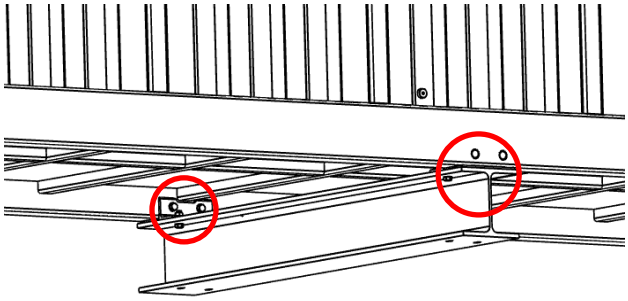
Step 4 : Repeat all the steps of task 2 for the 3 remaining container feet.

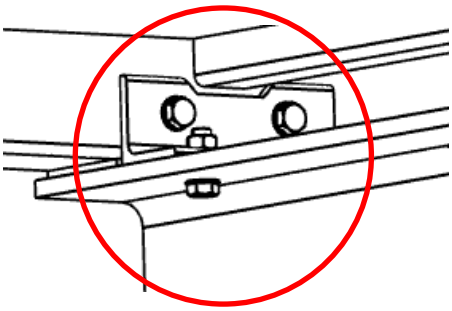
✓ **The container feet have been successfully installed to the BESS container.**

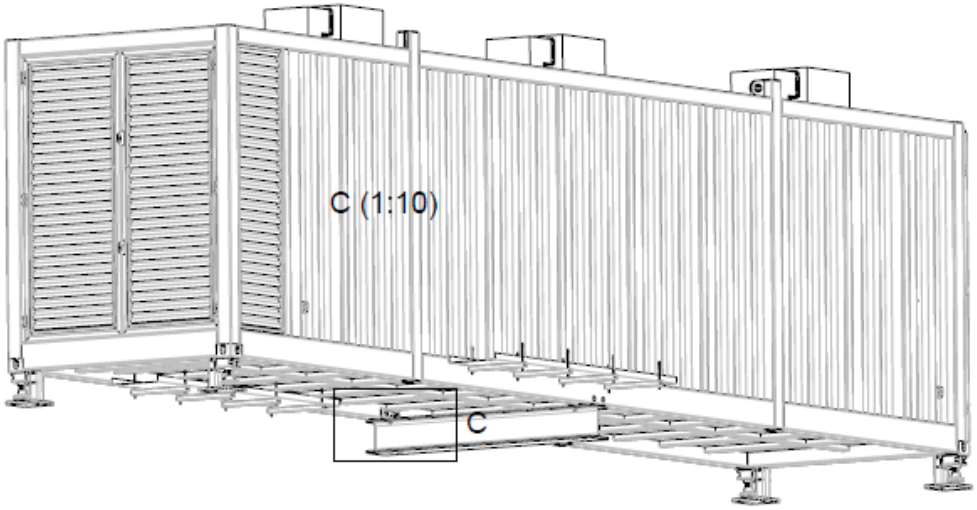
Task 3 **Install the t-beam to BESS container.**

Step 1 : While the container is still lifted on the stools, lift the provided t-beam (④) using a suitable lifting device under the container.
Beam weight approx. 260 kg.
Refer to below drawing for exact positioning of the beam.

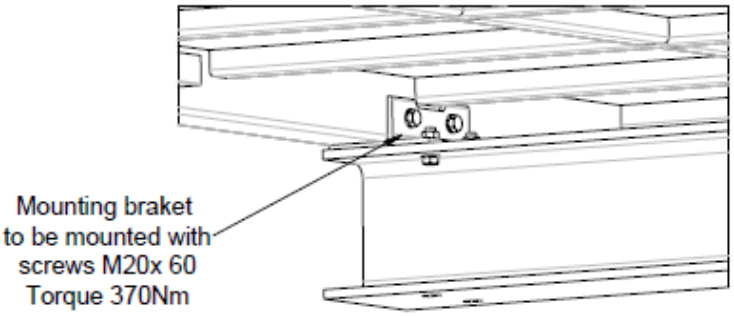
Step 2 : Fix the t-beam to the container using the bore holes underneath the container and provided mounting brackets, nuts and bolts. Apply a torque of 370 Nm to the connections.

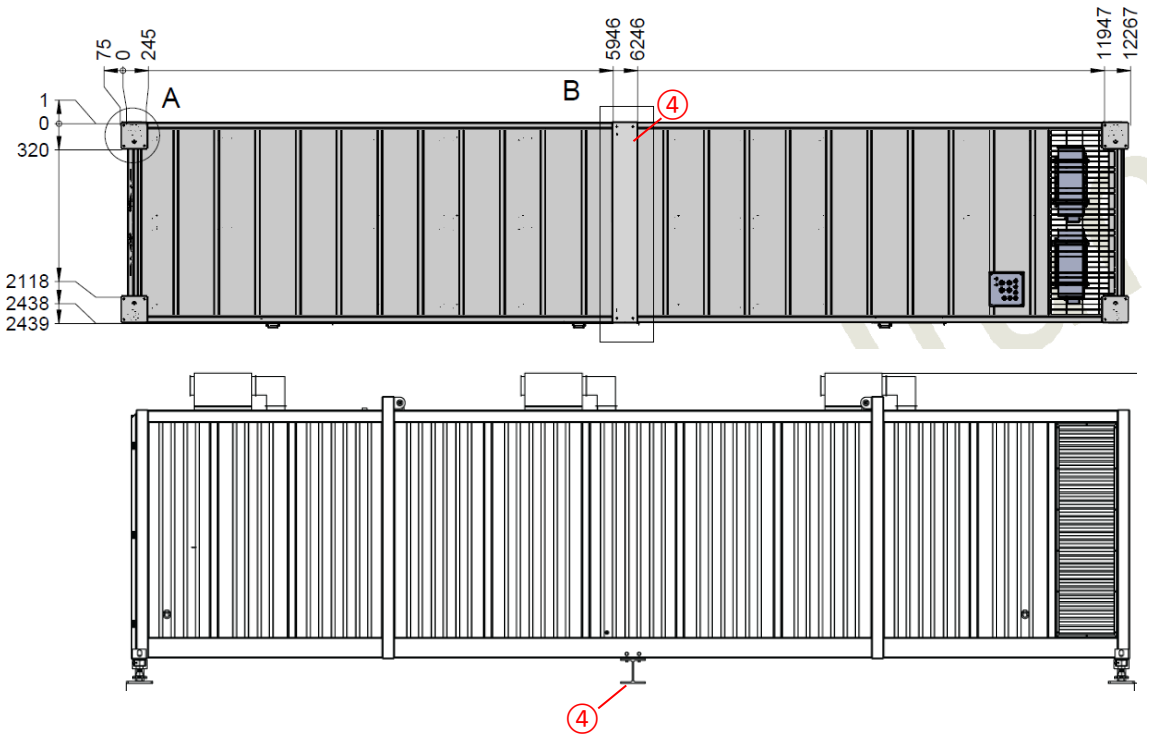


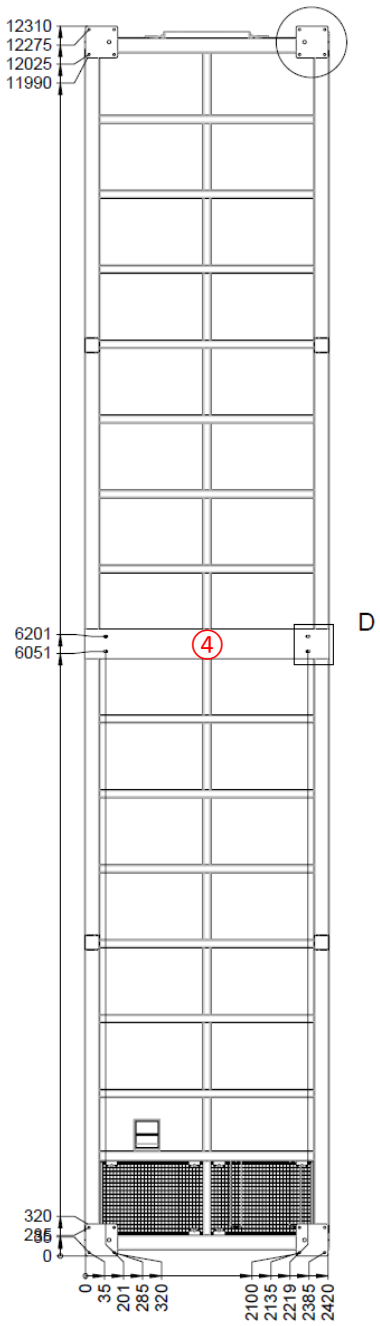


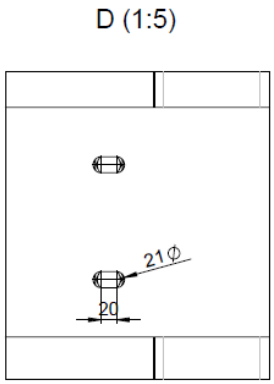

C (1:10)
C

C


Mounting braket
to be mounted with
screws M20x 60
Torque 370Nm


75
0
245
5946
6246
11947
12267
A
B
4
1
0
320
2118
2438
2439
4


12310
12275
12025
11990
6201
6051
4
D
320
285
0
0
35
201
285
320
2100
2135
2219
2385
2420


D (1:5)
21Φ
20

Task 4 **Install cable trays on container bottom**

Step 1 : While the container is still lifted on the stools, drill the bore holes for cable tray installation according to the attached drawing " Mounting cable tray".

Step 2 : Insert blind rivet nuts to the prepared bore holes according to the drawing "Mounting cable Tray".

Step 3 : Fix the cable tray (②) according to drawing "Mounting cable Tray".

Step 4 : Apply a torque to the connections according to drawing "Mounting cable Tray".

Cable trays:

RKS-Magic® 60 A4



Figure 16: Cable tray RKS-Magic® 60 A4

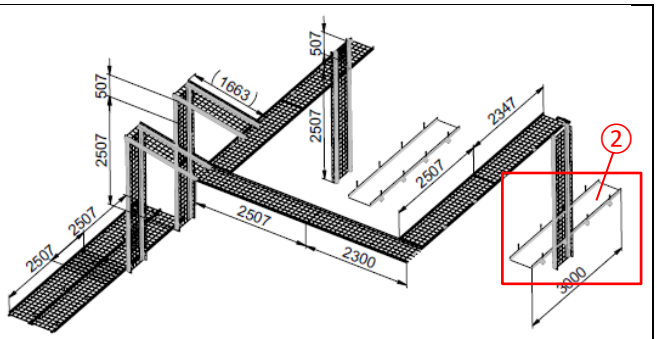


Figure 17: Cable tray for BESS 2 container installation

Specification per cable tray:

Description / name	Cable tray RKS-Magic® 60 A4
Original manufacturer part no.	6047422
Type	RKS-Magic® 60 A4
Length	3000 mm
Width	500 mm
Height	60 mm

Task 5 **Lift BESS container with installed feet to installation location.**

Step 1 : Lift the container (*see section 5.2.1*) and place it to the desired installation location. If bolting of the container feet and T-beam is foreseen, make sure the boreholes of the installed container feet and t-beam are aligned with the connection provisions at the ground of the installation site.

Step 2 : Fix the T-beam to the ground using suitable connection material (welding or bolting).

Step 3 : Fix the container feet to the ground using suitable connection material (welding or bolting).

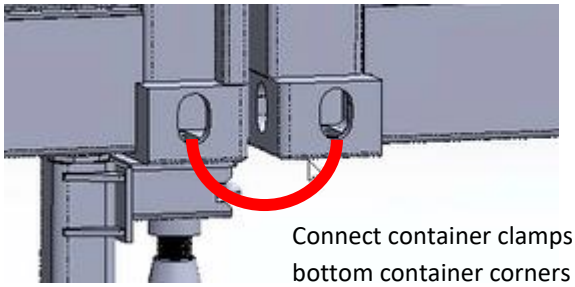
Step 4 : Check connections for tightness.

✓ **BESS container has been successfully fixed to the installation location.**

Task 6 **Fix BESS 1 and 2 containers with container clamps**

Step 1 : Attach container clamps for fixation of BESS 1 and BESS 2 containers like indicated below.

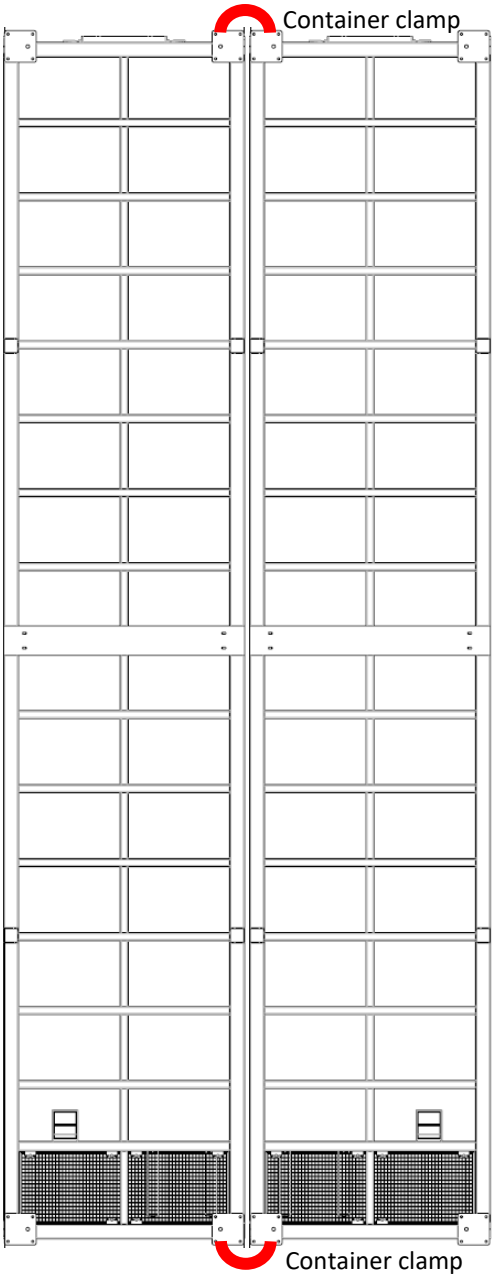
✓ **BESS container 1 and 2 has been successfully installed at the installation location.**



Connect container clamps to bottom container corners

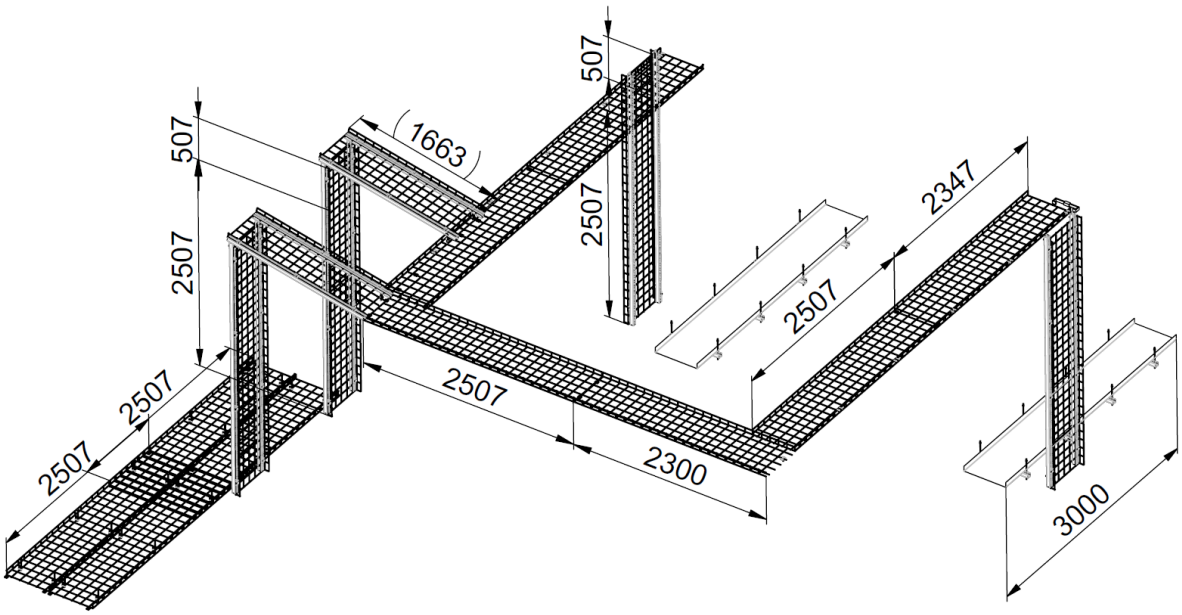


Container clamp

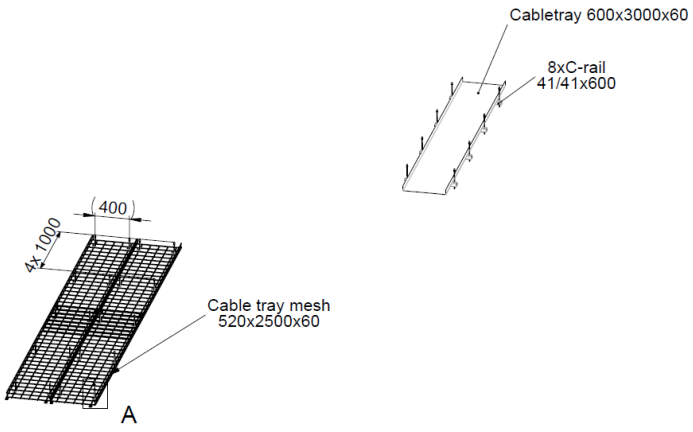


7 Appendix

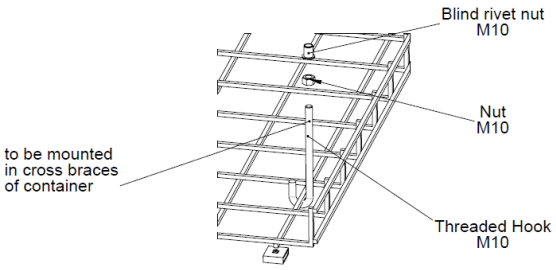
1. Drawing “Mounting cable tray”



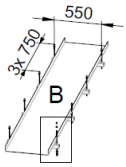
Pos. Nr.	Menge	Bezeichnung	Art.-Nr.	Lieferant	Lieferanten Nr.
1	25	V2A_ Gitterrinne GKX 520x60x2507	52520	Pflitsch	115496 GKX 520x60 V2A
6	6	MS 41-41 VA	54532	Sikla	195796
8	80	Blindnietmutter M10 Flachkopf (0,7-3,5)	505856	Böllhoff	23307100235
9	60	Sperrkantscheibe - Form M - M10	503802	--	--
10	60	Zylinderschraube mit ISK ISO 4762 - M10 x 20 - 8.8 - St.	500865	--	--
11	15	Gewindeplatte VA NT CC41 M10	54544	Sikla	199312
12	6	Befestigungswinkel	54546		
13	50	Sechskantmutter ISO 4032 - M10 - 8	503711	--	--
14	20	Gewindehaken GH	54547	Sikla	101602
15	4	Befestigungswinkel	54549		
16	50	Gewindeplatte CC41-M8	54550	Sikla	195305
17	55	V4A Gitterkanal Verbindungslasche X1	52531	Pflitsch	GK L X1 V4A
18	55	Sperrkantscheibe - Form M - M8	503801	--	--
19	55	Zylinderschraube mit ISK ISO 4762 - M8 x 30 - 8.8 - St.	503670	--	--
20	30	Gitterkanal VerbindungslascheX2	52505	Pflitsch	GK L X2
21	2	Bridge Fitting CL1/50	53388	Plomben.de	TS20003-001
22	16	threaded rod / Gewindestange	---		
23	8	MS 41-41 VA-600	54717	Sikla	195796
24	2	Kabelrinne RKS Magic 60A4	509409	Obo	6047422
25	16	Sperrkantscheibe - Form B - M8	505744	--	--
26	16	Blindnietmutter M8 KSGRSO (e=3,0-4,5)	505060	Böllhoff	34367080045



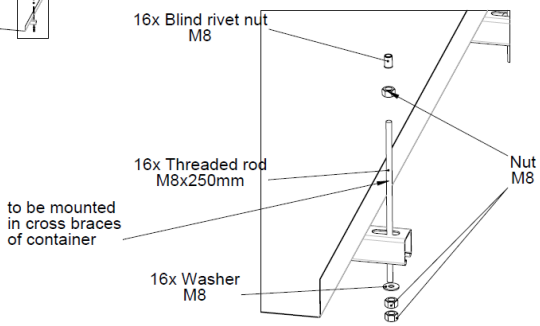
A (1:5)



Torque for all M10: 35Nm



B (1:5)



Torque for all M8: 20Nm

Rev.:	Änderung (changes):	Datum (Date):	Name:

Allgemeintoleranzen für Längenmaße DIN ISO 2768-mK
Abmaße in mm für Nennmaßbereiche

Genauigkeitsgrad	0,5 ... 3	> 3 ... 6	> 6 ... 30	> 30 ... 120	> 120 ... 400	> 400 ... 1000	> 1000 ... 2000
m (mittel)	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2

Oberfläche (surface): -
Werkstoff (material): 176.97 kg

	Datum (Date):	Name:
Drawn:	03.07.2024	MvD
Checked:		

+0,5 -0,5
ISO 13715

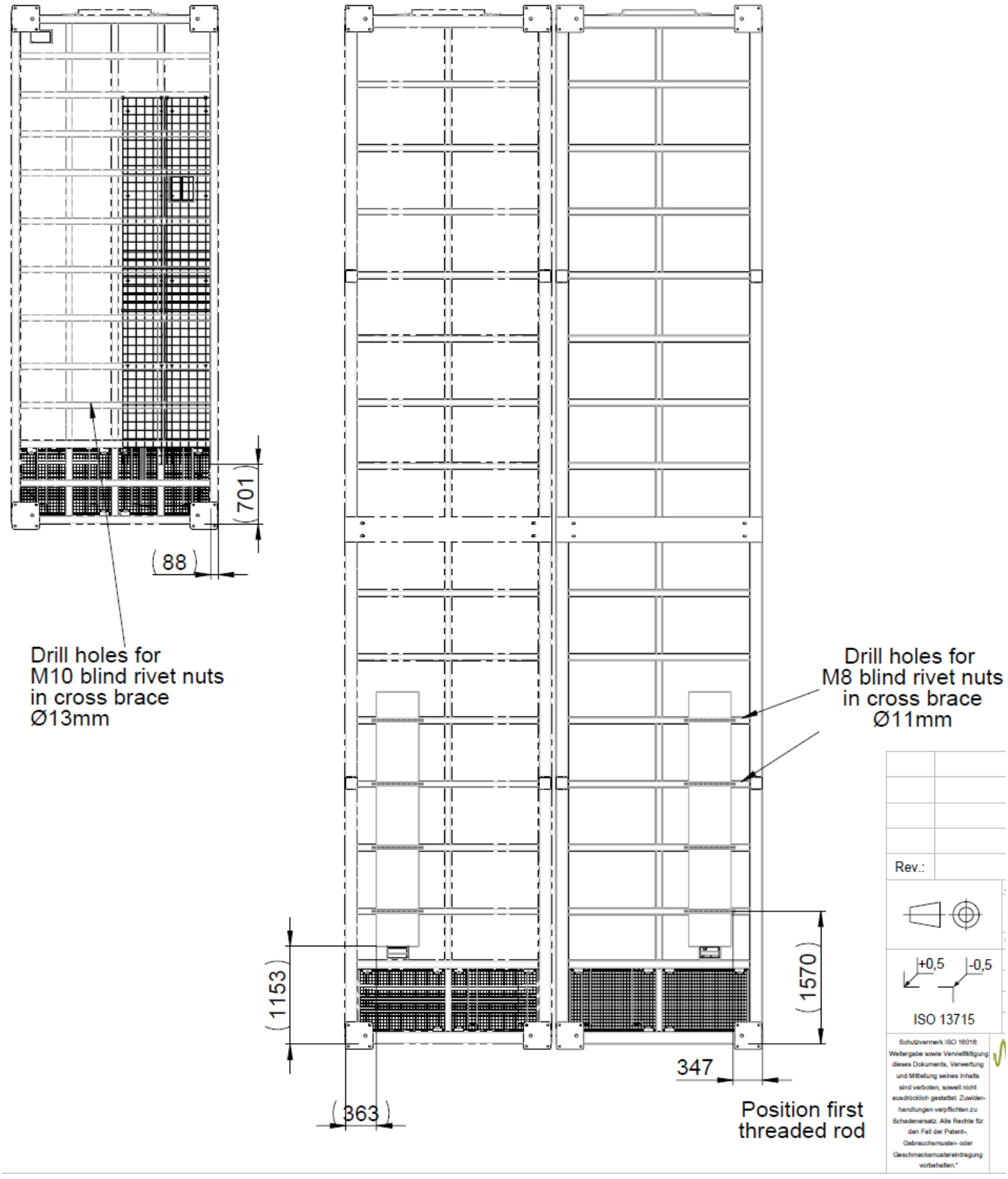
Bezeichnung (description): Cable trays

Scale: 1:40
Sheet: 2 (A3)
2 of: 4
Revision:

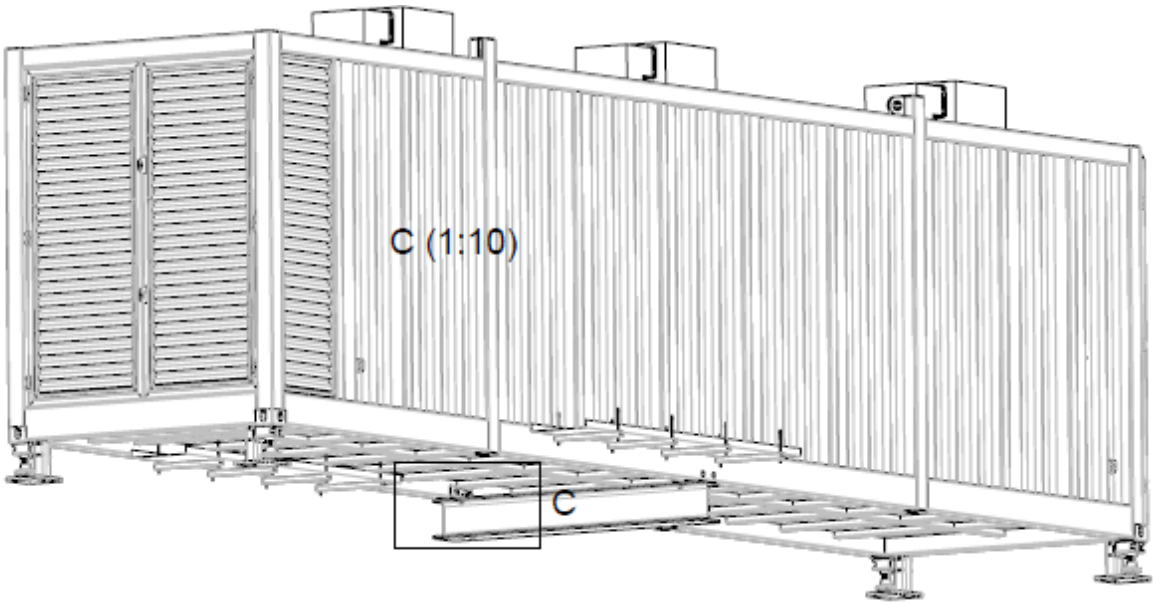
Artikel-Nr. (article number): 54543
Projekt-Nr. & Kunde (project number & customer): 23A2007 Statron

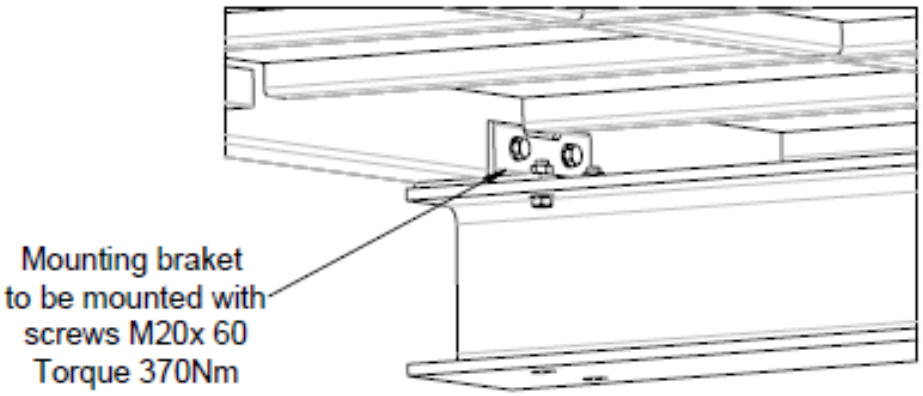
FREQCON
Freqcon GmbH
Bürgerwiesenweg 5
D-27336 Rethem
+49 (0) 5165 291760-0

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701
88
Drill holes for
M10 blind rivet nuts
in cross brace
Ø13mm
Drill holes for
M8 blind rivet nuts
in cross brace
Ø11mm
1153
1570
363
347
Position first
threaded rod
Rev.:
+0,5
-0,5
ISO 13715

2. Drawing "Mounting T-Beam"





Version	1.0.0.12
Autor	JHM
Name für Datei:	Die Datei wird nach folgendem Schema benannt: [Kundennummer]_[Projektnum
Profil:	Ein Profil ist ein zusammenschluss von logischen Daten mit einer Größe von 32Byt werden. Im Standard gibt es ein Freqcon Steuerungs- und zwei Statusprofile. Alle Modbusclient kann i.d.R. das Profil nicht an einen Slot gebunden werden, da die K DIE ADRESSZUORDNUNG GEACHTET WERDEN! A profile is a collection of logical data with a size of 32bytes. Unlike a slot, a profile and two status profiles. All other profiles can be freely defined. The standard prof a slot, since the customers specify the address assignment and these cannot usua
Slot:	Ein Slot ist ein zusammenschluss von logischen Daten. Ein Slot ist 32Byte groß.Die Software einfach zu portieren sind. Die Slots sind an Physikalische Adressen gebur A slot is a union of logical data. The size of a slot is 32Byte and was chosen in a wa are bound to physical addresses. For the PN-PN couplers as well as the I-Device or
Nutzung des Dokuments/Using the document::	History: Änderungsverzeichnis Slots: Hier werden die Profie den Slots zugeordnet. Profile Xy: In den Mappen mit "Profile…" werden die einzelnen Profile im Detail be History: List of changes Slots: Here the profiles are assigned to the slots. Profiles Xy: The individual profiles are described in detail in the folders with "Profi
Range:	Mögliche Zustände der Variable Possible states of the variable
Scale:	Scalingfaktor Scalingfactor
Resolution:	Zeigt die Skalierung in Bezug auf den Datentyp. Somit ist "Resolution" der Werteb Status : OutgoingValue = InternalValue * ScalingFactor control: InternalValue = IncomingValue*ScalingFactor Shows the scaling in relation to the data type.Thus, "Resolution" is the value range Status : OutgoingValue = InternalValue * ScalingFactor control: InternalValue = IncomingValue*ScalingFactor
Profile Freqcon CON: Setpoints	Die Setpoints für den Umrichter können vom Kunden frei gewählt werden. Dies be Kundenvorgabe, werden die Setpoints so belegt wie in Profile Freqcon Con darges The setpoints for the inverter can be freely selected by the customer. This means specification, the setpoints are assigned as shown in Profile Freqcon Con.

Readslot Nr:		Modbus Adress (Standard)	PN-PN Modul	PN-PN Adress (Standard)
1	Start	40000	1:#OUT 32 Byte	1000
	End	40015		1031
2	Start	40016	2:#OUT 32 Byte	1032
	End	40031		1063
3	Start	40032	3:#OUT 32 Byte	1064
	End	40047		1095
4	Start	40048	4:#OUT 32 Byte	1096
	End	40063		1127
5	Start	40064	5:#OUT 32 Byte	1128
	End	40079		1159
6	Start	40080	6:#OUT 32 Byte	1160
	End	40095		1191
7	Start	40096	7:#OUT 32 Byte	1192
	End	40111		1223
8	Start	40112	8:#OUT 32 Byte	1224
	End	40127		1255
..		..		
249		43984-43999		

Bitdatatyp

Daten dieses Typs umfassen entweder 1 Bit, 8 Bit, 16 Bit oder 32 Bit. Der Data of this type c

Bit	BOOL	1	0, 1 or FALSE, TRUE
Byte	BYTE	8	16#0 to 16#FF
Wort	WORD	16	16#0 to 16#FFFF
Doubleword	DWORD	32	16#0 to 16#FFFF_FFFF

Numeric Types

Sie stehen für die Verarbeitung numerischer Werte zur Verfügung. Der They are available

short int	SINT	8	-128 to 127 (-2**7 to 2**7-1)
short unsigned Int	USINT	8	0 to 255 (0 to 2**8-1)
Int	INT	16	-32_768 to 32_767 (-2**15 to 2**15-1)
unsigned Int	UINT	16	0 to 65_535 (0 to 2**16-1)
Double Int	DINT	32	-2_147_483_648 to 2_147_483_647 (-2**31 to 2**31-1)

Unsigned double Int	UDINT	32	0 to 4_294_967_295 (0 to 2**32-1)
Real	REAL	32	-3.402_823_466E+38 to -1.175_494_351E-38, 0.0, +1.175_494_351E-38 to +3.402_823_466E+38 Genauigkeit: Mantisse 23 Bit (entspricht 6 Dezimalstellen), Exponent 8 Bit, Vorzeichen 1 Bit.
Long Real	LREAL	64	-1.797_693_134_862_315_7E+308 to -2.225_073_858_507_201_4E-308, 0.0, +2.225_073_858_507_201_4E-308 to +1.797_693_134_862_315_7E+308 Genauigkeit: Mantisse 52 Bit (entspricht 15 Dezimalstellen), Exponent 11 Bit, Vorzeichen 1 Bit.

mer]_communication_interface_[Versionsnummer]. Bsp : 10438_20A2005_communication_interface_001

:e. Im gegensatz zu einem Slot , ist ein Profil nicht an eine Adresse gebunden. Somit kann ein Profil einem bel
anderen Profile können frei definiert werden. Die Standard Profile liegen im Standard auf den jeweils ersten S
unden die Adressbelegung vorgeben und diese meist nicht mit den Slots in Einklang zu bringen sind. DAHER M

e is not bound to an address. Therefore, a profile can be assigned to any slot. In the standard version, there is
iles are located on the first slots in the standard system. ATTENTION: In the case of a Modbus client, the prof
lly be brought into line with the slots. THEREFORE, SPECIAL ATTENTION MUST BE PAID TO THE ADDRESS ALLO

Größe des Slots wurde so gewählt, das verschiedene Interfaces wie PN-PN ,HMI, I-Device oder Modbus Inter
nden. Bei den PN-PN Kopplern als auch beim I-Device sind nur die ersten acht Slots als Standard vergeben.

y that different interfaces like PN-PN, HMI, I-Device or Modbus interfaces can be easily ported internally in th
nly the first eight slots are assigned as standard.

eschrieben. Die Profile "Profile Freqcon …" sind standartisierte Freqcon Profile. Alle anderen sind Kundenspez

les...". The profiles "Profile Freqcon ..." are standardized Freqcon profiles. All others are customer specific pro

ereich, der vom Umrichter ausgeben wird bzw. der zulässige Empfangsbereich.

e that is output by the inverter or the permissible reception range.

edeutet das man z.B. für einen Inselnetzbetrieb auf den ersten Setpoint die gewünschte Spannung legen kan
stellt.

that, for example, the desired voltage can be applied to the first setpoint for island network operation. If the

I-Device	I-Device Adress (Standard)
	1500
	1515
	1516
	1531
	1532
	1547
	1548
	1563
	1564
	1579
	1580
	1595
	1596
	1611
	1612
	1627

Writeslot Nr.:		Modbus Adress (Standard)	PN-PN Modul
250	Start	44000	1:#IN 32 Byte
	End	44015	
251	Start	44016	1:#IN 32 Byte
	End	44031	
252	Start	44032	1:#IN 32 Byte
	End	44047	
253	Start	44048	1:#IN 32 Byte
	End	44063	
254	Start	44064	1:#IN 32 Byte
	End	44079	
255	Start	44080	1:#IN 32 Byte
	End	44095	
256	Start	44096	1:#IN 32 Byte
	End	44111	
257	Start	44112	1:#IN 32 Byte
	End	44127	
..		..	
499		44000-49999	

ɔmprises either 1 bit, 8 bits, 16 bits or 32 bits. The initialisation

for processing numerical values. The initialisation value of a

ibiegen Slot zugewiesen
Slots. ACHTUNG: Bei einem
MUSS HIER BESONDERS AUF

s one Freqcon control profile
ile cannot usually be bound to
OCATION HERE!

faces intern in der Umrichter

he inverter software. The slots

zifische Profile.

ofiles.

ın. Gibt es keine

re is no customer

PN-PN Adresse (Stadard)	I-Device	I-Device Adress (Standard)
1000		1500
1031		1515
1032		1516
1063		1531
1064		1532
1095		1547
1096		1548
1127		1563
1128		1564
1159		1579
1160		1580
1191		1595
1192		1596
1223		1611
1224		1612
1255		1627

Version

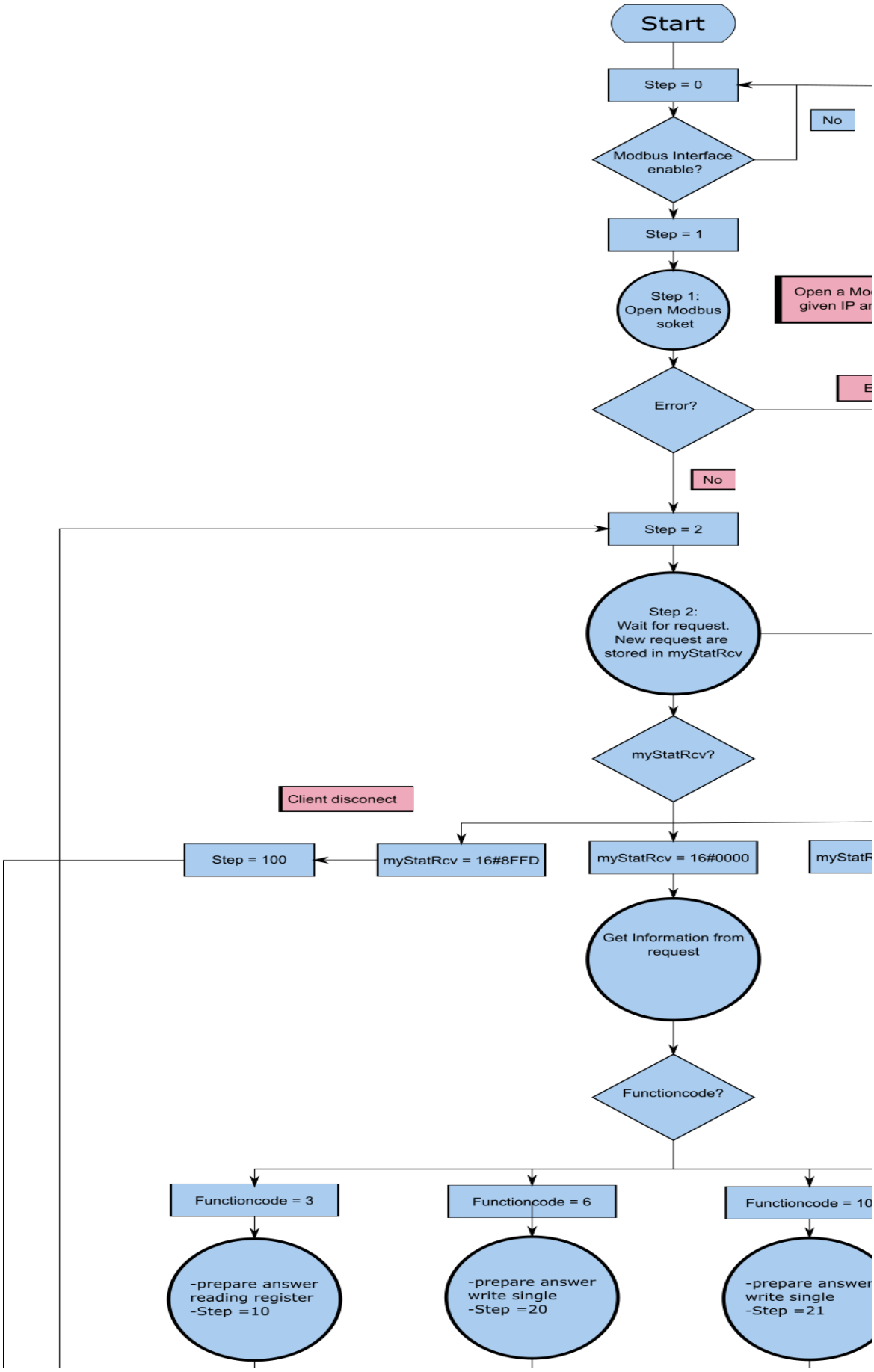
1.0.0.0

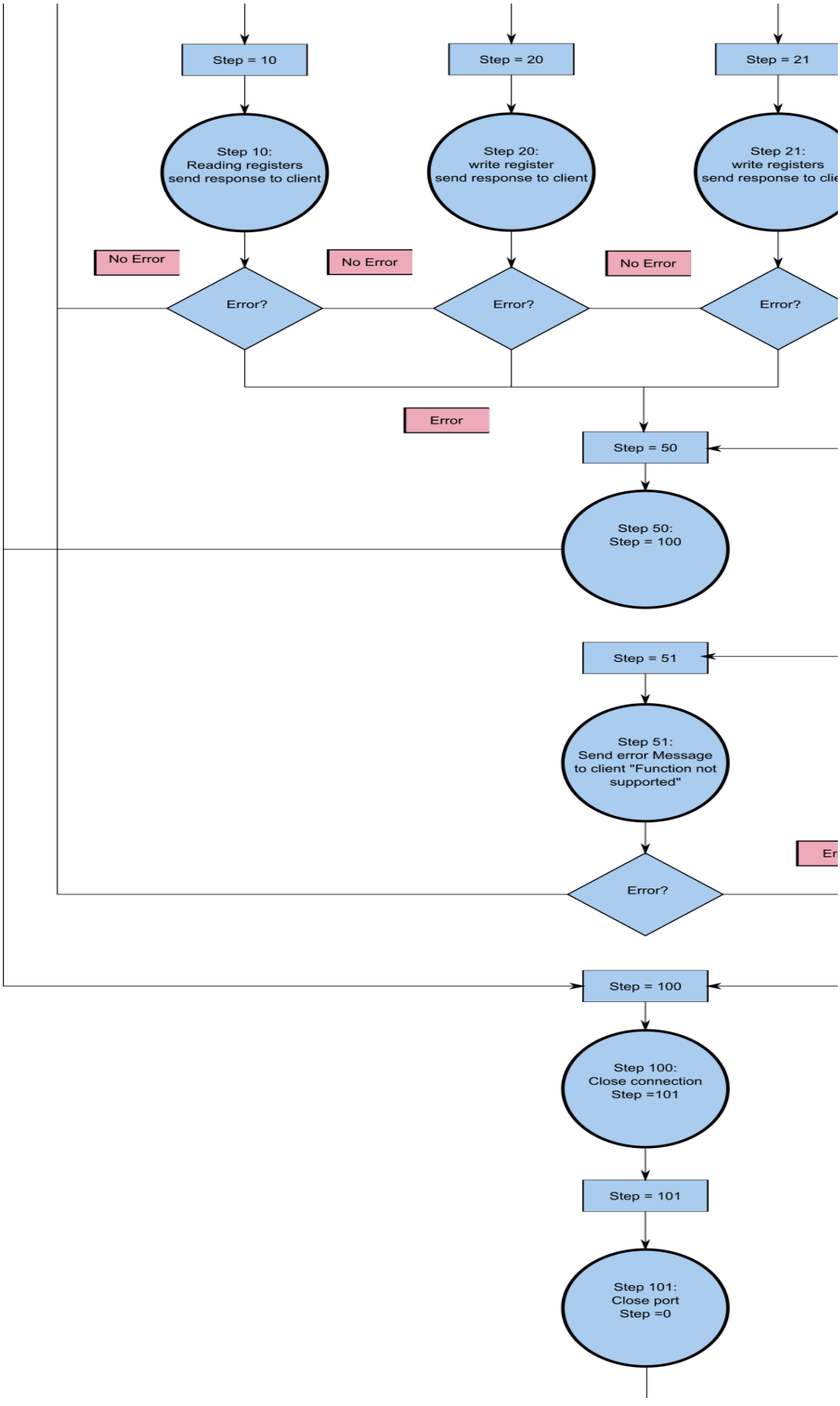
Änderung
Grundversion

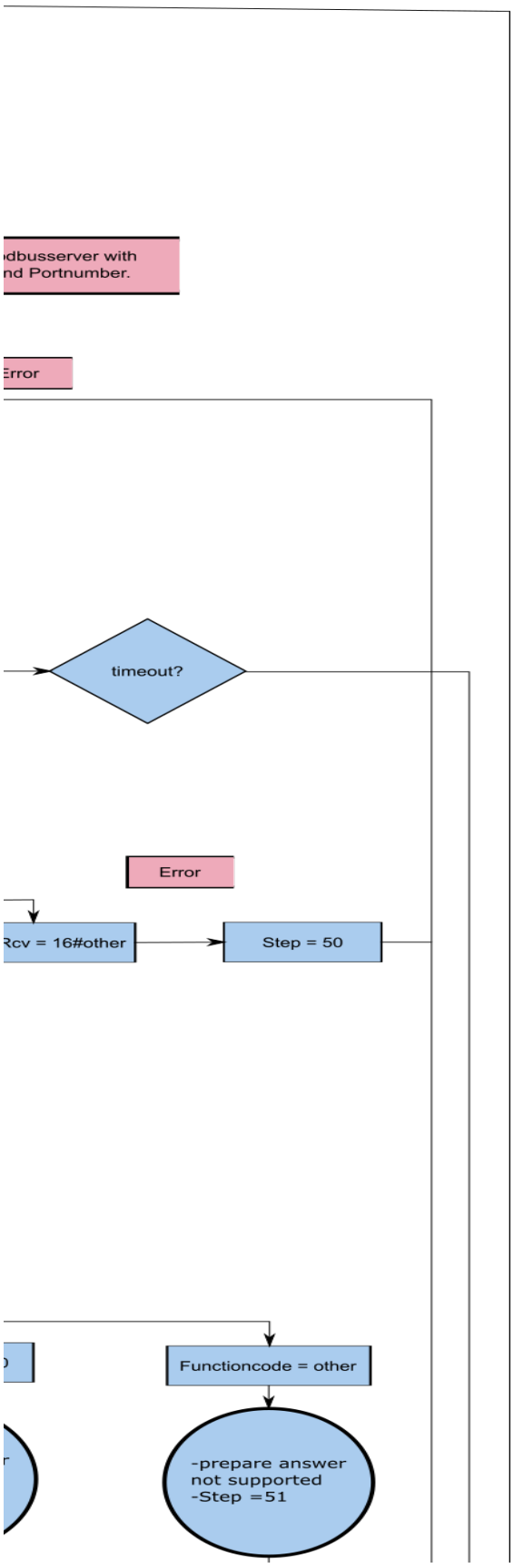
Autor

JHM

Flowchart of the Modbusserver




Step = 10
Step = 20
Step = 21
Step 10:
Reading registers
send response to client
Step 20:
write register
send response to client
Step 21:
write registers
send response to cli
No Error
No Error
No Error
Error?
Error?
Error?
Error
Step = 50
Step 50:
Step = 100
Step = 51
Step 51:
Send error Message
to client "Function not
supported"
Er
Error?
Step = 100
Step 100:
Close connection
Step =101
Step = 101
Step 101:
Close port
Step =0

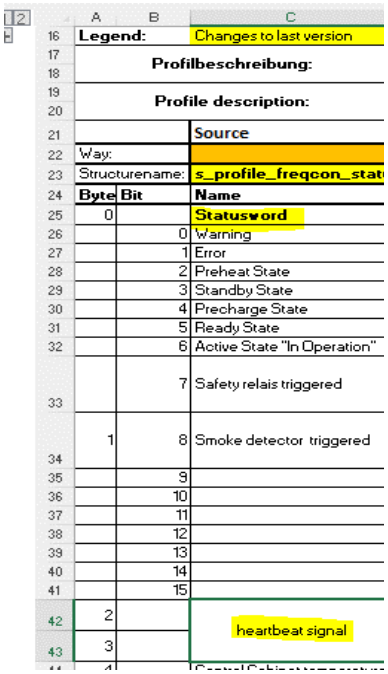


Flowchart Reading single/m

Request from client:

Byte:	0
Name:	Transaction No
Value:	0

Transaction No
Protocol ID
Length
Unit ID/Element ID
Function Code
Startregister
Number of Register



	A	B	C
16	Legend:		Changes to last version
17			
18		Profilbeschreibung:	
19			
20		Profile description:	
21			Source
22	Way:		
23	Structurename:		s_profile_freqcon_stat
24	Byte	Bit	Name
25	0		Statusword
26		0	Warning
27		1	Error
28		2	Preheat State
29		3	Standby State
30		4	Precharge State
31		5	Ready State
32		6	Active State "In Operation"
33		7	Safety relais triggered
34	1	8	Smoke detector triggered
35		9	
36		10	
37		11	
38		12	
39		13	
40		14	
41		15	
42	2		heartbeat signal
43	3		

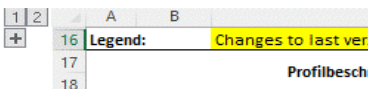
Answer from server:

Byte:	0
Name:	Transaction No
Value:	0

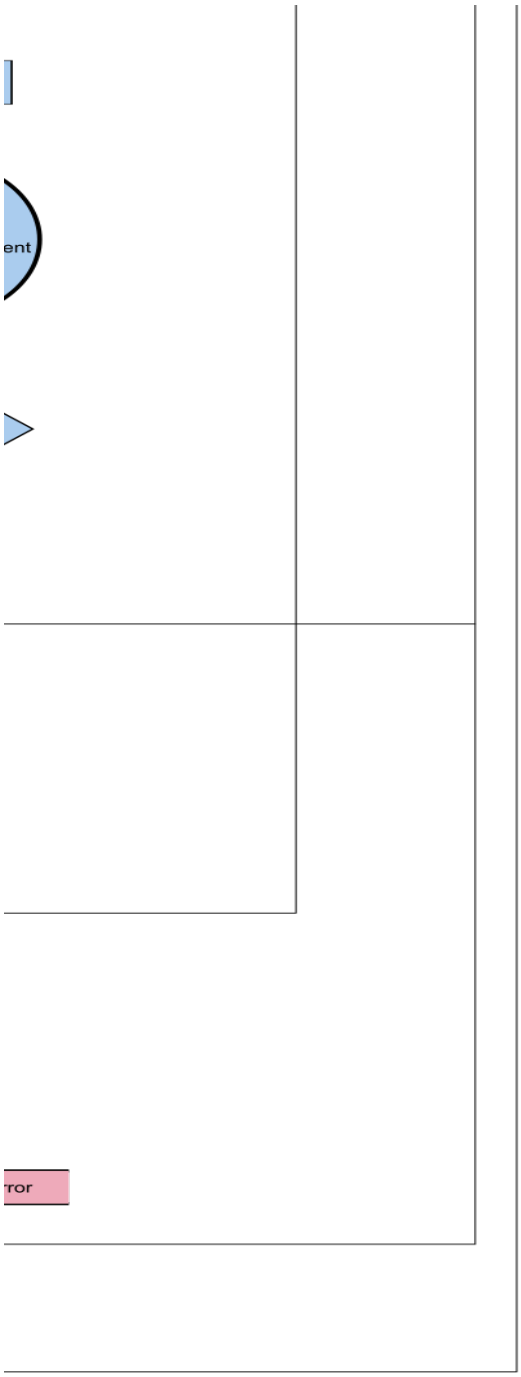
Flowchart write single Regis

Request from client:

Byte:	0
Name:	Transaction No
Value:	0



	A	B
16	Legend:	Changes to last ver
17		Profilbesch
18		



19			Profile des
20			
21			Target
22	Way:		
23	Structurename:		s_profile_freqcon_co
24	Byte	Bit	Name
25	0		Controlword
26		0	Reset
27		1	Enable pre-heating
28		2	Enable pre-chargin
29		3	Enable primary con
30		4	Enable secondary c
31		5	
32		6	
33		7	
34	1	8	
35		9	
36		10	
37		11	
38		12	
39		13	
40		14	
41		15	

Answer from server:

The request from the client v

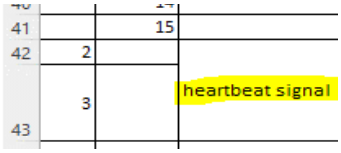
Byte:	0
Name:	Transaction No
Value:	0

Flowchart write multi Regist

Request from client:

Byte:	0
Name:	Transaction No
Value:	0

	A	B	
16	Legend:		Changes to last ve
17			
18			Profilbesc
19			Profile de
20			
21			Target
22	Way:		
23	Structurename:		s_profile_freqcon_c
24	Byte	Bit	Name
25	0		Controlword
26		0	Reset
27		1	Enable pre-heatir
28		2	Enable pre-chargi
29		3	Enable primary co
30		4	Enable secondary
31		5	
32		6	
33		7	
34	1	8	
35		9	
36		10	
37		11	
38		12	
39		13	
40		14	



Answer from server:

Byte:	0
Name:	Transaction No
Value:	0

Flowchart not supported Fu

Answer from server:

Byte:	0
Name:	Transaction No
Value:	0

ulti Registers: CAUTION: All values are in hex!

Read from 40000 to 40001

1	2	3	4	5	6
Transaction No	Protocol ID	Protocol ID	Length	Length	Unit ID/Element ID
1	0	0	0	6	0

Set by client. Will be mirrored by server.
Set by client. Always 0 when using TCP.
Amount of byte followed from here.
Only used for Modbus RTU,can be a value from #00 to #FF.
3= Reafing, 6=Write Single, 16=Write Multi
Modbus startregister.
Amount of registers that should be read/write

D	E	F	G	H	I	J
Header						
					Das Profil gibt Statuserte des gesamten Umrichters aus.	
					The profile can be used to monitor the whole Converter.	
us_1					Description	Beschreibung
Datatyp	Range	Scaling	Resolution	Unit		
WORD	0 - 65535	no	no	no		
	True/False	no	no	no	A warning message is active.	Eine Warnmeldung ist aktiv.
	True/False	no	no	no	An error has occurred.	Ein Fehler ist aufgetreten.
	True/False	no	no	no	The inverter is heated up to operating temperature.	Der Umrichter wird auf Betriebstemperatur aufgeheizt.
	True/False	no	no	no	The inverter is at operating temperature.	Der Umrichter ist auf Betriebstemperatur.
	True/False	no	no	no	The DC Link is precharged and the main switch is switched on.	Der Zwischenkreis wird vorgeladen und der Hauptschalter z
	True/False	no	no	no	The inverter is ready to switch on the IGBTs.	Der Umrichter ist Bereit, die IGBTs einzuschalten.
	True/False	no	no	no	The inverter is in operation. The IGBTs are pulsing.	Der Umrichter ist in Betrieb. Die IGBTs pulsen.
	True/False	no	no	no	The safety chain was interrupted. Except for the control energy, all energy sources are disconnected from the inverter.	Die Sicherheitskette wurde unterbrochen. Dies löst einen N Umrichters aus.Bis auf die Steuerenergie, werden alle Ener Umrichter getrennt.
	True/False	no	no	no	The smoke alarm has triggered. The inverter switches off. Except for the control energy, all energy sources are disconnected from the inverter.	Der Rauchmelder hat ausgelöst. Der Umrichter Schaltet aus Not-Aus des Umrichters aus.Bis auf die Steuerenergie, wer Energiequellen vom Umrichter getrennt.
	True/False	no	no	no		
	True/False	no	no	no		
	True/False	no	no	no		
	True/False	no	no	no		
	True/False	no	no	no		
	True/False	no	no	no		
	True/False	no	no	no		
WORD	0 - 16383	1	0 - 16383	no	The heartbeat signal is increased by the value 1 in each cycle. The counter will be reset to 0 by a value of 16383.	Das Heartbeatsignal wird in jedem Zyklus um den Wert 1 erh Wert von 16383 wird der Zähler auf 0 resettet.

Read from 40000 to 40001

1	2	3	4	5	6
Transaction No	Protocol ID	Protocol ID	Length	Length	Unit ID/Element ID
1	0	0	0	7 (Number of Databytes+3)	0

ter:

write to 44000

1	2	3	4	5	6
Transaction No	Protocol ID	Protocol ID	Length	Length	Unit ID/Element ID
1	0	0	0	6	0

C	D	E	F	G	H	I
sion	Header		Not available yet.Designed for further using.			
reibung:						D

cription:						Th
ntrol_1						Description
	Datatyp	Range	Scalingfactor	Resolution	Unit	
	WORD	0 - 65535	no	no	no	
		True/False	no	no	no	Reset of errors.
entire system		True/False	no	no	no	Start the preheating. The cooling is started. The circulation pump, the exchanger and, if necessary, the heating are switched on.
g DC-link		True/False	no	no	no	Start the preload. The intermediate crystals are preloaded and the ma switch is switched on.
trol mode(s)		True/False	no	no	no	Enable to pulse the primary IGBTs. These usually supply the DC link a connected to the public grid.
control mode(s)		True/False	no	no	no	Enable for pulsing the secondary IGBTs. These are usually connected DC or island ports.
		True/False	no	no	no	
		True/False	no	no	no	
		True/False	no	no	no	
		True/False	no	no	no	
		True/False	no	no	no	
		True/False	no	no	no	
		True/False	no	no	no	
		True/False	no	no	no	
		True/False	no	no	no	
		True/False	no	no	no	
		True/False	no	no	no	

Read from 40000 to 40001

will be mirrored by the server.

1	2	3	4	5	6
Transaction No	Protocol ID	Protocol ID	Length	Length	Unit ID/Element ID
1	0	0	0	6	0

ters:

write to 44000 to 44001

1	2	3	4	5	6
Transaction No	Protocol ID	Protocol ID	Length	Length	Unit ID/Element ID
1	0	0	0	11 (Number of Databytes+7)	0

C	D	E	F	G	H	I
ersion	Header		Not available yet.Designed for further using.			
chreibung:						
escription:						

control_1						Description
	Datatyp	Range	Scalingfactor	Resolution	Unit	
	WORD	0 - 65535	no	no	no	
		True/False	no	no	no	Reset of errors.
ng entire system		True/False	no	no	no	Start the preheating. The cooling is started. The circu exchanger and, if necessary, the heating are switche
ing DC-link		True/False	no	no	no	Start the preload. The intermediate crystals are prelo switch is switched on.
ontrol mode(s)		True/False	no	no	no	Enable to pulse the primary IGBTs. These usually sup connected to the public grid.
y control mode(s)		True/False	no	no	no	Enable for pulsing the secondary IGBTs. These are us DC or island ports.
		True/False	no	no	no	
		True/False	no	no	no	
		True/False	no	no	no	
		True/False	no	no	no	
		True/False	no	no	no	
		True/False	no	no	no	
		True/False	no	no	no	
		True/False	no	no	no	
		True/False	no	no	no	
		True/False	no	no	no	

		True/False	no	no	no	
	WORD	0 - 16383	no		no	Expects a value that changes with each (bus) cycle in 16#FFFF).

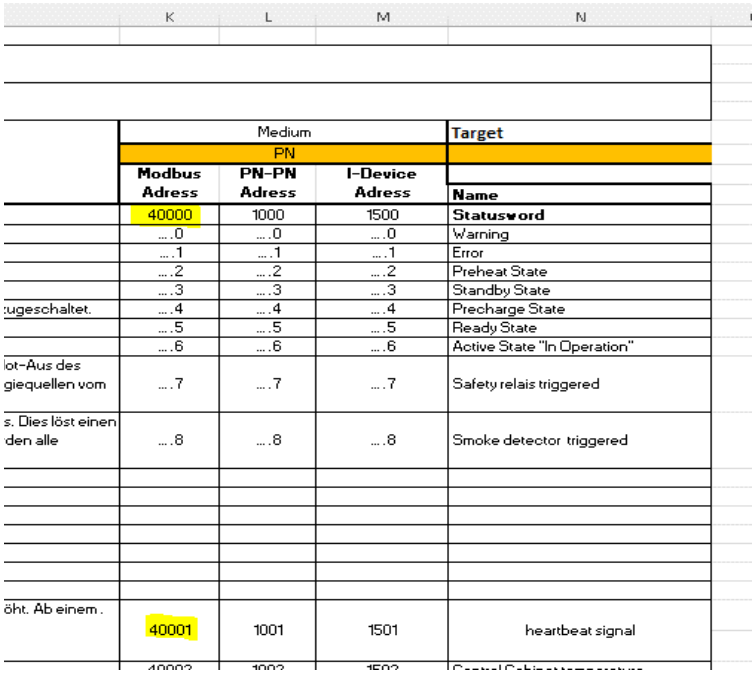
Read from 40000 to 40001

1	2	3	4	5	6
Transaction No	Protocol ID	Protocol ID	Length	Length	Unit ID/Element ID
1	0	0	0	6	0

nction:

1	2	3	4	5	6
Transaction No	Protocol ID	Protocol ID	Length	Length	Unit ID/Element ID
1	0	0	0	6	0

7	8	9	10
Function Code	Startregister	Startregister	Number of Register
3	0	0	0



	Medium			Target
	PN			
	Modbus Adress	PN-PN Adress	I-Device Adress	Name
	40000	1000	1500	Statusword
	0	0	0	Warning
	1	1	1	Error
	2	2	2	Preheat State
	3	3	3	Standby State
ugeschaltet.	4	4	4	Precharge State
	5	5	5	Ready State
	6	6	6	Active State "In Operation"
lot-Aus des giequellen vom	7	7	7	Safety relais triggered
s. Dies löst einen den alle	8	8	8	Smoke detector triggered
öht. Ab einem.	40001	1001	1501	heartbeat signal

7	8	9	10
Function Code	Number of Databytes	Databytes	Databytes
3	4	Statusword	

7	8	9	10
Function Code	Startregister	Startregister	Databytes
6	FA	0	Contrc



)as Profil dient zur Steueurng des Umrichters.

ıe converter can be controled over this profile.

	Beschreibung	Medium		
		PN		
		Modbus Adress (Standard)	PN-PN Adress (Standard)	I-Device Adress (Standard)
		44000	1000	1500
	Quittierung von Fehlern.	0	0	0
heat	Starten des Vorheizens. Die Kühlung wird gestartet. Die Umlaufpunmpe , der Wärmetauscher und ggf. die Heizung werden eingeschaltet.	1	1	1
ain	Starten des Vorladens. Der Zwischenkries wird vorgeladen und der Hauptschalter wird eingeschaltet.	2	2	2
nd are	Freigabe zum pulsen der primär IGBTs. Diese versorgen i.d.R.den Zwischenkreis und sind mit dem öffentlichen Netz verbunden.	3	3	3
to the	Freigabe zum pulsen der sekundär IGBTs. Diese sind i.d.R. mit den DC oder Insel Ports verbunden.	4	4	4
		5	5	5
		6	6	6
		7	7	7
		8	8	8
t1 to	Erwartet einen Wordwert der sich mit jedem (Bus) Zyklus ändert im Bereich			

7	8	9	10
Function Code	Startregister	Startregister	Databytes
6	FA	0	Contrc

7	8	9	10
Function Code	Startregister	Startregister	Number of Register
6	FA	0	0

	J	K
	Das Profil dient zur Steueurng des Umrichters.	
	The converter can be controled over this profile.	

	Beschreibung	
		Modbus Adress (Standard)
		44000
	Quittierung von Fehlern.	0
ılation pump, the heat d on.	Starten des Vorheizens. Die Kühlung wird gestartet. Die Umlaufpunmpe , der Wärmetauscher und ggf. die Heizung werden eingeschaltet.	1
oaded and the main	Starten des Vorladens. Der Zwischenkries wird vorgeladen und der Hauptschalter wird eingeschaltet.	2
pply the DC link and are	Freigabe zum pulsen der primär IGBTs. Diese versorgen i.d.R.den Zwischenkreis und sind mit dem öffentlichen Netz verbunden.	3
sually connected to the	Freigabe zum pulsen der sekundär IGBTs. Diese sind i.d.R. mit den DC oder Insel Ports verbunden.	4
		5
		6
		7
		8

the range of (16#1 to	Erwartet einen Wordwert der sich mit jedem (Bus) Zyklus ändert im Bereich von (16#1 bis 16#FFFF).	44001

7	8	9	10
Function Code	Startregister	Startregister	Number of Register
10	FA	0	0

7	8
Functioncode	Errorcode
128+Functioncode mirrored from client	16#01

11
Number of Register
2

11		12
Databytes		Databytes
Heartbeat		

11
Databytes
lword



Sourc

Name

11
Databytes
olword

11	12	13	14	15	16
Number of Register	Number of Databytes	Databytes	Databytes	Databytes	Databytes
2	4	Controlword		Heartbeat	

L

Med

P

PN-PN A

(Stand

100

100

11
Number of Register
2

Legend:

Readslot Nr:	Name	Profile
1		Profile_converter_status_1
2		Profile_converter_status_2
3		Profile_converter_status_3
4		Profile_String_status
5		Profile_String_status
6		Profile_String_status
7		Profile_String_status
8		Profile_String_status
9		Profile_String_status
10		Profile_String_status
11		Profile_String_status
12		Profile_String_status
13		Profile_String_status
14		Profile_String_status
15		Profile_String_status
16		Profile_String_status
17		Profile_String_status
249		

Writeslot Nr.:		
250		Profile_converter_control
251		

252		
253		
254		
255		
256		
257		
...		
499		

Beschreibung	Description
Umrichter 1	Converter 1 status
Umrichter 1	Converter 1 status
Umrichter 1	Converter 1 status
Batterieschrank 1 und 2 an DCDC 1	batteryrack 1&2 on DCDC1 status
Batterieschrank 3 an DCDC 1	batteryrack 3 on DCDC1 status
Batterieschrank 4 und 5 an DCDC 2	batteryrack 4&5 on DCDC2 status
Batterieschrank 6 und 7 an DCDC 3	batteryrack 6&7 on DCDC3 status
Batterieschrank 8 an DCDC 3	batteryrack 8 on DCDC3 status
Batterieschrank 9 und 10 an DCDC 4	batteryrack 9&10 on DCDC4 status
Batterieschrank 11 an DCDC 4	batteryrack 11 on DCDC4 status
Batterieschrank 12 und 13 an DCDC 6	batteryrack 12&13 on DCDC6 status
Batterieschrank 14 an DCDC 6	batteryrack 14 on DCDC6 status
Batterieschrank 15 und 16 an DCDC 7	batteryrack 15&16 on DCDC7 status
Batterieschrank 17 an DCDC 7	batteryrack 17 on DCDC7 status
Batterieschrank 18 und 19 an DCDC 8	batteryrack 18&19 on DCDC8 status
Batterieschrank 20 und 21 an DCDC 9	batteryrack 20&21 on DCDC9 status
Batterieschrank 22 an DCDC 9	batteryrack 22 on DCDC9 status

Umrichter 1	Converter 1 control

Changes to last version | Header

	Modbus Adress (Standard)	PN-PN Modul	PN-PN Adress (Standard)	I-Device
Start	40000	1:#OUT 32 Byte	1000	
End	40015		1031	
Start	40016	2:#OUT 32 Byte	1032	
End	40031		1063	
Start	40032	3:#OUT 32 Byte	1064	
End	40047		1095	
Start	40048	4:#OUT 32 Byte	1096	
End	40063		1127	
Start	40064	5:#OUT 32 Byte	1128	
End	40079		1159	
Start	40080	6:#OUT 32 Byte	1160	
End	40095		1191	
Start	40096	7:#OUT 32 Byte	1192	
End	40111		1223	
Start	40112	8:#OUT 32 Byte	1224	
End	40127		1255	
Start	40128	9:#OUT 32 Byte	1256	
End	40143		1287	
Start	40144	10:#OUT 32 Byte	1288	
End	40159		1319	
Start	40160	11:#OUT 32 Byte	1320	
End	40175		1351	
Start	40176	12:#OUT 32 Byte	1352	
End	40191		1383	
Start	40192	13:#OUT 32 Byte	1384	
End	40207		1415	
Start	40208	14:#OUT 32 Byte	1416	
End	40223		1447	
Start	40224	15:#OUT 32 Byte	1448	
End	40239		1479	
Start	40240	16:#OUT 32 Byte	1480	
End	40255		1511	
Start	40256	17:#OUT 32 Byte	1512	
End	40271		1543	
	43984-43999			

	Modbus Adress (Standard)	PN-PN Modul	PN-PN Adresse (Stadard)	I-Device
Start	44000	1:#IN 32 Byte	1000	
End	44015		1031	
Start	44016	1:#IN 32 Byte	1032	
End	44031		1063	

Start	44032	1:#IN 32 Byte	1064	
End	44047		1095	
Start	44048	1:#IN 32 Byte	1096	
End	44063		1127	
Start	44064	1:#IN 32 Byte	1128	
End	44079		1159	
Start	44080	1:#IN 32 Byte	1160	
End	44095		1191	
Start	44096	1:#IN 32 Byte	1192	
End	44111		1223	
Start	44112	1:#IN 32 Byte	1224	
End	44127		1255	
Start				
End				
	44000-49999			

I-Device Adress (Standard)
1500
1515
1516
1531
1532
1547
1548
1563
1564
1579
1580
1595
1596
1611
1612
1627
1628
1643
1644
1659
1660
1675
1676
1691
1692
1707
1708
1723
1724
1739
1740
1755
1756
1771

I-Device Adress (Standard)
1500
1515
1516
1531

1532
1547
1548
1563
1564
1579
1580
1595
1596
1611
1612
1627

Legend:		Changes to last version	Header	
		Profilbeschreibung:		
		Profile description:		
		Source		
Way:				
Structurename:		**s_profile_freqcon_status_1**		
Byte	**Bit**	**Name**	**Datatyp**	**Range**
0		**Statusword**	WORD	0 - 65535
	0	Warning		True/False
	1	Error		True/False
	2	Preheat State		True/False
	3	Standby State		True/False
	4	Precharge State		True/False
	5	Ready State		True/False
	6	Active State "In Operation"		True/False
	7	Safety relais triggered		True/False
1	8	Smoke detector triggered		True/False
	9	main switch on		True/False
	10			
	11			
	12			
	13			True/False
	14			True/False
	15			True/False
2		heartbeat signal	WORD	0 - 16383
3				
4		Control Cabinet temperature	SINT	-128 - 127
5		Power Cabinet temperature	SINT	-128 - 127
6		Add.1 Cabinet temperature	SINT	-128 - 127
7				
8		Cooling water temperature	SINT	-128 - 127
9		outside Temperature (Optional)		
10		room temperature (optional)		
11				
12				
13				
14		actual records	INT	0-500
15				
16		record	INT	1-500

17		record	INT	1-500
18		record error number	UDINT	
19				
20				
21				
22		record error_level	INT	0-4
23				
24		record Timestamp_Date	UDINT	0 - 65535
25				
26				
27				
28		record Timestamp_Time	UDINT	0 - 86399999
29				
30				
31				

Scaling	Resolution	Unit
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
1	0 - 16383	no
1	-128 - 127	°C
1	-128 - 127	°C
1	-128 - 127	°C
1	-128 - 127	°C
1	0-500	no
1	1-500	no

1	1-500	no
1		no
1	0-4	no
1	0 - 65535	no
1	0 - 86399999	no

Description
A warning message is active.
An error has occurred.
The inverter is heated up to operating temperature.
The inverter is at operating temperature.
The DC Link is precharged and the main switch is switched on.
The inverter is ready to switch on the IGBTs.
The inverter is in operation. The IGBTs are pulsing.
The safety chain was interrupted. Except for the control energy, all energy sources are disconnected from the inverter.
The smoke alarm has triggered. The inverter switches off. Except for the control energy, all energy sources are disconnected from the inverter.
main switch is switched on
The heartbeat signal is increased by the value 1 in each cycle.The counter will be reset to 0 by a value of 16383.
Cabinet temperature of the control cabinet +CTRL.
Cabinet temperature of the +CON cabinet.
Cabinet temperature of the first additional cabinet e.g. +IND or +CIR
Cooling water temperature.
Shows the number of currently pending errors.
Via the variable "request an alarm record" in the profile "Profile Freqcon Con" the error entries 1-500 can be actively queried. Example: "actual records" reports that there are three errors. The second fault should be queried. For this purpose "request an alarm

three errors. The second fault should be queried. For this purpose "request an alarm record" =2 is set. With the next processing cycle "records" is set =2. "Records" mirrors the current request.
An error number is assigned to each error. This number is divided into the category, the error location in the program and a consecutive number.
The error level of the currently queried error entry. 2 = Warning 3 = Switch off the power electronics, open the main switch Cooling continues. 4 = Switching off the power electronics, opening the main switch. Cooling is switched off.
Date on which the error occurred. DATE#1990-01-01 --> (W#16#0000) D#2168-12-31--> (W#16#FF62) A variable with type DATE is stored in a word as an unsigned fixed point number. The content of this variable corresponds to the number of days elapsed since 1.1.1992.
Time at which the error occurred. TIME_OF_DAY#00:00:00 --> (W#16#0000_0000) TOD#23:5:.59.999 -->(W#16#0526_5BFF) This type occupies a double word and contains the number of milliseconds since the beginning of the day (0:00).

Das Profil gibt Statuserte des gesamte

The profile can be used to monitor the

Beschreibung	**Modbus Adress (Standard)**
	40000
Eine Warnmeldung ist aktiv.	… .0
Ein Fehler ist aufgetreten.	… .1
Der Umrichter wird auf Betriebstemperatur aufgeheizt.	… .2
Der Umrichter ist auf Betriebstemperatur.	… .3
Der Zwischenkreis wird vorgeladen und der Hauptschalter zugeschaltet.	… .4
Der Umrichter ist Bereit, die IGBTs einzuschalten.	… .5
Der Umrichter ist in Betrieb. Die IGBTs pulsen.	… .6
Die Sicherheitskette wurde unterbrochen. Dies löst einen Not-Aus des Umrichters aus.Bis auf die Steuerenergie, werden alle Energiequellen vom Umrichter getrennt.	… .7
Der Rauchmelder hat ausgelöst. Der Umrichter Schaltet aus. Dies löst einen Not-Aus des Umrichters aus.Bis auf die Steuerenergie, werden alle Energiequellen vom Umrichter getrennt.	… .8
Hauptschalter ist eingeschaltet	… .9
	… .10
	… .11
	… .12
Das Heartbeatsignal wird in jedem Zyklus um den Wert 1 erhöht. Ab einem . Wert von 16383 wird der Zähler auf 0 resettet.	40001
Schaltschranktemperatur des Steuerungsschranks +CTRL.	40002
Schaltschranktemperatur des +CON Schranks.	
Schaltschranktemperatur optioneller Temperaturüberwachung für z.B. +IND oder +CIR Schrank. Kann frei vergeben werden.	40003
Kühlwassertemperatur.	40004
	40005
	40006
Zeigt die Anzahl aktuell anstehender Fehler.	40007
Über die Variabel "request an alarm record" im Profil "Profile Freqcon Con" können die Fehler Einträge 1-500 aktiv abgefragt werden. Beispiel: "actual records" meldet, das drei Strörungen vorliegen. Es soll die zweite Störung abgefragt werden. Hierzu wird	40008

drei Störungen vorliegen. Es soll die zweite Störung abgefragt werden. Hierzu wird "request an alarm record" =2 gesetzt. Mit dem nächsten Bearbeitungszyklus wird "records" =2 gesetzt. "Records" spiegelt die aktuelle anfrage.	
Jedem Fehler ist eine Errornummer zugeordnet. Diese unterteilt sich in die Kategorie, den Fehlerort im Programm und einer laufenden Nummer.	40009 40010
Das Errorlevel des aktuell abgefragten Fehlereintrages. 2 = Warnung 3 = Abschaltung der Leistungselektronik, öffnen des Hauptschalters. Kühlung läuft weiter. 4 = Abschaltung der Leistungselektronik, öffnen des Hauptschalters. Kühlung wird abgeschaltet.	40011
Datum, an dem der Fehler auftrat. DATE#1990-01-01 --> (W#16#0000) D#2168-12-31--> (W#16#FF62) Eine Variable mit Typ DATE wird in einem Wort als vorzeichenlose Festpunktzahl abgelegt. Der Inhalt dieser Variable entspricht der Anzahl der seid dem 1.1.1992 verstrichenen Tage.	40012 40013
Zeit, an dem der Fehler auftrat. TIME_OF_DAY#00:00:00 --> (W#16#0000_0000) TOD#23:5:.59.999 -->(W#16#0526_5BFF) Dieser Typ belegt ein Doppelwort und beinhaltet die anzahl der Millisekunden seid Tagesbeginn (0:00 Uhr).	40014 40015

en Umrichters aus.

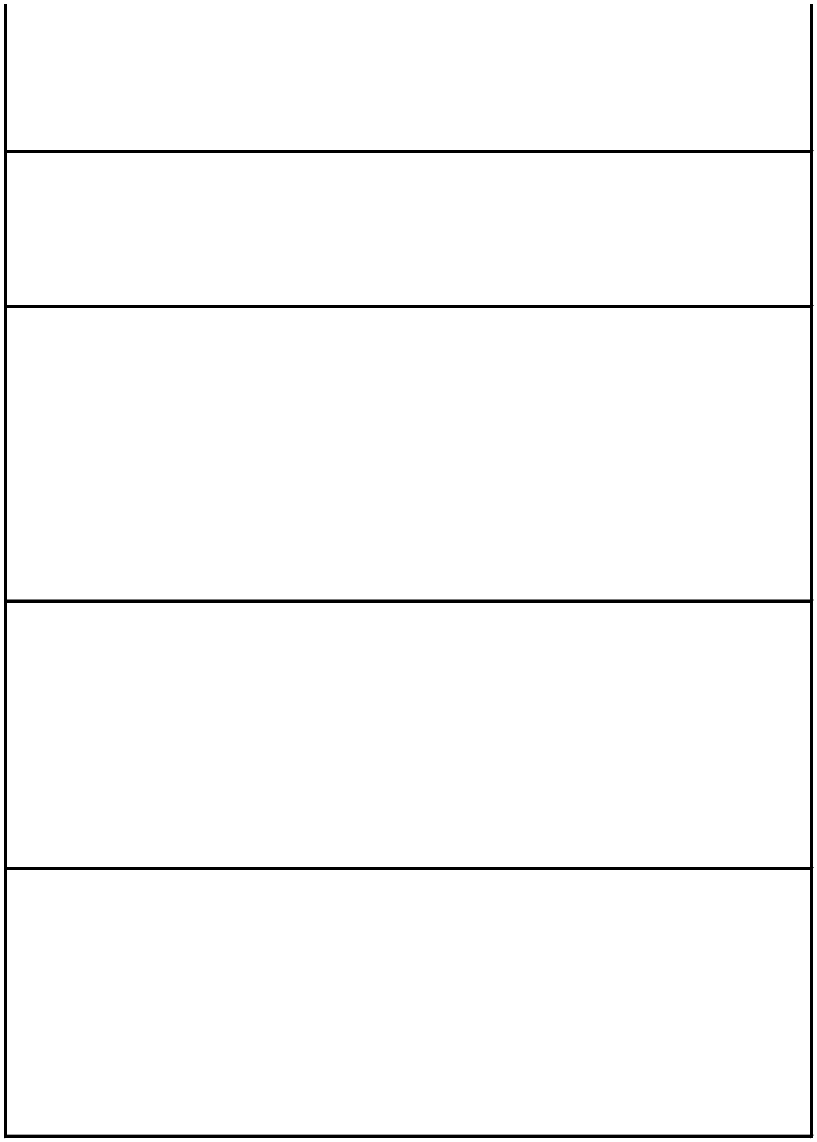
e whole Converter.

Medium		Target
PN		
PN-PN Adress (Standard)	**I-Device Adress (Standard)**	**Name**
1000	1500	**Statusword**
… .0	… .0	Warning
… .1	… .1	Error
… .2	… .2	Preheat State
… .3	… .3	Standby State
… .4	… .4	Precharge State
… .5	… .5	Ready State
… .6	… .6	Active State "In Operation"
… .7	… .7	Safety relais triggered
… .8	… .8	Smoke detector triggered
… .9	… .9	
… .10	… .10	
… .11	… .11	
… .12	… .12	
1001	1501	heartbeat signal
1002	1502	Control Cabinet temperature
		Power Cabinet temperature
1003	1503	Add. Cabinet temperature
1004	1504	Cooling water temperature
1005	1505	
1006	1506	
1007	1507	actual records
1008	1508	record

		record
1009	1509	record error number
1010	1510	
1011	1511	record error_level
1012	1512	record Timestamp_Date
1013	1513	
1014	1514	record Timestamp_Time
1015	1515	

Test Date:
Testing by changing the value and comparing with customer
working as intended:
instance 1
yes
yes
yes
yes
yes
yes
yes
yes
yes
yes
yes

instance 2
yes
yes
yes
yes
yes
yes
yes
yes
yes
yes
yes



Legend:	Changes to last version	Header

Profilbeschreibung:	
Profile description:	

	Source
Way:	
Structurename:	s_profile_freqcon_status_2

Byte	Bit	Name	Datatyp	Range	Scaling
0		**Statusword**	WORD	0 - 65535	no
	0			True/False	no
	1			True/False	no
	2			True/False	no
	3			True/False	no
	4			True/False	no
	5			True/False	no
	6			True/False	no
	7			True/False	no
1	8			True/False	no
	9			True/False	no
	10			True/False	no
	11			True/False	no
	12			True/False	no
	13			True/False	no
	14			True/False	no
	15			True/False	no
2		IGBT 1 temperature	SINT	-128 - 127	1
3		Inductor 1 temperature	SINT	-128 - 127	1
4					
5		IGBT 2 temperature	SINT	-128 - 127	1
6		Inductor 2 temperature	SINT	-128 - 127	1
7					
8		IGBT 3 temperature	SINT	-128 - 127	1
9		Inductor 3 temperature	SINT	-128 - 127	1
10					
11		IGBT 4 temperature	SINT	-128 - 127	1
12		Inductor 4 temperature	SINT	-128 - 127	1
13					
14		IGBT 5 temperature	SINT	-128 - 127	1
15		Inductor 5 temperature	SINT	-128 - 127	1
16					
17					
18		grid frequency	UINT	0 - 65535	1000
19					
20		IGBT 1 RMS Voltage *1	INT	-32768 - 32767	10
21					
22		IGBT 2 RMS Voltage *1	INT	-32768 - 32767	10
23					

24		IGBT 3 RMS Voltage *1	INT	-32768 - 32767	10
25					
26		IGBT 1 RMS Current *1	INT	-32768 - 32767	10
27					
28		IGBT 2 RMS Current *1	INT	-32768 - 32767	10
29					
30		IGBT 3 RMS Current *1	INT	-32768 - 32767	10
31					

*1: The voltage is internal a REAL Value. The Origanal REAL Value is multiplied with the ScaleFactor an

Resolution	Unit
no	no
no	no
no	no
no	no
no	no
no	no
no	no
no	no
no	no
no	no
no	no
no	no
no	no
no	no
no	no
no	no
no	no
no	no
-128 - 127	°C
-128 - 127	°C
-128 - 127	°C
-128 - 127	°C
-128 - 127	°C
-128 - 127	°C
-128 - 127	°C
-128 - 127	°C
-128 - 127	°C
-128 - 127	°C
0 - 65.535	Hz
-3276,8 - 3276.7	V
-3276,8 - 3276.7	V

-3276,8 - 3276.7	V
-3276,8 - 3276.7	V
-3276,8 - 3276.7	V
-3276,8 - 3276.7	V

ıd then turned into a rounded IN

Description
This status word is freely assignable for specific PIII states such as hardware error or sttus messages of individual IGBTs.
Temperature IGBT 1.
Temperature coil 1.
Temperature IGBT 2.
Temperature coil 2.
Temperature IGBT 3.
Temperature coil 3.
Temperature IGBT 4.
Temperature coil 4.
Temperature IGBT 5.
Temperature coil 5.
actual grid frequency
Voltage IGBT 1 AC Phase 1
Voltage IGBT 2 AC Phase 2

Voltage IGBT 3 AC Phase 3
Current IGBT 1 AC Phase 1
Current IGBT 2 AC Phase 2
Current IGBT 3 AC Phase 3

ITEGER Vallue.

Das Profil gibt Statuserte eines einzelnen IGBT Ports

The profile can be used to monitor a single IGBT p

Beschreibung
Dieses Statuswort ist frei belegbar für spezifische PIII Stati wie z.B. Hardware Error oder Sttusmeldungen einzelner IGBTs.
Temperatur IGBT 1.
Temperatur Drossel 1.
Temperatur IGBT 2.
Temperatur Drossel 2.
Temperatur IGBT 3.
Temperatur Drossel 3.
Temperatur IGBT 4.
Temperatur Drossel 4.
Temperatur IGBT 5.
Temperatur Drossel 5.

Spannung am IGBT 1

Spannung am IGBT 2

Spannung am IGBT 3
Strom am IGBT 1
Strom am IGBT 2
Strom am IGBT 3

s aus.

ort.

Medium			Target
PN			
Modbus Adress (Standard)	**PN-PN Adress (Standard)**	**I-Device Adress (Standard)**	**Name**
40000	1032	1532	**Statusword**
… .0	… .0	… .0	
… .1	… .1	… .1	
… .2	… .2	… .2	
… .3	… .3	… .3	
… .4	… .4	… .4	
… .5	… .5	… .5	
… .6	… .6	… .6	
… .7	… .7	… .7	
… .8	… .8	… .8	
40001	1033	1533	
40002	1034	1534	
40003	1035	1535	
40004	1036	1536	
40005	1037	1537	
40006	1038	1538	
40007	1039	1539	
40008	1040	1540	
40009	1041	1541	
40010	1042	1542	
40011	1043	1543	

40012	1044	1544	
40013	1045	1545	
40014	1046	1546	
40015	1047	1547	

Test Date: 12.01.2023
Testing by changing the value and comparing with customer
working as intended:
instance 1

yes
yes
yes
yes

instance 2

yes
yes
yes
yes

Legend:	Changes to last version	Header
Profilbeschreibung:		
Profile description:		

	Source
Way:	
Structurename:	**s_profile_freqcon_status_1**

Byte	Bit	Name	Datatyp	Range
0		**Statusword**	WORD	0 - 65535
	0	available		True/False
	1	PRL_active		True/False
	2			True/False
	3			True/False
	4			True/False
	5			True/False
	6			True/False
	7			True/False
1	8			True/False
	9			True/False
	10			True/False
	11			True/False
	12			True/False
	13			True/False
	14			True/False
	15			True/False
2		active_power	INT	-32768 - 32767
3				
4		reactive_power	INT	-32768 - 32767
5				
6		SOC	INT	-32768 - 32767
7				
8		SOH	INT	-32768 - 32767
9				
10		charge_power_max	INT	-32768 - 32767
11				
12		discharge_power_max	INT	-32768 - 32767
13				
14		charge_energy	INT	-32768 - 32767
15				
16		discharge_energy	INT	-32768 - 32767
17				
18				
19				
20				

21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				

Scaling	Resolution	Unit
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
10	-3276.8 - 3276.7	kW
10	-3276.8 - 3276.7	KVAr
10	-3276.8 - 3276.7	%
10	-3276.8 - 3276.7	%
10	-3276.8 - 3276.7	kW
10	-3276.8 - 3276.7	kW
10	-3276.8 - 3276.7	kWh
10	-3276.8 - 3276.7	kWh

Description
"1" means the inverter is available for setpoint demand
PRL is active
actual active power >0 discharge to grid <0 charge from grid
actual reactive power
State of charge 0 means storage empty 100 means fully charged
not used
maximum power demand for charging
maximum power demand for discharging
available charge energy
available discharge energy

Beschreibung	Modbus Adress (Standard)
	40000
„1“ bedeutet verfügbar für OFE-Vorgabe (Sollwert Entladeleistung und Sollwert DV-Abschaltung), d.h. weder „Handbetrieb“ noch „gestört“ noch „Wartung“	… .0
PRL Funktion ist aktiv	… .1
	… .2
	… .3
	… .4
	… .5
	… .6
	… .7
	… .8
>0 Entladung (nach Wechselrichter-&Ausspeicherverlusten, vor Trafoverlusten); <0: Beladung (vor Wechselrichter-&Einspeicherverlusten, nach Trafoverlusten)	40001
	40002
„0%“ bedeutet Speicher entleert, „100%“ bedeutet Speicher voll, jeweils bezogen auf die nutzbare Speicherkapazität	40003
nicht verwendet	40004
Vor Wechselrichter-&Einspeicherverlusten, nach Trafoverlusten, ohne Batterieeigenverbrauch; Die maximale Ladeladeleistung reduziert sich im	40005
Nach Wechselrichter-&Ausspeicherverlusten, vor Trafoverlusten; Die maximale Entladeladeleistung reduziert sich im Falle technischer	40006
verfügbare Ladeenergie	40007
verfügbare Entladeenergie	40008
	40009
	40010

	40010
	40011
	40012
	40013
	40014
	40015

Medium	
PN	
PN-PN Adress (Standard)	**I-Device Adress (Standard)**
1032	1532
… .0	… .0
… .1	… .1
… .2	… .2
… .3	… .3
… .4	… .4
… .5	… .5
… .6	… .6
… .7	… .7
… .8	… .8
1033	1533
1034	1534
1035	1535
1036	1536
1037	
1038	
1039	
1040	
1041	
1042	

1042	
1043	
1044	
1045	
1046	
1047	1

Target	**Test Date:**
	Testing by changing the value and comparing with customer
	working as intended:
Name	**instance 1**
Statusword	
	yes
	yes
	yes
	yes
	yes
	yes
	yes
	yes

instance 2	total
yes	yes
yes	yes
yes	yes
yes	yes
yes	yes
yes	yes
yes	yes
yes	yes
yes	yes

Legend:	Changes to last version	Header
Profilbeschreibung:		
Profile description:		

	Source			
Way:				
Structurename:	**s_profile_freqcon_status_1**			
Byte	**Bit**	**Name**	**Datatyp**	**Range**
0		**Statusword**	WORD	0 - 65535
	0	balancing demand		True/False
	1	balancing active		True/False
	2	Battery rack 1 connected		True/False
	3	Battery rack 2 connected		True/False
	4	Battery rack 1 error		True/False
	5	Battery rack 2 error		True/False
	6	Smoke detector triggered battery rack 1		True/False
	7	Smoke detector triggered battery rack 2		True/False
1	8	gas alarm battery rack 1		True/False
	9	gas alarm battery rack 2		True/False
	10			True/False
	11			True/False
	12			True/False
	13			True/False
	14			True/False
	15			True/False
2 3		current _1	INT	-32768 - 32767
4 5		voltage_1	INT	-32768 - 32767
6 7		cell_voltage_min_1	INT	-32768 - 32767
8 9		cell_voltage_max_1	INT	-32768 - 32767
10 11		cell_temp_min_1	INT	-32768 - 32767
12 13		cell_temp_max_1	INT	-32768 - 32767
14 15		SOC_1	INT	-32768 - 32767

16		current _2	INT	-32768 - 32767
17				
18		voltage_2	INT	-32768 - 32767
19				
20		cell_voltage_min_2	INT	-32768 - 32767
21				
22		cell_voltage_max_2	INT	-32768 - 32767
23				
24		cell_temp_min_2	INT	-32768 - 32767
25				
26		cell_temp_max_2	INT	-32768 - 32767
27				
28		SOC_2	INT	-32768 - 32767
29				
30		IGBT 1 temperature	SINT	-128 - 127
31		Inductor 1 temperature	SINT	-128 - 127

Scaling	Resolution	Unit
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
10	-3276.8 - 3276.7	A
10	-3276.8 - 3276.7	V
10	-3276.8 - 3276.7	V
10	-3276.8 - 3276.7	V
10	-3276.8 - 3276.7	degC
10	-3276.8 - 3276.7	degC
10	-3276.8 - 3276.7	%

10	-3276.8 - 3276.7	A
10	-3276.8 - 3276.7	V
10	-3276.8 - 3276.7	V
10	-3276.8 - 3276.7	V
10	-3276.8 - 3276.7	degC
10	-3276.8 - 3276.7	degC
10	-3276.8 - 3276.7	%
1	-128 - 127	°C
1	-128 - 127	°C

Description
Will be acitve if the converter hasnt balanced for a long time. Customer to either initate balancing through power setpoint or the enable balancing control bit.
balancing is active
battery rack 1 is connected and available for discharging and charging
battery rack 2 is connected and available for discharging and charging
battery rack 1 is disconnected and has an error
battery rack 2 is disconnected and has an error
The smoke alarm has triggered. The inverter switches off. Except for the control energy, all energy sources are disconnected from the inverter.
The smoke alarm has triggered. The inverter switches off. Except for the control energy, all energy sources are disconnected from the inverter.
The gas alarm has triggered. The inverter switches off. Except for the control energy, all energy sources are disconnected from the inverter.
The gas alarm has triggered. The inverter switches off. Except for the control energy, all energy sources are disconnected from the inverter.
Current of this Rack
Total voltage of this Rack
minimum cell voltage
maximum cell voltage
minimum temperature
maximum temperature
state of charge

Current of this Rack
Total voltage of this Rack
minimum cell voltage
maximum cell voltage
minimum temperature
maximum temperature
state of charge
Temperature IGBT for this rack
Temperature coil for this rack

Beschreibung	Modbus Adress (Standard)
	40000
	… .0
balancing ist aktiv	… .1
Batterie 1 is verbunden mit dem DC-Port	… .2
Batterie 2 is verbunden mit dem DC-Port	… .3
	… .4
	… .5
Der Rauchmelder hat ausgelöst. Der Umrichter schaltet aus. Dies löst einen Not-Aus des Umrichters aus.Bis auf die Steuerenergie, werden alle Energiequellen vom Umrichter getrennt.	… .6
Der Rauchmelder hat ausgelöst. Der Umrichter schaltet aus. Dies löst einen Not-Aus des Umrichters aus.Bis auf die Steuerenergie, werden alle Energiequellen vom Umrichter getrennt.	… .7
Der Gasalarm hat ausgelöst. Der Umrichter schaltet aus. Dies löst einen Not-Aus des Umrichters aus.Bis auf die Steuerenergie, werden alle Energiequellen vom Umrichter getrennt.	… .8
Der Gasalarm hat ausgelöst. Der Umrichter schaltet aus. Dies löst einen Not-Aus des Umrichters aus.Bis auf die Steuerenergie, werden alle Energiequellen vom Umrichter getrennt.	
	40001
	40002
	40003
	40004
	40005
	40006
	40007

	40008
	40009
	40010
	40011
	40012
	40013
	40014
Temperatur IGBT für diesen Batterieschrank	40015
Temperatur Drossel für diesen Batterieschrank	

Das Profil gibt Statuswerte für übergeordnete Steuer und Regeleinrichtingen w

The profile outputs status values for higher-level control devices such as pa

Medium	
PN	
PN-PN Adress (Standard)	**I-Device Adress (Standard)**
1032	1532
… .0	… .0
… .1	… .1
… .2	… .2
… .3	… .3
… .4	… .4
… .5	… .5
… .6	… .6
… .7	… .7
… .8	… .8
1033	1533
1034	1534
1035	1535
1036	1536
1037	
1038	
1039	

1040	
1041	
1042	
1043	
1044	
1045	
1046	
1047	1

ie z.B. Parkregller aus.

arking controllers.

Target	Test Date: 12.01.2023				
	Testing by changing the value and comparing with customer				
	working as intended:				
Name	instance 1	instance 2	instance 3	instance 4	instance 5
Statusword					
	yes	yes	yes	yes	yes
	yes	yes	yes	yes	yes
	yes	yes	yes	yes	yes
	yes	yes	yes	yes	yes
	yes	yes	yes	yes	yes

	yes	yes	yes	yes	yes
	yes	yes	yes	yes	yes
	yes	yes	yes	yes	yes
	yes	yes	yes	yes	yes
	yes	yes	yes	yes	yes
	no, not read by cu	no, not read by c	no, not read by cus	no, not read by c	no, not read by cust

instance 6	instance 7	instance 8	instance 9	instance 10
yes	yes			
yes	yes			
yes	yes			
yes	yes			
yes	yes			

yes	yes			
yes	yes			
yes	yes			
yes	yes			
yes	yes			
no, not read by cu	no, not read by cu	no, not read by cu	no, not read by cu	no, not read by cus

instance 11	instance 12	instance 13	instance 14	instance 15

no, not read by custo	no, not read by cu	no, not read by cu	no, not read by cus	no, not read by custom

instance 16

no, not read by custo

Legend:	Changes to last version	Header
Profilbeschreibung:		
Profile description:		

	Target			
Way:				
Structurename:	**s_profile_freqcon_control_1**			
Byte	**Bit**	**Name**	**Datatyp**	**Range**
0		Controlword	WORD	0 - 65535
	0	Reset		True/False
	1	Enable pre-heating entire system		True/False
	2	Enable pre-charging DC-link		True/False
	3	Enable primary control mode(s)		True/False
	4	Enable Balancing DCDC 1		True/False
	5	Enable Balancing DCDC 2		True/False
	6	Enable Balancing DCDC 3		True/False
	7	Enable Balancing DCDC 4		True/False
1	8	Enable Balancing DCDC 5		True/False
	9	Enable Balancing DCDC 6		True/False
	10	Enable Balancing DCDC 7		True/False
	11	Enable Balancing DCDC 8		True/False
	12	Enable Balancing DCDC 9		True/False
	13	Startsignal from EMCS		True/False
	14			True/False
	15			True/False
2		heartbeat signal	WORD	0 - 16383
3				
4		Heartbeat timeout	INT	0..30
5				
6		request an alarm record	INT	0..500
7				
8		active power	INT	-10000 - 10000
9				
10		reactive power	INT	-10000 - 10000
11				

12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				

Scalingfactor	Resolution	Unit
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no	no	no
no		no
1		s
1		no
0.1	-1000.0 - 1000.0	kW
0.1	-1000.0 - 1000.0	kVAr

Description
Reset of errors.
Start the preheating. The cooling is started. The circulation pump, the heat exchanger and, if necessary, the heating are switched on.
Start the preload. The intermediate crystals are preloaded and the main switch is switched on.
Enable to pulse the primary IGBTs. These usually supply the DC link and are connected to the public grid.
Enable balancing of this DC port
Enable balancing of this DC port
Enable balancing of this DC port
Enable balancing of this DC port
Enable balancing of this DC port
Enable balancing of this DC port
Start signal to run the converter; 1 = start; 0 = stop
Expects a value that changes with each (bus) cycle in the range of (16#1 to 16#FFFF).
The TimeOut time specifies the time after which a communication error message appears if the heartbeat no longer changes.
Via the variable "request an alarm record" in the profile "Profile Freqcon Con" the error entries 0-500 can be actively queried. Example: "actual records" reports that there are three errors. The second fault should be queried. For this purpose "request an alarm record" =2 is set. With the next processing cycle the error entry is output via the profile "s_profile_freqcon_status_1_struct"
Active power setpoint input to the inverter.
Reactive power setpoint input to the inverter.

Das Profil dient zur Steueurng des Umrichters.

The converter can be controled over this profile.

Beschreibung	**Modbus Adress (Standard)**
	44000
Quittierung von Fehlern.	… .0
Starten des Vorheizens. Die Kühlung wird gestartet. Die Umlaufpunmpe , der Wärmetauscher und ggf. die Heizung werden eingeschaltet.	… .1
Starten des Vorladens. Der Zwischenkries wird vorgeladen und der Hauptschalter wird eingeschaltet.	… .2
Freigabe zum pulsen der primär IGBTs. Diese versorgen i.d.R.den Zwischenkreis und sind mit dem öffentlichen Netz verbunden.	… .3
	… .4
	… .5
	… .6
	… .7
	… .8
Erwartet einen Wordwert der sich mit jedem (Bus) Zyklus ändert im Bereich von (16#1 bis 16#FFFF).	44001
Die TimeOutZeit gibt an, nach welcher Zeit eine Kommunikations Fehlermeldung erscheint, wenn sich der Heartbeat nicht mehr ändert.	44002
Über die Variabel "request an alarm record" im Profil "Profile Freqcon Con" können die Fehler Einträge 0-500 aktiv abgefragt werden. Beispiel: "actual records" meldet, das drei Strörungen vorliegen. Es soll die zweite Störung abgefragt werden. Hierzu wird "request an alarm record" =2 gesetzt. Mit dem nächsten Bearbeitungszyklus wird der Feherleintrag über das Profil "s_profile_freqcon_status_1_struct" ausgegeben.	44003
Wirkleistungssollwertvorgabe an den Umrichter.	44004
Blindleistungssollwertvorgabe an den Umrichter.	44005

	44006
	44007
	44008
	44009
	44010
	44011
	44012
	44013
	44014
	44015

Medium		Source	Test Date: 12.0
PN			Testing by char
PN-PN Adress (Standard)	I-Device Adress (Standard)		working as inte
		Name	instance 1
1000	1500		
… .0	… .0		
… .1	… .1		
… .2	… .2		
… .3	… .3		
… .4	… .4		
… .5	… .5		
… .6	… .6		
… .7	… .7		
… .8	… .8		
1001	1501		
1002	1502		
1003	1503		
1004	1504		
1005	1505		

1006	1506		
1007	1507		
1008	1508		
1009	1509		
1010	1510		
1011	1511		
1012	1512		
1013	1513		
1014	1514		
1015	1515		

)1.2023
nging the valu
ended:
instance 2



Project documentation

created with

SIMARIS design

Version: 24.1.0 (2024-05-07)
Subrevision: 1218

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http://www.siemens.com/simaris

Master data

Project name:	Shell Crosswind Offshore
Project description:	BESS FQ 1MW 5MWh
Editor:	Freqcon_DG
Planning office:	Freqcon GmbH
Created at:	Wednesday, 4. September 2024
Changed at:	Tuesday, 8. October 2024

Customer data

City:	
Customer:	Statron AG

Comment:

Converter Container

Network parameters:

General	
Standard	IEC
Attitude of Site	< 1000 m

Medium Voltage	
Rated voltage	6.6 kV
Relative operating voltage at feeding point	100 %
Voltage factor c max	1.1
Voltage factor c min	1
Max./Min short-circuit power	92.71 / 92.71 MVA
Max./Min. short-circuit current	8.11 / 8.11 kA
Neutral System	Low-resistance
Relation R1/X1	0.2

Low Voltage	
Rated voltage	620 V
System configuration	TN-S
Frequency	50 Hz
Tolerable touch voltage	50 V
Ambient temperature of devices	30 °C
Voltage factor c max	1.1
Voltage factor c min	0.9
Base point of voltage drop calculation	Transformer-secondary terminals
Max. permissible voltage drop in network	8 %

Defined network modes for calculation and dimensioning:

Operating mode: Betriebsart 1

Starting point	Target point	Connection	Status
Transformer 18T1	LVMD 4	LVMD 4.1	On

List of devices:

Sources of feeding:

Transformers:

Designation	Type	Sn [kVA]	ukr [%]	Uprim [kV]/ Usec [V]	Pk [kW]	P0 [kW]	Vector group	Δu_transformer [%]	Air forced	Catalog Reference
Transformer 18T1		1,250	6	6.6/ 620	1.8	0.252	Dyn5	3.629	No	-

Output Δu_transformer [%] is independent from defined reference point for voltage drop calculation.

Switches/Fuses:

Circuit Breaker/Miniature circuit-breaker:

Place	Designation	Catalog Reference	In [A]	Icu/Icn [kA]	Icu/Icn [kA] required	Release type / characteristics	Quantity
CONV	-80Q1	3WL11122BB611AA2	1,250	42	17.603	ETU15B	1

Connections and line distribution:

Cable/Conductor Low voltage:

Designation	Type/ Profile [mm²]	Starting point / Target point	Ib [A] Iz [A]	Material	Length [m]	Isolation	Installation type / ftot	u [%] / Δu [%] / ∑ Δu [%]	θΔu [°C] / θlkmax [°C] / θlkmin [°C]	Number of runs
-	e.g. NYY, NYCWY, NYCY, NYKY 3x240/240/ 120	LVMD 4.1 LVMD 4	1,164.013 1,209	Cu	20	PVC70	C 1	96.12 0.253 0.253	55 20 80	3
-	e.g. NYY, NYCWY, NYCY, NYKY 3x300/300/ 150	LVMD 4 CONV	1,164.013 1,392	Cu	5	PVC70	C 1	96.06 0.055 0.308	55 20 80	3

Loads:

Stationary loads:

Designation	Place	Pn [kW]	In [A]	Un [V]	cos φ	ai	Phase connection	Type of load	Quantity
CONV	Inner zone	1,000	1,164.013	620	0.8	1	L1-L2-L3-N	inductive	1

Messages

Designation	Message
LVMD 4.1	Protective device required due to possible selectivity requirement

Personal protection against electric shock

All circuits of the project have a permissable break time ta-req > ta-cur and therefor fulfill the requirements for Personal protection against electric shock.

Disclaimer:

Dimensioned protection devices inside tap-off units of busbar trunking systems may not correspond to the actual available devices for those components. Please verify the dimensioning results in the device lists and correct them accordingly.

Symbols legend:

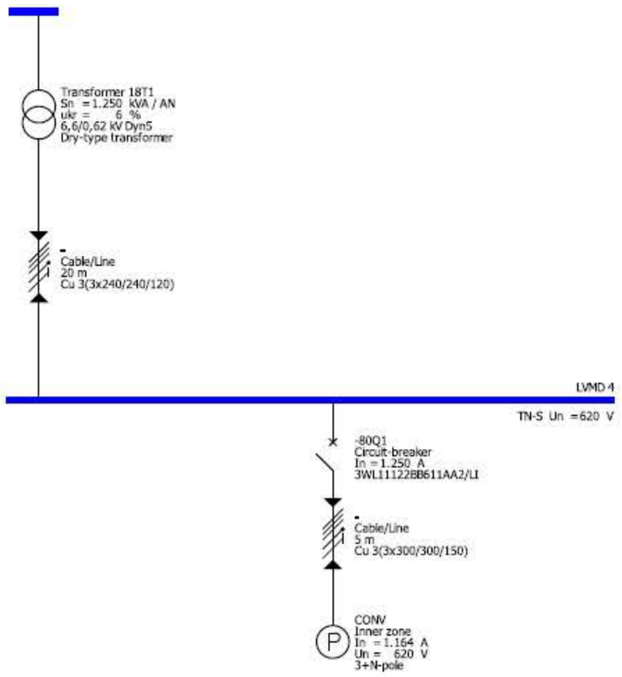
Symbol [Unit]	Description
ai	Load factor
cos φ	Power factor
ftot	Derating factor
Ia/In	Inrush current relation
Ib [A] Iz [A]	Operating current / allowed load capacity
Icu(fuse) [kA]	Rated ultimate short-circuit breaking capacity - fuse
Icu [kA] Icn [kA]	Rated ultimate short-circuit breaking capacity according to IEC 60947-2 Rated short-circuit breaking capacity according to IEC 60898-1
Icu/Icn [kA] required	the required breaking capacity of the protection device at installation location
Icw 1s [kA]	Rated short-time withstand current 1s
IΔn [mA]	Residual current - RCD
Ik1max	Maximum single phase short-circuit current
Ik1min	Minimum single phase short-circuit current
Ik3max	Maximum three phase short-circuit current
Ik3min	Minimum three phase short-circuit current
Ik1D [kA]	single pole uninterrupted short-circuit current
Ik3D [kA]	three pole uninterrupted short-circuit current
Ikmax/Ikmin	Relation of maximum and minimum short-circuit current
Ikre	Short-circuit current recovery factor
In [A]	Nominal current
P0 [kW]	No-load losses
Pk [kW]	Short-circuit losses
Pmech [kW]	mechan. Power
Pn [kW]	Active power
R0 N [mΩ]	Zero phase-sequence resistance phase-neutral conductor
R0 PE(N) [mΩ]	Zero phase-sequence resistance phase-PE(N) conductor
R0/R1	Resistance relation positive / zero phase-sequence system
r1 [%]	Relative value of positive phase-sequence resistance
R1 [mΩ]	Positive phase-sequence resistance

Sn [kVA]	Nominal apparent power
ukr [%]	Short-circuit voltage
Un [V]	Nominal voltage
Uprim [kV]	Primary voltage
Usec [V]	Secondary voltage
X0 N [mΩ]	Zero phase-sequence reactance phase-neutral conductor
X0 PE(N) [mΩ]	Zero phase-sequence reactance phase-PE(N) conductor
X0/X1	Reactance relation positive / zero phase-sequence system
X1 [mΩ]	Positive phase-sequence reactance
xd" [%]	Subtransient reactance
Z1 max	Maximum impedance in positive phase-sequence system
Z1 min	Minimum impedance in positive phase-sequence system
Zs	Faulted circuit impedance
Zs max	Maximum faulted circuit impedance
Zs min	Minimum faulted circuit impedance
u [%] / Δu [%] / ∑ Δu [%]	Relative nominal voltage / voltage drop between beginning and end of a section / cumulated voltage drop from the transformer primary/ secondary clamps to the specified point
θΔu [°C] / θIkmax [°C] / θIkmin [°C]	Conductor temperature of MV cable / Conductor temperature of LV cable for voltage drop / on beginning of short circuit / for disconnection
η	Efficiency
φ [°]	Phase angle
φ1 min/max [°]	Phase angle at Ik1 min/max
φ3 min/max [°]	Phase angle at Ik3 min/max

Standards for computation:

Title	IEC	HD	EN	DIN VDE
Low-voltage electrical installations *	60364-1…6	384		0100 – 100...710
Short-circuit currents in three-phase a.c. systems – Calculation of currents	60909		60909	0102
Short-circuit currents – calculation of effects Definitions and calculation methods	60865		60865	0103
Low-voltage switchgear and controlgear – Circuit-breakers	60947-2		60947-2	0660 – 101
Low-voltage switchgear and controlgear assemblies	61439		61439	0660 – 600
A method of temperature-rise assessment by extrapolation for partially type-tested assemblies (PTTA) of low-voltage switchgear and controlgear	60890+C	528 S2		0660 – 507
Electrical installations of buildings – Part 5-52: Selection and erection of electrical equipment – Wiring systems	60364-5-52	384		0298 – 4
Low-voltage electrical installations – Selection and erection of electrical equipment – Part 520: Wiring systems – Supplement 3: Current-carrying capacity of cables in three-phase distribution circuits at load currents with harmonic content				0100-520 Supplement 3
Electrical accessories – Circuit-breakers for overcurrent protection for household and similar installations – Circuit-breakers for a.c. operation	60898-1		60898-1	0641 – 11
High-voltage switchgear and controlgear – Alternating Current switch-fuse combinations	62271		62271	0671 – 105
Electrical installations of buildings – Selection and erection of electrical equipment – Isolation, switching and control	60364-5-53	60364-5-534		0100-534
Low-voltage electrical installations – Protection for safety – Protection against voltage disturbances and electromagnetic disturbances	60364-4-44	60364-4-443		0100-443
Protection against lightning – Part 1…4	62305-1…4			0185 – 1…4
Low-voltage surge protective devices - Surge protective devices connected to low-voltage power systems; Requirements and tests	61643-11			0675-6-11
Tests for electric cables under fire conditions – Circuit integrity	60331-11, 21		50200	0472-814 0482-200
Fire behaviour of building materials and building components — Part 12: Circuit integrity maintenance of electric cable systems, requirements and testing				4102-12 : 1998-11
Electrical equipment of electric road vehicles - Electric vehicles conductive charging system	61851		61851	

*) Special national conditions and deviations from IEC 60364-4-41: 2005 are not implemented and need to be considered!



Project name:	Shell Crosswind Offshore		
Planner: Freqcon_DG	View: Device parameters	Sheet: 1/1	
Design office: Freqcon GmbH	Location:		
Client: Statron AG	Created on: 4 Sep 2024	Changed on: 8 Oct 2024	

Selectivity evaluation

created with

SIMARIS design

Version: 24.1.0 (2024-05-07)
Subrevision: 1218

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http://www.siemens.com/simaris

Master data

Project name:	Shell Crosswind Offshore
Project description:	BESS FQ 1MW 5MWh
Editor:	Freqcon_DG
Planning office:	Freqcon GmbH
Created at:	Wednesday, 4. September 2024
Changed at:	Tuesday, 8. October 2024

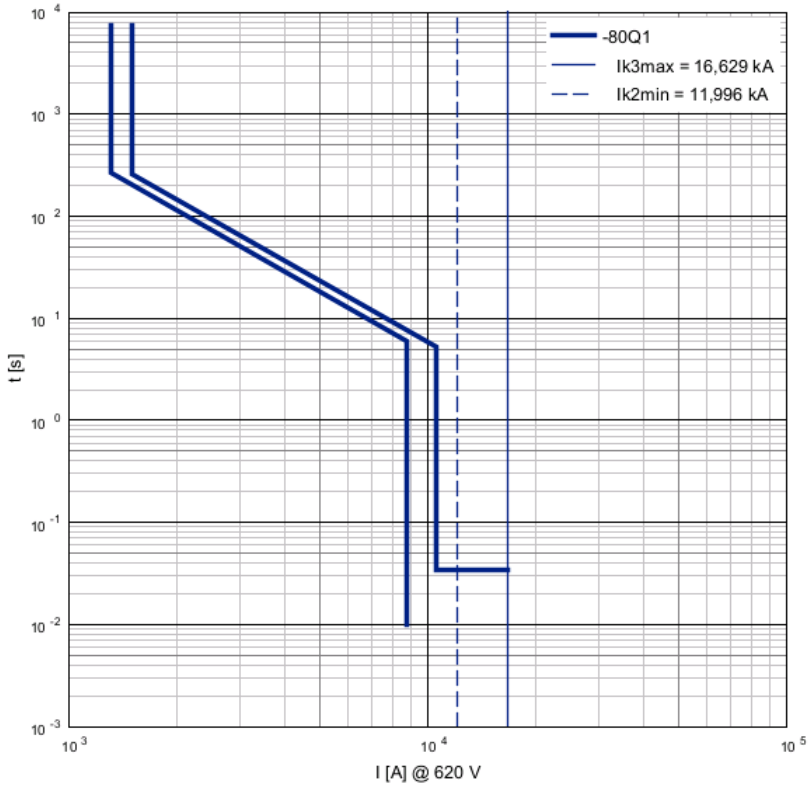
Customer data

City:	
Customer:	Statron AG

Comment:

Converter Container

Circuit name: **CONV**
Designation: **-80Q1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -80Q1

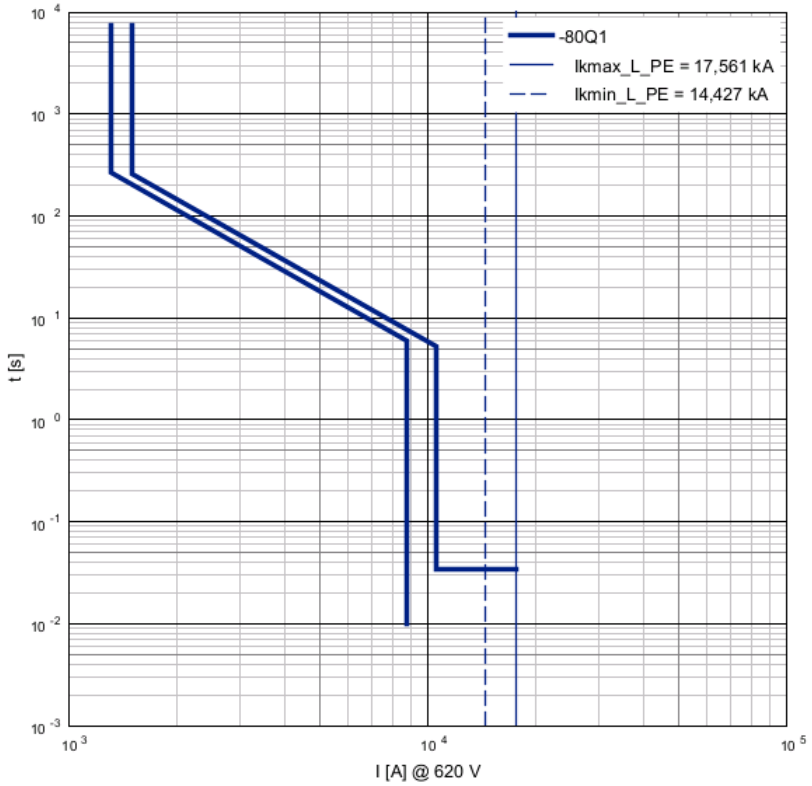
3WL11122BB611AA2

In 1,250 A

L Protection: On
Ir 1 x In corresp. 1,250 A
tr 10 s

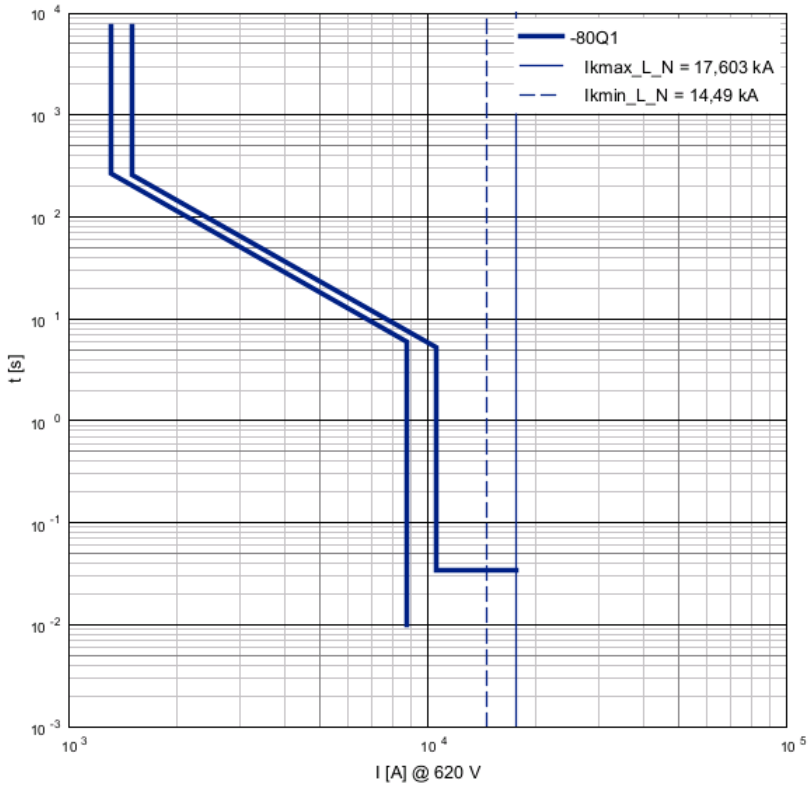
I Protection: On
Ii 7 x In corresp. 8,750 A

Short cut current: **Ik1-PE**
Selectivity evaluation:


-80Q1
Ikmax_L_PE = 17,561 kA
Ikmin_L_PE = 14,427 kA
t [s]
I [A] @ 620 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Project documentation

created with

SIMARIS design

Version: 24.1.0 (2024-05-07)
Subrevision: 1218

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Master data

Project name:	Shell Crosswind Offshore
Project description:	BESS FQ 1MW 5MWh
Editor:	Freqcon_DG
Planning office:	Freqcon GmbH
Created at:	Wednesday, 4. September 2024
Changed at:	Tuesday, 8. October 2024

Customer data

City:	
Customer:	Statron AG

Comment:

Converter Container

Network parameters:

General	
Standard	IEC
Attitude of Site	< 1000 m

Medium Voltage	
Rated voltage	6.6 kV
Relative operating voltage at feeding point	100 %
Voltage factor c max	1.1
Voltage factor c min	1
Max./Min short-circuit power	91.452 / 91.452 MVA
Max./Min. short-circuit current	8 / 8 kA
Neutral System	Low-resistance
Relation R1/X1	0.2

Low Voltage	
Rated voltage	400 V
System configuration	TN-S
Frequency	50 Hz
Tolerable touch voltage	50 V
Ambient temperature of devices	30 °C
Voltage factor c max	1.1
Voltage factor c min	0.9
Base point of voltage drop calculation	Transformer-secondary terminals
Max. permissible voltage drop in network	8 %

Defined network modes for calculation and dimensioning:

Operating mode: Betriebsart 1

Starting point	Target point	Connection	Status
NSHV 1	NSHV 2	NSUV 3.1	On
Supply	NSHV 1	NSHV 3.2	On

List of devices:

Sources of feeding:

Neutral Infeed:

Designation	Un [V]	In [A]	Imp. in positive phase system [mΩ] Z1 max Z1 min Zs max Zs min	Loop Impedance Zs [mΩ] φ [°] R0/R1 X0/X1 Ikmax/Ikmin	Short circuit current [kA] Ik3max Ik3min Ik1max Ik1min
Supply	400	160			50 50 50 50

Switches/Fuses:

Circuit Breaker/Miniature circuit-breaker:

Place	Designation	Catalog Reference	In [A]	Icu/Icn [kA]	Icu/Icn [kA] required	Release type / characteristics	Quantity
NSUV 3.1	=UNIT_01++CT+CTRL_1.3-84F2	5SY43327	32	10	4.291	C	1
230V 3WL	-187F1	5SY41137	13	10	2.054	C	1
400V/24V Power Supply	-101Q1	3RV20111DA25	3.2	100	4.291	TM	1
Cabinet Heating	-185F2	5SY41067	6	10	2.054	C	1
CIR Cabinet Fans	-183F2	5SY41107	10	10	2.054	C	1
Clima 1	-191F1	5SY43167	16	10	4.291	C	1
Clima 2	-191F2	5SY43167	16	10	4.291	C	1
CON Cabinet Fans	-183F1	5SY41167	16	10	2.054	C	1
CTRL Cabinet Fan	-185F1	5SY41107	10	10	2.054	C	1
Fan Heat Exchanger	-182Q1	3RV20111FA25	5	100	3.982	TM	1
Water Heating	-181Q2	3RV20111GA25	6.3	50	3.982	TM	1
Water Pump	-181Q1	3RV20111FA25	5	100	3.982	TM	1

Residual current circuit breaker with integral overload protection (RCBO):

Place	Designation	Catalog Reference	In [A]	Icn [kA] IΔn [mA]	Icu/Icn [kA] required	Release type / characteristics	Quantity
Cabinet Light / Socket	-190F3	5SU13547KK16	16	10 30	2.219	C	1

Connections and line distribution:

Cable/Conductor Low voltage:

Designation	Type/ Profile [mm²]	Starting point / Target point	Ib [A] Iz [A]	Material	Length [m]	Isolation	Installation type / ftot	u [%] / Δu [%] / ∑ Δu [%]	θΔu [°C] / θIkmax [°C] / θIkmin [°C]	Number of runs
K/L 3.2	e.g. NYY, NYCWY, NYCY, NYKY 3x10/10/10	NSHV 3.2 NSHV 1	51.81 57	Cu	30	PVC70	C 1	98.84 1.158 1.158	55 20 80	1
K/L 3.1	e.g. NYY, NYCWY, NYCY, NYKY 3x4/4/4	NSHV 1 NSHV 2	15.61 32	Cu	1	PVC70	C 1	98.81 0.028 1.187	55 20 80	1
-80W2	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 2 230V 3WL	0.57 19.5	Cu	6	PVC70	C 1	98.78 0.033 1.22	55 20 80	1
-	e.g. H07V2-U, H07V2-R, H07V2-K 3x1.5/1.5/1.5	NSHV 1 400V/24V Power Supply	2 22	Cu	1	PVC heat-resistant	C 1	98.83 0.01 1.168	55 20 80	1
-185W1	e.g. H07V2-U, H07V2-R, H07V2-K 1x1.5/1.5/1.5	NSHV 2 Cabinet Heating	3.48 24	Cu	3	PVC heat-resistant	C 1	98.71 0.101 1.288	55 20 80	1
K/L 3.6	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 1 Cabinet Light / Socket	16 19.5	Cu	1	PVC70	C 1	98.69 0.154 1.313	55 20 80	1
-281W1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 2 CIR Cabinet Fans	0.9 19.5	Cu	5	PVC70	C 1	98.77 0.043 1.23	55 20 80	1
-	e.g. NYY, NYCWY, NYCY, NYKY 3x1.5/1.5/1.5	NSHV 1 Clima 1	9.1 17.5	Cu	10	PVC70	C 1	98.4 0.438 1.597	55 20 80	1
-	e.g. NYY, NYCWY, NYCY, NYKY 3x1.5/1.5/1.5	NSHV 1 Clima 2	9.1 17.5	Cu	10	PVC70	C 1	98.4 0.438 1.597	55 20 80	1
-279W1	e.g. NYY, NYCWY, NYCY, NYKY	NSHV 2 CON Cabinet Fans	1.5 19.5	Cu	5	PVC70	C 1	98.74 0.072 1.259	55 20 80	1

Designation	Type/ Profile [mm²]	Starting point / Target point	Ib [A] Iz [A]	Material	Length [m]	Isolation	Installation type / ftot	u [%] / Δu [%] / ∑ Δu [%]	θΔu [°C] / θlkmax [°C] / θlkmin [°C]	Number of runs
	1x1.5/1.5/1.5									
-278W1	e.g. H07V2-U, H07V2-R, H07V2-K 1x1.5/1.5/1.5	NSHV 2 CTRL Cabinet Fan	0.17 24	Cu	5	PVC heat-resistant	C 1	98.8 0.008 1.195	55 20 80	1
-181W1	e.g. NYY, NYCWY, NYCY, NYKY 3x1.5/1.5/1.5	NSHV 2 Fan Heat Exchanger	2.5 17.5	Cu	8	PVC70	C 1	98.72 0.096 1.283	55 20 80	1
-181W1	e.g. NYY, NYCWY, NYCY, NYKY 3x1.5/1.5/1.5	NSHV 2 Water Heating	4.33 17.5	Cu	8	PVC70	C 1	98.65 0.167 1.354	55 20 80	1
-181W1	e.g. NYY, NYCWY, NYCY, NYKY 3x1.5/1.5/1.5	NSHV 2 Water Pump	3.8 17.5	Cu	8	PVC70	C 1	98.67 0.146 1.333	55 20 80	1

Loads:

Stationary loads:

Designation	Place	Pn [kW]	In [A]	Un [V]	cos φ	ai	Phase connection	Type of load	Quantity
230V 3WL	Inner zone	0.105	0.57	230	0.8	1	L2-N	inductive	1
400V/24V Power Supply	Inner zone	1.109	2	400	0.8	1	L1-L2-L3-N	inductive	1
Cabinet Heating	Inner zone	0.643	3.48	230	0.8	1	L1-N	inductive	1
Cabinet Light / Socket	Inner zone	2.956	16	230	0.8	1	L2-N	inductive	1
CIR Cabinet Fans	Inner zone	0.166	0.9	230	0.8	1	L2-N	inductive	1
Clima 1	Inner zone	5.044	9.1	400	0.8	1	L1-L2-L3-N	inductive	1
Clima 2	Inner zone	5.044	9.1	400	0.8	1	L1-L2-L3-N	inductive	1
CON Cabinet Fans	Inner zone	0.277	1.5	230	0.8	1	L1-N	inductive	1
CTRL Cabinet Fan	Inner zone	0.031	0.17	230	0.8	1	L3-N	inductive	1
Fan Heat Exchanger	Inner zone	1.386	2.5	400	0.8	1	L1-L2-L3-N	inductive	1
Water Heating	Inner zone	2.4	4.33	400	0.8	1	L1-L2-L3-N	inductive	1
Water Pump	Inner zone	2.106	3.8	400	0.8	1	L1-L2-L3-N	inductive	1

Messages

Designation	Message
NSHV 3.2	Protective device required due to possible selectivity requirement

Personal protection against electric shock

All circuits of the project have a permissable break time ta-req > ta-cur and therefor fulfill the requirements for Personal protection against electric shock.

Disclaimer:

Dimensioned protection devices inside tap-off units of busbar trunking systems may not correspond to the actual available devices for those components. Please verify the dimensioning results in the device lists and correct them accordingly.

Symbols legend:

Symbol [Unit]	Description
ai	Load factor
cos φ	Power factor
ftot	Derating factor
Ia/In	Inrush current relation
Ib [A] Iz [A]	Operating current / allowed load capacity
Icu(fuse) [kA]	Rated ultimate short-circuit breaking capacity - fuse
Icu [kA] Icn [kA]	Rated ultimate short-circuit breaking capacity according to IEC 60947-2 Rated short-circuit breaking capacity according to IEC 60898-1
Icu/Icn [kA] required	the required breaking capacity of the protection device at installation location
Icw 1s [kA]	Rated short-time withstand current 1s
IΔn [mA]	Residual current - RCD
Ik1max	Maximum single phase short-circuit current
Ik1min	Minimum single phase short-circuit current
Ik3max	Maximum three phase short-circuit current
Ik3min	Minimum three phase short-circuit current
Ik1D [kA]	single pole uninterrupted short-circuit current
Ik3D [kA]	three pole uninterrupted short-circuit current
Ikmax/Ikmin	Relation of maximum and minimum short-circuit current
Ikre	Short-circuit current recovery factor
In [A]	Nominal current
P0 [kW]	No-load losses
Pk [kW]	Short-circuit losses
Pmech [kW]	mechan. Power
Pn [kW]	Active power
R0 N [mΩ]	Zero phase-sequence resistance phase-neutral conductor
R0 PE(N) [mΩ]	Zero phase-sequence resistance phase-PE(N) conductor
R0/R1	Resistance relation positive / zero phase-sequence system
r1 [%]	Relative value of positive phase-sequence resistance
R1 [mΩ]	Positive phase-sequence resistance

Sn [kVA]	Nominal apparent power
ukr [%]	Short-circuit voltage
Un [V]	Nominal voltage
Uprim [kV]	Primary voltage
Usec [V]	Secondary voltage
X0 N [mΩ]	Zero phase-sequence reactance phase-neutral conductor
X0 PE(N) [mΩ]	Zero phase-sequence reactance phase-PE(N) conductor
X0/X1	Reactance relation positive / zero phase-sequence system
X1 [mΩ]	Positive phase-sequence reactance
xd" [%]	Subtransient reactance
Z1 max	Maximum impedance in positive phase-sequence system
Z1 min	Minimum impedance in positive phase-sequence system
Zs	Faulted circuit impedance
Zs max	Maximum faulted circuit impedance
Zs min	Minimum faulted circuit impedance
u [%] / Δu [%] / ∑ Δu [%]	Relative nominal voltage / voltage drop between beginning and end of a section / cumulated voltage drop from the transformer primary/ secondary clamps to the specified point
θΔu [°C] / θIkmax [°C] / θIkmin [°C]	Conductor temperature of MV cable / Conductor temperature of LV cable for voltage drop / on beginning of short circuit / for disconnection
η	Efficiency
φ [°]	Phase angle
φ1 min/max [°]	Phase angle at Ik1 min/max
φ3 min/max [°]	Phase angle at Ik3 min/max

Standards for computation:

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A method of temperature-rise assessment by extrapolation for partially type-tested assemblies (PTTA) of low-voltage switchgear and controlgear	60890+C	528 S2		0660 – 507
Electrical installations of buildings – Part 5-52: Selection and erection of electrical equipment – Wiring systems	60364-5-52	384		0298 – 4
Low-voltage electrical installations – Selection and erection of electrical equipment – Part 520: Wiring systems – Supplement 3: Current-carrying capacity of cables in three-phase distribution circuits at load currents with harmonic content				0100-520 Supplement 3
Electrical accessories – Circuit-breakers for overcurrent protection for household and similar installations – Circuit-breakers for a.c. operation	60898-1		60898-1	0641 – 11
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Electrical installations of buildings – Selection and erection of electrical equipment – Isolation, switching and control	60364-5-53	60364-5-534		0100-534
Low-voltage electrical installations – Protection for safety – Protection against voltage disturbances and electromagnetic disturbances	60364-4-44	60364-4-443		0100-443
Protection against lightning – Part 1…4	62305-1…4			0185 – 1…4
Low-voltage surge protective devices - Surge protective devices connected to low-voltage power systems; Requirements and tests	61643-11			0675-6-11
Tests for electric cables under fire conditions – Circuit integrity	60331-11, 21		50200	0472-814 0482-200
Fire behaviour of building materials and building components — Part 12: Circuit integrity maintenance of electric cable systems, requirements and testing				4102-12 : 1998-11
Electrical equipment of electric road vehicles - Electric vehicles conductive charging system	61851		61851	

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Supply
In = 160 A
Un = 400 V

K/L 3.2
Cable/Line
30 m
Cu (3x10/10/10)

NSHV 1
TN-S Un = 400 V

=UNIT_01+CT+CTRL_1.3-84F2
Miniature circuit-breaker
In = 32 A
5SY43327/C

K/L 3.1
Cable/Line
1 m
Cu (3x4/4/4)

-190F3
Miniature circuit-breaker
In = 16 A
5SU13547KK16/C

K/L 3.6
Cable/Line
1 m
Cu (1x1,5/1,5/1,5)

Cabinet Light / Socket
Inner zone
In = 16 A
Un = 230 V
1+N-pole

-101Q1
Circuit-breaker
In = 3,2 A
3RV20111DA25/LI

Cable/Line
1 m
Cu (3x1,5/1,5/1,5)

400V/24V Power Supply
Inner zone
In = 2 A
Un = 400 V
3+N-pole

-191F1
Miniature circuit-breaker
In = 16 A
5SY43167/C

Cable/Line
10 m
Cu (3x1,5/1,5/1,5)

Clima 1
Inner zone
In = 9,1 A
Un = 400 V
3+N-pole

-191F2
Miniature circuit-breaker
In = 16 A
5SY43167/C

Cable/Line
10 m
Cu (3x1,5/1,5/1,5)

Clima 2
Inner zone
In = 9,1 A
Un = 400 V
3+N-pole

NSHV 2
TN-S Un = 400 V

-183F1
Miniature circuit-breaker
In = 16 A
5SY41167/C

-279W1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

CON Cabinet Fans
Inner zone
In = 1,5 A
Un = 230 V
1+N-pole

-183F2
Miniature circuit-breaker
In = 10 A
5SY41107/C

-281W1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

CIR Cabinet Fans
Inner zone
In = 0,9 A
Un = 230 V
1+N-pole

-185F1
Miniature circuit-breaker
In = 10 A
5SY41107/C

-278W1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

CTRL Cabinet Fan
Inner zone
In = 0,17 A
Un = 230 V
1+N-pole

-185F2
Miniature circuit-breaker
In = 6 A
5SY41067/C

-185W1
Cable/Line
3 m
Cu (1x1,5/1,5/1,5)

Cabinet Heating
Inner zone
In = 3,48 A
Un = 230 V
1+N-pole

-187F1
Miniature circuit-breaker
In = 13 A
5SY41137/C

-80W2
Cable/Line
6 m
Cu (1x1,5/1,5/1,5)

230V 3WL
Inner zone
In = 0,57 A
Un = 230 V
1+N-pole

-181Q1
Circuit-breaker
In = 5 A
3RV20111FA25/LI

-181W1
Cable/Line
8 m
Cu (3x1,5/1,5/1,5)

Water Pump
Inner zone
In = 3,8 A
Un = 400 V
3+N-pole

-181Q2
Circuit-breaker
In = 6,3 A
3RV20111GA25/LI

-181W1
Cable/Line
8 m
Cu (3x1,5/1,5/1,5)

Water Heating
Inner zone
In = 4,33 A
Un = 400 V
3+N-pole

-182Q1
Circuit-breaker
In = 5 A
3RV20111FA25/LI

-181W1
Cable/Line
8 m
Cu (3x1,5/1,5/1,5)

Fan Heat Exchanger
Inner zone
In = 2,5 A
Un = 400 V
3+N-pole

Project name:	Shell Crosswind Offshore		
Planner: Freqcon_DG	View: Device parameters	Sheet: 1/1	
Design office: Freqcon GmbH	Location:		
Client: Statron AG	Created on: 4 Sep 2024	Changed on: 8 Oct 2024	

SIMARIS design 24.1.0

Selectivity evaluation

created with

SIMARIS design

Version: 24.1.0 (2024-05-07)
Subrevision: 1218

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Master data

Project name:	Shell Crosswind Offshore
Project description:	BESS FQ 1MW 5MWh
Editor:	Freqcon_DG
Planning office:	Freqcon GmbH
Created at:	Wednesday, 4. September 2024
Changed at:	Tuesday, 8. October 2024

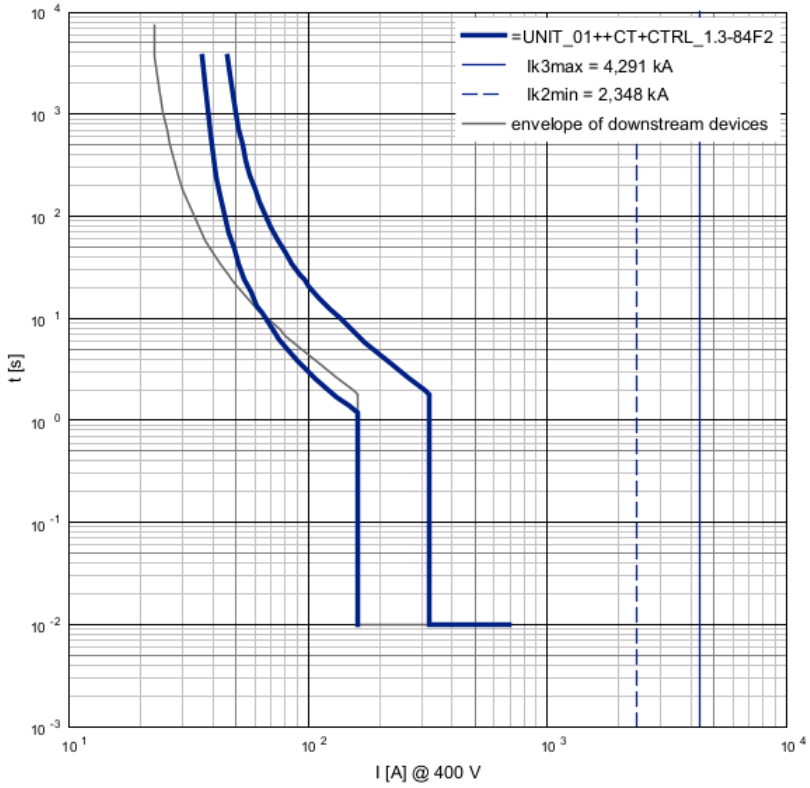
Customer data

City:	
Customer:	Statron AG

Comment:

Converter Container

Circuit name: **NSUV 3.1**
Designation: **=UNIT_01++CT+CTRL_1.3-84F2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: =UNIT_01++CT+CTRL_1.3-84F2

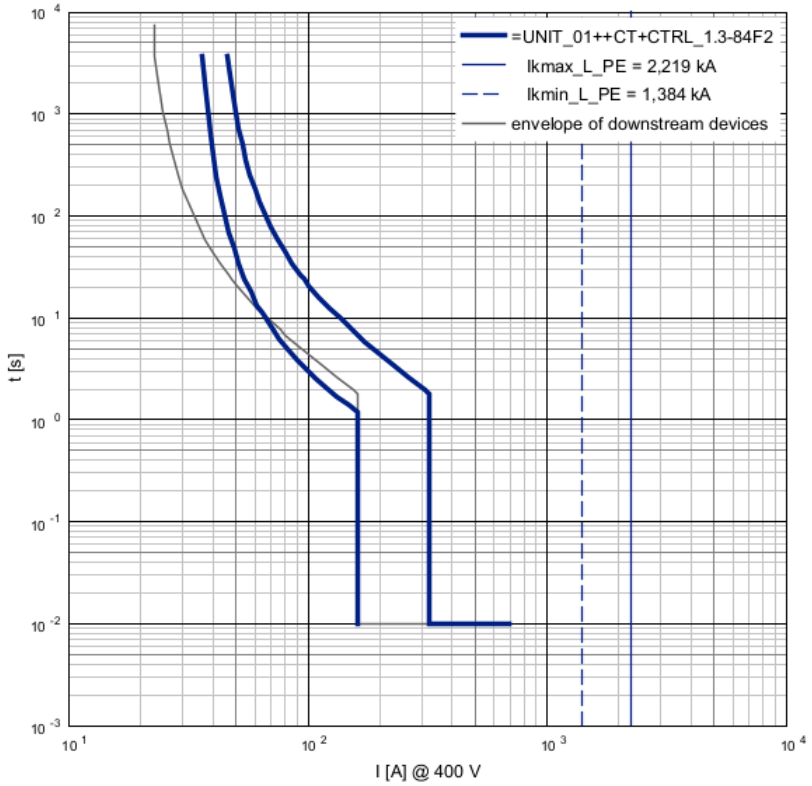
5SY43327

In 32 A

L Protection: On
Ir - corresp. 32 A

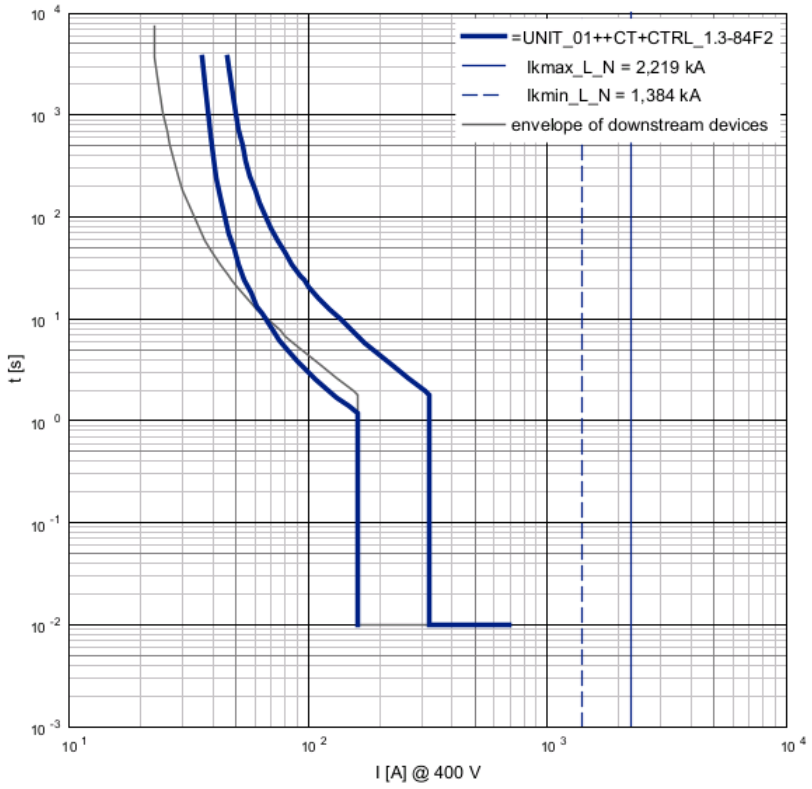
I Protection: On
Ii - corresp. 160 A

Short cut current: **Ik1-PE**
Selectivity evaluation:

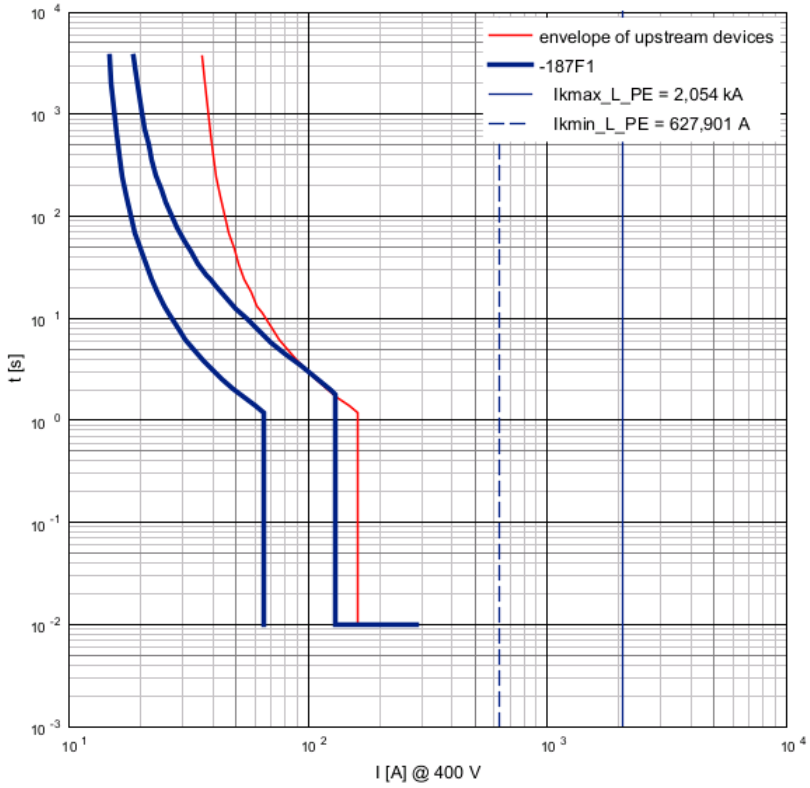

=UNIT_01++CT+CTRL_1.3-84F2
Ikmax_L_PE = 2,219 kA
Ikmin_L_PE = 1,384 kA
envelope of downstream devices
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Circuit name: **230V 3WL**
Designation: **-187F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -187F1

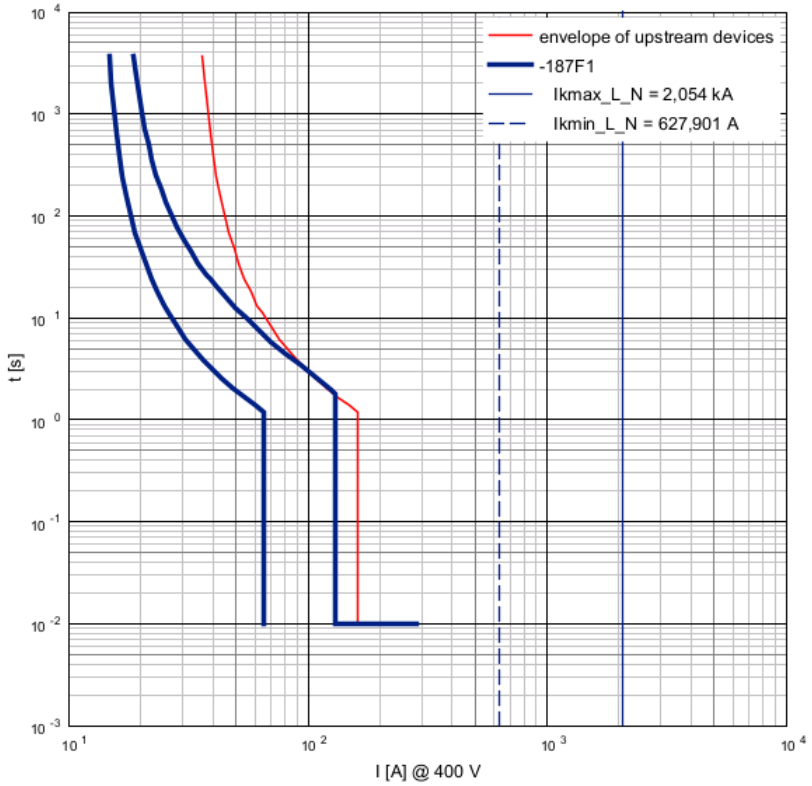
5SY41137

In 13 A

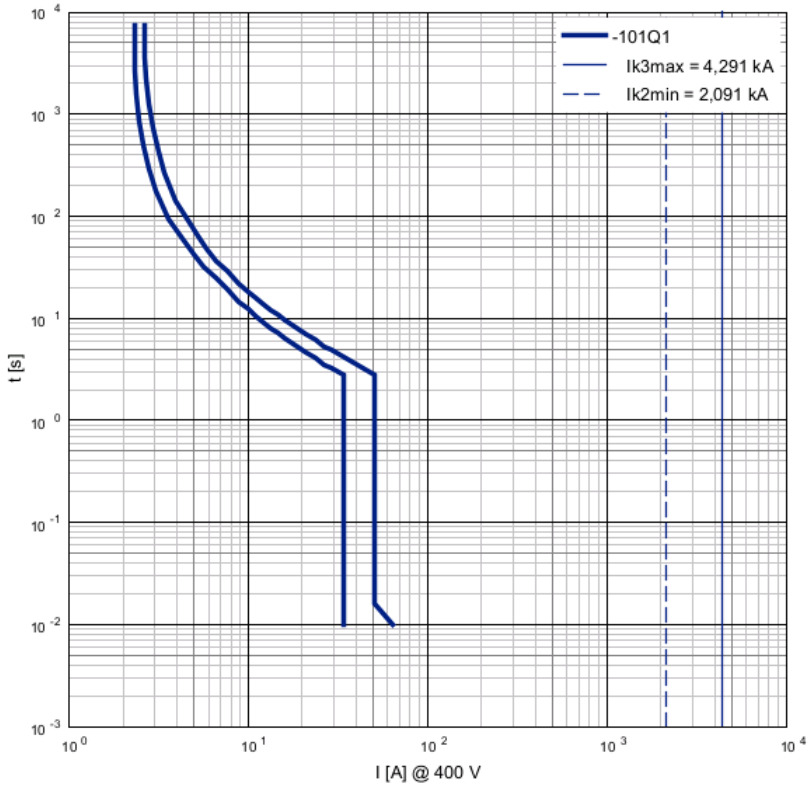
L Protection: On
Ir - corresp. 13 A

I Protection: On
Ii - corresp. 65 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-187F1
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 627,901 A
t [s]
I [A] @ 400 V

Circuit name: **400V/24V Power Supply**
Designation: **-101Q1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -101Q1

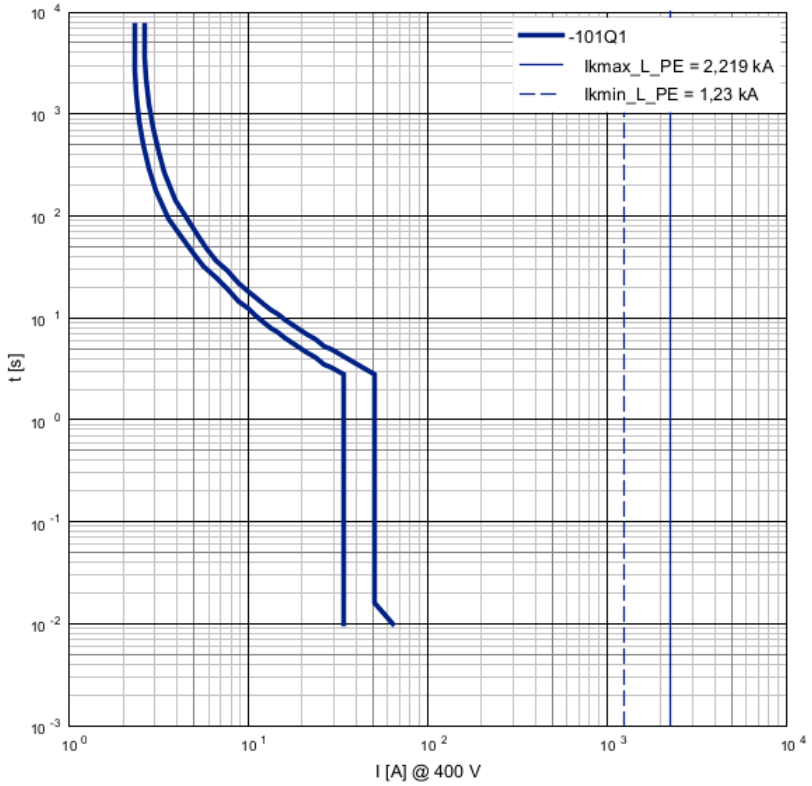
3RV20111DA25

In 3.2 A

L Protection: On
Ir - corresp. 2.2 A
tr 10 s

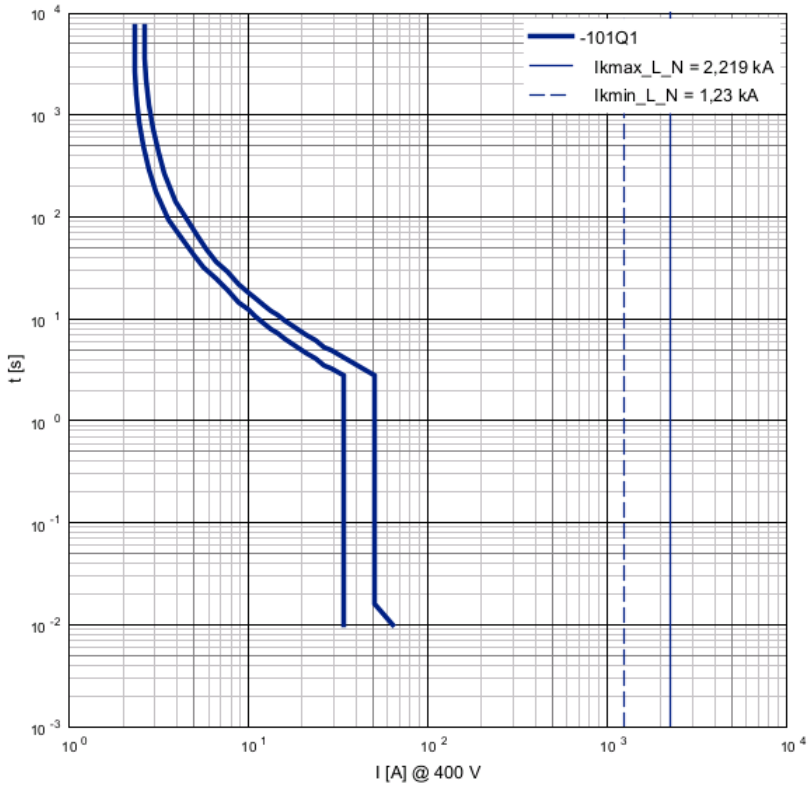
I Protection: On
Ii - corresp. 42 A

Short cut current: **Ik1-PE**
Selectivity evaluation:

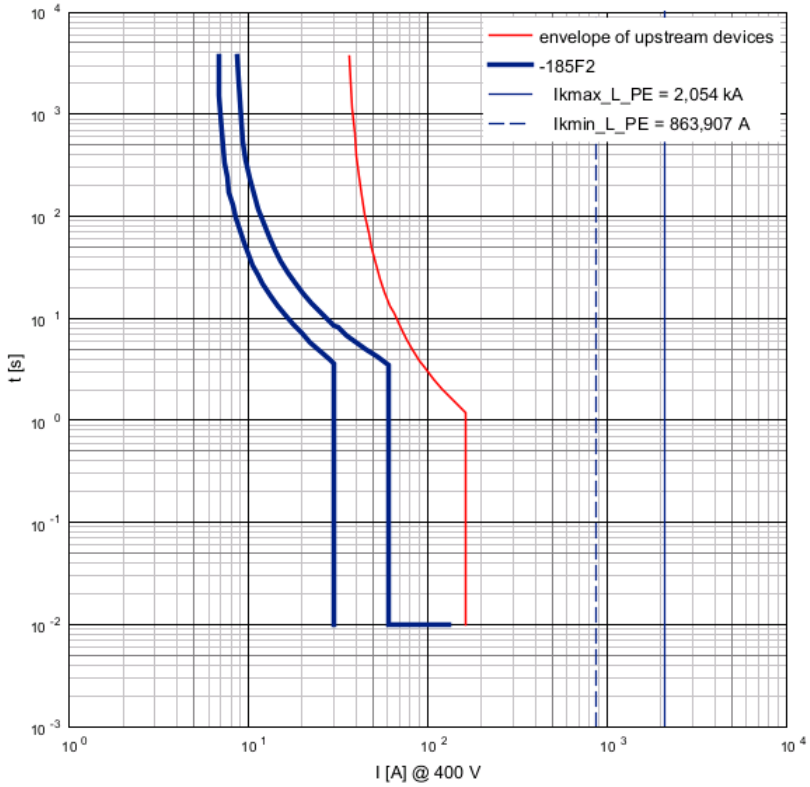

-101Q1
Ikmax_L_PE = 2,219 kA
Ikmin_L_PE = 1,23 kA
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Circuit name: **Cabinet Heating**
Designation: **-185F2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -185F2

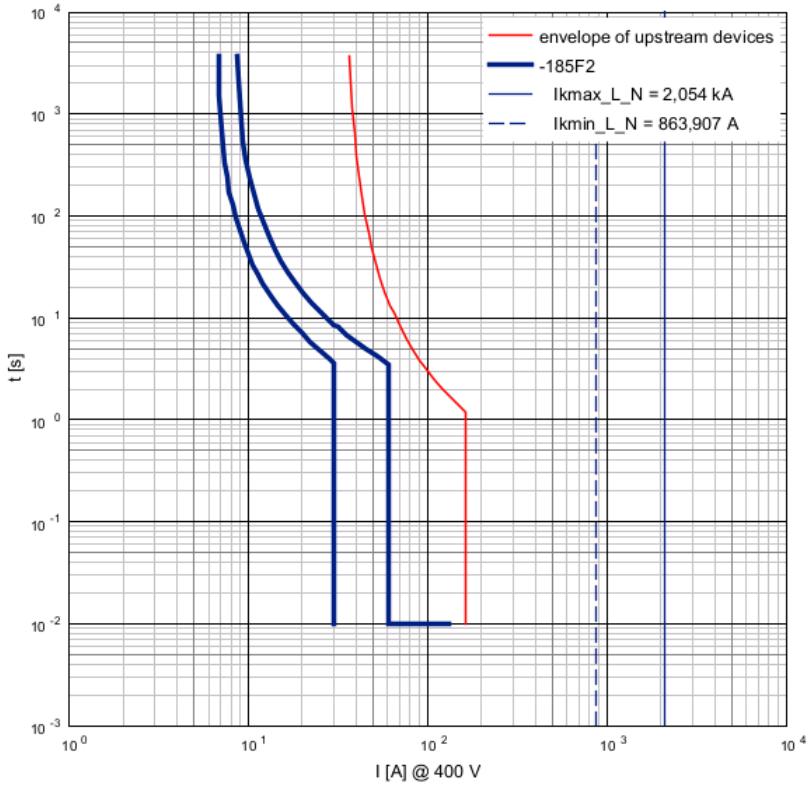
5SY41067

In 6 A

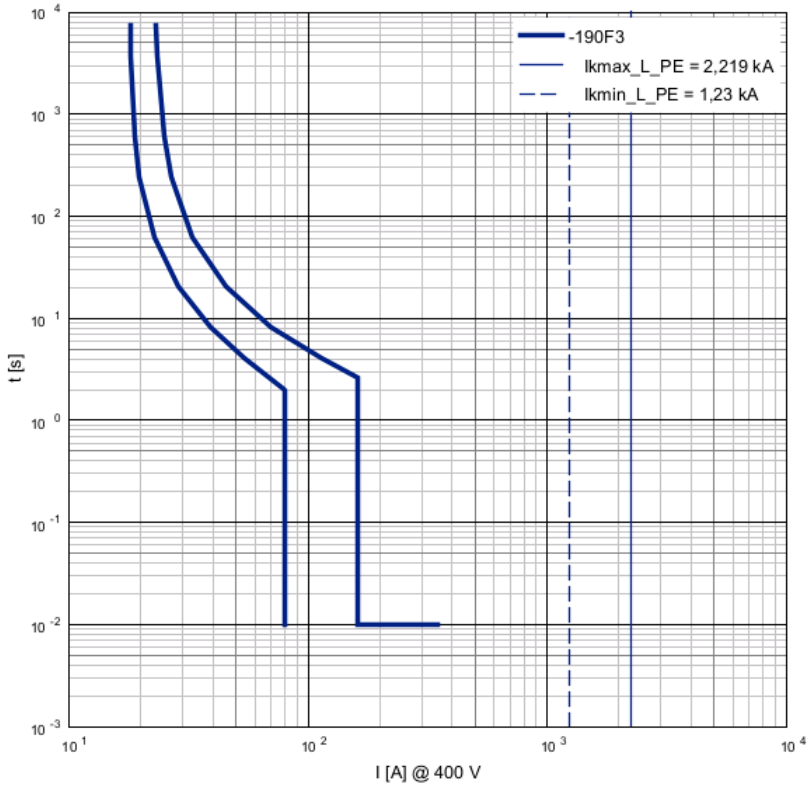
L Protection: On
Ir - corresp. 6 A

I Protection: On
Ii - corresp. 30 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-185F2
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 863,907 A
t [s]
I [A] @ 400 V

Circuit name: **Cabinet Light / Socket**
Designation: **-190F3**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -190F3

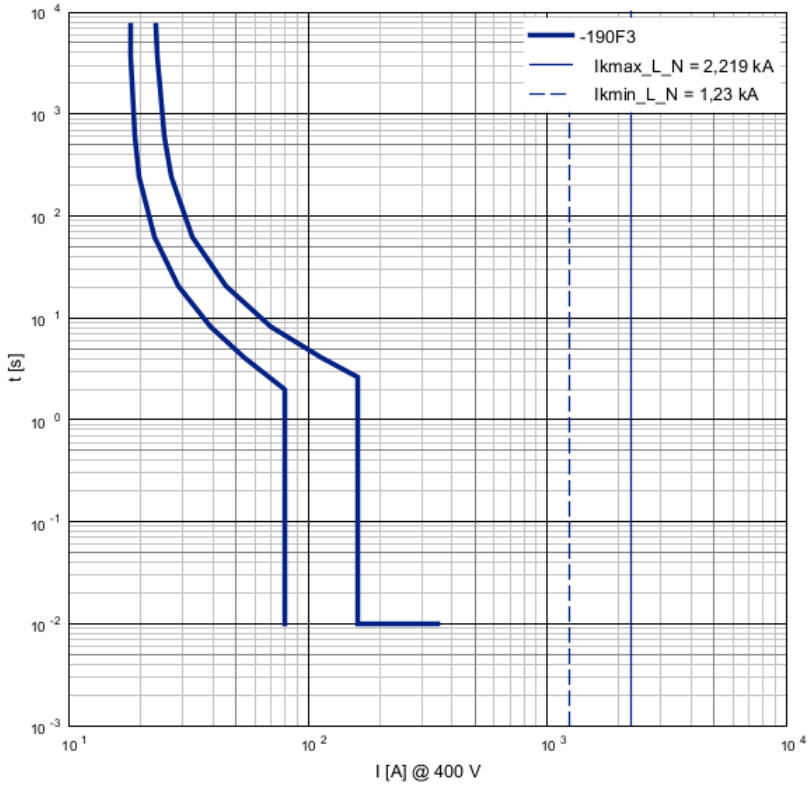
5SU13547KK16

In 16 A

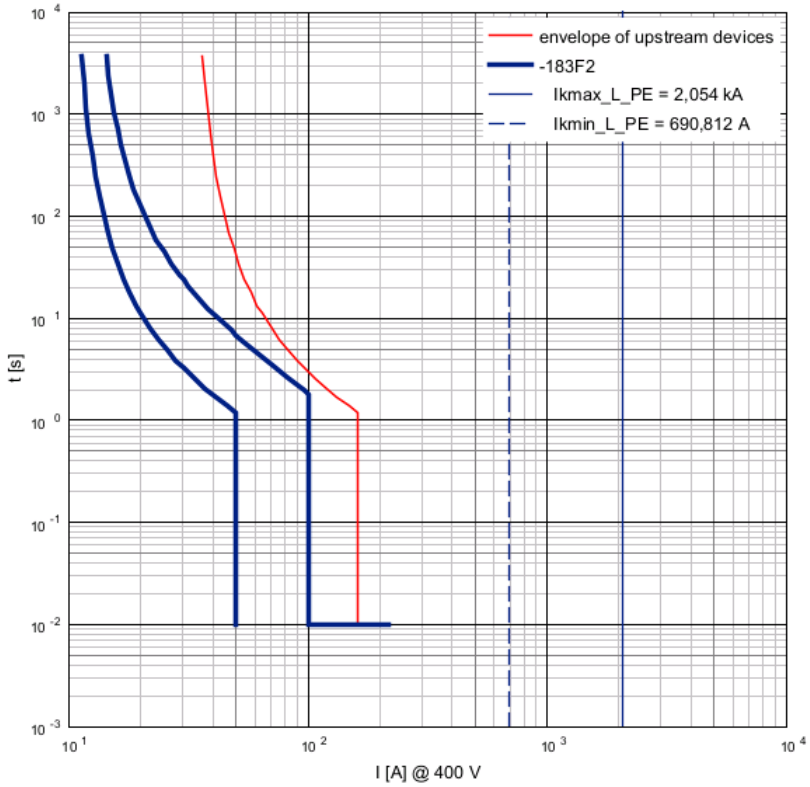
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


-190F3
Ikmax_L_N = 2,219 kA
Ikmin_L_N = 1,23 kA
t [s]
I [A] @ 400 V

Circuit name: **CIR Cabinet Fans**
Designation: **-183F2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -183F2

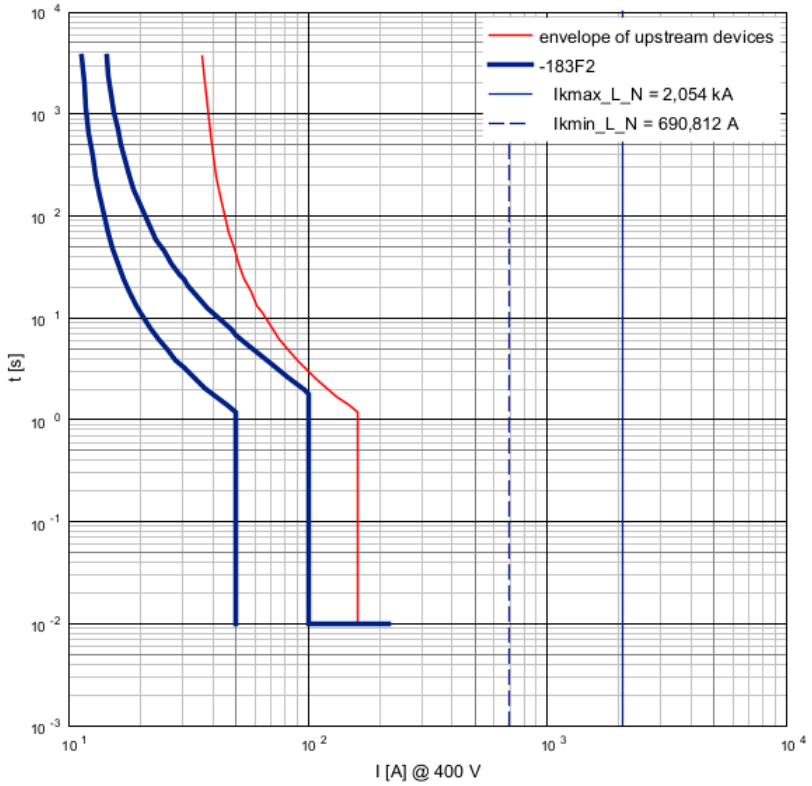
5SY41107

In 10 A

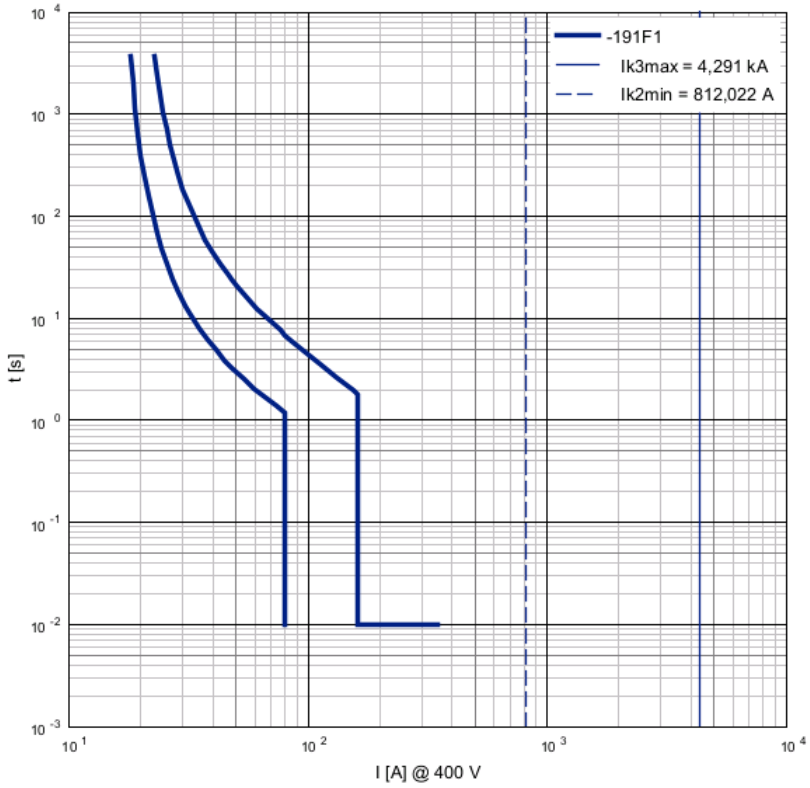
L Protection: On
Ir - corresp. 10 A

I Protection: On
Ii - corresp. 50 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-183F2
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **Clima 1**
Designation: **-191F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -191F1

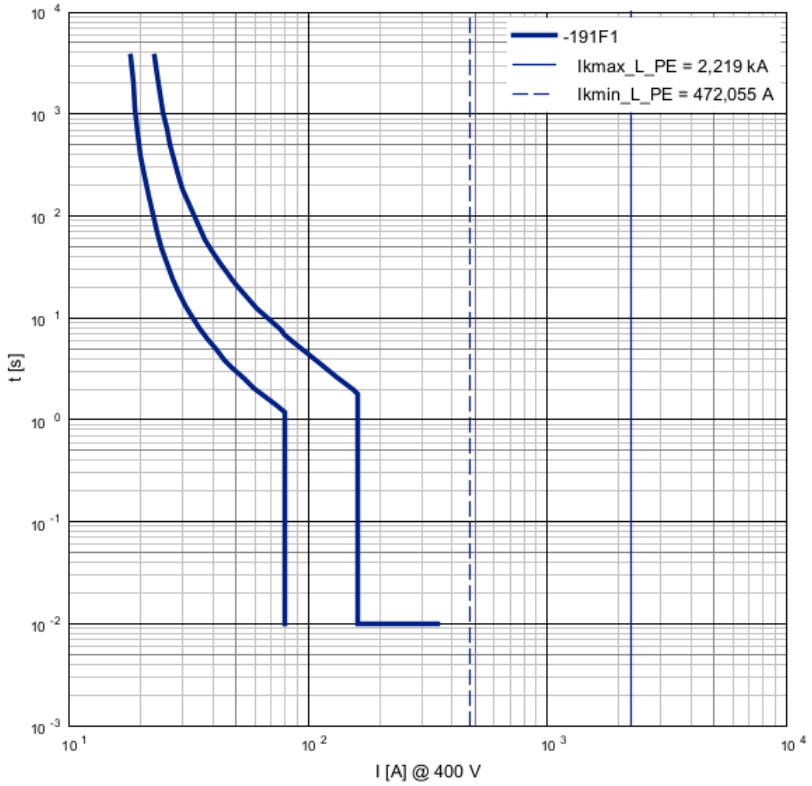
5SY43167

In 16 A

L Protection: On
Ir - corresp. 16 A

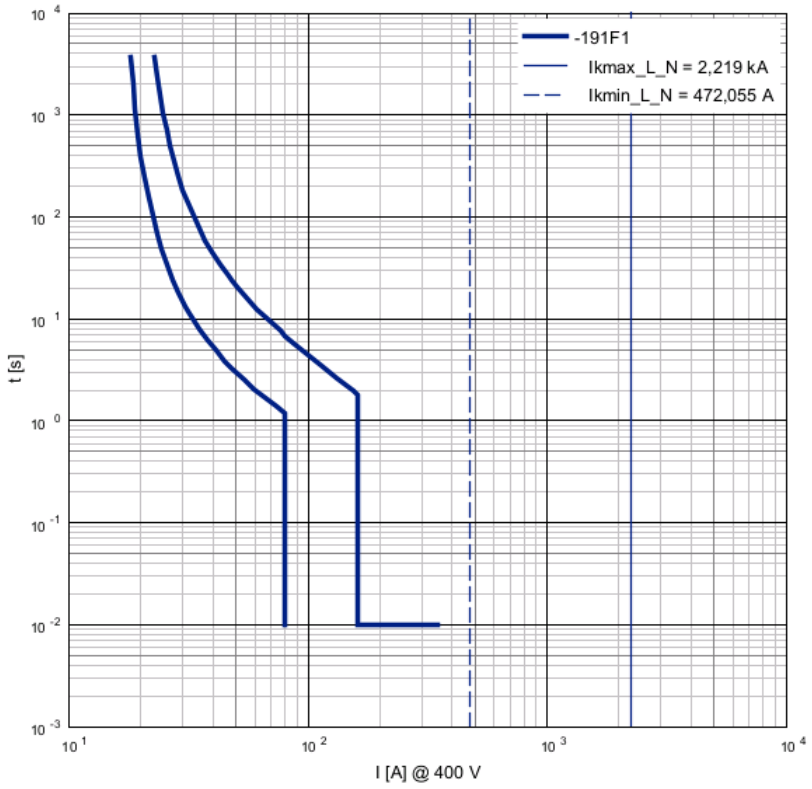
I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-PE**
Selectivity evaluation:

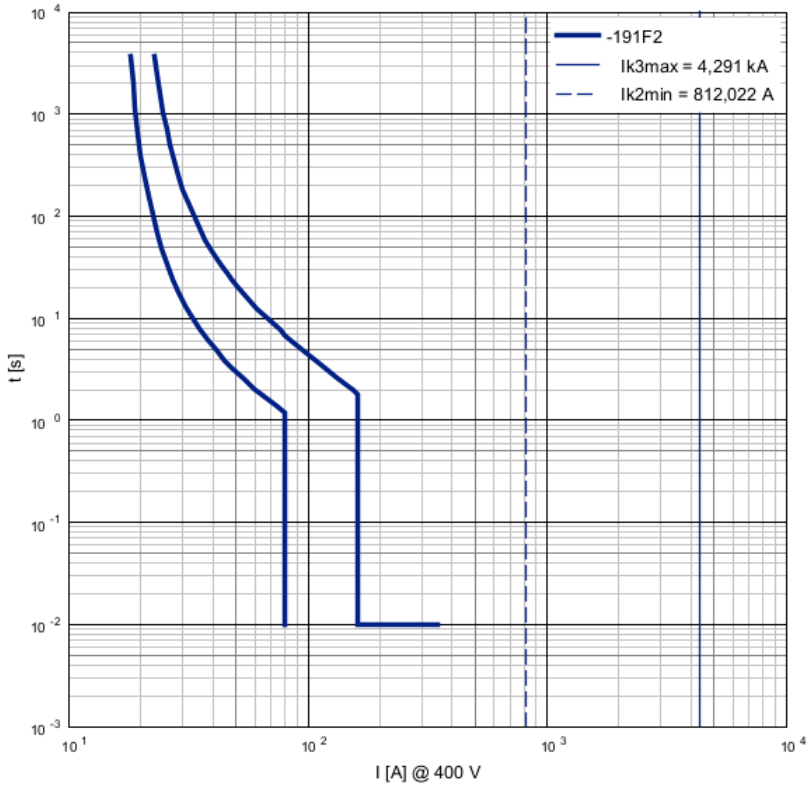

-191F1
Ikmax_L_PE = 2,219 kA
Ikmin_L_PE = 472,055 A
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Circuit name: **Clima 2**
Designation: **-191F2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -191F2

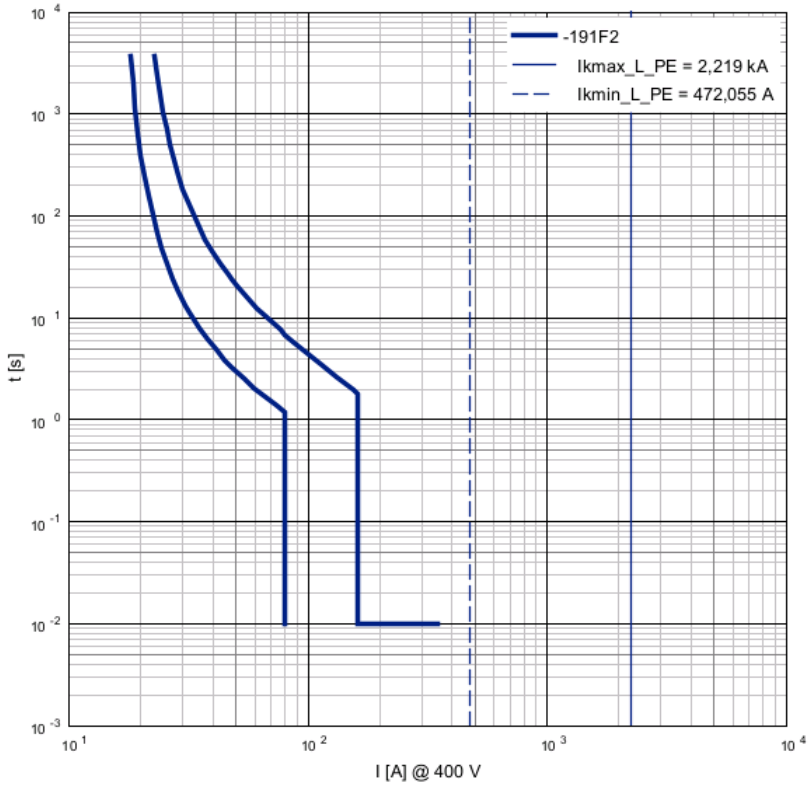
5SY43167

In 16 A

L Protection: On
Ir - corresp. 16 A

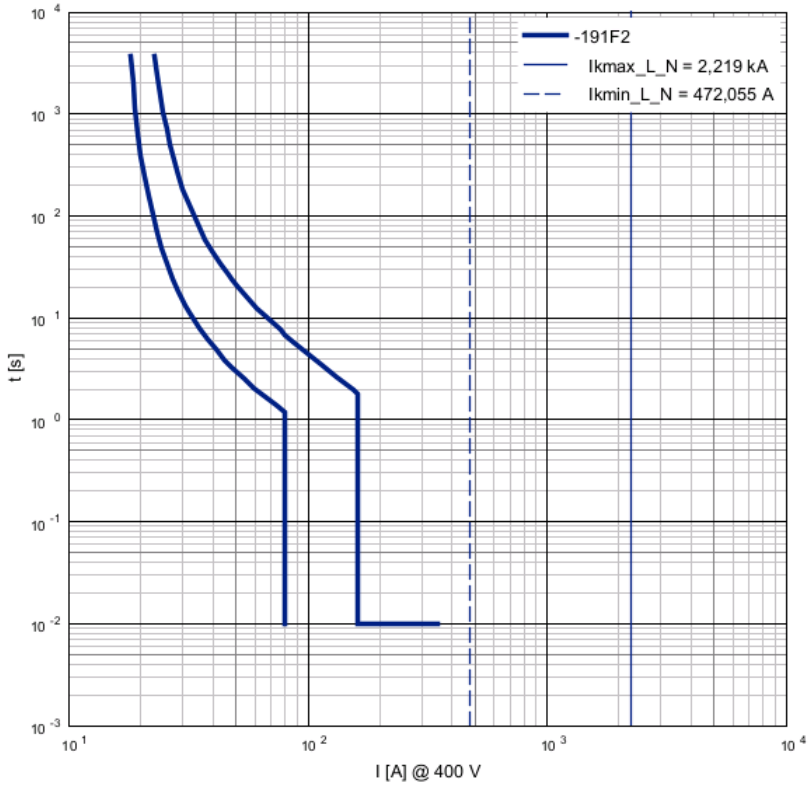
I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-PE**
Selectivity evaluation:

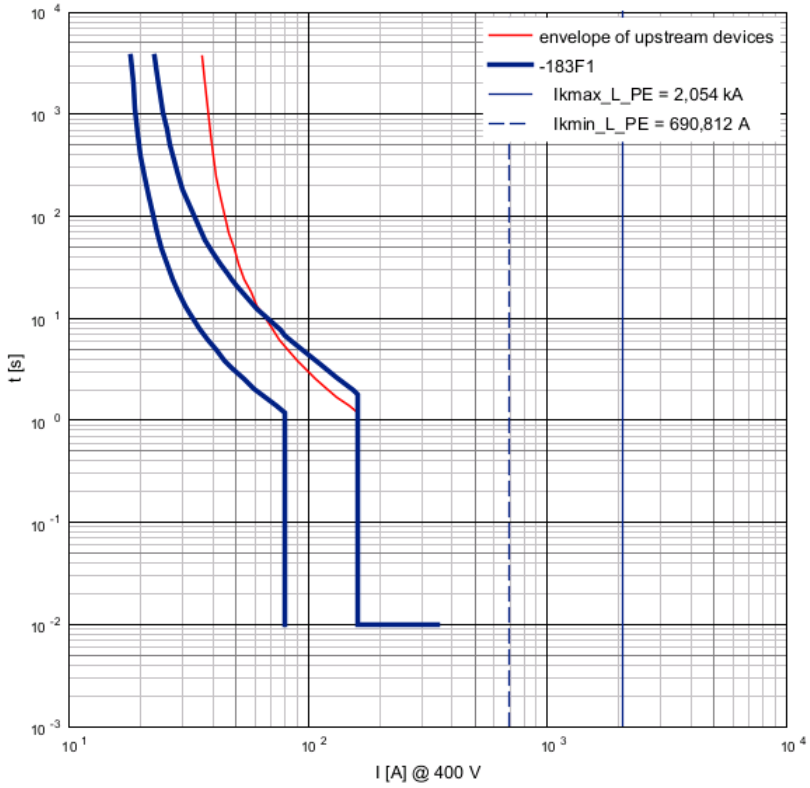

-191F2
Ikmax_L_PE = 2,219 kA
Ikmin_L_PE = 472,055 A
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Circuit name: **CON Cabinet Fans**
Designation: **-183F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -183F1

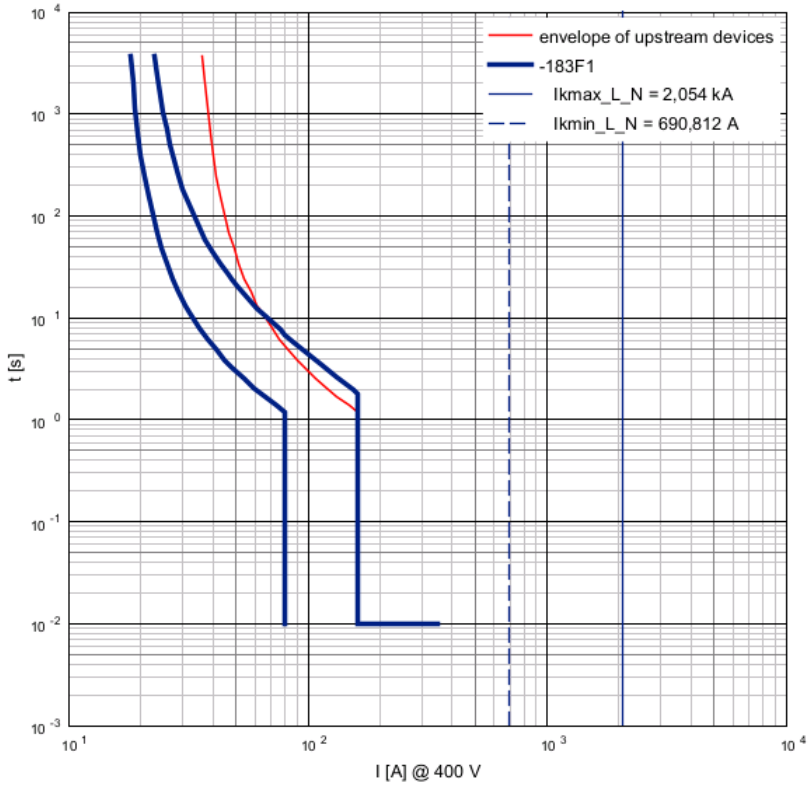
5SY41167

In 16 A

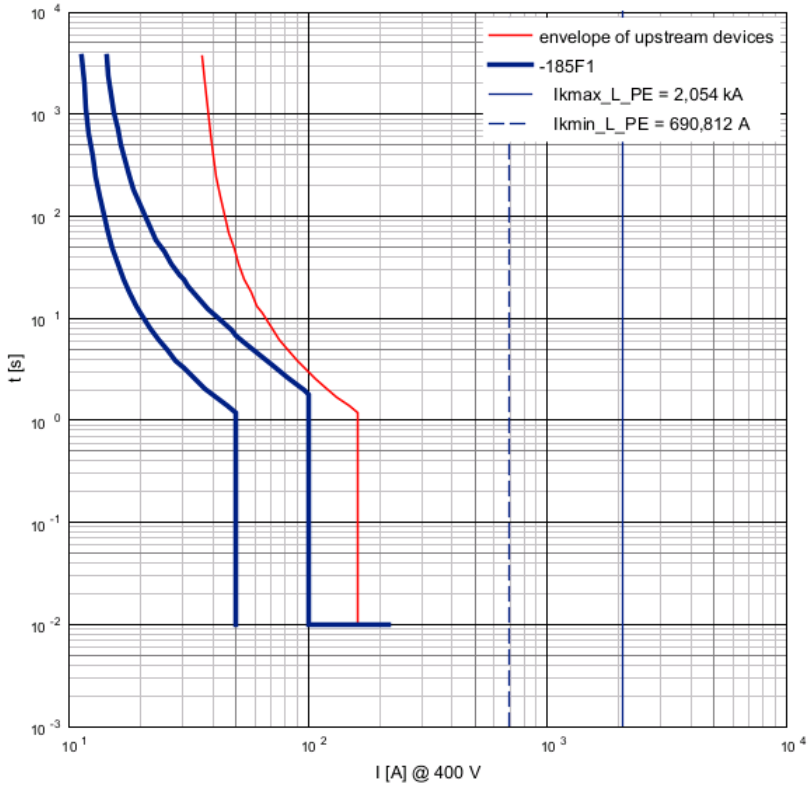
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-183F1
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **CTRL Cabinet Fan**
Designation: **-185F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -185F1

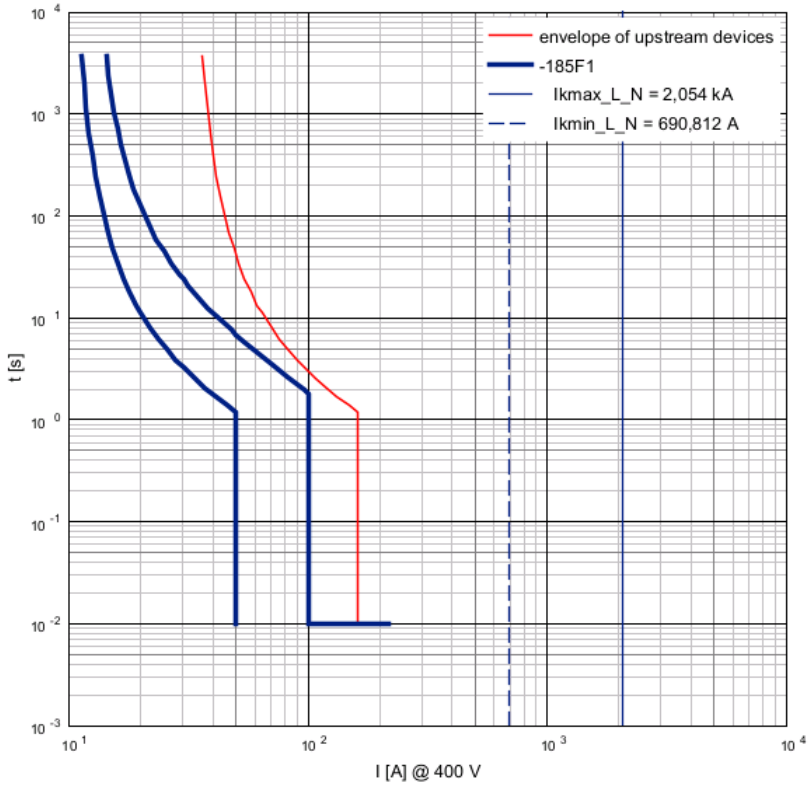
5SY41107

In 10 A

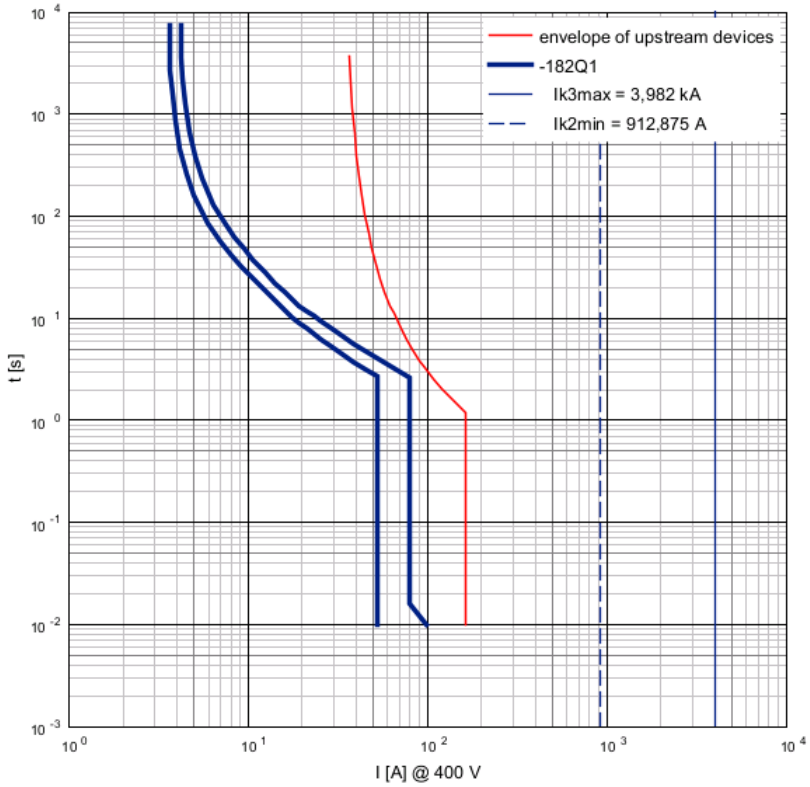
L Protection: On
Ir - corresp. 10 A

I Protection: On
Ii - corresp. 50 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-185F1
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **Fan Heat Exchanger**
Designation: **-182Q1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -182Q1

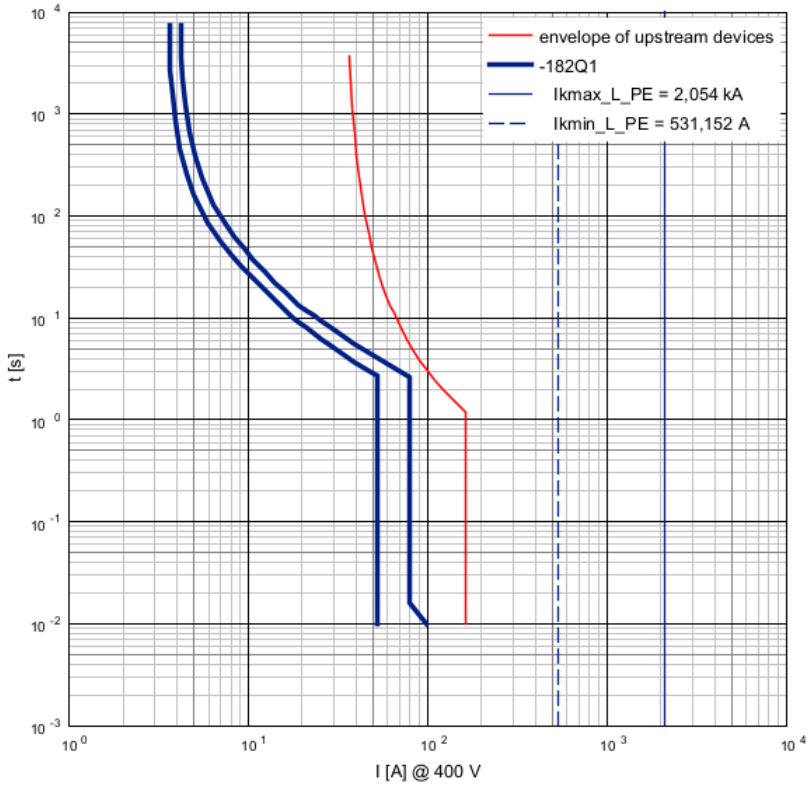
3RV20111FA25

In 5 A

L Protection: On
Ir - corresp. 3.5 A
tr 10 s

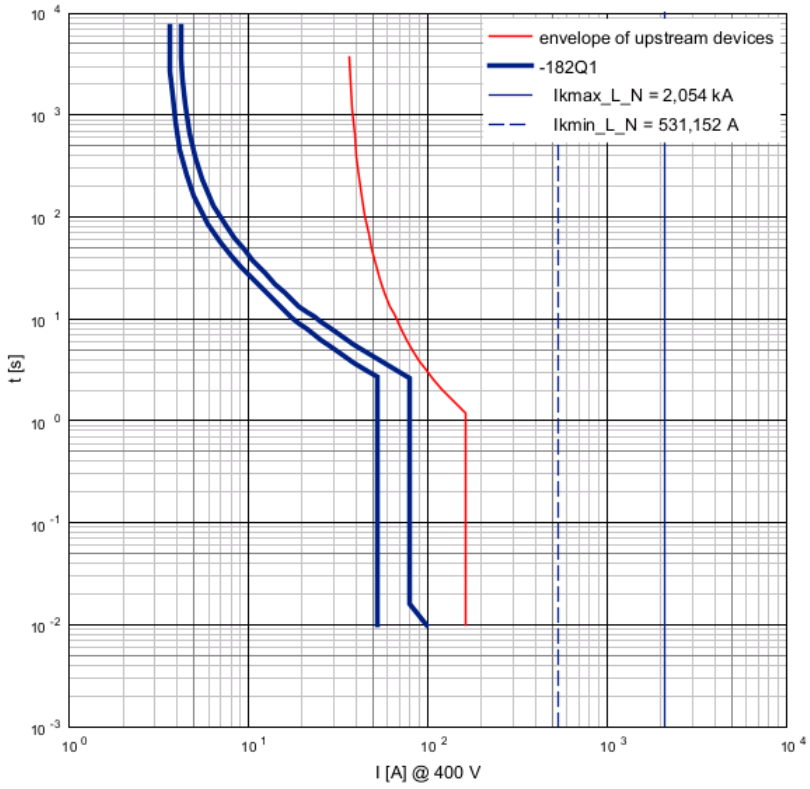
I Protection: On
Ii - corresp. 65 A

Short cut current: **Ik1-PE**
Selectivity evaluation:

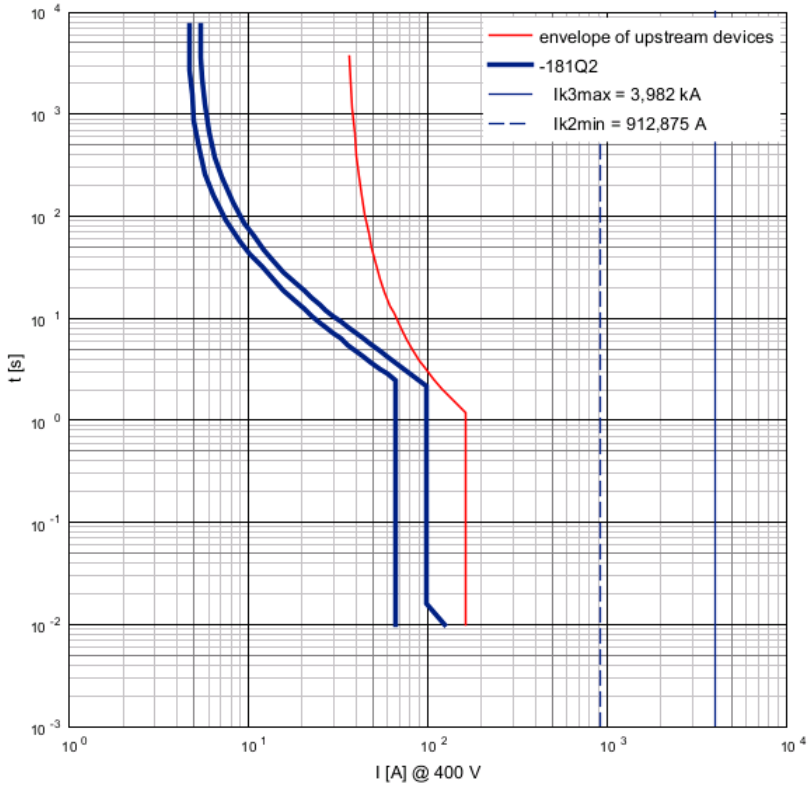

envelope of upstream devices
-182Q1
Ikmax_L_PE = 2,054 kA
Ikmin_L_PE = 531,152 A
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Circuit name: **Water Heating**
Designation: **-181Q2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -181Q2

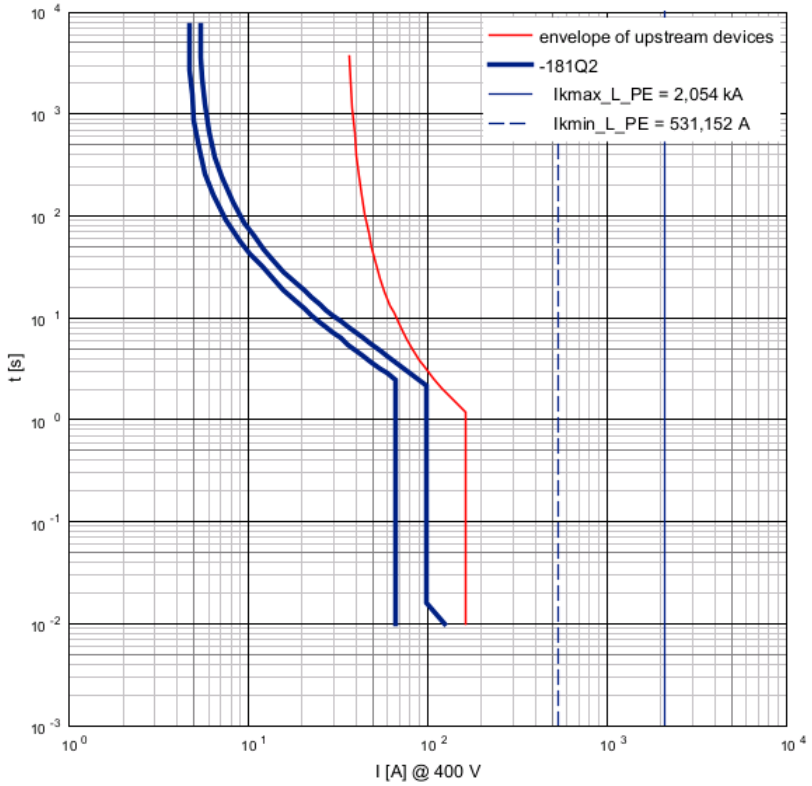
3RV20111GA25

In 6.3 A

L Protection: On
Ir - corresp. 4.5 A
tr 10 s

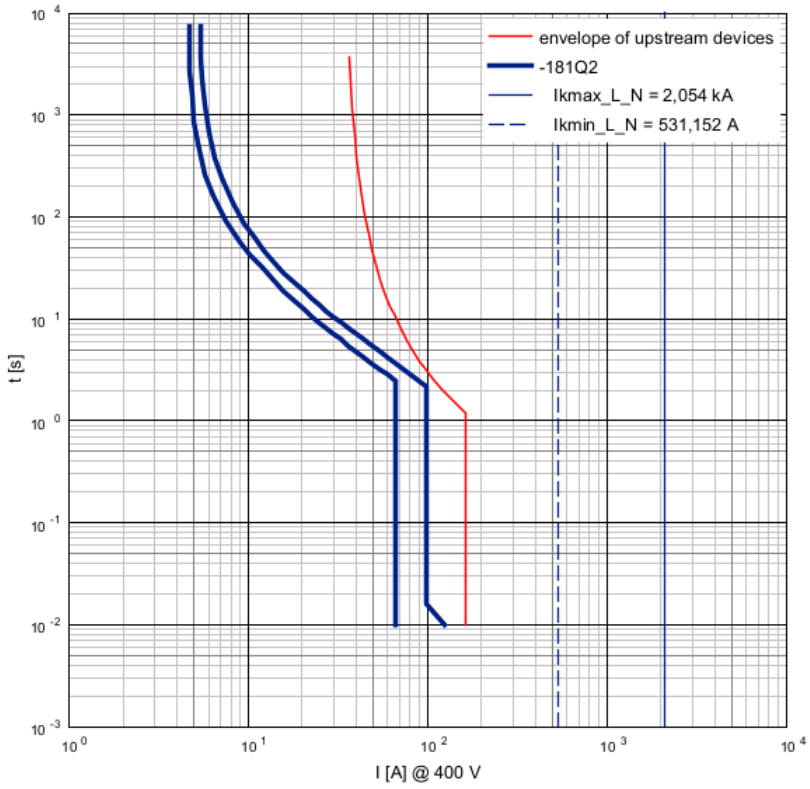
I Protection: On
Ii - corresp. 82 A

Short cut current: **Ik1-PE**
Selectivity evaluation:

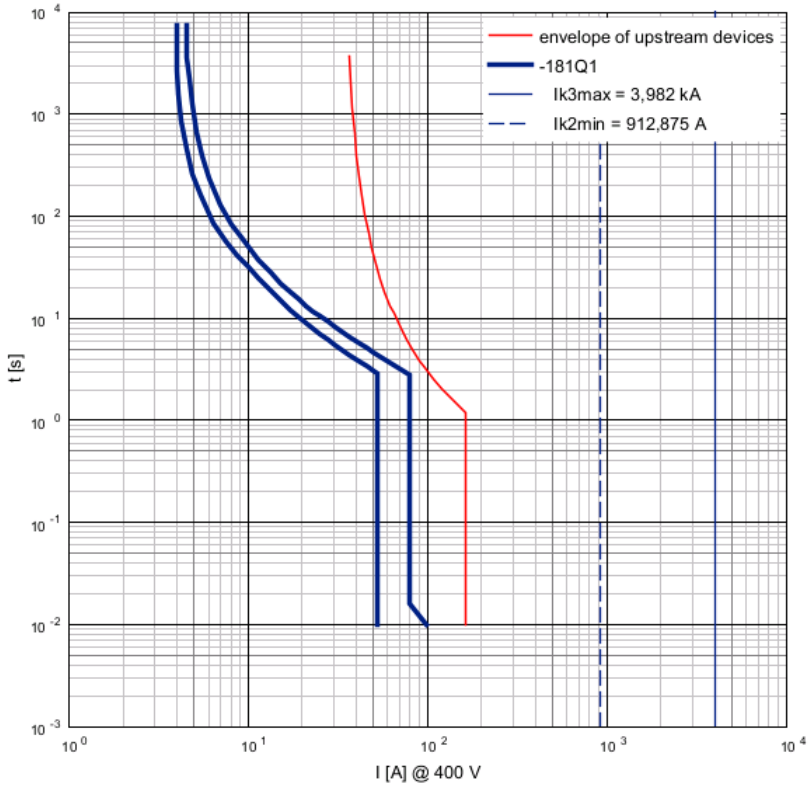

envelope of upstream devices
-181Q2
Ikmax_L_PE = 2,054 kA
Ikmin_L_PE = 531,152 A
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Circuit name: **Water Pump**
Designation: **-181Q1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -181Q1

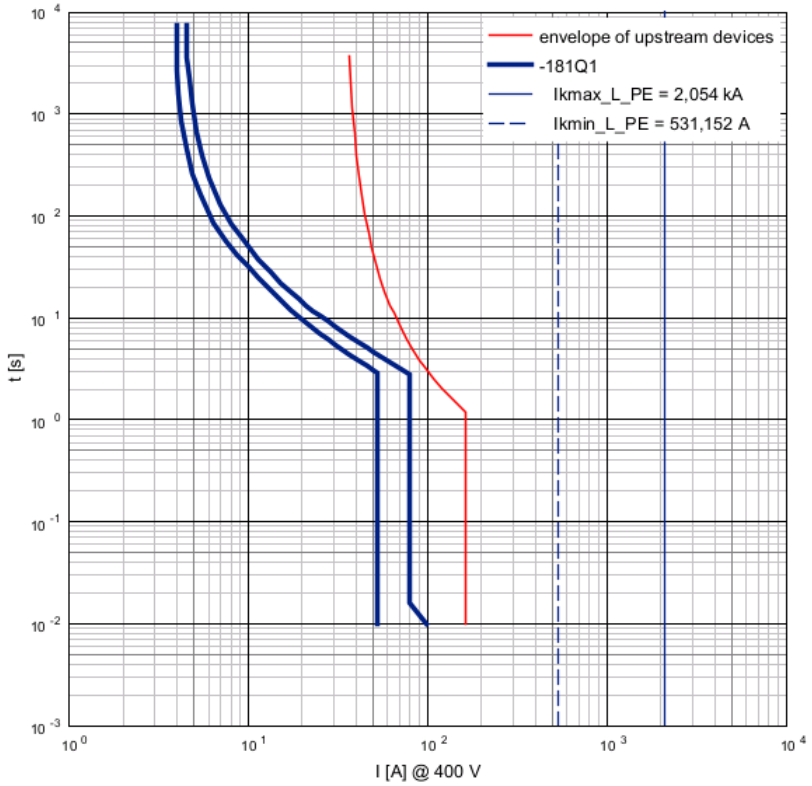
3RV20111FA25

In 5 A

L Protection: On
Ir - corresp. 3.8 A
tr 10 s

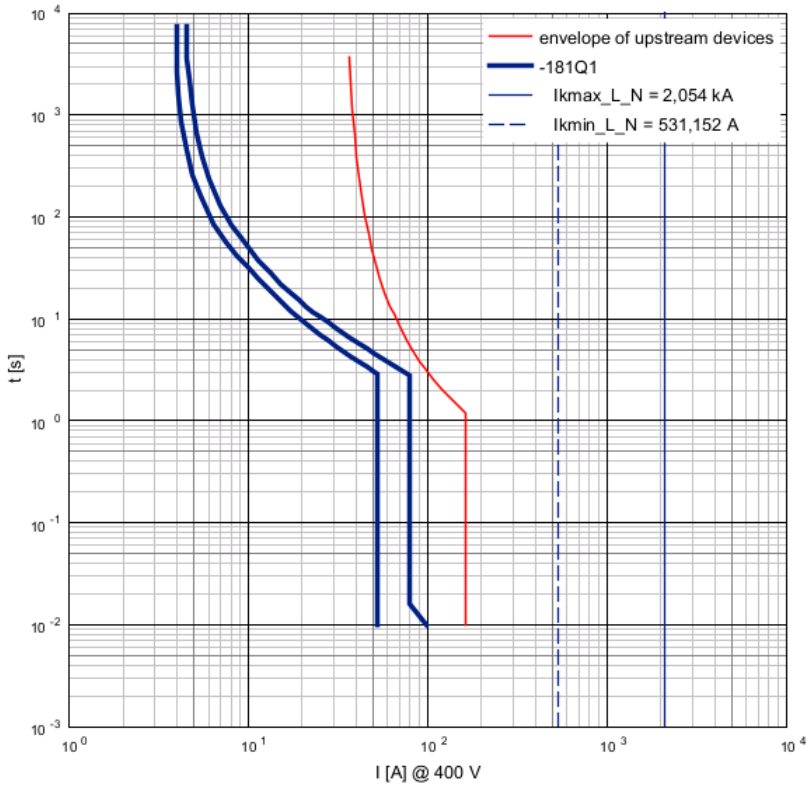
I Protection: On
Ii - corresp. 65 A

Short cut current: **Ik1-PE**
Selectivity evaluation:


envelope of upstream devices
-181Q1
Ikmax_L_PE = 2,054 kA
Ikmin_L_PE = 531,152 A
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Project documentation

created with

SIMARIS design

Version: 24.1.0 (2024-05-07)
Subrevision: 1218

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Master data

Project name:	Shell Crosswind Offshore
Project description:	BESS FQ 1MW 5MWh
Editor:	Freqcon_DG
Planning office:	Freqcon GmbH
Created at:	Wednesday, 4. September 2024
Changed at:	Wednesday, 30. October 2024

Customer data

City:	
Customer:	Statron AG

Comment:

Battery Container

Network parameters:

General	
Standard	IEC
Attitude of Site	< 1000 m

Medium Voltage	
Rated voltage	6.6 kV
Relative operating voltage at feeding point	100 %
Voltage factor c max	1.1
Voltage factor c min	1
Max./Min short-circuit power	91.452 / 91.452 MVA
Max./Min. short-circuit current	8 / 8 kA
Neutral System	Low-resistance
Relation R1/X1	0.2

Low Voltage	
Rated voltage	400 V
System configuration	TN-S
Frequency	50 Hz
Tolerable touch voltage	50 V
Ambient temperature of devices	30 °C
Voltage factor c max	1.1
Voltage factor c min	0.9
Base point of voltage drop calculation	Transformer-secondary terminals
Max. permissible voltage drop in network	8 %

Defined network modes for calculation and dimensioning:

Operating mode: Betriebsart 1

Starting point	Target point	Connection	Status
NSHV 3	NSHV 4	NSUV 3.1	On
Supply	NSHV 3	NSHV 3.2	On
NSHV 3	NSHV 5	LVSD 4.1	On
NSHV 3	NSHV 6	LVSD 5.1	On

List of devices:

Sources of feeding:

Neutral Infeed:

Designation	Un [V]	In [A]	Imp. in positive phase system [mΩ] Z1 max Z1 min Zs max Zs min	Loop Impedance Zs [mΩ] φ [°] R0/R1 X0/X1 Ikmax/Ikmin	Short circuit current [kA] Ik3max Ik3min Ik1max Ik1min
Supply	400	160			50 50 50 50

Switches/Fuses:

Circuit Breaker/Miniature circuit-breaker:

Place	Designation	Catalog Reference	In [A]	Icu/Icn [kA]	Icu/Icn [kA] required	Release type / characteristics	Quantity
LVSD 4.1	-684F3	5SY43327	32	10	4.291	C	1
LVSD 5.1	-684F1	5SY43327	32	10	4.291	C	1
NSUV 3.1	-684F4	5SY43327	32	10	4.291	C	1
230V Bat Cabinet 1	-687F1	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 2	-687F2	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 3	-687F3	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 4	-687F4	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 5	-687F5	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 6	-687F6	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 7	-688F1	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 8	-688F2	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 9	-688F3	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 10	-688F4	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 11	-688F5	5SY41167	16	10	2.054	C	1
400V/230V Power Supply	-101Q1	3RV20111DA25	3.2	100	4.291	TM	1
Clima	-691F4	5SY43167	16	10	3.982	C	1
Crane 1	-690F3	5SY41067	6	10	2.054	C	1
Crane 2	-690F4	5SY41067	6	10	2.054	C	1
Crane 3	-690F5	5SY41067	6	10	2.054	C	1
Exhaust Unit / shut-off flap	-691F1	5SY41067	6	10	2.054	C	1
Exhaust Unit / shut-off flap	-691F2	5SY41067	6	10	2.054	C	1
Exhaust Unit / shut-off flap	-691F3	5SY41067	6	10	2.054	C	1

Residual current circuit breaker with integral overload protection (RCBO):

Place	Designation	Catalog Reference	In [A]	Icn [kA] IΔn [mA]	Icu/Icn [kA] required	Release type / characteristics	Quantity
Container Light	-690F1	5SU13546KK10	10	10 30	2.054	B	1
Container Sockets	-690F2	5SU13547KK20	20	10 30	2.219	C	1

Connections and line distribution:

Cable/Conductor Low voltage:

Designation	Type/ Profile [mm²]	Starting point / Target point	Ib [A] Iz [A]	Material	Length [m]	Isolation	Installation type / ftot	u [%] / Δu [%] / ∑ Δu [%]	θΔu [°C] / θIkmax [°C] / θIkmin [°C]	Number of runs
K/L 3.2	e.g. NYY, NYCWY, NYCY, NYKY 3x10/10/10	NSHV 3.2 NSHV 3	39.65 57	Cu	30	PVC70	C 1	99.11 0.887 0.887	55 20 80	1
C/L 4.1	e.g. NYY, NYCWY, NYCY, NYKY 3x4/4/4	NSHV 3 NSHV 5	8.1 32	Cu	1	PVC70	C 1	99.1 0.015 0.902	55 20 80	1
C/L 5.1	e.g. NYY, NYCWY, NYCY, NYKY 3x4/4/4	NSHV 3 NSHV 6	11.95 32	Cu	1	PVC70	C 1	99.09 0.022 0.909	55 20 80	1
K/L 3.1	e.g. NYY, NYCWY, NYCY, NYKY 3x4/4/4	NSHV 3 NSHV 4	8 32	Cu	1	PVC70	C 1	99.1 0.015 0.902	55 20 80	1
-290W1-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 1	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-290W2-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 2	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-290W3-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 3	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-291W1-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 4	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-291W2-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 5	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-292W1-1	e.g. NYY, NYCWY, NYCY, NYKY	NSHV 4 230V Bat Cabinet 6	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1

Designation	Type/ Profile [mm²]	Starting point / Target point	Ib [A] Iz [A]	Material	Length [m]	Isolation	Installation type / ftot	u [%] / Δu [%] / ∑ Δu [%]	θΔu [°C] / θlkmax [°C] / θlkmin [°C]	Number of runs
	1x1.5/1.5/1.5									
-292W2-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 7	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-292W3-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 8	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-293W1-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 9	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-293W2-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 10	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-293W3-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 11	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
C/L 3.4	e.g. NYY, NYCWY, NYCY, NYKY 3x1.5/1.5/1.5	NSHV 3 400V/230V Power Supply	1.6 17.5	Cu	2	PVC70	C 1	99.1 0.015 0.903	55 20 80	1
C/L 5.8	e.g. NYY, NYCWY, NYCY, NYKY 3x1.5/1.5/1.5	NSHV 6 Clima	9 17.5	Cu	10	PVC70	C 1	98.66 0.434 1.343	55 20 80	1
C/L 5.2	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 6 Container Light	1 19.5	Cu	10	PVC70	C 1	98.99 0.097 1.005	55 20 80	1
C/L 3.3	e.g. NYY, NYCWY, NYCY, NYKY 1x2.5/2.5/2.5	NSHV 3 Container Sockets	10 27	Cu	10	PVC70	C 1	98.53 0.581 1.468	55 20 80	1

Designation	Type/ Profile [mm²]	Starting point / Target point	Ib [A] Iz [A]	Material	Length [m]	Isolation	Installation type / ftot	u [%] / Δu [%] / ∑ Δu [%]	θΔu [°C] / θIkmax [°C] / θIkmin [°C]	Number of runs
C/L 5.4	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 6 Crane 1	1.95 19.5	Cu	10	PVC70	C 1	98.9 0.188 1.097	55 20 80	1
C/L 5.5	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 6 Crane 2	1.95 19.5	Cu	10	PVC70	C 1	98.9 0.188 1.097	55 20 80	1
C/L 5.7	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 6 Crane 3	1.95 19.5	Cu	10	PVC70	C 1	98.9 0.188 1.097	55 20 80	1
C/L 4.2	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 5 Exhaust Unit / shut-off flap	2.7 19.5	Cu	1	PVC70	C 1	99.07 0.026 0.928	55 20 80	1
C/L 4.3	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 5 Exhaust Unit / shut-off flap	2.7 19.5	Cu	1	PVC70	C 1	99.07 0.026 0.928	55 20 80	1
C/L 4.4	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 5 Exhaust Unit / shut-off flap	2.7 19.5	Cu	1	PVC70	C 1	99.07 0.026 0.928	55 20 80	1

Loads:

Stationary loads:

Designation	Place	Pn [kW]	In [A]	Un [V]	cos φ	ai	Phase connection	Type of load	Quantity
230V Bat Cabinet 1	Inner zone	0.37	2	230	0.8	1	L1-N	inductive	1
230V Bat Cabinet 2	Inner zone	0.37	2	230	0.8	1	L2-N	inductive	1
230V Bat Cabinet 3	Inner zone	0.37	2	230	0.8	1	L3-N	inductive	1
230V Bat Cabinet 4	Inner zone	0.37	2	230	0.8	1	L1-N	inductive	1
230V Bat Cabinet 5	Inner zone	0.37	2	230	0.8	1	L2-N	inductive	1
230V Bat Cabinet 6	Inner zone	0.37	2	230	0.8	1	L3-N	inductive	1
230V Bat Cabinet 7	Inner zone	0.37	2	230	0.8	1	L1-N	inductive	1
230V Bat Cabinet 8	Inner zone	0.37	2	230	0.8	1	L2-N	inductive	1
230V Bat Cabinet 9	Inner zone	0.37	2	230	0.8	1	L3-N	inductive	1
230V Bat Cabinet 10	Inner zone	0.37	2	230	0.8	1	L1-N	inductive	1
230V Bat Cabinet 11	Inner zone	0.37	2	230	0.8	1	L2-N	inductive	1
400V/230V Power Supply	Inner zone	0.887	1.6	400	0.8	1	L1-L2-L3-N	inductive	1
Clima	Inner zone	4.988	9	400	0.8	1	L1-L2-L3-N	inductive	1
Container Light	Inner zone	0.185	1	230	0.8	1	L2-N	inductive	1
Container Sockets	Inner zone	1.848	10	230	0.8	1	L3-N	inductive	1
Crane 1	Inner zone	0.36	1.95	230	0.8	1	L1-N	inductive	1
Crane 2	Inner zone	0.36	1.95	230	0.8	1	L2-N	inductive	1
Crane 3	Inner zone	0.36	1.95	230	0.8	1	L3-N	inductive	1
Exhaust Unit / shut-off flap	Inner zone	0.499	2.7	230	0.8	1	L1-N	inductive	1
Exhaust Unit / shut-off flap	Inner zone	0.499	2.7	230	0.8	1	L1-N	inductive	1
Exhaust Unit / shut-off flap	Inner zone	0.499	2.7	230	0.8	1	L1-N	inductive	1

Messages

Designation	Message
NSHV 3.2	Protective device required due to possible selectivity requirement

Personal protection against electric shock

All circuits of the project have a permissable break time ta-req > ta-cur and therefor fulfill the requirements for Personal protection against electric shock.

Disclaimer:

Dimensioned protection devices inside tap-off units of busbar trunking systems may not correspond to the actual available devices for those components. Please verify the dimensioning results in the device lists and correct them accordingly.

Symbols legend:

Symbol [Unit]	Description
ai	Load factor
cos φ	Power factor
ftot	Derating factor
Ia/In	Inrush current relation
Ib [A] Iz [A]	Operating current / allowed load capacity
Icu(fuse) [kA]	Rated ultimate short-circuit breaking capacity - fuse
Icu [kA] Icn [kA]	Rated ultimate short-circuit breaking capacity according to IEC 60947-2 Rated short-circuit breaking capacity according to IEC 60898-1
Icu/Icn [kA] required	the required breaking capacity of the protection device at installation location
Icw 1s [kA]	Rated short-time withstand current 1s
IΔn [mA]	Residual current - RCD
Ik1max	Maximum single phase short-circuit current
Ik1min	Minimum single phase short-circuit current
Ik3max	Maximum three phase short-circuit current
Ik3min	Minimum three phase short-circuit current
Ik1D [kA]	single pole uninterrupted short-circuit current
Ik3D [kA]	three pole uninterrupted short-circuit current
Ikmax/Ikmin	Relation of maximum and minimum short-circuit current
Ikre	Short-circuit current recovery factor
In [A]	Nominal current
P0 [kW]	No-load losses
Pk [kW]	Short-circuit losses
Pmech [kW]	mechan. Power
Pn [kW]	Active power
R0 N [mΩ]	Zero phase-sequence resistance phase-neutral conductor
R0 PE(N) [mΩ]	Zero phase-sequence resistance phase-PE(N) conductor
R0/R1	Resistance relation positive / zero phase-sequence system
r1 [%]	Relative value of positive phase-sequence resistance
R1 [mΩ]	Positive phase-sequence resistance

Sn [kVA]	Nominal apparent power
ukr [%]	Short-circuit voltage
Un [V]	Nominal voltage
Uprim [kV]	Primary voltage
Usec [V]	Secondary voltage
X0 N [mΩ]	Zero phase-sequence reactance phase-neutral conductor
X0 PE(N) [mΩ]	Zero phase-sequence reactance phase-PE(N) conductor
X0/X1	Reactance relation positive / zero phase-sequence system
X1 [mΩ]	Positive phase-sequence reactance
xd" [%]	Subtransient reactance
Z1 max	Maximum impedance in positive phase-sequence system
Z1 min	Minimum impedance in positive phase-sequence system
Zs	Faulted circuit impedance
Zs max	Maximum faulted circuit impedance
Zs min	Minimum faulted circuit impedance
u [%] / Δu [%] / ∑ Δu [%]	Relative nominal voltage / voltage drop between beginning and end of a section / cumulated voltage drop from the transformer primary/ secondary clamps to the specified point
θΔu [°C] / θIkmax [°C] / θIkmin [°C]	Conductor temperature of MV cable / Conductor temperature of LV cable for voltage drop / on beginning of short circuit / for disconnection
η	Efficiency
φ [°]	Phase angle
φ1 min/max [°]	Phase angle at Ik1 min/max
φ3 min/max [°]	Phase angle at Ik3 min/max

Standards for computation:

Title	IEC	HD	EN	DIN VDE
Low-voltage electrical installations *	60364-1…6	384		0100 – 100...710
Short-circuit currents in three-phase a.c. systems – Calculation of currents	60909		60909	0102
Short-circuit currents – calculation of effects Definitions and calculation methods	60865		60865	0103
Low-voltage switchgear and controlgear – Circuit-breakers	60947-2		60947-2	0660 – 101
Low-voltage switchgear and controlgear assemblies	61439		61439	0660 – 600
A method of temperature-rise assessment by extrapolation for partially type-tested assemblies (PTTA) of low-voltage switchgear and controlgear	60890+C	528 S2		0660 – 507
Electrical installations of buildings – Part 5-52: Selection and erection of electrical equipment – Wiring systems	60364-5-52	384		0298 – 4
Low-voltage electrical installations – Selection and erection of electrical equipment – Part 520: Wiring systems – Supplement 3: Current-carrying capacity of cables in three-phase distribution circuits at load currents with harmonic content				0100-520 Supplement 3
Electrical accessories – Circuit-breakers for overcurrent protection for household and similar installations – Circuit-breakers for a.c. operation	60898-1		60898-1	0641 – 11
High-voltage switchgear and controlgear – Alternating Current switch-fuse combinations	62271		62271	0671 – 105
Electrical installations of buildings – Selection and erection of electrical equipment – Isolation, switching and control	60364-5-53	60364-5-534		0100-534
Low-voltage electrical installations – Protection for safety – Protection against voltage disturbances and electromagnetic disturbances	60364-4-44	60364-4-443		0100-443
Protection against lightning – Part 1…4	62305-1…4			0185 – 1…4
Low-voltage surge protective devices - Surge protective devices connected to low-voltage power systems; Requirements and tests	61643-11			0675-6-11
Tests for electric cables under fire conditions – Circuit integrity	60331-11, 21		50200	0472-814 0482-200
Fire behaviour of building materials and building components — Part 12: Circuit integrity maintenance of electric cable systems, requirements and testing				4102-12 : 1998-11
Electrical equipment of electric road vehicles - Electric vehicles conductive charging system	61851		61851	

*) Special national conditions and deviations from IEC 60364-4-41: 2005 are not implemented and need to be considered!

Supply
In = 160 A
Un = 400 V

K/L 3.2
Cable/Line
30 m
Cu (3x10/10/10)

NSHV 3
TN-S Un = 400 V

-684F4
Miniature circuit-breaker
In = 32 A
5SY43327/C

K/L 3.1
Cable/Line
1 m
Cu (3x4/4/4)

-684F3
Miniature circuit-breaker
In = 32 A
5SY43327/C

C/L 4.1
Cable/Line
1 m
Cu (3x4/4/4)

NSHV 5
TN-S Un = 400 V

-691F1
Miniature circuit-breaker
In = 6 A
5SY41067/C

C/L 4.2
Cable/Line
1 m
Cu (1x1,5/1,5/1,5)

Exhaust Unit / shut-off flap
Inner zone
In = 2,7 A
Un = 230 V
1+N-pole

-691F2
Miniature circuit-breaker
In = 6 A
5SY41067/C

C/L 4.3
Cable/Line
1 m
Cu (1x1,5/1,5/1,5)

Exhaust Unit / shut-off flap
Inner zone
In = 2,7 A
Un = 230 V
1+N-pole

-691F3
Miniature circuit-breaker
In = 6 A
5SY41067/C

C/L 4.4
Cable/Line
1 m
Cu (1x1,5/1,5/1,5)

Exhaust Unit / shut-off flap
Inner zone
In = 2,7 A
Un = 230 V
1+N-pole

-684F1
Miniature circuit-breaker
In = 32 A
5SY43327/C

C/L 5.1
Cable/Line
1 m
Cu (3x4/4/4)

Crane 3
Inner zone
In = 1,95 A
Un = 230 V
1+N-pole

C/L 5.7
Cable/Line
10 m
Cu (1x1,5/1,5/1,5)

-690F5
Miniature circuit-breaker
In = 6 A
5SY41067/C

Clima
Inner zone
In = 9 A
Un = 400 V
3+N-pole

C/L 5.8
Cable/Line
10 m
Cu (3x1,5/1,5/1,5)

-691F4
Miniature circuit-breaker
In = 16 A
5SY43167/C

-101Q1
Circuit-breaker
In = 3,2 A
3RV20111DA25/LI

C/L 3.4
Cable/Line
2 m
Cu (3x1,5/1,5/1,5)

400V/230V Power Supply
Inner zone
In = 1,6 A
Un = 400 V
3+N-pole

-690F2
Miniature circuit-breaker
In = 20 A
5SU13547KK20/C

C/L 3.3
Cable/Line
10 m
Cu (1x2,5/2,5/2,5)

Container Sockets
Inner zone
In = 10 A
Un = 230 V
1+N-pole

NSHV 6
TN-S Un = 400 V

-690F1
Miniature circuit-breaker
In = 10 A
5SU13546KK10/B

C/L 5.2
Cable/Line
10 m
Cu (1x1,5/1,5/1,5)

Container Light
Inner zone
In = 1 A
Un = 230 V
1+N-pole

-690F3
Miniature circuit-breaker
In = 6 A
5SY41067/C

C/L 5.4
Cable/Line
10 m
Cu (1x1,5/1,5/1,5)

Crane 1
Inner zone
In = 1,95 A
Un = 230 V
1+N-pole

-690F4
Miniature circuit-breaker
In = 6 A
5SY41067/C

C/L 5.5
Cable/Line
10 m
Cu (1x1,5/1,5/1,5)

Crane 2
Inner zone
In = 1,95 A
Un = 230 V
1+N-pole

230V Bat Cabinet 7
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-292W2-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

-688F1
Miniature circuit-breaker
In = 16 A
5SY41167/C

230V Bat Cabinet 8
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-292W3-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

-688F2
Miniature circuit-breaker
In = 16 A
5SY41167/C

230V Bat Cabinet 9
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-293W1-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

-688F3
Miniature circuit-breaker
In = 16 A
5SY41167/C

230V Bat Cabinet 10
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-293W2-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

-688F4
Miniature circuit-breaker
In = 16 A
5SY41167/C

230V Bat Cabinet 11
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-293W3-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

-688F5
Miniature circuit-breaker
In = 16 A
5SY41167/C

NSHV 4
TN-S Un = 400 V

-687F1
Miniature circuit-breaker
In = 16 A
5SY41167/C

-290W1-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

230V Bat Cabinet 1
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-687F2
Miniature circuit-breaker
In = 16 A
5SY41167/C

-290W2-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

230V Bat Cabinet 2
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-687F3
Miniature circuit-breaker
In = 16 A
5SY41167/C

-290W3-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

230V Bat Cabinet 3
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-687F4
Miniature circuit-breaker
In = 16 A
5SY41167/C

-291W1-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

230V Bat Cabinet 4
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-687F5
Miniature circuit-breaker
In = 16 A
5SY41167/C

-291W2-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

230V Bat Cabinet 5
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-687F6
Miniature circuit-breaker
In = 16 A
5SY41167/C

-292W1-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

230V Bat Cabinet 6
Inner zone
In = 2 A
Un = 230 V
1+N-pole

Project name:	Shell Crosswind Offshore		
Planner: Freqcon_DG		View: Device parameters	Sheet: 1/1
Design office: Freqcon GmbH		Location:	
Client: Statron AG		Created on: 4 Sep 2024	Changed on: 30 Oct 2024

Selectivity evaluation

created with

SIMARIS design

Version: 24.1.0 (2024-05-07)
Subrevision: 1218

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http://www.siemens.com/simaris

Master data

Project name:	Shell Crosswind Offshore
Project description:	BESS FQ 1MW 5MWh
Editor:	Freqcon_DG
Planning office:	Freqcon GmbH
Created at:	Wednesday, 4. September 2024
Changed at:	Wednesday, 30. October 2024

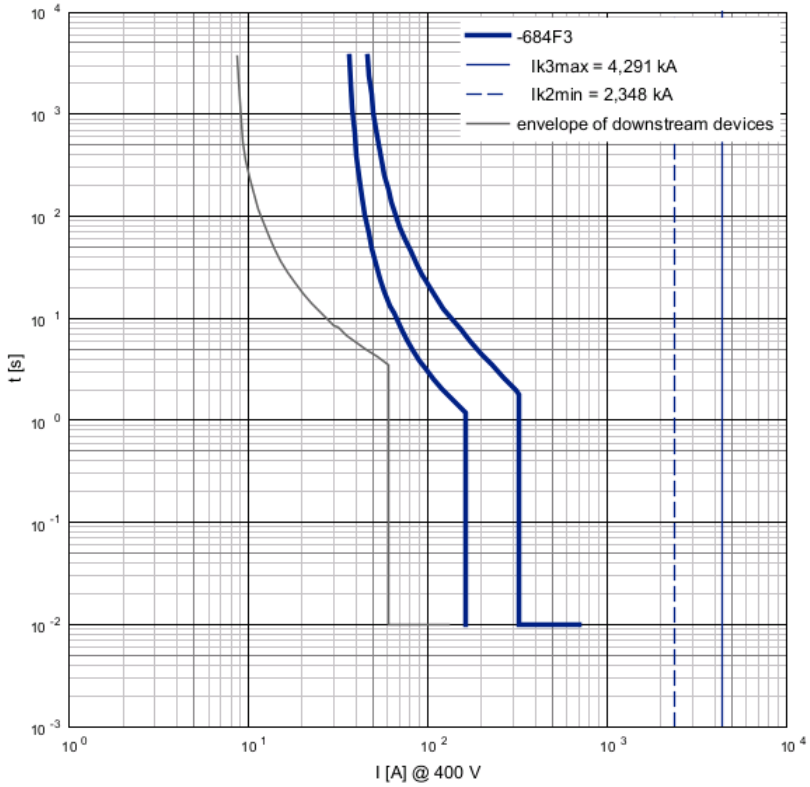
Customer data

City:	
Customer:	Statron AG

Comment:

Battery Container

Circuit name: **LVSD 4.1**
Designation: **-684F3**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -684F3

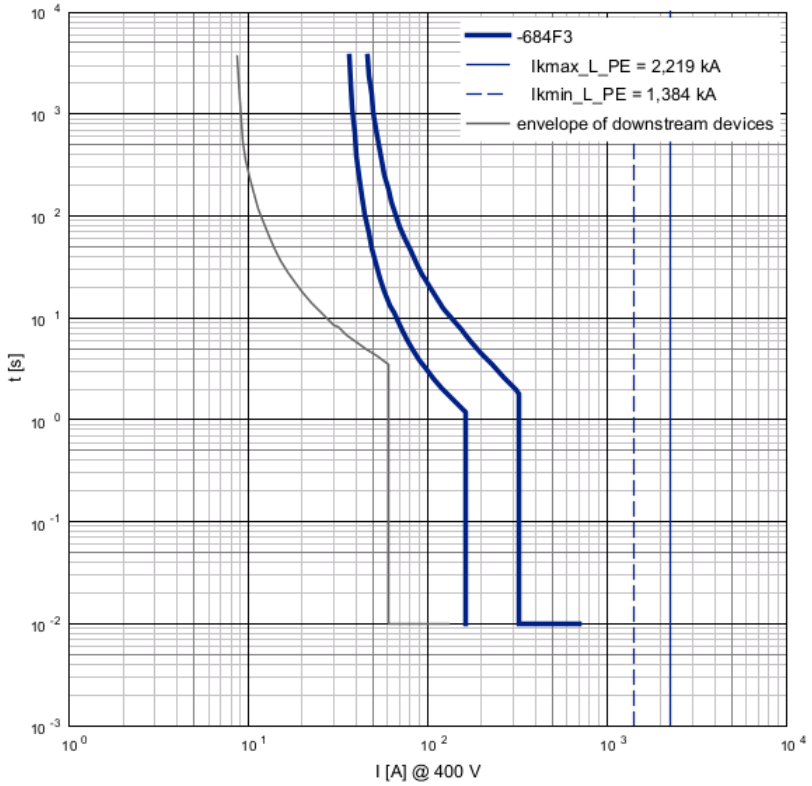
5SY43327

In 32 A

L Protection: On
Ir - corresp. 32 A

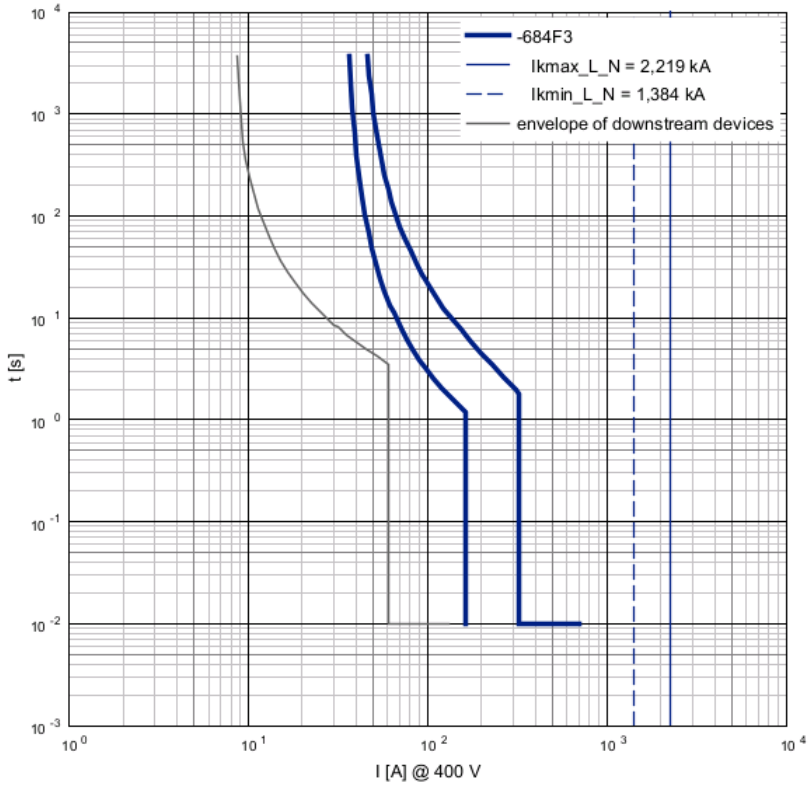
I Protection: On
Ii - corresp. 160 A

Short cut current: **Ik1-PE**
Selectivity evaluation:

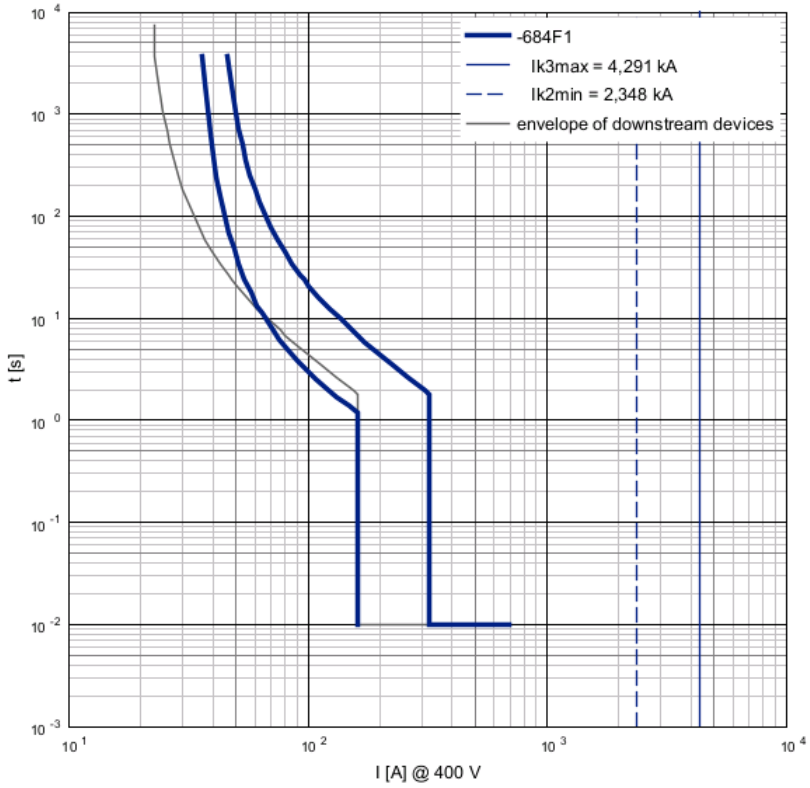

-684F3
Ikmax_L_PE = 2,219 kA
Ikmin_L_PE = 1,384 kA
envelope of downstream devices
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Circuit name: **LVSD 5.1**
Designation: **-684F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -684F1

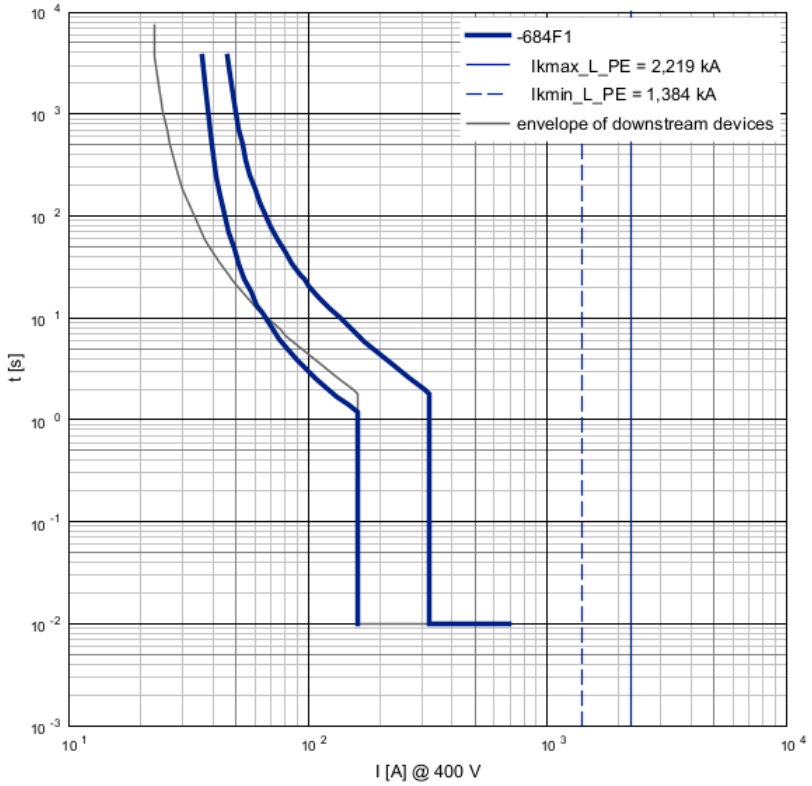
5SY43327

In 32 A

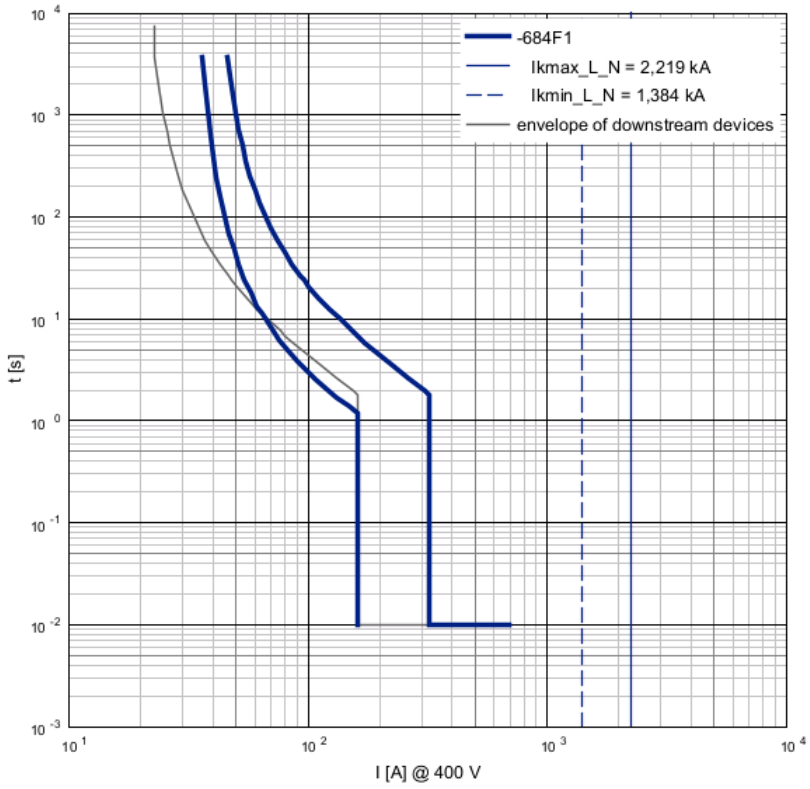
L Protection: On
Ir - corresp. 32 A

I Protection: On
Ii - corresp. 160 A

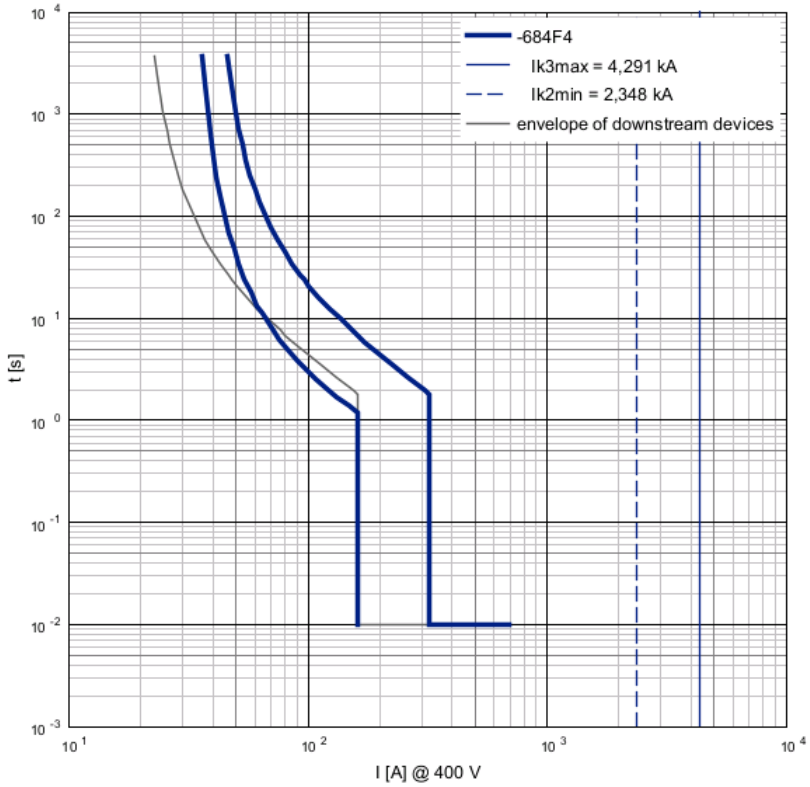
Short cut current: **Ik1-PE**
Selectivity evaluation:


-684F1
Ikmax_L_PE = 2,219 kA
Ikmin_L_PE = 1,384 kA
envelope of downstream devices
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**
Selectivity evaluation:



Circuit name: **NSUV 3.1**
Designation: **-684F4**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -684F4

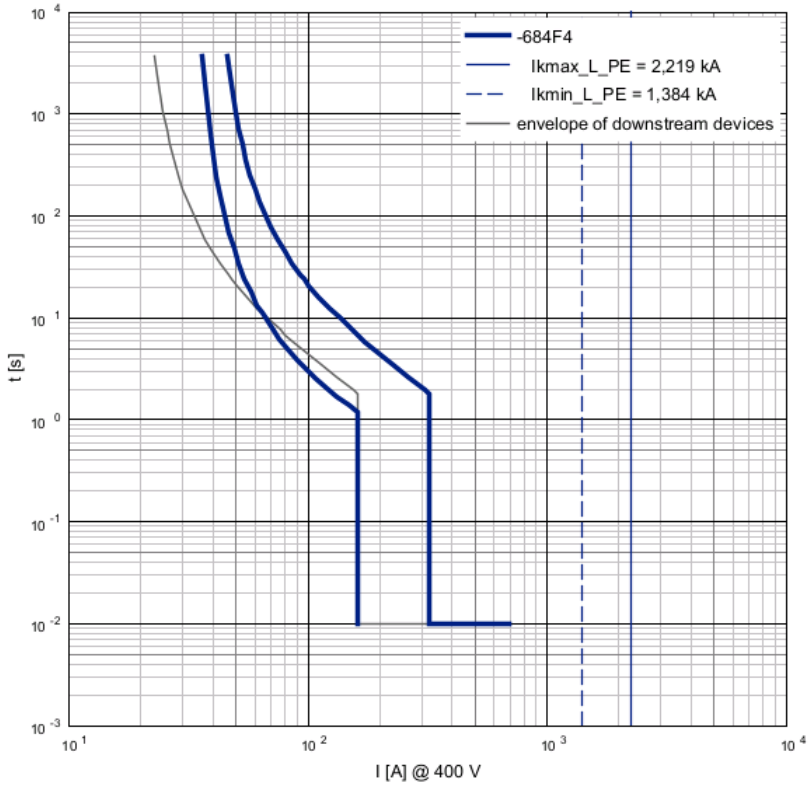
5SY43327

In 32 A

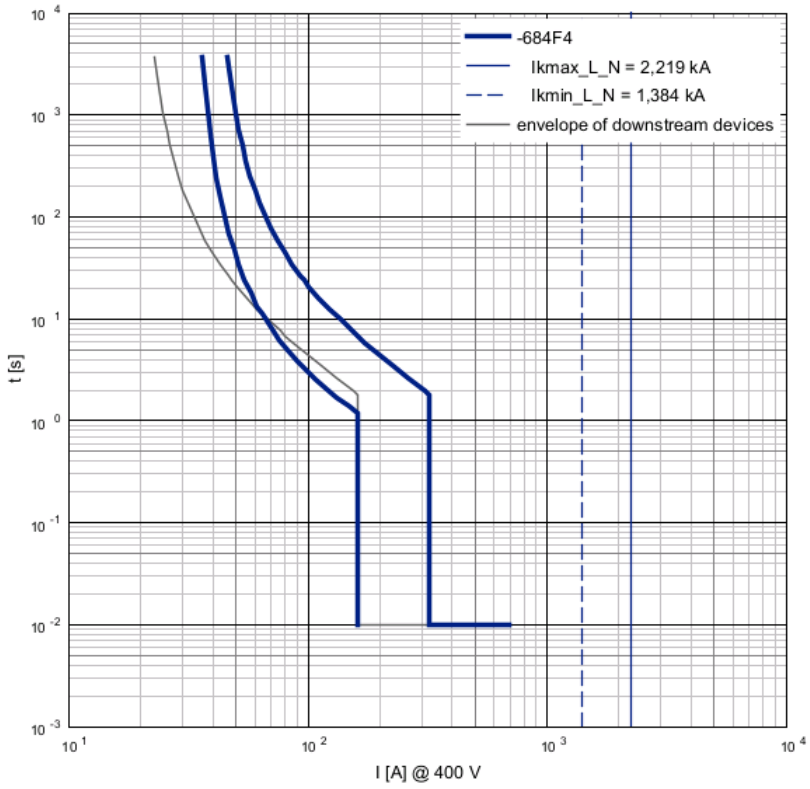
L Protection: On
Ir - corresp. 32 A

I Protection: On
Ii - corresp. 160 A

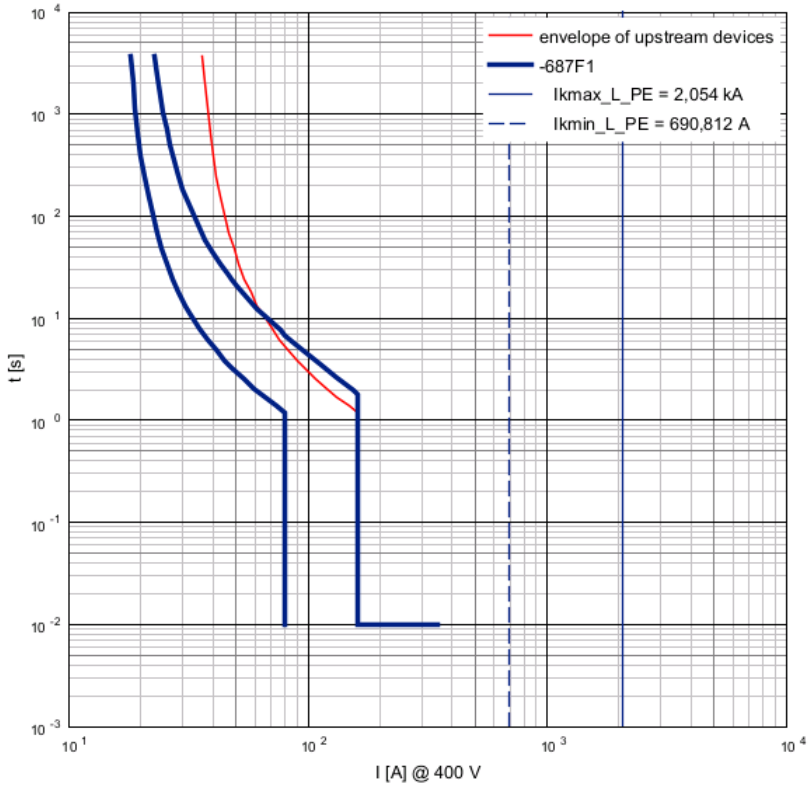
Short cut current: **Ik1-PE**
Selectivity evaluation:


-684F4
Ikmax_L_PE = 2,219 kA
Ikmin_L_PE = 1,384 kA
envelope of downstream devices
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**
Selectivity evaluation:



Circuit name: **230V Bat Cabinet 1**
Designation: **-687F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -687F1

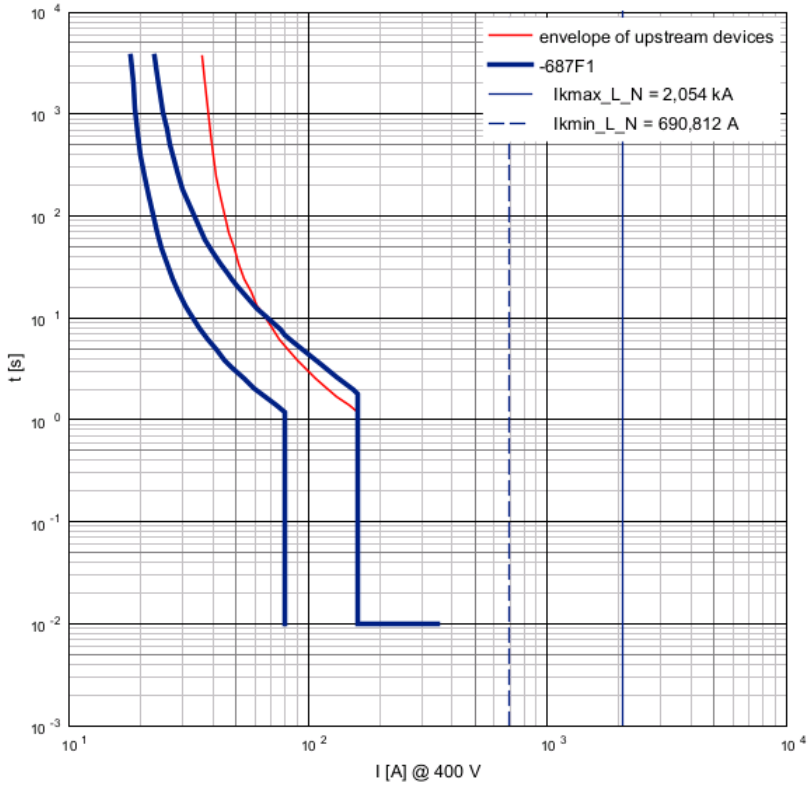
5SY41167

In 16 A

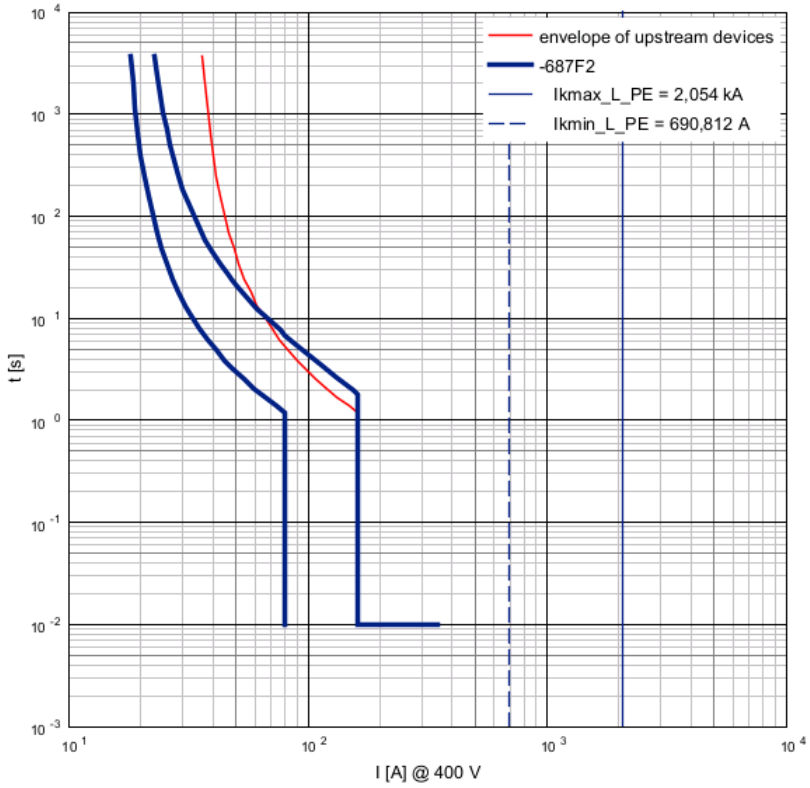
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-687F1
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 2**
Designation: **-687F2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -687F2

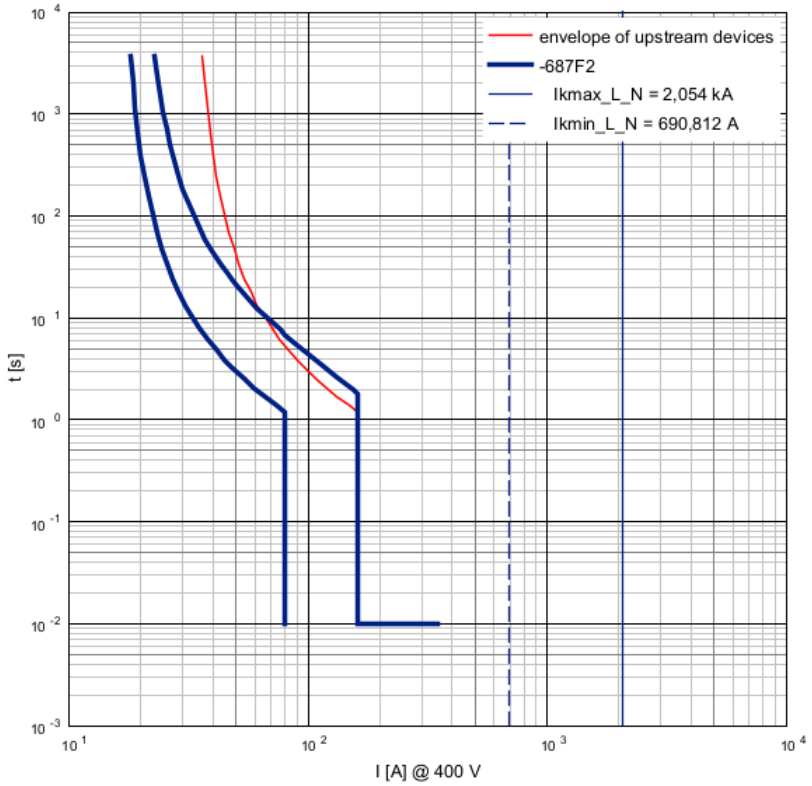
5SY41167

In 16 A

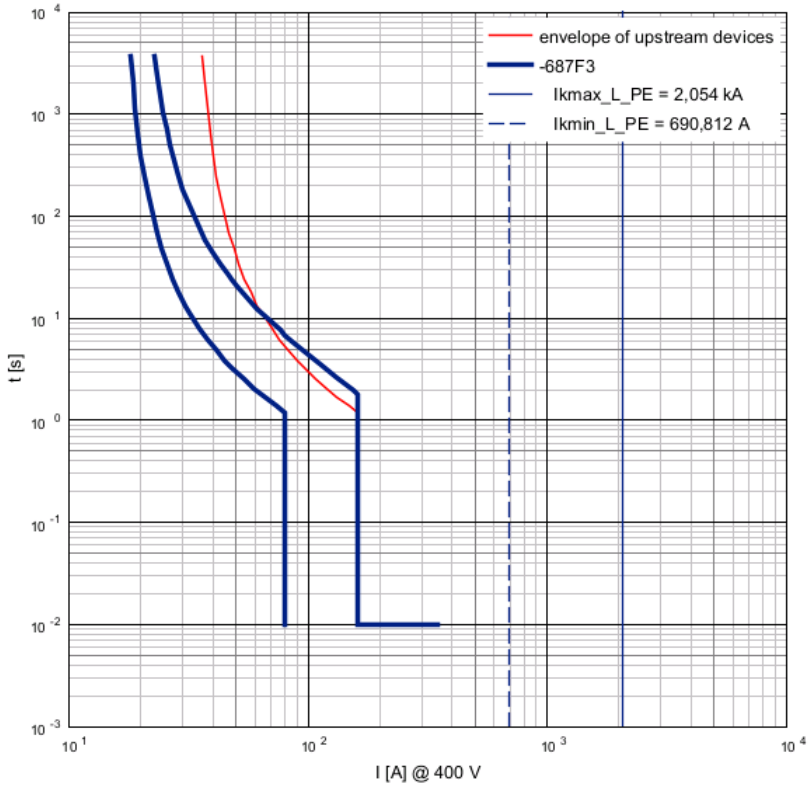
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-687F2
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 3**
Designation: **-687F3**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -687F3

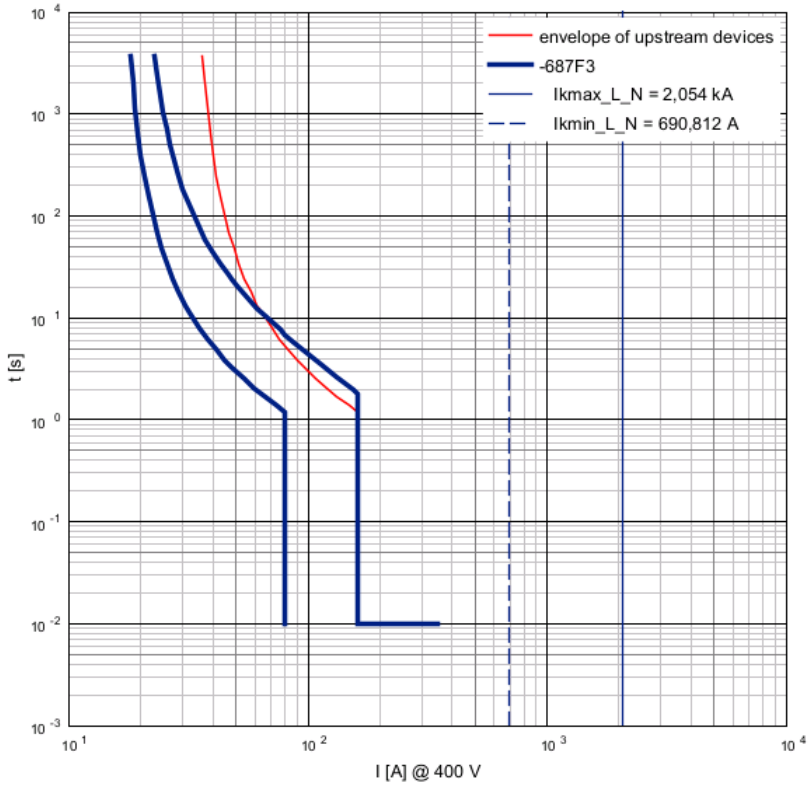
5SY41167

In 16 A

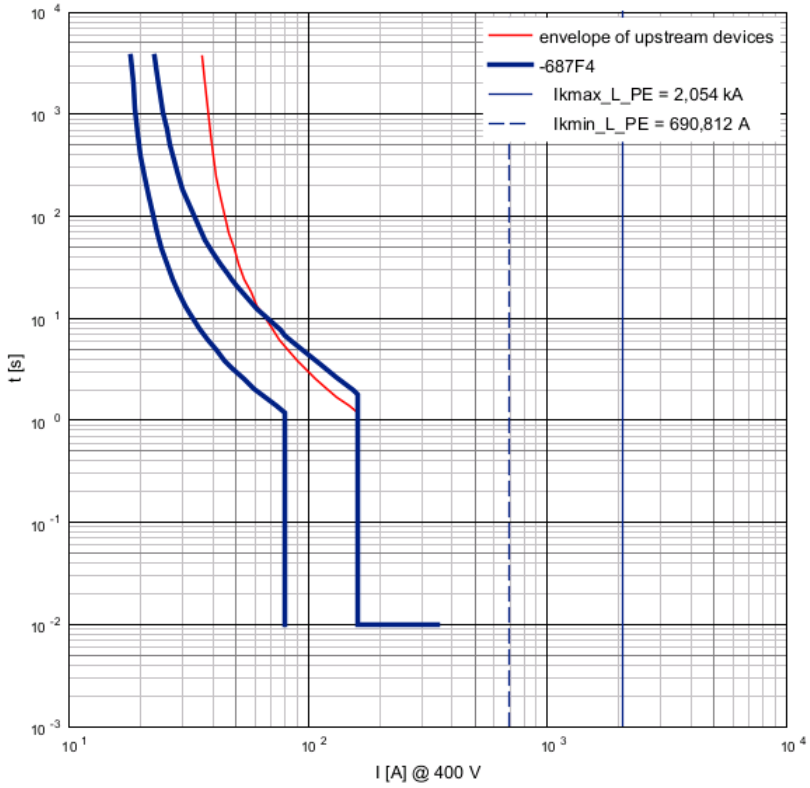
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-687F3
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 4**
Designation: **-687F4**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -687F4

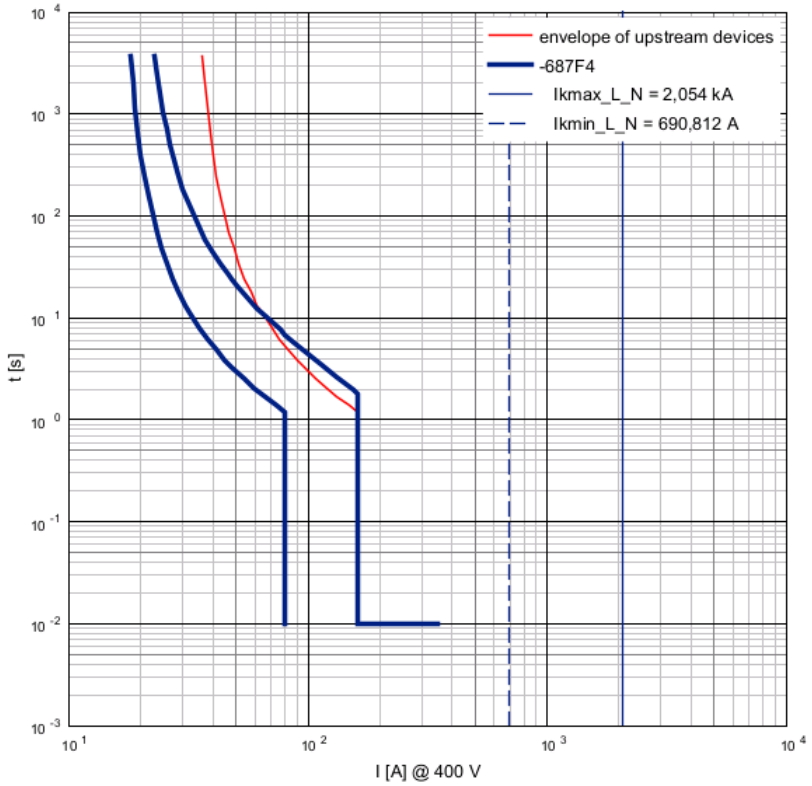
5SY41167

In 16 A

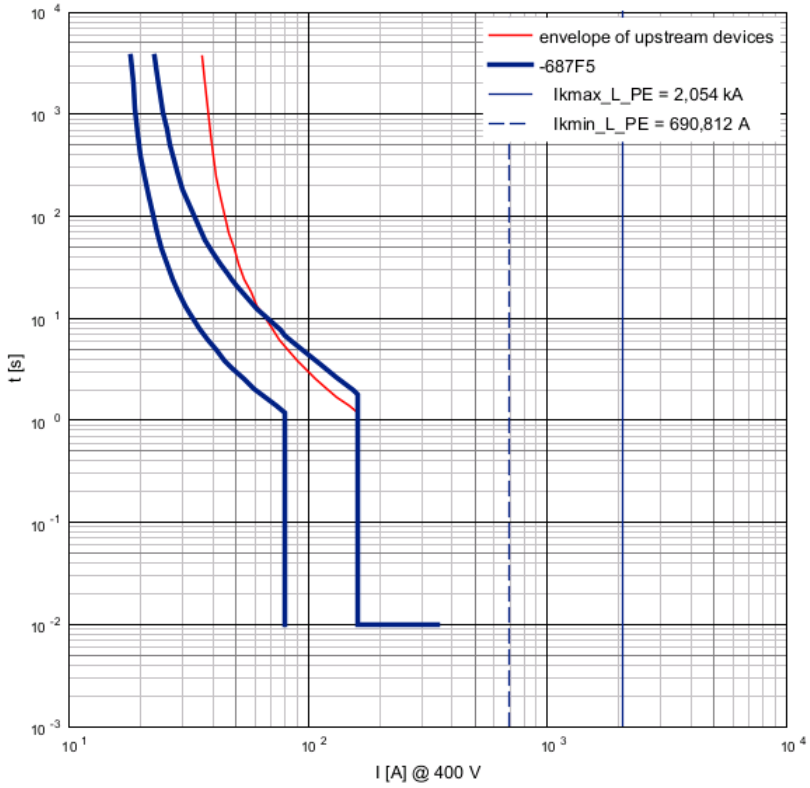
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-687F4
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 5**
Designation: **-687F5**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -687F5

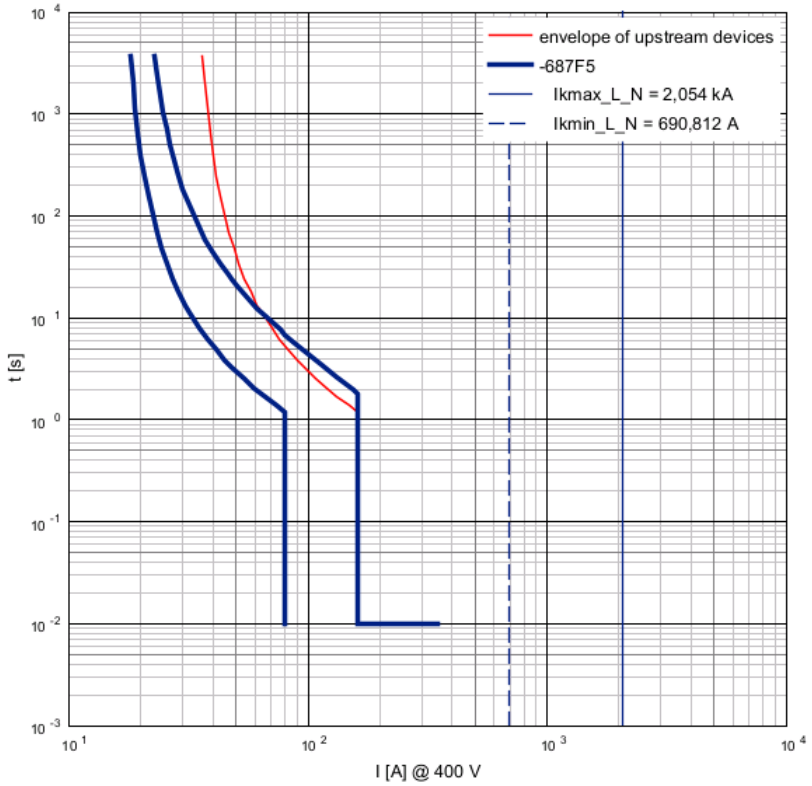
5SY41167

In 16 A

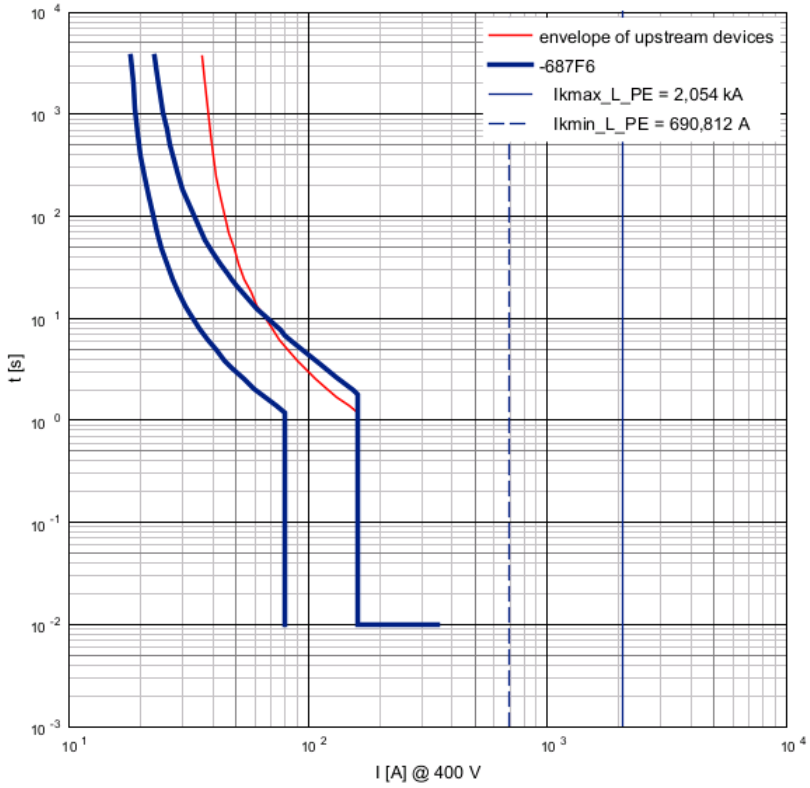
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-687F5
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 6**
Designation: **-687F6**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -687F6

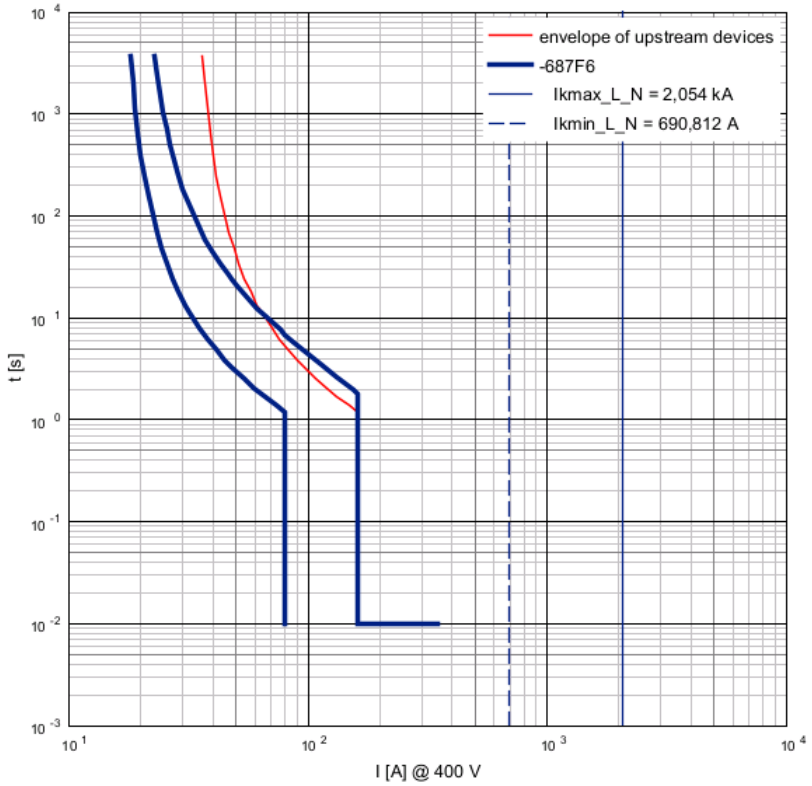
5SY41167

In 16 A

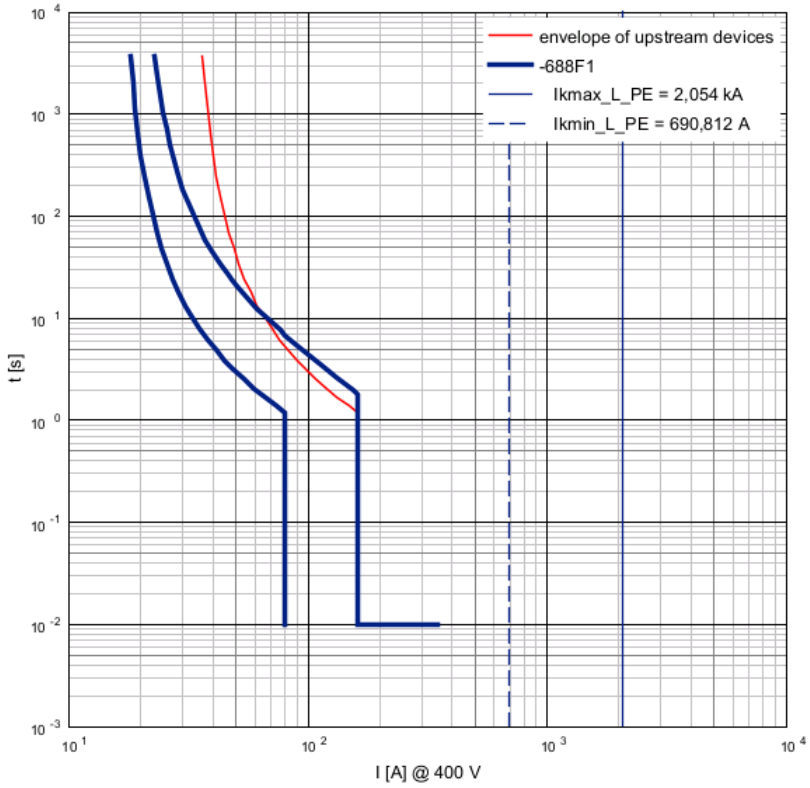
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-687F6
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 7**
Designation: **-688F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -688F1

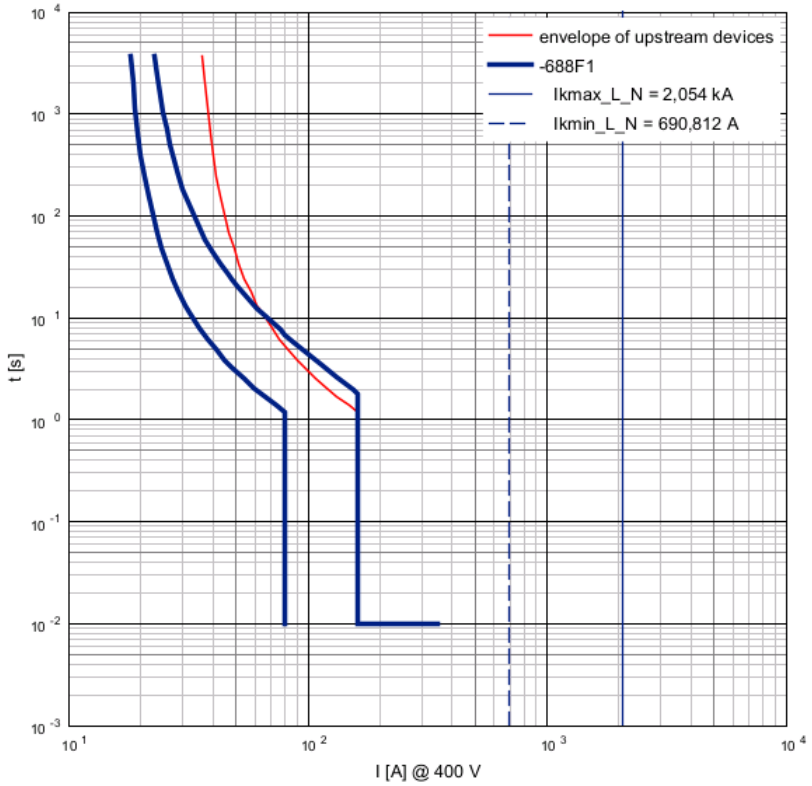
5SY41167

In 16 A

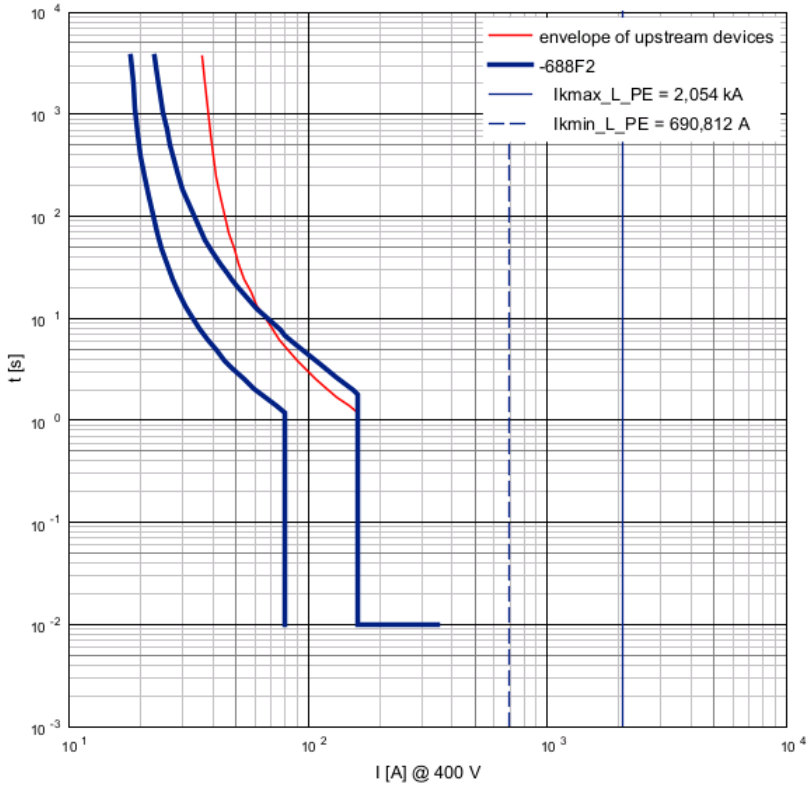
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-688F1
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 8**
Designation: **-688F2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -688F2

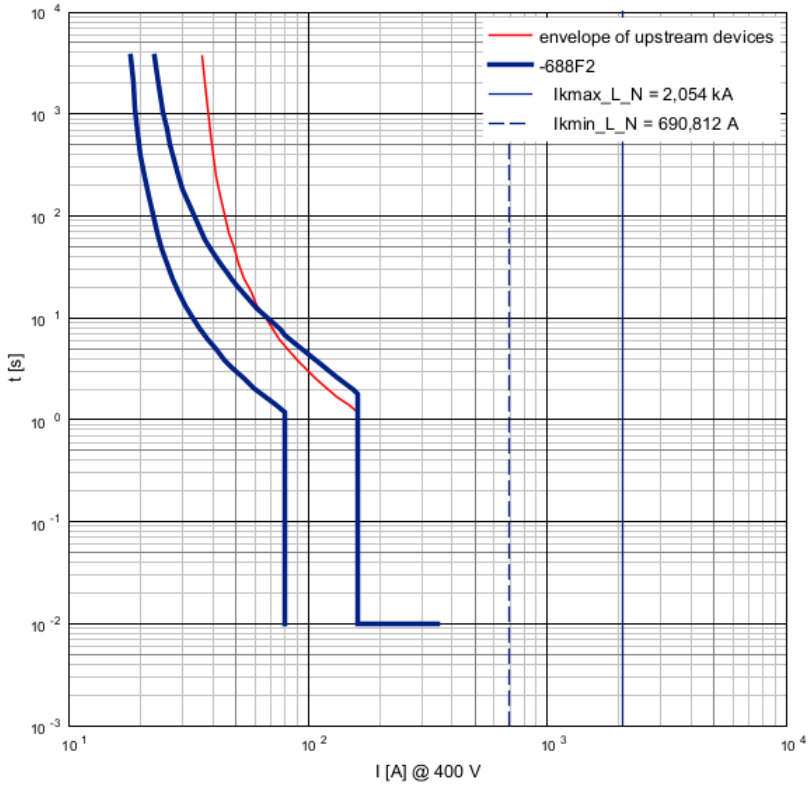
5SY41167

In 16 A

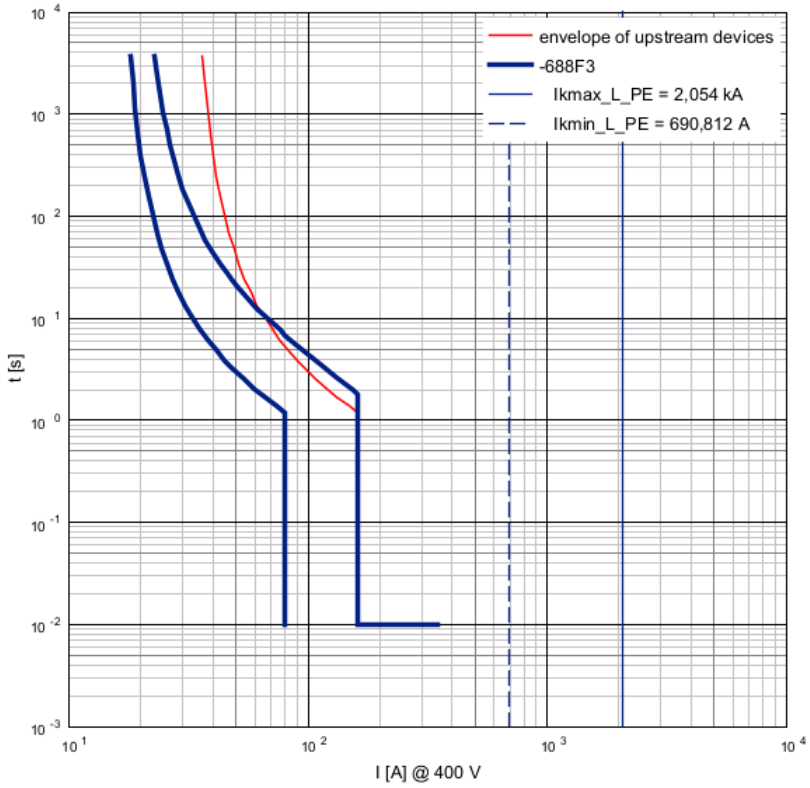
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-688F2
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 9**
Designation: **-688F3**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -688F3

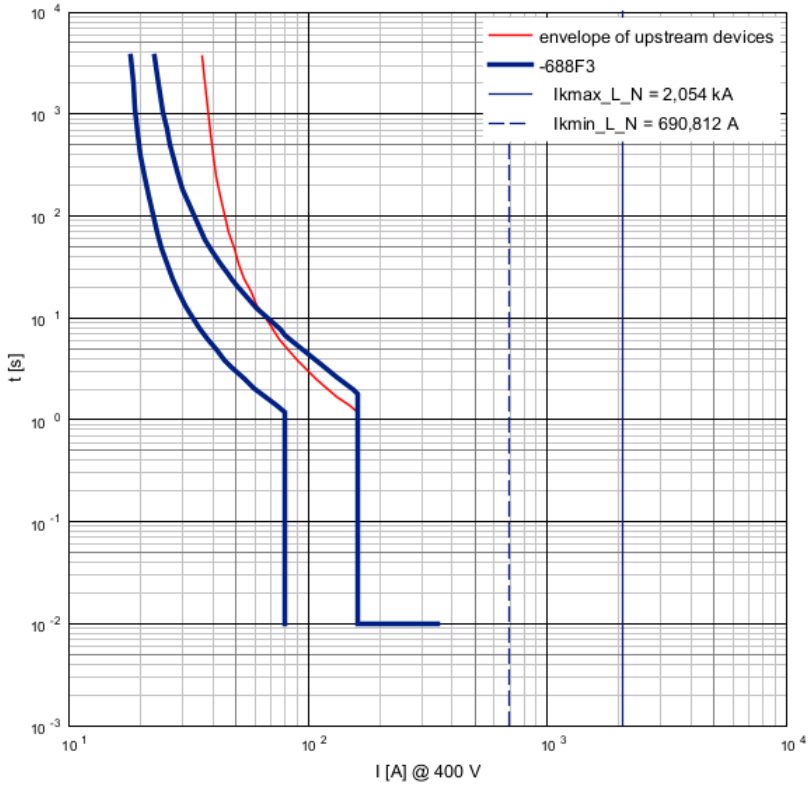
5SY41167

In 16 A

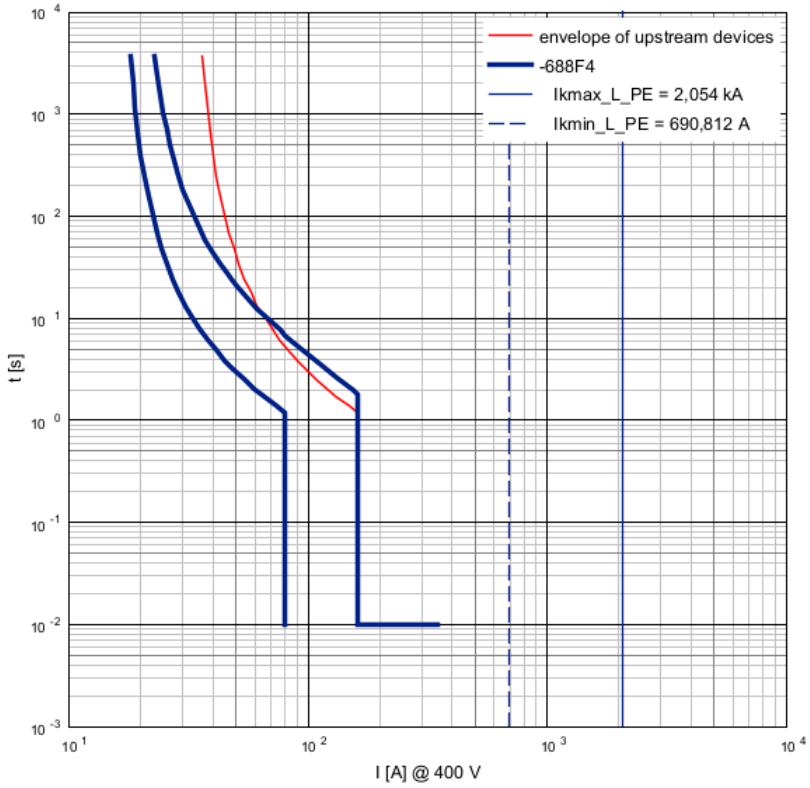
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-688F3
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 10**
Designation: **-688F4**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -688F4

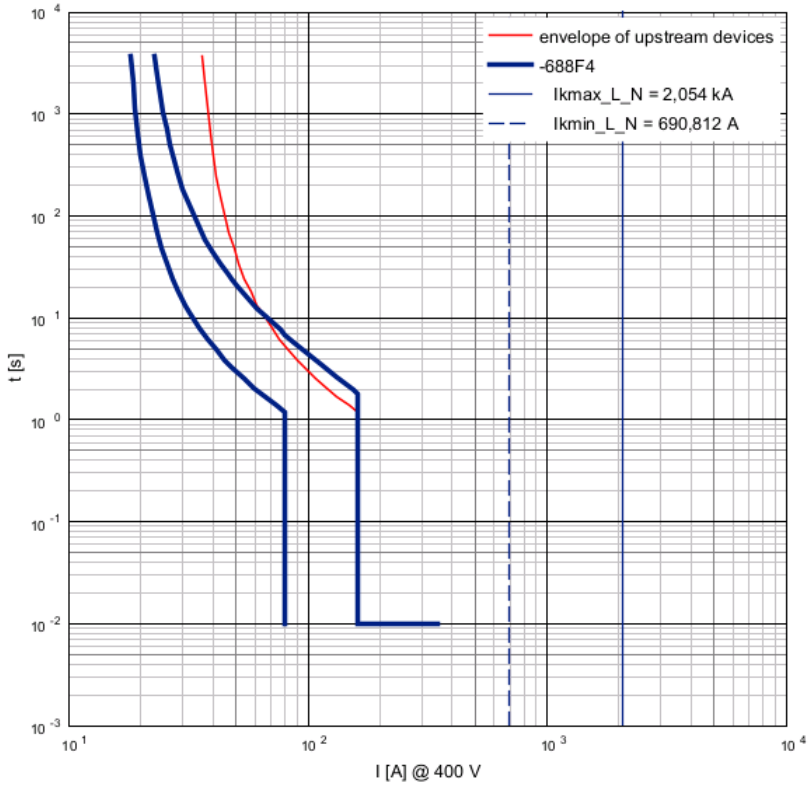
5SY41167

In 16 A

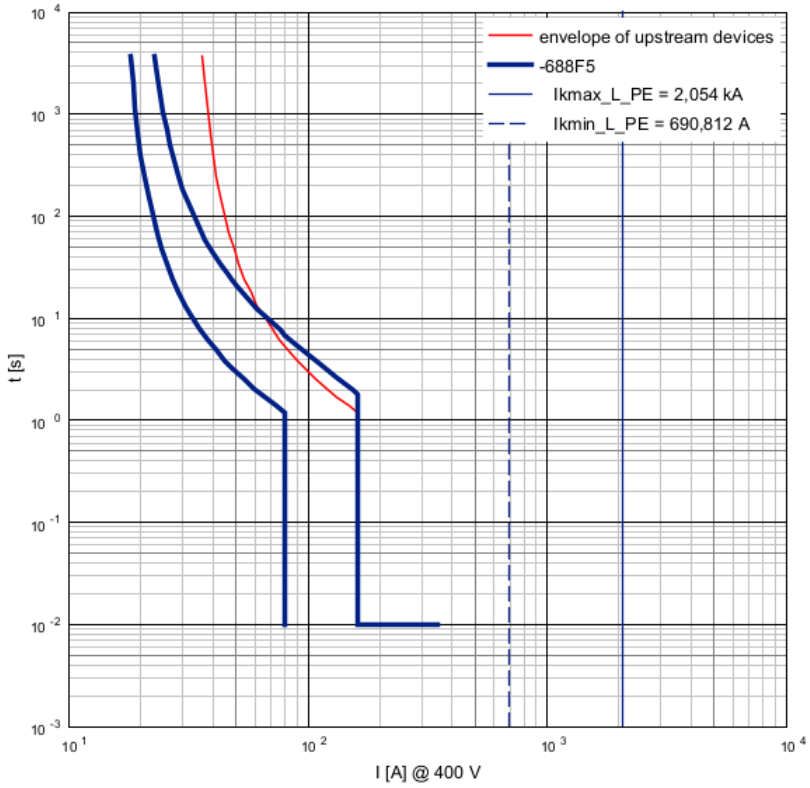
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-688F4
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 11**
Designation: **-688F5**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -688F5

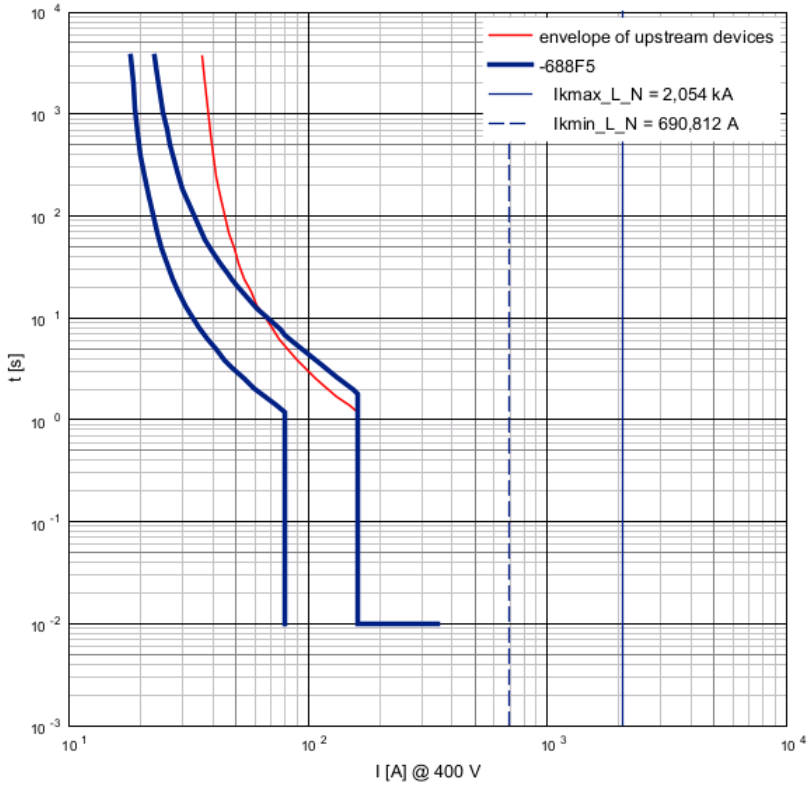
5SY41167

In 16 A

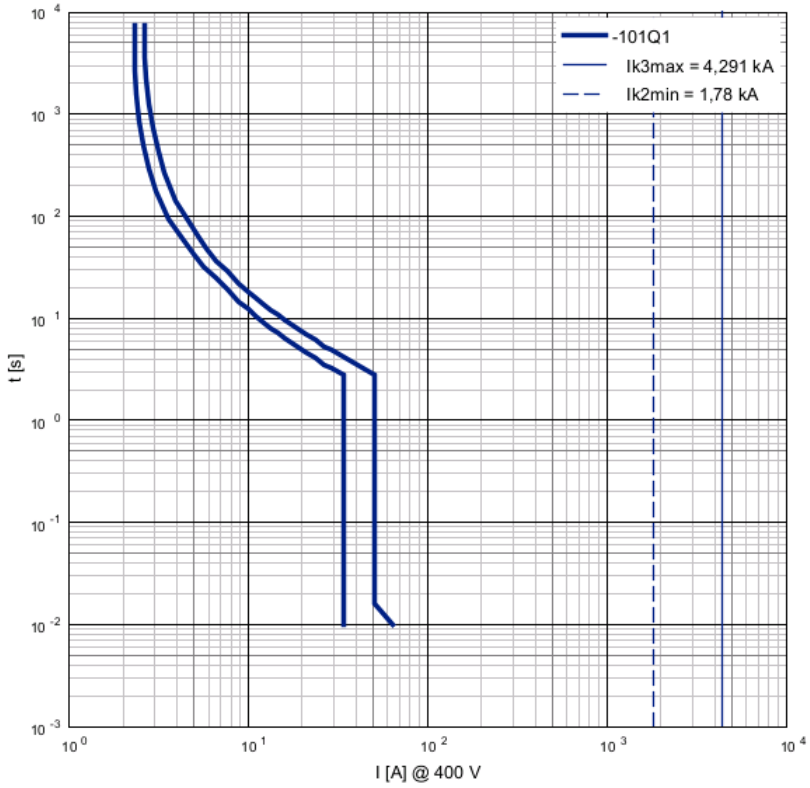
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-688F5
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **400V/230V Power Supply**
Designation: **-101Q1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -101Q1

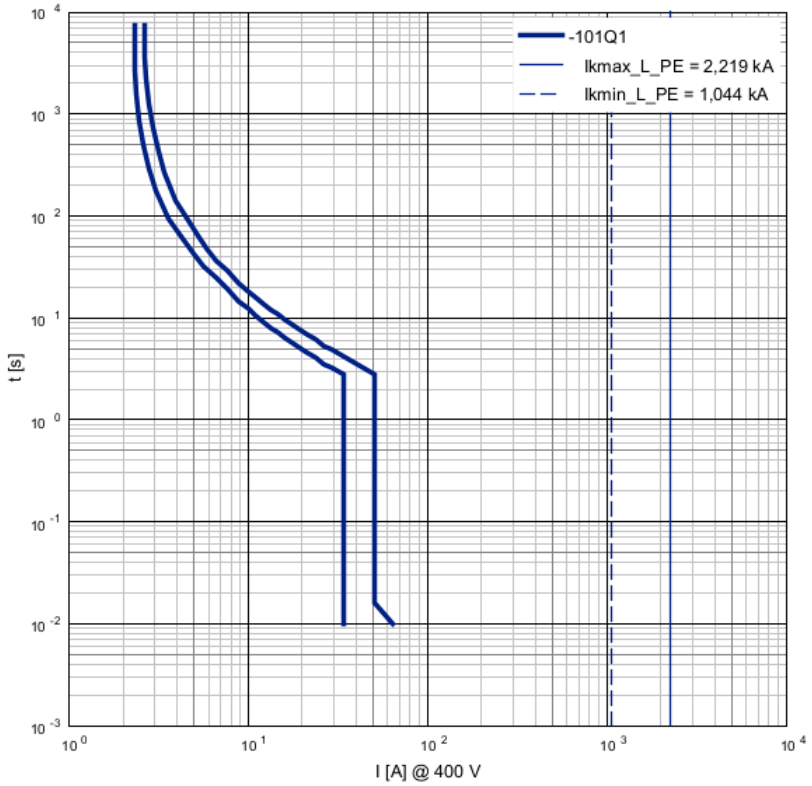
3RV20111DA25

In 3.2 A

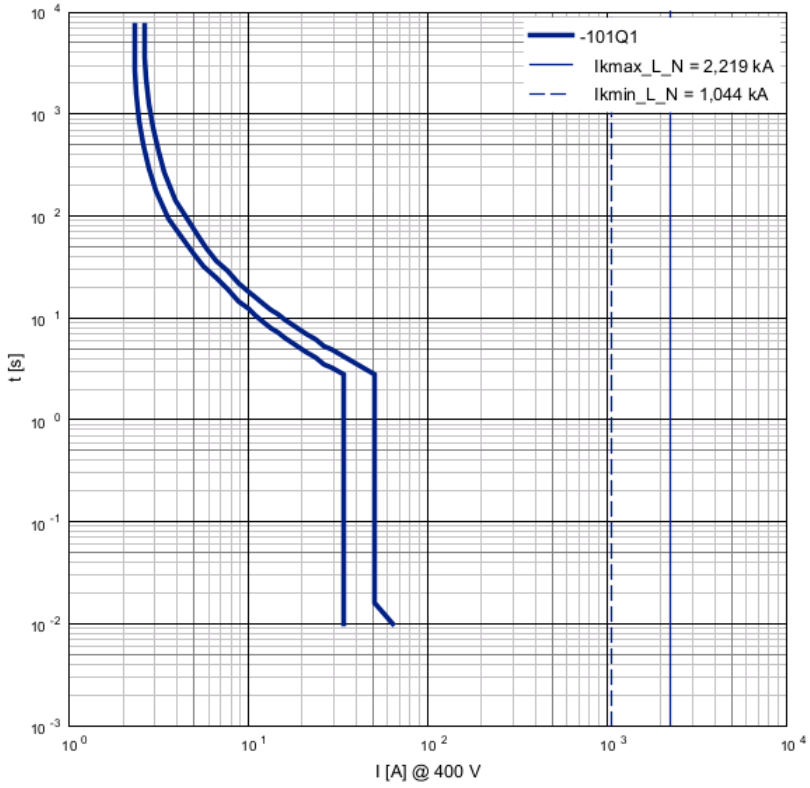
L Protection: On
Ir - corresp. 2.2 A
tr 10 s

I Protection: On
Ii - corresp. 42 A

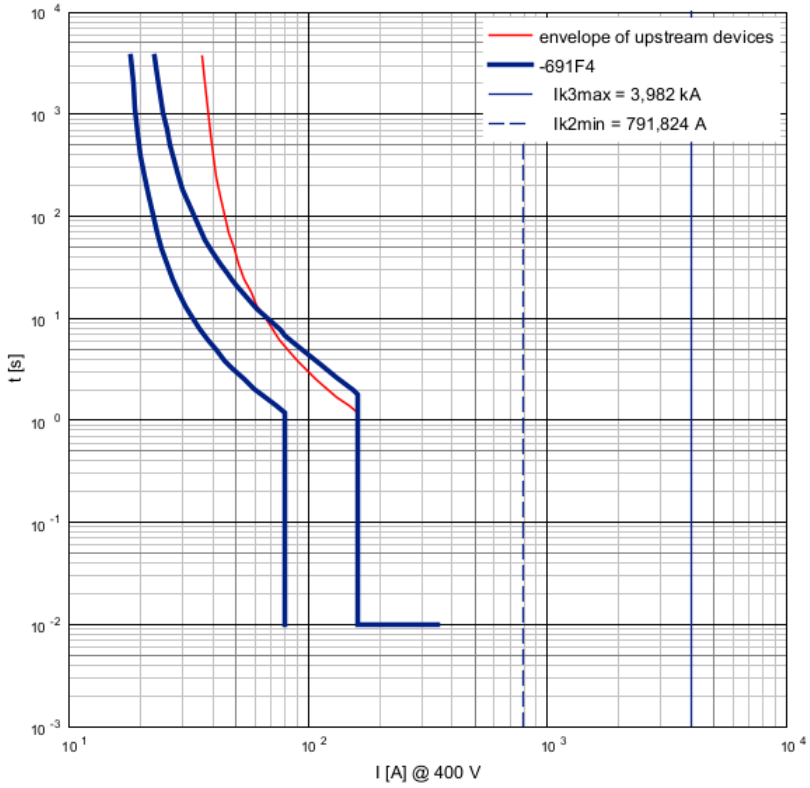
Short cut current: **Ik1-PE**
Selectivity evaluation:


-101Q1
Ikmax_L_PE = 2,219 kA
Ikmin_L_PE = 1,044 kA
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**
Selectivity evaluation:



Circuit name: **Clima**
Designation: **-691F4**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -691F4

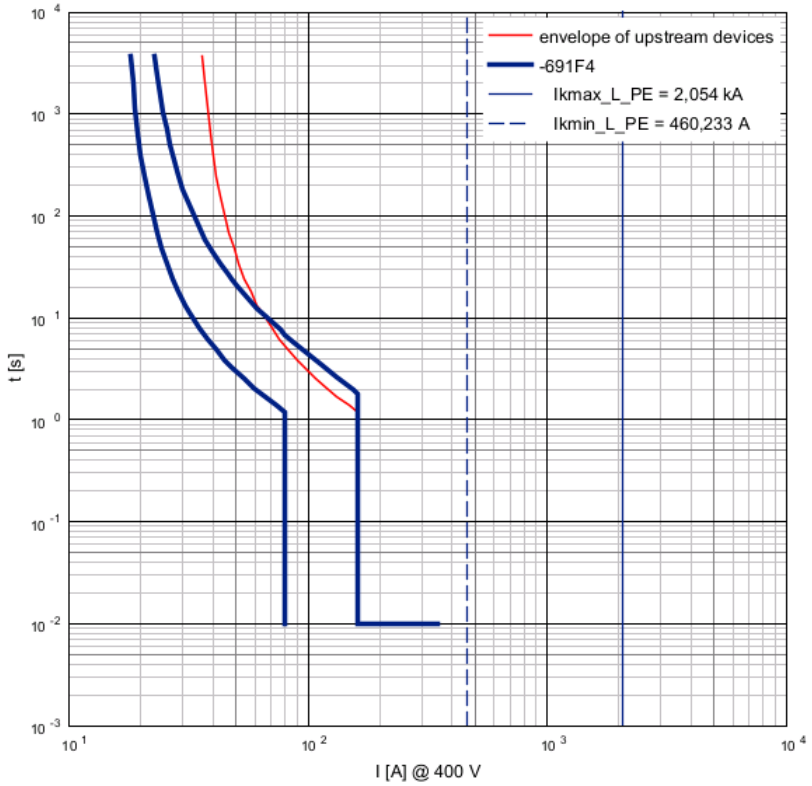
5SY43167

In 16 A

L Protection: On
Ir - corresp. 16 A

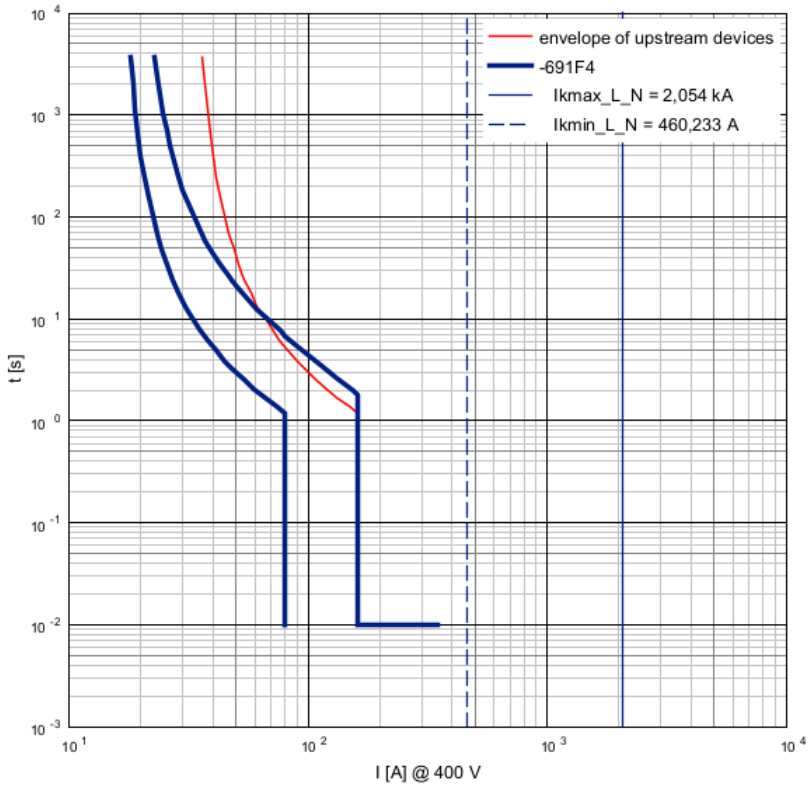
I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-PE**
Selectivity evaluation:

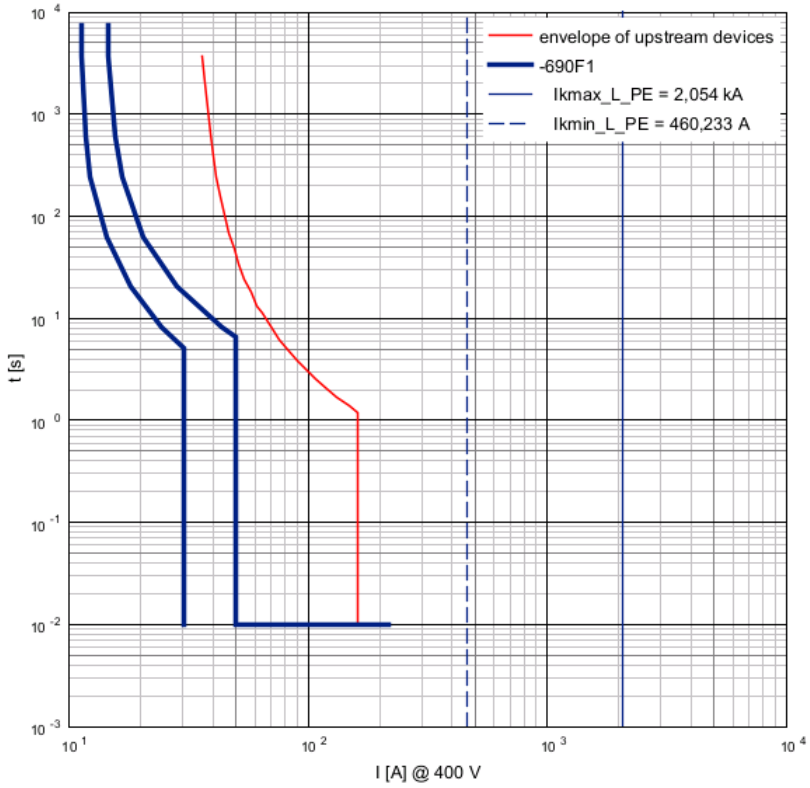

envelope of upstream devices
-691F4
Ikmax_L_PE = 2,054 kA
Ikmin_L_PE = 460,233 A
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Circuit name: **Container Light**
Designation: **-690F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -690F1

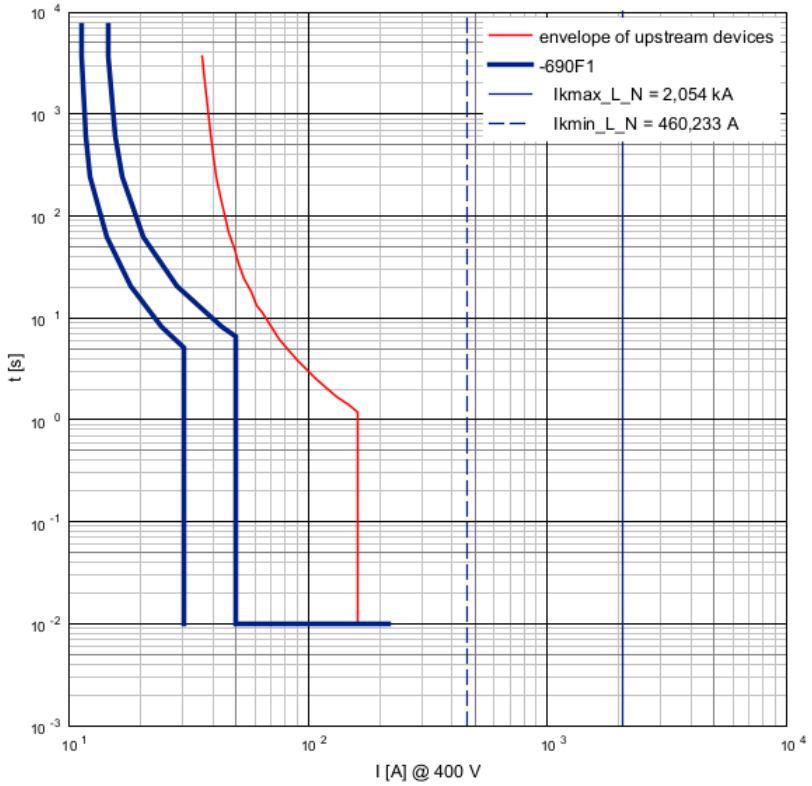
5SU13546KK10

In 10 A

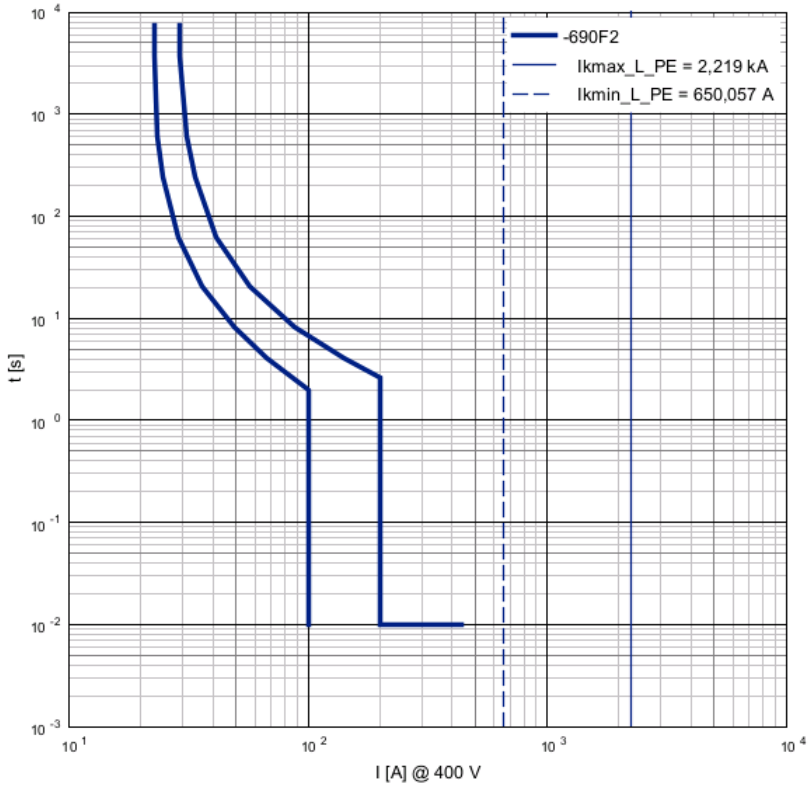
L Protection: On
Ir - corresp. 10 A

I Protection: On
Ii - corresp. 30 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-690F1
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 460,233 A
t [s]
I [A] @ 400 V

Circuit name: **Container Sockets**
Designation: **-690F2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -690F2

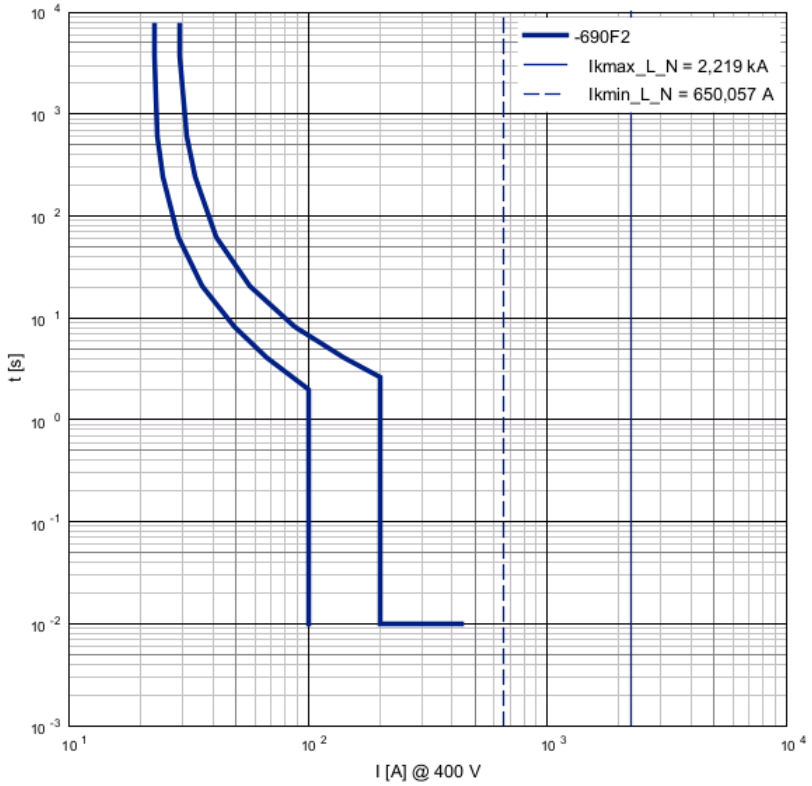
5SU13547KK20

In 20 A

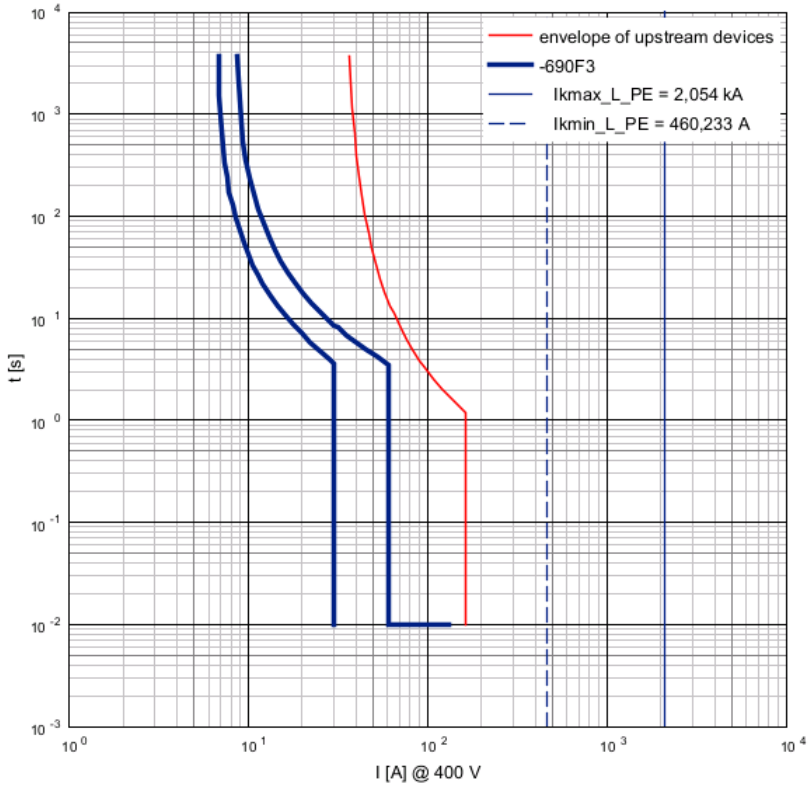
L Protection: On
Ir - corresp. 20 A

I Protection: On
Ii - corresp. 100 A

Short cut current: **Ik1-N**
Selectivity evaluation:


-690F2
Ikmax_L_N = 2,219 kA
Ikmin_L_N = 650,057 A
t [s]
I [A] @ 400 V

Circuit name: **Crane 1**
Designation: **-690F3**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -690F3

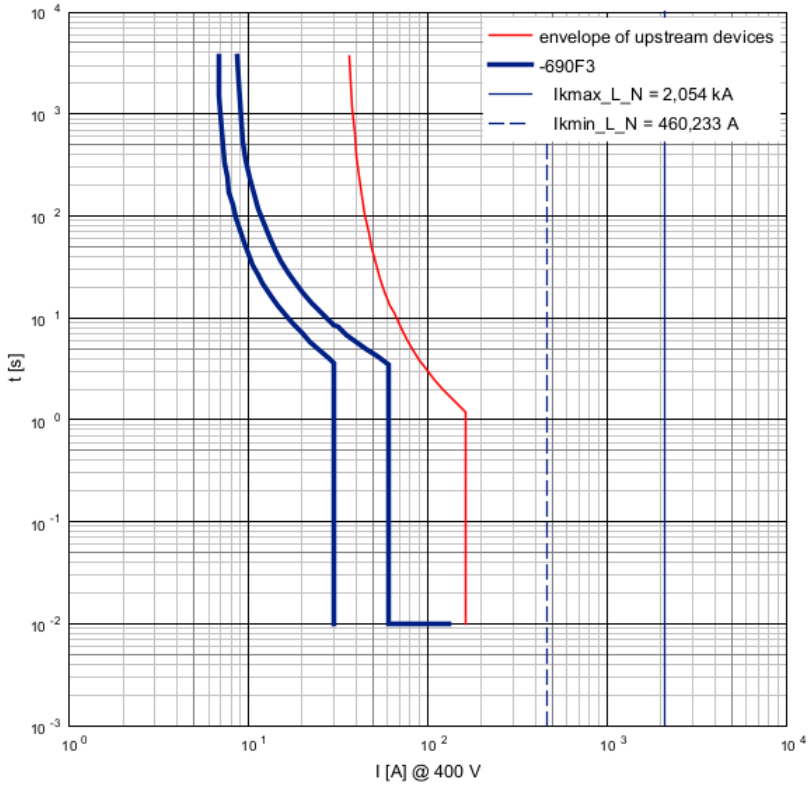
5SY41067

In 6 A

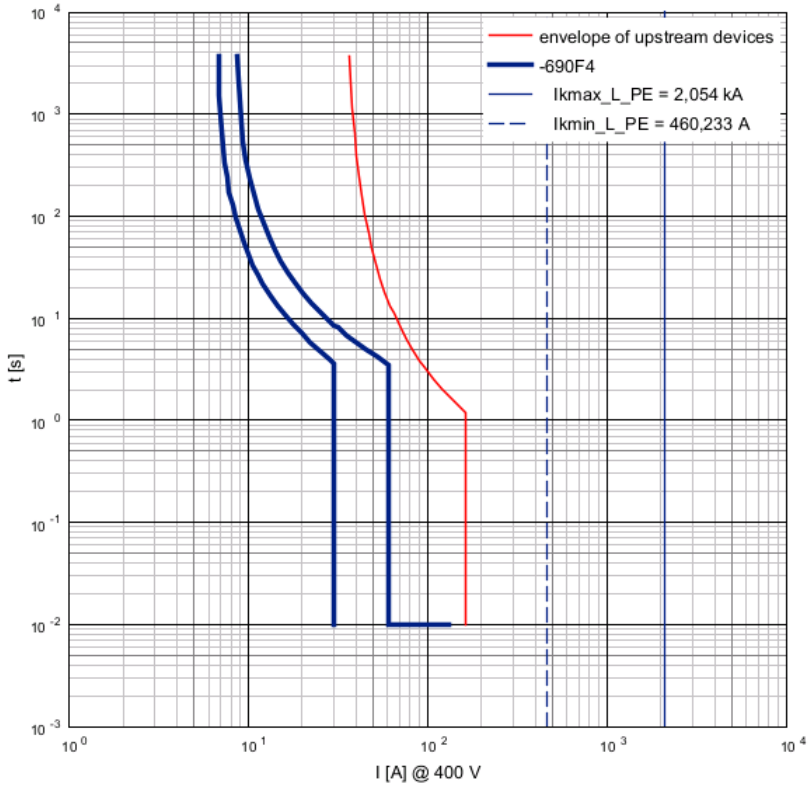
L Protection: On
Ir - corresp. 6 A

I Protection: On
Ii - corresp. 30 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-690F3
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 460,233 A
t [s]
I [A] @ 400 V

Circuit name: **Crane 2**
Designation: **-690F4**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -690F4

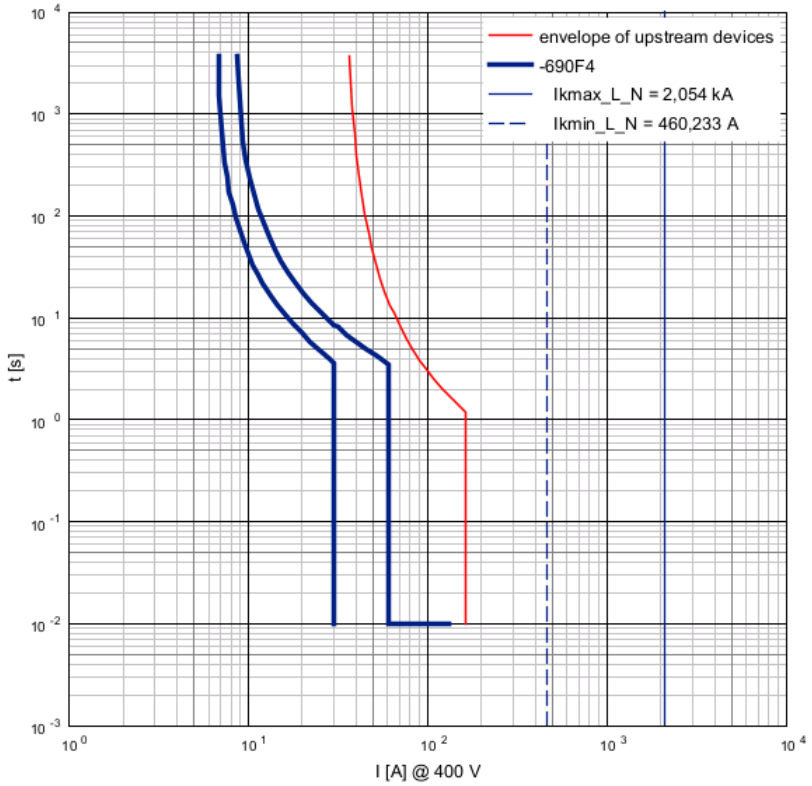
5SY41067

In 6 A

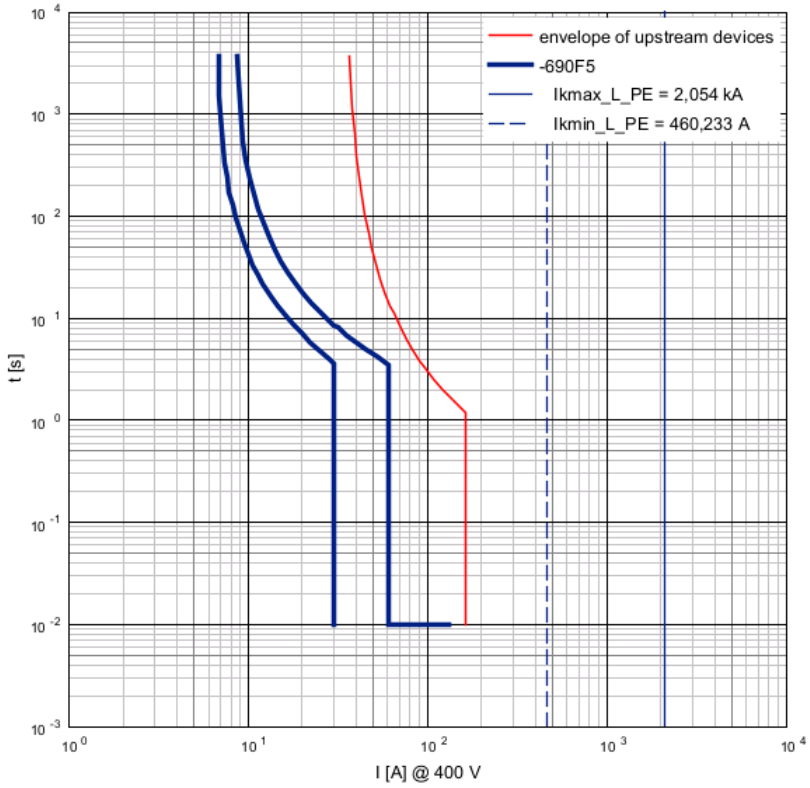
L Protection: On
Ir - corresp. 6 A

I Protection: On
Ii - corresp. 30 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-690F4
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 460,233 A
t [s]
I [A] @ 400 V

Circuit name: **Crane 3**
Designation: **-690F5**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -690F5

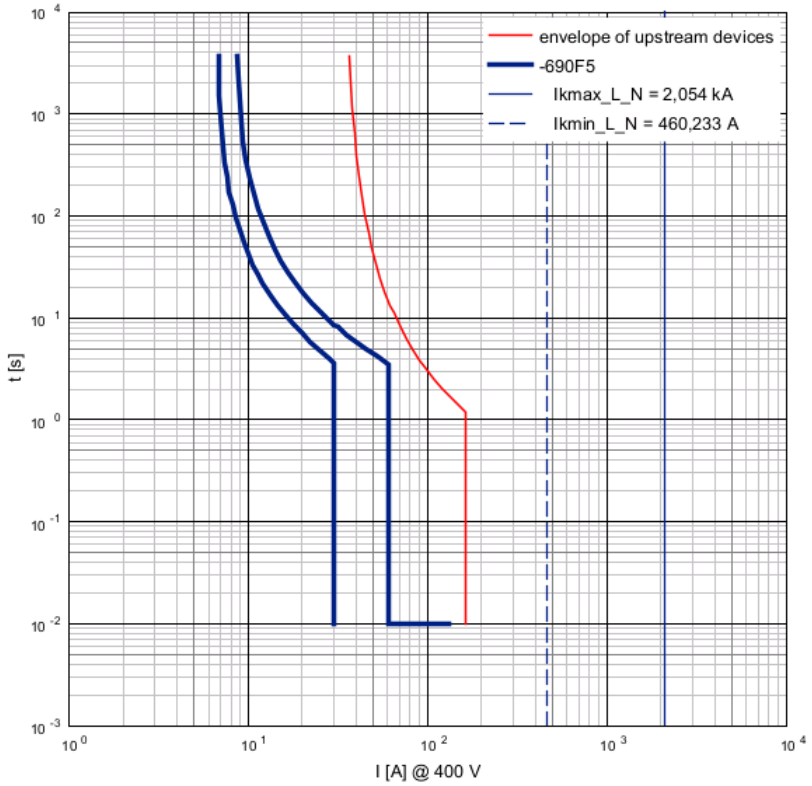
5SY41067

In 6 A

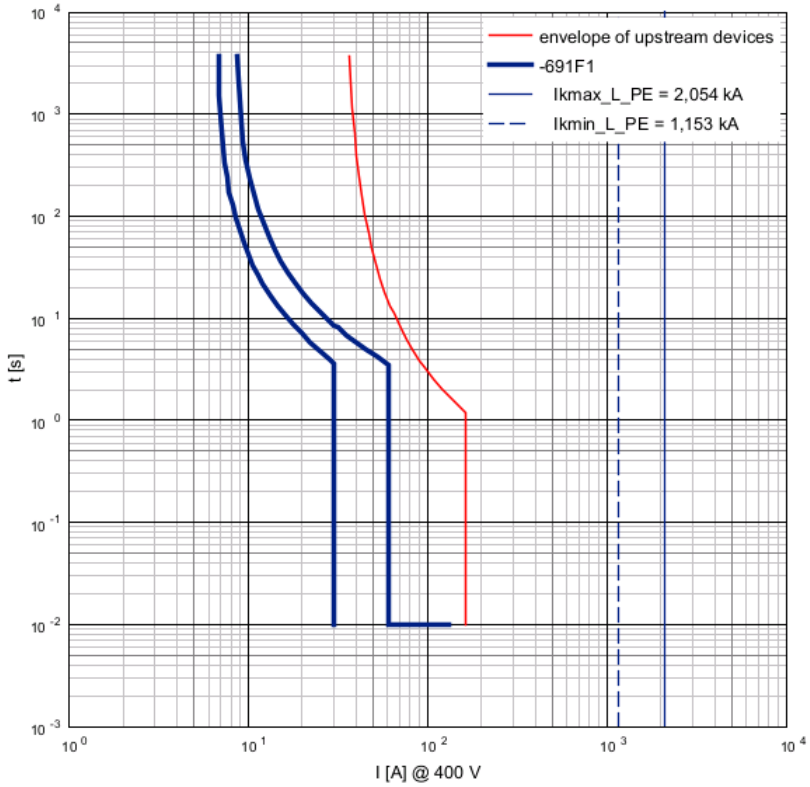
L Protection: On
Ir - corresp. 6 A

I Protection: On
Ii - corresp. 30 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-690F5
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 460,233 A
t [s]
I [A] @ 400 V

Circuit name: **Exhaust Unit / shut-off flap**
Designation: **-691F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -691F1

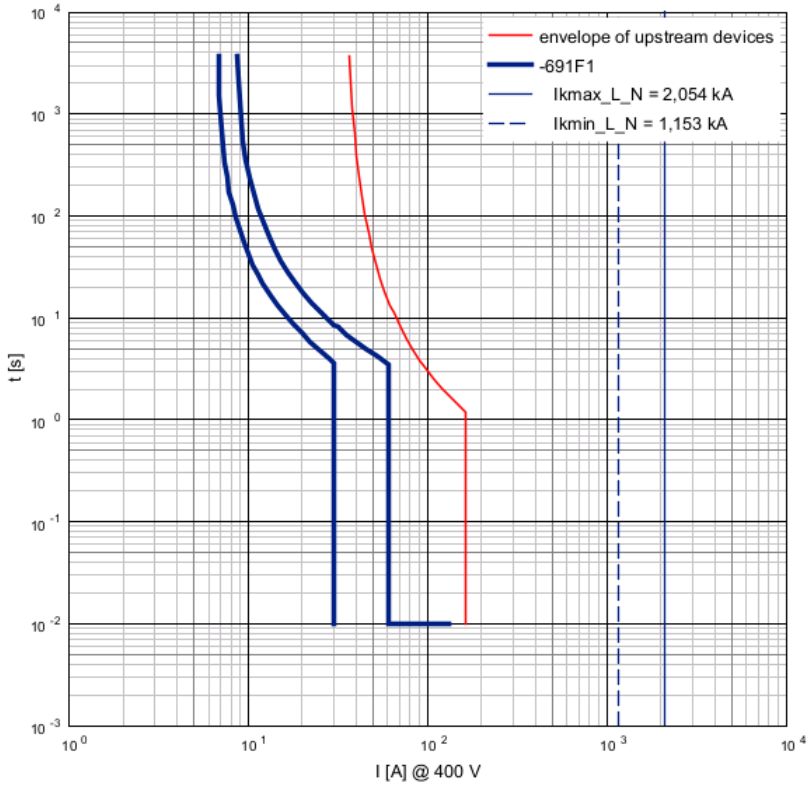
5SY41067

In 6 A

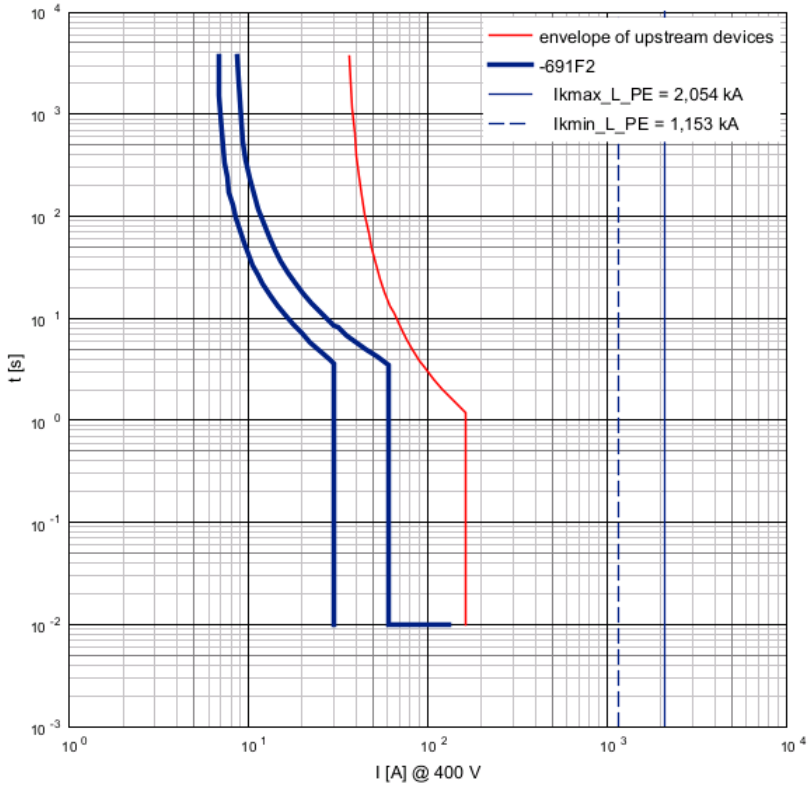
L Protection: On
Ir - corresp. 6 A

I Protection: On
Ii - corresp. 30 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-691F1
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 1,153 kA
t [s]
I [A] @ 400 V

Circuit name: **Exhaust Unit / shut-off flap**
Designation: **-691F2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -691F2

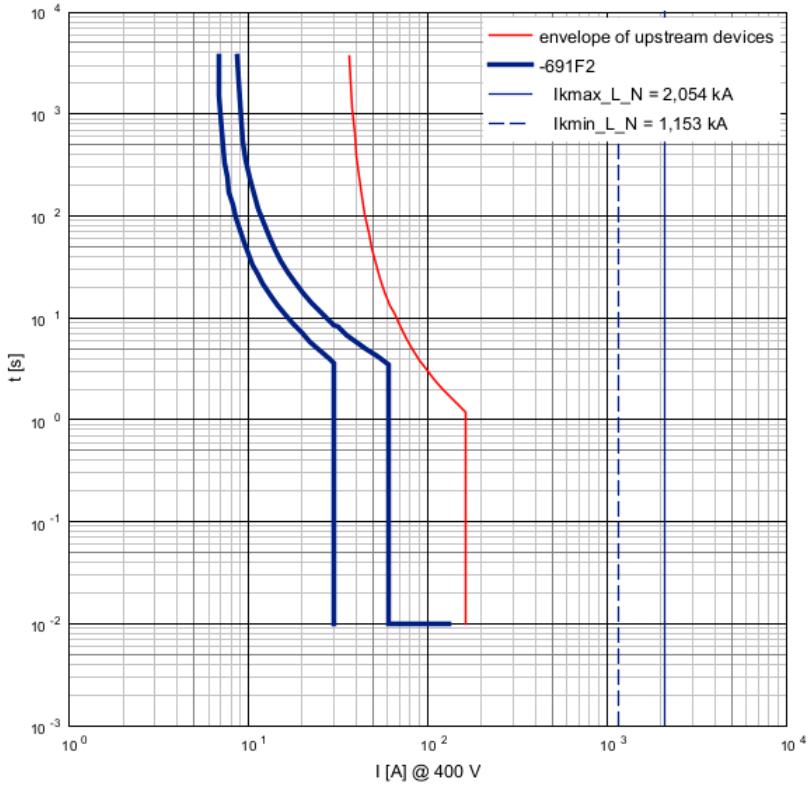
5SY41067

In 6 A

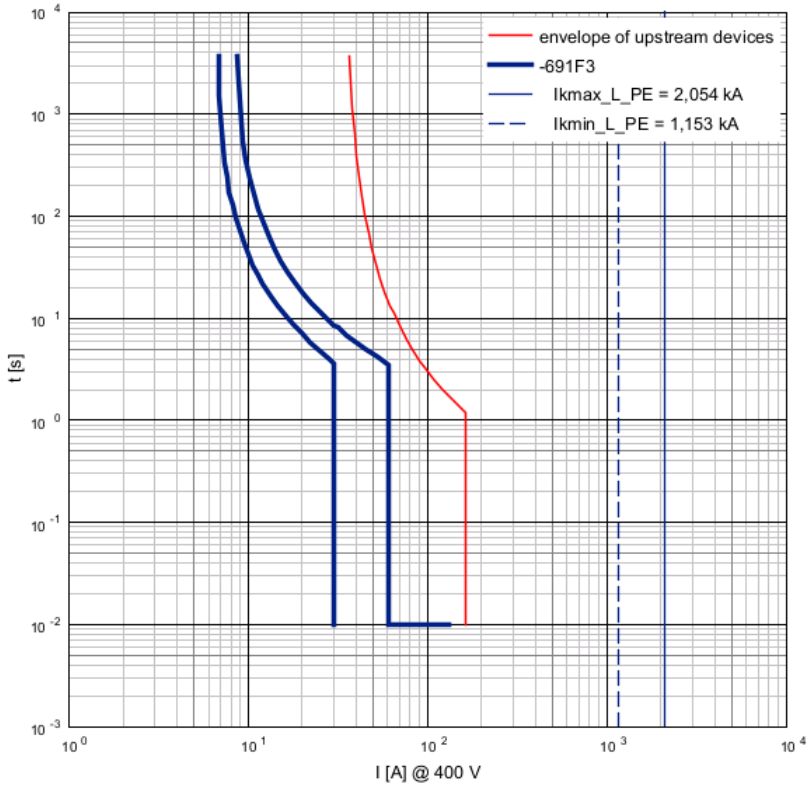
L Protection: On
Ir - corresp. 6 A

I Protection: On
Ii - corresp. 30 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-691F2
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 1,153 kA
t [s]
I [A] @ 400 V

Circuit name: **Exhaust Unit / shut-off flap**
Designation: **-691F3**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -691F3

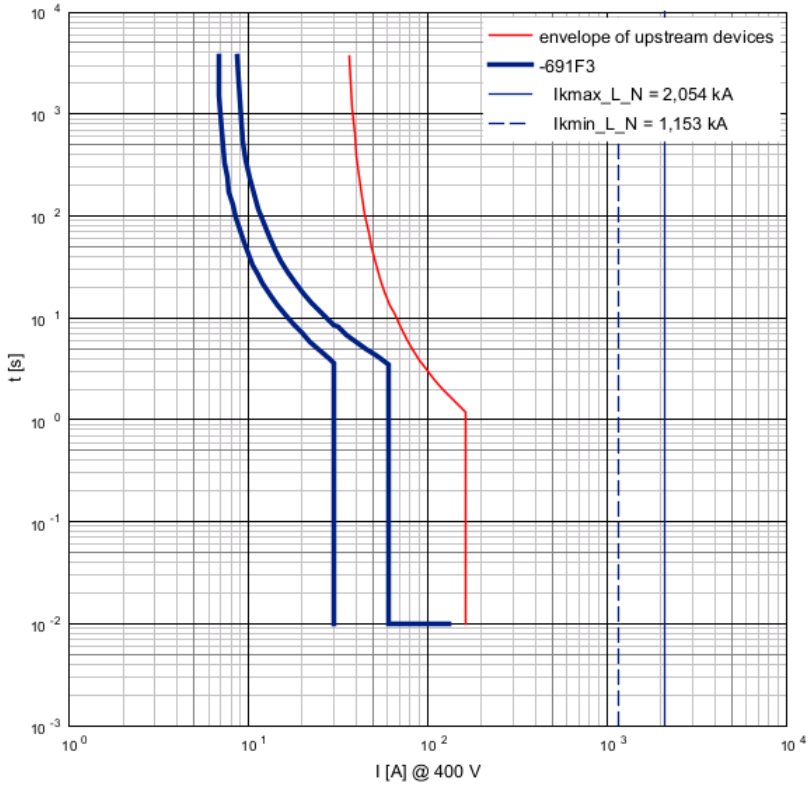
5SY41067

In 6 A

L Protection: On
Ir - corresp. 6 A

I Protection: On
Ii - corresp. 30 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-691F3
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 1,153 kA
t [s]
I [A] @ 400 V

Project documentation

created with

SIMARIS design

Version: 24.1.0 (2024-05-07)
Subrevision: 1218

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http://www.siemens.com/simaris

Master data

Project name:	Shell Crosswind Offshore
Project description:	BESS FQ 1MW 5MWh
Editor:	Freqcon_DG
Planning office:	Freqcon GmbH
Created at:	Wednesday, 4. September 2024
Changed at:	Tuesday, 8. October 2024

Customer data

City:	
Customer:	Statron AG

Comment:

Converter Container

Network parameters:

General	
Standard	IEC
Attitude of Site	< 1000 m

Medium Voltage	
Rated voltage	6.6 kV
Relative operating voltage at feeding point	100 %
Voltage factor c max	1.1
Voltage factor c min	1
Max./Min short-circuit power	92.71 / 92.71 MVA
Max./Min. short-circuit current	8.11 / 8.11 kA
Neutral System	Low-resistance
Relation R1/X1	0.2

Low Voltage	
Rated voltage	620 V
System configuration	TN-S
Frequency	50 Hz
Tolerable touch voltage	50 V
Ambient temperature of devices	30 °C
Voltage factor c max	1.1
Voltage factor c min	0.9
Base point of voltage drop calculation	Transformer-secondary terminals
Max. permissible voltage drop in network	8 %

Defined network modes for calculation and dimensioning:

Operating mode: Betriebsart 1

Starting point	Target point	Connection	Status
Transformer 18T1	LVMD 4	LVMD 4.1	On

List of devices:

Sources of feeding:

Transformers:

Designation	Type	Sn [kVA]	ukr [%]	Uprim [kV]/ Usec [V]	Pk [kW]	P0 [kW]	Vector group	Δu_transformer [%]	Air forced	Catalog Reference
Transformer 18T1		1,250	6	6.6/ 620	1.8	0.252	Dyn5	3.629	No	-

Output Δu_transformer [%] is independent from defined reference point for voltage drop calculation.

Switches/Fuses:

Circuit Breaker/Miniature circuit-breaker:

Place	Designation	Catalog Reference	In [A]	Icu/Icn [kA]	Icu/Icn [kA] required	Release type / characteristics	Quantity
CONV	-80Q1	3WL11122BB611AA2	1,250	42	17.603	ETU15B	1

Connections and line distribution:

Cable/Conductor Low voltage:

Designation	Type/ Profile [mm²]	Starting point / Target point	Ib [A] Iz [A]	Material	Length [m]	Isolation	Installation type / ftot	u [%] / Δu [%] / ∑ Δu [%]	θΔu [°C] / θlkmax [°C] / θlkmin [°C]	Number of runs
-	e.g. NYY, NYCWY, NYCY, NYKY 3x240/240/ 120	LVMD 4.1 LVMD 4	1,164.013 1,209	Cu	20	PVC70	C 1	96.12 0.253 0.253	55 20 80	3
-	e.g. NYY, NYCWY, NYCY, NYKY 3x300/300/ 150	LVMD 4 CONV	1,164.013 1,392	Cu	5	PVC70	C 1	96.06 0.055 0.308	55 20 80	3

Loads:

Stationary loads:

Designation	Place	Pn [kW]	In [A]	Un [V]	cos φ	ai	Phase connection	Type of load	Quantity
CONV	Inner zone	1,000	1,164.013	620	0.8	1	L1-L2-L3-N	inductive	1

Messages

Designation	Message
LVMD 4.1	Protective device required due to possible selectivity requirement

Personal protection against electric shock

All circuits of the project have a permissable break time ta-req > ta-cur and therefor fulfill the requirements for Personal protection against electric shock.

Disclaimer:

Dimensioned protection devices inside tap-off units of busbar trunking systems may not correspond to the actual available devices for those components. Please verify the dimensioning results in the device lists and correct them accordingly.

Symbols legend:

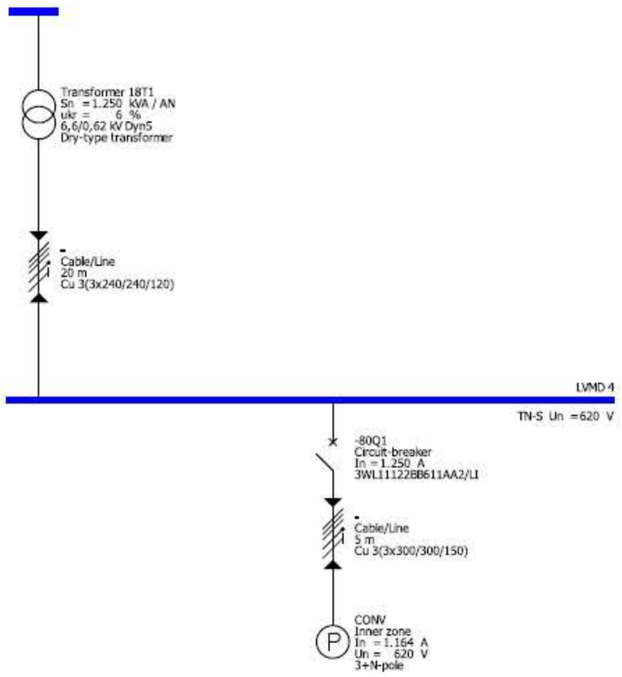
Symbol [Unit]	Description
ai	Load factor
cos φ	Power factor
ftot	Derating factor
Ia/In	Inrush current relation
Ib [A] Iz [A]	Operating current / allowed load capacity
Icu(fuse) [kA]	Rated ultimate short-circuit breaking capacity - fuse
Icu [kA] Icn [kA]	Rated ultimate short-circuit breaking capacity according to IEC 60947-2 Rated short-circuit breaking capacity according to IEC 60898-1
Icu/Icn [kA] required	the required breaking capacity of the protection device at installation location
Icw 1s [kA]	Rated short-time withstand current 1s
IΔn [mA]	Residual current - RCD
Ik1max	Maximum single phase short-circuit current
Ik1min	Minimum single phase short-circuit current
Ik3max	Maximum three phase short-circuit current
Ik3min	Minimum three phase short-circuit current
Ik1D [kA]	single pole uninterrupted short-circuit current
Ik3D [kA]	three pole uninterrupted short-circuit current
Ikmax/Ikmin	Relation of maximum and minimum short-circuit current
Ikre	Short-circuit current recovery factor
In [A]	Nominal current
P0 [kW]	No-load losses
Pk [kW]	Short-circuit losses
Pmech [kW]	mechan. Power
Pn [kW]	Active power
R0 N [mΩ]	Zero phase-sequence resistance phase-neutral conductor
R0 PE(N) [mΩ]	Zero phase-sequence resistance phase-PE(N) conductor
R0/R1	Resistance relation positive / zero phase-sequence system
r1 [%]	Relative value of positive phase-sequence resistance
R1 [mΩ]	Positive phase-sequence resistance

Sn [kVA]	Nominal apparent power
ukr [%]	Short-circuit voltage
Un [V]	Nominal voltage
Uprim [kV]	Primary voltage
Usec [V]	Secondary voltage
X0 N [mΩ]	Zero phase-sequence reactance phase-neutral conductor
X0 PE(N) [mΩ]	Zero phase-sequence reactance phase-PE(N) conductor
X0/X1	Reactance relation positive / zero phase-sequence system
X1 [mΩ]	Positive phase-sequence reactance
xd" [%]	Subtransient reactance
Z1 max	Maximum impedance in positive phase-sequence system
Z1 min	Minimum impedance in positive phase-sequence system
Zs	Faulted circuit impedance
Zs max	Maximum faulted circuit impedance
Zs min	Minimum faulted circuit impedance
u [%] / Δu [%] / ∑ Δu [%]	Relative nominal voltage / voltage drop between beginning and end of a section / cumulated voltage drop from the transformer primary/ secondary clamps to the specified point
θΔu [°C] / θIkmax [°C] / θIkmin [°C]	Conductor temperature of MV cable / Conductor temperature of LV cable for voltage drop / on beginning of short circuit / for disconnection
η	Efficiency
φ [°]	Phase angle
φ1 min/max [°]	Phase angle at Ik1 min/max
φ3 min/max [°]	Phase angle at Ik3 min/max

Standards for computation:

Title	IEC	HD	EN	DIN VDE
Low-voltage electrical installations *	60364-1…6	384		0100 – 100...710
Short-circuit currents in three-phase a.c. systems – Calculation of currents	60909		60909	0102
Short-circuit currents – calculation of effects Definitions and calculation methods	60865		60865	0103
Low-voltage switchgear and controlgear – Circuit-breakers	60947-2		60947-2	0660 – 101
Low-voltage switchgear and controlgear assemblies	61439		61439	0660 – 600
A method of temperature-rise assessment by extrapolation for partially type-tested assemblies (PTTA) of low-voltage switchgear and controlgear	60890+C	528 S2		0660 – 507
Electrical installations of buildings – Part 5-52: Selection and erection of electrical equipment – Wiring systems	60364-5-52	384		0298 – 4
Low-voltage electrical installations – Selection and erection of electrical equipment – Part 520: Wiring systems – Supplement 3: Current-carrying capacity of cables in three-phase distribution circuits at load currents with harmonic content				0100-520 Supplement 3
Electrical accessories – Circuit-breakers for overcurrent protection for household and similar installations – Circuit-breakers for a.c. operation	60898-1		60898-1	0641 – 11
High-voltage switchgear and controlgear – Alternating Current switch-fuse combinations	62271		62271	0671 – 105
Electrical installations of buildings – Selection and erection of electrical equipment – Isolation, switching and control	60364-5-53	60364-5-534		0100-534
Low-voltage electrical installations – Protection for safety – Protection against voltage disturbances and electromagnetic disturbances	60364-4-44	60364-4-443		0100-443
Protection against lightning – Part 1…4	62305-1…4			0185 – 1…4
Low-voltage surge protective devices - Surge protective devices connected to low-voltage power systems; Requirements and tests	61643-11			0675-6-11
Tests for electric cables under fire conditions – Circuit integrity	60331-11, 21		50200	0472-814 0482-200
Fire behaviour of building materials and building components — Part 12: Circuit integrity maintenance of electric cable systems, requirements and testing				4102-12 : 1998-11
Electrical equipment of electric road vehicles - Electric vehicles conductive charging system	61851		61851	

*) Special national conditions and deviations from IEC 60364-4-41: 2005 are not implemented and need to be considered!



Project name:	Shell Crosswind Offshore		
Planner: Freqcon_DG	View: Device parameters	Sheet: 1/1	
Design office: Freqcon GmbH	Location:		
Client: Statron AG	Created on: 4 Sep 2024	Changed on: 8 Oct 2024	

Selectivity evaluation

created with

SIMARIS design

Version: 24.1.0 (2024-05-07)
Subrevision: 1218

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http://www.siemens.com/simaris

Master data

Project name:	Shell Crosswind Offshore
Project description:	BESS FQ 1MW 5MWh
Editor:	Freqcon_DG
Planning office:	Freqcon GmbH
Created at:	Wednesday, 4. September 2024
Changed at:	Tuesday, 8. October 2024

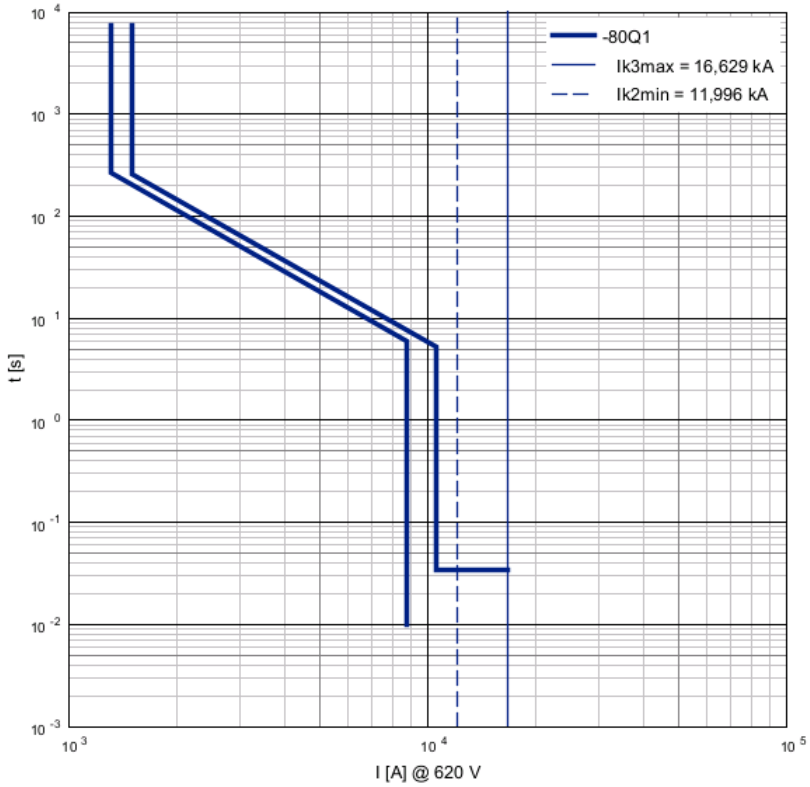
Customer data

City:	
Customer:	Statron AG

Comment:

Converter Container

Circuit name: **CONV**
Designation: **-80Q1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -80Q1

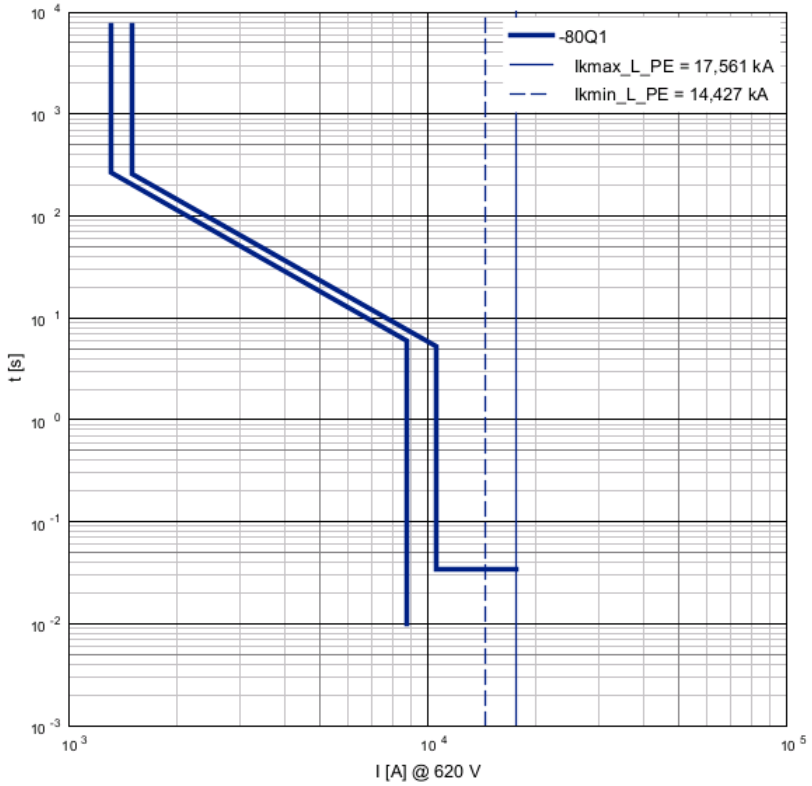
3WL11122BB611AA2

In 1,250 A

L Protection: On
Ir 1 x In corresp. 1,250 A
tr 10 s

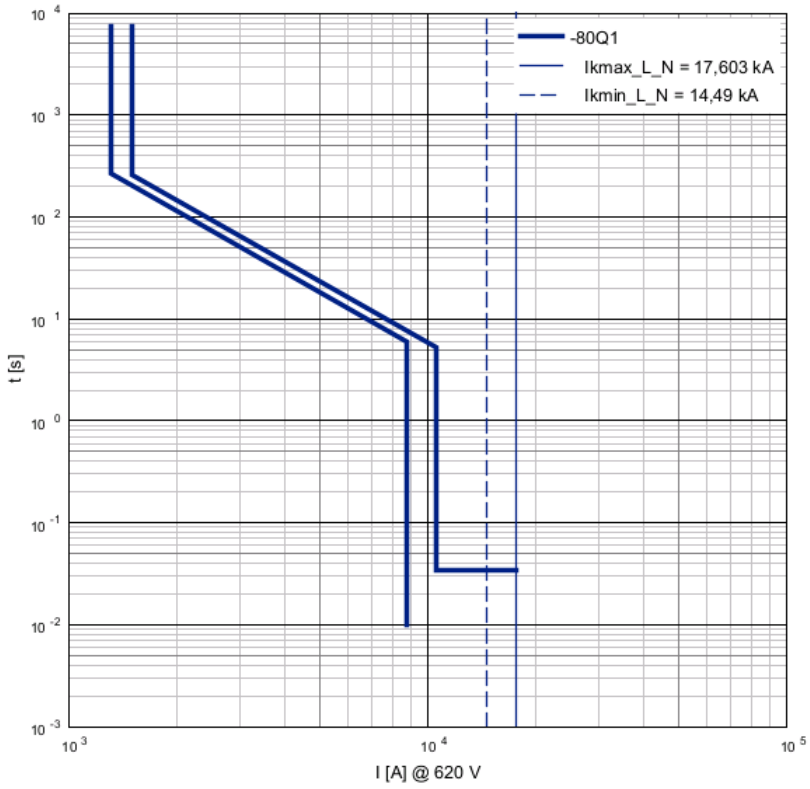
I Protection: On
Ii 7 x In corresp. 8,750 A

Short cut current: **Ik1-PE**
Selectivity evaluation:


-80Q1
Ikmax_L_PE = 17,561 kA
Ikmin_L_PE = 14,427 kA
t [s]
I [A] @ 620 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Project documentation

created with

SIMARIS design

Version: 24.1.0 (2024-05-07)
Subrevision: 1218

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http://www.siemens.com/simaris

Master data

Project name:	Shell Crosswind Offshore
Project description:	BESS FQ 1MW 5MWh
Editor:	Freqcon_DG
Planning office:	Freqcon GmbH
Created at:	Wednesday, 4. September 2024
Changed at:	Tuesday, 8. October 2024

Customer data

City:	
Customer:	Statron AG

Comment:

Converter Container

Network parameters:

General	
Standard	IEC
Attitude of Site	< 1000 m

Medium Voltage	
Rated voltage	6.6 kV
Relative operating voltage at feeding point	100 %
Voltage factor c max	1.1
Voltage factor c min	1
Max./Min short-circuit power	91.452 / 91.452 MVA
Max./Min. short-circuit current	8 / 8 kA
Neutral System	Low-resistance
Relation R1/X1	0.2

Low Voltage	
Rated voltage	400 V
System configuration	TN-S
Frequency	50 Hz
Tolerable touch voltage	50 V
Ambient temperature of devices	30 °C
Voltage factor c max	1.1
Voltage factor c min	0.9
Base point of voltage drop calculation	Transformer-secondary terminals
Max. permissible voltage drop in network	8 %

Defined network modes for calculation and dimensioning:

Operating mode: Betriebsart 1

Starting point	Target point	Connection	Status
NSHV 1	NSHV 2	NSUV 3.1	On
Supply	NSHV 1	NSHV 3.2	On

List of devices:

Sources of feeding:

Neutral Infeed:

Designation	Un [V]	In [A]	Imp. in positive phase system [mΩ] Z1 max Z1 min Zs max Zs min	Loop Impedance Zs [mΩ] φ [°] R0/R1 X0/X1 Ikmax/Ikmin	Short circuit current [kA] Ik3max Ik3min Ik1max Ik1min
Supply	400	160			50 50 50 50

Switches/Fuses:

Circuit Breaker/Miniature circuit-breaker:

Place	Designation	Catalog Reference	In [A]	Icu/Icn [kA]	Icu/Icn [kA] required	Release type / characteristics	Quantity
NSUV 3.1	=UNIT_01++CT+CTRL_1.3-84F2	5SY43327	32	10	4.291	C	1
230V 3WL	-187F1	5SY41137	13	10	2.054	C	1
400V/24V Power Supply	-101Q1	3RV20111DA25	3.2	100	4.291	TM	1
Cabinet Heating	-185F2	5SY41067	6	10	2.054	C	1
CIR Cabinet Fans	-183F2	5SY41107	10	10	2.054	C	1
Clima 1	-191F1	5SY43167	16	10	4.291	C	1
Clima 2	-191F2	5SY43167	16	10	4.291	C	1
CON Cabinet Fans	-183F1	5SY41167	16	10	2.054	C	1
CTRL Cabinet Fan	-185F1	5SY41107	10	10	2.054	C	1
Fan Heat Exchanger	-182Q1	3RV20111FA25	5	100	3.982	TM	1
Water Heating	-181Q2	3RV20111GA25	6.3	50	3.982	TM	1
Water Pump	-181Q1	3RV20111FA25	5	100	3.982	TM	1

Residual current circuit breaker with integral overload protection (RCBO):

Place	Designation	Catalog Reference	In [A]	Icn [kA] IΔn [mA]	Icu/Icn [kA] required	Release type / characteristics	Quantity
Cabinet Light / Socket	-190F3	5SU13547KK16	16	10 30	2.219	C	1

Connections and line distribution:

Cable/Conductor Low voltage:

Designation	Type/ Profile [mm²]	Starting point / Target point	Ib [A] Iz [A]	Material	Length [m]	Isolation	Installation type / ftot	u [%] / Δu [%] / ∑ Δu [%]	θΔu [°C] / θIkmax [°C] / θIkmin [°C]	Number of runs
K/L 3.2	e.g. NYY, NYCWY, NYCY, NYKY 3x10/10/10	NSHV 3.2 NSHV 1	51.81 57	Cu	30	PVC70	C 1	98.84 1.158 1.158	55 20 80	1
K/L 3.1	e.g. NYY, NYCWY, NYCY, NYKY 3x4/4/4	NSHV 1 NSHV 2	15.61 32	Cu	1	PVC70	C 1	98.81 0.028 1.187	55 20 80	1
-80W2	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 2 230V 3WL	0.57 19.5	Cu	6	PVC70	C 1	98.78 0.033 1.22	55 20 80	1
-	e.g. H07V2-U, H07V2-R, H07V2-K 3x1.5/1.5/1.5	NSHV 1 400V/24V Power Supply	2 22	Cu	1	PVC heat-resistant	C 1	98.83 0.01 1.168	55 20 80	1
-185W1	e.g. H07V2-U, H07V2-R, H07V2-K 1x1.5/1.5/1.5	NSHV 2 Cabinet Heating	3.48 24	Cu	3	PVC heat-resistant	C 1	98.71 0.101 1.288	55 20 80	1
K/L 3.6	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 1 Cabinet Light / Socket	16 19.5	Cu	1	PVC70	C 1	98.69 0.154 1.313	55 20 80	1
-281W1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 2 CIR Cabinet Fans	0.9 19.5	Cu	5	PVC70	C 1	98.77 0.043 1.23	55 20 80	1
-	e.g. NYY, NYCWY, NYCY, NYKY 3x1.5/1.5/1.5	NSHV 1 Clima 1	9.1 17.5	Cu	10	PVC70	C 1	98.4 0.438 1.597	55 20 80	1
-	e.g. NYY, NYCWY, NYCY, NYKY 3x1.5/1.5/1.5	NSHV 1 Clima 2	9.1 17.5	Cu	10	PVC70	C 1	98.4 0.438 1.597	55 20 80	1
-279W1	e.g. NYY, NYCWY, NYCY, NYKY	NSHV 2 CON Cabinet Fans	1.5 19.5	Cu	5	PVC70	C 1	98.74 0.072 1.259	55 20 80	1

Designation	Type/ Profile [mm²]	Starting point / Target point	Ib [A] Iz [A]	Material	Length [m]	Isolation	Installation type / ftot	u [%] / Δu [%] / ∑ Δu [%]	θΔu [°C] / θlkmax [°C] / θlkmin [°C]	Number of runs
	1x1.5/1.5/1.5									
-278W1	e.g. H07V2-U, H07V2-R, H07V2-K 1x1.5/1.5/1.5	NSHV 2 CTRL Cabinet Fan	0.17 24	Cu	5	PVC heat-resistant	C 1	98.8 0.008 1.195	55 20 80	1
-181W1	e.g. NYY, NYCWY, NYCY, NYKY 3x1.5/1.5/1.5	NSHV 2 Fan Heat Exchanger	2.5 17.5	Cu	8	PVC70	C 1	98.72 0.096 1.283	55 20 80	1
-181W1	e.g. NYY, NYCWY, NYCY, NYKY 3x1.5/1.5/1.5	NSHV 2 Water Heating	4.33 17.5	Cu	8	PVC70	C 1	98.65 0.167 1.354	55 20 80	1
-181W1	e.g. NYY, NYCWY, NYCY, NYKY 3x1.5/1.5/1.5	NSHV 2 Water Pump	3.8 17.5	Cu	8	PVC70	C 1	98.67 0.146 1.333	55 20 80	1

Loads:

Stationary loads:

Designation	Place	Pn [kW]	In [A]	Un [V]	cos φ	ai	Phase connection	Type of load	Quantity
230V 3WL	Inner zone	0.105	0.57	230	0.8	1	L2-N	inductive	1
400V/24V Power Supply	Inner zone	1.109	2	400	0.8	1	L1-L2-L3-N	inductive	1
Cabinet Heating	Inner zone	0.643	3.48	230	0.8	1	L1-N	inductive	1
Cabinet Light / Socket	Inner zone	2.956	16	230	0.8	1	L2-N	inductive	1
CIR Cabinet Fans	Inner zone	0.166	0.9	230	0.8	1	L2-N	inductive	1
Clima 1	Inner zone	5.044	9.1	400	0.8	1	L1-L2-L3-N	inductive	1
Clima 2	Inner zone	5.044	9.1	400	0.8	1	L1-L2-L3-N	inductive	1
CON Cabinet Fans	Inner zone	0.277	1.5	230	0.8	1	L1-N	inductive	1
CTRL Cabinet Fan	Inner zone	0.031	0.17	230	0.8	1	L3-N	inductive	1
Fan Heat Exchanger	Inner zone	1.386	2.5	400	0.8	1	L1-L2-L3-N	inductive	1
Water Heating	Inner zone	2.4	4.33	400	0.8	1	L1-L2-L3-N	inductive	1
Water Pump	Inner zone	2.106	3.8	400	0.8	1	L1-L2-L3-N	inductive	1

Messages

Designation	Message
NSHV 3.2	Protective device required due to possible selectivity requirement

Personal protection against electric shock

All circuits of the project have a permissable break time ta-req > ta-cur and therefor fulfill the requirements for Personal protection against electric shock.

Disclaimer:

Dimensioned protection devices inside tap-off units of busbar trunking systems may not correspond to the actual available devices for those components. Please verify the dimensioning results in the device lists and correct them accordingly.

Symbols legend:

Symbol [Unit]	Description
ai	Load factor
cos φ	Power factor
ftot	Derating factor
Ia/In	Inrush current relation
Ib [A] Iz [A]	Operating current / allowed load capacity
Icu(fuse) [kA]	Rated ultimate short-circuit breaking capacity - fuse
Icu [kA] Icn [kA]	Rated ultimate short-circuit breaking capacity according to IEC 60947-2 Rated short-circuit breaking capacity according to IEC 60898-1
Icu/Icn [kA] required	the required breaking capacity of the protection device at installation location
Icw 1s [kA]	Rated short-time withstand current 1s
IΔn [mA]	Residual current - RCD
Ik1max	Maximum single phase short-circuit current
Ik1min	Minimum single phase short-circuit current
Ik3max	Maximum three phase short-circuit current
Ik3min	Minimum three phase short-circuit current
Ik1D [kA]	single pole uninterrupted short-circuit current
Ik3D [kA]	three pole uninterrupted short-circuit current
Ikmax/Ikmin	Relation of maximum and minimum short-circuit current
Ikre	Short-circuit current recovery factor
In [A]	Nominal current
P0 [kW]	No-load losses
Pk [kW]	Short-circuit losses
Pmech [kW]	mechan. Power
Pn [kW]	Active power
R0 N [mΩ]	Zero phase-sequence resistance phase-neutral conductor
R0 PE(N) [mΩ]	Zero phase-sequence resistance phase-PE(N) conductor
R0/R1	Resistance relation positive / zero phase-sequence system
r1 [%]	Relative value of positive phase-sequence resistance
R1 [mΩ]	Positive phase-sequence resistance

Sn [kVA]	Nominal apparent power
ukr [%]	Short-circuit voltage
Un [V]	Nominal voltage
Uprim [kV]	Primary voltage
Usec [V]	Secondary voltage
X0 N [mΩ]	Zero phase-sequence reactance phase-neutral conductor
X0 PE(N) [mΩ]	Zero phase-sequence reactance phase-PE(N) conductor
X0/X1	Reactance relation positive / zero phase-sequence system
X1 [mΩ]	Positive phase-sequence reactance
xd" [%]	Subtransient reactance
Z1 max	Maximum impedance in positive phase-sequence system
Z1 min	Minimum impedance in positive phase-sequence system
Zs	Faulted circuit impedance
Zs max	Maximum faulted circuit impedance
Zs min	Minimum faulted circuit impedance
u [%] / Δu [%] / ∑ Δu [%]	Relative nominal voltage / voltage drop between beginning and end of a section / cumulated voltage drop from the transformer primary/ secondary clamps to the specified point
θΔu [°C] / θIkmax [°C] / θIkmin [°C]	Conductor temperature of MV cable / Conductor temperature of LV cable for voltage drop / on beginning of short circuit / for disconnection
η	Efficiency
φ [°]	Phase angle
φ1 min/max [°]	Phase angle at Ik1 min/max
φ3 min/max [°]	Phase angle at Ik3 min/max

Standards for computation:

Title	IEC	HD	EN	DIN VDE
Low-voltage electrical installations *	60364-1…6	384		0100 – 100...710
Short-circuit currents in three-phase a.c. systems – Calculation of currents	60909		60909	0102
Short-circuit currents – calculation of effects Definitions and calculation methods	60865		60865	0103
Low-voltage switchgear and controlgear – Circuit-breakers	60947-2		60947-2	0660 – 101
Low-voltage switchgear and controlgear assemblies	61439		61439	0660 – 600
A method of temperature-rise assessment by extrapolation for partially type-tested assemblies (PTTA) of low-voltage switchgear and controlgear	60890+C	528 S2		0660 – 507
Electrical installations of buildings – Part 5-52: Selection and erection of electrical equipment – Wiring systems	60364-5-52	384		0298 – 4
Low-voltage electrical installations – Selection and erection of electrical equipment – Part 520: Wiring systems – Supplement 3: Current-carrying capacity of cables in three-phase distribution circuits at load currents with harmonic content				0100-520 Supplement 3
Electrical accessories – Circuit-breakers for overcurrent protection for household and similar installations – Circuit-breakers for a.c. operation	60898-1		60898-1	0641 – 11
High-voltage switchgear and controlgear – Alternating Current switch-fuse combinations	62271		62271	0671 – 105
Electrical installations of buildings – Selection and erection of electrical equipment – Isolation, switching and control	60364-5-53	60364-5-534		0100-534
Low-voltage electrical installations – Protection for safety – Protection against voltage disturbances and electromagnetic disturbances	60364-4-44	60364-4-443		0100-443
Protection against lightning – Part 1…4	62305-1…4			0185 – 1…4
Low-voltage surge protective devices - Surge protective devices connected to low-voltage power systems; Requirements and tests	61643-11			0675-6-11
Tests for electric cables under fire conditions – Circuit integrity	60331-11, 21		50200	0472-814 0482-200
Fire behaviour of building materials and building components — Part 12: Circuit integrity maintenance of electric cable systems, requirements and testing				4102-12 : 1998-11
Electrical equipment of electric road vehicles - Electric vehicles conductive charging system	61851		61851	

*) Special national conditions and deviations from IEC 60364-4-41: 2005 are not implemented and need to be considered!

Supply
In = 160 A
Un = 400 V

K/L 3.2
Cable/Line
30 m
Cu (3x10/10/10)

NSHV 1
TN-S Un = 400 V

=UNIT_01+CT+CTRL_1.3-84F2
Miniature circuit-breaker
In = 32 A
5SY43327/C

K/L 3.1
Cable/Line
1 m
Cu (3x4/4/4)

-190F3
Miniature circuit-breaker
In = 16 A
5SU13547KK16/C

K/L 3.6
Cable/Line
1 m
Cu (1x1,5/1,5/1,5)

Cabinet Light / Socket
Inner zone
In = 16 A
Un = 230 V
1+N-pole

-101Q1
Circuit-breaker
In = 3,2 A
3RV20111DA25/LI

Cable/Line
1 m
Cu (3x1,5/1,5/1,5)

400V/24V Power Supply
Inner zone
In = 2 A
Un = 400 V
3+N-pole

-191F1
Miniature circuit-breaker
In = 16 A
5SY43167/C

Cable/Line
10 m
Cu (3x1,5/1,5/1,5)

Clima 1
Inner zone
In = 9,1 A
Un = 400 V
3+N-pole

-191F2
Miniature circuit-breaker
In = 16 A
5SY43167/C

Cable/Line
10 m
Cu (3x1,5/1,5/1,5)

Clima 2
Inner zone
In = 9,1 A
Un = 400 V
3+N-pole

NSHV 2
TN-S Un = 400 V

-183F1
Miniature circuit-breaker
In = 16 A
5SY41167/C

-279W1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

CON Cabinet Fans
Inner zone
In = 1,5 A
Un = 230 V
1+N-pole

-183F2
Miniature circuit-breaker
In = 10 A
5SY41107/C

-281W1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

CIR Cabinet Fans
Inner zone
In = 0,9 A
Un = 230 V
1+N-pole

-185F1
Miniature circuit-breaker
In = 10 A
5SY41107/C

-278W1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

CTRL Cabinet Fan
Inner zone
In = 0,17 A
Un = 230 V
1+N-pole

-185F2
Miniature circuit-breaker
In = 6 A
5SY41067/C

-185W1
Cable/Line
3 m
Cu (1x1,5/1,5/1,5)

Cabinet Heating
Inner zone
In = 3,48 A
Un = 230 V
1+N-pole

-187F1
Miniature circuit-breaker
In = 13 A
5SY41137/C

-80W2
Cable/Line
6 m
Cu (1x1,5/1,5/1,5)

230V 3WL
Inner zone
In = 0,57 A
Un = 230 V
1+N-pole

-181Q1
Circuit-breaker
In = 5 A
3RV20111FA25/LI

-181W1
Cable/Line
8 m
Cu (3x1,5/1,5/1,5)

Water Pump
Inner zone
In = 3,8 A
Un = 400 V
3+N-pole

-181Q2
Circuit-breaker
In = 6,3 A
3RV20111GA25/LI

-181W1
Cable/Line
8 m
Cu (3x1,5/1,5/1,5)

Water Heating
Inner zone
In = 4,33 A
Un = 400 V
3+N-pole

-182Q1
Circuit-breaker
In = 5 A
3RV20111FA25/LI

-181W1
Cable/Line
8 m
Cu (3x1,5/1,5/1,5)

Fan Heat Exchanger
Inner zone
In = 2,5 A
Un = 400 V
3+N-pole

Project name:	Shell Crosswind Offshore		
Planner: Freqcon_DG	View: Device parameters	Sheet: 1/1	
Design office: Freqcon GmbH	Location:		
Client: Statron AG	Created on: 4 Sep 2024	Changed on: 8 Oct 2024	

SIMARIS design 24.1.0

Selectivity evaluation

created with

SIMARIS design

Version: 24.1.0 (2024-05-07)
Subrevision: 1218

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http://www.siemens.com/simaris

Master data

Project name:	Shell Crosswind Offshore
Project description:	BESS FQ 1MW 5MWh
Editor:	Freqcon_DG
Planning office:	Freqcon GmbH
Created at:	Wednesday, 4. September 2024
Changed at:	Tuesday, 8. October 2024

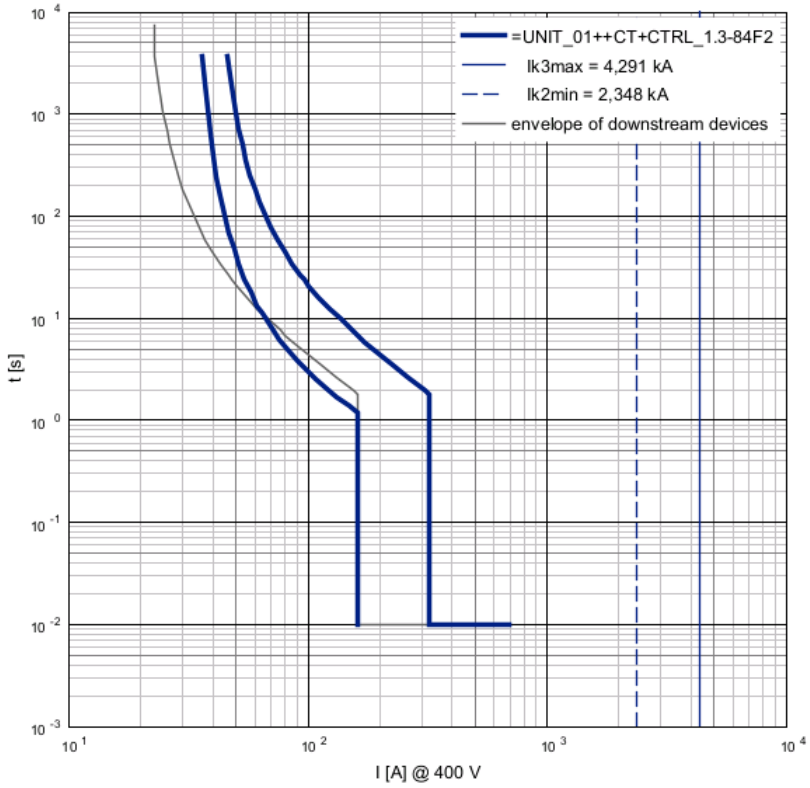
Customer data

City:	
Customer:	Statron AG

Comment:

Converter Container

Circuit name: **NSUV 3.1**
Designation: **=UNIT_01++CT+CTRL_1.3-84F2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: =UNIT_01++CT+CTRL_1.3-84F2

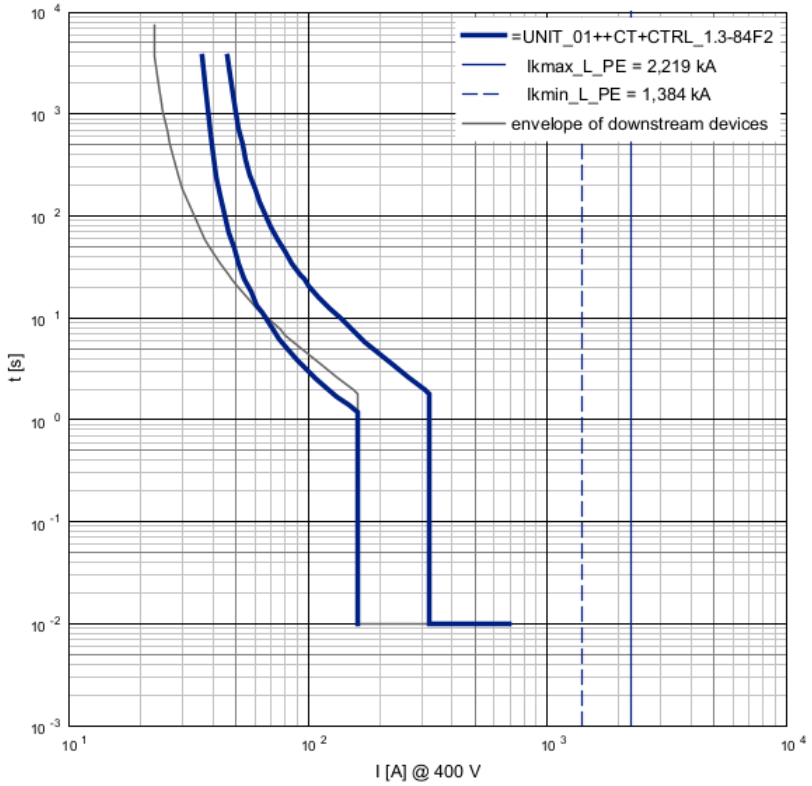
5SY43327

In 32 A

L Protection: On
Ir - corresp. 32 A

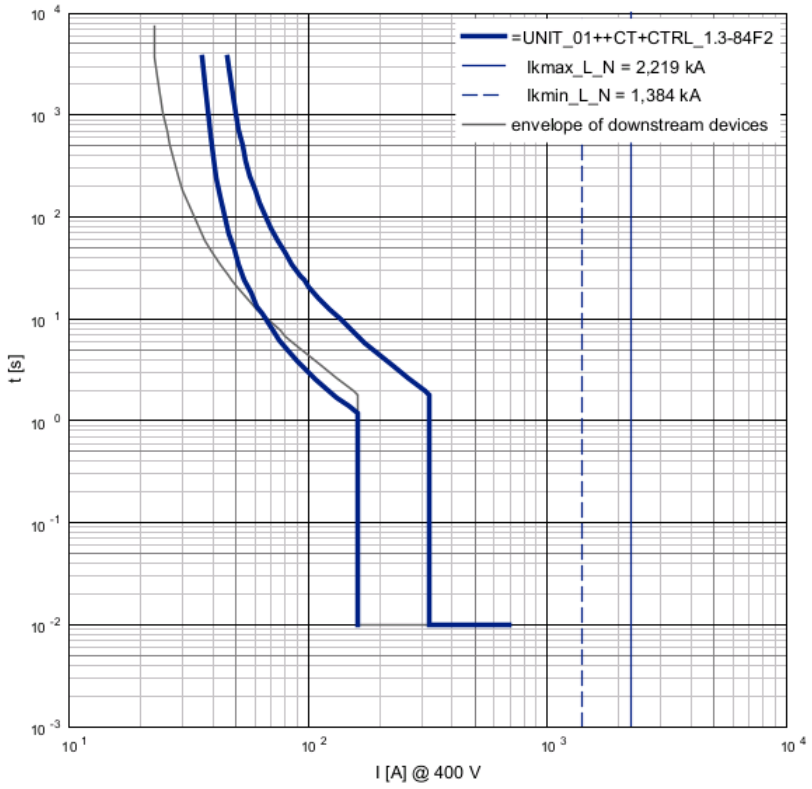
I Protection: On
Ii - corresp. 160 A

Short cut current: **Ik1-PE**
Selectivity evaluation:

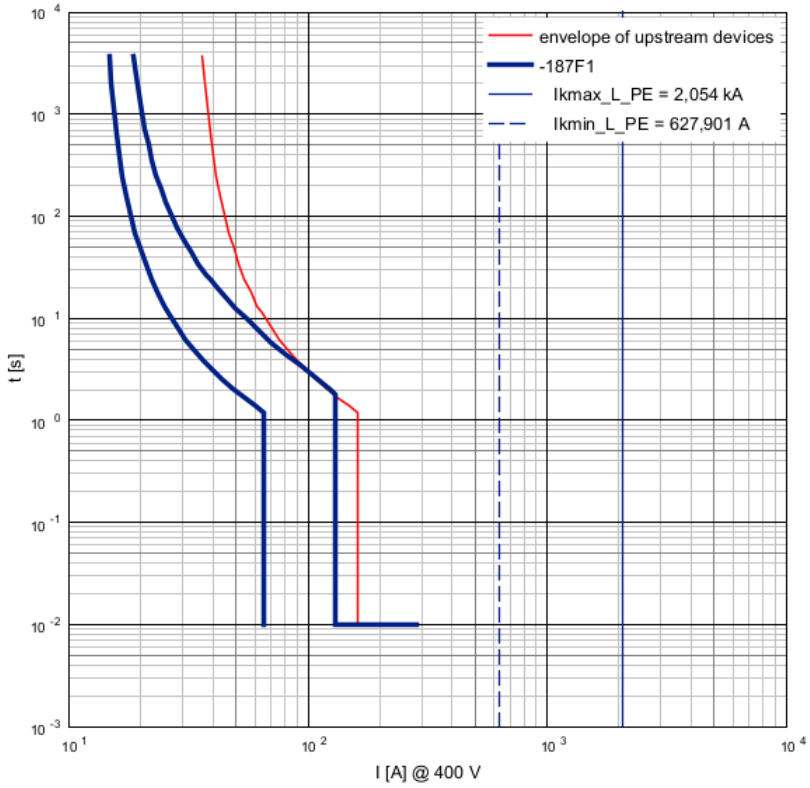

=UNIT_01++CT+CTRL_1.3-84F2
Ikmax_L_PE = 2,219 kA
Ikmin_L_PE = 1,384 kA
envelope of downstream devices
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Circuit name: **230V 3WL**
Designation: **-187F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -187F1

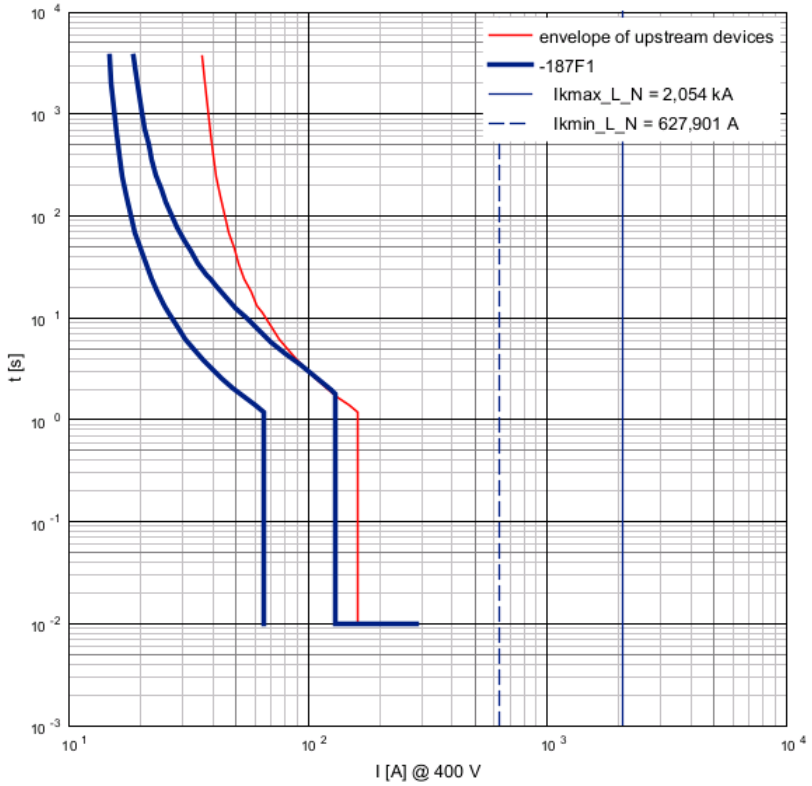
5SY41137

In 13 A

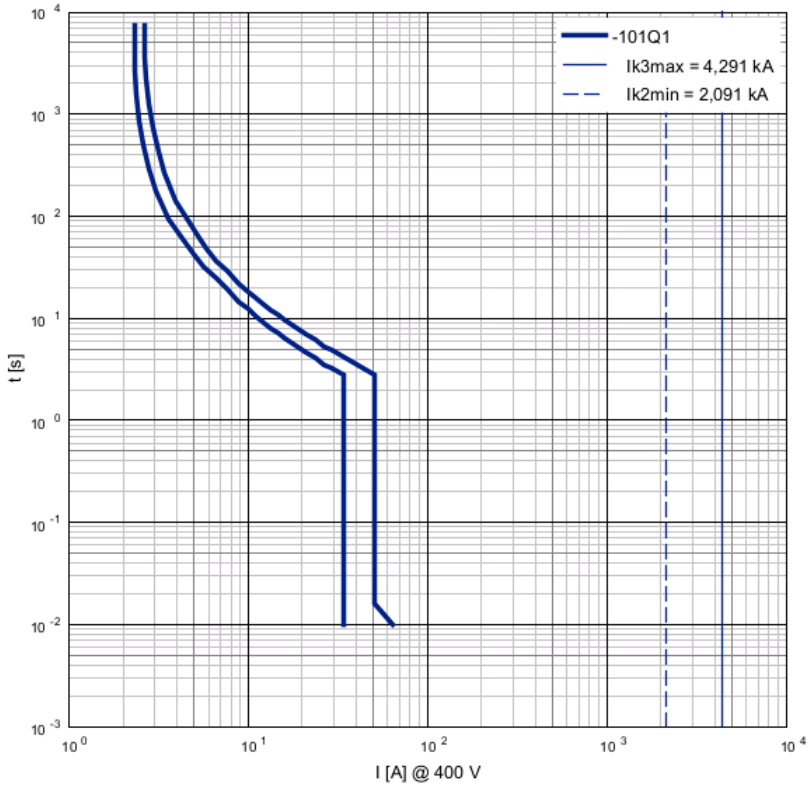
L Protection: On
Ir - corresp. 13 A

I Protection: On
Ii - corresp. 65 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-187F1
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 627,901 A
t [s]
I [A] @ 400 V

Circuit name: **400V/24V Power Supply**
Designation: **-101Q1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -101Q1

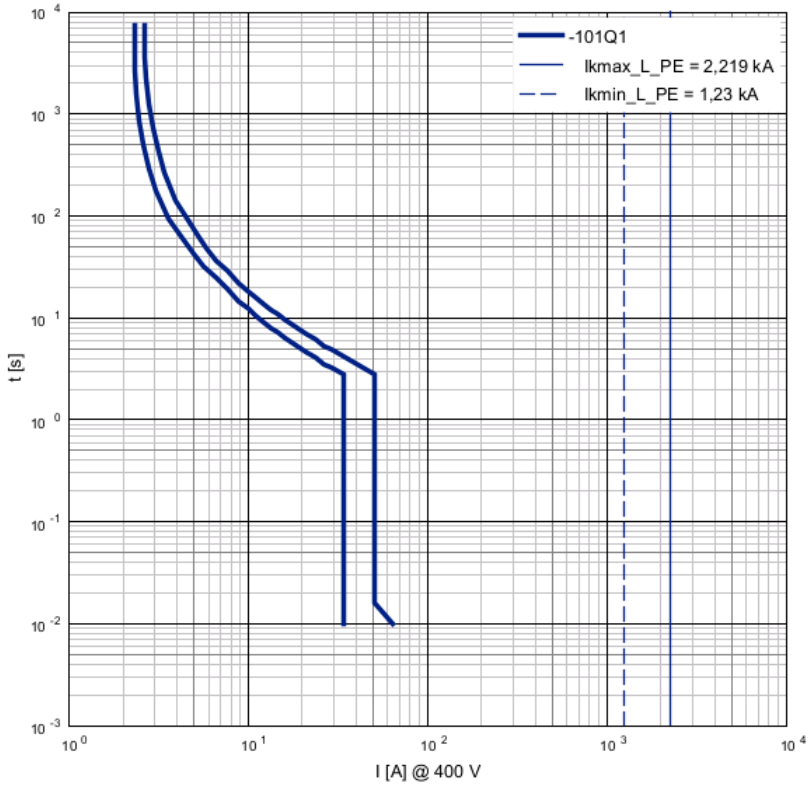
3RV20111DA25

In 3.2 A

L Protection: On
Ir - corresp. 2.2 A
tr 10 s

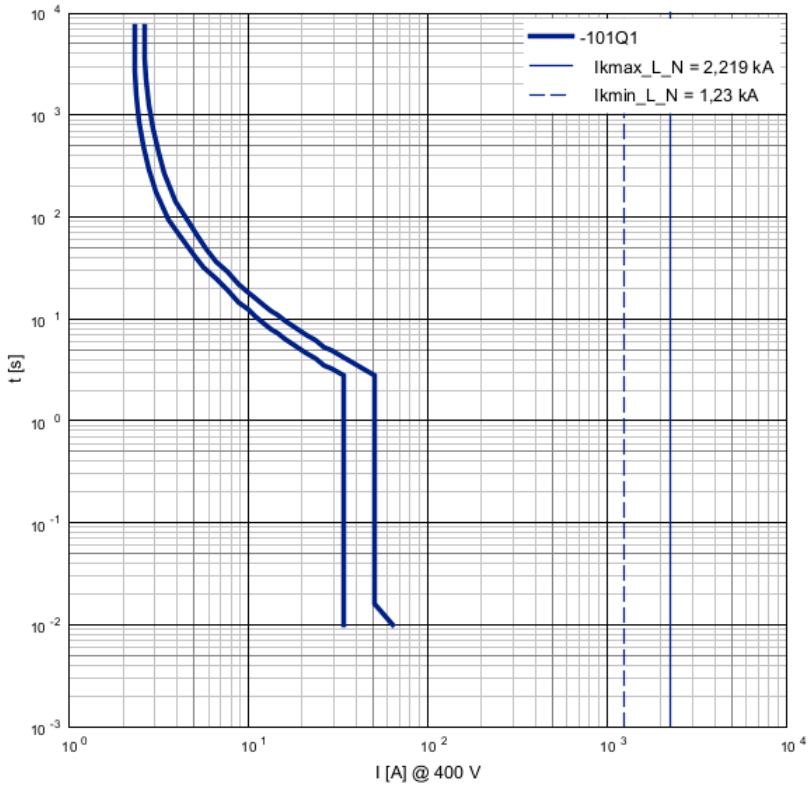
I Protection: On
Ii - corresp. 42 A

Short cut current: **Ik1-PE**
Selectivity evaluation:

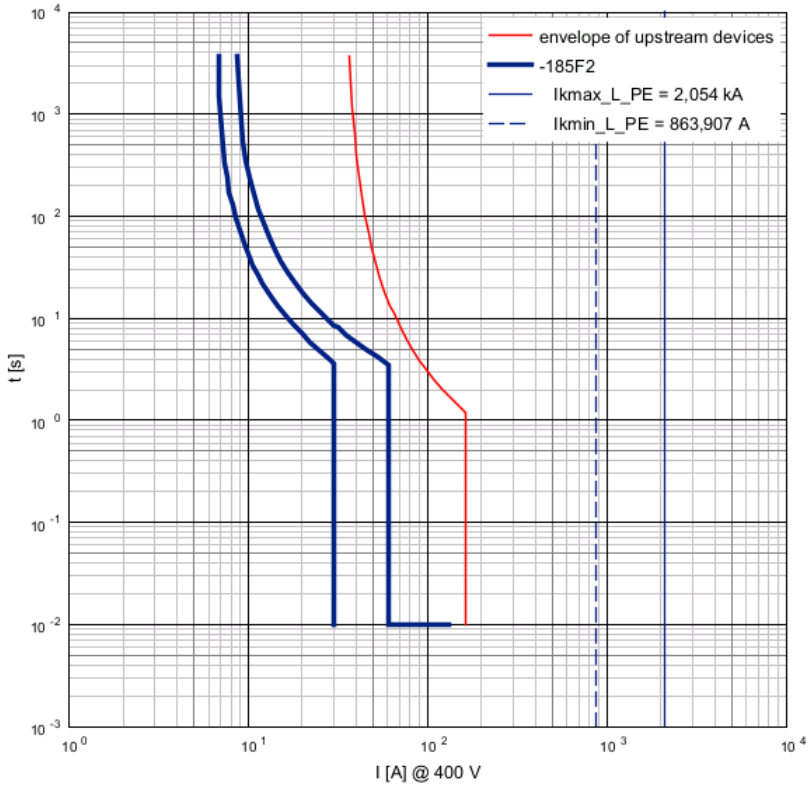

-101Q1
Ikmax_L_PE = 2,219 kA
Ikmin_L_PE = 1,23 kA
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Circuit name: **Cabinet Heating**
Designation: **-185F2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -185F2

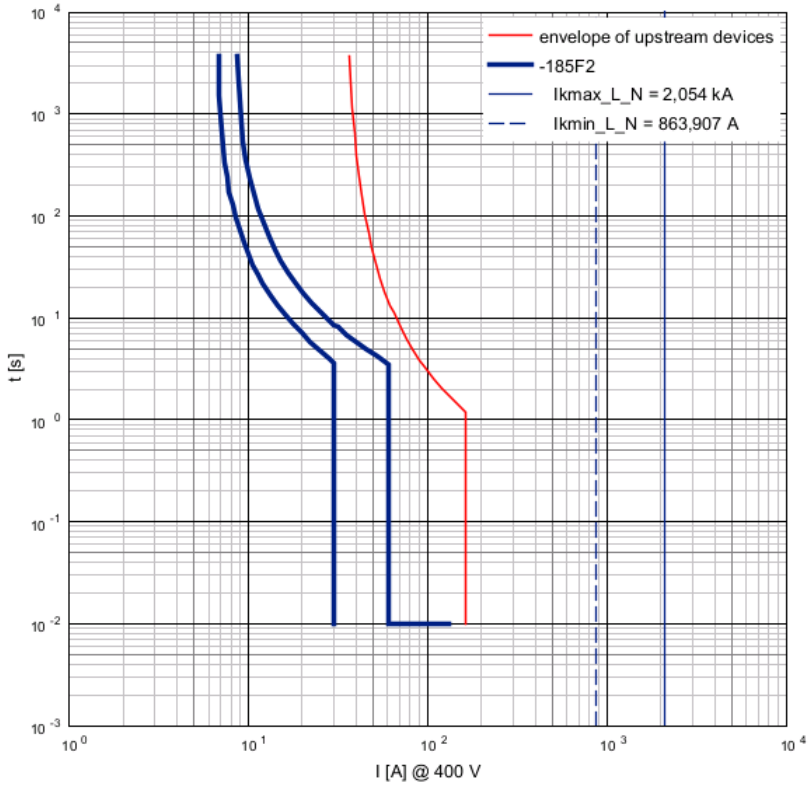
5SY41067

In 6 A

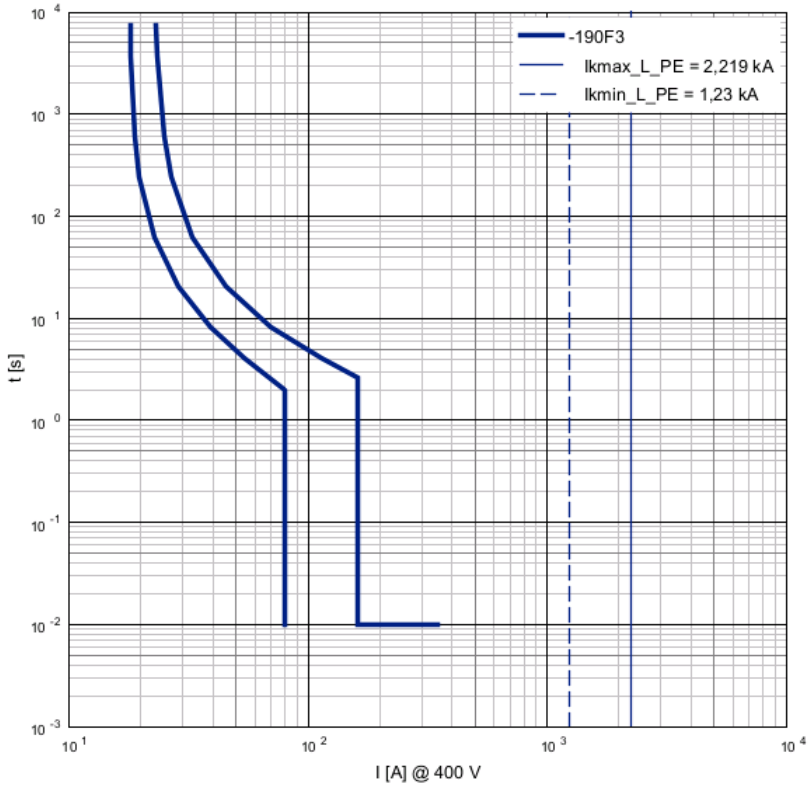
L Protection: On
Ir - corresp. 6 A

I Protection: On
Ii - corresp. 30 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-185F2
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 863,907 A
t [s]
I [A] @ 400 V

Circuit name: **Cabinet Light / Socket**
Designation: **-190F3**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -190F3

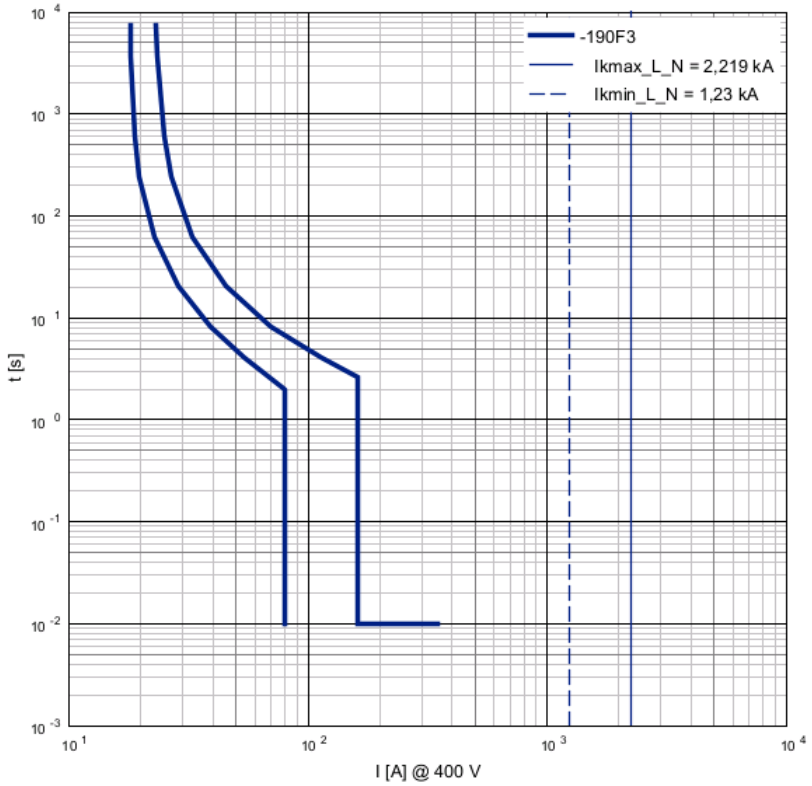
5SU13547KK16

In 16 A

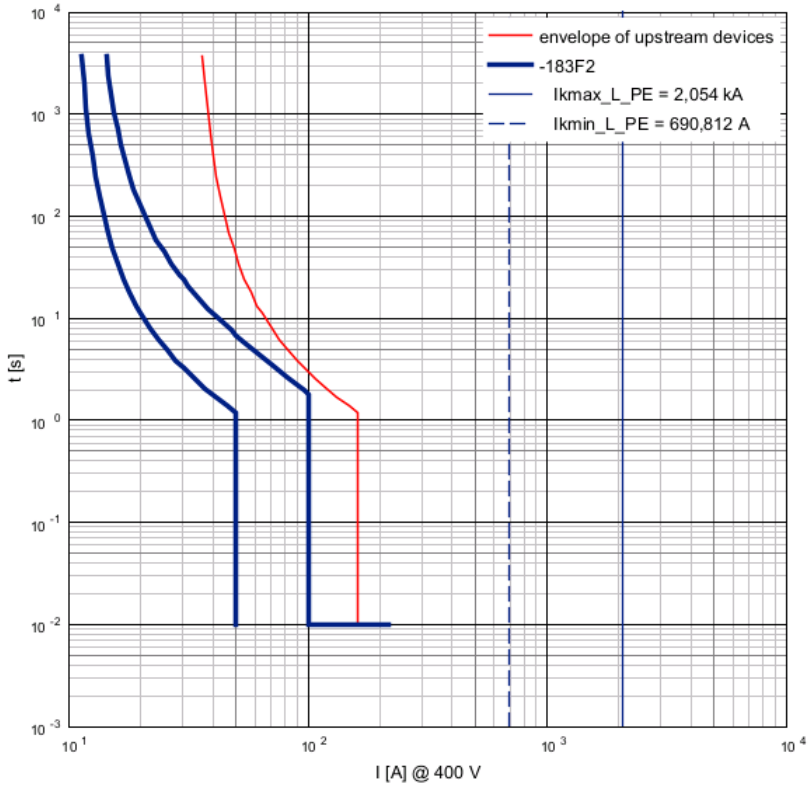
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


-190F3
Ikmax_L_N = 2,219 kA
Ikmin_L_N = 1,23 kA
t [s]
I [A] @ 400 V

Circuit name: **CIR Cabinet Fans**
Designation: **-183F2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -183F2

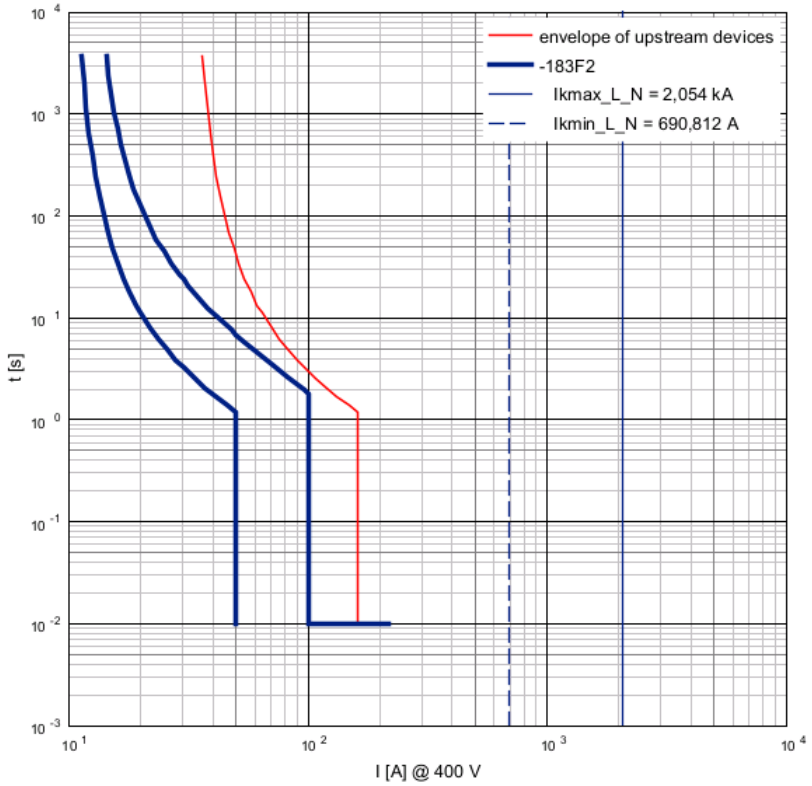
5SY41107

In 10 A

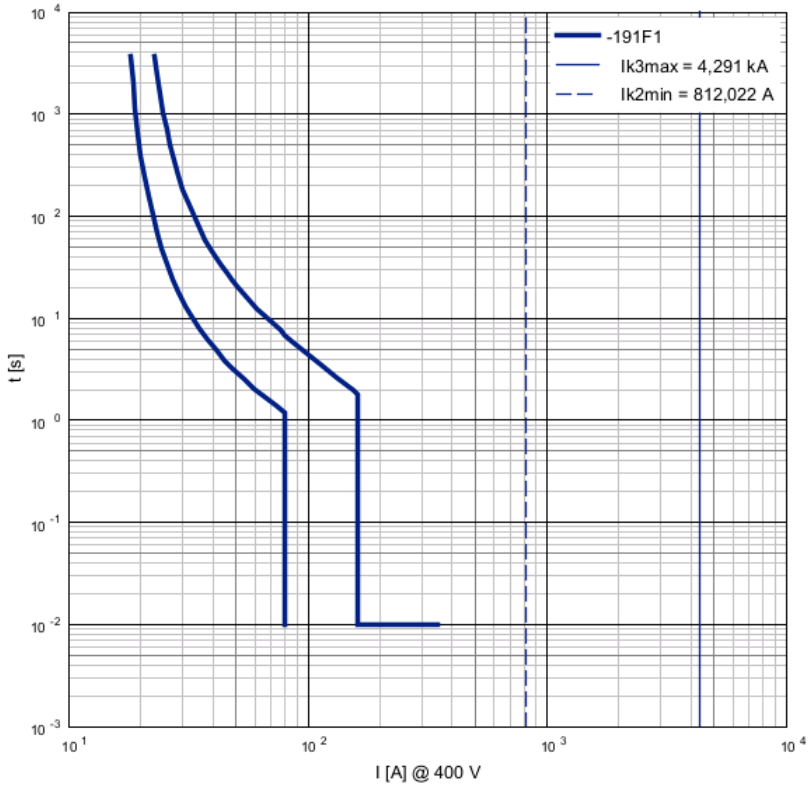
L Protection: On
Ir - corresp. 10 A

I Protection: On
Ii - corresp. 50 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-183F2
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **Clima 1**
Designation: **-191F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -191F1

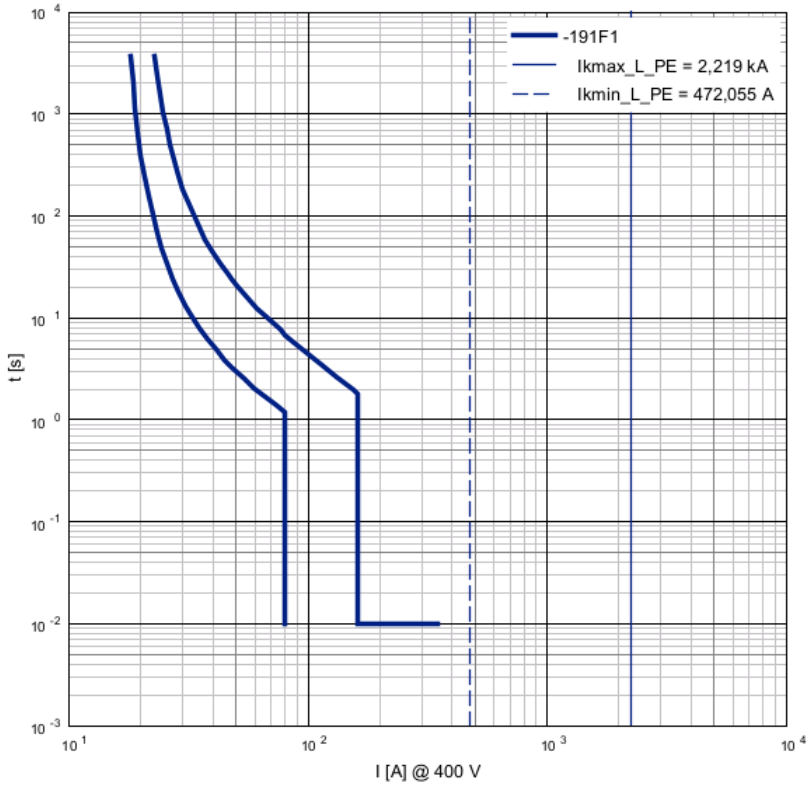
5SY43167

In 16 A

L Protection: On
Ir - corresp. 16 A

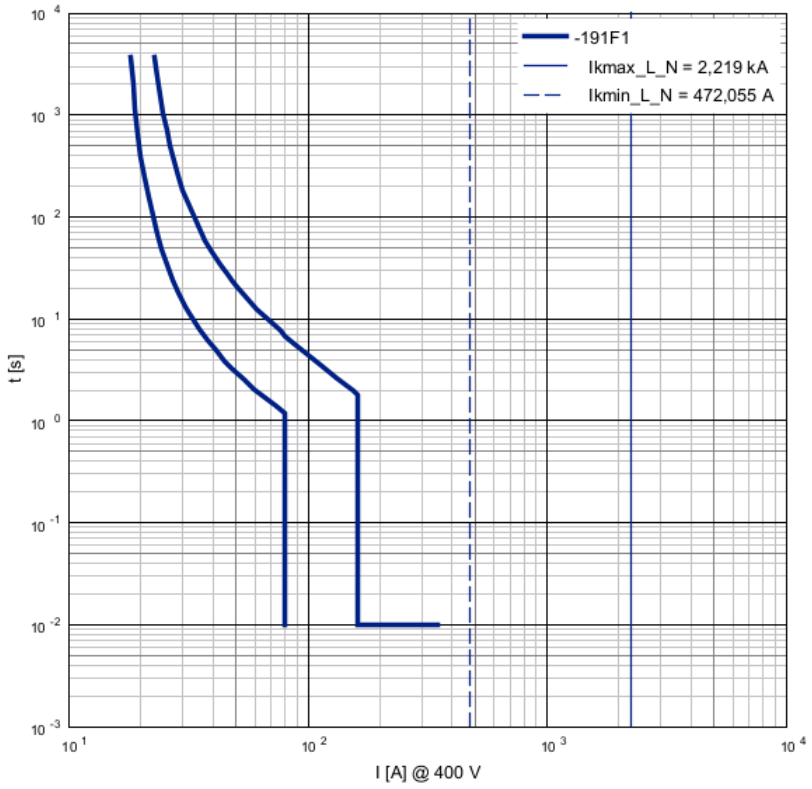
I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-PE**
Selectivity evaluation:

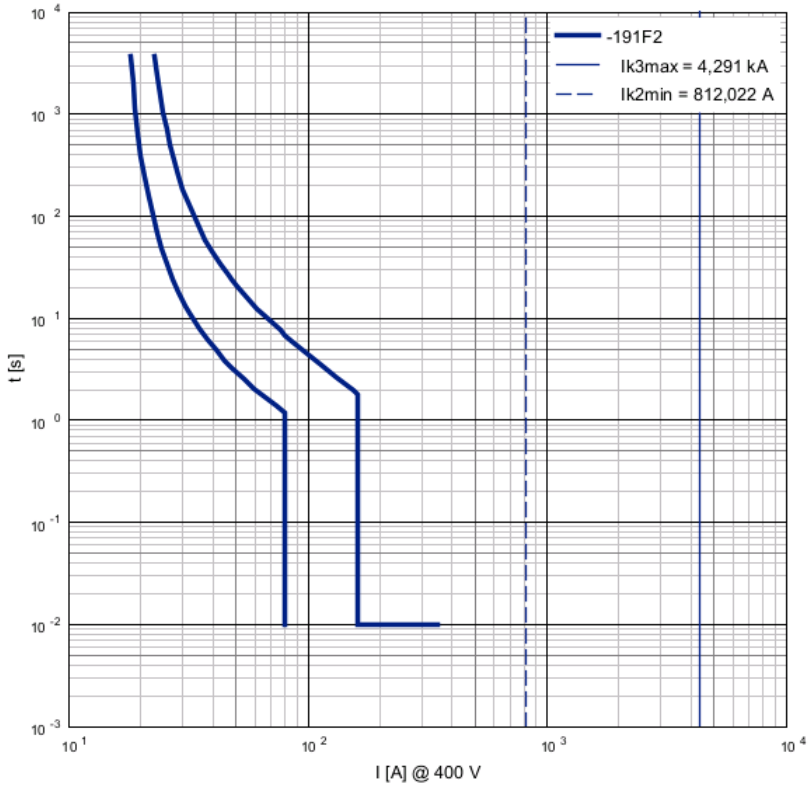

-191F1
Ikmax_L_PE = 2,219 kA
Ikmin_L_PE = 472,055 A
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Circuit name: **Clima 2**
Designation: **-191F2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -191F2

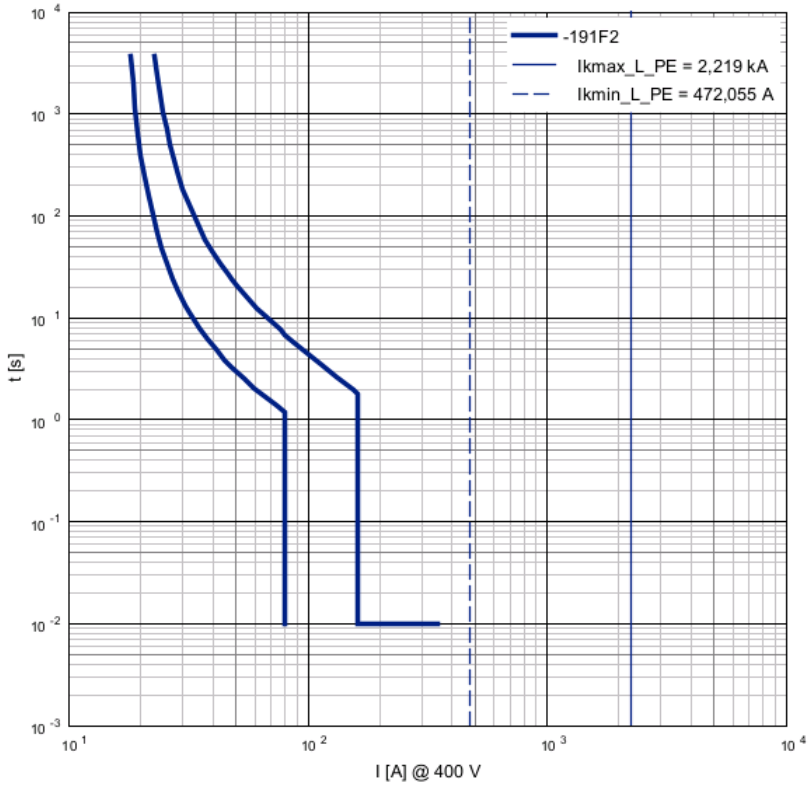
5SY43167

In 16 A

L Protection: On
Ir - corresp. 16 A

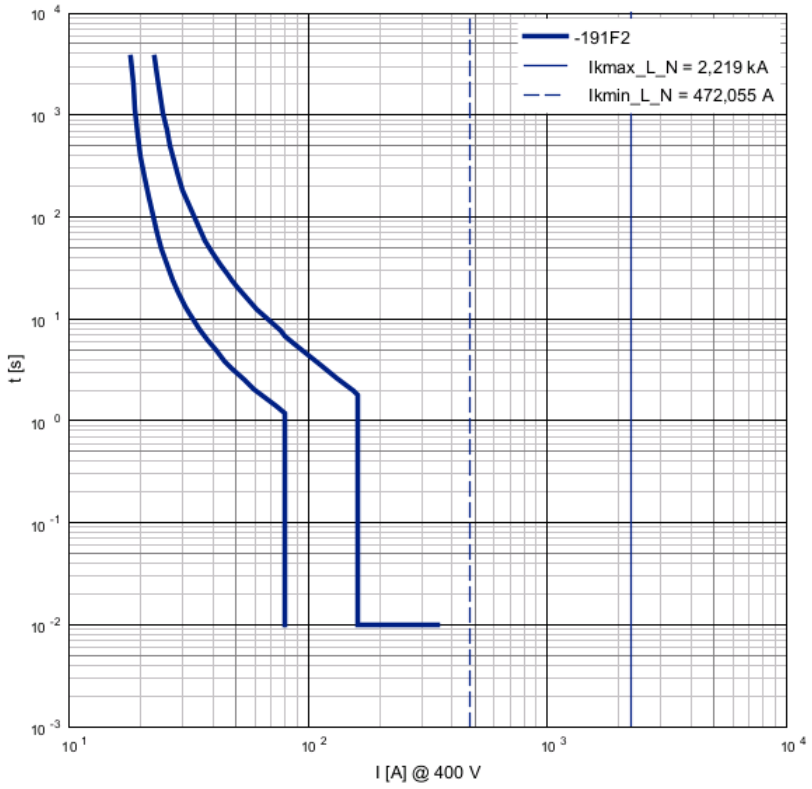
I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-PE**
Selectivity evaluation:

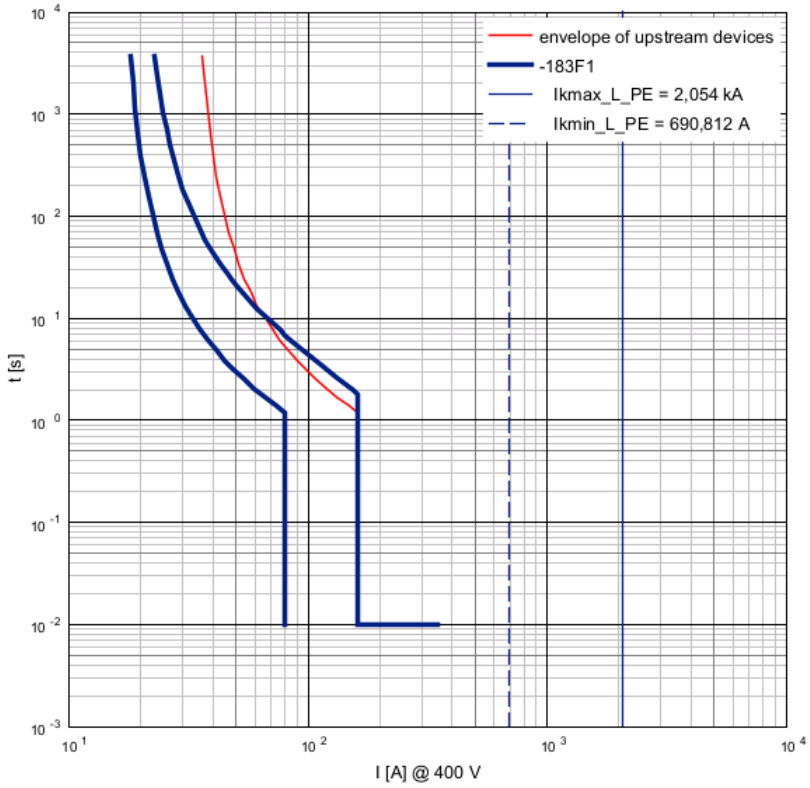

-191F2
Ikmax_L_PE = 2,219 kA
Ikmin_L_PE = 472,055 A
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Circuit name: **CON Cabinet Fans**
Designation: **-183F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -183F1

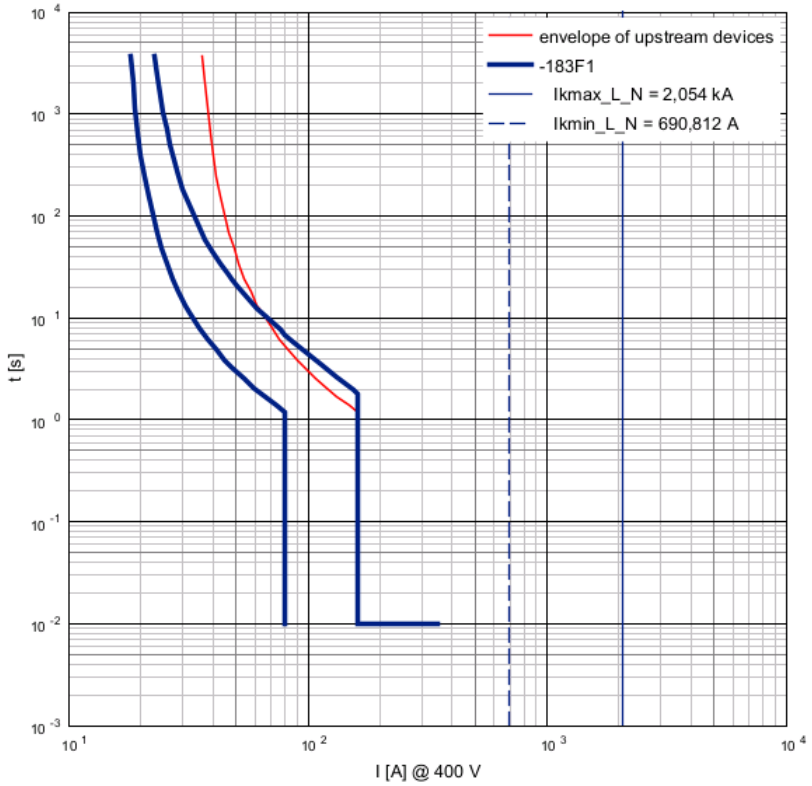
5SY41167

In 16 A

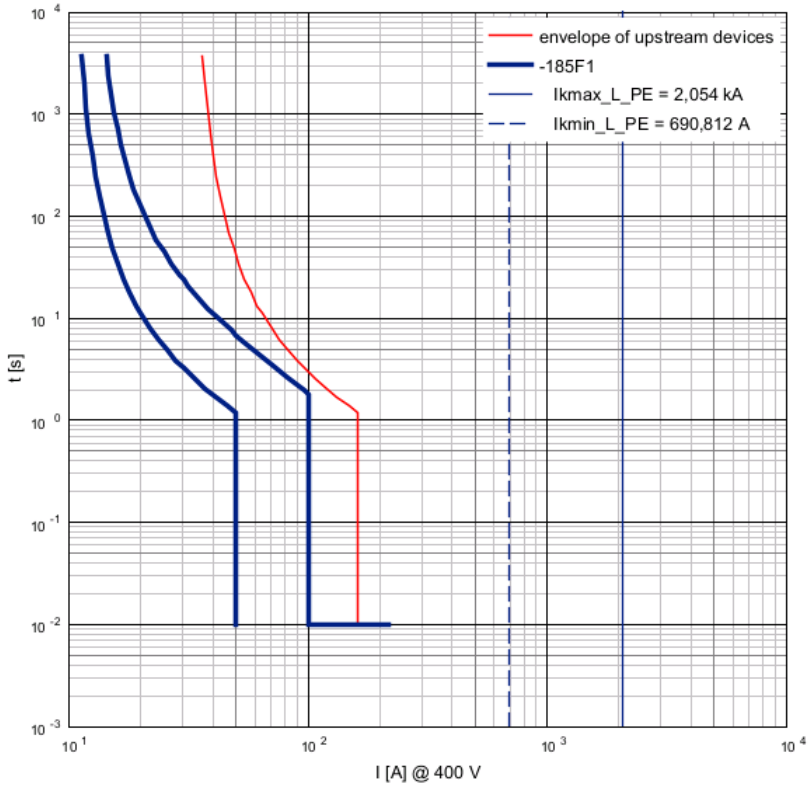
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-183F1
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **CTRL Cabinet Fan**
Designation: **-185F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -185F1

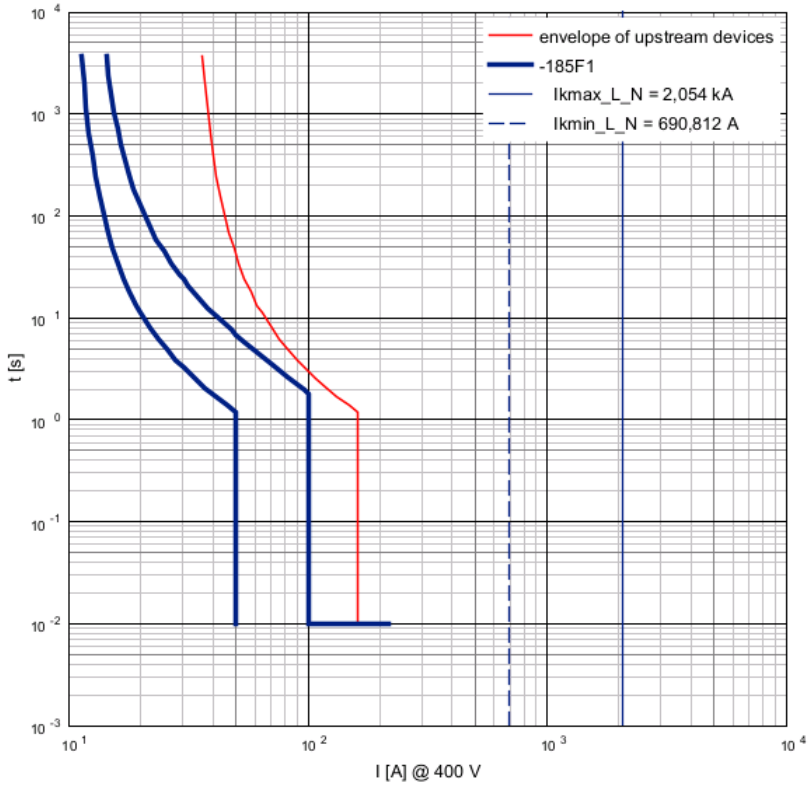
5SY41107

In 10 A

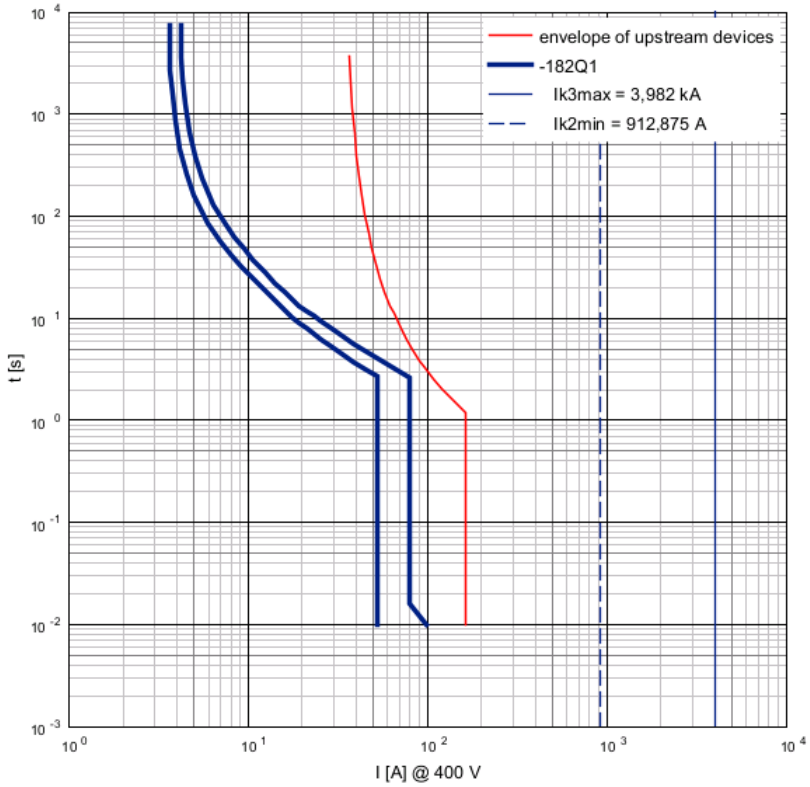
L Protection: On
Ir - corresp. 10 A

I Protection: On
Ii - corresp. 50 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-185F1
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **Fan Heat Exchanger**
Designation: **-182Q1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -182Q1

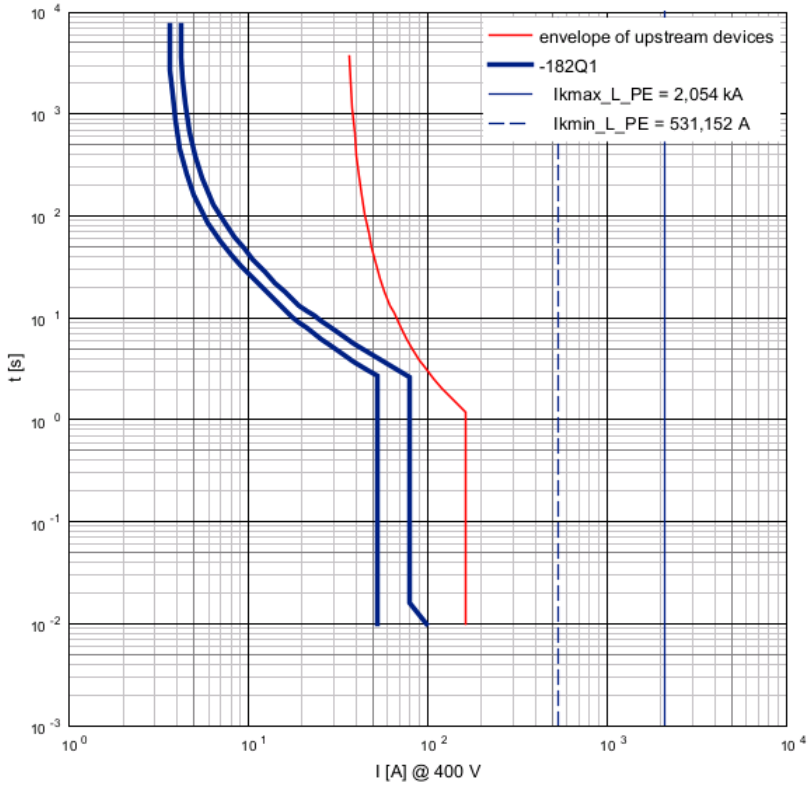
3RV20111FA25

In 5 A

L Protection: On
Ir - corresp. 3.5 A
tr 10 s

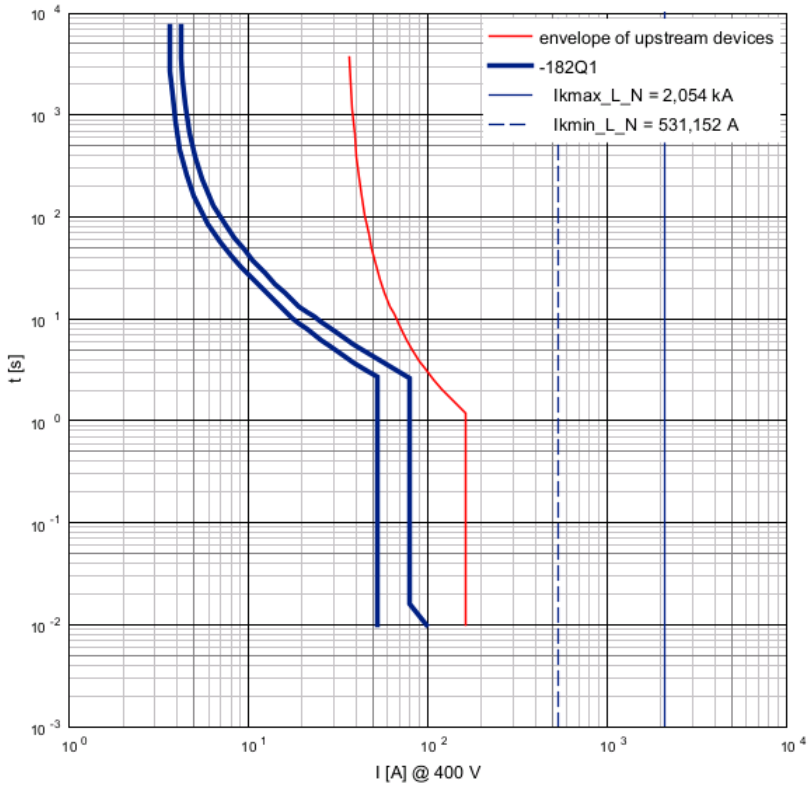
I Protection: On
Ii - corresp. 65 A

Short cut current: **Ik1-PE**
Selectivity evaluation:

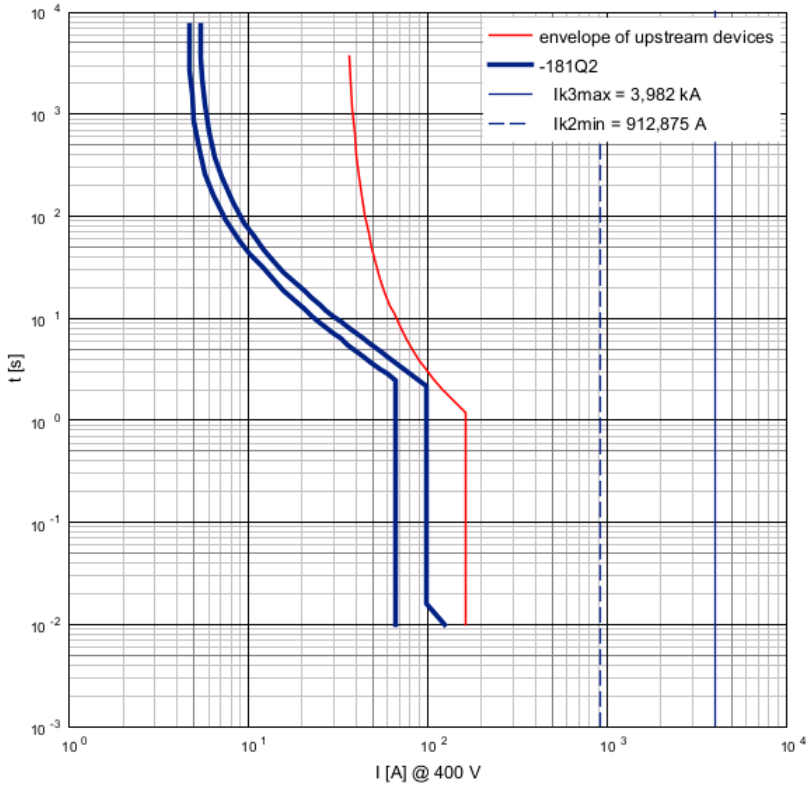

envelope of upstream devices
-182Q1
Ikmax_L_PE = 2,054 kA
Ikmin_L_PE = 531,152 A
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Circuit name: **Water Heating**
Designation: **-181Q2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -181Q2

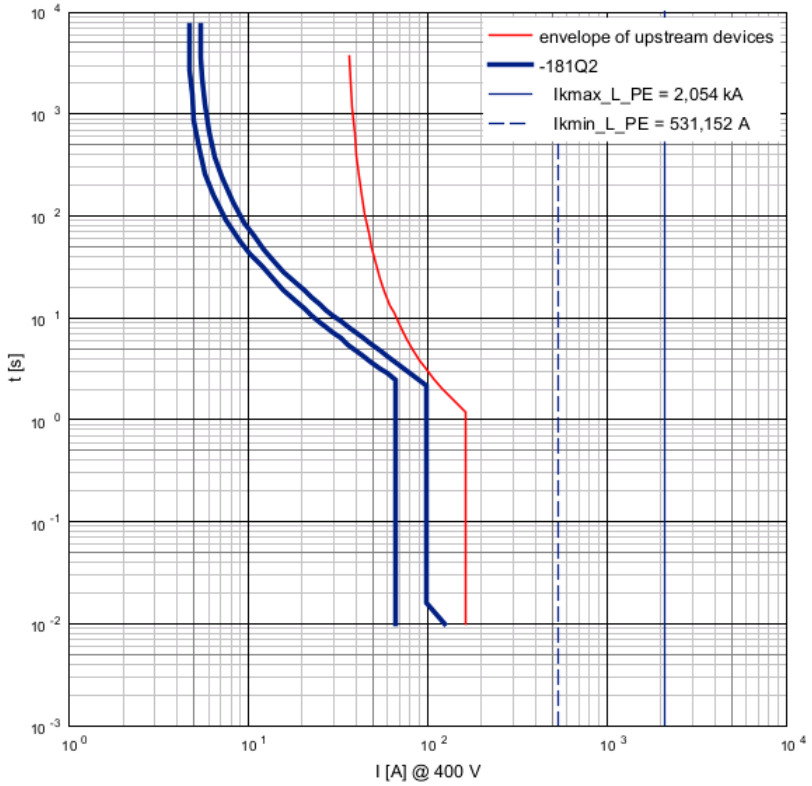
3RV20111GA25

In 6.3 A

L Protection: On
Ir - corresp. 4.5 A
tr 10 s

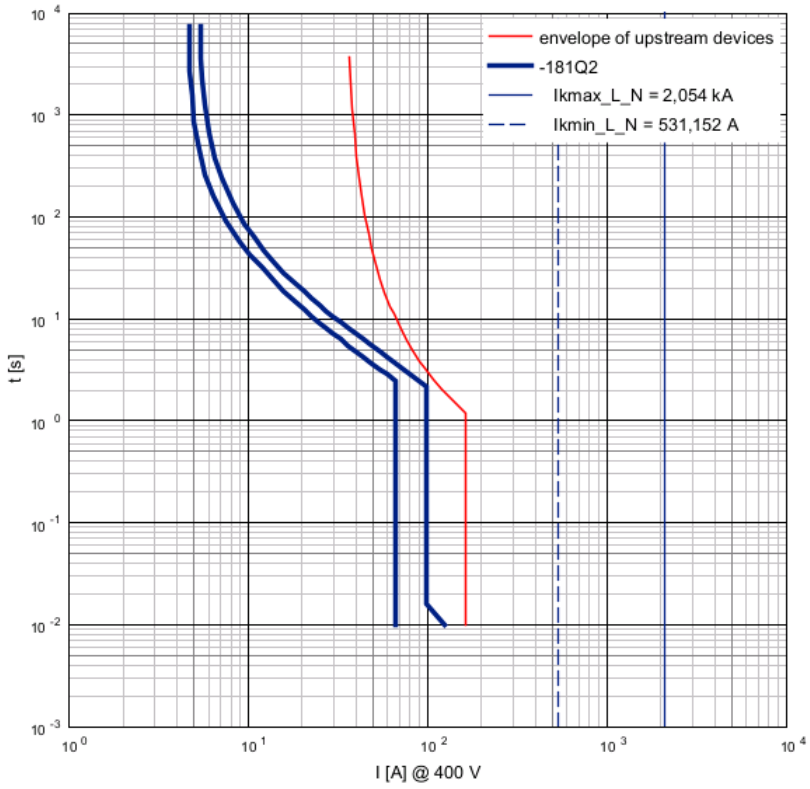
I Protection: On
Ii - corresp. 82 A

Short cut current: **Ik1-PE**
Selectivity evaluation:

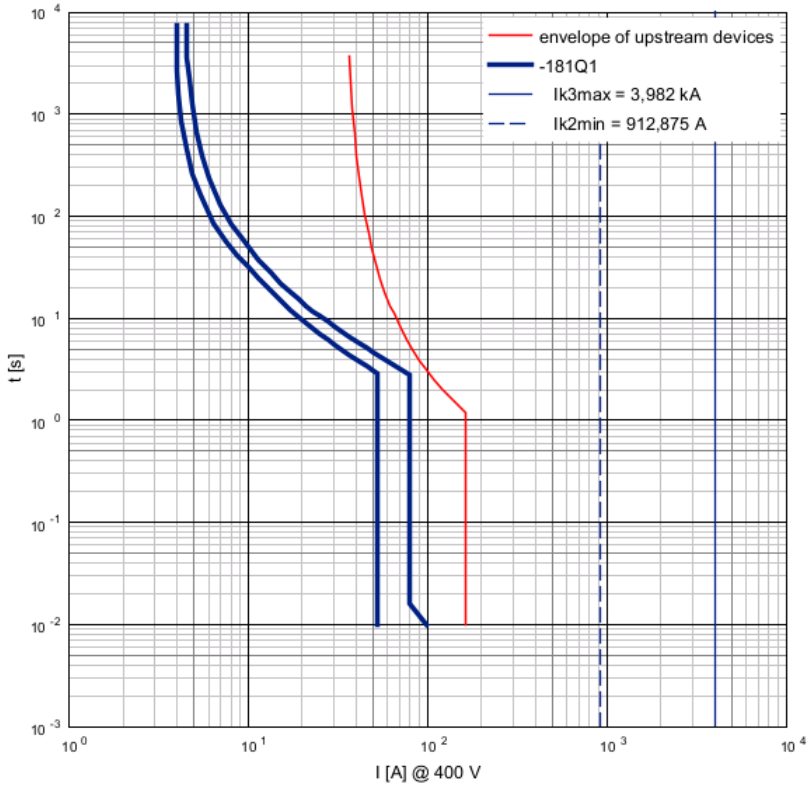

envelope of upstream devices
-181Q2
Ikmax_L_PE = 2,054 kA
Ikmin_L_PE = 531,152 A
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Circuit name: **Water Pump**
Designation: **-181Q1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -181Q1

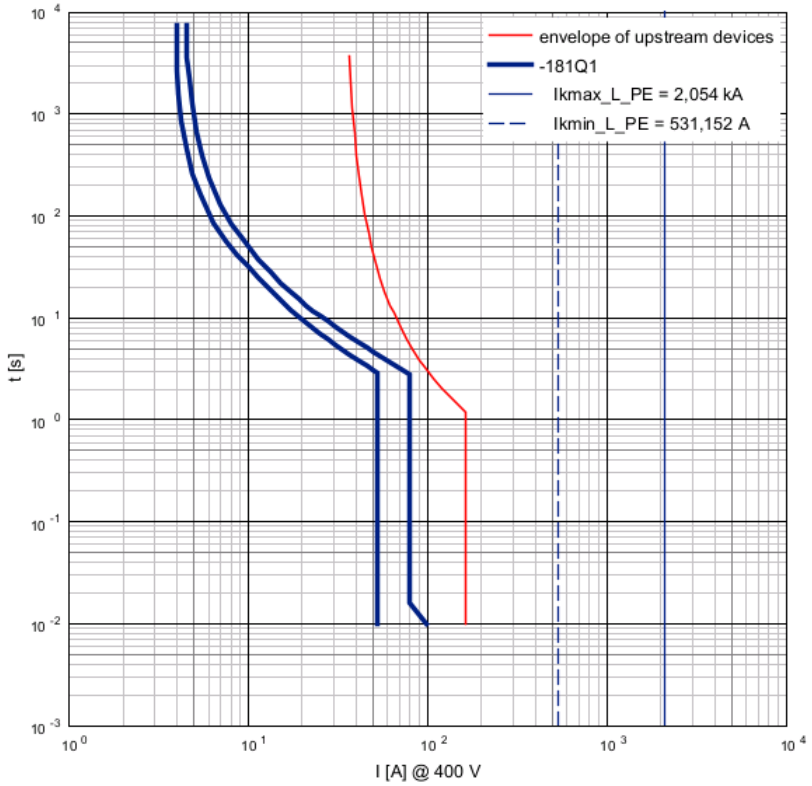
3RV20111FA25

In 5 A

L Protection: On
Ir - corresp. 3.8 A
tr 10 s

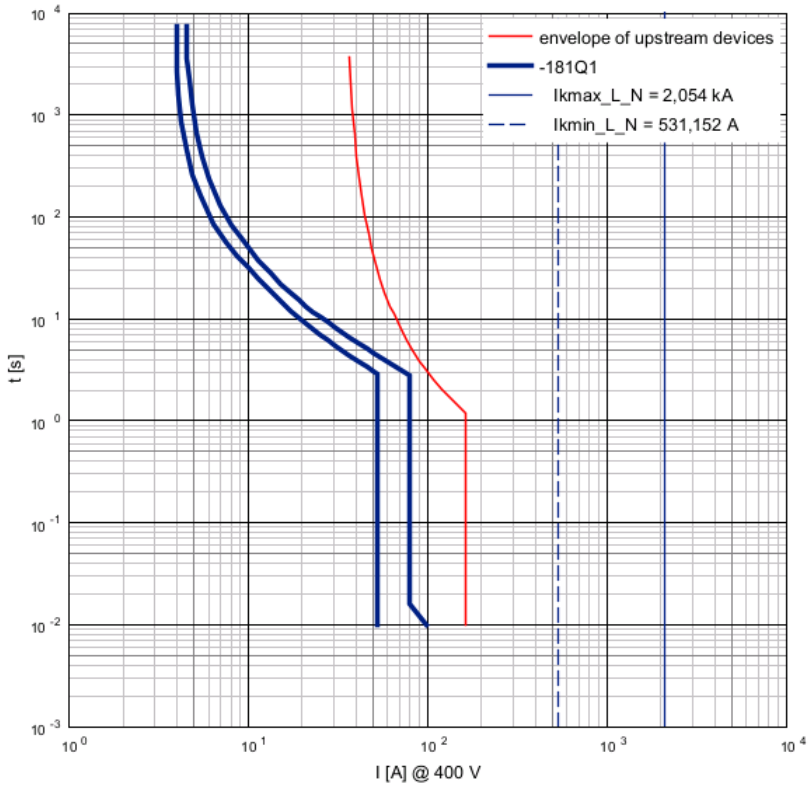
I Protection: On
Ii - corresp. 65 A

Short cut current: **Ik1-PE**
Selectivity evaluation:


envelope of upstream devices
-181Q1
Ikmax_L_PE = 2,054 kA
Ikmin_L_PE = 531,152 A
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Project documentation

created with

SIMARIS design

Version: 24.1.0 (2024-05-07)
Subrevision: 1218

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http://www.siemens.com/simaris

Master data

Project name:	Shell Crosswind Offshore
Project description:	BESS FQ 1MW 5MWh
Editor:	Freqcon_DG
Planning office:	Freqcon GmbH
Created at:	Wednesday, 4. September 2024
Changed at:	Wednesday, 30. October 2024

Customer data

City:	
Customer:	Statron AG

Comment:

Battery Container

Network parameters:

General	
Standard	IEC
Attitude of Site	< 1000 m

Medium Voltage	
Rated voltage	6.6 kV
Relative operating voltage at feeding point	100 %
Voltage factor c max	1.1
Voltage factor c min	1
Max./Min short-circuit power	91.452 / 91.452 MVA
Max./Min. short-circuit current	8 / 8 kA
Neutral System	Low-resistance
Relation R1/X1	0.2

Low Voltage	
Rated voltage	400 V
System configuration	TN-S
Frequency	50 Hz
Tolerable touch voltage	50 V
Ambient temperature of devices	30 °C
Voltage factor c max	1.1
Voltage factor c min	0.9
Base point of voltage drop calculation	Transformer-secondary terminals
Max. permissible voltage drop in network	8 %

Defined network modes for calculation and dimensioning:

Operating mode: Betriebsart 1

Starting point	Target point	Connection	Status
NSHV 3	NSHV 4	NSUV 3.1	On
Supply	NSHV 3	NSHV 3.2	On
NSHV 3	NSHV 5	LVSD 4.1	On
NSHV 3	NSHV 6	LVSD 5.1	On

List of devices:

Sources of feeding:

Neutral Infeed:

Designation	Un [V]	In [A]	Imp. in positive phase system [mΩ] Z1 max Z1 min Zs max Zs min	Loop Impedance Zs [mΩ] φ [°] R0/R1 X0/X1 Ikmax/Ikmin	Short circuit current [kA] Ik3max Ik3min Ik1max Ik1min
Supply	400	160			50 50 50 50

Switches/Fuses:

Circuit Breaker/Miniature circuit-breaker:

Place	Designation	Catalog Reference	In [A]	Icu/Icn [kA]	Icu/Icn [kA] required	Release type / characteristics	Quantity
LVSD 4.1	-684F3	5SY43327	32	10	4.291	C	1
LVSD 5.1	-684F1	5SY43327	32	10	4.291	C	1
NSUV 3.1	-684F4	5SY43327	32	10	4.291	C	1
230V Bat Cabinet 1	-687F1	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 2	-687F2	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 3	-687F3	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 4	-687F4	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 5	-687F5	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 6	-687F6	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 7	-688F1	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 8	-688F2	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 9	-688F3	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 10	-688F4	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 11	-688F5	5SY41167	16	10	2.054	C	1
400V/230V Power Supply	-101Q1	3RV20111DA25	3.2	100	4.291	TM	1
Clima	-691F4	5SY43167	16	10	3.982	C	1
Crane 1	-690F3	5SY41067	6	10	2.054	C	1
Crane 2	-690F4	5SY41067	6	10	2.054	C	1
Crane 3	-690F5	5SY41067	6	10	2.054	C	1
Exhaust Unit / shut-off flap	-691F1	5SY41067	6	10	2.054	C	1
Exhaust Unit / shut-off flap	-691F2	5SY41067	6	10	2.054	C	1
Exhaust Unit / shut-off flap	-691F3	5SY41067	6	10	2.054	C	1

Residual current circuit breaker with integral overload protection (RCBO):

Place	Designation	Catalog Reference	In [A]	Icn [kA] IΔn [mA]	Icu/Icn [kA] required	Release type / characteristics	Quantity
Container Light	-690F1	5SU13546KK10	10	10 30	2.054	B	1
Container Sockets	-690F2	5SU13547KK20	20	10 30	2.219	C	1

Connections and line distribution:

Cable/Conductor Low voltage:

Designation	Type/ Profile [mm²]	Starting point / Target point	Ib [A] Iz [A]	Material	Length [m]	Isolation	Installation type / ftot	u [%] / Δu [%] / ∑ Δu [%]	θΔu [°C] / θIkmax [°C] / θIkmin [°C]	Number of runs
K/L 3.2	e.g. NYY, NYCWY, NYCY, NYKY 3x10/10/10	NSHV 3.2 NSHV 3	39.65 57	Cu	30	PVC70	C 1	99.11 0.887 0.887	55 20 80	1
C/L 4.1	e.g. NYY, NYCWY, NYCY, NYKY 3x4/4/4	NSHV 3 NSHV 5	8.1 32	Cu	1	PVC70	C 1	99.1 0.015 0.902	55 20 80	1
C/L 5.1	e.g. NYY, NYCWY, NYCY, NYKY 3x4/4/4	NSHV 3 NSHV 6	11.95 32	Cu	1	PVC70	C 1	99.09 0.022 0.909	55 20 80	1
K/L 3.1	e.g. NYY, NYCWY, NYCY, NYKY 3x4/4/4	NSHV 3 NSHV 4	8 32	Cu	1	PVC70	C 1	99.1 0.015 0.902	55 20 80	1
-290W1-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 1	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-290W2-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 2	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-290W3-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 3	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-291W1-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 4	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-291W2-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 5	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-292W1-1	e.g. NYY, NYCWY, NYCY, NYKY	NSHV 4 230V Bat Cabinet 6	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1

Designation	Type/ Profile [mm²]	Starting point / Target point	Ib [A] Iz [A]	Material	Length [m]	Isolation	Installation type / ftot	u [%] / Δu [%] / ∑ Δu [%]	θΔu [°C] / θlkmax [°C] / θlkmin [°C]	Number of runs
	1x1.5/1.5/1.5									
-292W2-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 7	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-292W3-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 8	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-293W1-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 9	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-293W2-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 10	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-293W3-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 11	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
C/L 3.4	e.g. NYY, NYCWY, NYCY, NYKY 3x1.5/1.5/1.5	NSHV 3 400V/230V Power Supply	1.6 17.5	Cu	2	PVC70	C 1	99.1 0.015 0.903	55 20 80	1
C/L 5.8	e.g. NYY, NYCWY, NYCY, NYKY 3x1.5/1.5/1.5	NSHV 6 Clima	9 17.5	Cu	10	PVC70	C 1	98.66 0.434 1.343	55 20 80	1
C/L 5.2	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 6 Container Light	1 19.5	Cu	10	PVC70	C 1	98.99 0.097 1.005	55 20 80	1
C/L 3.3	e.g. NYY, NYCWY, NYCY, NYKY 1x2.5/2.5/2.5	NSHV 3 Container Sockets	10 27	Cu	10	PVC70	C 1	98.53 0.581 1.468	55 20 80	1

Designation	Type/ Profile [mm²]	Starting point / Target point	Ib [A] Iz [A]	Material	Length [m]	Isolation	Installation type / ftot	u [%] / Δu [%] / ∑ Δu [%]	θΔu [°C] / θIkmax [°C] / θIkmin [°C]	Number of runs
C/L 5.4	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 6 Crane 1	1.95 19.5	Cu	10	PVC70	C 1	98.9 0.188 1.097	55 20 80	1
C/L 5.5	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 6 Crane 2	1.95 19.5	Cu	10	PVC70	C 1	98.9 0.188 1.097	55 20 80	1
C/L 5.7	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 6 Crane 3	1.95 19.5	Cu	10	PVC70	C 1	98.9 0.188 1.097	55 20 80	1
C/L 4.2	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 5 Exhaust Unit / shut-off flap	2.7 19.5	Cu	1	PVC70	C 1	99.07 0.026 0.928	55 20 80	1
C/L 4.3	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 5 Exhaust Unit / shut-off flap	2.7 19.5	Cu	1	PVC70	C 1	99.07 0.026 0.928	55 20 80	1
C/L 4.4	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 5 Exhaust Unit / shut-off flap	2.7 19.5	Cu	1	PVC70	C 1	99.07 0.026 0.928	55 20 80	1

Loads:

Stationary loads:

Designation	Place	Pn [kW]	In [A]	Un [V]	cos φ	ai	Phase connection	Type of load	Quantity
230V Bat Cabinet 1	Inner zone	0.37	2	230	0.8	1	L1-N	inductive	1
230V Bat Cabinet 2	Inner zone	0.37	2	230	0.8	1	L2-N	inductive	1
230V Bat Cabinet 3	Inner zone	0.37	2	230	0.8	1	L3-N	inductive	1
230V Bat Cabinet 4	Inner zone	0.37	2	230	0.8	1	L1-N	inductive	1
230V Bat Cabinet 5	Inner zone	0.37	2	230	0.8	1	L2-N	inductive	1
230V Bat Cabinet 6	Inner zone	0.37	2	230	0.8	1	L3-N	inductive	1
230V Bat Cabinet 7	Inner zone	0.37	2	230	0.8	1	L1-N	inductive	1
230V Bat Cabinet 8	Inner zone	0.37	2	230	0.8	1	L2-N	inductive	1
230V Bat Cabinet 9	Inner zone	0.37	2	230	0.8	1	L3-N	inductive	1
230V Bat Cabinet 10	Inner zone	0.37	2	230	0.8	1	L1-N	inductive	1
230V Bat Cabinet 11	Inner zone	0.37	2	230	0.8	1	L2-N	inductive	1
400V/230V Power Supply	Inner zone	0.887	1.6	400	0.8	1	L1-L2-L3-N	inductive	1
Clima	Inner zone	4.988	9	400	0.8	1	L1-L2-L3-N	inductive	1
Container Light	Inner zone	0.185	1	230	0.8	1	L2-N	inductive	1
Container Sockets	Inner zone	1.848	10	230	0.8	1	L3-N	inductive	1
Crane 1	Inner zone	0.36	1.95	230	0.8	1	L1-N	inductive	1
Crane 2	Inner zone	0.36	1.95	230	0.8	1	L2-N	inductive	1
Crane 3	Inner zone	0.36	1.95	230	0.8	1	L3-N	inductive	1
Exhaust Unit / shut-off flap	Inner zone	0.499	2.7	230	0.8	1	L1-N	inductive	1
Exhaust Unit / shut-off flap	Inner zone	0.499	2.7	230	0.8	1	L1-N	inductive	1
Exhaust Unit / shut-off flap	Inner zone	0.499	2.7	230	0.8	1	L1-N	inductive	1

Messages

Designation	Message
NSHV 3.2	Protective device required due to possible selectivity requirement

Personal protection against electric shock

All circuits of the project have a permissable break time ta-req > ta-cur and therefor fulfill the requirements for Personal protection against electric shock.

Disclaimer:

Dimensioned protection devices inside tap-off units of busbar trunking systems may not correspond to the actual available devices for those components. Please verify the dimensioning results in the device lists and correct them accordingly.

Symbols legend:

Symbol [Unit]	Description
ai	Load factor
cos φ	Power factor
ftot	Derating factor
Ia/In	Inrush current relation
Ib [A] Iz [A]	Operating current / allowed load capacity
Icu(fuse) [kA]	Rated ultimate short-circuit breaking capacity - fuse
Icu [kA] Icn [kA]	Rated ultimate short-circuit breaking capacity according to IEC 60947-2 Rated short-circuit breaking capacity according to IEC 60898-1
Icu/Icn [kA] required	the required breaking capacity of the protection device at installation location
Icw 1s [kA]	Rated short-time withstand current 1s
IΔn [mA]	Residual current - RCD
Ik1max	Maximum single phase short-circuit current
Ik1min	Minimum single phase short-circuit current
Ik3max	Maximum three phase short-circuit current
Ik3min	Minimum three phase short-circuit current
Ik1D [kA]	single pole uninterrupted short-circuit current
Ik3D [kA]	three pole uninterrupted short-circuit current
Ikmax/Ikmin	Relation of maximum and minimum short-circuit current
Ikre	Short-circuit current recovery factor
In [A]	Nominal current
P0 [kW]	No-load losses
Pk [kW]	Short-circuit losses
Pmech [kW]	mechan. Power
Pn [kW]	Active power
R0 N [mΩ]	Zero phase-sequence resistance phase-neutral conductor
R0 PE(N) [mΩ]	Zero phase-sequence resistance phase-PE(N) conductor
R0/R1	Resistance relation positive / zero phase-sequence system
r1 [%]	Relative value of positive phase-sequence resistance
R1 [mΩ]	Positive phase-sequence resistance

Sn [kVA]	Nominal apparent power
ukr [%]	Short-circuit voltage
Un [V]	Nominal voltage
Uprim [kV]	Primary voltage
Usec [V]	Secondary voltage
X0 N [mΩ]	Zero phase-sequence reactance phase-neutral conductor
X0 PE(N) [mΩ]	Zero phase-sequence reactance phase-PE(N) conductor
X0/X1	Reactance relation positive / zero phase-sequence system
X1 [mΩ]	Positive phase-sequence reactance
xd" [%]	Subtransient reactance
Z1 max	Maximum impedance in positive phase-sequence system
Z1 min	Minimum impedance in positive phase-sequence system
Zs	Faulted circuit impedance
Zs max	Maximum faulted circuit impedance
Zs min	Minimum faulted circuit impedance
u [%] / Δu [%] / ∑ Δu [%]	Relative nominal voltage / voltage drop between beginning and end of a section / cumulated voltage drop from the transformer primary/ secondary clamps to the specified point
θΔu [°C] / θIkmax [°C] / θIkmin [°C]	Conductor temperature of MV cable / Conductor temperature of LV cable for voltage drop / on beginning of short circuit / for disconnection
η	Efficiency
φ [°]	Phase angle
φ1 min/max [°]	Phase angle at Ik1 min/max
φ3 min/max [°]	Phase angle at Ik3 min/max

Standards for computation:

Title	IEC	HD	EN	DIN VDE
Low-voltage electrical installations *	60364-1…6	384		0100 – 100...710
Short-circuit currents in three-phase a.c. systems – Calculation of currents	60909		60909	0102
Short-circuit currents – calculation of effects Definitions and calculation methods	60865		60865	0103
Low-voltage switchgear and controlgear – Circuit-breakers	60947-2		60947-2	0660 – 101
Low-voltage switchgear and controlgear assemblies	61439		61439	0660 – 600
A method of temperature-rise assessment by extrapolation for partially type-tested assemblies (PTTA) of low-voltage switchgear and controlgear	60890+C	528 S2		0660 – 507
Electrical installations of buildings – Part 5-52: Selection and erection of electrical equipment – Wiring systems	60364-5-52	384		0298 – 4
Low-voltage electrical installations – Selection and erection of electrical equipment – Part 520: Wiring systems – Supplement 3: Current-carrying capacity of cables in three-phase distribution circuits at load currents with harmonic content				0100-520 Supplement 3
Electrical accessories – Circuit-breakers for overcurrent protection for household and similar installations – Circuit-breakers for a.c. operation	60898-1		60898-1	0641 – 11
High-voltage switchgear and controlgear – Alternating Current switch-fuse combinations	62271		62271	0671 – 105
Electrical installations of buildings – Selection and erection of electrical equipment – Isolation, switching and control	60364-5-53	60364-5-534		0100-534
Low-voltage electrical installations – Protection for safety – Protection against voltage disturbances and electromagnetic disturbances	60364-4-44	60364-4-443		0100-443
Protection against lightning – Part 1…4	62305-1…4			0185 – 1…4
Low-voltage surge protective devices - Surge protective devices connected to low-voltage power systems; Requirements and tests	61643-11			0675-6-11
Tests for electric cables under fire conditions – Circuit integrity	60331-11, 21		50200	0472-814 0482-200
Fire behaviour of building materials and building components — Part 12: Circuit integrity maintenance of electric cable systems, requirements and testing				4102-12 : 1998-11
Electrical equipment of electric road vehicles - Electric vehicles conductive charging system	61851		61851	

*) Special national conditions and deviations from IEC 60364-4-41: 2005 are not implemented and need to be considered!

Supply
In = 160 A
Un = 400 V

K/L 3.2
Cable/Line
30 m
Cu (3x10/10/10)

NSHV 3
TN-S Un = 400 V

-684F4
Miniature circuit-breaker
In = 32 A
5SY43327/C

K/L 3.1
Cable/Line
1 m
Cu (3x4/4/4)

-684F3
Miniature circuit-breaker
In = 32 A
5SY43327/C

C/L 4.1
Cable/Line
1 m
Cu (3x4/4/4)

NSHV 5
TN-S Un = 400 V

-691F1
Miniature circuit-breaker
In = 6 A
5SY41067/C

C/L 4.2
Cable/Line
1 m
Cu (1x1,5/1,5/1,5)

Exhaust Unit / shut-off flap
Inner zone
In = 2,7 A
Un = 230 V
1+N-pole

-691F2
Miniature circuit-breaker
In = 6 A
5SY41067/C

C/L 4.3
Cable/Line
1 m
Cu (1x1,5/1,5/1,5)

Exhaust Unit / shut-off flap
Inner zone
In = 2,7 A
Un = 230 V
1+N-pole

-691F3
Miniature circuit-breaker
In = 6 A
5SY41067/C

C/L 4.4
Cable/Line
1 m
Cu (1x1,5/1,5/1,5)

Exhaust Unit / shut-off flap
Inner zone
In = 2,7 A
Un = 230 V
1+N-pole

-684F1
Miniature circuit-breaker
In = 32 A
5SY43327/C

C/L 5.1
Cable/Line
1 m
Cu (3x4/4/4)

Crane 3
Inner zone
In = 1,95 A
Un = 230 V
1+N-pole

C/L 5.7
Cable/Line
10 m
Cu (1x1,5/1,5/1,5)

-690F5
Miniature circuit-breaker
In = 6 A
5SY41067/C

Clima
Inner zone
In = 9 A
Un = 400 V
3+N-pole

C/L 5.8
Cable/Line
10 m
Cu (3x1,5/1,5/1,5)

-691F4
Miniature circuit-breaker
In = 16 A
5SY43167/C

-101Q1
Circuit-breaker
In = 3,2 A
3RV20111DA25/LI

C/L 3.4
Cable/Line
2 m
Cu (3x1,5/1,5/1,5)

400V/230V Power Supply
Inner zone
In = 1,6 A
Un = 400 V
3+N-pole

-690F2
Miniature circuit-breaker
In = 20 A
5SU13547KK20/C

C/L 3.3
Cable/Line
10 m
Cu (1x2,5/2,5/2,5)

Container Sockets
Inner zone
In = 10 A
Un = 230 V
1+N-pole

NSHV 6
TN-S Un = 400 V

-690F1
Miniature circuit-breaker
In = 10 A
5SU13546KK10/B

C/L 5.2
Cable/Line
10 m
Cu (1x1,5/1,5/1,5)

Container Light
Inner zone
In = 1 A
Un = 230 V
1+N-pole

-690F3
Miniature circuit-breaker
In = 6 A
5SY41067/C

C/L 5.4
Cable/Line
10 m
Cu (1x1,5/1,5/1,5)

Crane 1
Inner zone
In = 1,95 A
Un = 230 V
1+N-pole

-690F4
Miniature circuit-breaker
In = 6 A
5SY41067/C

C/L 5.5
Cable/Line
10 m
Cu (1x1,5/1,5/1,5)

Crane 2
Inner zone
In = 1,95 A
Un = 230 V
1+N-pole

230V Bat Cabinet 7
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-292W2-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

-688F1
Miniature circuit-breaker
In = 16 A
5SY41167/C

230V Bat Cabinet 8
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-292W3-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

-688F2
Miniature circuit-breaker
In = 16 A
5SY41167/C

230V Bat Cabinet 9
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-293W1-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

-688F3
Miniature circuit-breaker
In = 16 A
5SY41167/C

230V Bat Cabinet 10
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-293W2-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

-688F4
Miniature circuit-breaker
In = 16 A
5SY41167/C

230V Bat Cabinet 11
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-293W3-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

-688F5
Miniature circuit-breaker
In = 16 A
5SY41167/C

NSHV 4
TN-S Un = 400 V

-687F1
Miniature circuit-breaker
In = 16 A
5SY41167/C

-290W1-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

230V Bat Cabinet 1
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-687F2
Miniature circuit-breaker
In = 16 A
5SY41167/C

-290W2-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

230V Bat Cabinet 2
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-687F3
Miniature circuit-breaker
In = 16 A
5SY41167/C

-290W3-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

230V Bat Cabinet 3
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-687F4
Miniature circuit-breaker
In = 16 A
5SY41167/C

-291W1-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

230V Bat Cabinet 4
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-687F5
Miniature circuit-breaker
In = 16 A
5SY41167/C

-291W2-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

230V Bat Cabinet 5
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-687F6
Miniature circuit-breaker
In = 16 A
5SY41167/C

-292W1-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

230V Bat Cabinet 6
Inner zone
In = 2 A
Un = 230 V
1+N-pole

Project name:	Shell Crosswind Offshore		
Planner: Freqcon_DG		View: Device parameters	Sheet: 1/1
Design office: Freqcon GmbH		Location:	
Client: Statron AG		Created on: 4 Sep 2024	Changed on: 30 Oct 2024

Selectivity evaluation

created with

SIMARIS design

Version: 24.1.0 (2024-05-07)
Subrevision: 1218

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http://www.siemens.com/simaris

Master data

Project name:	Shell Crosswind Offshore
Project description:	BESS FQ 1MW 5MWh
Editor:	Freqcon_DG
Planning office:	Freqcon GmbH
Created at:	Wednesday, 4. September 2024
Changed at:	Wednesday, 30. October 2024

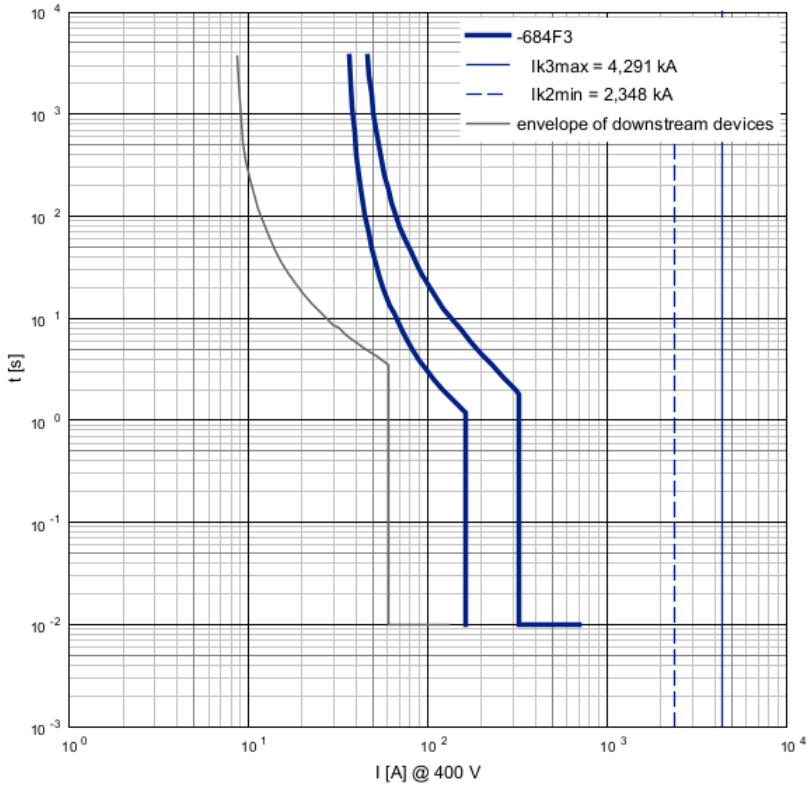
Customer data

City:	
Customer:	Statron AG

Comment:

Battery Container

Circuit name: **LVSD 4.1**
Designation: **-684F3**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -684F3

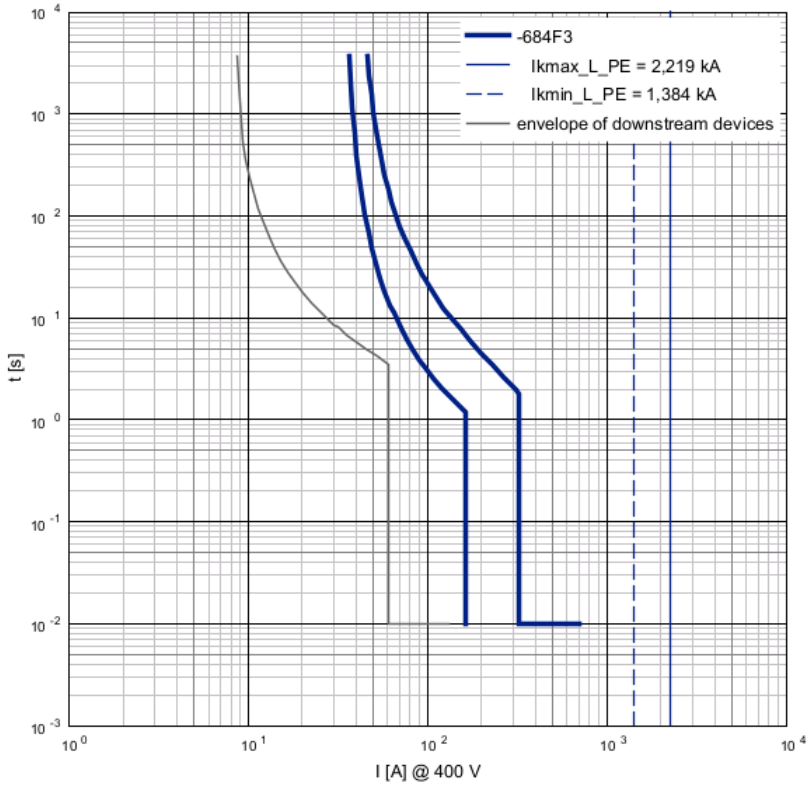
5SY43327

In 32 A

L Protection: On
Ir - corresp. 32 A

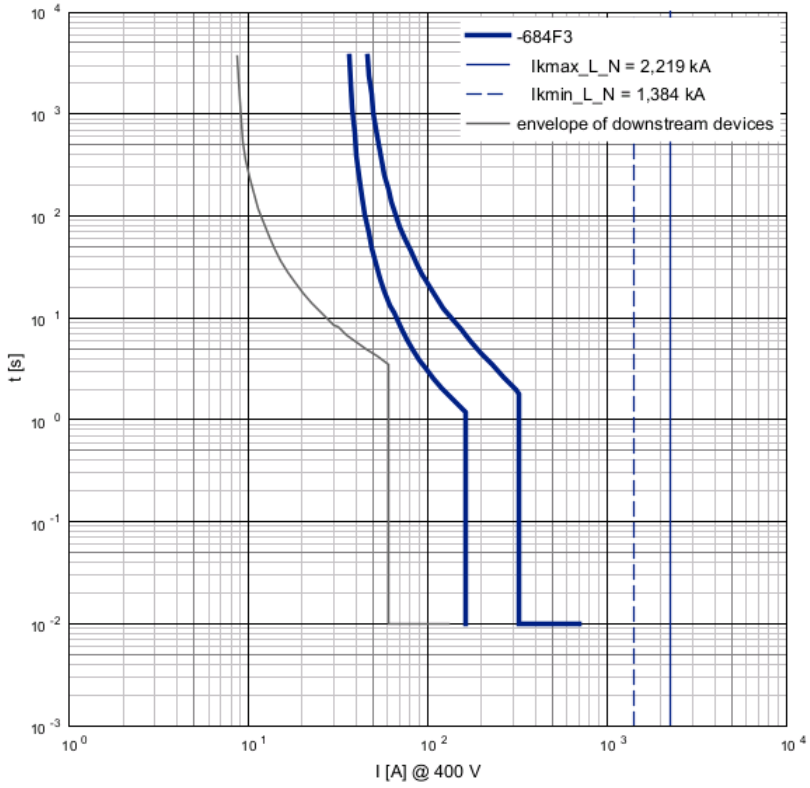
I Protection: On
Ii - corresp. 160 A

Short cut current: **Ik1-PE**
Selectivity evaluation:

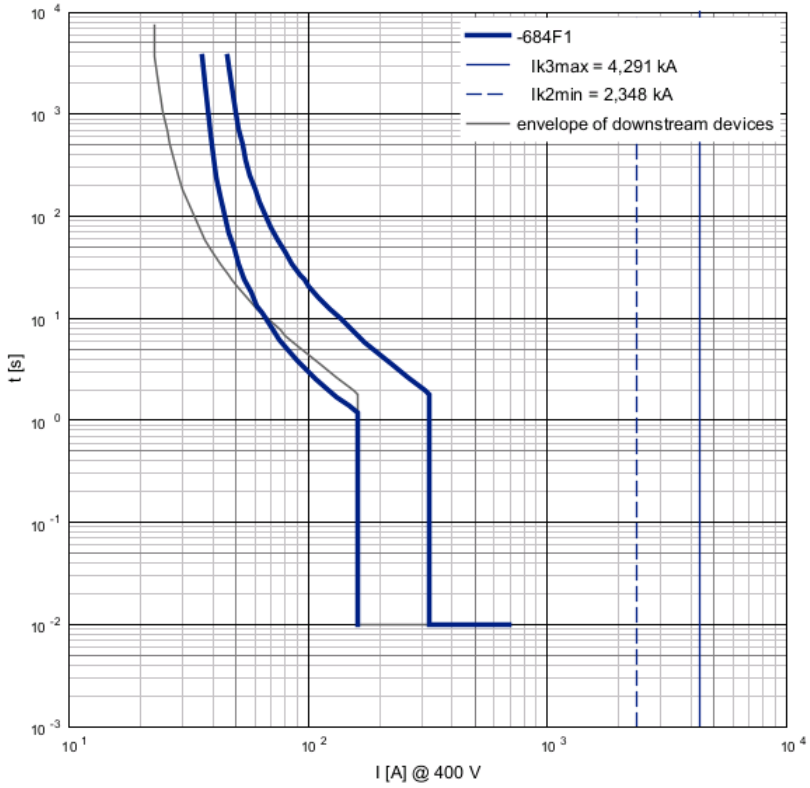

-684F3
Ikmax_L_PE = 2,219 kA
Ikmin_L_PE = 1,384 kA
envelope of downstream devices
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Circuit name: **LVSD 5.1**
Designation: **-684F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -684F1

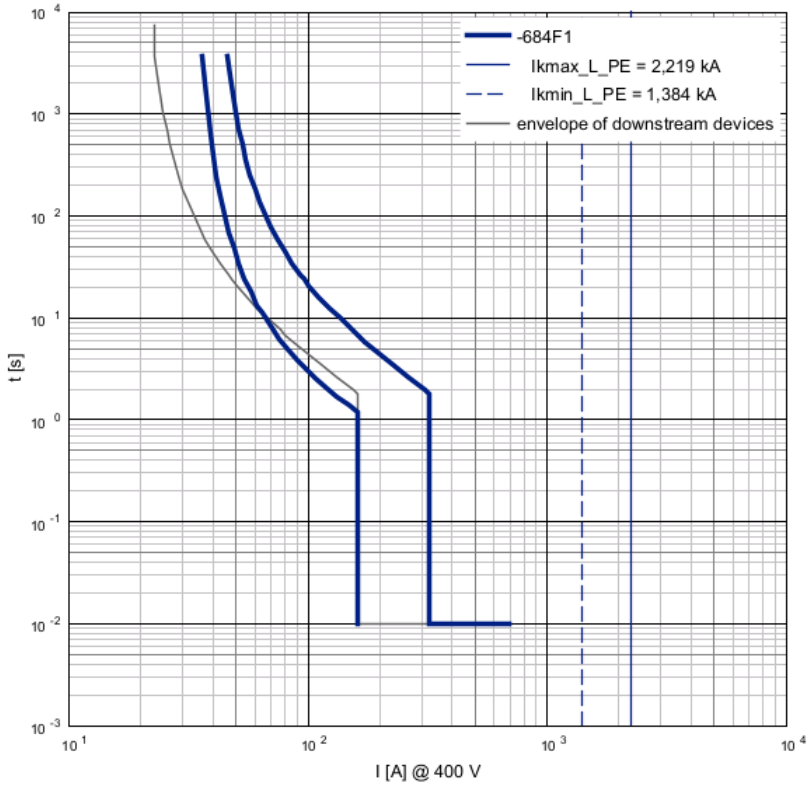
5SY43327

In 32 A

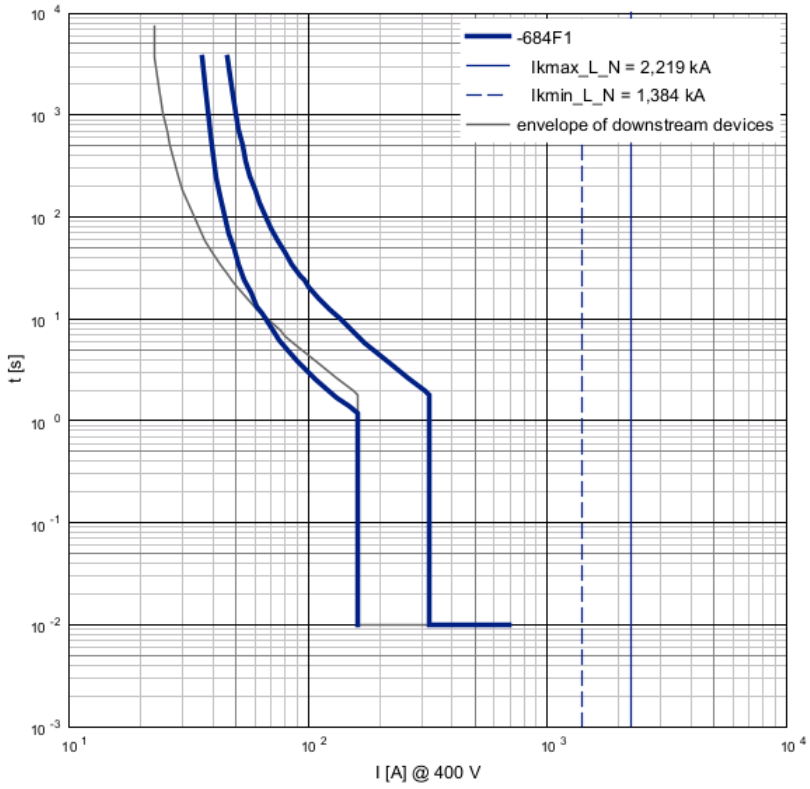
L Protection: On
Ir - corresp. 32 A

I Protection: On
Ii - corresp. 160 A

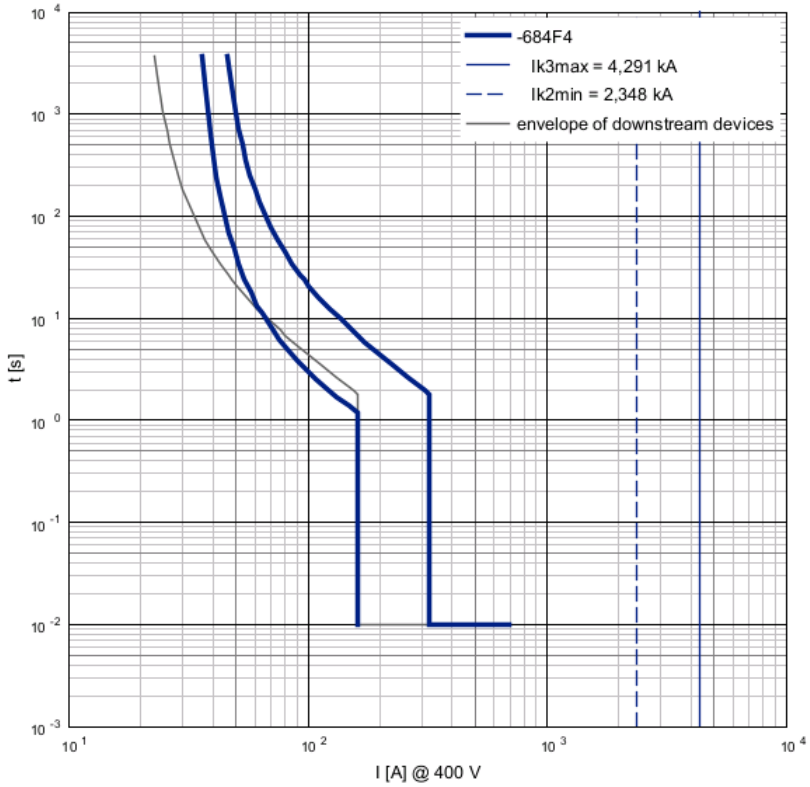
Short cut current: **Ik1-PE**
Selectivity evaluation:


-684F1
Ikmax_L_PE = 2,219 kA
Ikmin_L_PE = 1,384 kA
envelope of downstream devices
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**
Selectivity evaluation:



Circuit name: **NSUV 3.1**
Designation: **-684F4**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -684F4

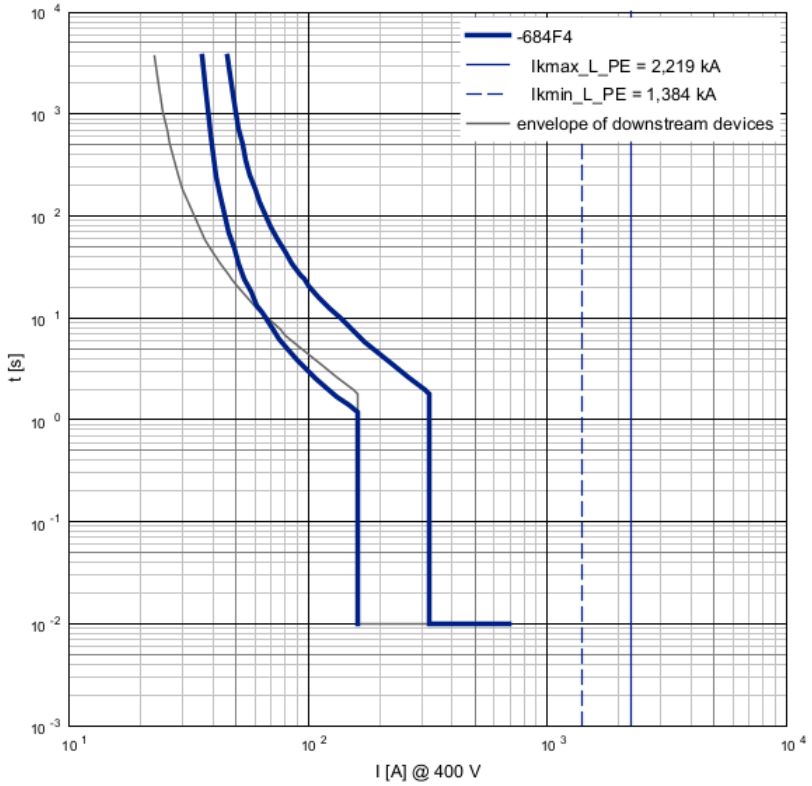
5SY43327

In 32 A

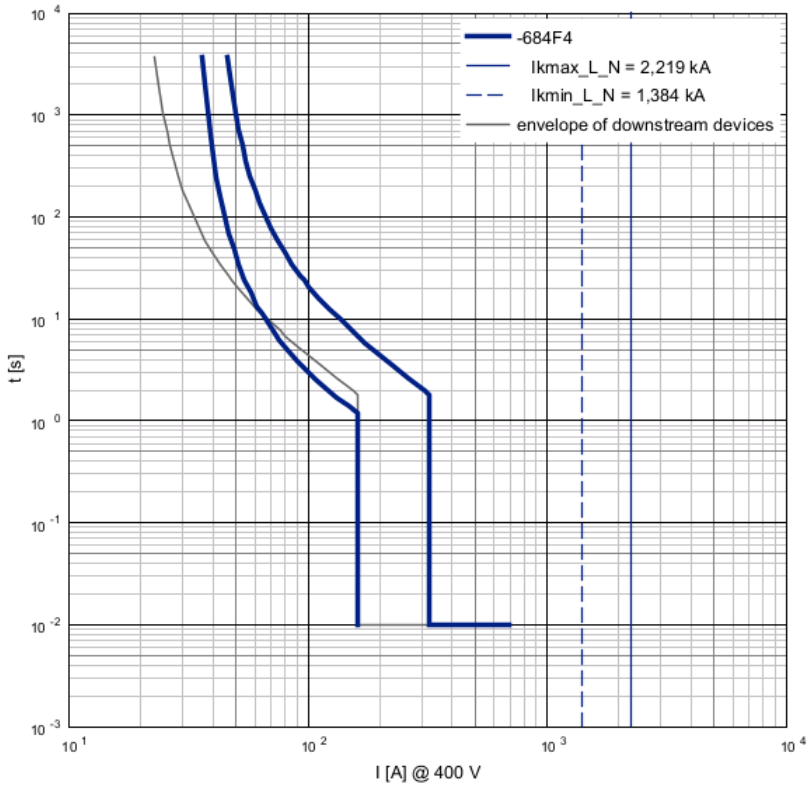
L Protection: On
Ir - corresp. 32 A

I Protection: On
Ii - corresp. 160 A

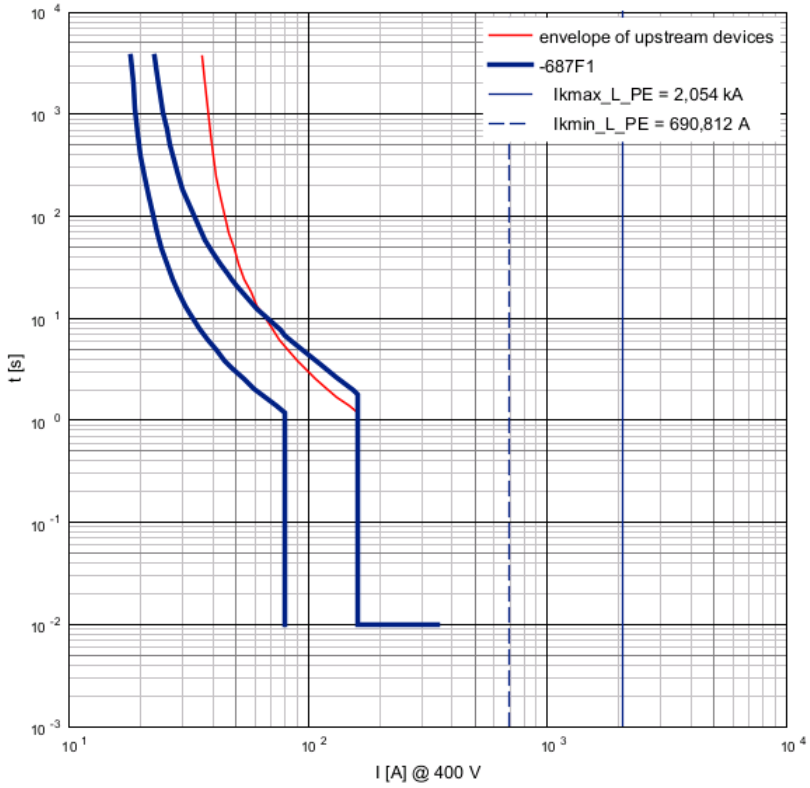
Short cut current: **Ik1-PE**
Selectivity evaluation:


-684F4
Ikmax_L_PE = 2,219 kA
Ikmin_L_PE = 1,384 kA
envelope of downstream devices
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**
Selectivity evaluation:



Circuit name: **230V Bat Cabinet 1**
Designation: **-687F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -687F1

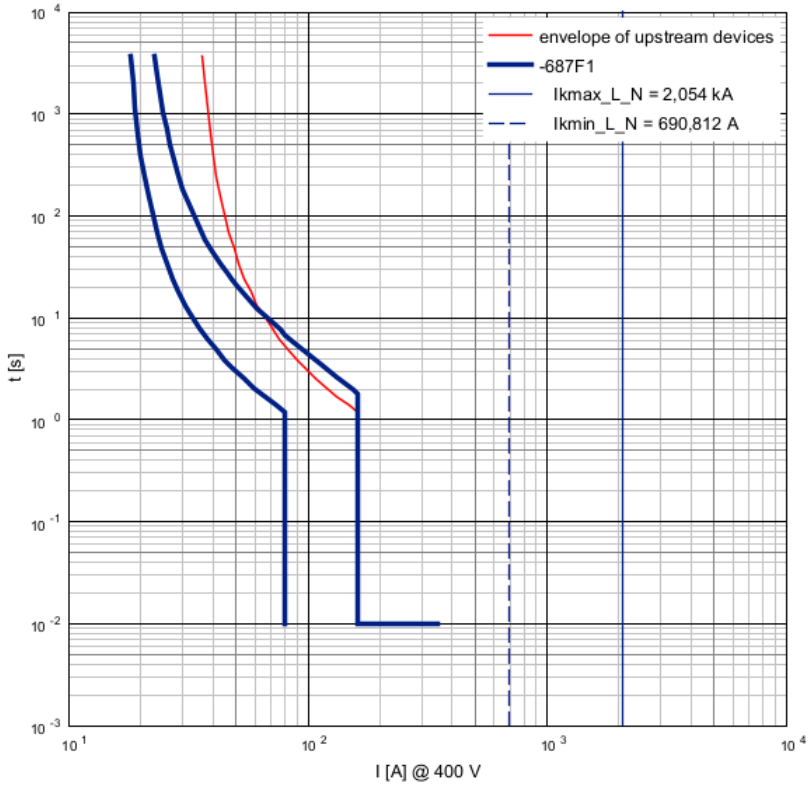
5SY41167

In 16 A

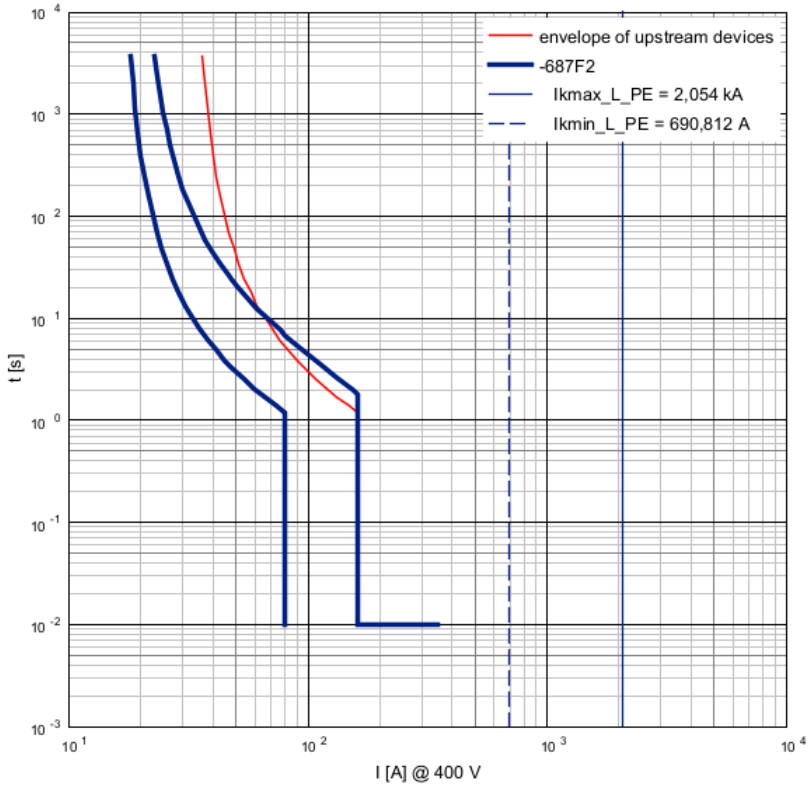
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-687F1
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 2**
Designation: **-687F2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -687F2

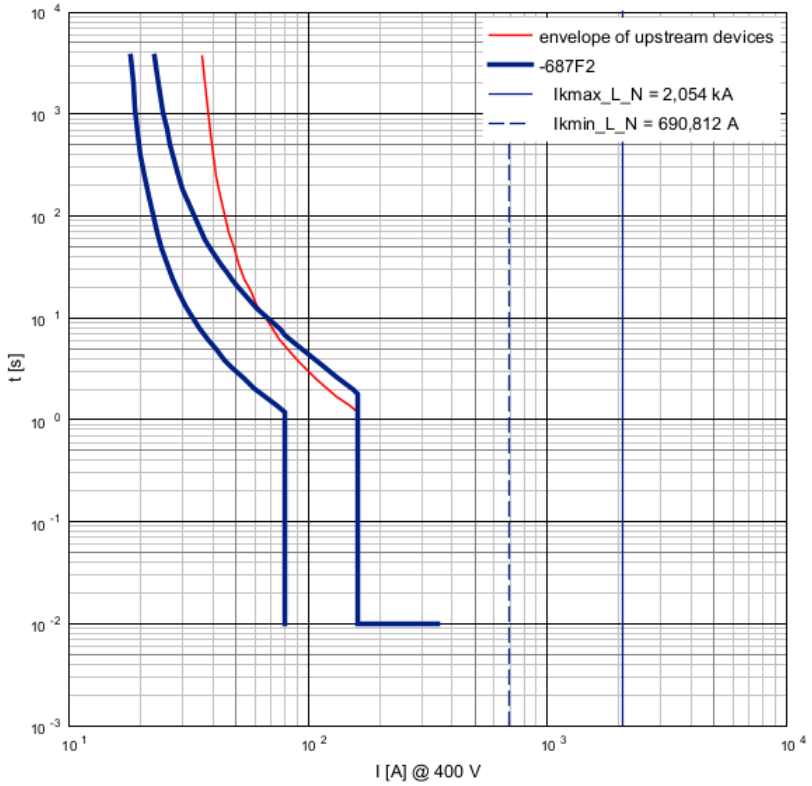
5SY41167

In 16 A

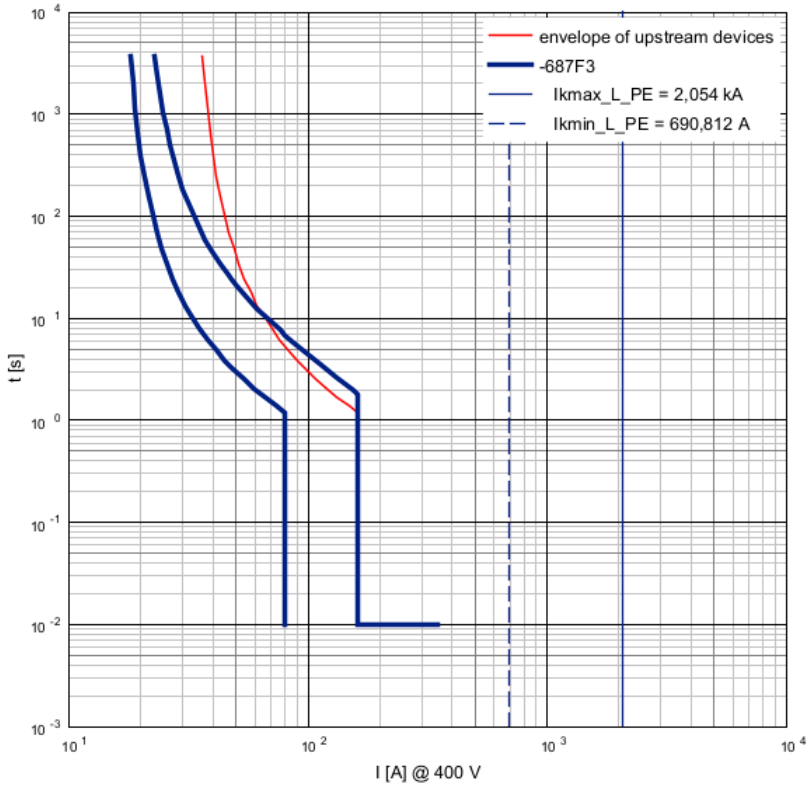
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-687F2
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 3**
Designation: **-687F3**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -687F3

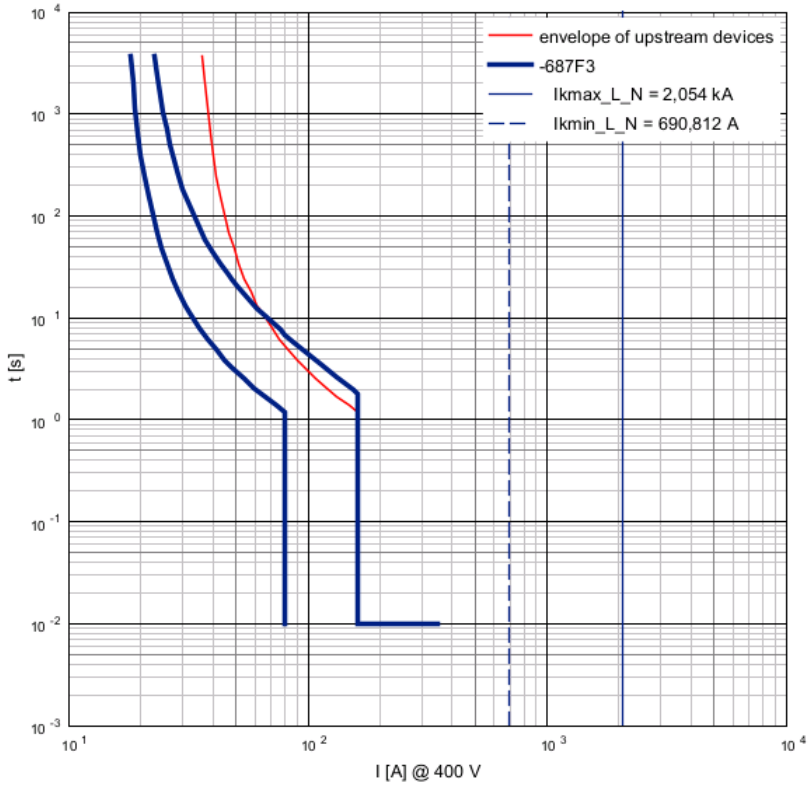
5SY41167

In 16 A

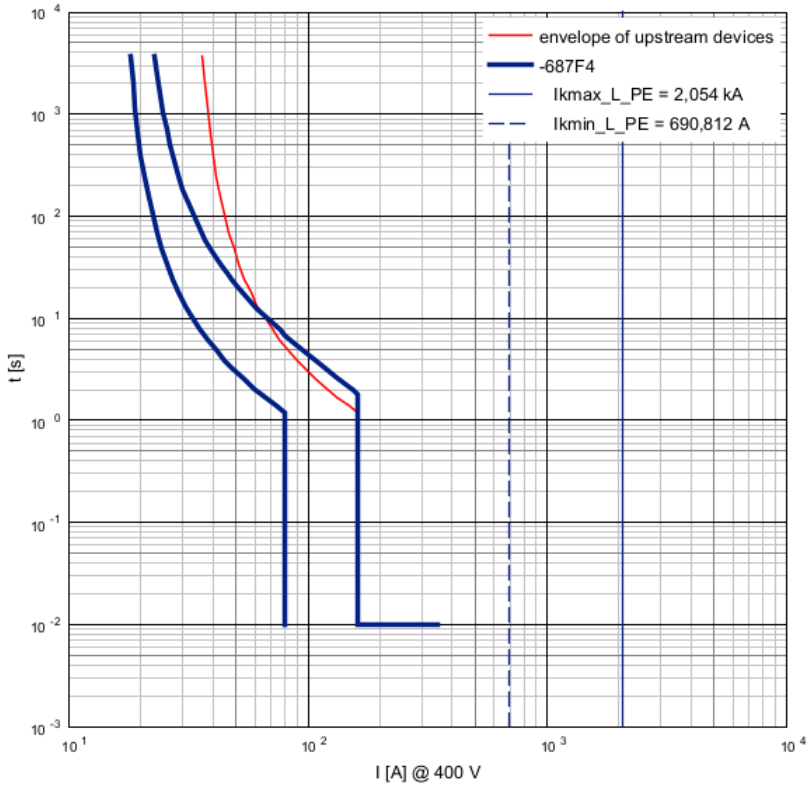
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-687F3
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 4**
Designation: **-687F4**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -687F4

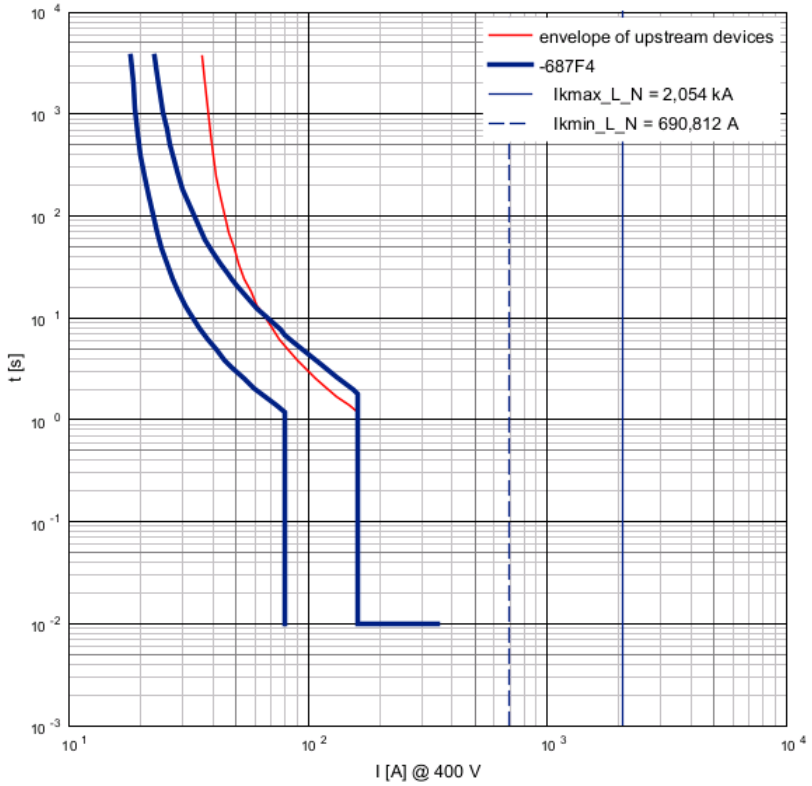
5SY41167

In 16 A

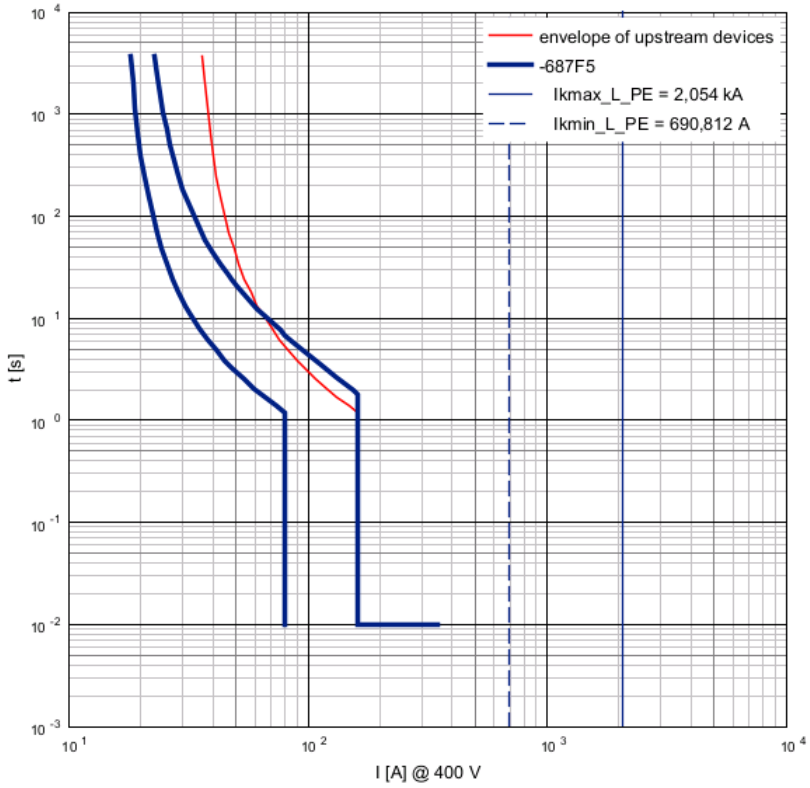
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-687F4
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 5**
Designation: **-687F5**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -687F5

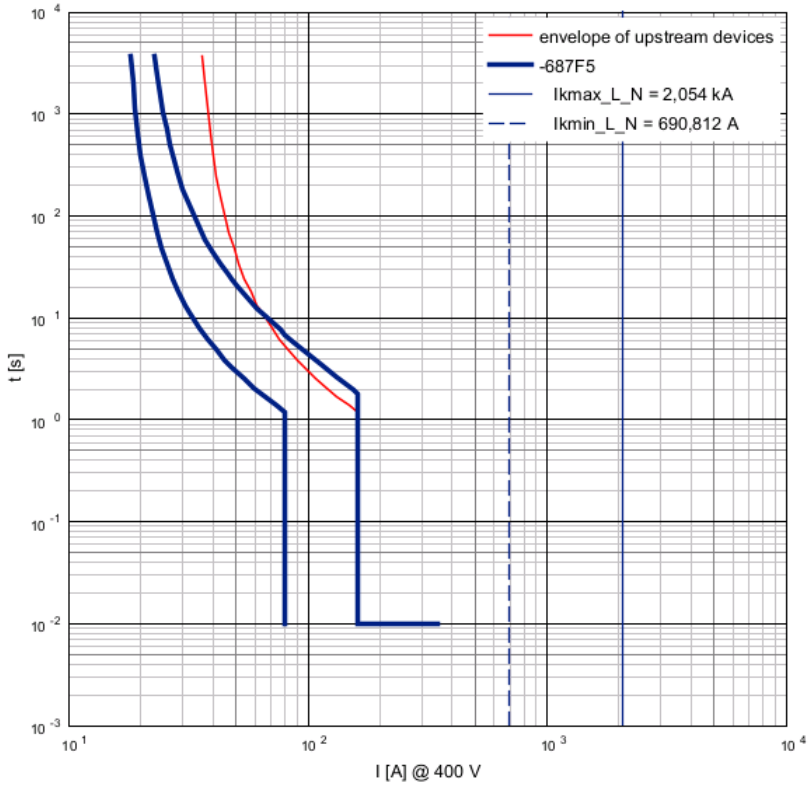
5SY41167

In 16 A

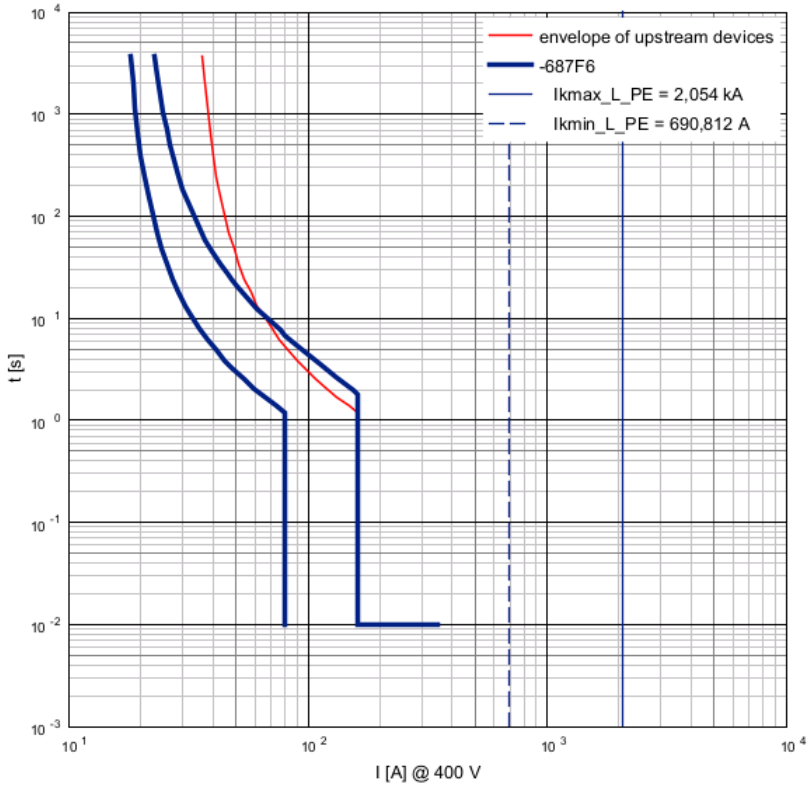
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-687F5
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 6**
Designation: **-687F6**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -687F6

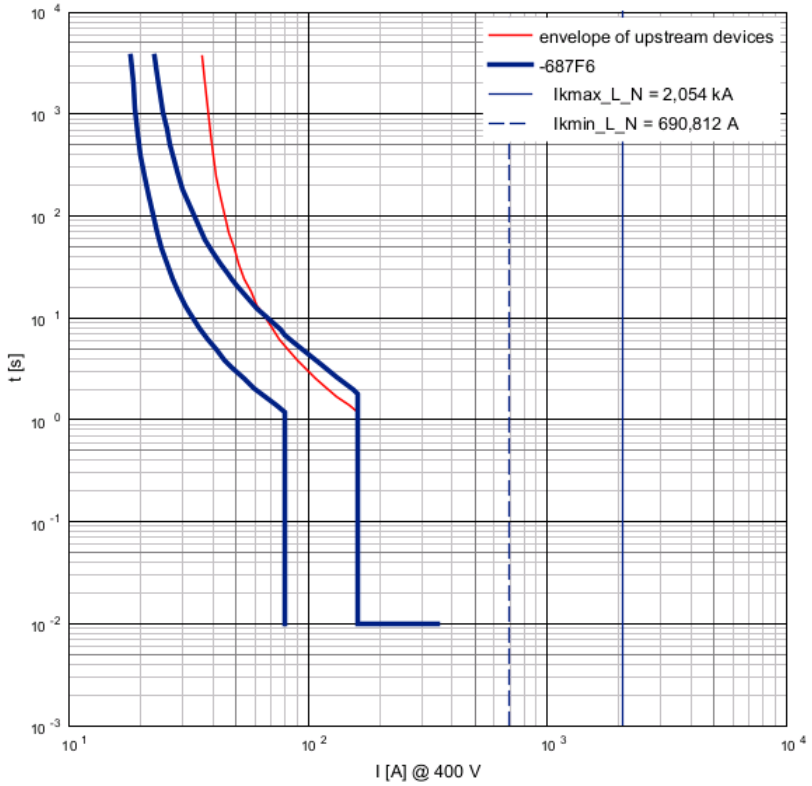
5SY41167

In 16 A

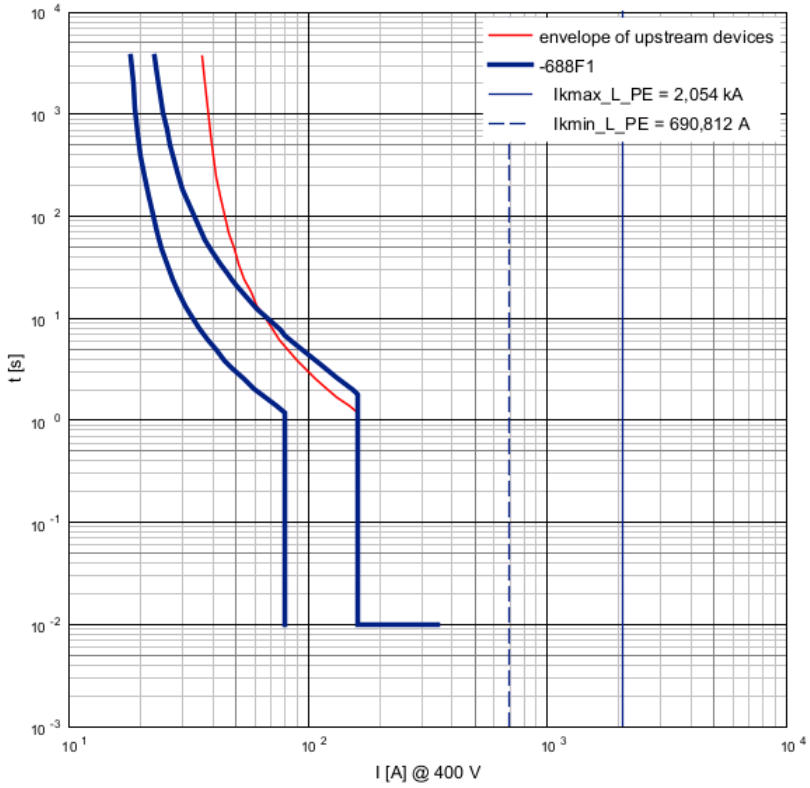
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-687F6
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 7**
Designation: **-688F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -688F1

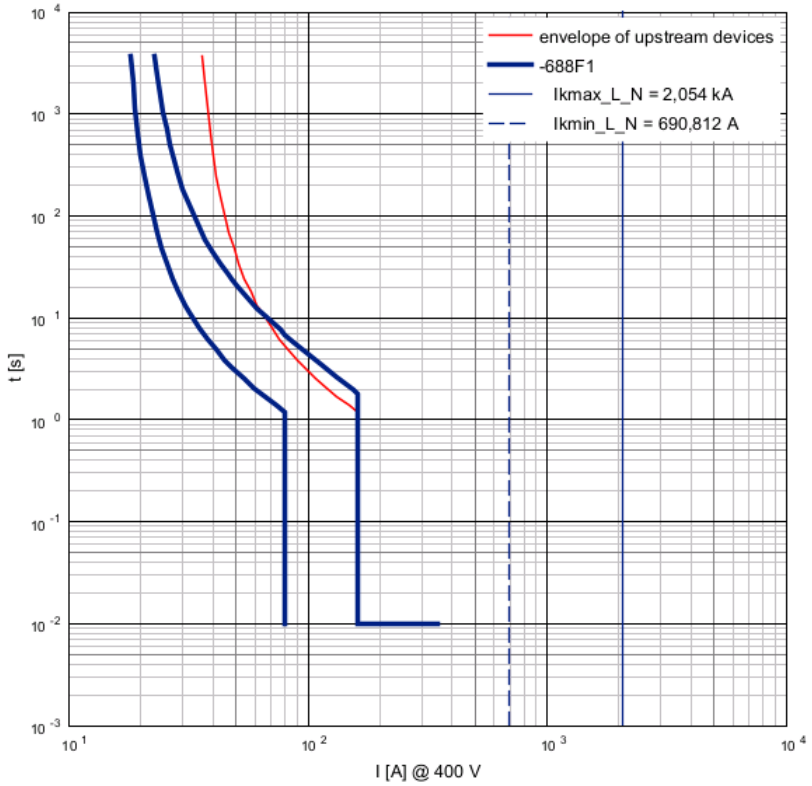
5SY41167

In 16 A

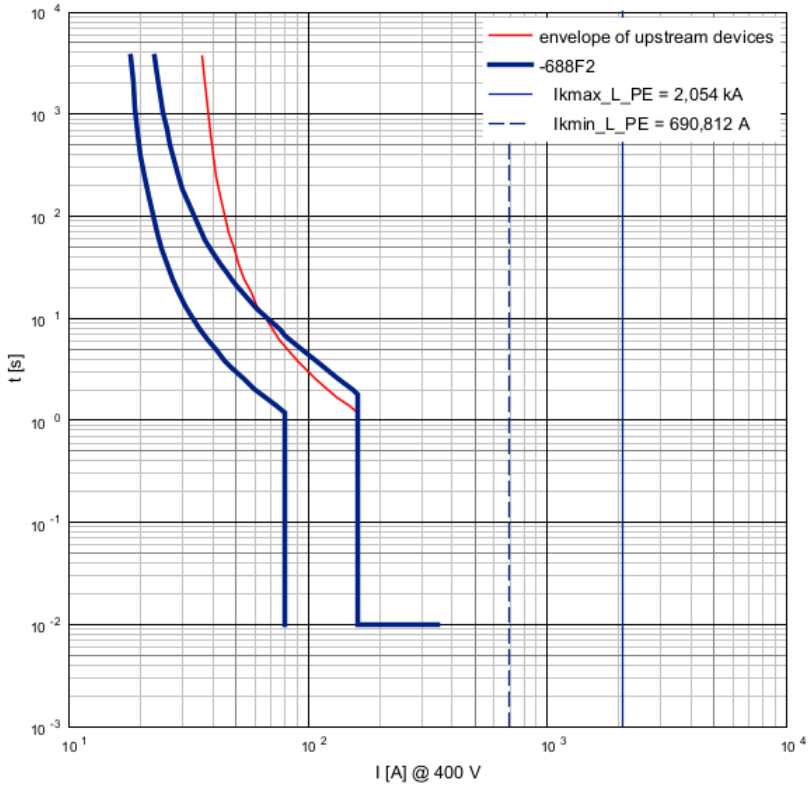
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-688F1
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 8**
Designation: **-688F2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -688F2

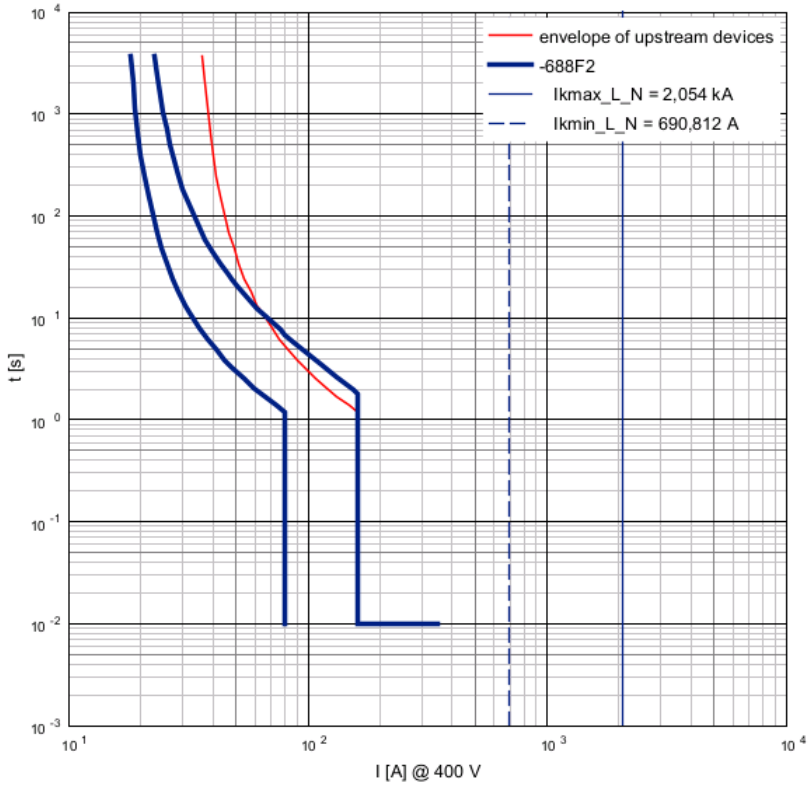
5SY41167

In 16 A

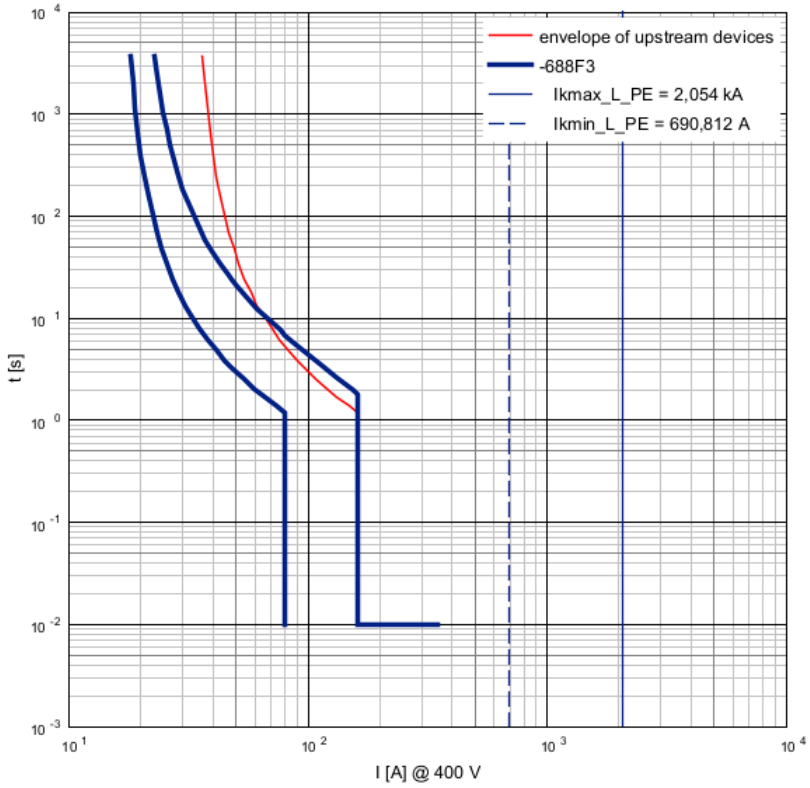
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-688F2
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 9**
Designation: **-688F3**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -688F3

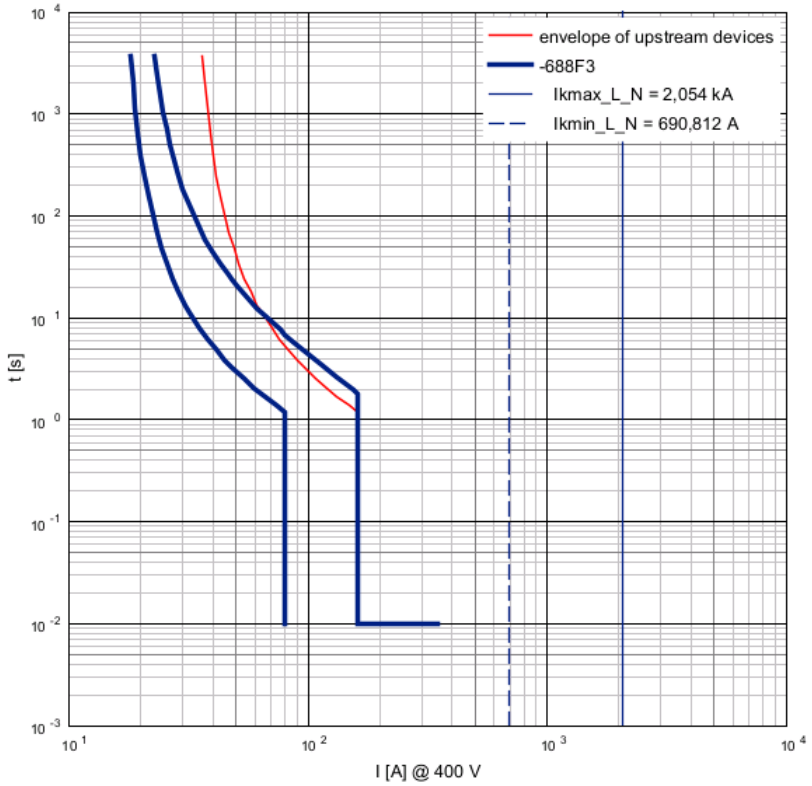
5SY41167

In 16 A

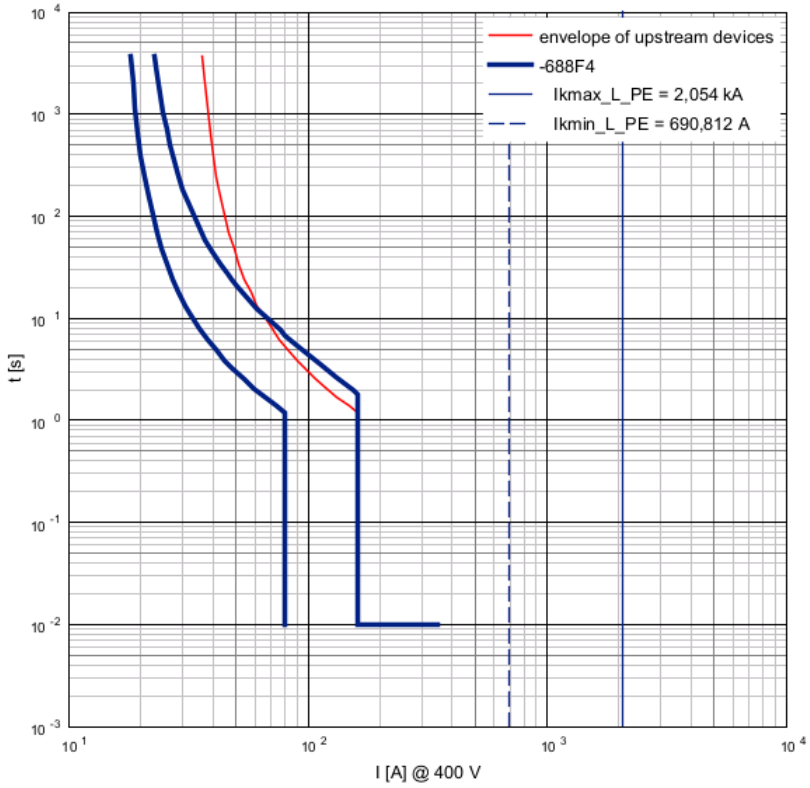
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-688F3
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 10**
Designation: **-688F4**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -688F4

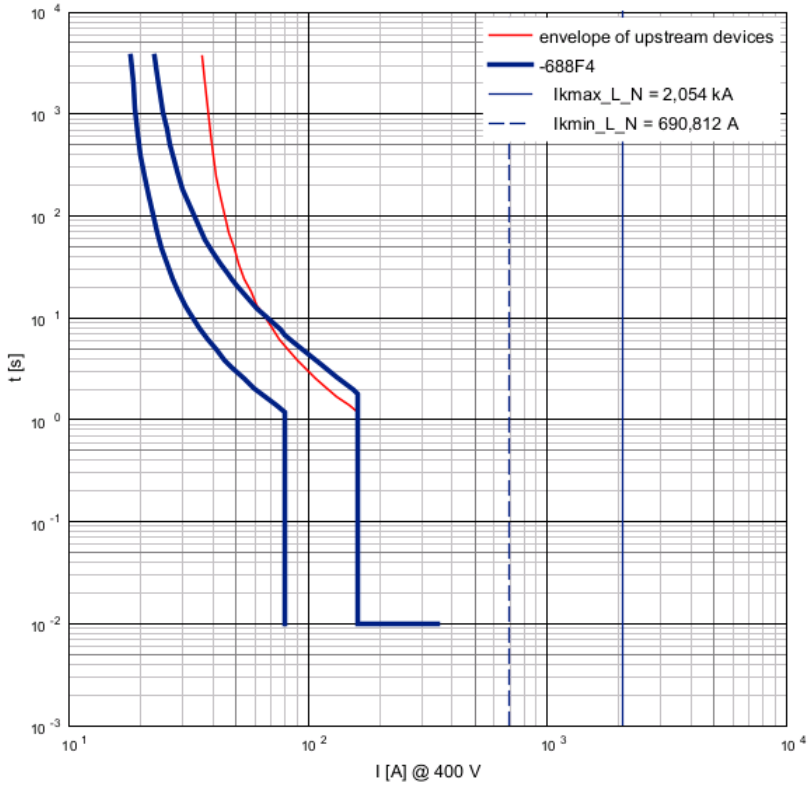
5SY41167

In 16 A

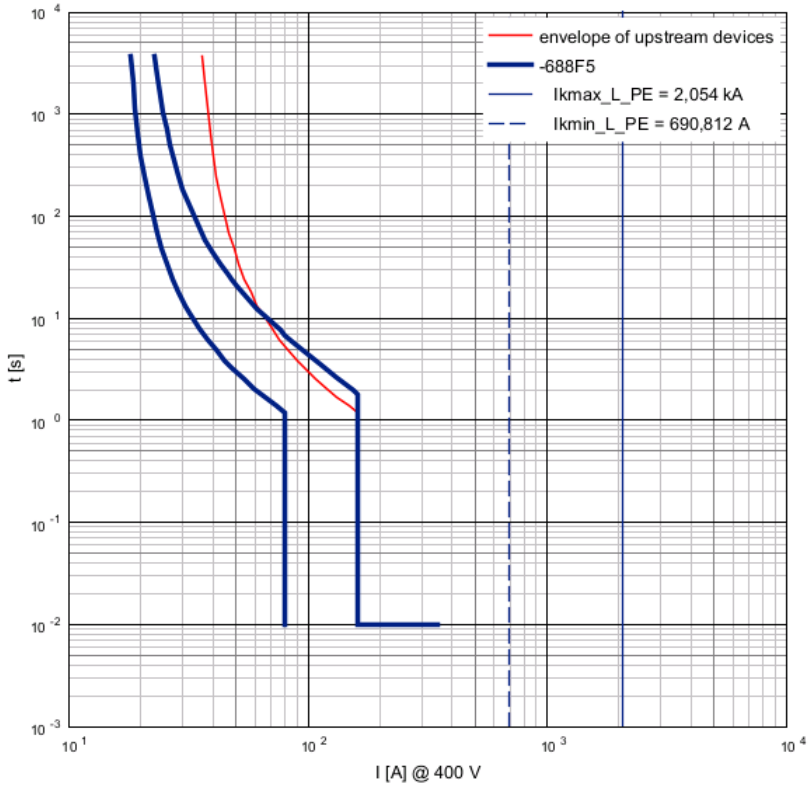
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-688F4
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 11**
Designation: **-688F5**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -688F5

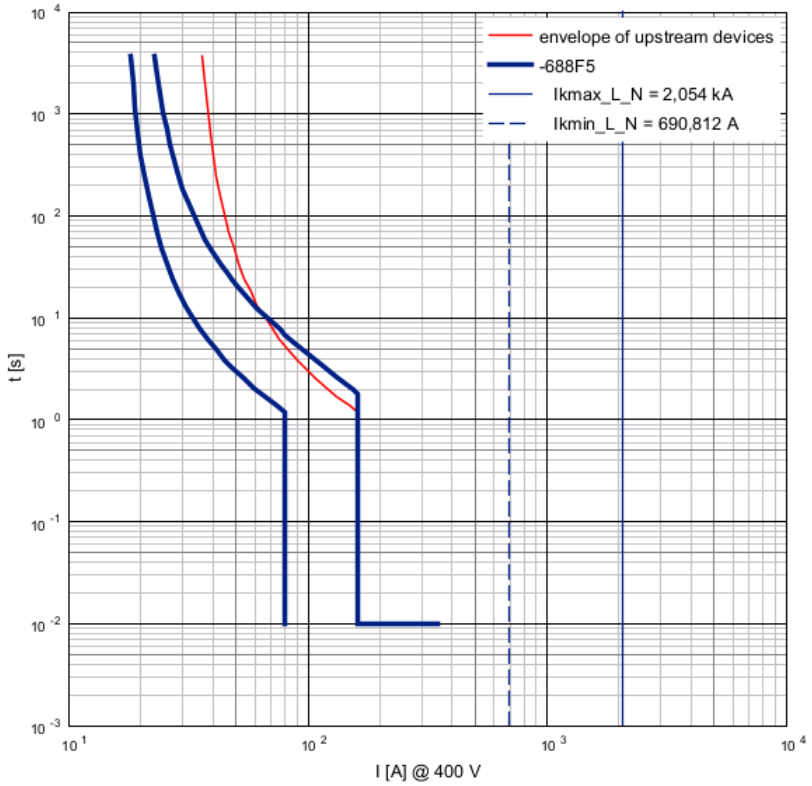
5SY41167

In 16 A

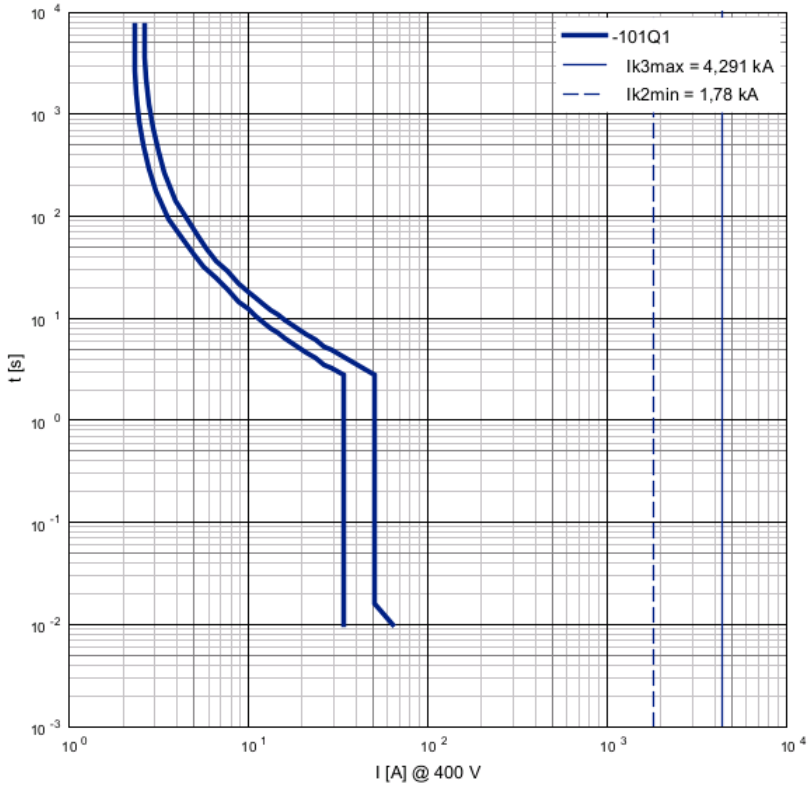
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-688F5
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **400V/230V Power Supply**
Designation: **-101Q1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -101Q1

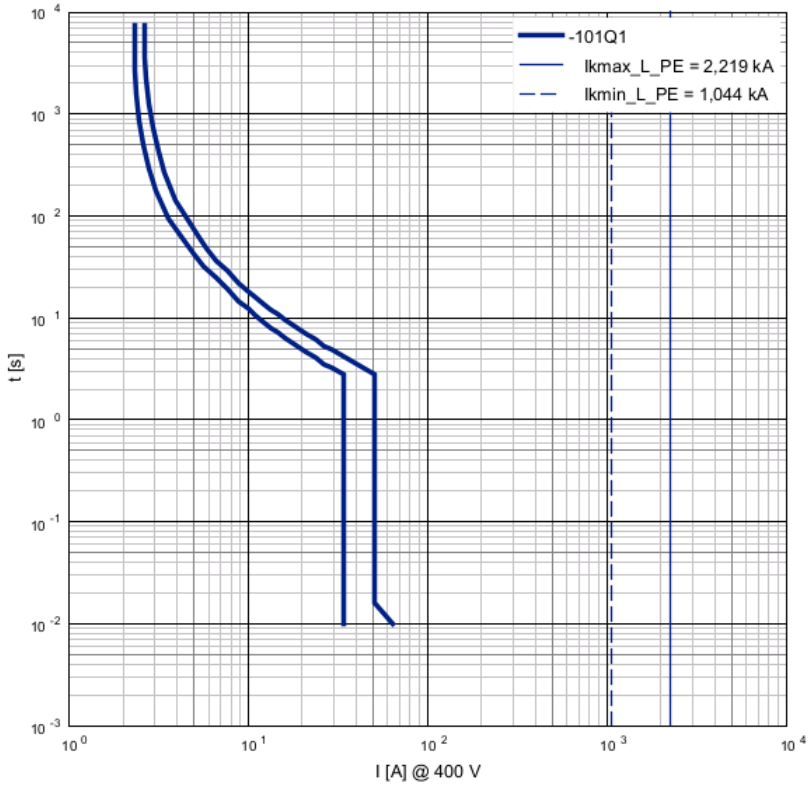
3RV20111DA25

In 3.2 A

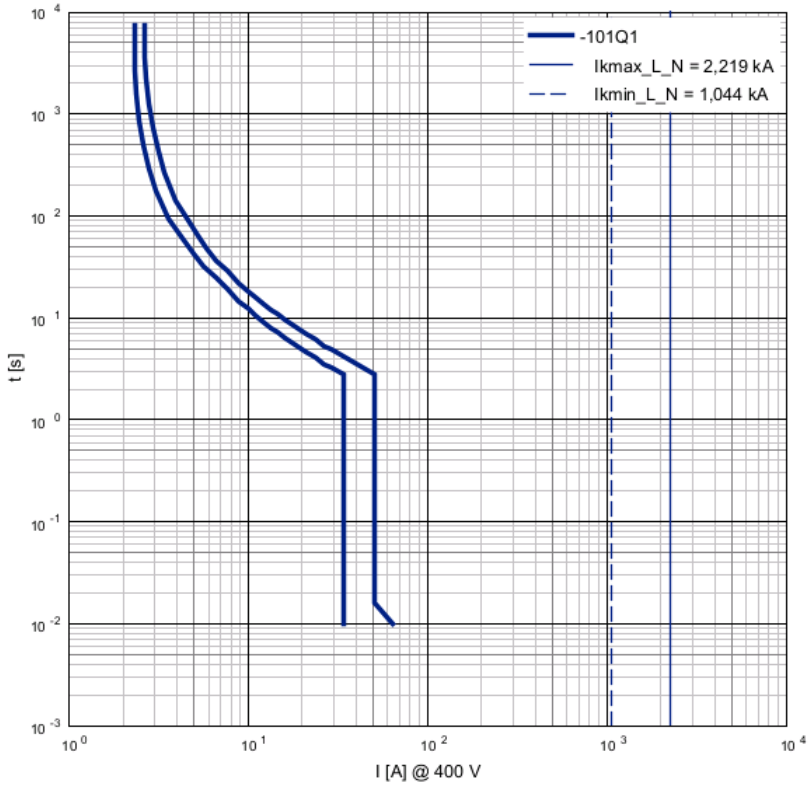
L Protection: On
Ir - corresp. 2.2 A
tr 10 s

I Protection: On
Ii - corresp. 42 A

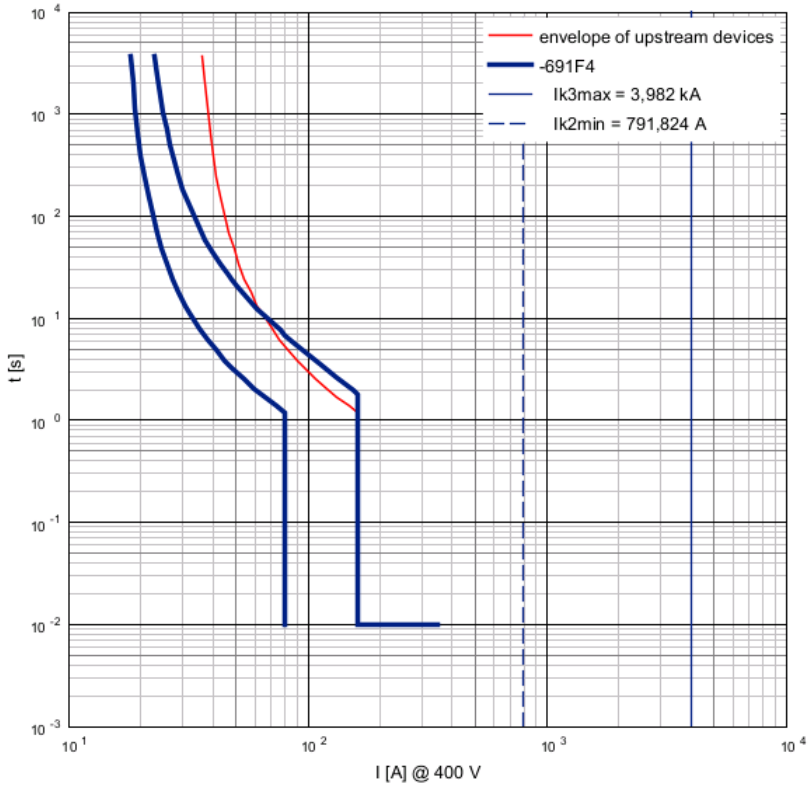
Short cut current: **Ik1-PE**
Selectivity evaluation:


-101Q1
Ikmax_L_PE = 2,219 kA
Ikmin_L_PE = 1,044 kA
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**
Selectivity evaluation:



Circuit name: **Clima**
Designation: **-691F4**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -691F4

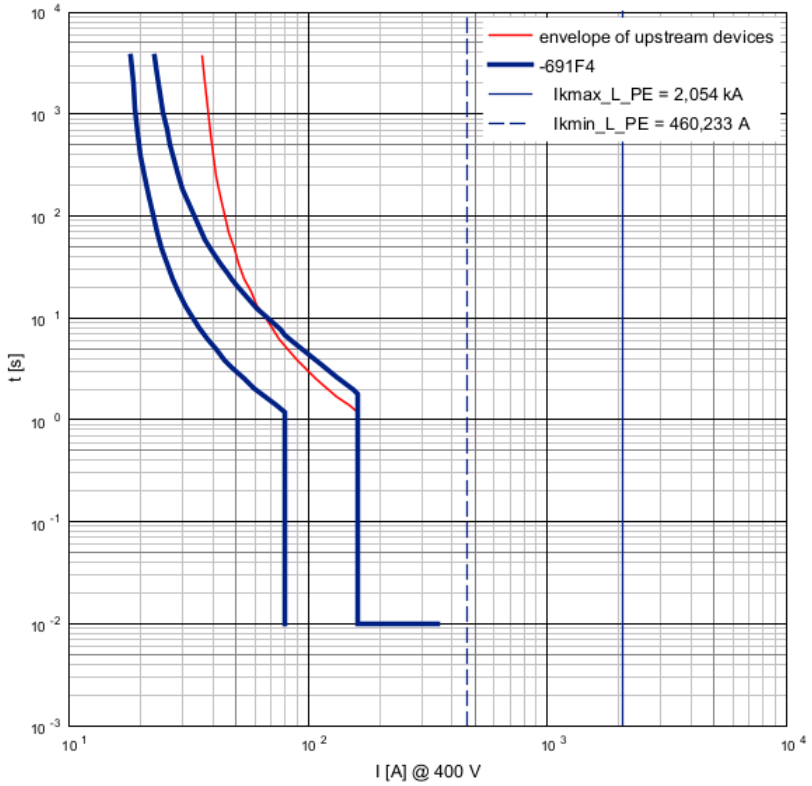
5SY43167

In 16 A

L Protection: On
Ir - corresp. 16 A

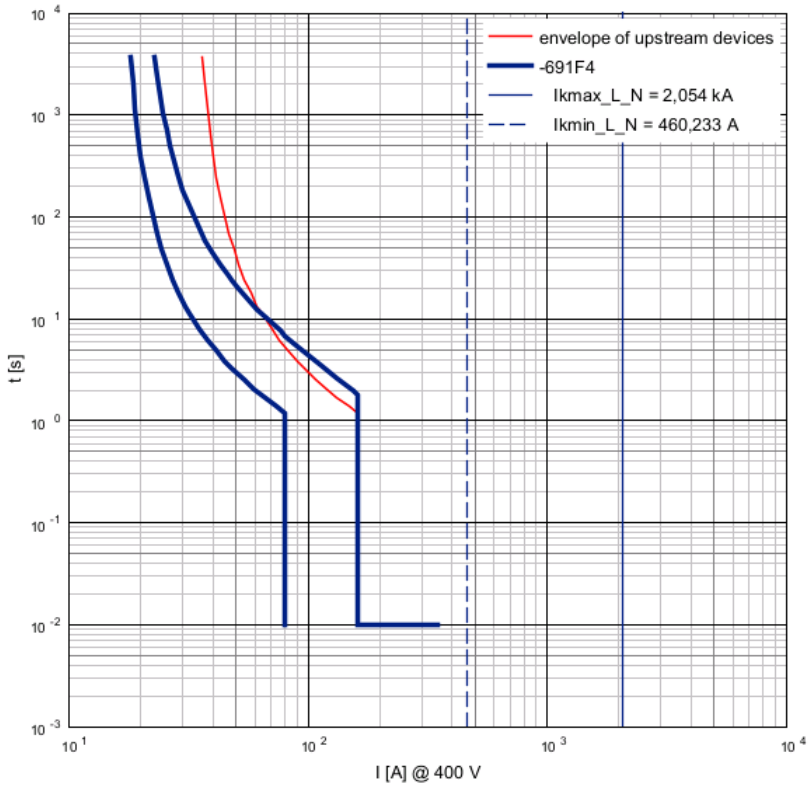
I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-PE**
Selectivity evaluation:

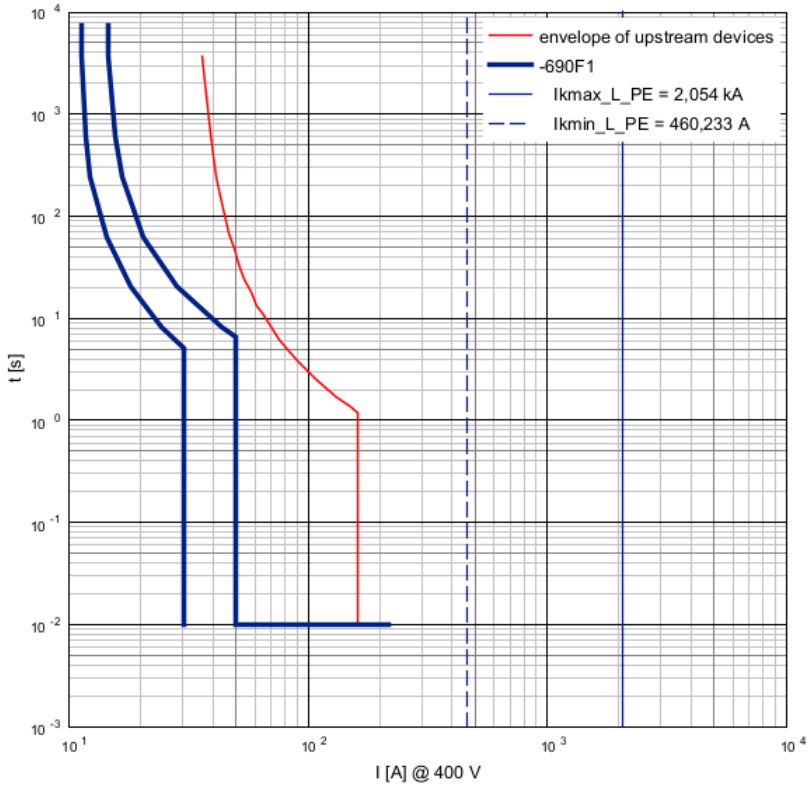

envelope of upstream devices
-691F4
Ikmax_L_PE = 2,054 kA
Ikmin_L_PE = 460,233 A
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Circuit name: **Container Light**
Designation: **-690F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -690F1

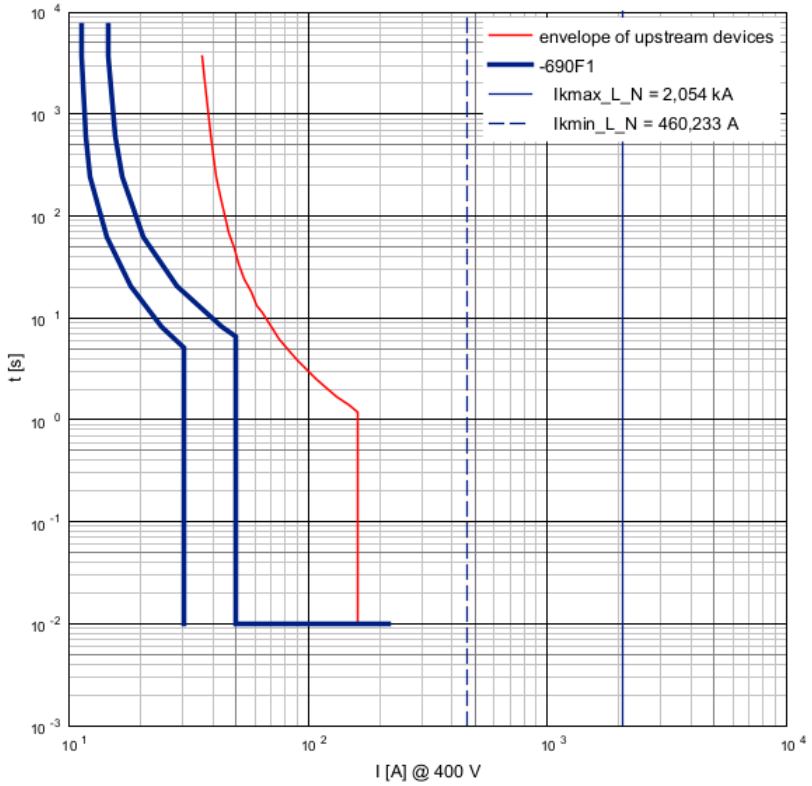
5SU13546KK10

In 10 A

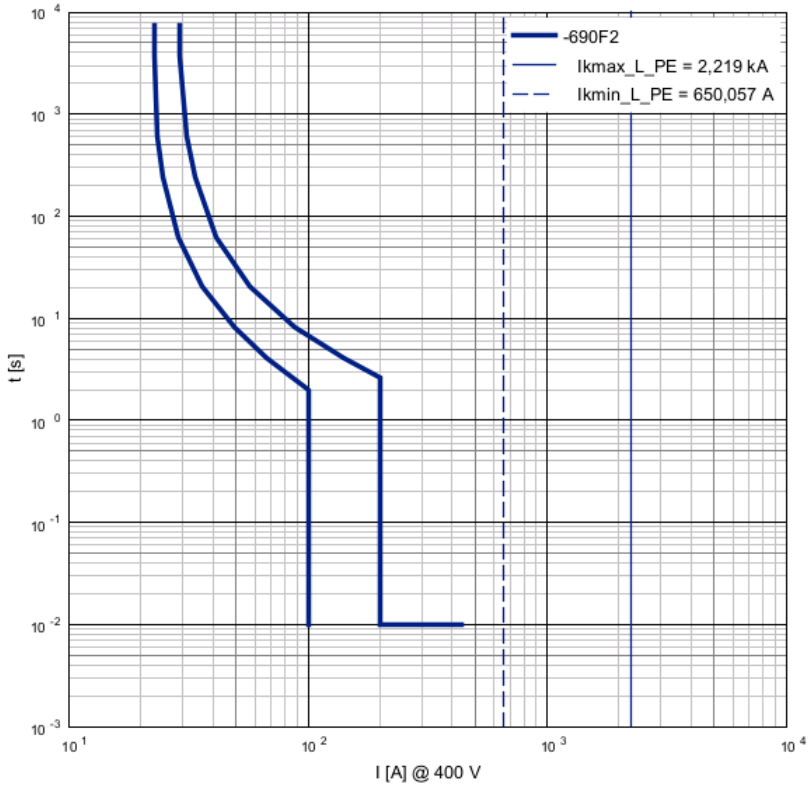
L Protection: On
Ir - corresp. 10 A

I Protection: On
Ii - corresp. 30 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-690F1
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 460,233 A
t [s]
I [A] @ 400 V

Circuit name: **Container Sockets**
Designation: **-690F2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -690F2

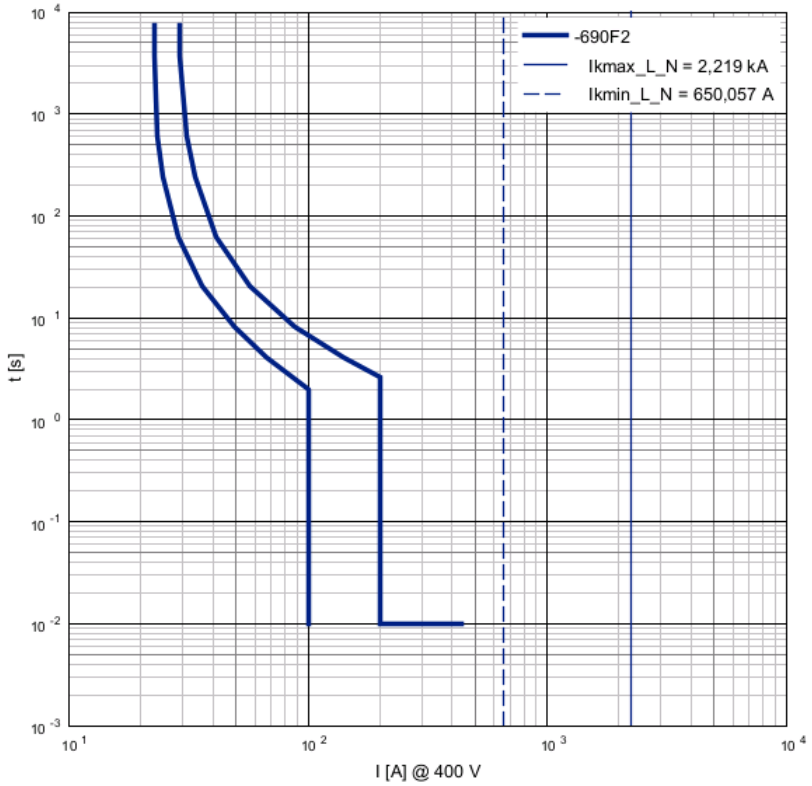
5SU13547KK20

In 20 A

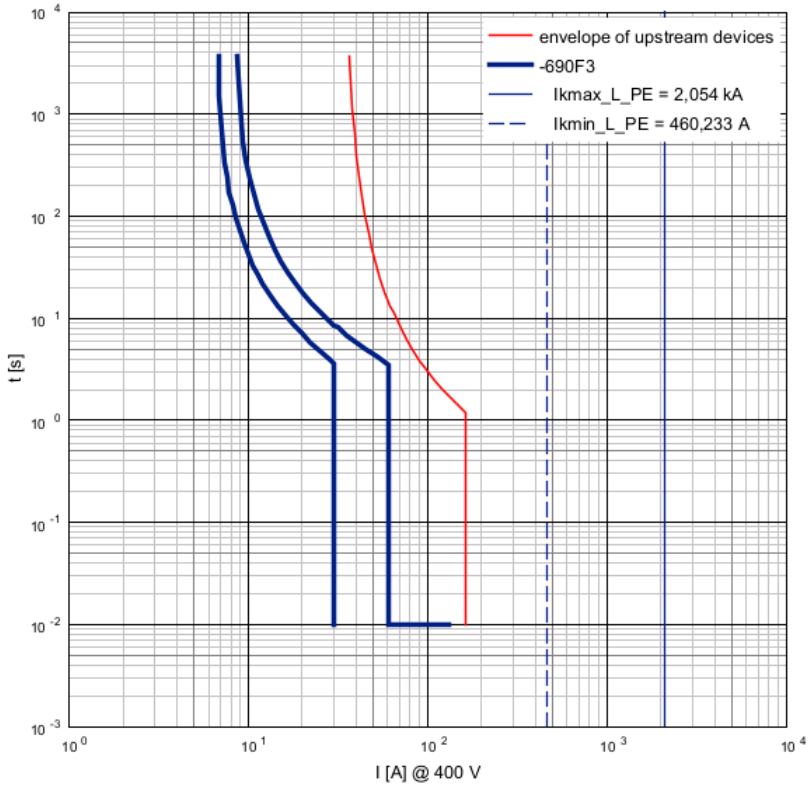
L Protection: On
Ir - corresp. 20 A

I Protection: On
Ii - corresp. 100 A

Short cut current: **Ik1-N**
Selectivity evaluation:


-690F2
Ikmax_L_N = 2,219 kA
Ikmin_L_N = 650,057 A
t [s]
I [A] @ 400 V

Circuit name: **Crane 1**
Designation: **-690F3**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -690F3

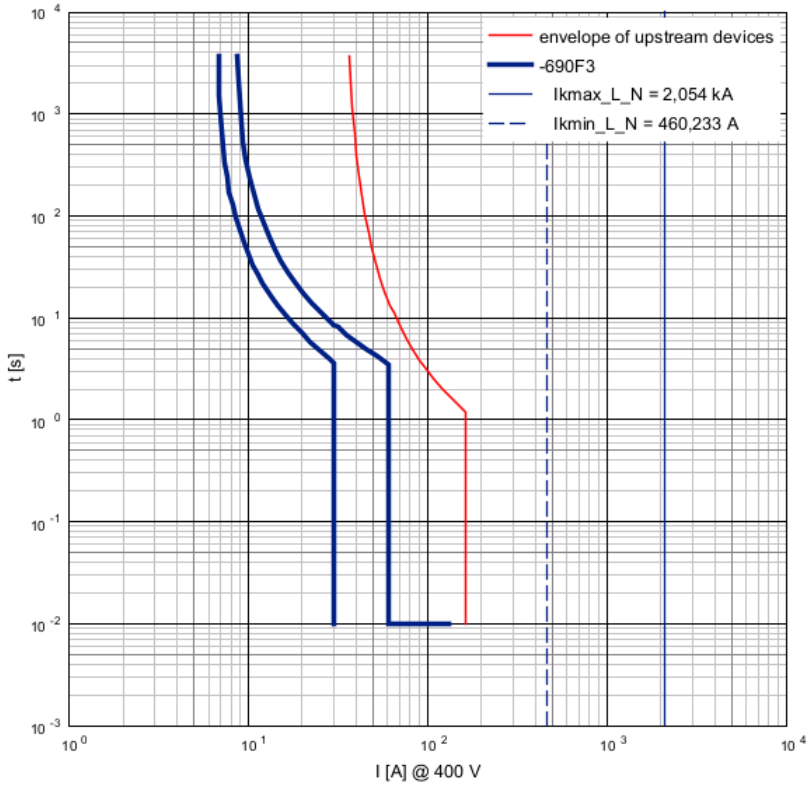
5SY41067

In 6 A

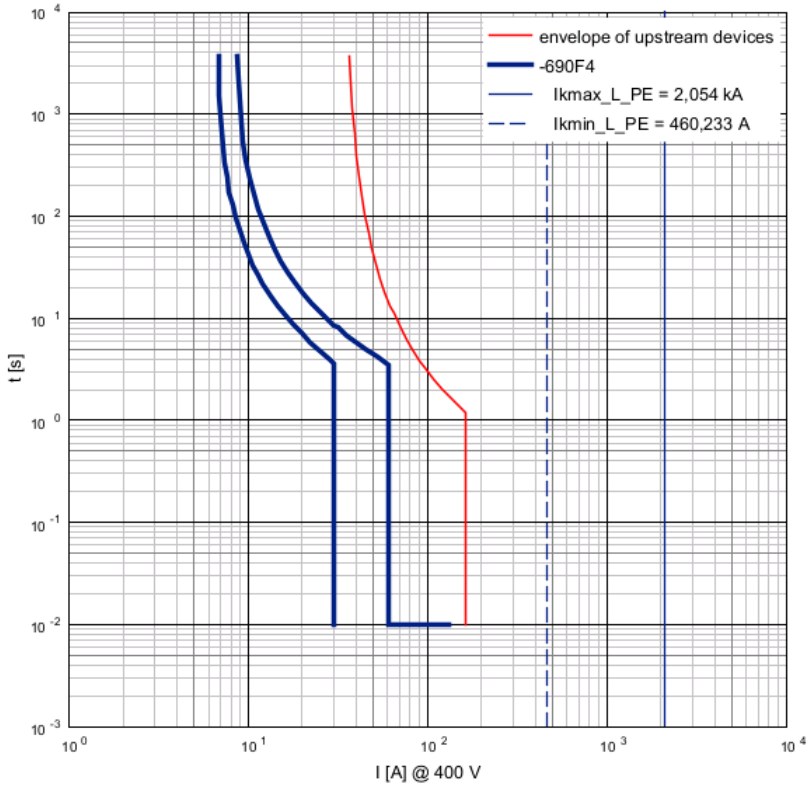
L Protection: On
Ir - corresp. 6 A

I Protection: On
Ii - corresp. 30 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-690F3
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 460,233 A
t [s]
I [A] @ 400 V

Circuit name: **Crane 2**
Designation: **-690F4**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -690F4

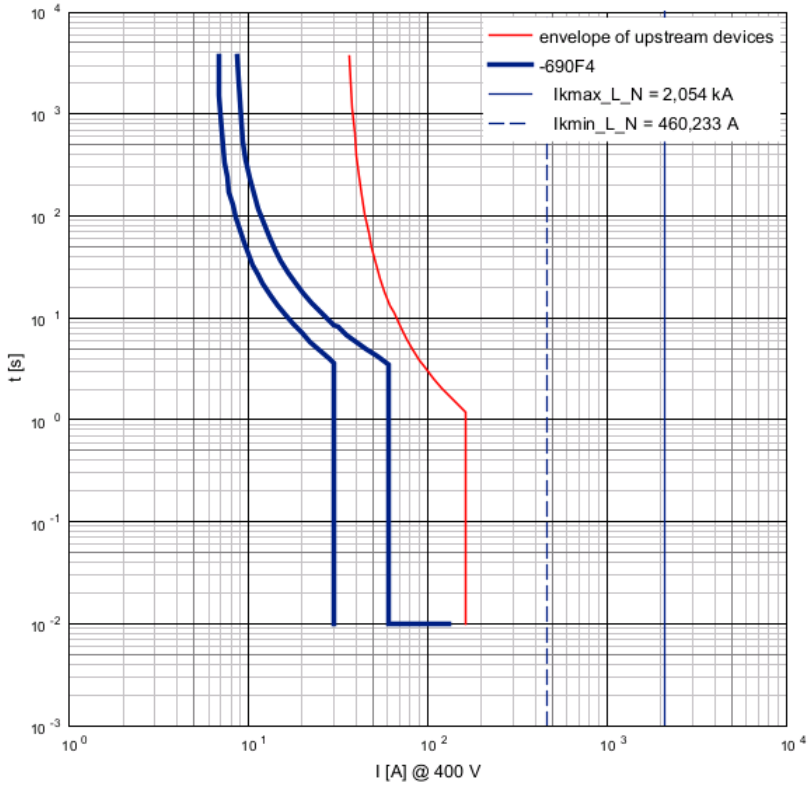
5SY41067

In 6 A

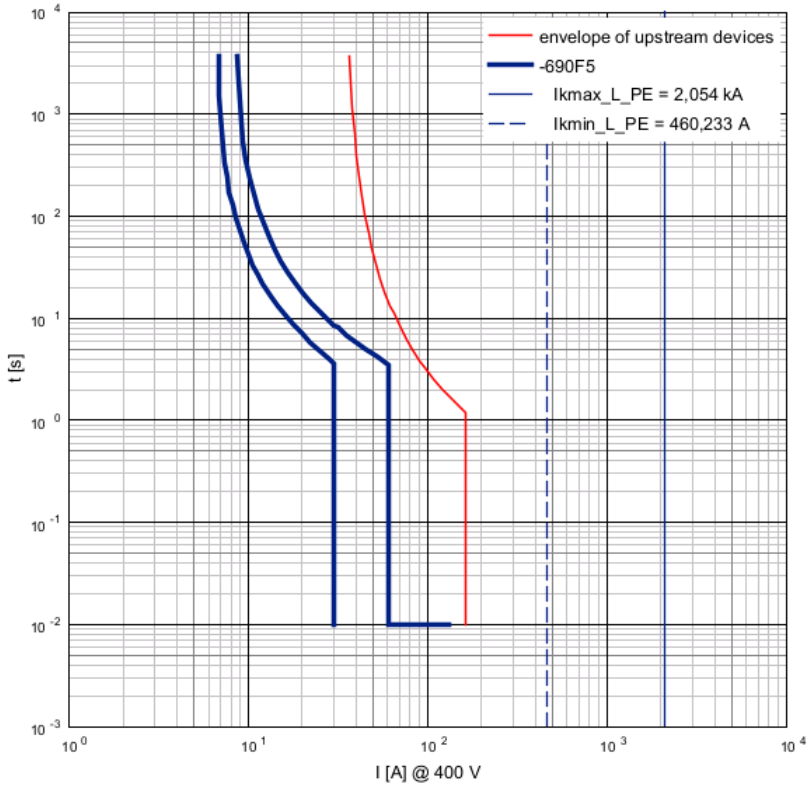
L Protection: On
Ir - corresp. 6 A

I Protection: On
Ii - corresp. 30 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-690F4
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 460,233 A
t [s]
I [A] @ 400 V

Circuit name: **Crane 3**
Designation: **-690F5**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -690F5

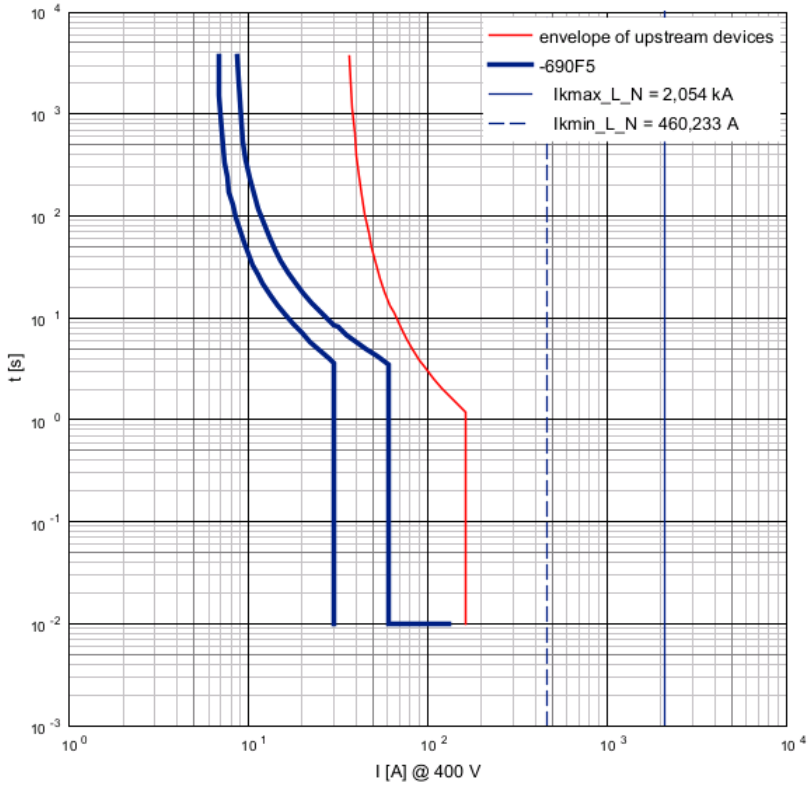
5SY41067

In 6 A

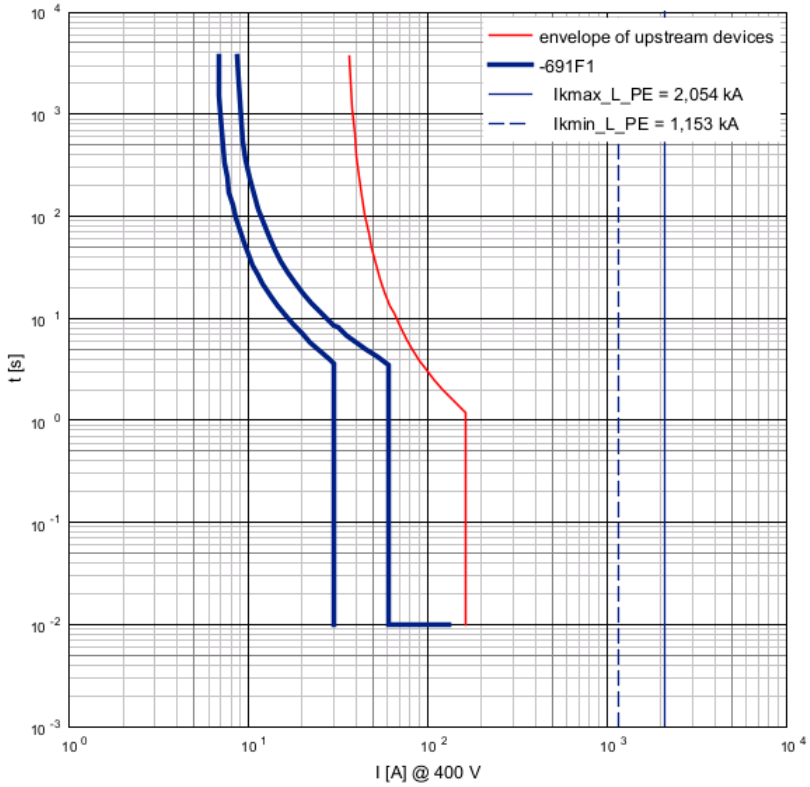
L Protection: On
Ir - corresp. 6 A

I Protection: On
Ii - corresp. 30 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-690F5
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 460,233 A
t [s]
I [A] @ 400 V

Circuit name: **Exhaust Unit / shut-off flap**
Designation: **-691F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -691F1

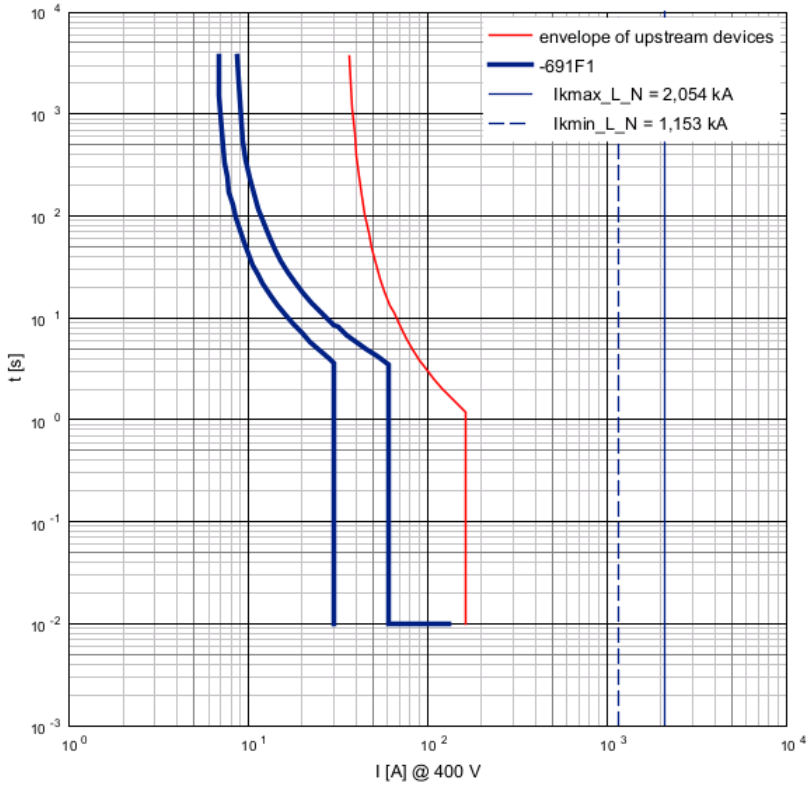
5SY41067

In 6 A

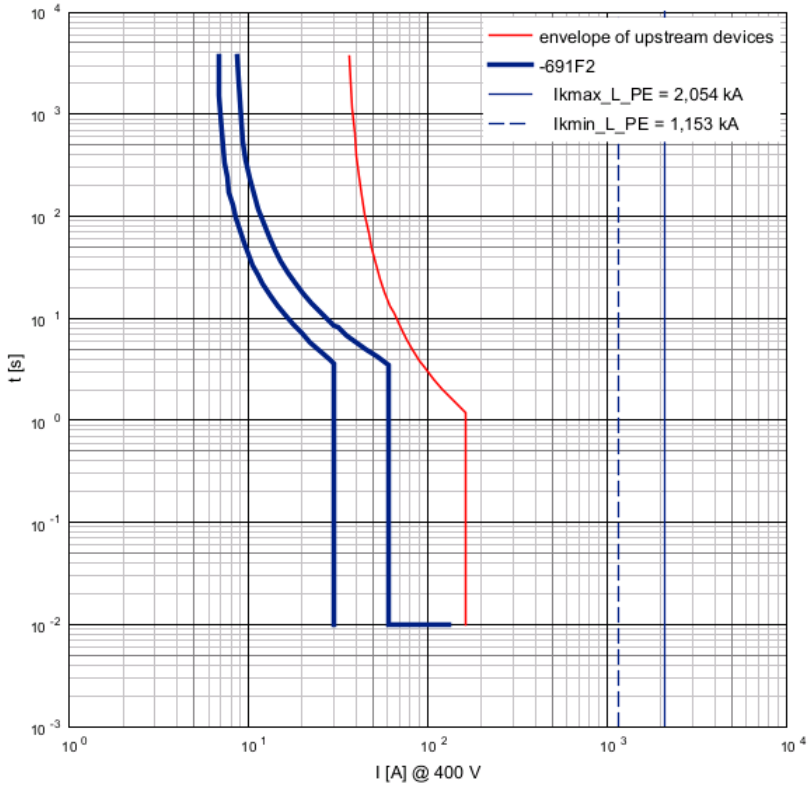
L Protection: On
Ir - corresp. 6 A

I Protection: On
Ii - corresp. 30 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-691F1
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 1,153 kA
t [s]
I [A] @ 400 V

Circuit name: **Exhaust Unit / shut-off flap**
Designation: **-691F2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -691F2

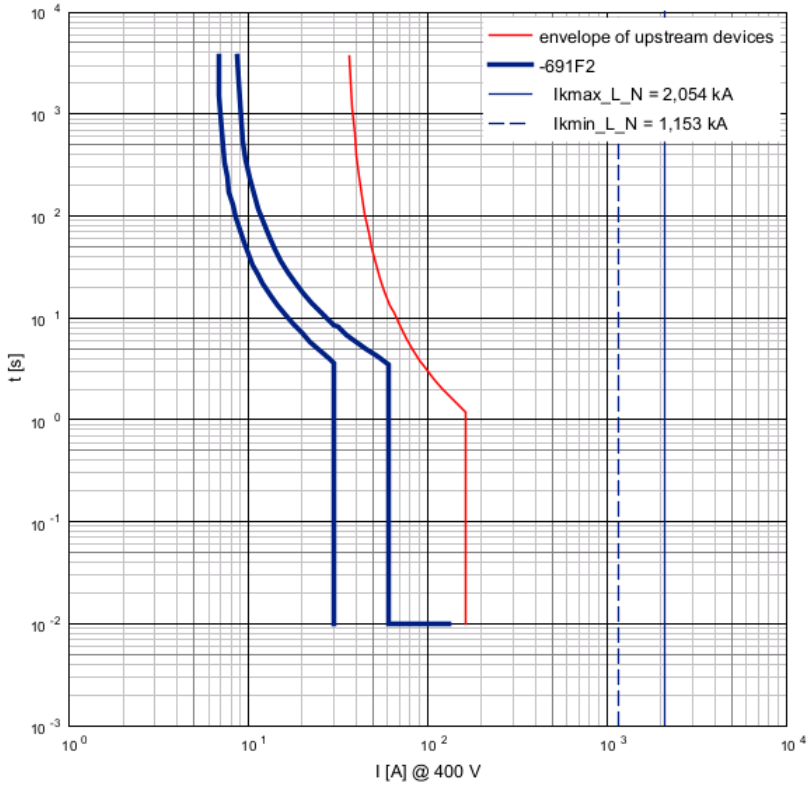
5SY41067

In 6 A

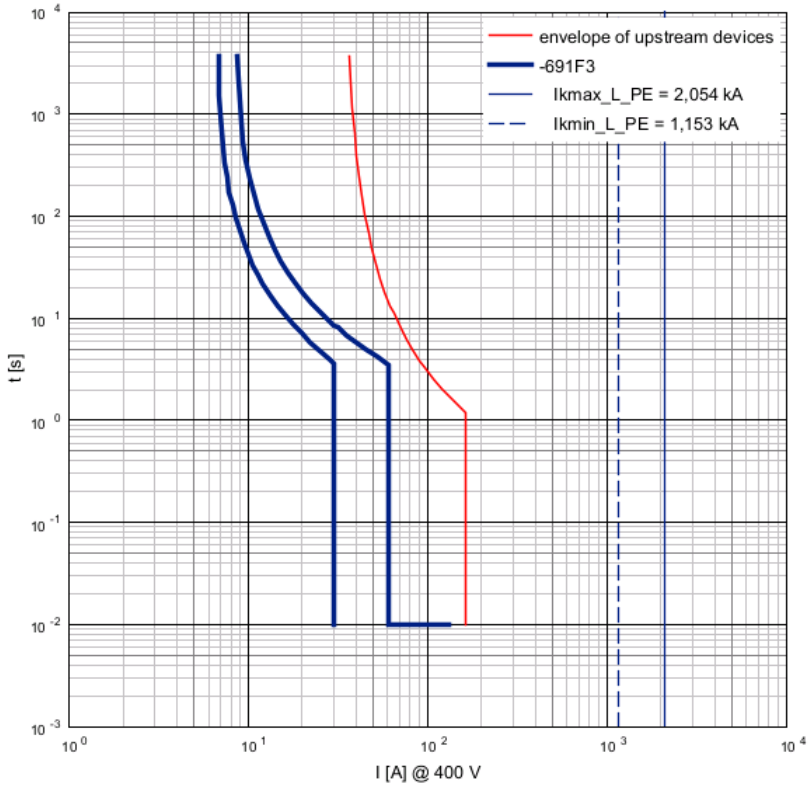
L Protection: On
Ir - corresp. 6 A

I Protection: On
Ii - corresp. 30 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-691F2
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 1,153 kA
t [s]
I [A] @ 400 V

Circuit name: **Exhaust Unit / shut-off flap**
Designation: **-691F3**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -691F3

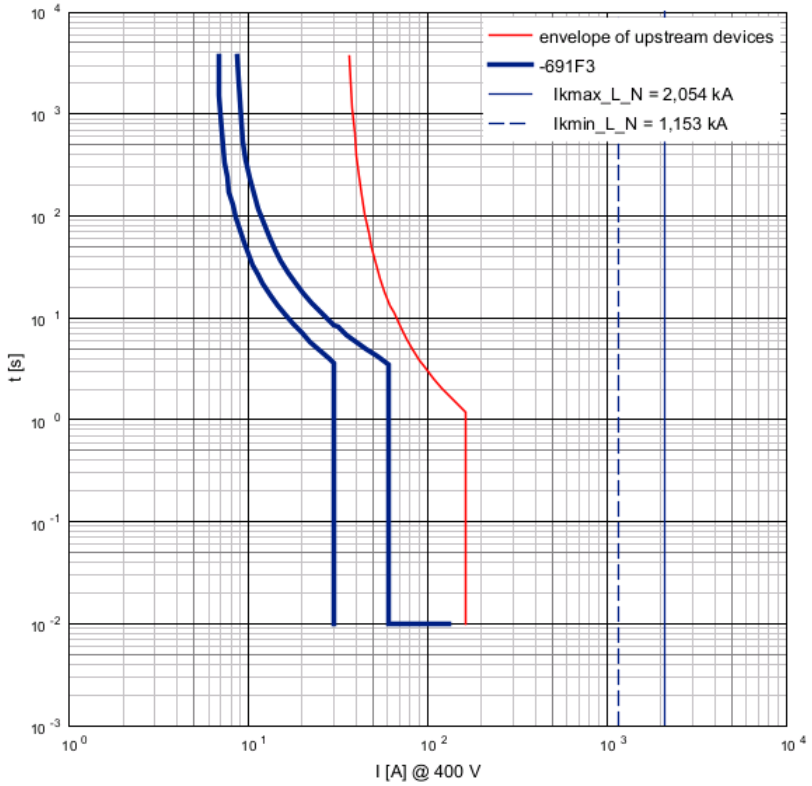
5SY41067

In 6 A

L Protection: On
Ir - corresp. 6 A

I Protection: On
Ii - corresp. 30 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-691F3
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 1,153 kA
t [s]
I [A] @ 400 V

Installation Manual

Battery Modules

Installation Manual of LF280 Battery Modules for Battery Energy Storage Systems provided by FREQCON

Version	Date	Name	Description
v1.0	2022-02-18	C. Palenzuela	First version
v2.0	2024-11-10	C. Palenzuela	First version

Table 1: Version overview

	Date	Name
Editor:	2022-02-22	C. Palenzuela / M. Müller
Checked by:	2022-02-22	A. Radtke
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Original document

This document is an original document of FREQCON GmbH.

Target Group

This document is intended for persons responsible for the maintenance of FREQCON Battery Energy Storage Systems.

Display Elements

Symbol	Significance
➜	Action with one or several steps for which the sequence is irrelevant.
Step 1 : **Step 2 :**	Action with several steps for which the sequence is relevant.
•	First level of list.
-	Second level of list.

1.1 Applicable Documents

The delivery scope of the product includes the following documents:

Document	Document Name
Circuit diagram - BESS (FREQCON)	Project specific
Circuit diagram - Inverter (FREQCON)	Project specific
Communication variable list (FREQCON)	Interface description
Data Sheet Battery Module LF280	50_20_220217_52365_Datenblatt_Batteriemodul_LF280_v1.0_EN
Maintenance Schedule BESS	EED_0000_20_230308_Wartungsplan_BESS_LFP_v1.3_EN

Table 3: Applicable Documents

1.2 List of Abbreviations

This following list should help you understand some of the abbreviations used in this document.

Generic Term and Abbreviation	Significance
AC	Alternating current
Identifier	Component Designation
BMS	Battery management system
CMC	Cell management controller
DC	Direct current
DC-link	Direct current link
HMI	Human-machine interface
MV	Medium voltage
LTO	Lithium-titanate-oxide
LV	Low voltage
PLC	Programmable Logic Controller
SoC	State of charge
UPS	Uninterruptable power supply
WGC	Water-glycol circuit
CON	Converter

Table 4: List of Abbreviations

1.3 Disclaimer of Liability

The contents of this publication have been reviewed to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, any necessary corrections are included in subsequent editions.

2 Safety Instructions

2.1 The Five Safety Rules

For your own personal safety and to prevent material damage when carrying out any work, always observe the safety-relevant instructions and the following five safety rules according to EN 50110-1 "Working in a voltage-free state".

5 Sicherheitsregeln

Vor Beginn der Arbeiten
- Freischalten
- Gegen Wiedereinschalten sichern
- Spannungsfreiheit feststellen
- Erden und Kurzschließen
- Benachbarte, unter Spannung stehende Teile abdecken oder abschranken

2.2 Basic Safety Information

Do not operate!	**Lock and tag power switches and controller devices**
	Follow national laws regarding occupational safety and health. ➜ Identify the energy source(s). ➜ Isolate the energy source(s). ➜ Determine voltage-free status. ➜ Ground device or equipment to protect from short circuiting and from shocks. ➜ Lock and Tag the energy source(s). ➜ Prove that the equipment isolation is effective. ➜ When required, apply lock-out device or clamp and secure with padlock(s).

Important!	
	➜ Read the instructions of this manual thoroughly before use! ➜ Keep manual within reach. ➜ All personnel who have to perform any task on the Battery Module (on-site or remotely) with respect to operation of the unit are obligated to read all related manuals regarding the Battery Module. By proceeding with work on the Battery Module, the personnel declare that they have fully read and understood all contents of the manuals and agree to follow all instructions, especially issues regarding safety and accident prevention.

⚠ GEFAHR	
	**Hazard by voltage** Always respect all the safety instructions and, in particular: ➜ Always use protective devices suitable and approved for each type of activity. ➜ The instructions in this manual must be strictly followed. ➜ Use of the equipment must comply with all national and local regulations. ➜ Access to internal components is only allowed after the converter has been de-energized and disconnected from all power supplies.

⚠ GEFAHR	
	**Hazard by voltage** ➜ Electric shock hazard. ➜ Only electricians may perform work on electrical components. ➜ Do not touch live components! ➜ Disconnect the device from all power supplies, before performing work on the device. ➜ Do not short circuit any conductive parts that are not de-energized before. (Take care with jewellery, tools, instruments, etc. which can cause short circuits accidentally.)

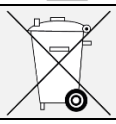
⚠ GEFAHR	
	**Hazard by voltage** ➜ Before opening the cabinet doors de-energize the converter. ➜ Even if the main circuit breaker is switched off, the cabinets are not completely voltage-free.

⚠ GEFAHR	
	**Risk of burns on hot surfaces** ➜ Avoid contact with hot surfaces or wear protective clothing (e.g. protective gloves).

⚠ GEFAHR	
	**General risk of injury due to improper handling** ➜ Only perform work on this device if you have adequate expert knowledge for the respective work. ➜ Follow the operating instructions and warnings stated in this manual.

2.3 Warning Symbols

Observe the warning symbols in this document and those attached on the device. The warning symbols have the following meaning:

Symbols	Significance
	Hazard (general)
	Hazard by voltage
	Hazard by high temperature
	Hazard by batteries
	Maintenance lockout tagout, do not switch!
	Acute toxicity (oral, dermal, inhalation) (hazard. category 4)
	Respiratory sensitization (hazard category 1, 1A and 1B)
	Prohibition for people with pacemakers
	Hazard by heavy load
	Do not dispose in household waste.

2.4 Information Symbols

Symbol	Significance
	Important technical information for this product

2.5 Warning Levels / Signal Words

⚠ DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury
NOTICE	Indicates that property damage can result, if proper precautions are not taken.

2.6 Warnings and Symbols on the Device

30 Min.
WARNUNG
Gefährliche DC-Spannung!
Vor Wartungsarbeiten, Entladung des Kondensatorfilters (bis zu 30 min.) abwarten und Spannungsfreiheit prüfen.
Sicherheitshinweise in der Dokumentation beachten.

30 min.
WARNING
Hazardous DC voltage!
Observe capacitor´s discharge time (up to 30 min.) and check voltage in case of maintenance.
Observe the safety instructions in the manual.

WARNUNG
Beachten Sie die Sicherheits- und Aufstellhinweise in der Dokumentation.

WARNING
Observe the safety and installation instructions in the manual.

Aufstellung nur
- in Betriebsstätten mit beschränktem Zutritt
- auf Beton oder nicht brennbarem Boden

Installation only
- in operating facilities with restricted access
- on concrete or other non-flammable surface

GEFAHR
Gefahr durch austretendes Elektrolyt!
Arbeiten am Batteriespeicher dürfen nur von ausgebildetem und von der FREQCON GmbH qualifiziertem und freigegebenen Fachpersonal durchgeführt werden. Modifizierungen oder Manipulationen am Batteriespeicher können zu erheblichen Sicherheitsrisiken führen und sind deshalb verboten.

DANGER
Hazard by spilling electrolyte!
Only qualified personal trained and certified by FREQCON GmbH are allowed to perform work on the battery storage system. Modifications or manipulation to the battery storage system may lead to severe safety risks and are therefore forbidden.

WARNUNG
Störung von Herzschrittmachern!
Durch elektromagnetische Felder können Herzschrittmacher in ihrer Funktion beeinträchtigt werden. Personen mit Herzschrittmachern dürfen sich deshalb nicht in der Nähe des Umrichters aufhalten.

WARNING
Interference with cardiac pacemakers!
Electromagnetic fields generated by the device may interfere with the correct functioning of cardiac pacemakers. Therefore, persons with cardiac pacemakers are not allowed in the proximity of the device.

WARNUNG
Zum Freischalten des Gerätes Hauptschalter und alle (externen) Einspeisetrenner öffnen!

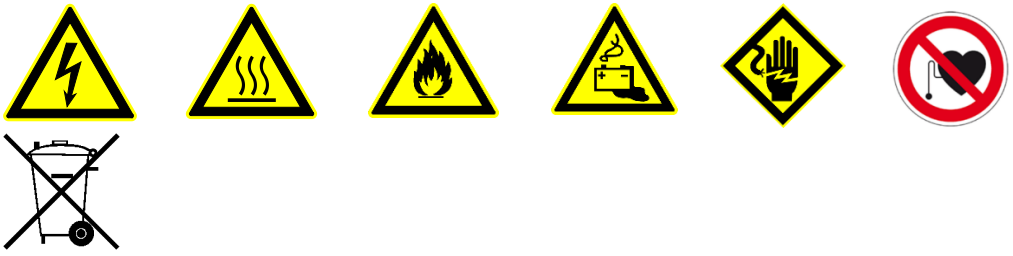
WARNING
For disconnection, open main switch and all (external) input disconnectors!

HINWEIS
Nicht manuell schalten!

NOTICE
Do not switch manually!

WARNUNG
Schaltschranktüren während des Betriebs nicht öffnen!

WARNING
Do not open switch cabinet doors during operation!



2.7 Qualification of Personnel

Installation, service and operating personnel must be sufficiently trained before installing, operating and handling the equipment.

2.8 Personal Protection Equipment (PPE)

Always wear safety equipment when working on the product.

When carrying out maintenance and service work, secure controllers, devices and units of designated area against accidental activation.

Symbol	Meaning and Application
	Gloves made of nitrile rubber against chemicals and microorganisms (at least protection index 2 according to EN 374-1) • for removal of electrolyte or hydrofluoric acid (only by FREQCON service) • Gloves according to EN 60903 - up to 1000 V AC for live working activities
	Safety shoes (toe protection, non-slip, ESD) • Operation • Cleaning Safety shoes (acid resistant) or rubber boots • for removal of electrolyte or hydrofluoric acid (only by FREQCON service)
	Tightly fitting safety goggles/basket goggles/face shield • for removal of electrolyte and hydrofluoric acid (only by FREQCON service)
	Chemical protective suit • for removal of electrolyte and hydrofluoric acid (only by FREQCON service) • for fire fighting
	Ambient air-independent breathing apparatus • for firefighting in case of smoke formation inside or outside the building (by rescue forces)

Table 5: Personal Protection Equipment (PPE)

2.9 Basic Safety Information

⚠ DANGER	
	**Electric shock hazard!** **Do not perform maintenance work on a live system.** After switching off the converter, the DC-link of the converter still carries dangerous voltages, which may cause death or severe injuries if touched or short circuit. ➜ Before performing work on the converter, deenergize the converter like explained in section, wait for 30 minutes until the installed capacitors are discharged and check the voltage-free status of the DC-link by using a 2-pole voltage tester ➜ It is not allowed to open the cabinet doors before the converter system has been de-energized and the capacitors are discharged. ➜ It is not allowed to perform any work on the converter before the system has been de-energized.

⚠ DANGER	
	**Electric shock hazard!** **Do not perform maintenance work on the converter system, before the converter system has been disconnected from all power sources.** After switching off the converter, the connected AC and DC connection busbars and DC switch & fuse modules still carry dangerous voltages, which may cause death or severe injuries if touched or short-circuit. ➜ Before performing work on the converter, deenergize the converter like explained in section, wait for 30 minutes until the installed capacitors are discharged and check the voltage-free status of the DC-link by using a 2-pole voltage tester ➜ Disconnect the system from the energy generation unit using appropriate disconnecting devices before handling or performing work on the unit. ➜ Before disconnecting the DC power cables from the DC connection busbars, always check for voltage free status of the DC power cables, since dangerous electric arcs may lead to severe injuries or death when disconnecting power cables.

⚠ DANGER	
	**Electric shock hazard!** **Before anywork is carried out onthe device, the circuit breaker must be opened and also secured against unintentional reclosing.** ➜ Before performing work inside the converter cabinets, the circuit breaker must be switched off and also be protected against unintended reclosure.

⚠ DANGER	
	**Danger to life through electric arcs** Danger by electric arcs could occur by: • Exceedance of the maximum input current • Faulty design of circuit breakers or transformers • Faulty or not connected cables • Excessive contamination Electric arcs may lead to death, severe injuries or material damage. ➜ Make sure the system is properly designed and all power cables are connected correctly. The maximum permissible input current is provided in the table "Technical Data". ➜ Excessive contamination must be removed.

⚠ DANGER	
	**General risk of injury due to improper handling.** Always respect all the safety instructions and, in particular: ➜ Always use protective devices suitable and approved for each type of activity. ➜ The instructions in this manual must be strictly followed. ➜ Use of the equipment must comply with all national and local regulations. ➜ Internal components may only be accessed when the device has been disconnected from all voltage sources and de-energized. ➜ It is not allowed to perform work on a live converter. ➜ The converter and all connected systems/components must be electrical grounded properly. ➜ All installation and maintenance work on the device must be carried out by qualified personnel. ➜ Improper use or handling of the device during transportation, installation or during operation may result in damage to the equipment or cause severe, even fatal injury. ➜ Maintenance work on the device must be carried out with the appropriate care. ➜ Non-compliance with the present instructions may cause damage to the product and could lead to serious injuries of the personnel.

⚠ DANGER	
	**Danger to life when live parts are touched on damaged devices** Improper handling of devices can cause damage. For damaged devices, hazardous voltages can be present at the enclosure or at exposed components. If touched, this can result in death or severe injury. ➜ Ensure compliance with the limit values specified in the technical data during transport, storage and operation. ➜ Do not use any damaged devices.

⚠ DANGER	
	**Danger to life through electric shock due to unconnected cable shields** Hazardous touch voltages can occur through capacitive cross-coupling due to unconnected cable shields. ➜ As a minimum, connect cable shields and the conductors of power cables that are not used (e.g. brake cores) at one end at the grounded housing potential.

⚠ DANGER	
	**Danger to life due to electric shock when not grounded** If the protective conductor connection is missing or incorrect, high voltages can occur at open, exposed parts when using devices of protection class I. Touching these parts can result in death or serious injury. ➜ Ground the device in compliance with the applicable regulations.

⚠ DANGER	
	**Danger to life due to electric shock when opening plug connections in operation** When opening plug connections in operation, arcs can result in death or severe injuries. ➜ Only open plug connections when the equipment is de-energized, unless it has been explicitly stated that they can be opened in operation.

⚠ DANGER	
	**Danger to life through electric shock due to the residual charge of the power component capacitors** Due to the use of capacitors, a dangerous voltage is present even up to 5 minutes after the power supply has been switched off. Contact with live parts can result in death or serious injury. ➜ Wait for 5 minutes and then check the de-energized state of the system. Only then should you start working on the device.

⚠ DANGER	
	**Danger to life from electromagnetic fields** Electromagnetic fields (EMF) are generated by the operation of electrical power equipment, such as transformers, converters, or motors. People with pacemakers or implants are at particular risk in the immediate vicinity of this equipment. ➜ If you have a heart pacemaker or implant, maintain a minimum distance of 2 m from electrical power equipment.

⚠ DANGER	
	**Danger to life when safety functions are inactive** Safety functions that are inactive or that have not been adjusted accordingly can cause operational faults on machines that could lead to serious injury or death. ➜ Observe the information in the appropriate product documentation before commissioning. ➜ Carry out a safety inspection for functions relevant to safety on the entire system, including all safety-related components. ➜ Ensure that the safety functions used in your drives and automation tasks are adjusted and activated through appropriate parameterizing. ➜ Perform a function test. ➜ Only put your plant into live operation once you have guaranteed that the functions relevant to safety are running correctly.

⚠ DANGER	
	**Danger to life due to fire if overheating occurs because of insufficient ventilation clearances** Inadequate ventilation clearances can cause overheating of components with subsequent fire and smoke. This can cause severe injury or even death. This can also result in increased downtime and reduced service lives for devices/systems. ➜ Ensure compliance with the specified minimum clearance as ventilation clearance for the respective component.

⚠ DANGER	
	**Danger of an accident occurring due to missing or illegible warning labels** Missing or illegible warning labels can result in accidents involving death or serious injury. Check that the warning labels are complete based on the documentation. ➜ Attach any missing warning labels to the components, in the national language if necessary. ➜ Replace illegible warning labels.

⚠ WARNING	
	**Hazard by hot surfaces of components** During operation, some components may heat up significantly, e.g. heat sinks and inductors. These components can still be very hot some time after operation. In case of contact, severe bodily injuries, such as skin burns, may result. ➜ Do not touch hot surfaces even after shutdown of the converter syste,m.

⚠ WARNING	
	**Danger to life due to malfunction of the device caused by incorrect or changed parameterization** As a result of incorrect or changed parameterization, the system can malfunction, which in turn can lead to injuries or death. ➜ Protect the parameterization (parameter assignments) against unauthorized access. ➜ Respond to possible malfunctions by applying suitable measures (e.g. EMERGENCY STOP or EMERGENCY OFF).

⚠ WARNING	
 	**Hazard by cooling liquid** The coolant used in the internal cooling system of the converter is harmful to human or animal health when touched or swallowed. ➜ Avoid oral ingestion of the coolant, since it can lead to harm to human or animal health. In case of accidental ingestion or eye contact with the coolant, seek immediate medical attention. ➜ Avoid skin contact with the coolant. ➜ Use appropriate eye protectors and protective gloves when working on the cooling system and during filling and draining of the cooling liquid.

⚠ CAUTION	
	**Hazard by sharp edges on packaging** Improper handling during unpacking can cause injuries. ➜ Use appropriate safety gloves to protect your hands from possible cuts.

NOTICE	
	**Material damage due to loose power connections** Insufficient tightening torques or vibrations can result in loose electrical connections. This can result in damage due to fire, device defects or malfunctions. ➜ Tighten all power connections with the specified tightening torques, e.g. line supply connection, motor connection, DC link connections. ➜ Check all power connections at regular intervals. This applies in particular after transport.

NOTICE



Device damage caused by incorrect voltage/insulation tests
Incorrect voltage/insulation tests can damage the device.
➜ Before performing voltage/insulation tests on the equipment, disconnect all equipment as high voltage tests have been performed on inverters and motors by their manufacturers. Therefore, it is not necessary to perform a retest on the system.

NOTICE



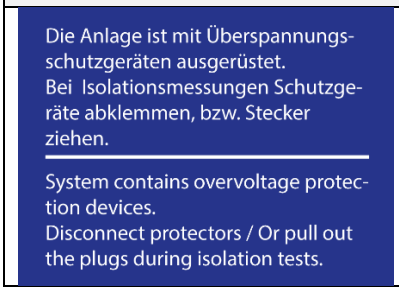
Material damage due to overloading of DC devices and connecting cables
DC paths and connection cables are not protected against overload by the system.
Size external devices according to the nominal and maximum current values specified for the system.
➜ If necessary, use appropriate protective equipment for the external components.

NOTICE



Material damage due to improper use of the transformer
For your safety, carefully read the delivered operating instructions of the transformer and observe the instructions. Technical specifications of the transformer which are provided on its´type plate like rated current, rated power etc. must be strictly observed when commissioning and feeding power to the grid. All electrical connection work must be carried out onsite and by trained, qualified personnel, provided with the required safety devices in accordance with the national occupational safety regulations. Please pay attention to the proper protection of the transformer during unloading, installation at the place of operation, feeding and operation The transgression of the voltage or power and the presence of external factors (such as condensation, solar radiation, plants and animals) can affect the proper functioning of the transformer).

NOTICE



General risk of damage
During isolation tests disconnect overvoltage protection devices or pull out the plugs otherwise they will be activated or destroyed.

2.10 Safety Instructions Battery Storage Unit

⚠ DANGER	
	**Hazard by electrolyte** Performing work on the battery storage unit and its components is only permitted for qualified personnel, trained and certified by FREQCON GmbH. It is not allowed to modify or manipulate the battery storage unit and its components. ➜ Do not open, disassemble or puncture the battery storage unit ➜ Do not short circuit the battery storage unit or battery modules ➜ Do not drop the battery storage unit and avoid vibrations ➜ Do not a use defective or damaged battery storage unit ➜ Do not a use defective or damaged battery storage unit ➜ Do not touch defective or damaged batteries with bare hands. Defective or damaged batteries must only be handled by FREQCON personnel. **Avoid these dangerous situations, since it may lead to severe injuries or even death!**

⚠ DANGER	
	**Hazard by electrolyte** The material/media required for intended operation of the battery storage system are procured and provided by the manufacturer. ➜ The proper handling of these materials/media and the associated risks underly the sole responsibility of the manufacturer. ➜ Hazard and disposal information must be provided by the manufacturer. ➜ The safety data sheets of the material and media manufacturers are to be observed. **Avoid these dangerous situations, since it may lead to severe injuries or even death!**

⚠ WARNING	
	**Health hazards due to negligent use of personal protective equipment** Serious injuries can occur when working without personal protective equipment. ➜ Wear personal protective equipment (PPE). **Avoid these dangerous situations, since it may lead to severe injuries or even death!**

2.10.1 First Aid Measures

Skin Contact
Not anticipated. If the battery module is leaking and the contained material contacts the skin, flush with copious amounts of clear water for at least 15 minutes.

Eye Contact
Not anticipated. If the battery module is leaking and the contained material contacts eyes, flush with copious amounts of clear water for at least 15 minutes. Get medical attention.

Inhalation
Not anticipated. If the battery module is leaking, remove to fresh air. If irritation persists, get medical attention.

Ingestion
Not anticipated. If the battery module is leaking and the contained material is ingested, rinse mouth and surrounding area with clear water. Immediately consult a physician for treatment.

2.10.2 Fire Fighting Measures

Unusual Fire and Explosion Hazards
Battery may explode or leak potentially hazardous vapors if:

- Exposed to excessive heat (above the maximum rated temperature as specified by the manufacturer) or fire.
- Overcharged
- Short-circuit
- Punctured
- and crushed

Hazardous Combustion Products
Fire, excessive heat, or over-voltage conditions may produce hazardous decomposition products. Damaged batteries can result in rapid heating and the release of flammable vapors.

Extinguishing Media
Dry chemical type extinguishers are the most effective means to extinguish a battery fire. A CO_2 extinguisher will also work effectively.

Fire Fighting Procedures
Use a positive pressure self-contained breathing apparatus if batteries are involved in a fire. Full protective clothing is necessary. During water application, caution is advised as burning pieces of flammable particles may be ejected from the fire.

2.10.3 Handling

- Improper charging of the battery modules may cause the battery to flame. When charging the battery, only use the dedicated converter provided by the manufacturer.
- Never disassemble or modify a battery module.
- Do not immerse, throw, or wet a battery module in water.
- Should a battery module be crushed unintentionally, thus releasing its contents, rubber gloves must be used to handle all battery components. Avoid inhalation of any vapors that may be emitted.
- Short-circuits cause heat. In addition, short-circuits reduce the battery life and can lead to ignition of surrounding materials. Physical contact with a short-circuited battery can cause skin burn.
- Avoid reversing the battery modules polarity, which can cause the battery module to be damaged or lead to flames
- In the event of skin or eye exposure to the electrolyte, refer to section 2.10.1 “First Aid Measures”.

2.10.4 Exposure Controls/Personal Protection

Engineering controls

Keep away from heat and open flame.

Ventilation

Not necessary under conditions of normal use. In case of abuse, use adequate mechanical ventilation (local exhaust) for the battery that vent gas or fumes.

Respiratory protection

Not necessary under conditions of normal use. If battery is burning, leave the area immediately. During fire fighting firemen should use self-contained breathing, full-face respiratory equipment. Fires may be fought but only from safe fire fighting distance, evacuate all persons from the area of fire immediately.

Eye protection

Not necessary under conditions of normal use. Use safety glasses with side shields if handling a leaking or ruptured battery module.

Body Protection

Not necessary under conditions of normal use. Use rubber apron and protective work clothing in case of handling a leaking or ruptured battery module.

Protective Gloves

Not necessary under conditions of normal use. Use chemical resistant rubber gloves if handling a leaking or ruptured battery module.

Others

Use good chemical hygiene practice. Wash hands thoroughly after cleaning-up a battery spill caused by leaking or ruptured battery modules. No eating, drinking, or smoking in battery storage area.

2.10.5 Disposal Considerations

- Disposal of battery modules should be performed by permitted, professional disposal firms knowledgeable in federal, state, an local law requirements of hazardous waste treatment and hazardous waste transportation.
- The battery modules should be completely discharged prior to disposal and/or the terminals taped or capped to prevent short circuit. When completely discharged, the battery module is not considered as hazardous.
- The battery modules contain recyclable materials. Recycling option available in your local area should be considered when disposing of this product, through licensed waste carrier.

2.11 Handling electrostatic sensitive devices (ESD)

Electrostatic sensitive devices (ESD) are individual components, integrated circuits, modules or devices that may be damaged by either electric fields or electrostatic discharge.

HINWEIS



Damage through electric fields or electrostatic discharge

Electric fields or electrostatic discharge can cause malfunctions through damaged individual components, integrated circuits, modules or devices.

- ➜ Only pack, store, transport and send electronic components, modules or devices in their original packaging or in other suitable materials, e.g. conductive foam rubber of aluminum foil.
- ➜ Only touch components, modules and devices when you are grounded by one of the following methods:
  - Wearing an ESD wrist strap
  - Wearing ESD shoes or ESD grounding straps in ESD areas with conductive flooring
- ➜ Place electronic components, modules or devices on conductive surfaces (table with ESD surface, conductive ESD foam. ESD packaging, ESD transport container).

⚠ DANGER



Danger to life as a result of unsafe operating states resulting from software manipulation

Software manipulations (e.g. viruses, trojans, malware or worms) can cause unsafe operating states in your system that may lead to death, serious injury, and property damage.

- ➜ Keep the software up to date.
- ➜ Incorporate all installed products, especially the automation and drive components into a holistic, state-of-the-art industrial security concept for the installation.
- ➜ Protect files stored on exchangeable storage media from malicious software by with suitable protection measures, e.g. virus scanners.

3 System Description

3.1 Battery Cabinet

The following internal components are contained within the battery cabinets of the BESS:

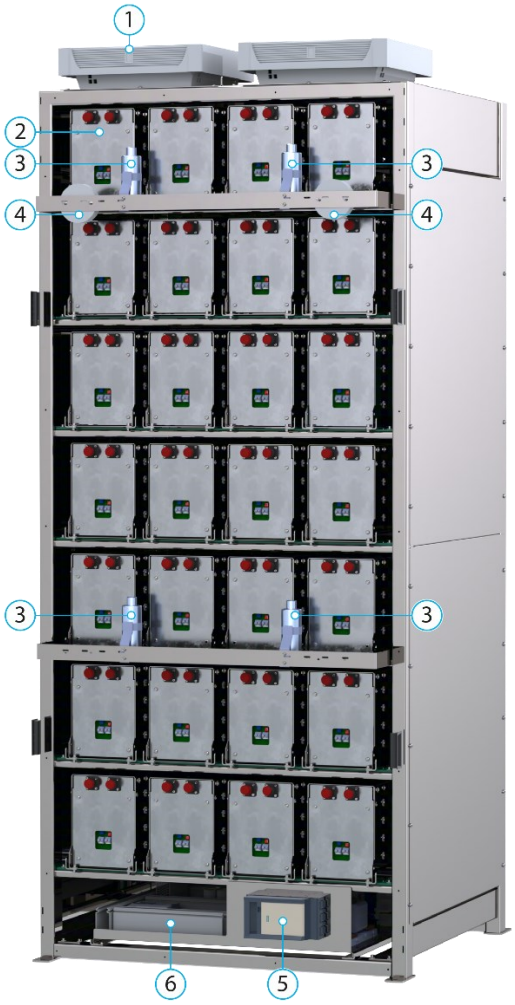
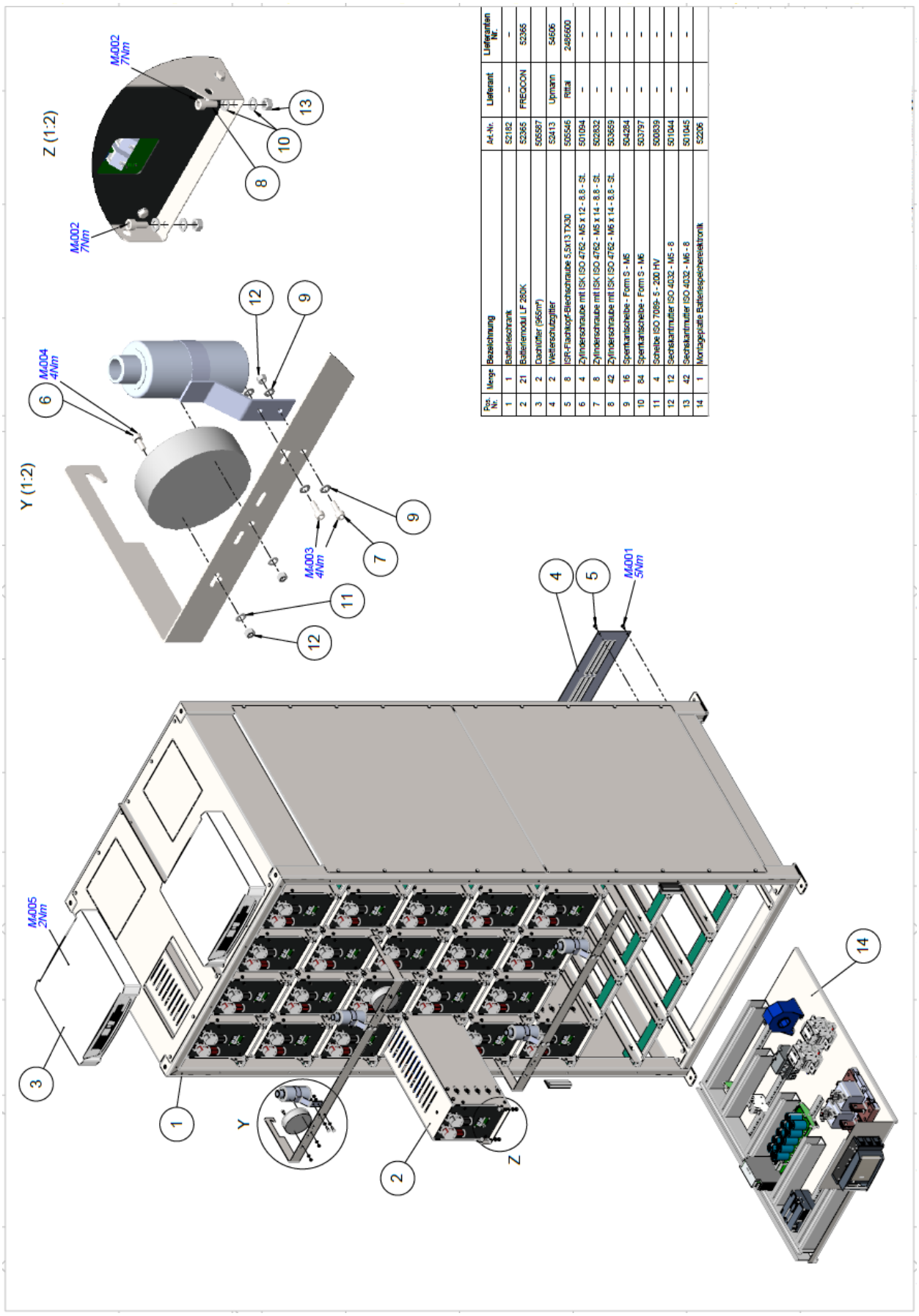


Figure 1: Internal components - battery cabinets

Pos.	Component	Part number
①	Cabinet fan	505587
②	Battery module LF 280	--
③	Aerosol cartridge of fire extinguishing unit Aero-X Stat-X 60E	506501
④	Optical smoke detector 12 V	500713
⑤	DC fuse switch disconnector 3NP1, 3-pole, NH2, 400 A	10226
⑥	Mounting plate with cabinet control system, DC, contactors etc.	52422

Table 6: Internal components - battery cabinets



Pos. Nr.	Menge	Bezeichnung	Art.-Nr.	Lieferant	Lieferanten Nr.
1	1	Batterieschrank	52182	--	--
2	21	Batteriemodul LF 280K	52365	FREQCON	52365
3	2	Dachlüfter (565m³)	505567		
4	2	Wetterschutzgitter	52413	Upmann	54606
5	8	ISR-Flachkopf-Blechschraube 5,5x13 TX30	505546	Rittal	2486600
6	4	Zylinderschraube mit ISK ISO 4762 - M5 x 12 - 8.8 - St.	501094	--	--
7	8	Zylinderschraube mit ISK ISO 4762 - M5 x 14 - 8.8 - St.	502832	--	--
8	42	Zylinderschraube mit ISK ISO 4762 - M6 x 14 - 8.8 - St.	503659	--	--
9	16	Spannlanschelbe - Form S - M5	504284	--	--
10	84	Spannlanschelbe - Form S - M6	503797	--	--
11	4	Scheibe ISO 7089 - 5 - 200 HV	500839	--	--
12	12	Sechskantmutter ISO 4032 - M5 - 8	501044	--	--
13	42	Sechskantmutter ISO 4032 - M6 - 8	501045	--	--
14	1	Montageplatte Batteriespeicherelektronik	52205		

3.2 Battery Modules



Figure 1: Battery module LF 280

3.2.1 Design

The lithium iron phosphate cells (LiFePO4) inside the LF 280 battery modules are connected in series and provide a total energy content of 8.96 kWh per module.

Each module is equipped with a monitoring PCB, providing the following functions:

- Voltage monitoring of single cells for charging and discharging
- Battery temperature monitoring
- Selective cell balancing
- Data exchange with central BESS controller
- Local insulation measurement
- Robust industrial design for transport, assembly und operation



Figure 2: Battery module design

No.	Component
①	Battery module LF280
②	Boreholes for lifting device (M6)
③	DC positive (+) socket
④	DC negative (-) socket
⑤	COM-Connection RJ45 and 24 V DC power supply
⑥	Boreholes for transport handle mounting
⑦	Label with safety and warning instructions

Table 1: Battery module design

3.2.2 Technical data

Technical Data Battery Module LF 280	
Part number	52365 / 52375 / 52157
Voltage (nominal)	32 V DC nochmal prüfen lassen laut GK
Total capacity	280 Ah
Number of cells per battery module	10
Stored Energy	8960 Wh
Maximum voltage	36 V DC nochmal prüfen lassen laut GK
Maximum current	280 A
Maximum charge and discharge rate	1 C
Temperature range storage	-20 °C … +45 °C (long-term storage at 0…35°C)
Temperature range operation	0 °C … +55 °C
Connections for DC+ / DC-	Surlock Plus
Connections for communication	RJ 45
Protection class	IP 20
Weight	65.3 kg
Dimensions (WxHxD)	188 mm x 239 mm x 908 mm
Cell Data (Single Cell)	
Type	Prismatic cell
Capacity (typ.)	280 Ah
Voltage (typ.)	3.2V
Voltage (maximum)	3.65 V
Voltage (minimum)	2.5 V
Battery life	>3500 cycles (80% remaining capacity)
Impedance (AC)	<0.25mΩ
BMS Pack Universal	
Power supply (external)	24 V DC (rated), <0.5 W
Power supply (internal)	36 V DC (max.), < 0.2 W
Communication	EIA-485, Modbus RTU
Baud rate (max.)	19200 Bit/s
Bus participants (max.)	32
Balancer design	Load resistor
Balancer current @3.5 V	1.06 A
Voltage measurements	10 measurements per 14-bit resolution
Temperature measurements	8x NTC 10 kΩ (up to 14 bit analogue/digital converter) 1x PT100 (12 bit analogue/digital converter)
Isolation measurement	Earth fault monitoring

Table 7: Technical data LF 280 battery module

3.2.3 Connection Elements



Figure 3:Connection elements

Pos.	Terminal	Description	Connection type	Cable
①	X1	DC + Battery module	10.3 mm Surlock Plus	Pay attention to cable routing in cabinet
②	X2	DC – Battery module	10.3 mm Surlock Plus	Pay attention to cable routing in cabinet
④	X3	Communication (input)	RJ45, 45°	PiMF, 4x2 min. AWG 27/7
⑤	X4	Communication (Output)	RJ45, 45°	PiMF, 4x2 min. AWG 27/7
⑤	X5	24 V DC power supply	2-pole male terminal	Pay attention to cable routing in cabinet

Table 2: Connection elements

3.2.4 Communication Scheme

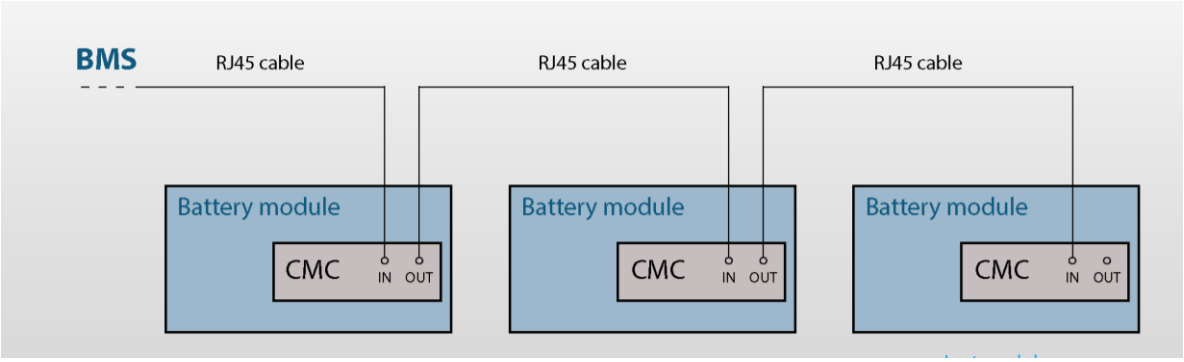


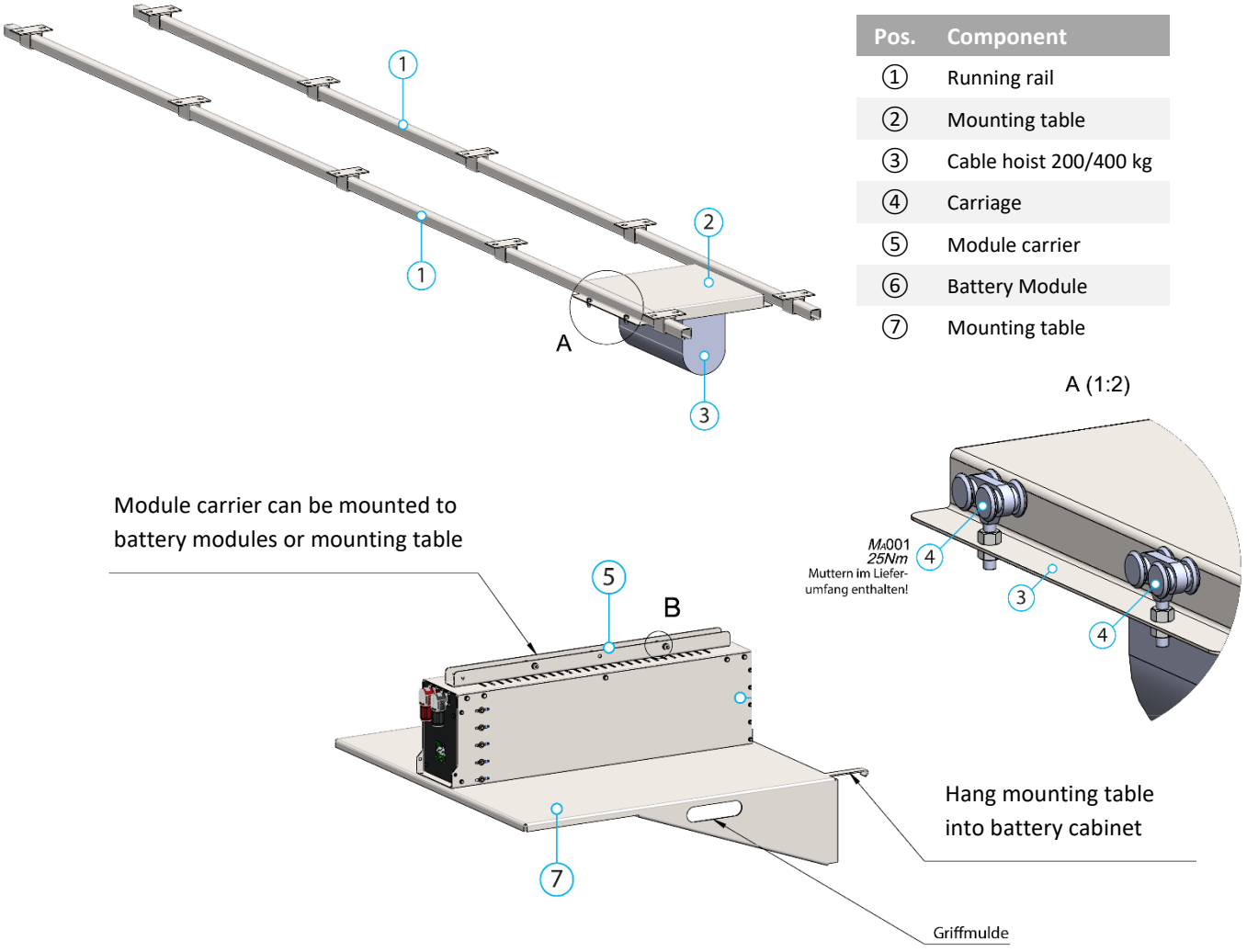
Figure 4: BMS communication scheme

3.2.5 Lifting Device and Mounting Table

For the lifting of battery modules, a lifting device is installed at the container ceiling, allowing safe handling and installation of the battery modules.

The lifting device mainly consist of a cable hoist which is mounted to a mounting plate with carriers, allowing to move the cable hoist through running rails to each end of the container. The cable hoist is operated via cable remote control.
For better handling of the battery modules when inserting them to the battery storage cabinet, a mounting table is provided, which can be attached to the battery storage cabinets.

Detailed information and operating instructions regarding the supplied cable hoist can be found in the original manufacturer's manual *(see section "Other applicable documents")*.



Pos.	Component
①	Running rail
②	Mounting table
③	Cable hoist 200/400 kg
④	Carriage
⑤	Module carrier
⑥	Battery Module
⑦	Mounting table

Figure 2: Lifting device

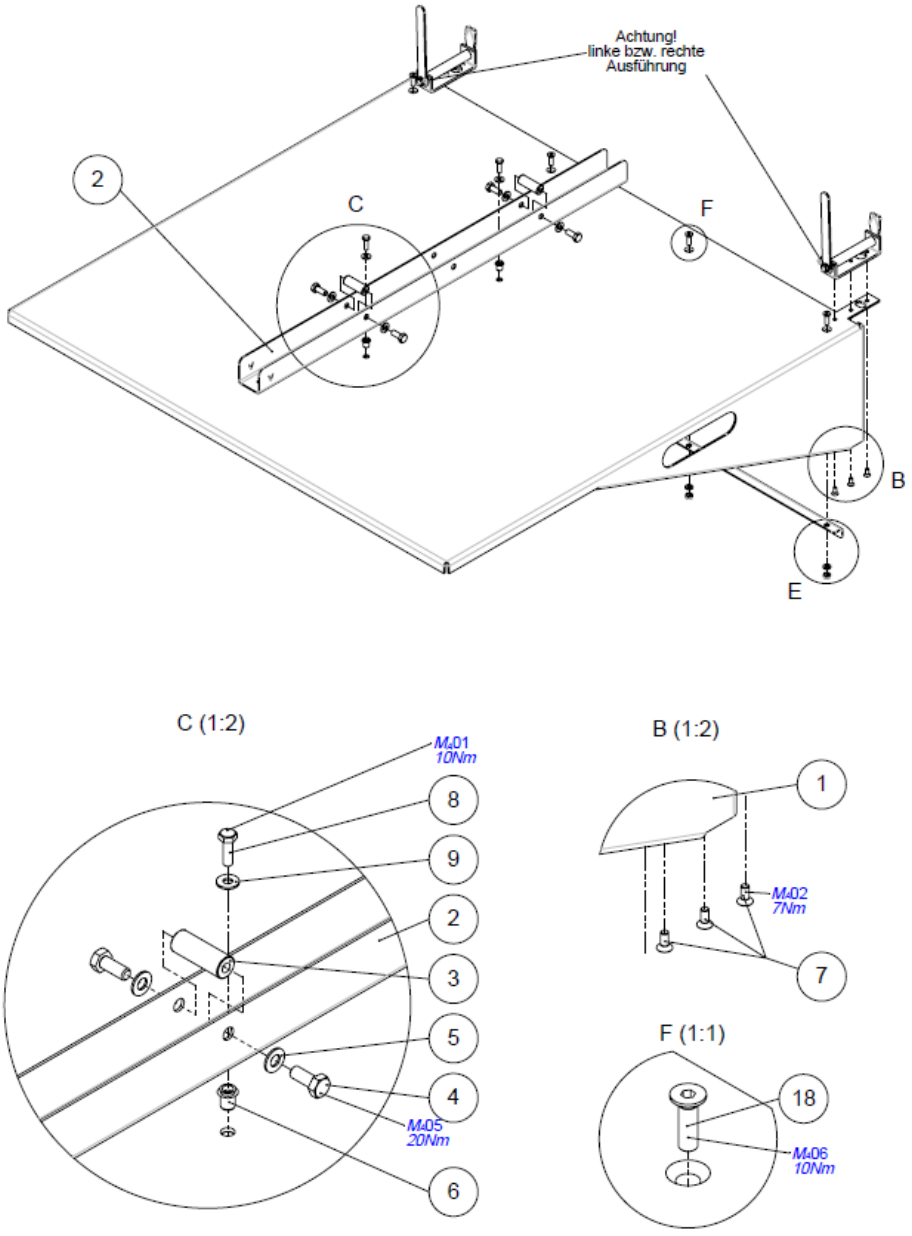


Figure 3: Assembly table

Pos. Nr.	Menge	**Bezeichnung**	Art.-Nr.
1	1	Montagetisch	52441
2	1	Modulträger	52444
3	2	Querstrebe Modulträger	52445
4	4	Sechskantschraube ISO 4017 - M8 x 20 - 8.8 - St.	503682
5	4	Sperrkantscheibe - Form S - M8	503798
6	2	Blindnietmutter M6 KSGRSO (e=0,5-3,0)	501165
7	6	Senkschraube ISO 10642 - M5 x 12 - A2	52564
8	2	Sechskantschraube ISO 4017 - M6 x 20 - 8.8 - St.	503679
9	6	Sperrkantscheibe - Form M - M6	503800
10	2	Lagerbock	52696
11	2	Verschlusshebel	52558
12	2	Verschlusswelle	52697
13	8	Passscheibe	52560
14	2	Verschlusszunge	52188
15	2	Zylinderschraube mit ISK ISO 4762 - M4 x 8 - 8.8 - St.	503998
16	4	Sechskantschraube ISO 4017 - M6 x 12 - 8.8 - St.	503805
17	1	Versteifungswinkel Montagetisch	52442
18	4	Senkschraube ISO 10642 - M6 x 20 - 8.8	503777
19	4	Sechskantmutter mit Klemmteil DIN 985 - M6 - 8	500782
20	4	Scheibe ISO 7089- 6 - 200 HV	500840

3.2.6 Mobile Lifting Device

A mobile lifting device for moving battery modules inside the BESS containers can be used. The mobile lifting device “Material-Lift GUIL ELC-725” or other models are suitable to lift and mount battery modules inside FREQCON BESS containers.

One (1) battery module can be placed onto the table of the mobile lifting device at once. The module needs to be pushed from the pallet of the forklift truck in front of the BESS container door onto the table of the mobile lifting device.

The mobile lifting device can then be moved to the battery cabinet where the battery module needs to be installed.

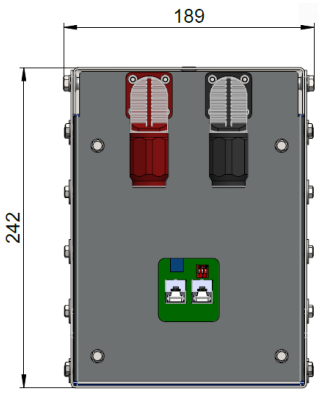


Figure 4: Mobile lifting device “Material-Lift GUIL ELC-725”

Technical details	
Dimensions L x W x H	400 mm x 550 mm x 1320 mm
Type of construction	Material lift
Overall height	1320 mm
Dead weight	51 kg
Lifting function	Cable winch
Lifting height	4000 mm
Platform dimensions L x W	550 x 500 mm
Table height max.	3940 mm
Table height min.	1320 mm
Load capacity:	125 kg

3.2.7 Battery Module Dimensions

Front View



Side View

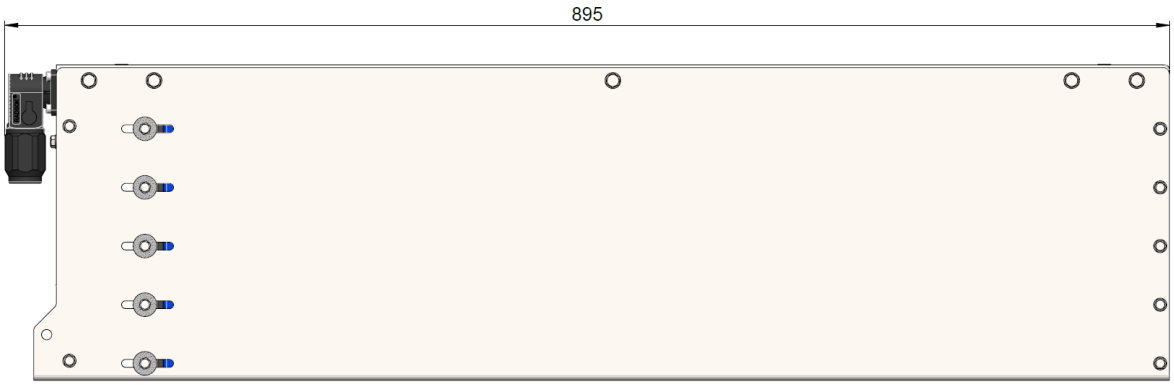


Figure 5: Dimensions

4 Battery Module Installation

⚠ DANGER	
	**Hazard by electrolyte** Performing work on the battery storage unit and its components is only permitted for qualified personnel, trained and certified by FREQCON GmbH. It is not allowed to modify or manipulate the battery storage unit and its components. ➜ Do not open, disassemble or puncture the battery modules ➜ Do not short circuit the battery modules ➜ Do not drop the battery modules and avoid vibrations ➜ Do not a use defective or damaged battery modules ➜ Do not a use defective or damaged battery storage unit ➜ Do not touch defective or damaged batteries with bare hands. Defective or damaged batteries must only be handled by FREQCON personnel. **Avoid these dangerous situations, since it may lead to severe injuries or even death!**

⚠ DANGER	
	**Electric shock hazard!** **Always respect all the safety instructions and, in particular:** ➜ Always use protective devices suitable and approved for each type of activity. ➜ The instructions in this manual must be strictly followed. ➜ The electrical connection must be carried out in accordance with the local regulations of the utility company and /or VDE (in Germany). ➜ Use of the equipment must comply with all national and local regulations. ➜ Battery modules must only be accessed after disconnecting the electrical system from all electrical power sources.

⚠ WARNING	
	**Lifting hazard!** **A single battery module weighs approx. 65 kg. Lifting by a single person can lead to injuries!** ➜ Use assistance when moving or lifting battery modules.

⚠ WARNING



Do not modify or manipulate batteries!
The battery modules are equipped with blue power connectors for power plug and interconnection of the battery modules.
➜ When disconnecting battery modules, only use the power plug for disconnection. Do not remove the power cables from the connection bolts of the battery modules .

NOTICE

Damage due to wrong installation
Avoid any contact of two or more battery modules. A contact can cause short circuits and damage the modules.
➜ Tighten all battery module installation connections with the specified torque.
➜ Check the battery cabinets for contact of battery modules.

NOTICE



Always wear PPE (Personal Protective Equipment) when handling battery modules:
- safety glasses
- safety shoes with steel toe
- electrically insulated gloves

Do not operate!	**Lock-out and tag power switches and controller devices!**
	Observe national laws regarding Occupational Safety and Health, as well as Industrial Standards DIN VDE 0105-100; VDE 0105-100:2009-10 Operation of electronic equipment - General requirements.

Required Tools

Installation personnel must at least have the following tools in reach before starting the installation of the converter:

Pos.	Installation Tools	Amount
1.	Flash light	1
2.	Insulated pliers set	1
3.	Insulated ratchet set	1
4.	Insulated torque wrench (1 - 100 Nm)	1
5.	Insulated socket wrench set (with sockets 7 – 19 mm)	1
6.	Insulated wrench set	1
7.	Insulated wrench extension (min. 300 mm)	
8.	Cross-section screw drivers set	1
9.	Flat-section screw drivers set	1
10.	Allen key / Hex socket key set	1
11.	Cutter	1
12.	First-aid kit	1
13.	Multi-meter instrument	1
14.	Two-pole voltage tester	1
15.	Mounting table	1
16.	Module carrier	

Table 8: Required tools - Battery module installation

4.1 Installation with Cable Hoist

Task 1: **Install the battery modules.**

Step 1 : Mount the module carrier (*see following figure,* ②) on the mounting table.

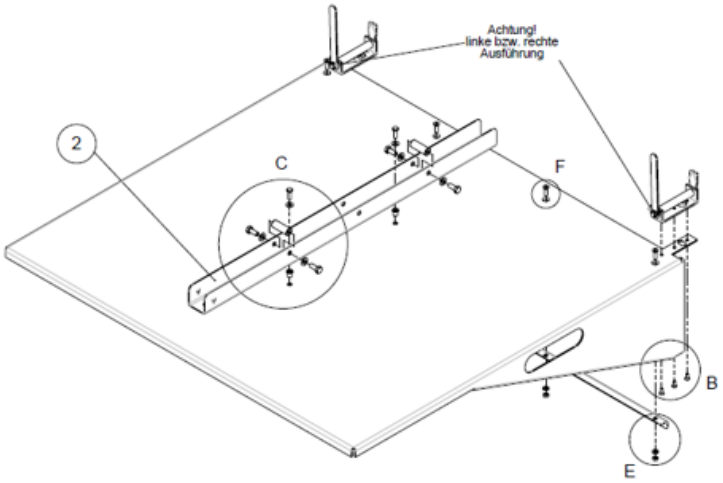


Figure 6: Assembly table with mounted module carrier

Step 2 : Use the hook of the lifting device mounted on the container ceiling and attach it to the transport bolts of the module carrier.

Step 3 : Raise the mounting table with the help of the lifting device and using the remote control and place the mounting table at the height of the module to be installed and in the centre of the battery cabinet. The latches on the sides of the mounting table must engage in the recesses on both sides of the battery cabinet row.

Step 4 : Fix the mounting table to the battery cabinet (*see following figure,* ⑦) by turning both hinges of the latches 90° to the side.

Step 5 : Check if the mounting table is firmly fixed.

Step 6 : Remove the hook of the lifting device from the module carrier.

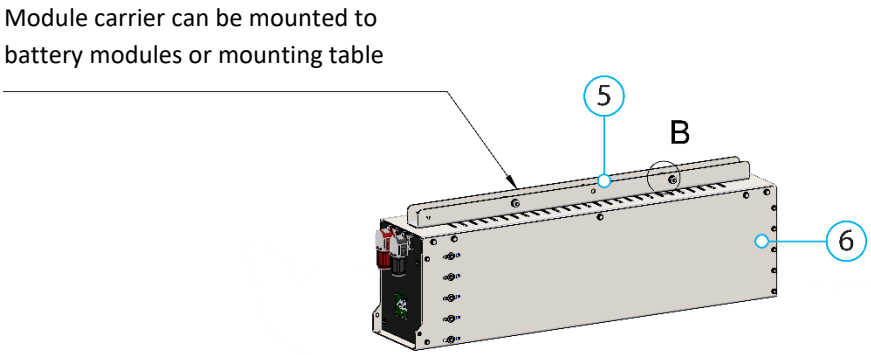
Step 7 : Remove the module support from the mounting table.



Figure 7: Mounting table on the battery cabinet

Step 8 : Mount the module carrier (*see following figure,* ⑤) on the battery module to be installed and tighten the connections.

Step 9 : Check connections for tightness.



⚠ WARNING	
	**Lifting hazard!** **A single battery module weighs approx. 65 kg. Lifting by a single person without a lifting device can lead to injuries!** ➜ Use assistance when moving or lifting battery modules. ➜ Always use a suitable lifting device for installing and removing modules to avoid injuries caused by heavy loads. Inside the container, use the installed lifting device on the container ceiling.

Step 10 : Use the hook of the lifting device mounted on the container ceiling and attach it to the transport bolt (B) of the module carrier.

Step 11 : Lift the battery module using the lifting device and the remote control and place the battery module on the mounting table (*see following figure*).

Step 12 : Remove the module carrier from the battery module. Keep the screws, nuts and washers for the installation of further battery modules.

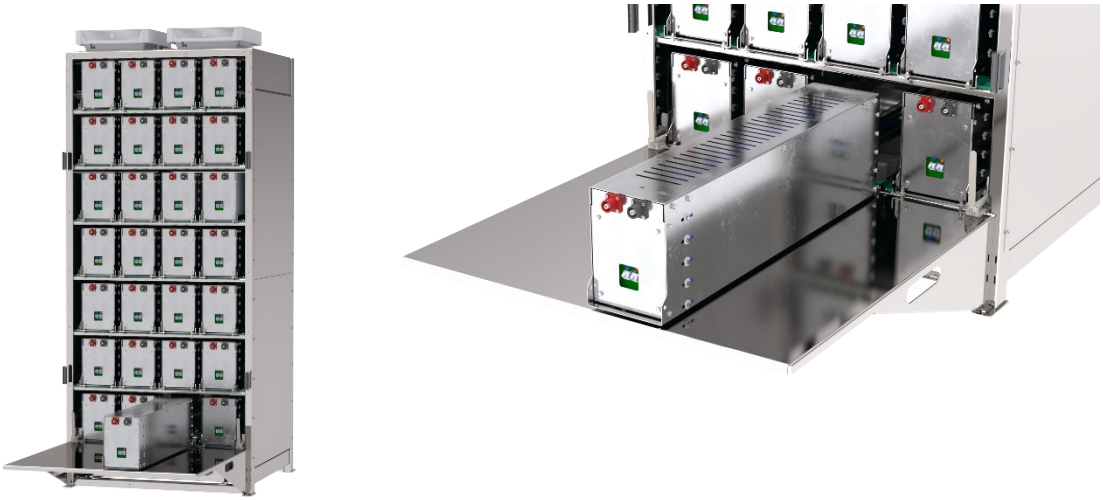


Figure 8: Battery module on mounting table

Step 13 : Mount the supplied transport handle on the two holes on the front of the battery module to be installed (*see markings in the following figure*).



Figure 9: Holes for transport handle

Step 14 : Carefully slide the battery module from the mounting table into the battery cabinet using the transport handle. Use assistance due to the modules´ weight!

Step 15 : Fix the installed battery module to the front mounting rail using the two metal pins (*see following figure,* ⑨).



Figure 10: Metal pins fixing the module

Step 16 : Repeat the process for installing the remaining battery modules.

Task 2: Connect the communication cables.

Step 1 : Locate the IN and OUT communication ports on the front of the battery module to be installed (*see Figure 14,* ④ *and* ⑤).

Step 2 : Connect the IN and OUT communication ports of the module with RJ45 cables to the two adjacent modules of the module row.

Task 3: Connect the DC terminals of the battery modules.

⚠ DANGER	
 	**Electric shock hazard!** **Short-circuiting when tool live parts are touched can lead to short-circuiting and therefore severe injuries:** ➜ Battery modules must only be accessed after disconnecting the converter system from all electrical power sources and subsequent disconnection of the battery modules´ DC connector. ➜ Avoid contact of metal tools or metal components with the live metal parts of the bolts on both sides of the module indicated in the illustration below. Therefore, always use insulated tools when working with battery modules.

Step 1 : Locate the DC +/- terminals of the battery module (*see following figure,* ① *and* ②).



Figure 11: Connections LF280 battery module

Step 2 : Insert the DC +/- plugs of the DC connection cables into the corresponding DC sockets.

Hinweis 1: The DC connectors can only be plugged onto the DC socket in one position when the groove and lug are on top of each other. In this case, the plug engages noticeably.

Hinweis 2: When installing multiple or all modules, be sure to first connect the DC connectors and cables in the vertical rows of modules. Start at the bottom left module and work your way up. In the next row, start from the top and work your way down*(see arrow indicators in Figure 15)*. Then connect the three cross-connections between the module rows *(see oval markings in Figure 15)*. Start with the two upper cross-connections and then set the lower one.

Step 3 : Check the DC connections for strength.

4.2 Installation with Mobile Lifting Device

Task 1: **Install the battery modules.**
Step 1 : XXXXX
Step 2 : XXXXX
Step 3 : XXXXX



Figure 12: Mobile lifting device “Material-Lift GUIL ELC-725”

Step 4 : XXXXX
Step 5 : XXXXX

5 Exchanging Battery Modules

The battery storage system is delivered with installed battery modules. In order to replace battery modules, e.g. due to malfunction, proceed as follows.

⚠ DANGER	
	**Hazard by electrolyte** Performing work on the battery storage unit and its components is only permitted for qualified personnel, trained and certified by FREQCON GmbH. It is not allowed to modify or manipulate the battery storage unit and its components. ➜ Do not open, disassemble or puncture the battery modules ➜ Do not short circuit the battery modules ➜ Do not drop the battery modules and avoid vibrations ➜ Do not a use defective or damaged battery modules ➜ Do not a use defective or damaged battery storage unit ➜ Do not touch defective or damaged batteries with bare hands. Defective or damaged batteries must only be handled by FREQCON personnel. **Avoid these dangerous situations, since it may lead to severe injuries or even death!**

⚠ DANGER	
	**Electric shock hazard!** **Always respect all the safety instructions and, in particular:** ➜ Always use protective devices suitable and approved for each type of activity. ➜ The instructions in this manual must be strictly followed. ➜ The electrical connection must be carried out in accordance with the local regulations of the utility company and /or VDE (in Germany). ➜ Use of the equipment must comply with all national and local regulations. ➜ Battery modules must only be accessed after disconnecting the electrical system from all electrical power sources.

⚠ WARNING	
	**Lifting hazard!** **A single battery module weighs approx. 65 kg. Lifting by a single person can lead to injuries!** ➜ Use assistance when moving or lifting battery modules.

⚠ WARNING	
	**Do not modify or manipulate batteries!** The battery modules are equipped with blue power connectors for power plug and interconnection of the battery modules. ➜ When disconnecting battery modules, only use the power plug for disconnection. Do not remove the power cables from the connection bolts of the battery modules .

NOTICE
Damage due to wrong installation Avoid any contact of two or more battery modules. A contact can cause short circuits and damage the modules. ➜ Tighten all battery module installation connections with the specified torque. ➜ Check the battery cabinets for contact of battery modules.

NOTICE	
	Always wear PPE (Personal Protective Equipment) when handling battery modules: • safety glasses • safety shoes with steel toe • electrically insulated gloves

Do not operate!	**Lock-out and tag power switches and controller devices!**
	Observe national laws regarding Occupational Safety and Health, as well as Industrial Standards DIN VDE 0105-100; VDE 0105-100:2009-10 Operation of electronic equipment - General requirements.

5.1 Battery Module Removal

Required Tools

Personnel must at least have the following tools in reach before starting work:

Pos.	Installation Tools	Amount
	Basic Tools	
1.	Flash light	1
2.	Insulated pliers set	1
3.	Insulated ratchet set	1
4.	Insulated torque wrench (1 - 100 Nm)	1
5.	Insulated socket wrench set (with sockets 7 – 19 mm)	1
6.	Insulated wrench set	1
7.	Insulated wrench extension (min. 300 mm)	1
8.	Cross-section screw drivers set	1
9.	Flat-section screw drivers set	1
10.	Allen key / Hex socket key set	1
11.	Cutter	1
12.	First-aid kit	1
13.	Multi-meter instrument	1
14.	Two-pole voltage tester	1

Table 9: Required tools – Battery removal



Task 2: **Check current-free status**

Step 6 : Check the current-free state of the battery cabinet on the outgoing side of the DC fuse switch-disconnector using a suitable current clamp *(see Figure 1, ⑤)*.

Task 3: **Remove fuse**

Step 1 : When the power-free condition of the battery cabinet is ensured, pull out the insert of the DC fuse switch disconnector.

Step 2 : Remove both fuses from the insert.

Step 3 : Reinsert the insert into the DC fuse switch disconnector.

Task 4: **If necessary, remove the component holders from the battery cabinet.**

Hinweis 3: If the module to be removed or parts of the module or connection cables are covered by component holders, remove them.

Step 1 : Locate the two component holders in the battery cabinet*(see following figure ① and ②)*.

Step 2 : Remove the component holder by lifting the holder suspended in the cabinet upwards and then pulling it backwards out of the cabinet.



Figure 13: Component holders in the battery cabinet

Step 3 : Carefully move the component holder to the left and let it hang down on the left side of the cabinet by its cables without damaging other cables or components.

Task 5: **Disconnect the DC connections between the battery modules.**

⚠ DANGER	
 	**Electric shock hazard!** **Short-circuiting when tool live parts are touched can lead to short-circuiting and therefore severe injuries:** ➜ Battery modules must only be accessed after disconnecting the converter system from all electrical power sources and subsequent disconnection of the battery modules´ DC connector. ➜ Avoid contact of metal tools or metal components with the live metal parts of the bolts on both sides of the module indicated in the illustration below. Therefore, always use insulated tools when working with battery modules.

Step 1 : Locate the DC +/- terminals of the battery module*(see following figure,* ① *and* ②).



Figure 14: Connections LF280 battery module

Step 2 : Remove the DC +/- plugs of the DC connection cables from the DC sockets by pulling the plugs backwards out of the socket.

Hinweis 1: When removing several or all modules, make sure that you first remove the three cross-connections between the module rows*(see oval markings in the following figure*). Start with the lower cross-connection and then remove the upper two. In the next step, remove the DC connectors and cables from the module at the bottom left and work your way up. In the next row, start from the top and work your way down*(see arrow indicators in the following figure*).

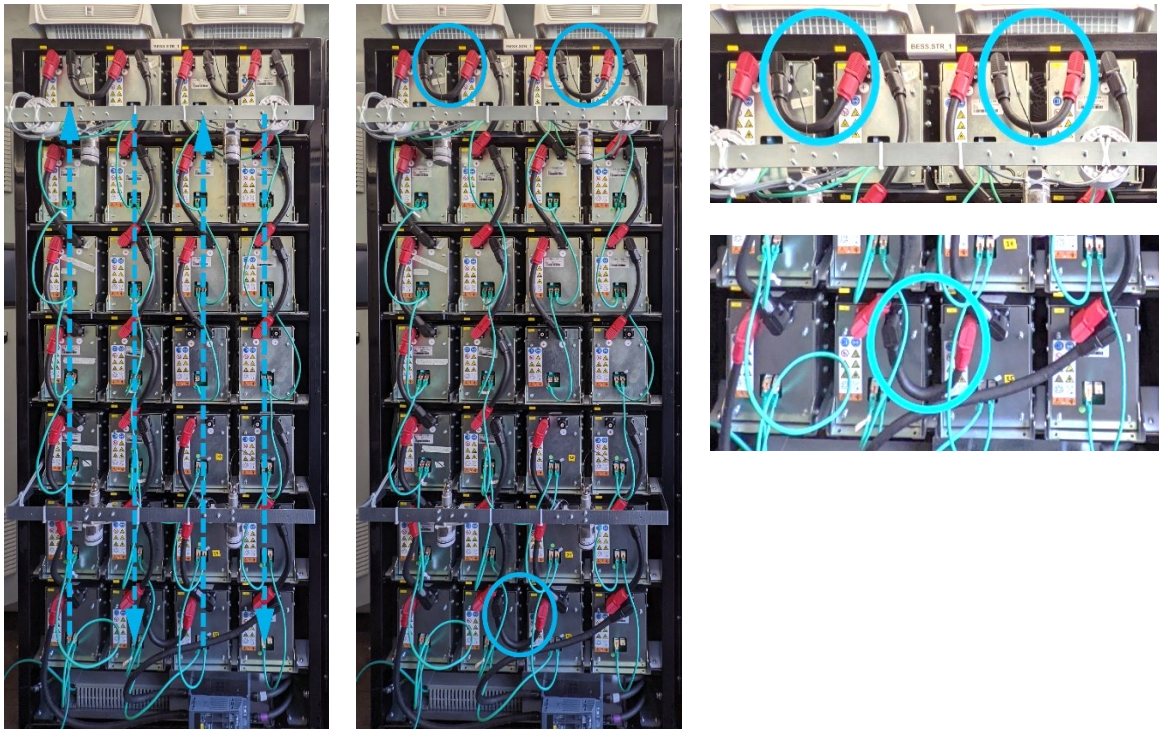


Figure 15: Module rows (vertical) and cross-connections between the module rows

Task 6: Remove communication cables

Step 1 : Locate the IN and OUT communication ports on the front of the battery module to be removed*(see Figure 14, ④ and ⑤)*.

Step 1 : Remove the RJ45 cables from the IN and OUT communication ports of the module.

Step 2 : Remove the other end of the RJ45 cables from the other two battery modules that were connected to the battery module to be removed.
Keep the RJ45 cables for later installation of the new battery module to be installed.

Task 7: Remove the battery module.

Step 3 : Locate the two metal pins that fix the battery module to the front mounting rail*(see following figure, ⑨)*.



Figure 16: Cylinder screws fixing the module

Step 4 : Mount the module support*(see following figure, ②)* on the mounting table.

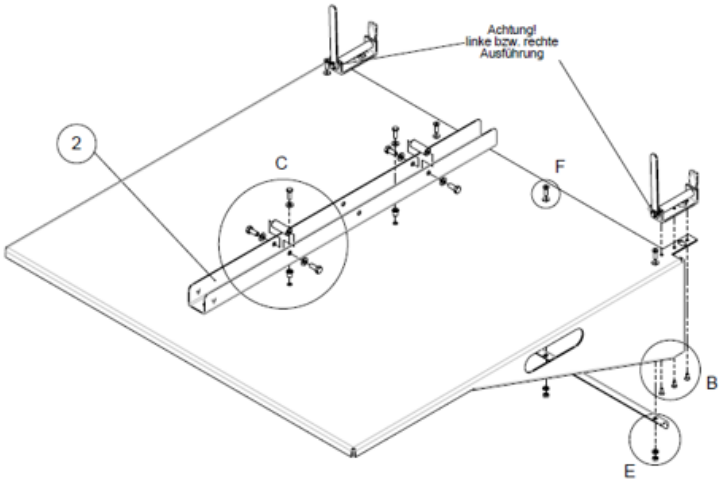


Figure 17: Assembly table with mounted module rack

Step 5 : Use the hook of the lifting device mounted on the container ceiling and attach it to the transport bolts of the module girder.

Step 6 : Raise the mounting table with the help of the lifting device and using the remote control and place the mounting table at the height of the module to be removed and in the center of the battery cabinet. The latches on the sides of the mounting table must engage in the recesses on both sides of the module row.

Step 7 : Fix the mounting table to the battery cabinet*(see following figure, ⑦)* by turning both hinges of the latches 90° to the side.

Step 8 : Check that the mounting table is firmly fixed.

Step 9 : Remove the hook of the lifting device from the module support.

Step 10 : Remove the module support from the mounting table.



Figure 18: Mounting table on the battery cabinet

Step 11 : Mount the supplied transport handle on the two holes on the front of the battery module to be removed*(see following figure, ⑧)*.



Figure 19: Holes for transport handle

⚠ WARNING	
	**Lifting hazard!** **A single battery module weighs approx. 65 kg. Lifting by a single person without a lifting device can lead to injuries!** ➜ Use assistance when moving or lifting battery modules. ➜ Always use a suitable lifting device for installing and removing modules to avoid injuries caused by heavy loads. Inside the container, use the installed lifting device on the container ceiling.

Step 12 : Carefully pull the battery module by the transport handle out of the battery cabinet onto the mounting table. Use assistance due to the modules´ weight!

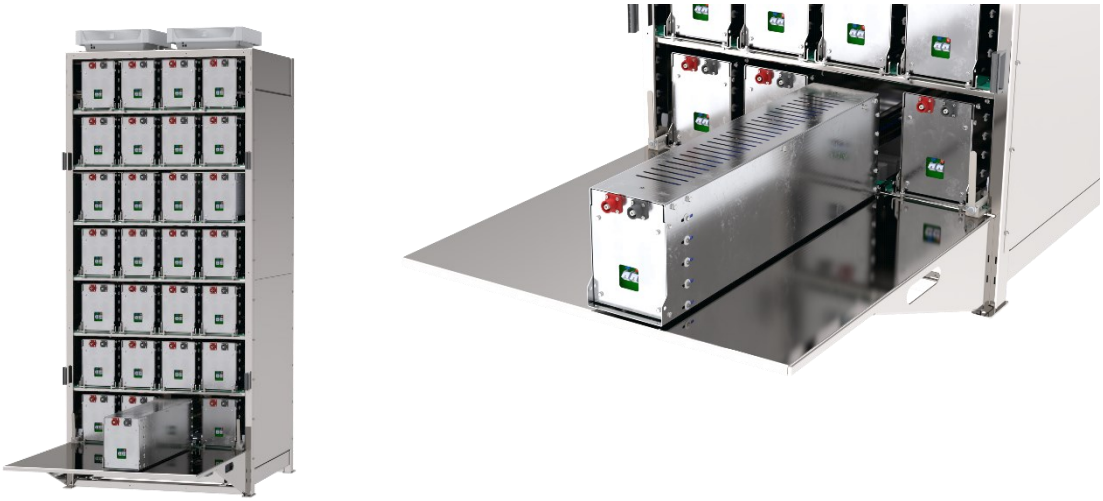
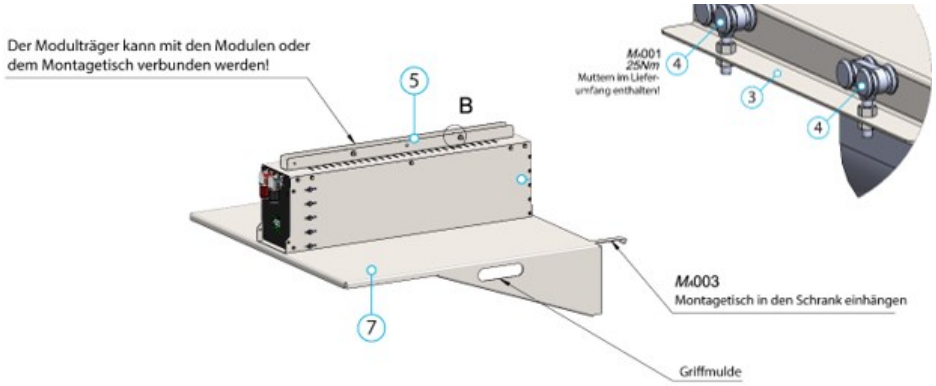


Figure 20: Battery module on mounting table

Step 13 : Mount the module carrier*(see following figure, ⑤)* on the battery module and tighten the connections.

Step 14 : Check connections for tightness.



Step 15 : Use the hook of the lifting device mounted on the container ceiling and attach it to the transport bolt (B) of the module girder.

Step 16 : Lift the battery module with the aid of the lifting device and using the remote control and place the battery module in a suitable storage location.

Step 17 : Remove the module holder from the battery module. Keep the screws, nuts and washers for later installation of the new battery module.

Step 18 : Repeat the process for removing additional battery modules.

Task 8: Install the battery cabinet component brackets, if necessary.

Hinweis 1: If component holders*(see Figure 13,* ① *and* ②) have been removed for module removal, they must be reinstalled.

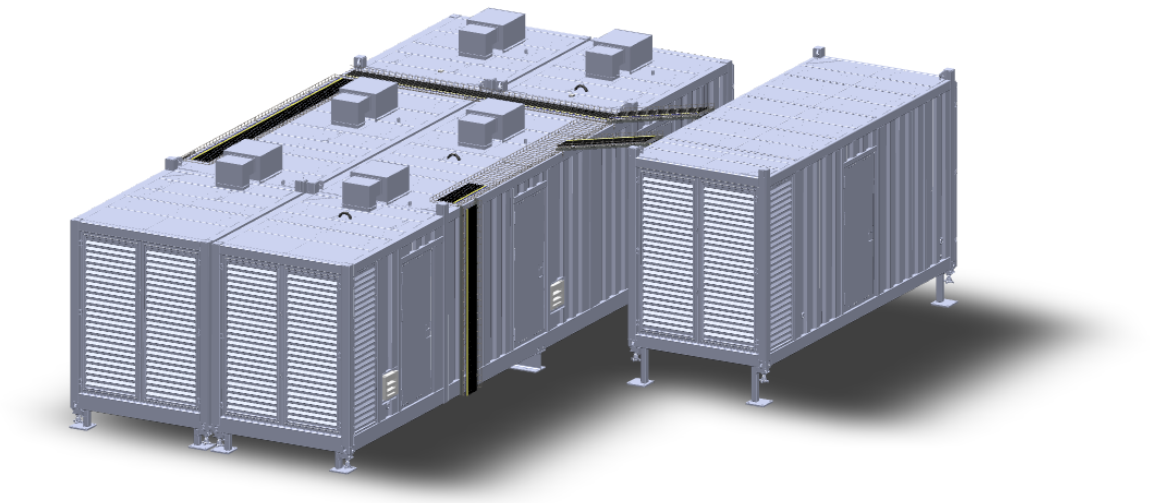
Step 1 : Carefully hook the component holder(s) into the holder provided on the battery cabinet without damaging other cables or components.

FREQCON

Operating and Maintenance Manual
BESS PRO

1 MW/ 5 MWh
6.6 kV AC

Stationary Battery Energy Storage System (BESS)



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v1.1	2025-01-31	M. Müller	Updated version
v1.2	2025-02-05	C. Palenzuela	Updated section 11.2.3.1

Table 1: Version overview

	Date	Name
Editor:	2024-08-22	M. Müller C. Palenzuela
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Approved by:	2024-08-24	C. Palenzuela

Table 2: Approval overview

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Identification

Product and Type Designation

Type
BESS 1 MW / 5 MWh / 6.6 kV / 620 V AC

Serial number

PCS	FRQ-53396000001
BESS 1	FRQ-53406000001
BESS 2	FRQ-53412000001

Product family
BESS Energy Storage System

Product Version / Document Version

Product version
Prototype

Document release date
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Doc Code
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Name and Address of Manufacturer and Supplier

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Original document

This document is an original document of FREQCON GmbH.

1 About these Instructions

This manual is part of the product and applies exclusively to the system described in this document.

This operating manual contains the necessary information for the proper use of the described system. The operating manual is supplied together with the product and is considered as an important part of the product.

Please read this manual carefully, as it contains important information on the installation and operation of the product.
Please pay particular attention to the notes regarding the safe use of the system.
The manufacturer accepts no liability for any damage caused by failure to observe these instructions.

Keep this manual and provide it to the new owner in case of a change of the operating company.
All personnel who have any relation of handling or operating the product must always have direct access to this manual.

All personnel who have any relation of operating the unit are obligated to read all related manuals regarding the system described in this document. The employed personnel must declare that they have fully read and understood all contents of the manuals and agree to follow all instructions, especially issues regarding safety and accident prevention.

Additional Documents

The instructions of this operating manual must be supplemented with the necessary, customary local and current accident prevention regulations, environmental protection rules and laws.

Location of the Manual

Always keep this manual within direct reach when operating or handling the unit. The operator must have direct access to the manual. The operator must have direct access to the manual.

Display Elements

Symbol	Significance
➜	Action with one or several steps for which the sequence is irrelevant.
Step 1 : **Step 2 :**	Action with several steps for which the sequence is relevant.
•	First level of list.
-	Second level of list.

1.1 Disclaimer of Liability

The contents of this publication have been reviewed to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, any necessary corrections are included in subsequent editions.

1.2 Applicable Documents

The delivery scope of the product includes the following documents:

Document	Document Name
Circuit diagram BESS 1 MW / 5 MWh (FREQCON)	10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20250123_V1.3
Data interface description (FREQCON)	23A2007_250116_Modbus_Register BESS_V1_0_0_1
Maintenance schedule – BESS (FREQCON)	EED_0000_20_Maintenance_Schedule_BESS_LFP_v1.3_EN
Operating and Maintenance Manual -AC circuit breaker 3WL (Siemens)	3ZX1812-0WL00-0AN4_online_201806140915326928
Operating Manual -DC circuit breaker 3NP1 (Siemens)	System_Manual_3NP1_3ZX1012-0NP10-1AC1_en-US
Operating, commissioning and maintenance instructions PLC Simotion P320-4 (Siemens)	P320_4_commissioning_en-US P320_4_operating_en-US
MSDS Battery Cells LF280 (EVE)	LF280K MSDS
Aerosol Safety Data Sheet (Stat-X)	Stat-X Aerosol Safety Sheet 19010.3_SDSR_Stat-X_1
Stat-X operating instructions (Stat-X)	19001 1.2.5 Owners Manual Electric DE
Operating and Maintenance Manual – exhaust units (Puma)	TFE_Direct_Driven_Unit_Run_&_Standby_O_&_M_1030
Operating and Maintenance Manual – fire dampers (Puma)	Air_Make_Up_Dampers_O&M_1032
Operating and Maintenance Manual – H2 sensors (Dräger)	Dräger Polytron 8200 manual 9033302_01_2011_enus
Operating Instructions – cable hoist	manual_2255140

Table 3: Applicable documents

1.3 Abbreviations

The following list provides descriptions about the generic terms and abbreviations used in this document:

Generic Term and Abbreviation	Significance
AC	Alternating current
Identifier	Equipment labeling
BESS	Battery Energy Storage System
BMS	Battery management system
BSU	Blackstart unit
DC	Direct current
DC-link	Direct current link
EMC	Electromagnetic compatibility
EMF	Electromagnetic fields
EMS	Energy management system
FRQ	FRFEQCON GmbH
HMI	Human-Machine Interface
HV	High voltage

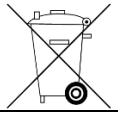
HVIO	High Voltage I/O Module
MB	Modbus
RTU	Remote Terminal Unit
TCP	Transmission control protocol
MSC	Multi-Source Converter
MV	Medium voltage
LFP	Lithium iron phosphate
LV	Low voltage
PCS	Power conversion system
PLC	Programmable Logic Controller
PPE	Personal safety equipment
IGBT	Insulated-Gate Bipolar Transistor
IEC	International Electrotechnical Commission
I/O	Input/output
IP	Internet protocol
SoC	State of charge
TR	Thermal runway
UPS	Uninterruptable power supply

Table 4: List of Abbreviations

1.4 Warning Symbols

Observe the warning symbols in this document and those attached on the device. The warning symbols have the following meaning:

Symbols	Significance
	Hazard (general)
	Hazard by voltage
	Hazard by high temperature
	Hazard by batteries
	Hazard by fire
	Maintenance lockout tagout, do not switch!
	Acute toxicity (oral, dermal, inhalation) (hazard. category 4)
	Respiratory sensitization (hazard category 1, 1A and 1B)
	Prohibition for people with pacemakers

	Hazard by heavy load
	Do not dispose in household waste. (See section 24 “Dismantling and Disposal”)

1.5 Information Symbols

Symbol	Significance
	Important technical information for this product

1.6 Warning Levels / Signal Words

DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury
NOTICE	Indicates that property damage can result, if proper precautions are not taken.

1.7 Target Groups

⚠ DANGER	
	**Danger from and for unauthorized persons** Unauthorized persons are not aware of the dangers in the work area and may endanger themselves and third parties. ➜ Keep unauthorized persons away from the work area. ➜ If in doubt, speak to persons and direct them away from the work area. ➜ Interrupt the work as long as unauthorized persons are in the work area. ➜ Always keep the entrance door(s) locked when not performing work on the system to prevent unauthorized persons from entering the container.

Group	Significance
Operator	• Uses the product himself for commercial or economic purposes or lets a third-party use/apply it. • During operation, bears legal product responsibility for the protection of the user, personnel and third parties. • May not open control cabinets and/or perform maintenance.
Trained person	• Has been demonstrably trained and instructed by the operator about the assigned tasks and possible dangers in case of improper behavior. • Is authorized to operate the plant. • May not open control cabinets and/or perform maintenance.
Service Personnel	• FREQCON GmbH service personnel • Personnel trained and authorized by FREQCON and authorized specialist personnel. • Carries out all other work on the plant, e. g. commissioning, maintenance work, transport, and troubleshooting.
Manufacturer	• Person who was/is involved in the development of the energy storage system and has detailed knowledge of the structure and function of the modules or the entire system - in accordance with the relevant specialist area.

Table 5: Target groups

2 Safety Instructions

2.1 The Five Safety Rules

For your own personal safety and to prevent material damage when carrying out any work, always observe the safety-relevant instructions and the following five safety rules according to EN 50110-1 "Working in a voltage-free state".



2.2 Basic Safety Information

Do not operate!	**Lock and tag power switches and controller devices**
	Follow national laws regarding occupational safety and health. ➜ Identify the energy source(s). ➜ Isolate the energy source(s). ➜ Determine voltage-free status. ➜ Ground device or equipment to protect from short circuiting and from shocks. ➜ Lock and Tag the energy source(s). ➜ Prove that the equipment isolation is effective. ➜ When required, apply lock-out device or clamp and secure with padlock(s).

Important!	
	➜ Read the instructions of this manual thoroughly before use! ➜ Keep manual within reach. ➜ All personnel who have to perform any task on the BESS (on-site or remotely) with respect to operation of the unit are obligated to read all related manuals regarding the BESS. By proceeding with work on the BESS, the personnel declare that they have fully read and understood all contents of the manuals and agree to follow all instructions, especially issues regarding safety and accident prevention.

⚠ DANGER	
	**Hazard by voltage** Always respect all the safety instructions and, in particular: ➜ Always use protective devices suitable and approved for each type of activity. ➜ The instructions in this manual must be strictly followed. ➜ Use of the equipment must comply with all national and local regulations. ➜ Access to internal components is only allowed after the converter has been de-energized and disconnected from all power supplies.

⚠ DANGER	
	**Hazard by voltage** ➜ Electric shock hazard. ➜ Only electricians may perform work on electrical components. ➜ Do not touch live components! ➜ Disconnect the device from all power supplies, before performing work on the device. ➜ Do not short circuit any conductive parts that are not de-energized before. (Take care with jewellery, tools, instruments, etc. which can cause short circuits accidentally.)

⚠ DANGER	
	**Hazard by voltage** ➜ Before opening the cabinet doors de-energize the converter. ➜ Even if the main circuit breaker is switched off, the cabinets are not completely voltage-free.

⚠ DANGER	
	**Risk of burns on hot surfaces** ➜ Avoid contact with hot surfaces or wear protective clothing (e.g. protective gloves).

⚠ DANGER	
	**General risk of injury due to improper handling** ➜ Only perform work on the device if you have expert knowledge of the respective activity. ➜ Follow the operating instructions and warnings stated in this manual.

⚠ DANGER	
	**Electric shock hazard!** **Do not perform maintenance work on a live system.** After switching off the converter, the DC-link of the converter still carries dangerous voltages, which may cause death or severe injuries if touched or short circuit. ➜ Before performing work on the converter, deenergize the converter, wait for 30 minutes until the installed capacitors are discharged and check the voltage-free status of the DC-link by using a 2-pole voltage tester. ➜ It is not allowed to open the cabinet doors before the converter system has been de-energized and the capacitors are discharged. ➜ It is not allowed to perform any work on the converter before the system has been de-energized.

⚠ DANGER	
	**Electric shock hazard!** **Do not perform maintenance work on the converter system, before the converter system has been disconnected from all power sources.** After switching off the converter, the connected DC power cables of the battery strings, the DC connection busbars in the AC_DC cabinet and the DC switch & fuse units continue to carry dangerous voltages that can cause death or serious injury if touched or short-circuited. ➜ Before starting work inside the converter cabinets, de-energize the converter system as described in section 14.6 “De-Energizing”, wait for 30 minutes until the installed capacitors are discharged and check the voltage-free status of the DC-link by using a 2-pole voltage tester. ➜ Disconnect the DC power cables from the converter system using suitable DC disconnecting devices before carrying out any work in the cabinets of the converter system. ➜ Before disconnecting the DC power cables from the DC connection busbars, always check for voltage-free status of the DC power cables, since dangerous electric arcs may lead to severe injuries or death when disconnecting the power cables.

⚠ DANGER	
	**Electric shock hazard!** **Do not perform any work on the MV switchgear and the MV transformer before the PLC container has been disconnected from all voltage sources.** After switching off the converter, the connected MV transformer, the MV switchgear, its connecting cables and terminals continue to carry dangerous voltages which, if touched or short-circuited, can cause death or serious injury. ➜ Before working on the medium voltage components of the converter container, de-energize the converter system as described in section 14.6 “De-Energizing”. ➜ Disconnect the AC mains connection by opening the MV switchgear. ➜ Before disconnecting the AC power cables from the AC connection busbars, always check the voltage-free status of the AC power cables, otherwise dangerous arcs can cause serious injury or death when disconnecting the power cables.

⚠ DANGER	
	**Electric shock hazard!** **Do not perform any maintenance work on the converter system before the AC circuit breaker and MV switchgear have been switched off and protected against unintentional reclosure.** ➜ Before starting work inside the converter cabinets, the AC circuit breaker 80Q1 must be switched off and protected against unintentional reclosure as described in section 14.8.3 “Protect the CB Against Unintentional Reclosing”. ➜ Before you start working inside the control cabinets, the medium-voltage switchgear must be switched off and protected against unintentional reclosure.

⚠ DANGER	
	**Danger to life through electric arcs** Danger by electric arcs could occur by: • Exceedance of the maximum input current • Faulty design of circuit breakers or transformers • Faulty or not connected cables • Excessive contamination Electric arcs may lead to death, severe injuries or material damage. ➜ Make sure the system is properly designed and all power cables are connected correctly. The maximum permissible input current is provided in the table "Technical Data". ➜ Excessive contamination must be removed.

⚠ DANGER	
	**General risk of injury due to improper handling.** Always respect all the safety instructions and, in particular: ➜ Always use protective devices suitable and approved for each type of activity. ➜ The instructions in this manual must be strictly followed. ➜ Use of the equipment must comply with all national and local regulations. ➜ Access to internal components is only allowed after the converter has been de-energized and disconnected from all power supplies. ➜ It is not allowed to perform work on a live converter. ➜ The converter and all connected systems/components must be electrical grounded properly. ➜ All installation work and maintenance on the BESS must be carried out by qualified personnel. ➜ Improper use or handling of the BESS during transportation, installation or during operation may result in damage to the equipment or cause severe, even fatal injury. ➜ Maintenance work on the converter unit must be performed with reasonable care. ➜ Non-compliance with the present instructions may cause damage to the product and could lead to serious injuries of the personnel.

⚠ DANGER	
	**Danger to life when live parts are touched on damaged devices** Improper handling of devices can cause damage. For damaged devices, hazardous voltages can be present at the enclosure or at exposed components. If touched, this can result in death or severe injury. ➜ Ensure compliance with the limit values specified in the technical data during transport, storage and operation. ➜ Do not use any damaged devices.

⚠ DANGER	
	**Danger to life through electric shock due to unconnected cable shields** Hazardous touch voltages can occur through capacitive cross-coupling due to unconnected cable shields. ➜ As a minimum, connect cable shields and the conductors of power cables that are not used (e.g. brake cores) at one end at the grounded housing potential.

⚠ DANGER	
	**Danger to life due to electric shock when not grounded** If the protective conductor connection is missing or incorrect, high voltages can occur at open, exposed parts when using devices of protection class I. Touching these parts can result in death or serious injury. ➜ Ground the device in compliance with the applicable regulations.

⚠ DANGER	
	**Danger to life due to electric shock when opening plug connections in operation** When opening plug connections in operation, arcs can result in death or severe injuries. ➜ Only open plug connections when the equipment is de-energized, unless it has been explicitly stated that they can be opened in operation.

⚠ DANGER	
	**Danger to life through electric shock due to the residual charge of the power component capacitors** Due to the use of capacitors, a dangerous voltage is present even up to 5 minutes after the power supply has been switched off. Contact with live parts can result in death or serious injury. ➜ Wait for 5 minutes and then check the de-energized state of the system. Only then should you start working on the device.

⚠ DANGER	
	**Danger to life from electromagnetic fields** Electromagnetic fields (EMF) are generated by the operation of electrical power equipment, such as transformers, converters, or motors. People with pacemakers or implants are at particular risk in the immediate vicinity of this equipment. ➜ If you have a heart pacemaker or implant, maintain a minimum distance of 2 m from electrical power equipment.

⚠ DANGER	
	**Danger to life when safety functions are inactive** Safety functions that are inactive or that have not been adjusted accordingly can cause operational faults on machines that could lead to serious injury or death. ➜ Observe the information in the appropriate product documentation before commissioning. ➜ Carry out a safety inspection for functions relevant to safety on the entire system, including all safety-related components. ➜ Ensure that the safety functions used in your drives and automation tasks are adjusted and activated through appropriate parameterizing. ➜ Perform a function test. ➜ Only put your plant into live operation once you have guaranteed that the functions relevant to safety are running correctly.

⚠ DANGER	
	**Danger to life due to fire if overheating occurs because of insufficient ventilation clearances** Inadequate ventilation clearances can cause overheating of components with subsequent fire and smoke. This can cause severe injury or even death. This can also result in increased downtime and reduced service lives for devices/systems. ➜ Ensure compliance with the specified minimum clearance as ventilation clearance for the respective component.

⚠ DANGER	
	**Danger of an accident occurring due to missing or illegible warning labels** Missing or illegible warning labels can result in accidents involving death or serious injury. Check that the warning labels are complete based on the documentation. ➜ Attach any missing warning labels to the components, in the national language if necessary. ➜ Replace illegible warning labels.

⚠ WARNING	
	**Hazard by hot surfaces of components** During operation, some components may heat up significantly, e.g. heat sinks and inductors. These components can still be very hot for some time after operation. In case of contact, severe bodily injuries, such as skin burns, may result. ➜ Do not touch hot surfaces even after shutdown of the converter system.

⚠ WARNING	
	**Danger to life or malfunctions of the BESS as a result of incorrect or changed parameterization** As a result of incorrect or changed parameterization, the system can malfunction, which in turn can lead to injuries or death. ➜ Protect the parameterization (parameter assignments) against unauthorized access. ➜ Respond to possible malfunctions by applying suitable measures (e.g. EMERGENCY STOP or EMERGENCY OFF).

⚠ WARNING	
 	**Hazard by cooling liquid** The coolant used in the internal cooling system of the converter is harmful to human or animal health when touched or swallowed. ➜ Avoid oral ingestion of the coolant since it can lead to harm to human or animal health. In case of accidental ingestion or eye contact with the coolant, seek immediate medical attention. ➜ Avoid skin contact with the coolant. ➜ Use appropriate eye protectors and protective gloves when working on the cooling system and during filling and draining of the cooling liquid.

⚠ CAUTION	
	**Hazard by sharp edges on packaging** Improper handling during unpacking can cause injuries. ➜ Use appropriate safety gloves to protect your hands from possible cuts.

NOTICE	
	**Material damage due to loose power connections** Insufficient tightening torques or vibrations can result in loose electrical connections. This can result in damage due to fire, device defects or malfunctions. ➜ Tighten all power connections with the specified tightening torques, e.g. grid supply connection. ➜ Check all power connections at regular intervals. This applies in particular after transport.

NOTICE	
	**Device damage caused by incorrect voltage/insulation tests** Incorrect voltage/insulation tests can damage the device. ➜ Before performing voltage/insulation tests on the equipment, disconnect all equipment as high voltage tests have been performed on inverters and motors by their manufacturers. Therefore, it is not necessary to perform a retest on the system.

NOTICE

Material damage due to overloading of DC devices and connecting cables

The DC paths and the connection cables are not protected against overload by the BESS.

Select external components according to the specified nominal and maximum currents of the BESS.

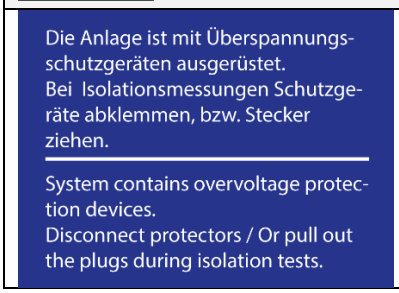
➜ If necessary, use appropriate protective equipment for the external components.

NOTICE

Material damage due to improper use of the transformer

For your safety, carefully read the delivered operating instructions of the transformer and observe the instructions. Technical specifications of the transformer which are provided on its´ type plate like rated current, rated power etc. must be strictly observed when commissioning and feeding power to the grid. All electrical connection work must be carried out onsite and by trained, qualified personnel, provided with the required safety devices in accordance with the national occupational safety regulations. Please pay attention to the proper protection of the transformer during unloading, installation at the place of operation, feeding and operation The transgression of the voltage or power and the presence of external factors (such as condensation, solar radiation, plants and animals) can affect the proper functioning of the transformer).

NOTICE



General risk of damage

During isolation tests disconnect overvoltage protection devices or pull out the plugs otherwise they will be activated or destroyed.

2.3 Safety Instructions Battery Storage Unit

⚠ DANGER	
	**Hazard by electrolyte** Work on the battery storage system is only allowed to be performed by FREQCON service personnel or qualified personnel trained and authorized by FREQCON. It is not allowed to modify or manipulate the battery storage unit and its components. ➜ Do not open, disassemble or puncture the battery storage cabinets or battery modules. ➜ Do not short circuit the battery storage unit. ➜ Do not expose the battery storage system to vibrations or shock. ➜ Do not a use defective or damaged battery storage system or battery modules. ➜ Do not touch defective or damaged batteries with bare hands. Defective or damaged batteries must only be handled by FREQCON personnel.

⚠ DANGER	
	**Hazard by electrolyte** The material/media required for intended operation of the battery storage system are procured and provided by the manufacturer. ➜ The proper handling of these materials/media and the associated risks underly the sole responsibility of the manufacturer. ➜ Hazard and disposal information must be provided by the manufacturer. ➜ The safety data sheets of the material and media manufacturers are to be observed.

⚠ WARNING	
	**Health hazards due to negligent use of personal protective equipment** Serious injuries can occur when working without personal protective equipment. ➜ Wear personal protective equipment (PPE) when working on the BESS. Refer to section 2.7 "Personal Protection Equipment (PPE)" for information regarding the required PPE.

⚠ WARNING	
	**Possible danger to life due to electric shock when extinguishing fire or due to flooding!** If the following instructions are not observed, this can lead to damage to property and personal injury, for which FREQCON GmbH accepts no liability whatsoever. ➜ In the event of a fire, switch off the battery storage system if safe to do so. ➜ Immediately alert the fire department. ➜ Immediately remove yourself and other persons from the danger zone. ➜ Inform the fire department about the presence of lithium iron phosphate batteries.

⚠ CAUTION	
	**Danger due to fire breaking out** During operation, fire may break out, e.g. due to sparks or heated surfaces. ➜ Observe the relevant safety regulations (5 safety rules). ➜ Note the risk of arcing when operating the NH isolators installed inside the battery storage cabinets. ➜ Never install or operate a potentially defective or obviously defective battery storage unit.

⚠ CAUTION	
	**Hazard by burns (electric arcs)** When working on the electrical equipment, you may come into direct contact with faulty or overloaded parts which can cause burns. ➜ Always observe the relevant country-specific safety regulations. ➜ Note the risk of arcing when operating the NH isolators installed inside the battery storage cabinets. ➜ Note the risk of arcing when operating the NH isolators installed inside the battery storage cabinets.

2.3.1 Safety Data Sheet

Observe the information provided in the Material Safety Data Sheet (MSDS) of the battery cells (*see section 1.2 "Applicable Documents"*).

2.3.2 Personal Protection

This chapter describes the personal protection for FREQCON battery converter systems in the event of fire or the occurrence of a toxic gas concentration.

Basic safety measures

- No person may remain inside the container or in the safety area of the container while the system is in operation.
- All container doors must be locked while the system is in operation.
- Maintenance and repair work may only be carried out when the system is switched off and all energy sources are disconnected from the system.

Critical situation regarding personal safety

A person enters the container for maintenance/repair work in which there is a fire (risk of deflagration when opening the container door) or a toxic concentration of carbon monoxide due to outgassing batteries.

Definition of the protection objective

Under all circumstances, a person must be prevented from entering the container if the critical situation mentioned before exists.

Technical measures to achieve the protection objective

- Reliable detection of a fire or toxic gas concentration using suitable sensors (smoke detectors, CO sensors, temperature sensors).
- The sensors are redundant. Smoke detectors, CO sensors and temperature sensors are installed in each battery room.
- One H2 sensor is installed inside each battery room of the BESS containers.
- If the system is shut down by emergency shutdown, no person may enter the container.
- If a hazardous situation exists, an infrared thermometer must first be used to check whether there is a fire in the container. A temperature above 60 °C is a sure sign of a fire inside the container. If this is the case, the container doors must not be opened (risk of deflagration) and the fire brigade must be alerted.
- If a fire can be ruled out as the cause of the emergency shutdown, a toxic gas concentration could be present. Entering the container is not permitted in this situation. Active ventilation (exhaust units in the BESS container roof) reduces the gas concentration in the container.

2.3.3 Fire Fighting Measures

1) Fire protection / early fire detection
   a. Spatial conditions:
      Primarily through the structural measure; Space between modules, air conditioning and ventilation reduces the risk of thermal stress to a minimum
   b. It must be ensured that there is no additional fire load in the battery rooms. Unauthorized access must be strictly prevented.
   c. Sensors for detecting smoke, heat and CO gas are redundantly built into the alarm system.
   d. At 300 °C automatic fire suppression using an aerosol mist triggers itself.

Important: Extinguishing an internal cell fire is not possible. Due to the chemical release of bound oxygen in the cathodes, the fire inside the cell sustains itself. The aerosol extinguishing system is intended to prevent the flames from spreading to the outer surroundings of the battery module!

2) Behavior in case of fire
   a. Upon detecting a fire in the battery room, the battery container is immediately and automatically disconnected from the grid. The circuit breaker opens its contacts to prevent any further external energy supply.
   b. Toxic and hazardous substances are released by the battery in the event of a fire.
      Harmful gases include:
      Hydrogen (H_2) 48%
      Carbon dioxide (CO_2) 27%
      Carbon monoxide (CO) 11%
   c. Remove all persons from the danger area.
   d. Clear affected area and secure from entry.
   e. Disconnect all supply voltages of the BESS at the disconnection points of the external voltage sources.
   f. Only start active measures in the event of visible flame development outside the energy storage unit.
   g. Do not enter any electrolyte cloud that may form in the external area (near the floor).
   h. Wait at least 48 hours before starting firefighting measures inside the container. First open the access door and wait another 2 h.

⚠ DANGER	
	**Poisoning and chemical burns hazard** Escaping electrolyte gases contain chemicals which are harmful to humans. ➜ Keep away from electrolyte mist clouds. ➜ Approach electrolyte mist clouds only under full protection. ➜ Observe the instructions in the Material Safety Data Sheet of the battery cells *(see applicable documents)*. ➜ Follow the following instructions

3) Recommendation for rescue units

   Firefighting should be conducted according to regional standards and guidelines.
   (EN 15182-1:2019-11).
   The distance for the fire hose nozzle must be maintained.

Ensure full protective gear according to DGUV Information 205-014 (e.g. DIN EN 469 ; Protective clothing for the fire brigade - performance requirements for protective clothing for fire brigade activities) and recirculating air independent respirator is worn.
For firefighting protective equipment, thermal risk is given more priority than chemical hazard.

4) Instructions after fire extinction

Once the fire brigade has cleared the fire site and the fire has been extinguished, an electrically trained specialist must immediately ensure and verify the absence of voltage (measure all poles) and secure against re-energization.
5 safety rules!
Attention: Batteries continue to maintain voltage even after disconnection!
In addition, ventilate the rooms adequately to eliminate any remaining hazardous fire gases.
According to the technical data sheet, the battery modules must be stored/disposed.

Rules of Conduct for the Fire Brigade

The following notice board must be kept outside the container or handed over to the local fire department. A laminated copy is included in the scope of delivery.

Rules of conduct for the fire brigade



Attention electrical voltage!

Batteries are still live after disconnection!!!

Batteries can outgas when heated

CO = carbon monoxide
H2 = Hydrogen







Unauthorized access is strictly prohibited.

Keep doors closed in case of fire

The use of respiratory protection is strongly recommended





Battery fire cannot be extinguished!

Container cooling from outside

Extinguishing agents: water

2.3.4 Disposal Considerations

Lithium-ion cell batteries are labeled in compliance with the EU Battery Directive 2006/66/EC.

For instructions regarding the disposal of the battery storage system and its battery storage modules, refer to section 24 ”Dismantling and Disposal”.

2.3.5 Transport Information

For information regarding the transport of the battery storage system and its battery storage modules, refer to section 10.2 "Transport”.

2.4 Handling Electrostatic Sensitive Devices (ESD)

Electrostatic sensitive devices (ESD) are individual components, integrated circuits, modules or devices that may be damaged by either electric fields or electrostatic discharge.

NOTICE



Damage through electric fields or electrostatic discharge

Electric fields or electrostatic discharge can cause malfunctions through damaged individual components, integrated circuits, modules or devices.

- ➜ Only pack, store, transport and send electronic components, modules or devices in their original packaging or in other suitable materials, e.g. conductive foam rubber of aluminum foil.
- ➜ Only touch components, modules and devices when you are grounded by one of the following methods:
  - Wearing an ESD wrist strap
  - Wearing ESD shoes or ESD grounding straps in ESD areas with conductive flooring
- ➜ Place electronic components, modules or devices on conductive surfaces (table with ESD surface, conductive ESD foam. ESD packaging, ESD transport container).

⚠ DANGER



Danger to life as a result of unsafe operating states resulting from software manipulation

Software manipulations (e.g. viruses, trojans, malware or worms) can cause unsafe operating states in your system that may lead to death, serious injury, and property damage.

- ➜ Keep the software up to date.
- ➜ Incorporate all installed products, especially the automation and drive components into a holistic, state-of-the-art industrial security concept for the installation.
- ➜ Protect files stored on exchangeable storage media from malicious software by with suitable protection measures, e.g. virus scanners.

2.5 Warnings and Symbols on the Device



2.6 Qualification of Personnel

Installation, service and operating personnel must be sufficiently trained before installing, operating and handling the equipment.

2.7 Personal Protection Equipment (PPE)

Always wear safety equipment when working on the product.

When carrying out maintenance and service work, secure controllers, devices and units of designated area against accidental activation.

Symbol	Meaning and Application
	Gloves made of nitrile rubber against chemicals and microorganisms (at least protection index 2 according to EN 374-1) • for removal of electrolyte or hydrofluoric acid (only by FREQCON service) • Gloves according to EN 60903 - up to 1000 V AC for live working activities
	Safety shoes (toe protection, non-slip, ESD) • Operation • Cleaning Safety shoes (acid resistant) or rubber boots • for removal of electrolyte or hydrofluoric acid (only by FREQCON service)
	Tightly fitting safety goggles/basket goggles/face shield • for removal of electrolyte and hydrofluoric acid (only by FREQCON service)
	Chemical protective suit • for removal of electrolyte and hydrofluoric acid (only by FREQCON service) • for fire fighting
	Ambient air-independent breathing apparatus • for firefighting in case of smoke formation inside or outside the building (by rescue forces)

Table 6: Personal Protection Equipment (PPE)

2.8 Changes of the Product

Modifications to the product and/or mounting of parts from other manufacturers can endanger the operating safety of the product. This especially applies to tampering with safety-relevant parts.

Any modification carried out without prior written approval by the manufacturer will result in the manufacturer's declaration of conformity becoming void. The responsibility for damage and accidents caused by modifications of this kind shall be borne solely by the user.

2.9 Proper Use

The Battery Energy Storage System (BESS) described in this document is intended to feed into or draw power out of a connected electric grid by means of a power conversion system connected between both. The system specifications are listed in section 3 of this document.

The system is properly constructed, installed and commissioned by FREQCON service personnel according to manufacturer specifications. The operator ensures that the required environmental conditions are met (*see section 8 and 9*).

Modification of the device by the operator or integrator is not permitted. Only use the device in accordance with the specifications in this manual and the locally applicable standards and directives. Use contrary to the specifications and specified operating limits as well as any modification of the energy storage unit by the user is not permitted and will void the warranty!

Deviations from this manual are not permitted or require the separate written approval of FREQCON GmbH.

The system is intended for stationary use as a fixed installation. Any other or additional use is considered improper and increases the risk of personal injury and property damage when handling the energy storage system. The manufacturer rejects any liability and warranty claims for damage caused by improper use.

Access to the container is only permitted for instructed personnel. The access doors of the container must be locked if no instructed personnel are on site. The access doors of the container must be locked if no instructed personnel is on site.

Proper use also includes the following measures:

- ➜ Observe the operating manual.
- ➜ Comply with technical data.
- ➜ Comply with maintenance conditions.
- ➜ Immediately eliminate faults which hamper safety.
- ➜ Operate the unit only when it is in technically flawless condition.

2.10 Misuse

Any use which goes beyond the proper use is considered to be misuse. It can result in serious injuries or damage and is therefore prohibited.

The responsibility for damage resulting from misuse shall be borne solely by the operating company of the product.

2.11 Duties of the Operating Company

To ensure safe, smooth operation of the unit, you as the operator must comply with the following:

Personnel

- ➜ Only allow personnel with corresponding knowledge to operate and clean the product.
- ➜ Only allow a trained electrician or person with electro technical instruction to work on the electrical system. The regulations given in section 1.7 “Target Groups” must be observed.
- ➜ Clearly and bindingly specify the responsibilities for operation, service and maintenance work.

Operating Manual

- ➜ Always keep this operating manual available near the device.
- ➜ Make sure that the personnel have read and understood this operating manual before working on the device.

Safety

- ➜ Monitor the compliance with the generally valid legal and other binding safety and accident prevention regulations.
- ➜ Make sure that the users of the product wear the necessary, personal safety equipment in accordance with their job.
- ➜ Ensure that all safety and danger warnings on the product and in the installation room are kept complete and in legible condition.

Inspection and Maintenance

- ➜ Observe the adherence of the inspection and maintenance intervals in section 16 „Maintenance“.
- ➜ Operate the product only if it is flawless.

2.12 Duties of the User

The following are referred to as users:

- Persons, who install and configure the product.
- Persons, who operate the product and eliminate errors during the process.
- Persons, who carry out checking, maintenance and inspection activities.

Follow the instructions below in the interest of your own safety and for fault-free operation of the product:

➜ Read this operating manual before using the product. If you have questions, contact your superior or the safety officer.
➜ Always carry out activities based on the complete operating manual. Missing information due to an incomplete operating manual can result in serious or fatal injuries and in damage.
➜ Familiarize yourself with the safety devices of the product. Do not make any modifications to it.
➜ Do not operate the product until you have received a complete user training course for this product from an authorized person.
➜ Report any fault in the product to your superior if you cannot and may not eliminate it yourself.

3 Product Description

The battery energy storage system described in this document (BESS) is designed as a battery-to-grid system.

The BESS system is generally capable to provide the following functions, but the specific functions depend on the contractually agreed specifications:



Figure 1: BESS Functions Overview

The BESS consisting of a battery storage system with battery modules, battery control system and air conditioning systems are integrated in two (2) 40" HC containers with an active fire suppression system (*see section 4, "Design"*).

The PCS hardware and software control system as well as the converter technology incl. water cooling system with heat exchangers and air conditioning systems for the interior temperature are integrated in one (1) separate 20" container with a passive fire suppression system. The BESS is connected to the AC grid via busbars at the HV side of a 6.6 kV /620 V AC MV transformer inside the PCS container. The cable entries into the containers are located in the container floors.

It is not permitted to use the BESS system for purposes other than those specified in this manual.

Only sufficiently trained personnel are permitted to run, handle, and operate the unit (*see section 1.7* "*Target* Groups").

3.1 Working Principle

The BESS consists of a converter system with a total output of 1 MW and a battery storage system with a usable storage capacity of 5 MWh (5.5 MWh installed).

The BESS is passively charged by the energy taken from the AC grid via contactors and resistors from the DC link of the PCS as soon as the voltage level of the battery storage system falls below a value predefined in the PCS controller.

3.2 Control

A Programmable Logic Controller (PLC) is used as system controller. After commissioning and parameterization, the BESS operates automatically. The control system provides remote monitoring and access to the converter functions and set point adjustment via IT network. For detailed information regarding the control system, refer to section 6 “Control System”.

3.3 PCS

The BESS system is equipped with an integrated power conversion system (PCS), the FREQCON MSC converter system.

The key component of the converter system is a DC link converter with a control unit, generating a controlled DC voltage from the AC infeed, the so-called DC link voltage. The DC link voltage is kept to a constant level independently from the grid voltage (also in case of power feedback into the grid). It is required that the specified DC voltage setpoint is within a defined operational range.

3.4 Decoupling Protection

The decoupling protection of the converter system consists of the main controller, which evaluates the signals and controls the coupling switch (circuit breaker). In addition, peripherals for measuring the grid voltage are installed. The periphery consists of a HVIO that divides the grid voltage to a lower voltage and a PIII converter interface that digitizes the measured voltage and provides it to the main controller.

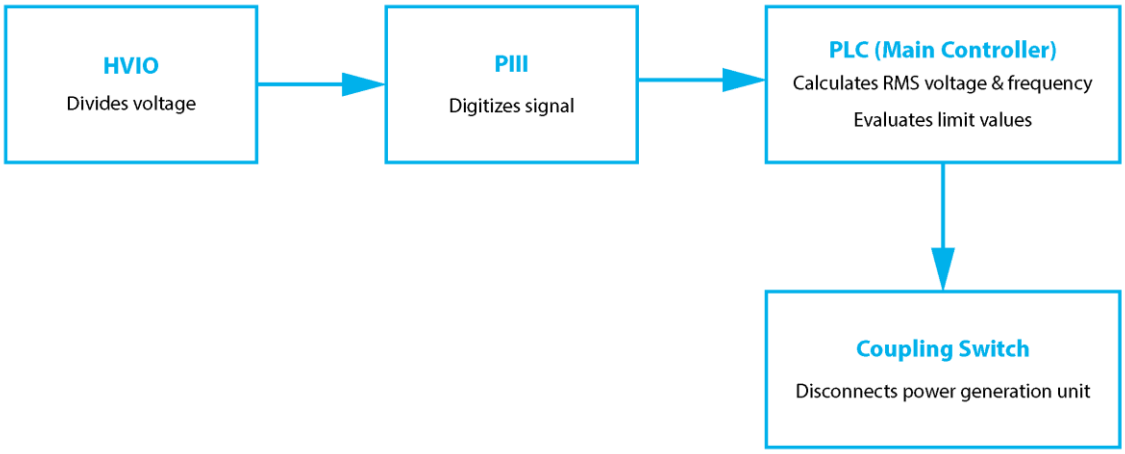


Figure 2: Decoupling protection scheme

The grid phases are measured by an HVIO board that is connected to a PIII. The voltages evaluated are phase-neutral voltages.

The measured instantaneous voltages are used to determine the RMS value, the phase angle and the frequency in the main controller. The currents are recorded directly at IGBT half bridges and also digitized via the PIII. RMS currents are calculated in the main controller.

RMS voltages, RMS currents and frequency are monitored for limit values in the main controller and the coupling switch is switched off if these are exceeded.

3.5 Auxiliary Power Supply of Protective Devices

The entire control system is buffered via a UPS. This is set so that the control and protection system is supplied with energy for at least 15 minutes.

In the event of a faulty UPS and a grid failure, the main controller fails, the grid switch opens, and the converter disconnects from the grid.

3.6 Behavior in the event of a supply voltage failure

If the supply voltage of the converter system fails, the following steps are carried out:

1. The failure of the supply voltage is immediately detected by the main controller.
2. A level 4 error is triggered. This means:
   a. All IGBTs (both DC and AC side) are switched off (500 µs after the fault occurs).
   b. The switches to the energy sources are opened (30 ms after the fault occurs), which disconnects the converter system from all AC and DC networks.
   c. The DC link of the converter system is discharged.
   d. The cooling system of the converter system is switched off (30 ms after the error occurs). This is possible because there are no more heat losses.
3. The UPS supplies the converter control system for another 15 minutes. A backup copy of the init files and parameters is created in the non-volatile memory.
   a. When the power supply is restored, this data is automatically reloaded. It is neither possible nor necessary for the customer to access the data.
   b. Important operating data of the converter system at the time of the power failure (voltages, currents, temperatures, etc.) are logged in a buffer file as long as the UPS is running. Which data is logged in detail depends on the converter type.
   c. The buffer file can be displayed via the FREQCON buffer analysis tool (subject to license) as soon as the supply voltage is available again.
4. If a battery storage system is present, the battery control is switched off immediately so that the battery storage is transferred to a safe state. No operating data of the battery system is saved.
5. Before the switch cabinet doors are opened for a visual inspection after the supply voltage has failed, it is essential to wait for the DC link to discharge.

⚠ DANGER	
	**Risk of injury due to electric shock** Discharging the DC link takes several minutes. The "Ready for Operation" signal light is not an indicator of a fully discharged DC link. Do not carry out any work on the converter before the DC link has been completely discharged. ➜ Wait until the DC link is completely discharged and check that it is de-energized as described in section 14.7 "Check Voltage-Free Status of DC Link ".

4 Design

For better handling and to increase system flexibility, all components of the BESS system are housed in containers.

BESS main components:

- BESS with installed battery modules, control systems and integrated fire protection and suppression system
- Integrated climate control system
- Integrated emergency fan system
- Several sensor systems (H2, CO; temperature and smoke)

PCS main components

- Converter system consisting of AC/DC battery converter, control system and converter cooling system
- Integrated water-air cooling system
- Integrated climate control system
- Several sensor systems (temperature and smoke)

Both the PCS and the BESS are controlled and monitored by the same main control system, which is installed in the control cabinet (CTRL) of the PCS container.

The waste heat in the interior of the containers is conducted via internal air conditioning (AC) units from the interior to external AC units at the front side of the container (*see section 4.8 "Cooling System"*).

The BESS containers are equipped with recesses on its underside for the passage of cables (*see section 11.2.2 "Cable Outlets"*). Furthermore, the PCS container is also provided with cutouts on the bottom side to connect the external AC and DC line cables to the converter system.

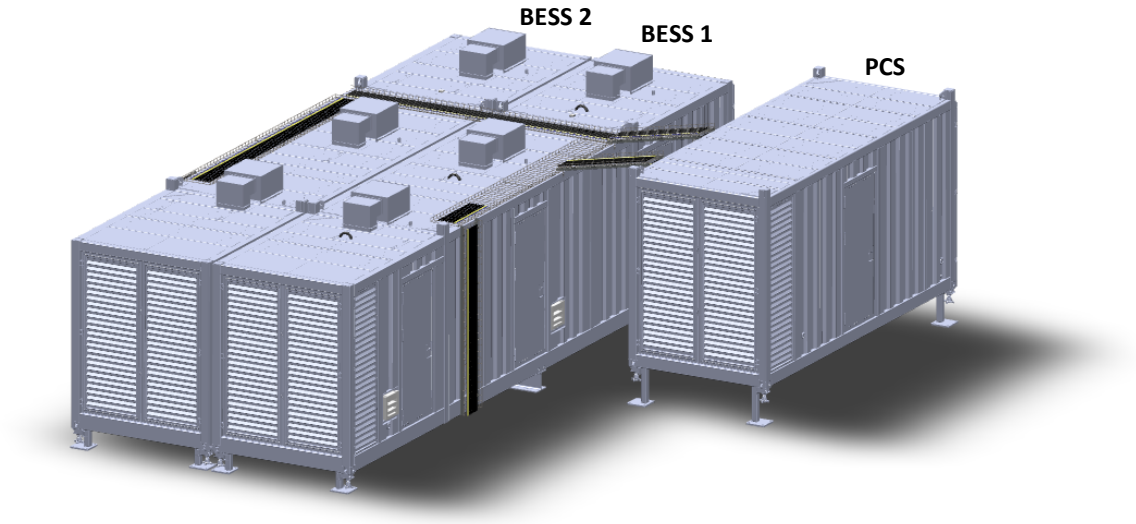


Figure 3: Design

4.1 AC Grid Connection

The BESS is equipped with AC busbars for connection of a 620 V AC grid. The AC busbars are located inside the AC_DC cabinet (*see section 4.4.3*) of the converter system.

Cutouts for inserting the AC power cables into the container are located in the container floor (*see section 11.2.2 "Cable Outlets"*). Through these cutouts, the AC power cables can be fed directly from below into the converter cabinets and connected to the corresponding AC connection busbars inside the cabinets of the converter system.

Further information and a description of the connection of the AC mains supply cables to the converter system are provided in section 11.2.4 "AC Connection".

Note:
The electrical connection must only be performed by personnel trained by FREQCON or by FREQCON service personnel.

4.2 Data Interface

The BESS system can be connected to an electronic higher-level control unit (control room) via a PROFINET interface. The required parameters (current, voltages, frequency, power) are provided by the BESS main control system and transmitted via PROFINET protocol.

The higher-level control unit is connected to the main control unit via a network isolator (114A1) in the CTRL_1 control cabinet (*see section 11.2.5 "Higher-Level Controller Connection"*).

For external control and monitoring of the converter, it is necessary that the customer has access to selected control and status variables stored in the BESS main control system, which can be read and overwritten by the customer's higher-level control. For this purpose, predefined control profiles with the relevant control variables and status profiles with all relevant status variables are stored for the data transfer between the customer's higher-level controller and the converter system.

For a detailed description of the individual data profiles, see the applicable document "23A2007_250116_Modbus_Register BESS_Vx_x_x_x".

4.3 Safety Design

4.3.1 Safety Chain Battery Cell

The battery monitoring system, BMS interface UI and BMS interface RS485, signal error messages via potential-free contacts. See also the documentation for the "BMS interface UI" and "BMS inter-face RS485" hardware modules.

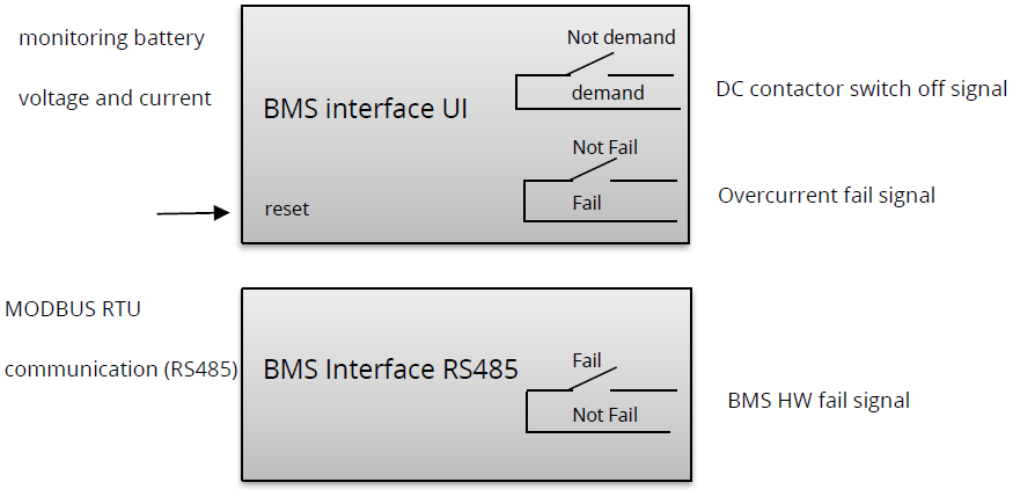


Figure 4: Safety chain battery cell

4.3.1.1 BMS Interface UI

The BMS interface UI monitors the total voltage of a battery rack and the current of the rack.
The BMS interface UI independently monitors the global battery voltage and the battery current. There is a potential-free contact for both errors which opens the contact in the event of an error.
The BMS interface UI has its own digital input for resetting an error message. If an error has been signaled and acknowledged manually via the visualization or MODBUS TCP, this digital input is set briefly.

4.3.1.2 BMS Module

The signals of the BMS interface are monitored in FB_battery_monitoring.
BMS interface RS485 HW error signal. The BMS monitors the battery cells for overvoltage, undervoltage and overtemperature.
If an error is detected locally by a BMS board, the safety chain is opened and an error is signaled.

4.3.2 Safety BMS Rack (S7)

The BMS rack monitors the following states:

- Modbus RTU communication error: The MODBUS RTU master cyclically queries the data of all BMS battery modules (MODBUS RTU slaves).
  If a MODBUS RTU slave [nmodule] is not reached or supplies faulty data, this is evaluated as a communication error. There is a communication error counter for each battery module. While a communication error increments the counter reading, successful communication re-sets the counter to 0.

- Battery voltage monitoring (cmp): The measured battery voltage is cyclically compared with the sum of the individual battery module voltages. If the absolute value of the difference be-tween the two voltages exceeds the 16 V limit value for more than 30 s, an error signal is is-sued.
- Battery monitoring cell voltage: Monitoring of all cell voltages to the maximum value of the measured voltages.
- Battery monitoring current: Monitoring of the battery current.
- Battery monitoring cell temperature: The maximum battery cell temperature is determined cyclically, approximately every 2.5 s, from all battery module cell temperatures recorded. A peak filter suppresses temperature jumps greater than 5 °C for a maximum of 8 cycles. If the average cell temperature is already close to the switch-off limit, incorrect measurements (jump) would result in a warning or error signal.
- Battery monitoring Balancer Temperature and ambient temperature Balancer
- Monitoring the battery pack connections + and - for overtemperature
- Smoke detector
- Gas sensor
- Line protection (fuses) of the auxiliary systems
- Main fuse (battery current)
- Modbus-TCP communication error: An error is triggered in the event of a communication timeout with the charging system (inverter control).
- Contactor feedback: Monitoring whether the status of the contactors matches the target status

If a fault is detected, the DC contactors open after 0.5 seconds.
In addition to errors, warnings can also be generated for cell voltages and cell currents.

4.3.3 Safety Converter Control

The converter system constantly communicates with the connected battery racks and continuously checks the following statuses:

- Modbus-TCP communication: In the event of a communication timeout with the battery racks, a corresponding rack is switched off or an error is triggered at converter level.
- Fault conditions: All faults at BMS rack level are signaled to the converter and the current is briefly set to zero to enable the DC contactors in the racks to be switched without current. Every fault reported by a rack prompts the converter system to disconnect the corresponding rack. Some error states also trigger a switch-off of the converter. The following error messages trigger a switch-off of the converter:
  - Error with the DC contactors in a rack
  - Tripping of a DC fuse in a rack
  - Triggering a smoke detector in a rack
  - Triggering a gas alarm in a rack
- Overvoltage (cell voltage): In the event of a cell overvoltage, the current setpoint value is also set to zero independently of the lookup tables.
- Undervoltage (cell voltage): If a cell is undervoltage, the batteries are charged with a low current to prevent deep discharge. If the cell voltage drops further, the corresponding rack is dis-connected.
- Warning messages: If a warning message is generated by a rack, the charging system re-quests a disconnection of the corresponding rack. As soon as the warning is no longer pre-sent, an attempt is made to reconnect the rack.

- Charge control system: To protect the cells from fault conditions, the following limits are available for charging and discharging the system. The respective limit values can be stored via lookup tables and thus set graduated limit values for the charging and discharging current. All limits are analyzed separately and the lowest limit is selected for the current limit. The limits are parameterized so that the charging or discharging current can be reduced to 0 A.
  - Maximum cell voltage
  - Maximum cell temperature
  - Maximum balance temperature
  - SOC (real)
  - Customer SOC (adjusted to capacity sold)

4.3.4 Overview of the Safety Concept

The safety aspects described in chapters 4.3.1 to 4.3.3 result in a three-stage safety concept:

1. Module level:
   - Detection of cell voltages and temperatures and opening of the safety chain in the event of a limit value violation.
2. Rack level:
   - Evaluation the safety chain and open the DC contactors if necessary.
   - In-house evaluation of cell voltages, cell currents, cell temperatures, smoke sensors, gas sensors and communication with the modules and the charging system. If required, fault generation and opening of the DC contactors.
   - Option to disconnect the rack independently if the safety chain is triggered or a self-detected fault condition occurs.
3. Converter level:
   - Evaluation of the cell voltages, currents and temperatures as well as the error states of a rack. Triggering of a converter error for selected error states of individual racks.
   - Reduction of the charging and discharging currents according to lookup tables depending on the cell voltage and temperatures.
   - Request to switch off the rack or the inverter in the event of a rack fault.

4.3.5 Fire Protection System and Suppression System

FREQCON uses highly safe lithium-ion battery cell technology: Lithium iron phosphate (LiFePO4) cells are, among other things, highly temperature resistant and significantly safer compared to cells based on other lithium-ion technologies. The use of these technologies significantly reduces the probability of a thermal runaway, as they do not catch fire even in the event of a short circuit or overcharging.

Furthermore, in addition to controlling and monitoring the state of charge at cell and system level, the FREQCON BMS (Battery Management System) also handles temperature management during charging and discharging. Every second, the temperature, state of charge and all other important operating parameters of each individual battery cell, as well as of the battery modules, are collected and analyzed by the FREQCON BMS.

This means that a potential problem of the cells is already detected at approx. 60 °C, and thus much earlier than the actual fire development the battery storage is brought back into a safe operating condition by segmental or complete shutdown.

In addition to CO sensors and smoke detectors, there are a total of 339 temperature sensors in one battery cabinet alone. This ensures that the cells are always kept within the defined and safe operating range and that, in addition to achieving high efficiency and low degradation, the probability of overloading is also excluded.

The fire protection system meets the thermal runaway propagation containment requirements of IEC 62619 as well as requirements of the EN 54 Fire detection and fire alarm systems standard.

4.3.5.1 Detection and Response

The fire protection system aims to detect malfunction as early as possible and suppress the problem before it results in a fire hazard. The system is divided into two parts. One part is primarily designed for plant protection and the other part has the aim of personal safety. For both purposes the BESS containers are equipped with several automatic detectors:

Personal safety:

- 3x H2 sensor per BESS container
- 3x emergency exhaust unit per BESS container

Plant protection:

- 1x CO sensor per battery cabinet
- 2x smoke detectors per battery cabinet
- Temperature sensors (in cells)

The carbon monoxide (CO) sensors for the battery cabinets are an extra measure to detect malfunctioning even before smoke detection (VESDA). Its primary objective is to detect outgassing from battery cells. With the cell chemistry known, the specific reactions that occur during outgassing are well understood. The relative proportions of these gases can be predicted based on the known reactions. For the used battery cells up to 169.7 liters of gas mixture of a single battery cell are released in the unlikely event of outgassing. The main components of this gas mixture being approximately:

- Carbon monoxide (CO): 11 %
- Carbon dioxide (CO2): 27 %
- Hydrogen (H2): 48 %

The CO sensors trigger an alarm based on the measured CO concentration as specified in DIN EN 50291-1:

Co concentration	No alarm within	Alarm not later than
30 ppm	120 min	-
50 ppm	60 min	90 min
100 ppm	10 min	40 min
300 ppm	-	3 min

As the complete outgassing of a single battery cell results in about 500 ppm CO in the battery room the CO sensor will be triggered in such an event based on the thresholds in table given above. The CO sensor alarm will reset when the CO concentration falls below approximately 50 ppm.

The alarm level of the analog CO sensor is set to 1000 ppm which is equivalent to a H_2 concentration of about 10 % LEL (lower explosive limit).

The smoke detector has an optical work principle and is getting triggered by (smoke) particles. It is getting also triggered from the aerosol which is released during the outgassing of a battery cell, being thereby independent of the gas concentration.

Personal safety - If an incident should occur and one sensor of the security chain for personal safety is triggered the system responds as follows:

- The complete system (BESS and PCS) is switched off and disconnected from the mains via a control system. The AC connection of the converter is disconnected, the DC connection to the battery storage system is cut off, and if existing, the MV switchgear with the transformer and low voltage distribution are disconnected from the mains.
- H2 concentration > 4000 ppm of analog H2 sensor (equivalent to about 4 % LEL H_2):
  - Battery cabinets are switched off
  - Stop charging/discharging
  - Ventilation starting (Exhaust units)
  - Error message (Error level 4)

Plant protection - Depending on which sensors are triggered the system responds as follows:

- Temperature >55 °C:
  - Battery cabinet is switched off
  - Stop charging/discharging
  - Warning message
- Temperature >56 °C:
  - Same as temperature >55 °C
  - Error message
- 1x CO sensor in the battery cabinets is triggered:
  - Battery cabinet is switched off

  - Stop charging/discharging
  - Warning message
- 2x smoke detectors are triggered:
  - Disconnects battery DC connection (contactors)
  - Deactivate converter IGBTs
  - Disconnect converter from AC connection
  - Error message
- Temperature > 300 °C:
  - StatX fire suppression triggers itself
- CO concentration > 300 ppm of analog CO sensor:
  - Battery cabinet is switched off
  - Stop charging/discharging
  - Error message

The active emergency exhaust system of the container ensures the gas concentration decreases over time. Based on the assumption of a slight overpressure of 1 Pa which is reasonable in the event of an outgassing battery cell, the estimated time for a complete air exchange in the battery room is less than an hour.

4.3.5.2 Active Fire Suppression inside Battery Cabinets

The fire protection system actively fights the fire only in the affected area (battery cabinet). This is achieved by using condensed aerosol, a compact and effective solution compared to CO2 or halocarbons. The aerosol is contained in Stat-X 60 E cartridges, which are triggered by a 12 VDC signal from the control system or self-triggered due to rupture of a temperature sensitive seal, releasing ultrafine cloud of condensed aerosol to chemically extinguish the fire. These cartridges are non-pressurized, leave minimal residue after discharge, and approved for halon and hydrofluorocarbons (HFCs). The cartridges meet the standards dictated by NFPA 2010 and UL 2775.

Each battery cabinet contains two (2) Stat-X aerosol cartridges and two (2) smoke detectors *(see figure below*). Furthermore, the battery cabinets are also equipped with temperature sensors and CO detectors. As soon as a temperature of >300°C has been reached inside the affected cabinet, the aerosol fire suppression cartridges are self-activated and the affected battery cabinet is filled with an aerosol cloud, extinguishing the fire. Aerosol is not released in other cabinets where the sensors have not been triggered, thereby eliminating the fault at the source, and preventing it from spreading to other parts of the system. The aerosol remaining in the air provides additional extended protection for a finite time against re-flash of any fire in case of lithium-ion batteries. The aerosol remains in the cabinet until it is certain that the fire hazard has been eliminated.



① Aerosol cartridge
② Smoke detector

For safety reasons, the container may not be entered for 48 hours after the extinguishing system has been triggered. The defective battery module must then be replaced by the manufacturer and the entire system is put back into operation.

The Stat-X aerosol cartridges are easily replaceable and are connected to the fire protection system again for future events.

Fire detectors will have to be cleaned and tested after a Stat-X discharge event.

After discharge there may be some minimal residue in the immediate vicinity of the generator or underneath it. This should clean up easily with water or detergent as any residue is water soluble. The Stat-X agent does not require hazmat procedures after discharge for cleanup and there are no hazardous materials in the generators themselves

Figure 5: Battery cabinet (1000 mm wide) with Stat-X fire extinguishing cartridges (front view)

4.4 PCS Container

4.4.1 Container Overview

Side view

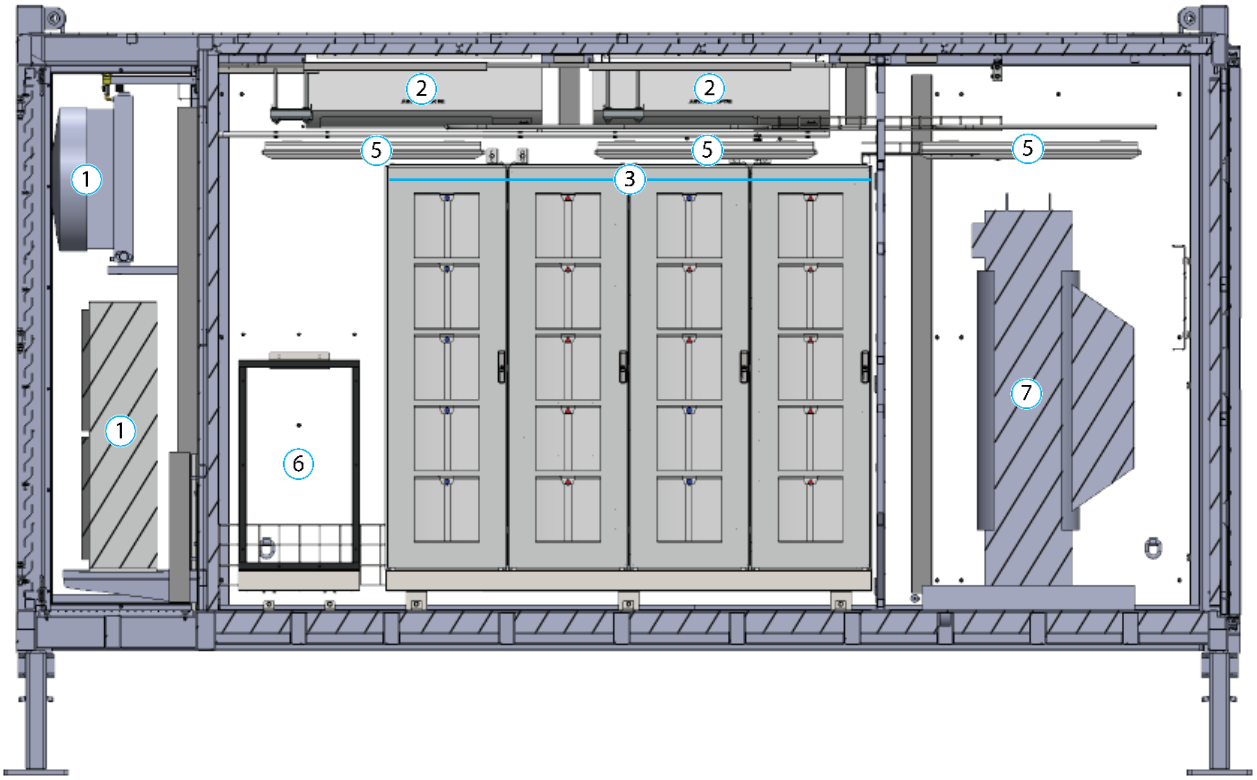


Figure 6: Container overview – side view

Position	Component
①	External cooling system components (*for details see section 4.8 "Cooling System"*)
②	Internal cooling system components (*for details see section 4.8 "Cooling System"*)
③	Converter cabinets (CONV)
④	Control cabinets (CTRL_1 & CTRL_2)
⑤	Container lights
⑥	Cooling system cabinet (COSY)
⑦	MV Transformer

Table 7: Container overview – components

Top View

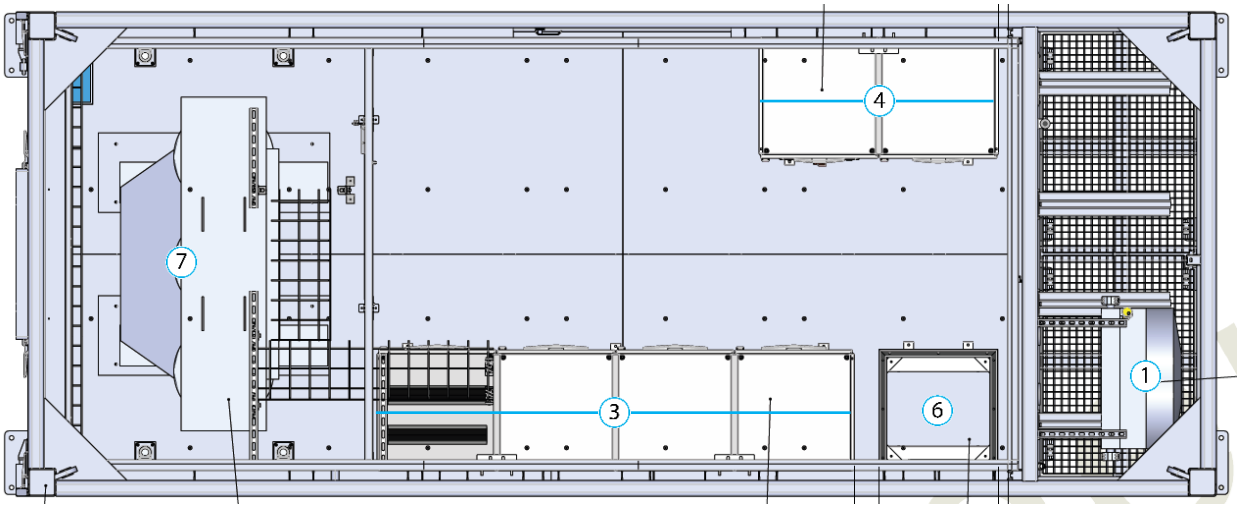


Figure 7: Container overview – side view

Perspective view

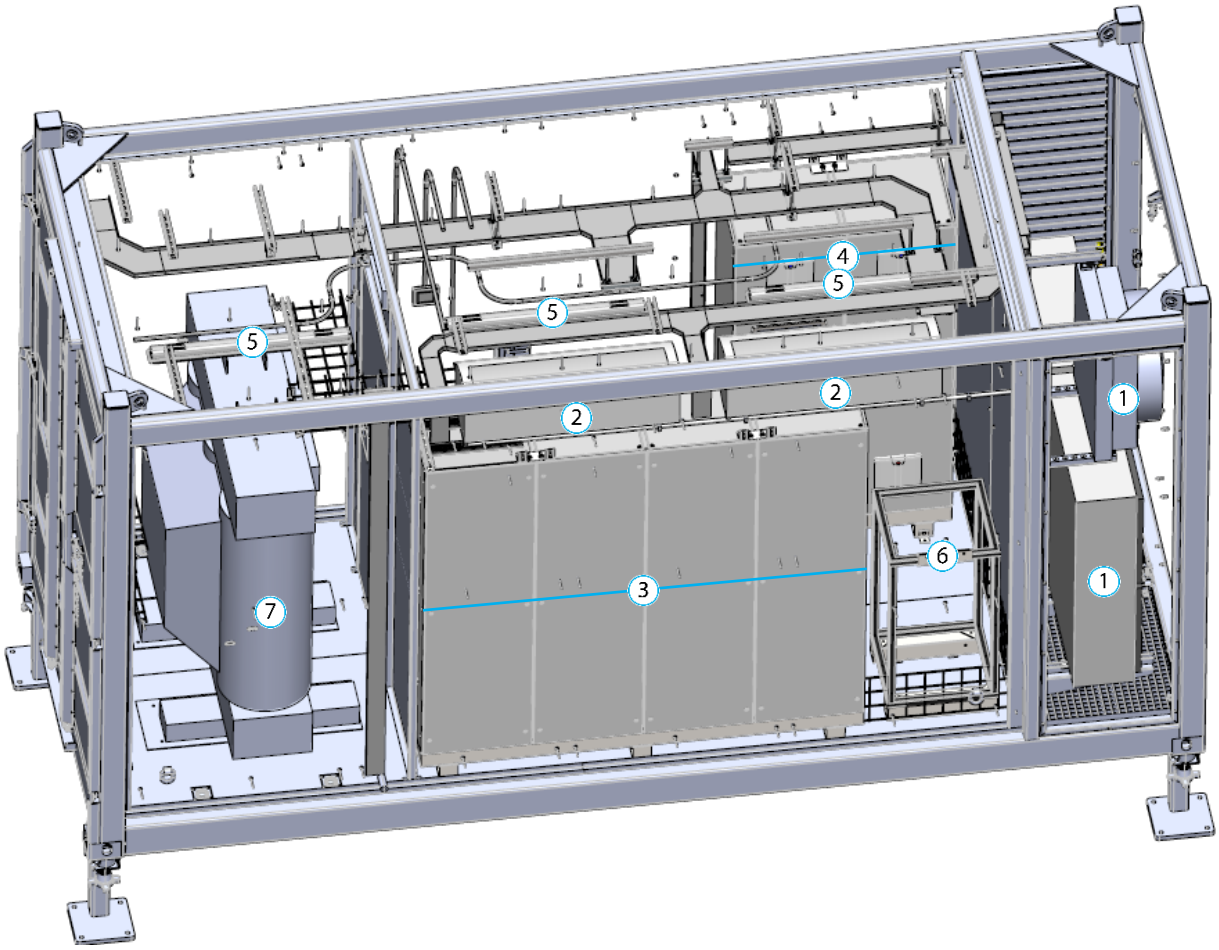


Figure 8: Container overview- perspective view

Side View Left

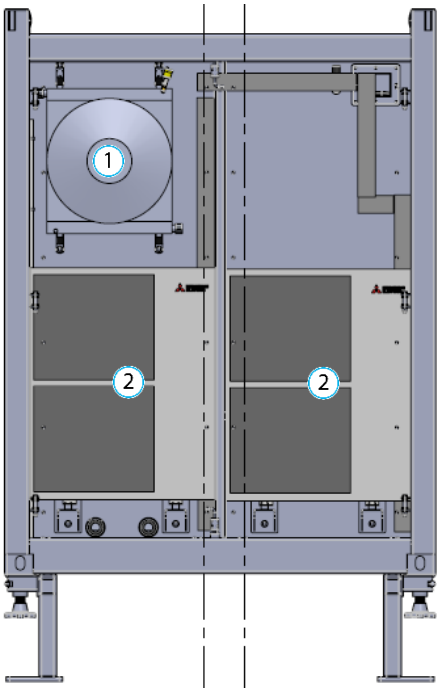


Figure 9: Container overview – side view left

Position	Component
①	Heat exchanger
②	External AC unit

Side View Right

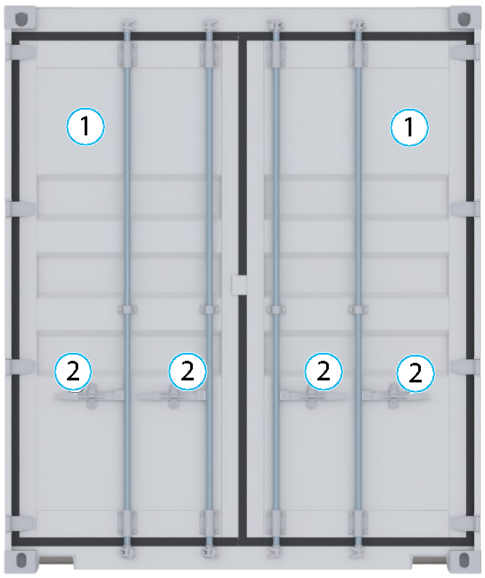


Figure 10: Container overview – side view right

Position	Component
①	Container doors
②	Door lock

Table 8: Container overview – side view left

4.4.2 Cabinet Overview- Converter Cabinets



Figure 11: Cabinet overview – converter unit

Position	Cabinet Designation	Abbreviation
①	Converter cabinet	CON
②	Inductor cabinet	IND
③	Circuit breaker cabinet	CIR
④	AC and DC connection cabinet	AC_DC

Table 9: Cabinet Overview – converter unit

4.4.3 Internal Components – Converter Cabinets

The following internal components are installed in the control cabinets of the AC/DC converter unit:

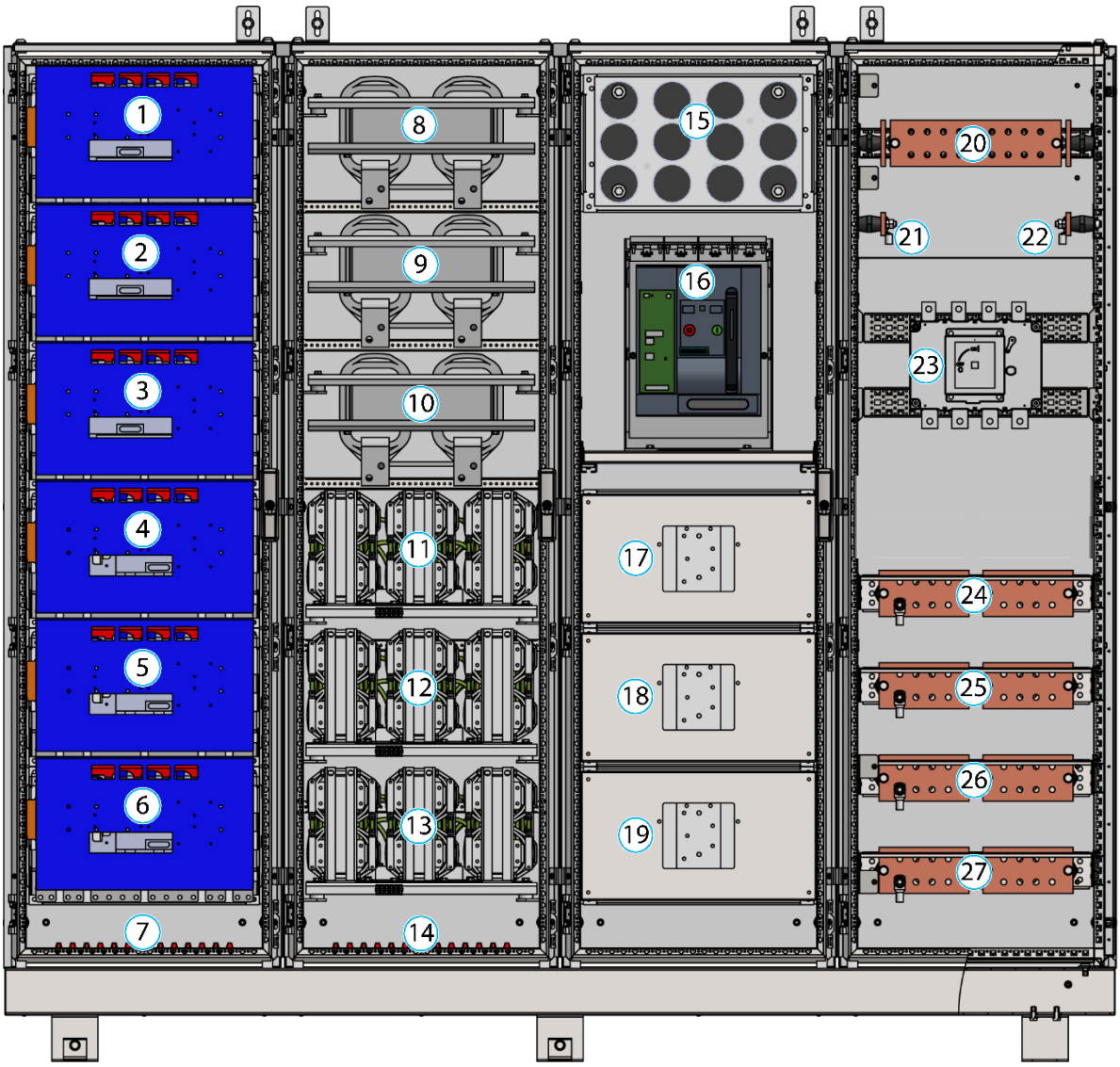


Figure 12: Internal components – converter unit

Pos.	Component	Part number	Identifier
1	AC IGBT Power Stack 1* 1000 A	52872	201Q1
2	AC IGBT Power Stack 1* 1000 A	52872	202Q1
3	AC IGBT Power Stack 1* 1000 A	52872	203Q1
4	DC IGBT Power Stack 3* 250 A	52867	207Q1
5	DC IGBT Power Stack 3* 250 A	52867	211Q1

6	DC IGBT Power Stack 3* 250 A	52867	217Q1
7	Coolant dispenser	--	--
8	AC Single phase line inductor 1000 A / 0.2 mH	53053	201L1
9	AC Single phase line inductor 1000 A / 0.2 mH	53053	202L1
10	AC Single phase line inductor 1000 A / 0.2 mH	53053	203L1
11	DC Single phase line inductor 3x 250 A / 0.6 mH	53046	207L1
12	DC Single phase line inductor 3x 250 A / 0.6 mH	53046	211L1
13	DC Single phase line inductor 3x 250 A / 0.6 mH	53046	217L1
14	Coolant dispenser	--	--
15	AC Filter 1000 A / 3*600 µF	52918	83U1
16	AC Main circuit breaker IEC 1000 A	52955	80Q1
17	DC Switch & Fuse 3* 250 A / 1000 V	52882	227U1
18	DC Switch & Fuse 3* 250 A / 1000 V	52882	231U1
19	DC Switch & Fuse 3* 250 A / 1000 V	52882	237U1
20	AC Grid connection busbars L1/L2/L3	--	78W1 - 78W3
21	N - Connection busbar	--	78W4
22	PE - Connection busbar	--	78W5
23	Switch for earthing and short-circuiting 600 A / 690 V	10172	18Q1
24	DC connection busbars + / - BESS 1 string 1 - 8	--	227W10 – 227W15
25	DC connection busbars + / - BESS 1 string 9 - 11	--	231W10 – 231W11
26	DC connection busbars + / - BESS 2 string 1 – 3 DC connection busbars + / - BESS 2 string 4 - 6	--	231W14 / 231W15 237W10 / 237W11
27	DC connection busbars + / - BESS 2 string 7 - 11	--	237W12 – 237W15

Table 10: Internal components – converter unit

4.4.4 Cabinet Overview - Control Cabinets

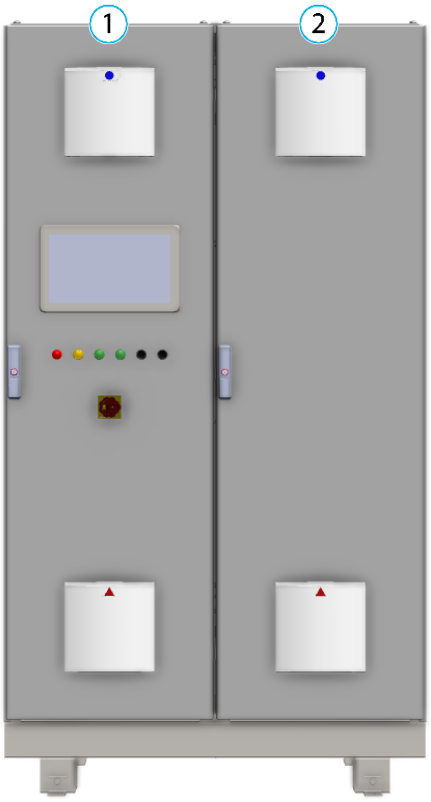


Figure 13: Cabinet overview – control cabinets

Position	Cabinet Designation	Abbreviation
①	Control cabinet 1	CTRL_1
②	Control cabinet 2	CTRL_2

Table 11: Cabinet Overview – control cabinets

4.4.5 Internal Components – Control Cabinets (CTRL_1 and CTRL_2)

The following internal components are contained within the control cabinets (CTRL_1 and CTRL_2).

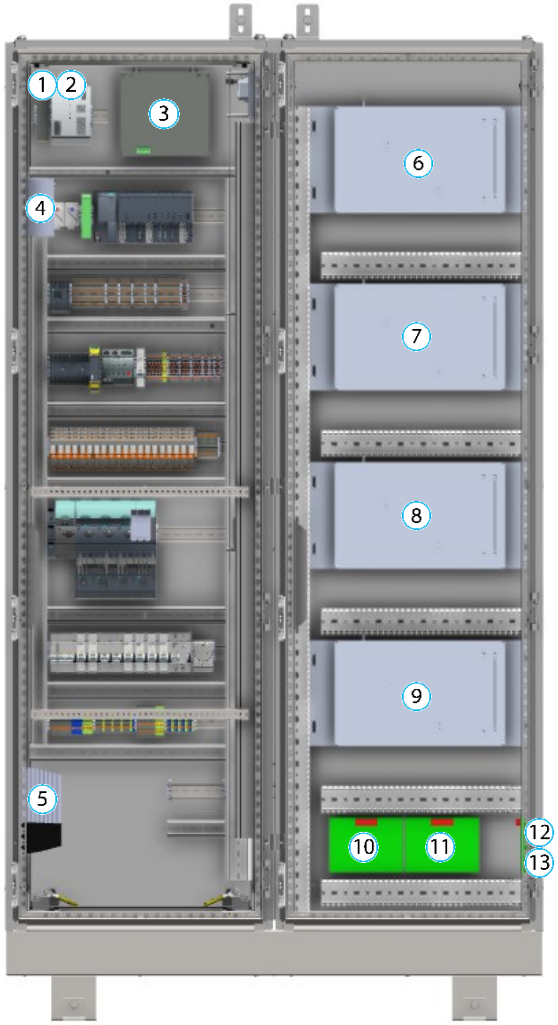


Figure 14: Internal components – control cabinets (CTRL_1 and CTRL_2)

Pos.	Component	Part number	Identifier
1	UPS unit 24 V DC	501836	102G1
2	24 V DC power supply for UPS unit	502745	101T1
3	Energy storage 24 V DC / 12 Ah for UPS unit	501229	102G2
4	Main controller PLC SIMOTION P320-4	500789	110U1
5	Cabinet heater 800 W	500621	185R1
6	PIII IGBT IRT Interface 2.6 V4	504890	240U1
7	PIII IGBT IRT Interface 2.6 V4	504890	241U1
8	PIII IGBT IRT Interface 2.6 V4	504890	242U1
9	PIII IGBT IRT Interface 2.6 V4	504890	243U1

10	HVIO Modul V5.0	500390	161U1
11	HVIO Modul V5.0	500390	162U1
12	HVIO Modul V5.0	500390	163U1
13	HVIO Modul V5.0	500390	164U1

4.4.6 External Components – Control Cabinet

The following internal components are contained within the control cabinet 1 (CTRL_1).

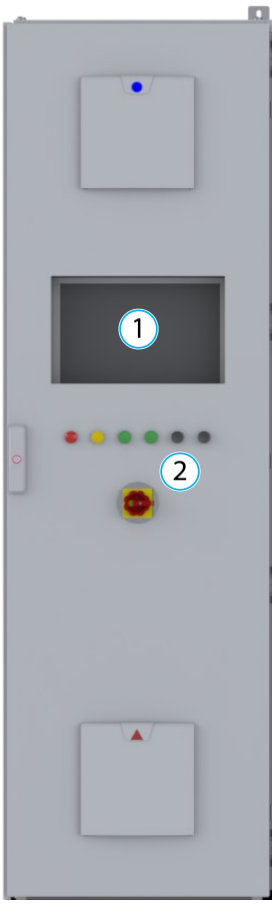


Figure 15: Internal components - control cabinet 1

Pos.	Component
1	HMI panel
2	Operating panel *(see 14.1 "Operating* Panel*")*

Table 12: Internal components - control cabinet

4.5 BESS 1 Container

4.5.1 Container Overview

Side view

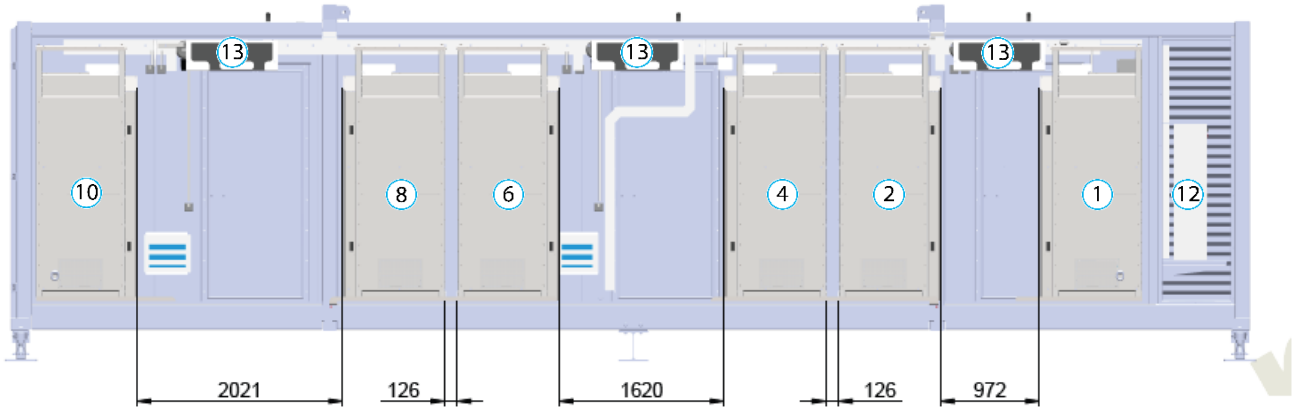


Figure 16: Container overview – side view

Position	Component
①	Battery storage cabinet (BESS 1 string 1)
②	Battery storage cabinet (BESS 1 string 2)
③	Battery storage cabinet (BESS 1 string 3)
④	Battery storage cabinet (BESS 1 string 4)
⑤	Battery storage cabinet (BESS 1 string 5)
⑥	Battery storage cabinet (BESS 1 string 6)
⑦	Battery storage cabinet (BESS 1 string 7)
⑧	Battery storage cabinet (BESS 1 string 8)
⑨	Battery storage cabinet (BESS 1 string 9)
⑩	Battery storage cabinet (BESS 1 string 10)
⑪	Battery storage cabinet (BESS 1 string 11)
⑫	External cooling system component (*for details see section 4.8 "Cooling System"*)
⑬	Internal cooling system component (*for details see section 4.8 "Cooling System"*)
⑭	Container lights
⑮	Lifting device (*for details see section 4.7.5 "Lifting Device"*)

Table 13: Container overview – components

Top View

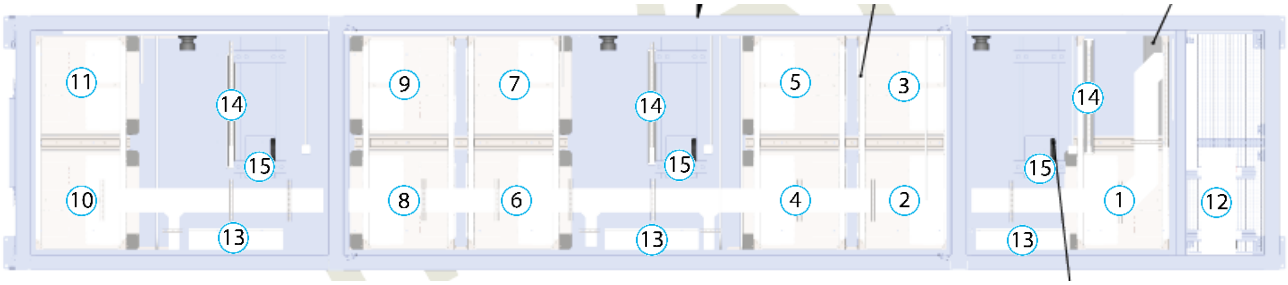


Figure 17: Container overview – top view

Perspective view

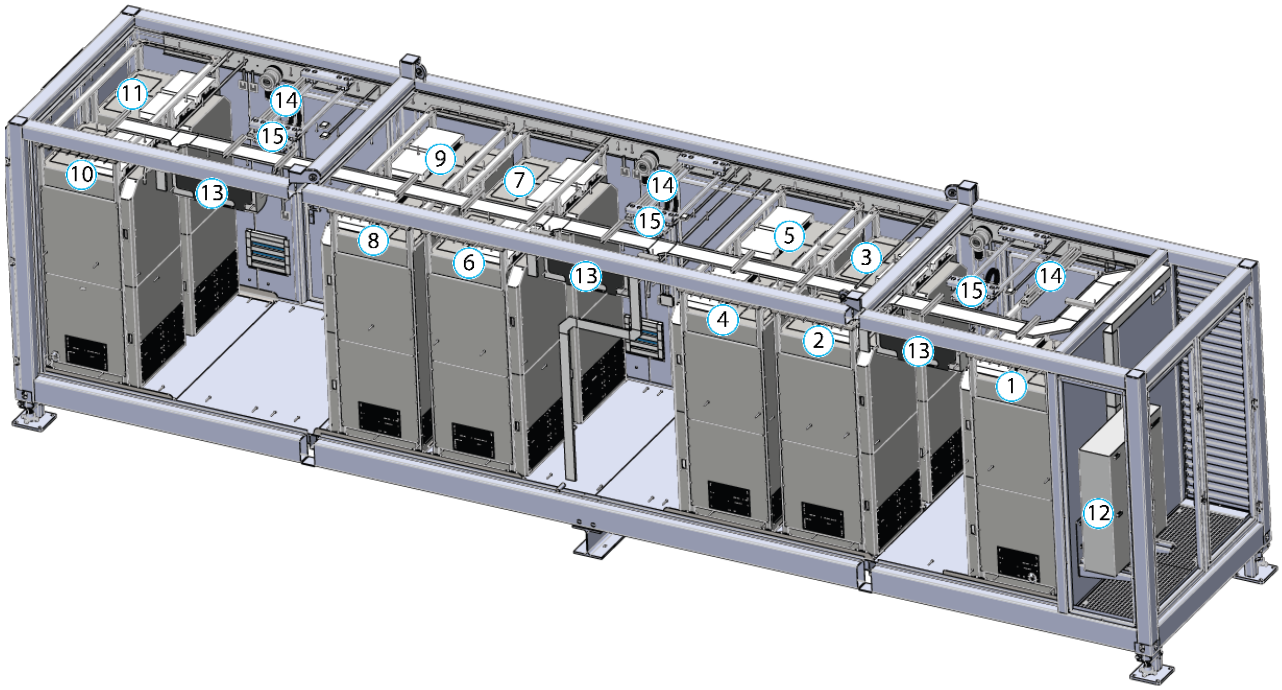


Figure 18: Container overview- perspective view

Side View Left

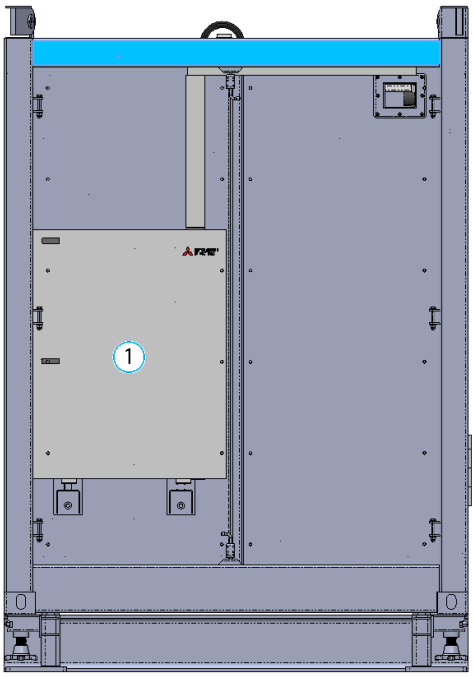


Figure 19: Container overview – side view left

Position	Component
①	External AC unit

Table 14: Container overview – side view left

Side View Right

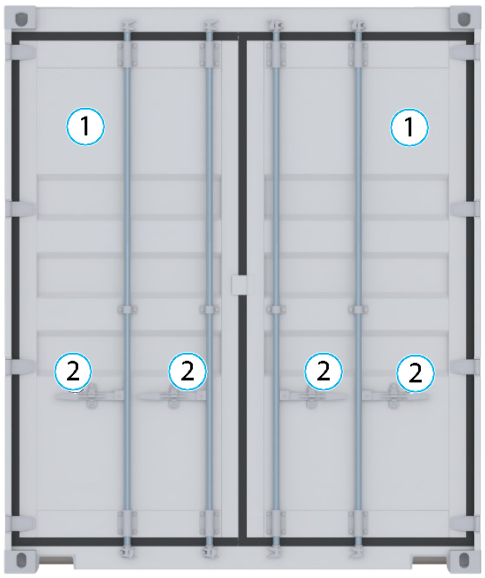


Figure 20: Container overview – side view right

Position	Component
①	Container doors
②	Door lock

Table 15: Container overview – side view left

4.5.2 Cabinet Overview- BESS 1 Battery Cabinets

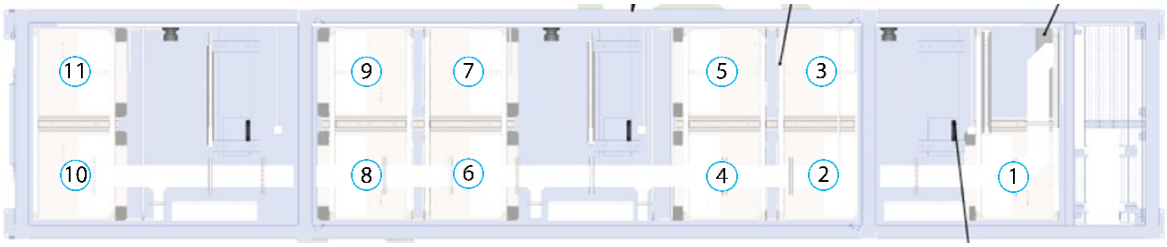


Figure 21: Cabinet overview – BESS 1 battery cabinets (Container top view)

Position	Cabinet Designation	Abbreviation
①	Battery cabinet 1	BESS.STR_1
②	Battery cabinet 2	BESS.STR_2
③	Battery cabinet 3	BESS.STR_3
④	Battery cabinet 4	BESS.STR_4
⑤	Battery cabinet 5	BESS.STR_5
⑥	Battery cabinet 6	BESS.STR_6
⑦	Battery cabinet 7	BESS.STR_7
⑧	Battery cabinet 8	BESS.STR_8
⑨	Battery cabinet 9	BESS.STR_9
⑩	Battery cabinet 10	BESS.STR_10
⑪	Battery cabinet 11	BESS.STR_11

Table 16: Cabinet Overview – BESS 1 battery cabinets

4.5.3 Internal Components – Battery Cabinets

The following internal components are contained within the battery cabinets:



Figure 22: Internal components – battery storage cabinets

Pos.	Component	Part number
①	Cabinet fan	505587
②	Battery module LF 280	508972
③	Aerosol cartridge of fire extinguishing unit Aero-X Stat-X 60E	506501
④	Optical smoke detector 12 V	500713
⑤	DC fuse switch disconnector 3NP1, 3-pole, NH2, 400 A	10226
⑥	Mounting plate with cabinet control system, DC, contactors etc.	52422

Table 17: Internal components – battery storage cabinets

4.6 BESS 2 Container

4.6.1 Container Overview

Side view

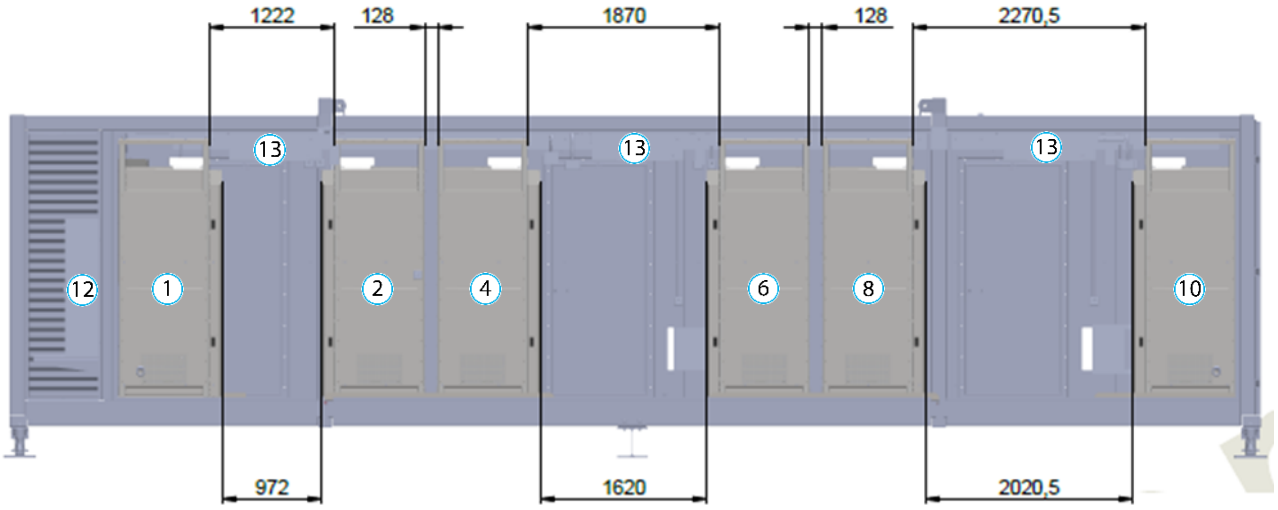


Figure 23: Container overview – side view

Position	Component
①	Battery storage cabinet (BESS 2 string 1)
②	Battery storage cabinet (BESS 2 string 2)
③	Battery storage cabinet (BESS 2 string 3)
④	Battery storage cabinet (BESS 2 string 4)
⑤	Battery storage cabinet (BESS 2 string 5)
⑥	Battery storage cabinet (BESS 2 string 6)
⑦	Battery storage cabinet (BESS 2 string 7)
⑧	Battery storage cabinet (BESS 2 string 8)
⑨	Battery storage cabinet (BESS 2 string 9)
⑩	Battery storage cabinet (BESS 2 string 10)
⑪	Battery storage cabinet (BESS 2 string 11)
⑫	External cooling system component (*for details see section 4.8 "Cooling System"*)
⑬	Internal cooling system component (*for details see section 4.8 "Cooling System"*)
⑭	Container lights
⑮	Lifting device (*for details see section 4.7.5 "Lifting Device"*)

Table 18: Container overview – components

Top View

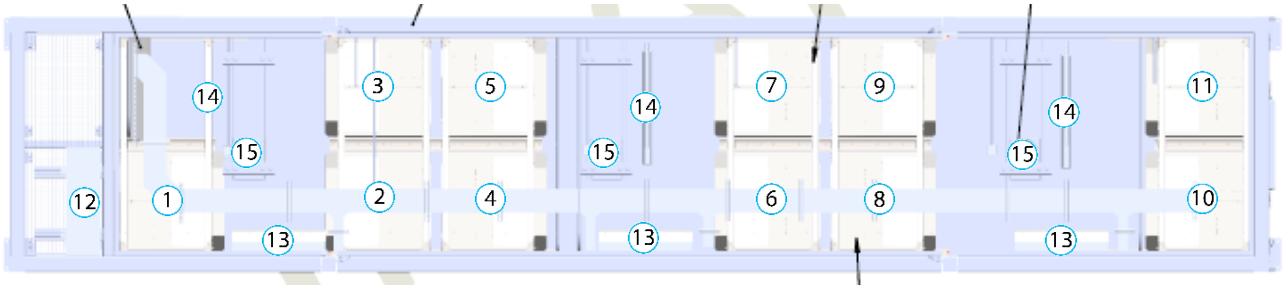


Figure 24: Container overview – top view

Perspective view

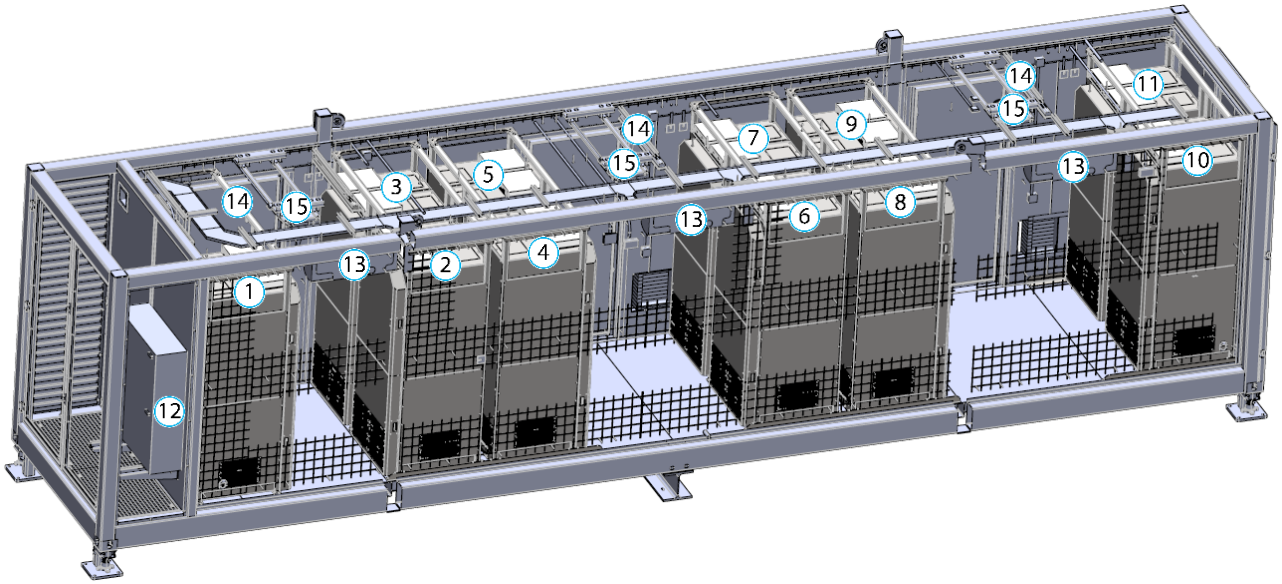


Figure 25: Container overview- perspective view

Side View Left

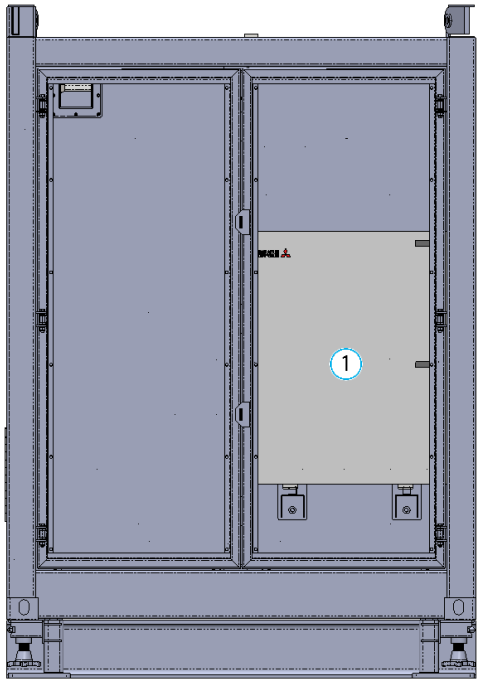


Figure 26: Container overview – side view left

Position	Component
①	External AC unit

Table 19: Container overview – side view left

Side View Right

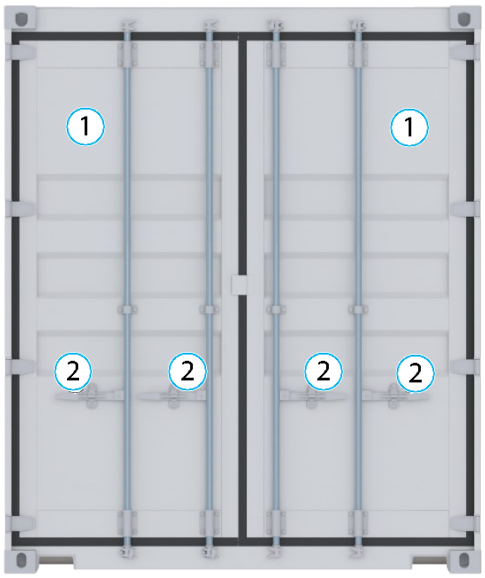


Figure 27: Container overview – side view right

Position	Component
①	Container doors
②	Door lock

Table 20: Container overview – side view left

4.6.2 Cabinet Overview- BESS 2 Battery Cabinets

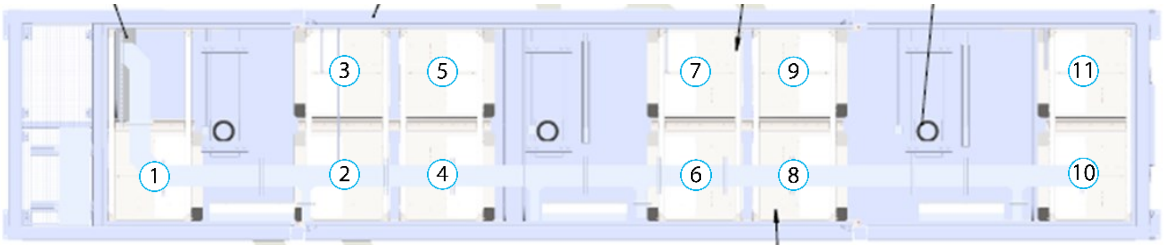


Figure 28: Cabinet overview – BESS 2 battery cabinets (Container top view)

Position	Cabinet Designation	Abbreviation
①	Battery cabinet 1	BESS.STR_1
②	Battery cabinet 2	BESS.STR_2
③	Battery cabinet 3	BESS.STR_3
④	Battery cabinet 4	BESS.STR_4
⑤	Battery cabinet 5	BESS.STR_5
⑥	Battery cabinet 6	BESS.STR_6
⑦	Battery cabinet 7	BESS.STR_7
⑧	Battery cabinet 8	BESS.STR_8
⑨	Battery cabinet 9	BESS.STR_9
⑩	Battery cabinet 10	BESS.STR_10
⑪	Battery cabinet 11	BESS.STR_11

Table 21: Cabinet Overview – BESS 2 battery cabinets

4.6.3 Internal Components – Battery Cabinets

The following internal components are contained within the battery cabinets:



Figure 29: Internal components – battery storage cabinets

Pos.	Component	Part number
①	Cabinet fan	505587
②	Battery module LF 280	508972
③	Aerosol cartridge of fire extinguishing unit Aero-X Stat-X 60E	506501
④	Optical smoke detector 12 V	500713
⑤	DC fuse switch disconnector 3NP1, 3-pole, NH2, 400 A	10226
⑥	Mounting plate with cabinet control system, DC, contactors etc.	52422

Table 22: Internal components – battery storage cabinets

4.7 Battery Modules



Figure 30: Battery module LF 280

4.7.1 Design

The lithium iron phosphate cells (LiFePO4) inside the LF 280 battery modules are connected in series and provide a total energy content of 8.96 kWh per module.

Each module is equipped with a monitoring PCB, providing the following functions:

- Voltage monitoring of single cells for charging and discharging
- Battery temperature monitoring
- Selective cell balancing
- Data exchange with central BESS controller
- Local insulation measurement
- Robust industrial design for transport, assembly und operation



Figure 31: Battery module design

No.	Component
①	Battery module LF280
②	Boreholes for lifting device (M6)
③	DC positive (+) socket
④	DC negative (-) socket
⑤	COM-Connection RJ45 and 24 V DC power supply
⑥	Boreholes for transport handle mounting
⑦	Label with safety and warning instructions

Table 23: Battery module design

4.7.2 Technical Data

Technical Data Battery Module LF 280	
Part number	508972
Rated Voltage	32 V DC
Total capacity	280 Ah
Number of cells per battery module	10
Stored Energy	8960 Wh
Maximum voltage	36 V DC
Max. current	280 A
Max. charge and discharge rate	1 C
Temperature range storage	-20 °C … +45 °C (long-term storage at 0…35°C)
Temperature range operation	0 °C … +55 °C
Connections for DC+ / DC-	Surlock Plus
Communication connections	RJ 45
Protection class	IP 20
Weight	65.3 kg
Dimensions (WxHxD)	188 mm x 239 mm x 908 mm
Cell Data (Single Cell)	
Type	Prismatic cells
Capacity (typ.)	280 Ah
Voltage (typ.)	3.2 V
Voltage (max.)	3.65 V
Voltage (min.)	2.5 V
Battery life	>3500 cycles (80% remaining capacity)
Impedance (AC)	<0.25 mΩ
BMS Pack Universal	
Power supply (external)	24 V DC (rated), <0.5 W
Power supply (internal)	36 V DC (max.), < 0.2 W
Communication	EIA-485, Modbus RTU
Baud rate (max.)	19200 Bit/s
Bus participants (max.)	32
Balancer design	Load resistor
Balancer current @3.5 V	1.06 A
Voltage measurement	10 measurements per 14-bit resolution
Temperature measurements	8x NTC 10 kΩ (up to 14 bit analogue/digital converter) 1x PT100 (12 bit analogue/digital converter)
Isolation measurement	Earth fault monitoring

Table 24: Technical data - Battery module LF280

4.7.3 Connection Elements



Figure 32:Connection elements

Pos.	Terminal	Description	Connection type	Cable
①	X1	DC + Battery module	10.3 mm Surlock Plus	Pay attention to cable routing in cabinet
②	X2	DC – Battery module	10.3 mm Surlock Plus	Pay attention to cable routing in cabinet
④	X3	Communication (input)	RJ45, 45°	PiMF, 4x2 min. AWG 27/7
⑤	X4	Communication (Output)	RJ45, 45°	PiMF, 4x2 min. AWG 27/7
⑤	X5	24 V DC power supply	2-pole male terminal	Pay attention to cable routing in cabinet

Table 25: Connection elements

4.7.4 Communication Scheme

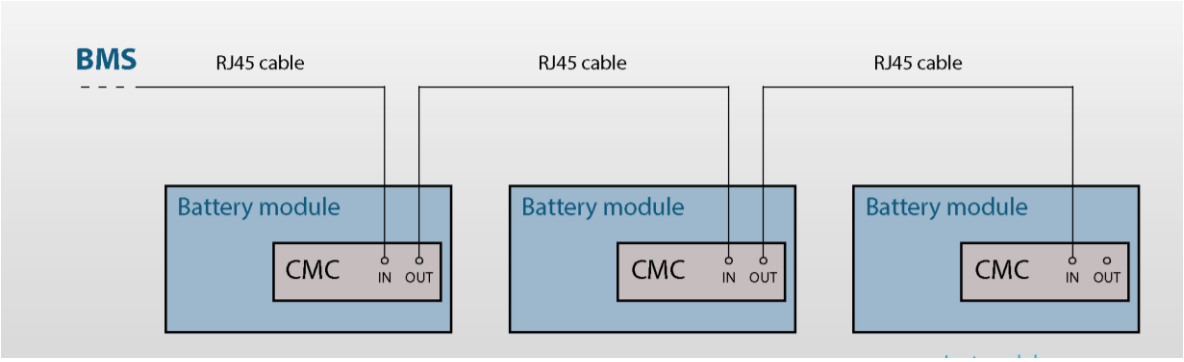


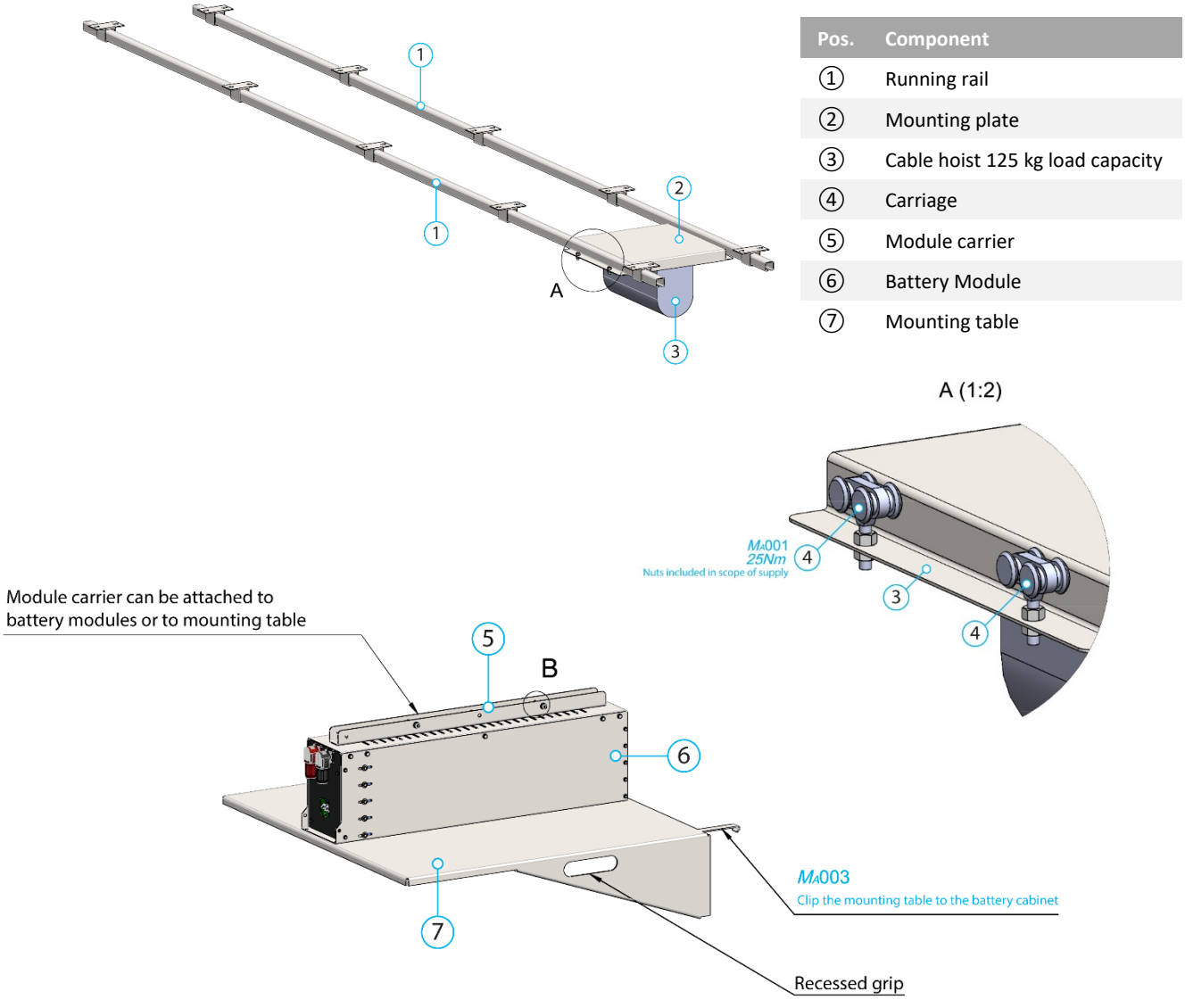
Figure 33: BMS communication scheme

4.7.5 Lifting Device and Mounting Table

For the lifting of battery modules, a lifting device is installed at the container ceiling, allowing safe handling and installation of the battery modules.

The lifting device mainly consist of a cable hoist which is mounted to a mounting plate with carriers, allowing to move the cable hoist through running rails to each end of the container. The cable hoist is operated via cable remote control.
For better handling of the battery modules when inserting them to the battery storage cabinet, a mounting table is provided, that can be attached to the battery storage cabinets.

For detailed information and operating instructions regarding the cable hoist, please refer to the original cable hoist manufacturer's original operating manual (*see section 1.2 "Applicable Documents"*).



Pos.	Component
①	Running rail
②	Mounting plate
③	Cable hoist 125 kg load capacity
④	Carriage
⑤	Module carrier
⑥	Battery Module
⑦	Mounting table

Figure 34: Lifting device and mounting table

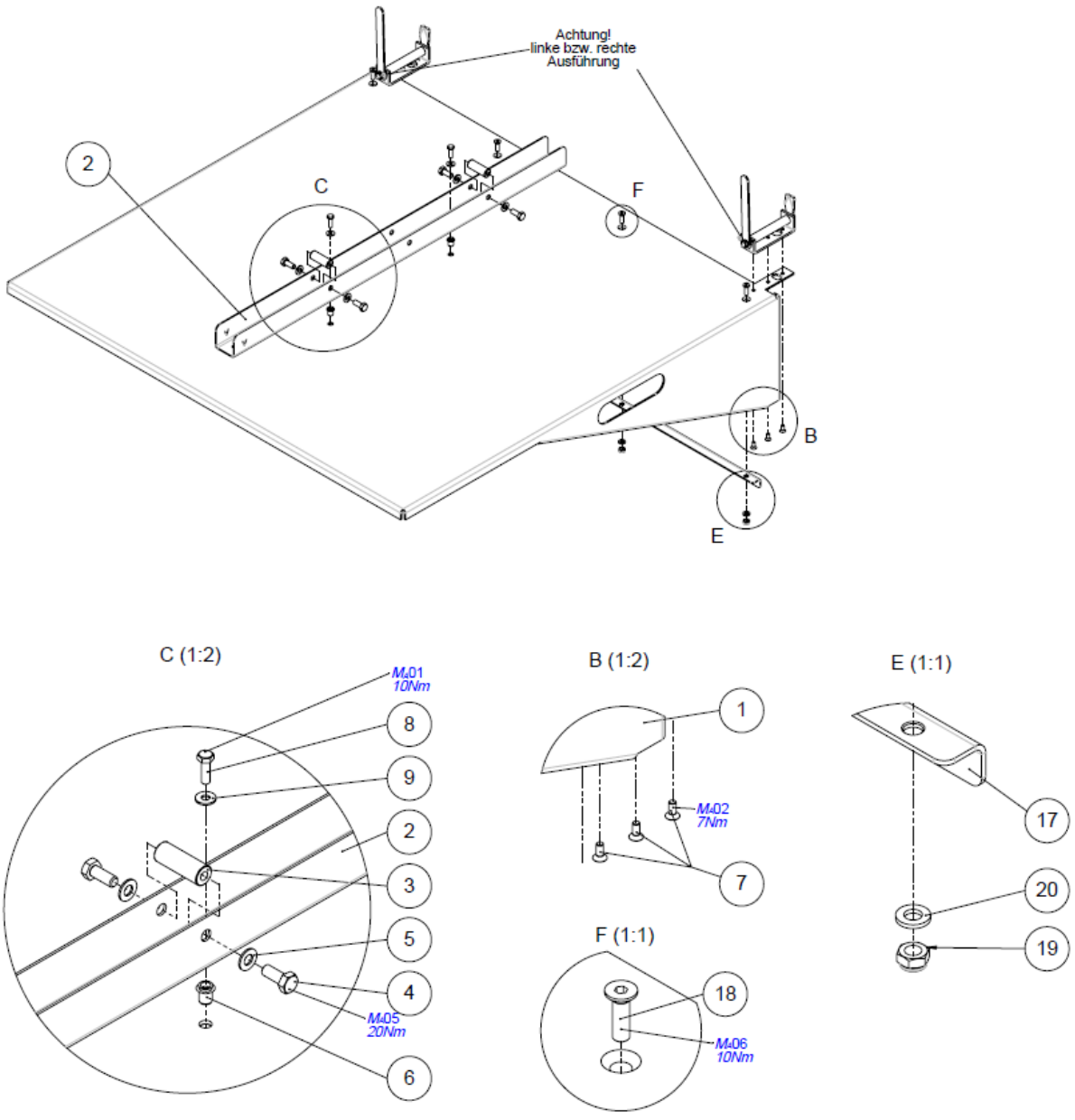


Figure 35: Mounting table

4.7.6 Mobile Lifting Device

A mobile lifting device for moving battery modules inside the BESS containers can be used. The mobile lifting device “Material-Lift GUIL ELC-725” or other models are suitable to lift and mount battery modules inside FREQCON BESS containers.

One (1) battery module can be placed onto the table of the mobile lifting device at once. The module needs to be pushed from the pallet of the forklift truck in front of the BESS container door onto the table of the mobile lifting device.

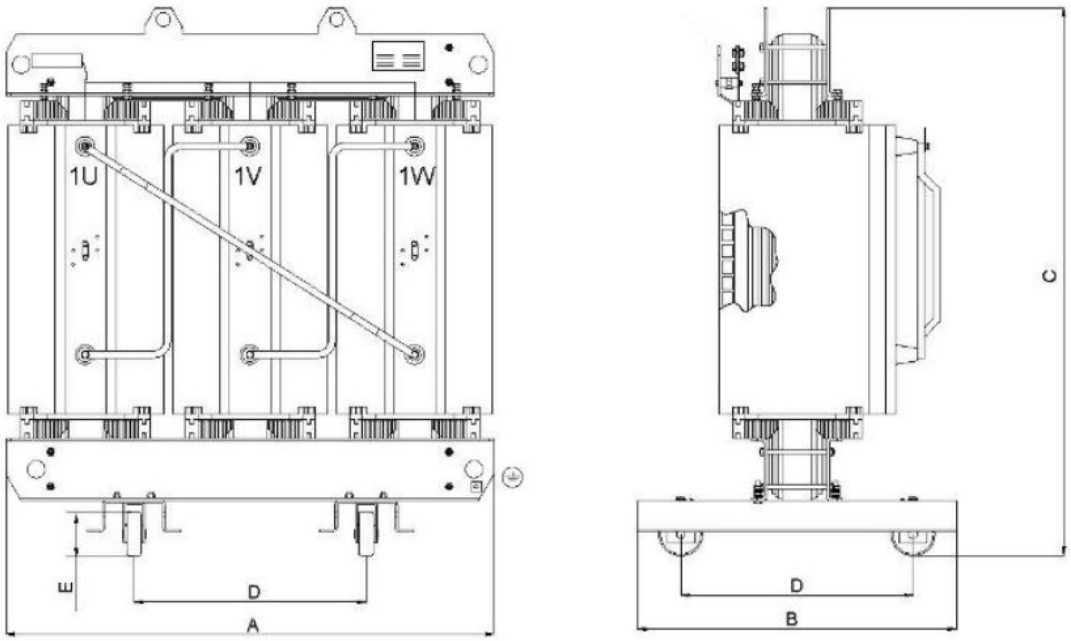
The mobile lifting device can then be moved to the battery cabinet where the battery module needs to be installed.



Figure 36: Mobile lifting device “Material-Lift GUIL ELC-725”

Technical details	
Dimensions L x W x H	400 mm x 550 mm x 1320 mm
Type of construction	Material lift
Overall height	1320 mm
Dead weight	51 kg
Lifting function	Cable winch
Lifting height	4000 mm
Platform dimensions L x W	550 x 500 mm
Table height max.	3940 mm
Table height min.	1320 mm
Load capacity:	125 kg

4.7.7 MV Transformer



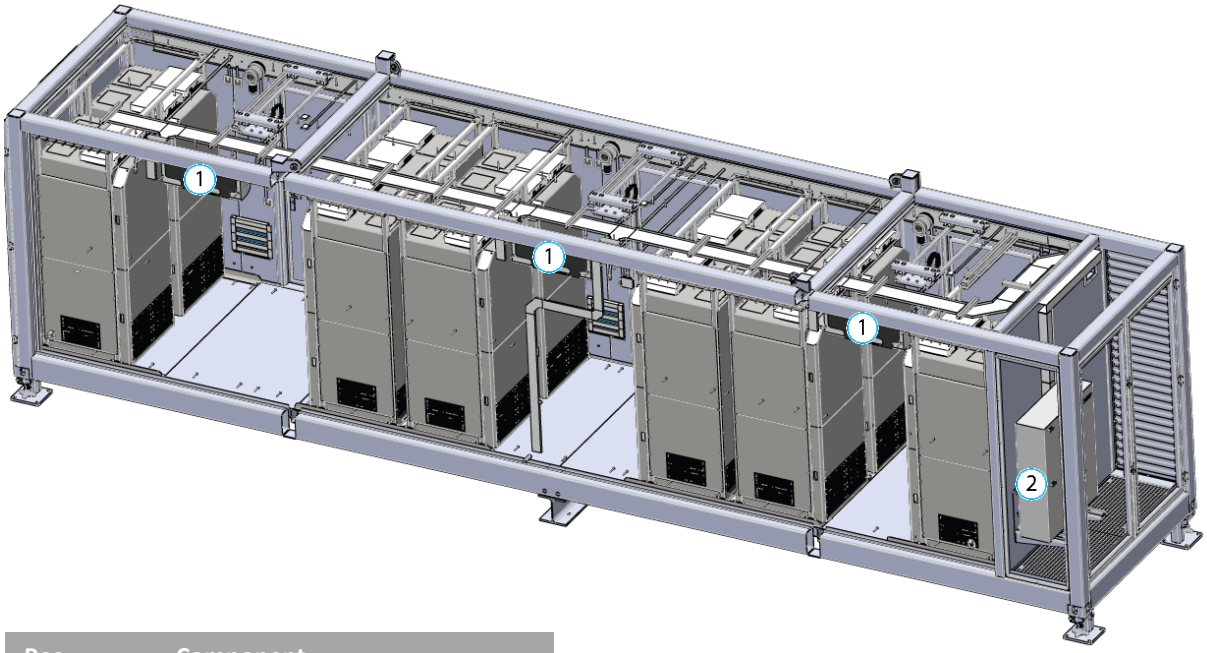
Position	1			
Reference Standards	IEC 60076-1,IEC 60076-11, EU 548/2014,EN 50588-1			
Type	TPZ3K7.2.1250	**Application**	Converter	6 Pulse
Rated Power – AN	1250 kVA	**Duty Class**	I	
Type of Cooling	AN	**Frequency**	50 Hz	
Degree of Protection	IP00			

CHARACTERISTICS

	HV	**LV**
Voltage	7 kV	0,62 kV
Insulation Class	7.2/20/60 kV	1,1/3/- kV
Tapping	±2x2,5%	-
Material	Aluminium	Aluminium
Insulation class	F	F
Temperature rise	100 K	100 K
Connections location	Top	Top
Vector Group	Dyn5	
Level of losses	EcoDesign TIER II	
No-Load Losses (Po)	1620 W	
On-Load Losses 120°C (Pcc)	11000 W	
Tolerance on the losses	0%	
Impedance 120°C (Uk%)	6%	
Power Noise (Lwa)	≤ 66 dB(A)	
Pressure Noise (Lpa)	≤ 52 dB(A)	
Ambient Temperature	-25°C ; + 40°C	
Installation	≤ 1.000 m	
Fire (F), Environmental (E), Climatic (C) Classes	F1/E2/C2	
HV/LV earth screen	YES	
Dimensions IP00 (AxBxC)	1680x1050x1990 mm	**Wheel Base (D)** 820 mm
Wheels Dimensions (E)	160 mm	**Total Weight IP00** 3600 Kg

4.8 Cooling System

4.8.1 BESS 1 / BESS 2 Container



Pos	Component
①	Internal AC unit
②	External AC unit

Table 26: BESS 1 / BESS 2: Cooling system components

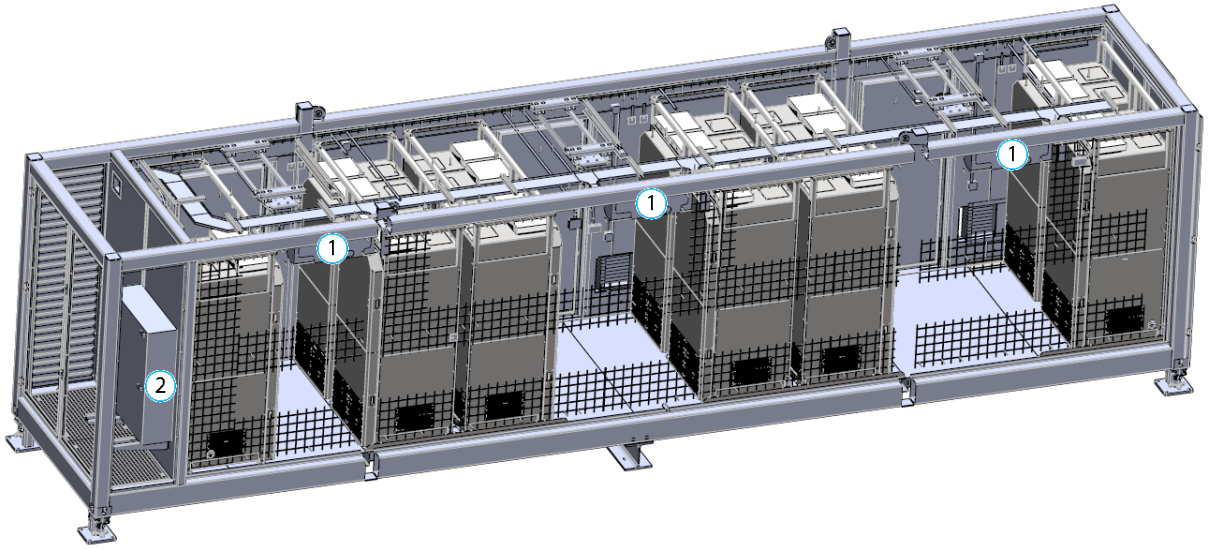


Figure 37: BESS 1 (above) / BESS 2 (below): Cooling system components

4.8.1.1 Battery Cabinets Cooling

The waste heat inside the battery cabinets is actively dissipated by two fans in the roof of each battery cabinet. The heated air is pushed out of the cabinet to the inside of the BESS container.

4.8.1.2 Container Cooling

The waste heat in the interior of the container is conducted via the three internal air conditioning (AC) units (*see Figure 37*) from the interior to the external air conditioning units of the container.

The container is equipped with several temperature sensors for monitoring the internal container temperature.

4.8.2 PCS Container

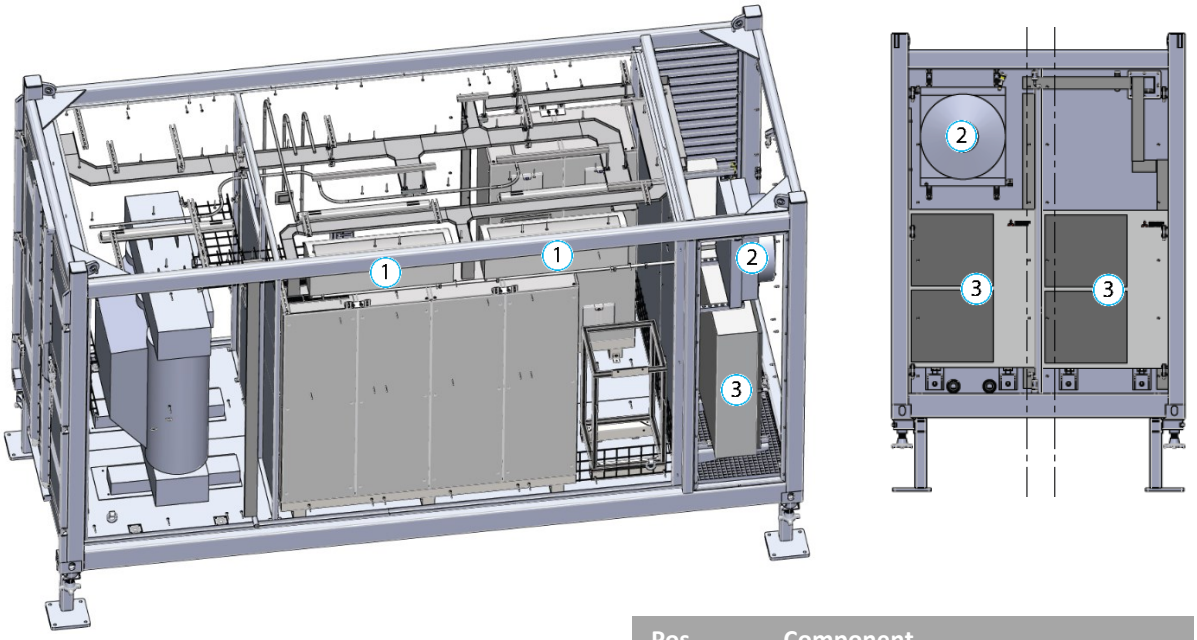


Figure 38: PCS: Cooling system components

Pos	Component
①	Internal AC unit
②	Heat exchanger
③	External AC unit

Table 27: PCS: Cooling system components

4.8.2.1 Container Cooling

The waste heat in the interior of the container is conducted via the three internal air conditioning (AC) units (*see Figure 38*) from the interior to the external air conditioning units of the container.

The container is equipped with several temperature sensors for monitoring the internal container temperature.

4.8.2.2 Converter Cooling System

To dissipate the waste heat from the IGBT power modules and inductors installed in the converter, these components are cooled down to the required operating temperature by an internal cooling system consisting of cooling hoses, coolant pumps, water distributors and four air/water heat exchangers.

The water-glycol-circulation (WGC) is designed as a closed cooling circuit. A water-glycol mix flows through the cooling modules of the converter and dissipates the heat produced by the IGBT modules. Additionally, the IGBT modules need a minimum temperature to operate properly. To heat up the IGBT modules from a cold start, the water-cooling system is pre-heated by an electrical heating element which is flange-mounted to the coolant manifold. The pre-heating process is performed to achieve an operational temperature of 25 °C, which takes about 20 minutes. After the IGBT modules have reached the temperature of about 25 °C, the converter is permitted to begin its normal operation.

The electrical pre-heater will be switched off automatically by a control unit at a temperature of > 28 °C of the coolant temperature sensor. The heating element is switched off at least 2 minutes before the pump is switched off. This procedure avoids overheating of the heating element since there must be a permanent flow around the heating element during heating.

A 3/2 directional mixing valve at the WGC unit controls the inlet temperature to the converter by mixing the water-glycol mixture of the heat exchanger and a bypass circuit. The 3/2 directional mixing valve opens at 36°C (mechanically set at mixing valve) and leads the cooling water to the heat exchanger.

Pre-heater on-off temperature hysteresis (sensor measures the inlet temperature to the converter)	
Coolant temperature > 28 °C	Heaters will be turned off
Coolant temperature < 25 °C	Heater will be turned back on

Table 28: Pre-heater on-off temperature hysteresis

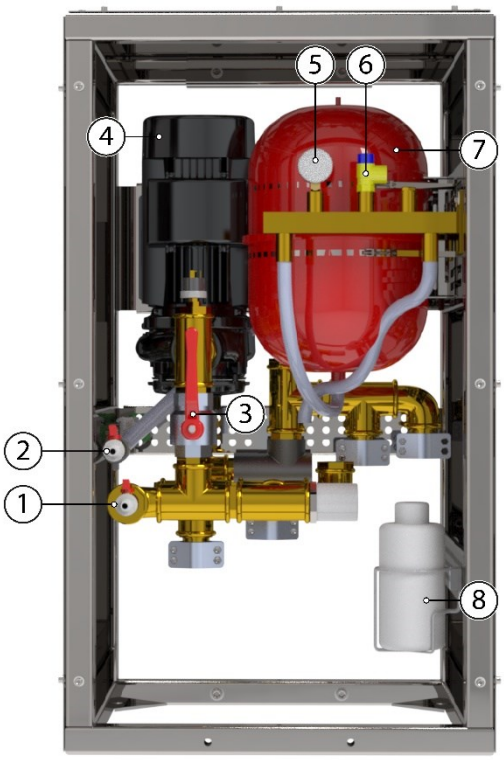


Figure 39: Cooling system cabinet (COSY) components

Position	Component
①	¾“ inlet flow connection with valve
②	"¾“ return flow connection with valve
③	Stop cock
④	Coolant pump
⑤	Manometer
⑥	Overpressure valve
⑦	Expansion vessel
⑧	Overflow vessel

Table 29: Cooling system enclosure (COSY) components

4.8.2.3 IGBT modules cooling

The cooling system dissipates the heat generated during normal operation of the converter.
The IGBT modules are mounted on heat sinks through which coolant flows. Tubing connectors provide the connection to the inlet and outlet of coolant.

4.8.2.4 Coolant Specifications

Coolant		
	Manufacturer	**Description**
Allowed Coolants	NALCO AG	Varidos FSK
	BASF AG	Glysantin G30
	Clariant	Antifrogen N
	Clariant	Antifrogen L
	DOW	Dowcal 20
Coolant concentration mixed with water	> 40 % to 60 % (depending on manufacturer recommendation)	
Coolant change interval	Every 5 years	

Table 30: Coolant specifications

5 Operating Interfaces

The BESS is operated and controlled either via

- The control panel on the control cabinet CTRL of the converter (*see section 14.1)*
  - Push-buttons
    - RESET (restart emergency stop circuit)
  - Indication lights:
    - Fault (red; controller error is active)
    - Preheating (yellow; preheating of coolant)
    - Ready for Operation (green; converter is ready for operation)
    - Operating (green; converter is active)
  - Other control elements:
    - Main switch
    - Emergency-stop push button
- interface to the customer's higher-level control system (*see section 6*).

6 Control System

6.1 Main Control System

The system is controlled and monitored by a main control system installed on the P320 PLC inside the control cabinet (CTRL). Both the converter and the BESS control system are installed on the same PLC.

Data exchange between the individual cabinet control systems and BESS main control system is performed via MODBUS TCP protocol.

BESS Main Control System Overview

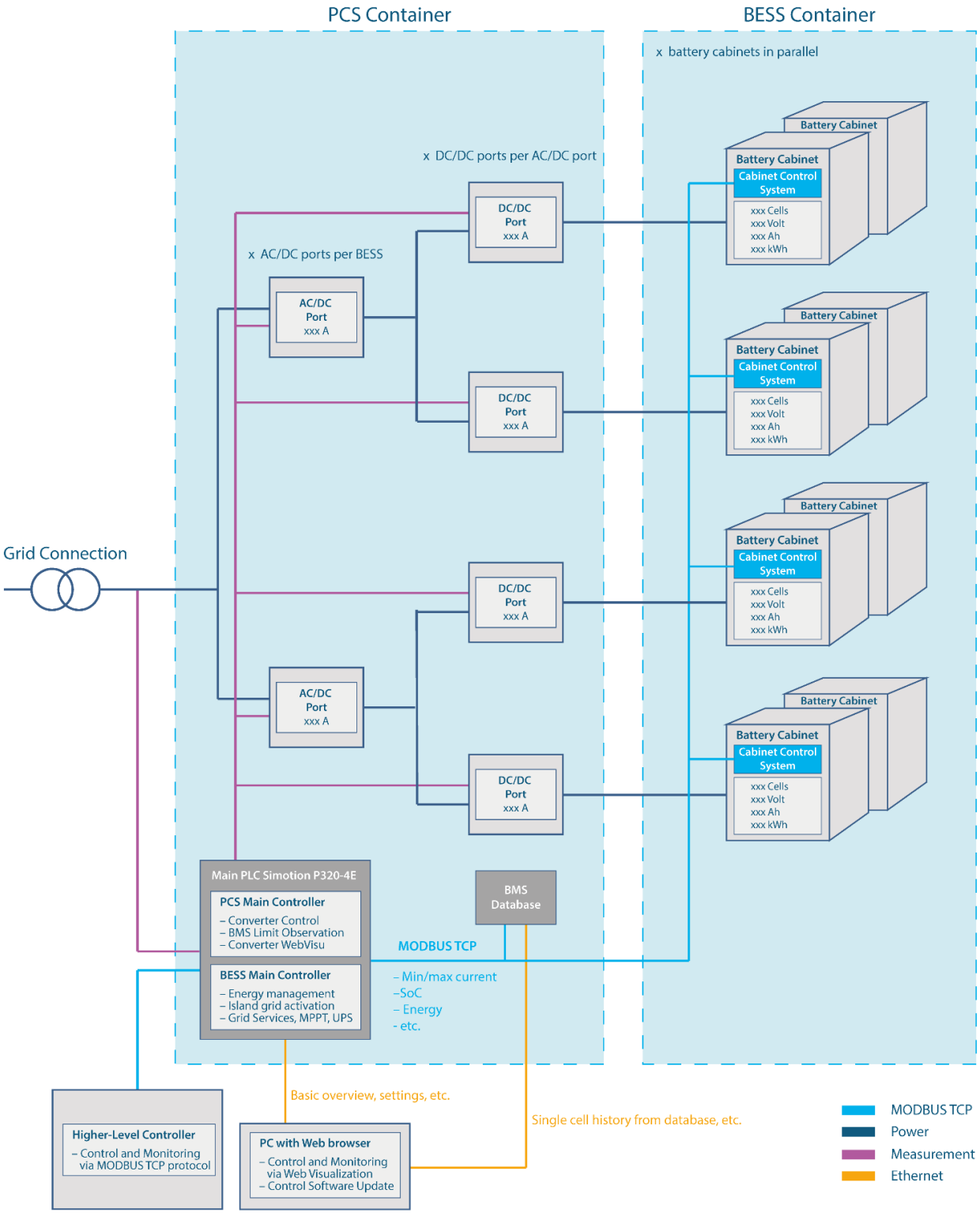


Figure 40: Main control system overview

6.2 Battery Cabinet Control System

Each battery cabinet is equipped with its own control system (Siemens S7) collecting the relevant data from the individual battery modules and providing these to the main control system (*see section 6.1*).

The tasks and features of the cabinet control system are the following:

- Monitoring of battery cell voltages and temperatures
- Monitoring of the battery charging and discharging current
- Control of DC switches
- Monitoring of line protection and smoke detectors
- MODBUS RTU Master for communication with BMS system (battery monitoring system)
- MODBUS TCP Server provides the communication interface to other systems. For example, for the external charger or the consumers

Cabinet Control System Overview

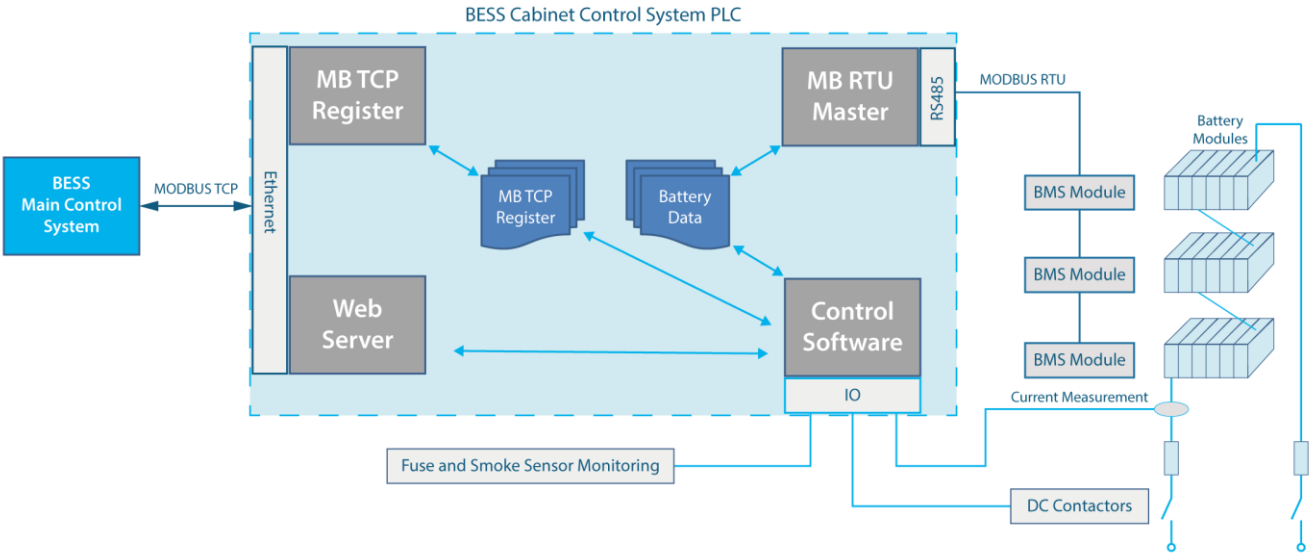


Figure 41: BESS cabinet control system overview

Data exchange between the cabinet control system and the individual battery modules is performed via MODBUS RTU protocol. Therefore, each battery cabinet is provided with several MODBUS RTU interfaces for Modbus connection of the battery modules.

6.3 Network Structure

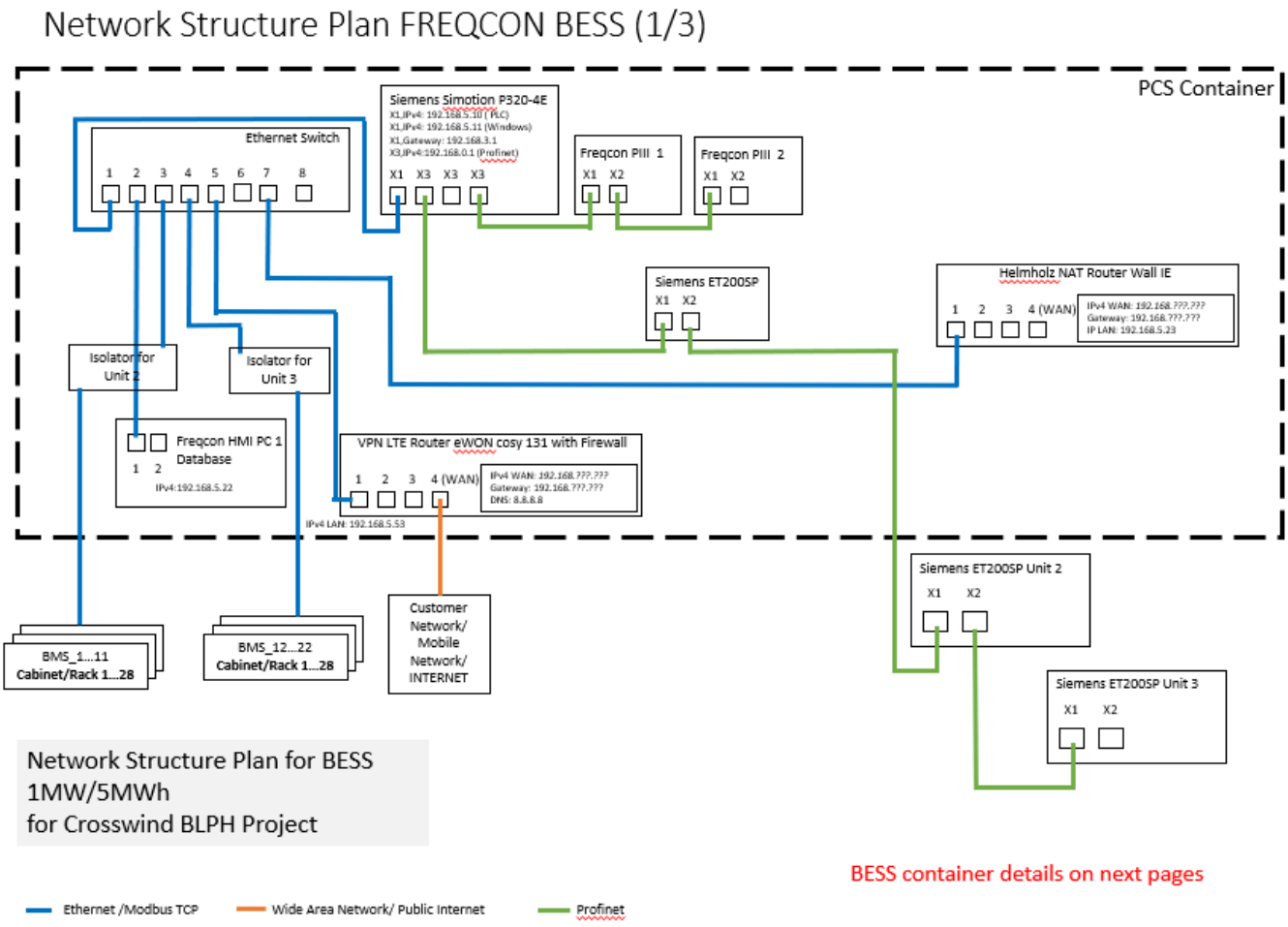


Figure 42: MSC network structure (1/3)

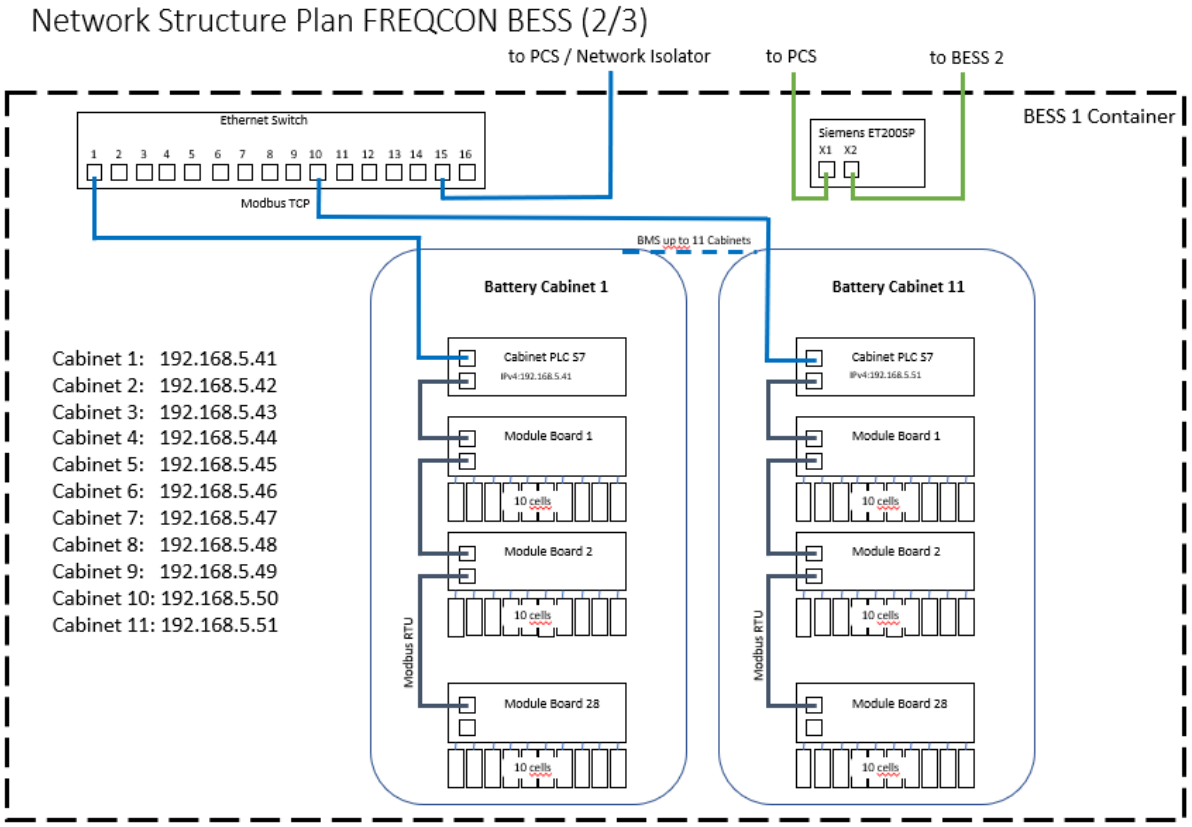


Figure 43: BESS network structure (2/3)

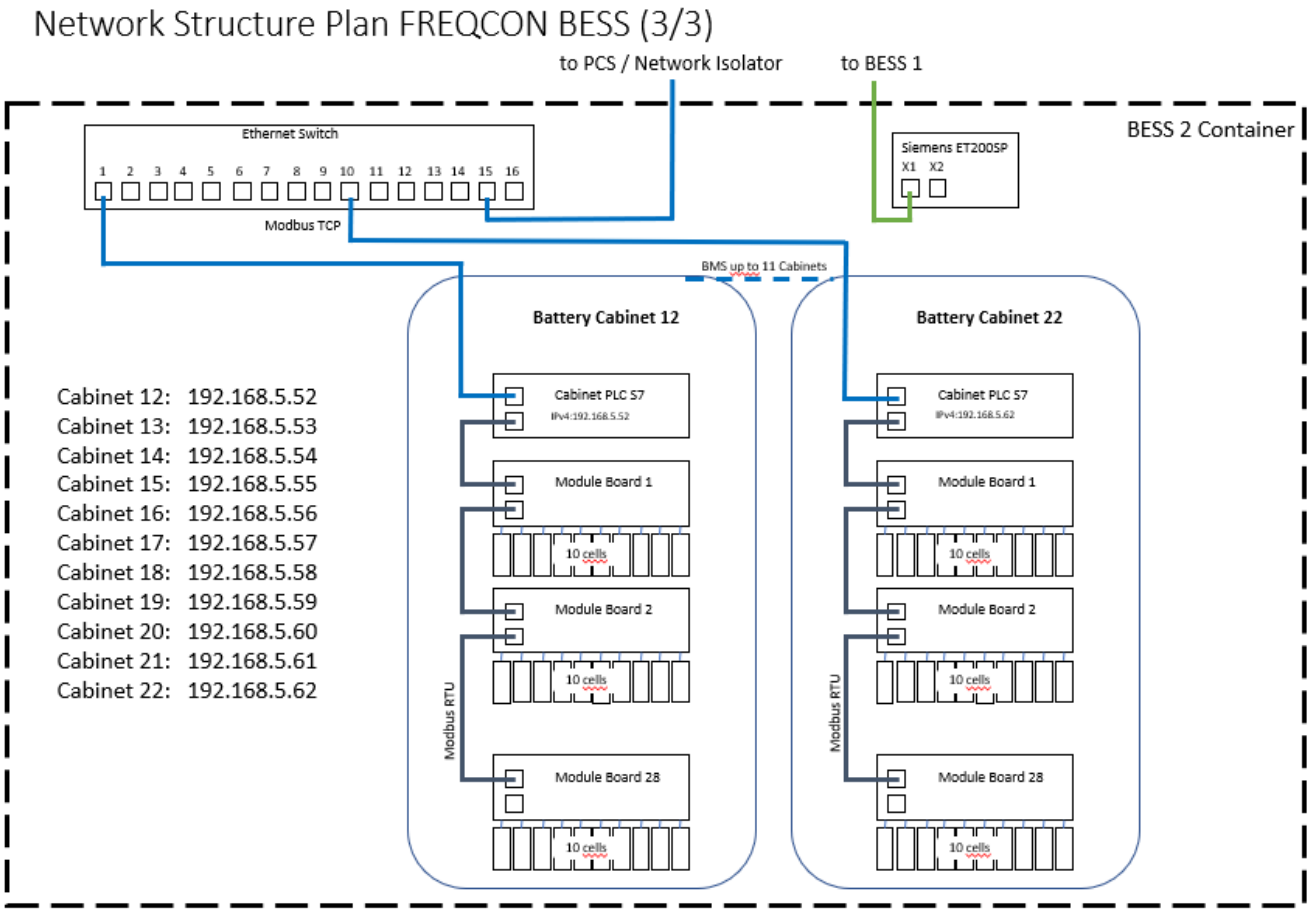


Figure 44: BESS network structure (3/3)

7 Converter Main States

The individual converter main states are depicted in the flow diagram below and described in section 7.2.

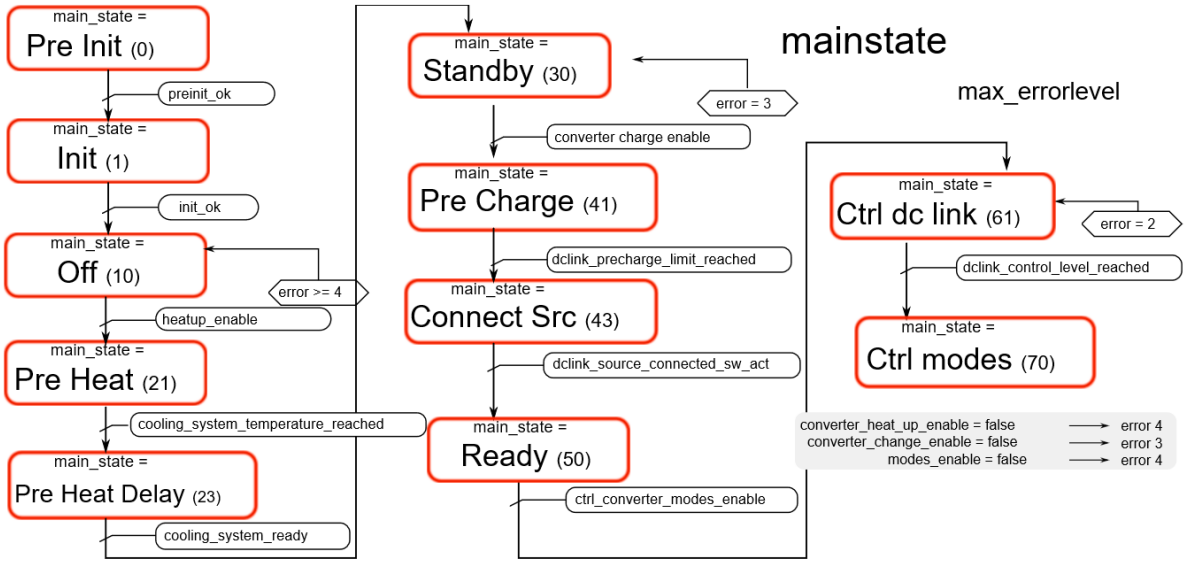


Figure 45: Converter main states

7.1 Error Levels

Error Level	Description
0	No error, logging information
1	Warning category, a warning limit is reached
2	Error category, stop subsystems
3	Error category, stop system and discharge DC-link, cooling system enable
4	Error category, stop system and also the cooling system

Table 31: Error levels

7.2 Main States

INIT

The system was turned on and the stored initialization parameters are read. Cooling and converter system are stopped.

OFF

DC link is discharged. The converter and cooling system are not in operation.

Pre-Heat

The converter is switched-off and is preparing for operation. The cooling system regulates to the optimum temperature of the cooling water, IGBT, capacitors and inductors.

An error level 4, such as a cooling system leak, leads to a change to main state "OFF" (stop cooling system and converter).

Heat-Delay

The converter is preparing for operation. The operation temperatures of the components are reached and maintained for a defined time span.

An error level 4, such as a cooling system leak, leads to a change to main state "OFF" (stop cooling system and converter).

STANDBY

Standby mode – converter is off, but the cooling system is in operation.

An error level 4, such as a cooling system leak, leads to a change to main state "OFF" (stop cooling system and converter).

Pre-Charge

The converter´s main DC-link is pre-charged to a defined voltage level.

An error level 3, such as detection of wrong grid conditions, is leading to a change to main state STANDBY (converter is off, cooling system is in operation).

An error level 4, such as a cooling system leak, leads to a change to main state "OFF" (stop cooling system and converter).

Connect SW

Source contactor is closed.

An error level 3, such as switching error of the source contactor, is leading to a change to main state "STANDBY" (converter is off, cooling system is in operation).

An error level 4, such as a cooling system leak, leads to a change to main state "OFF" (stop cooling system and converter).

READY

Converter is ready for operation. Cooling system is operating, the DC link is charged and source is connected.

An error level 3, such as grid faults, is leading to a change to main state STANDBY (converter is off, cooling system is in operation).

An error level 4, such as a cooling system leak, leads to a change to main state "OFF" (stop cooling system and converter).

DC link Ctrl

The converter power module that is set to "DC link control" mode is activated.

An error level 2, such as derating, DC link errors or over temperature, are leading to a change to main state READY (converter is off, cooling system is in operation).

An error level 3, such as grid faults, is leading to a change to main state STANDBY (converter is off, cooling system is in operation).

An error level 4, such as a cooling system leak, leads to a change to main state "OFF" (stop cooling system and converter).

Ctrl Mode

The remaining converter power modules that are enabled are activated. The converter is operating.

An error level 1, such as power module over temperature, over-current or over-voltage, is leading to a stop of the respective power module.

An error level 2, such as derating, DC link errors or over temperature, are leading to a change to main state READY (converter is off, cooling system is in operation).

An error level 3, such as grid faults, is leading to a change to main state STANDBY (converter is off, cooling system is in operation).

An error level 4, such as a cooling system leak, leads to a change to main state "OFF" (stop cooling system and converter).

8 Technical Data

Container	
Container type	PCS: Customer-specific container BESS: Customer-specific container
Transport weight	PCS: approx. 13.7 t BESS: approx. 15 t (Batteries not installed)
Total weight	BESS: approx. 35 t (Batteries installed)
Container dimensions (L x W x H)	PCS: 6058 mm x 2438 mm x 3200 mm BESS: 12310 mm x 2438 mm x 3783 mm

PCS	
Type	MSC-1000-620-8
Manufacturer	FREQCON GmbH
Nominal AC voltage	620 VAC + 10% - 20%
AC power frequency (nominal)	50 Hz ± 5 Hz
Nominal apparent power	1000 kVA
Nominal active power	1000 kW
Nominal AC current	931 A
Maximum AC current	1050 A
Power factor at rated power / adjustable	1 / 0.03 overexcited to 0.0 underexcited
IGBT switching frequency	2 to 4 kHz
DC link voltage	1175 VDC
Number of DC outputs	8
Current per DC output	250 ADC
DC voltage range	700 VDC to 1022 VDC
HVAC system	included

BESS	
Battery Module	1C LFP Battery 280Ah
Cell manufacturer	EVE
Battery cells per cabinet	28
Battery capacity per cabinet	250.88 kWh
Number of battery cabinets	22
BESS capacity (installed)	5500 kWh
BESS capacity (usable at 0.2 C operation)	5000 kWh
Storage temperature range battery storage (> 1 month)	0 °C to 35 °C (30% to 50% SoC)
Ambient temperature range	-20 °C to +40 °C
Battery management system	FREQCON BMS

Controller	
Main control system	Siemens Simotion P320-4
Control software	FREQCON Framework
Internal communication	Profinet IRT
External communication interfaces	Ethernet, RS485, RS232, MODBUS TCP, Profibus, Profinet
Maximum total harmonic distortion	< 3% at nominal power

Converter Cooling System	
Cooling principle	Liquid and air cooled, air heat exchanger
Maximum cooling water inlet temperature	65°C
Operating pressure range cooling system	2.5 … 3.5 bar
Nominal cooling system pressure	3 bar
Coolant capacity (without hoses)	Approx. 80 l
Heat exchanger weight (without cooling liquid)	Approx. 75 kg

Protective Devices and Standards	
Battery (DC)	Fuse and DC load break switch
AC side disconnection point	Air circuit breaker
DC overvoltage protection	Surge arrester, type I
AC overvoltage protection	Surge arrester, class I
Ground fault monitoring	Yes
Insulation monitoring	Yes
Fire protection (converter)	Smoke and arc detection
Fire protection (batteries)	Active Fire Protection System
Maximum permissible value for relative humidity (condensing / non-condensing)	95% to 100% (2 month/year) / 0% to 95%
Inverter Life (rated conditions)	20 years

Table 32: Technical data

9 Environmental Conditions

	Stationary Operation	Storage packaging with protected layers	Transportation packaging with protected layers
Relative Humidity	Max. 95% No condensation; Relative Humidity <60% under corrosive atmosphere	Max. 95%	Max. 95%
Pollution level IEC60721-3-3 IEC60721-3-2 IEC60721-3-1	No conductive dust		
	3S2 coated PCB: Chemical Air: 3C2 Solid Particulate: 3S2	1S3 coated PCB: Chemical Air: 1C2 Solid Particulate: 1S3	2S2 coated PCB: Chemical Air: 2C2 Solid Particulate: 2S2
Atmospheric pressure	70 … 106 kPa	70 … 106 kPa	70 … 106 kPa
Vibration amplitude	Max 1 mm (5 … 13.2 Hz)	Max 1 mm (5 … 13.2 Hz)	Max. 3.5 mm (5 … 13.2 Hz)
IEC60068-2	Max. 7 m/s^2 (13.2 … 100 Hz) sinusoidal	Max. 7m/s^2 (13.2 … 100 Hz) sinusoidal	Max. 15 m/s^2 (9 … 200 Hz) sinusoidal
Impact IEC60068-2-29	Impermissible	Max. 100 m/s^2, 11 ms	Max. 100 m/s2, 11 ms
Free-fall	Impermissible	Impermissible	Impermissible

Table 33: Environmental conditions

10 Transport, Storage and Commissioning



Please observe the instructions for transport in section 10.2 and for storage and professional handling in section 10.3.

10.1 Unpacking

⚠ CAUTION



Hazard by sharp edges on packaging
Improper handling during unpacking can cause injuries.
➜ Use appropriate safety gloves to protect your hands from possible cuts.

The packaging of the system consists of cardboard, plastic and corrugated board. After usage the packaging must be disposed according to the local regulations for the disposal of paper products (e.g. recycling). After delivery, the delivered units and components must be checked for completeness and damage. If any damage on the delivered units and components have been found, contact the delivery service or FREQCON GmbH immediately.

10.2 Transport

Regarding the transport of the battery modules, refer to the battery module manual.

⚠ DANGER	
	**Hazard by electrolyte release due to mechanical damage to battery modules** Severe burns, long-term physical damage, and environmental damage due to electrolyte. ➜ The device must be disconnected before maintenance work. Work under voltage is not permitted. ➜ Observe the safety data sheet of the battery module and keep it accessible at all times. ➜ Never open battery modules by force. ➜ Avoid contact with escaping electrolyte at all costs, leave the danger area immediately. ➜ In case of ingestion, immediately alert the emergency services! ➜ In case of eye contact: Rinse cautiously with water for several minutes. Remove any contact lenses and continue rinsing. Call poison information center or doctor! ➜ In case of skin contact: Remove contaminated clothing immediately. Wash/shower skin with plenty of water. Call poison control center or doctor! ➜ Prevent release of electrolyte into the environment at all costs. ➜ Wear suitable protective equipment when disposing of electrolyte *(see section* 2.7 "Personal Protection Equipment (PPE)").

⚠ DANGER	
	**Fire due to short circuits in the event of mechanical damage to the battery modules.** Severe burns or death due to short circuits that may result in fire. The electrolyte used is highly flammable as a liquid or vapor. ➜ Avoid mechanical damage. ➜ Never open battery modules by force. ➜ Protect the system against vandalism. ➜ Fire loads or sources of fire near the installation site are not permitted. ➜ In the event of damage, press the emergency OFF button immediately. ➜ In case of fire, leave the danger area immediately and alert the fire department!

NOTICE
Inadequate transportation of the device and all of its components may cause damage to the installed components. ➜ Vibrations and jolts must be avoided during transportation. ➜ The container must be transported in a horizontal position (lying down). ➜ Make sure to observe the specific national safety precautions for transport by truck, train or ship´.

NOTICE
Do not transport the containers with installed batteries ➜ Lifting or Moving of the Container is not allowed if battery modules are inside the container ➜ Remove every battery module from the container before lifting or mowing the container

The container must be transported to the installation site by instructed personnel.

The container weight is specified in section 8, "Technical Data" on page 93. Make sure that the components can be placed at ground level.

For information regarding the dimensions and center of gravity of the container, see section 10.2.2. The container weight is specified in section 8, "Technical Data". Make sure that the components can be placed at ground level.
Vibrations and jolts must be avoided during transportation. If the system was damaged during transport, you must immediately inform the responsible transport company.

The cabinet must be transported in a horizontal position (lying down). It is not permitted to tip over the container during transportation or in any other scenario.
Applied assemblies (if existing) must be protected against damage by external influences during transportation and storage.



All persons involved in the transport of lithium batteries must be trained and certified according to regulations.

The information provided below is for informational purposes only.

10.2.1 Container Lifting

⚠ DANGER	
	**Heavy load** **Improper lifting can result in death, serious injury or property damage.** Never lift the container above people. Use only lifting and personal protective equipment approved by OSHA or other national institutions.

NOTICE
Only use an appropriate crane to lift the container, capable to withstand the loads specified as follows: Total weight of cabinet combination *see section 8, „Technical Data“ page 93.*

NOTICE
Observe the container´s center of gravity during lifting: Observe the container´s center of gravity during lifting with crane, shown in section 10.2.2.

To lift the containers with a crane, use the four transport lugs on the top corners of the container (*see following illustration*).

PCS

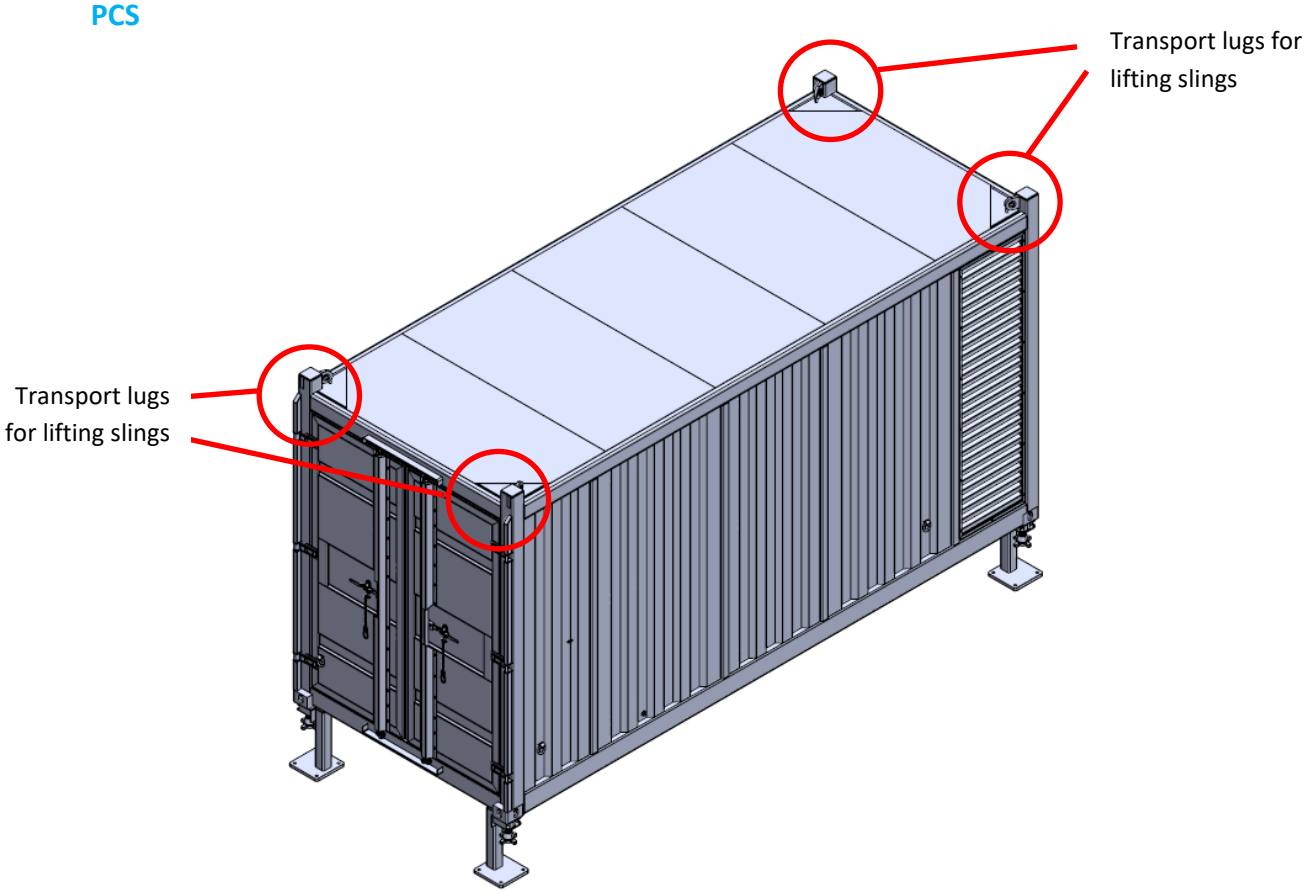


Figure 46: PCS container transport lugs

BESS 1

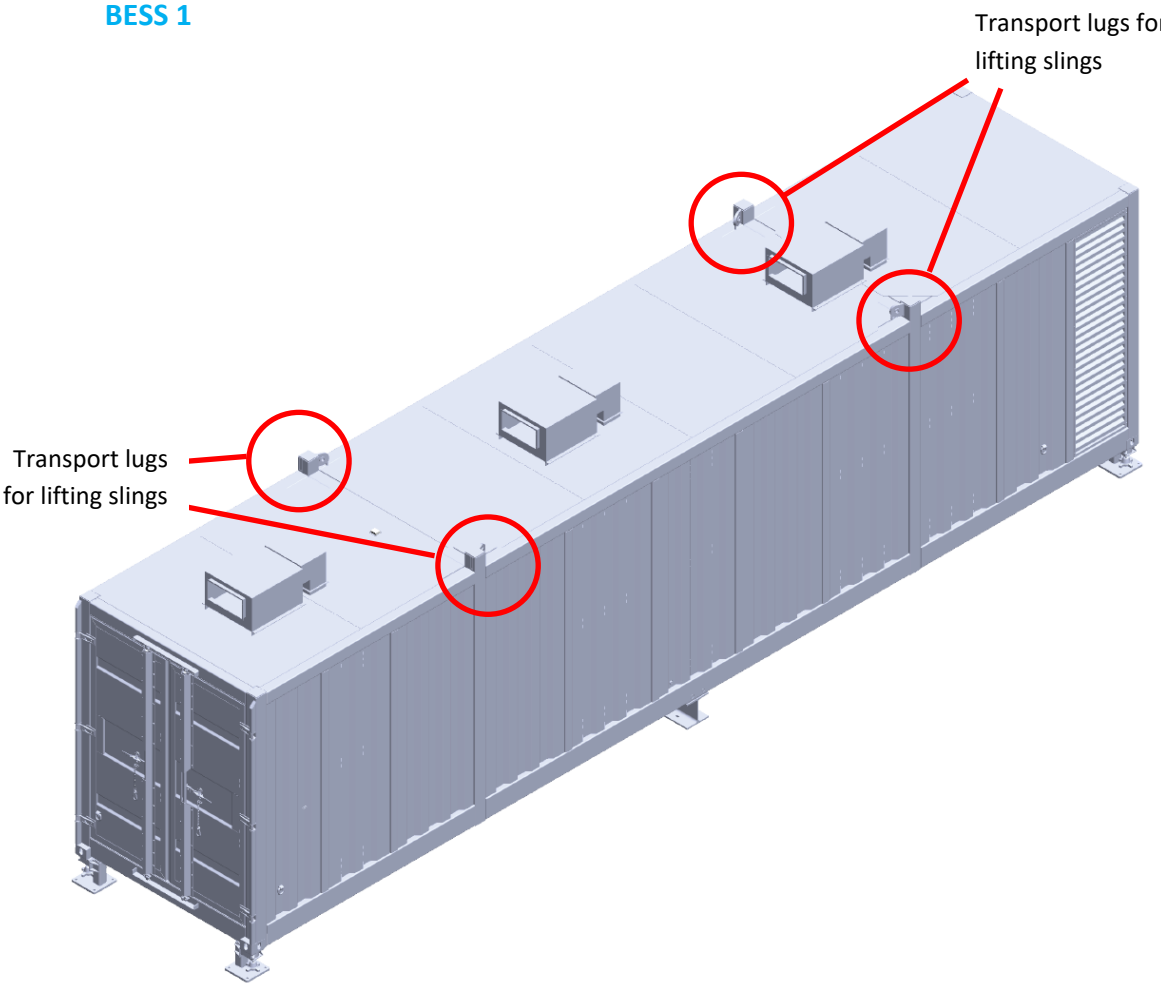


Figure 47: BESS 1 container transport lugs

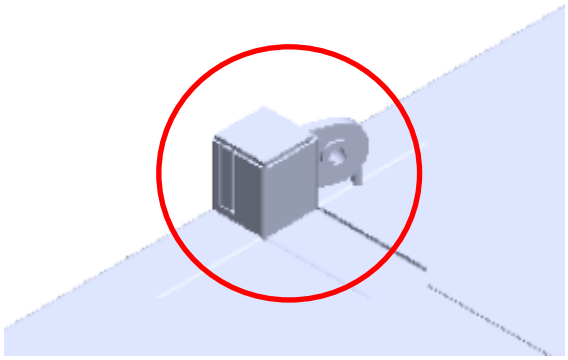


Figure 48: Transport lug

BESS 2

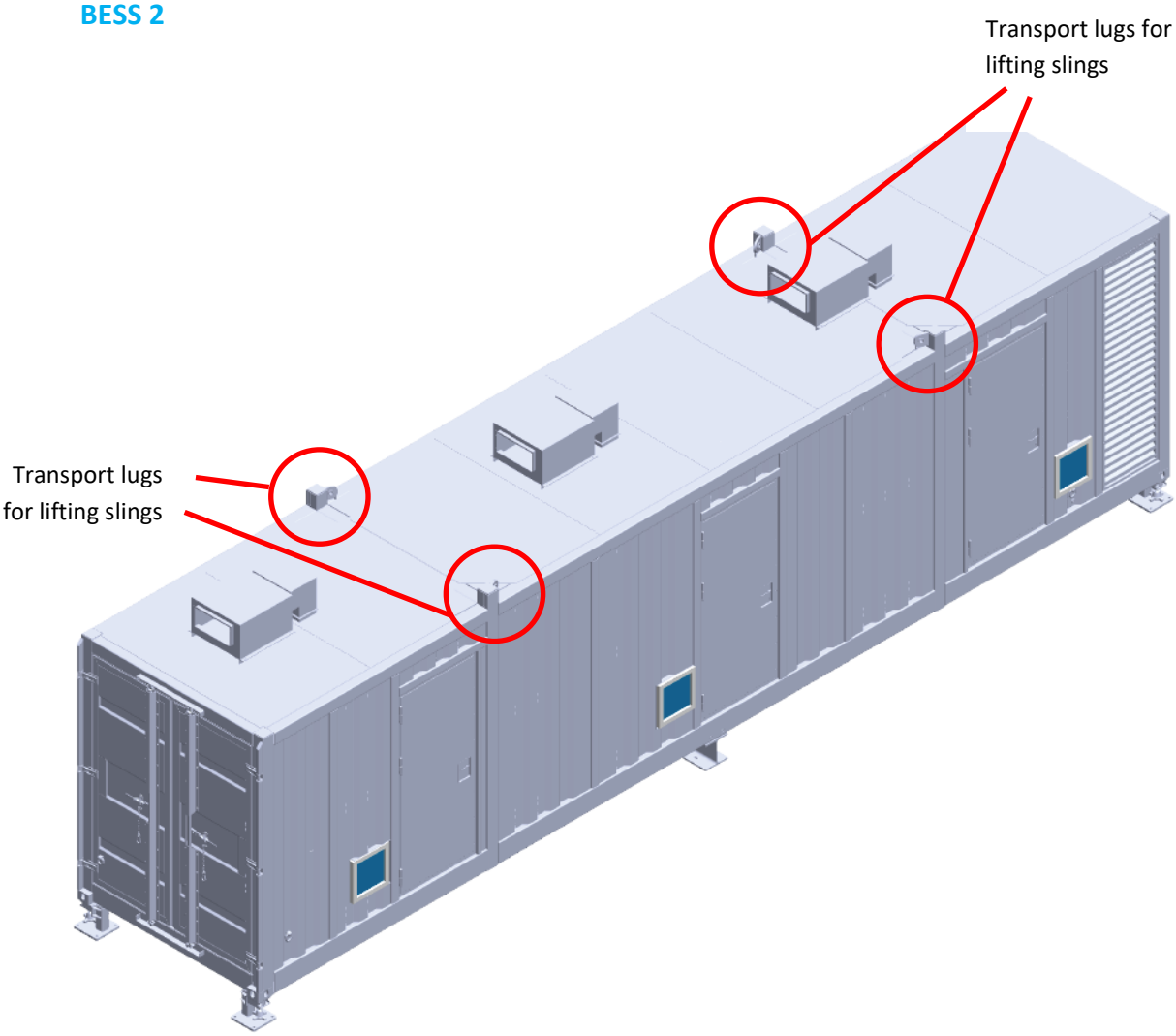


Figure 49: BESS 2 container transport lugs

10.2.2 Dimensions and Center of Gravity

10.2.2.1 PCS Container

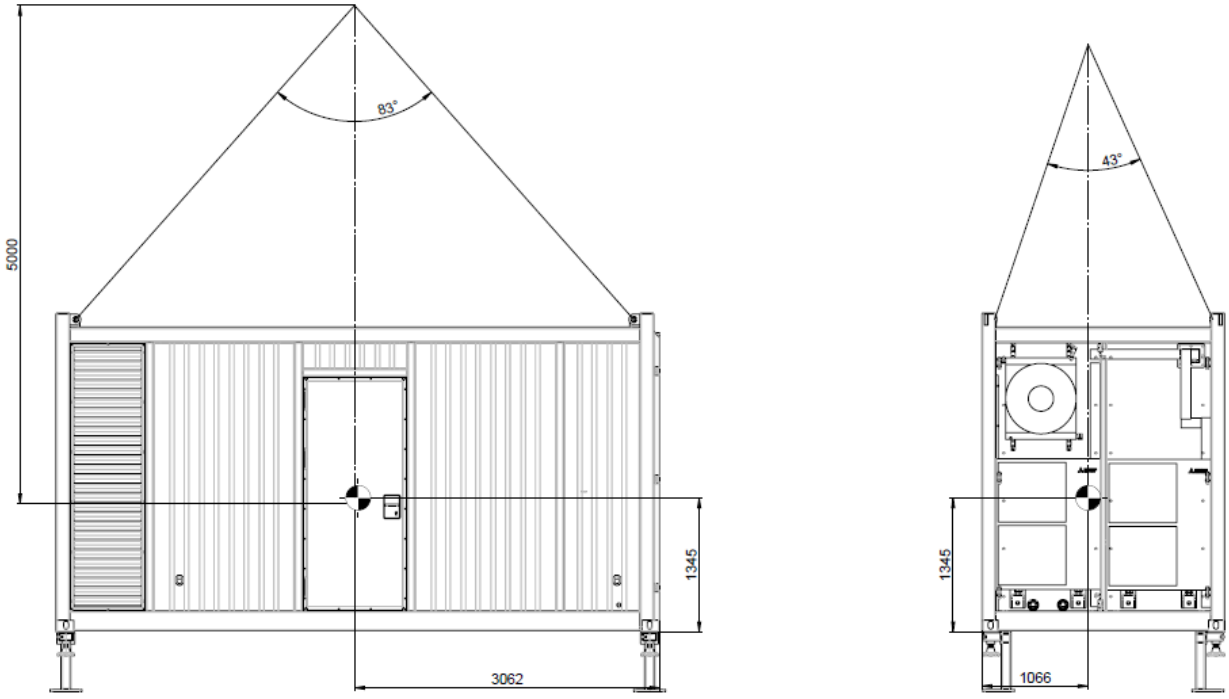
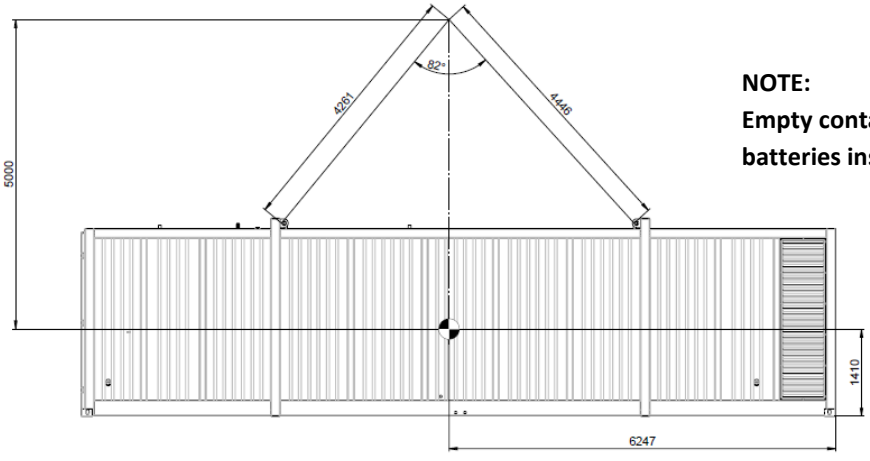


Figure 50: PCS Container – dimensions and center of gravity

10.2.2.2 BESS 1 Container



NOTE:
Empty container, no batteries installed

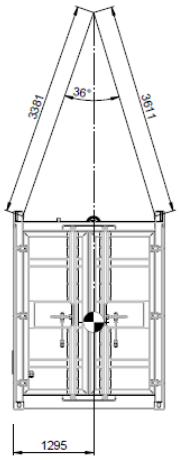
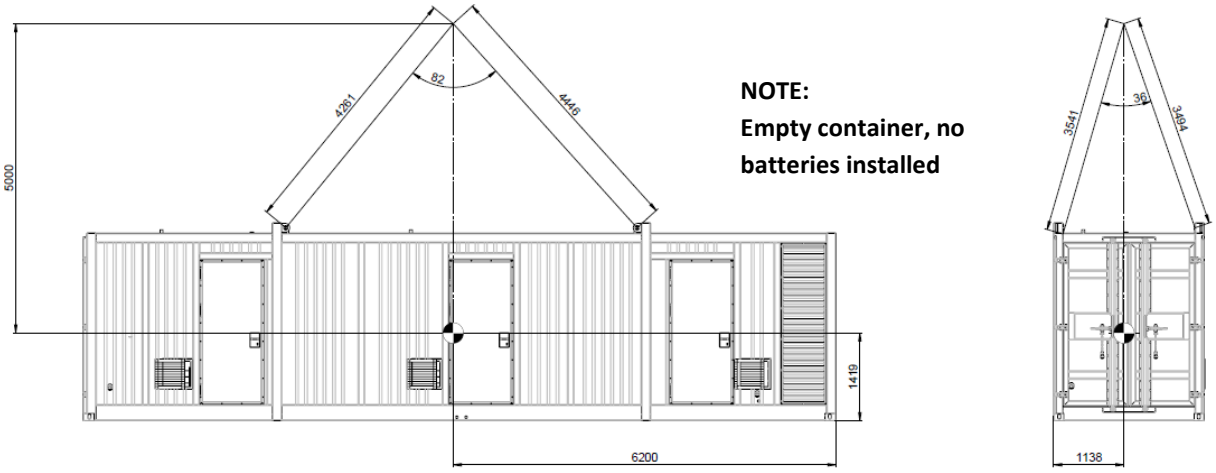


Figure 51: BESS 1 Container – dimensions and center of gravity

10.2.2.3 BESS 2 Container



NOTE:
Empty container, no batteries installed

Figure 52: BESS 2 Container – dimensions and center of gravity

10.3 Storage

10.3.1 Storage Condition

NOTICE	
	Damage to components in the event of improper storage. The storage conditions of the energy storage device are only maintained when the climate control of the container is active. ➜ Keep air conditioning activated/enabled even in case of storage. ➜ Supply energy storage with power even if it is out of operation. ➜ Only deactivate air conditioning if storage conditions are maintained by other measures. ➜ Condensing must be avoided.

NOTICE
The cooling liquid inside the cooling system must be removed at least once every five years. ➜ Check the pressure on the expansion tank every time the cooling liquid is exchanged. The cooling system must be completely drained during a pressure test of the expansion vessel *(see section 17.8.1.3 "Draining the cooling* system*")*.

NOTICE
➜ The BESS container must not be exposed to strong vibrations. ➜ Condensing must be avoided.

NOTICE
The battery of the UPS unit of the converter system must be removed from the battery module at storage temperatures of <0°C. ➜ The removal of the UPS battery is described at 17.3.2.

Store the components of the energy storage system under the following conditions:

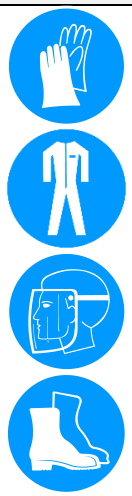
➜ Store the components of the energy storage device according to pollution degree 2 (no conductive pollution).
➜ Do not expose components of the energy storage device to aggressive media.

Storage Condition	Value
Storage temperature	*see technical data in section 8*
Max. relative humidity	*see technical data in section 8*
Positioning of the product during storage	laying down, horizontal

Table 34: Storage conditions

10.4 Assembly and Initial Commissioning

⚠ DANGER	
	**Electric shock due to low voltage and arcing on loose wires.** Severe irreparable damage to the nervous system, burns and death. ➜ Access to control cabinets and string cabinets only by FREQCON service personnel or by FREQCON instructed and authorized maintenance personnel. ➜ Plant control units may also be opened by instructed persons with the qualification of a qualified electrician. ➜ Work on electrical and electronic components as well as cables of the battery system may only be carried out by FREQCON service personnel!

⚠ DANGER	
	**Electric shock due to low voltage and arcing on loose wires.** Severe irreparable damage to the nervous system, burns and death. ➜ Access to control cabinets and string cabinets only by FREQCON service personnel or by FREQCON instructed and authorized maintenance personnel. ➜ Work on electrical and electronic components as well as cables of the battery system may only be carried out by FREQCON service personnel! ➜ Wear personal protection equipment (Electrician's gloves, protective visor, safety shoes, hearing protection)

The energy storage system may only be installed and commissioned by trained service personnel or by FREQCON instructed and authorized maintenance personnel.

11 Mounting

11.1 General

The BESS container must be set up and positioned safely at the installation site and may only be installed by instructed FREQCON service personnel.

Service personnel must at least have the following tools in reach before starting the installation:

Pos.	Installation Tools	Amount
	Basic Tools	
1.	Flashlight	1
2.	Pliers set	1
3.	Ratchet set	1
4.	Torque wrench (1 - 100 Nm)	1
5.	Socket wrench set (with sockets 7 – 19 mm)	1
6.	Wrench set	1
7.	Cross-section screw drivers set	1
8.	Flat-section screw drivers set	1
9.	Allen key / Hex socket key set	1
10.	Cutter	1
11.	First-aid kit	1
12.	Multi-meter instrument	1
13.	Two-pole voltage tester	

Table 35: Installation tools

⚠ DANGER	
	**Electric shock due to low voltage and arcing on loose wires.** Severe irreparable damage to the nervous system, burns and death. ➜ Access to control cabinets and string cabinets only by FREQCON service personnel or by FREQCON instructed and authorized maintenance personnel. ➜ Plant control units may also be opened by instructed persons with the qualification of a qualified electrician. ➜ Work on electrical and electronic components as well as cables of the battery system may only be carried out by FREQCON service personnel or by FREQCON instructed and authorized maintenance personnel.

⚠ DANGER
Make sure that the energy source is locked and tagged and ensure that the isolation is effective before conducting work on the system. After switching-off the voltage supply, some components might still carry a charge. Check all poles using a suitable device.

⚠ WARNING
The electrical connection must be carried out in accordance with the local regulations of the utility company and /or VDE (in Germany).

Do not operate!	Lock and tag power switches and controller devices
	Observe national laws regarding Occupational Safety and Health, as well as Industrial Standards. ➢ DIN VDE 0105-100; VDE 0105-100:2009-10 Operation of electrical installations - General requirements.

11.1.1 Cable Routing

It is recommended that the power cables and the control cables are installed in separate trays. Avoid long parallel runs of power cables with other cables in order to decrease electromagnetic interference.
Where control cables must cross power cables, make sure they are arranged at an angle as near to 90 degrees as possible.
The cable trays must have good electrical connection to each other and to the grounding/earthing.

11.1.2 Coding

11.1.2.1 Coding Terminal Strip

Terminal designation	Description
-XE1	Main power supply 600 V AC
-XE2	DC power supply 1000 V DC
-XE	Main power supply 400 V AC
-X1	Main power 400 V / 230 VAC
-X2	Light cabinet 230 V AC
-X3	Control voltage 24 V DC
-14X1	Control voltage 24 V DC (to DC contactors)
-X5	Low-voltage signals
-XDC0	24 V DC power supply
-XDC1-4	Control voltage 24 VDC (UPS)
-XT	Transfer terminal block 24 V DC / 230 V AC

11.1.2.2 Coding Wiring colors

Cable	Color
L1/L2/L3	Black
N	Light blue
PE	Yellow-green
External voltage	Orange
Control voltage 24 VDC	Dark blue
Analog signals	White

11.1.2.3 Coding Power Supply

Terminal	Phase
U1	L1
V1	L2
W1	L3

11.2 Installation location

⚠ DANGER

Danger to life due to electric shock!
The DC paths and the connection cables are not protected against overload by the BESS.
Select external components according to the specified nominal and maximum currents of the BESS.
➜ If necessary, use appropriate protective equipment for the external components.

⚠ DANGER

Danger from and for unauthorized persons
Unauthorized persons are not aware of the dangers in the work area and may endanger themselves and third parties danger.
➜ Keep unauthorized persons away from the work area.
➜ If in doubt, speak to persons and direct them away from the work area.
➜ Interrupt the work as long as unauthorized persons are in the work area.
➜ Always keep the entrance door(s) locked when not performing work on the system to prevent unauthorized persons from entering the container.

⚠ WARNING

Danger to life due to unsuitable lifting material
While lifting the battery modules use only suitable lifting equipment and lifting tackle
➜ Make sure that all the material and equipment is designed for the weight and all required inspections have been done.
➜ Make sure that no person is under the battery module during lifting.

⚠ CAUTION

Danger to life due to unsuitable lifting material
While lifting the container and/or battery modules use only suitable lifting equipment and lifting tackle
➜ Make sure that all the material and equipment is designed for the weight and all required inspections have been done.
➜ Make sure that no person is under the container or battery module during lifting.

NOTICE

Equipment damage due to intruding animals
Prevent animals from entering the interior of the container from below through the cable glands or recesses.
➜ Secure the container from the outside with suitable protection against the entry of animals.

The BESS containers are designed for outdoor installation, on a flat and ground level surface. Make sure that the environmental conditions meet the values of section 8 „Technical Data“ and section 9 “Environmental Conditions”.

The entrances to the containers must be accessible from every side to allow for visual inspections or maintenance and repair work, if necessary

Air inlets and outlets of the containers, as well as on the cabinets inside the container, must always be kept free and cleaned of dirt in order to ensure the required air flow of the installed fans.

11.2.1 Distances Between Containers

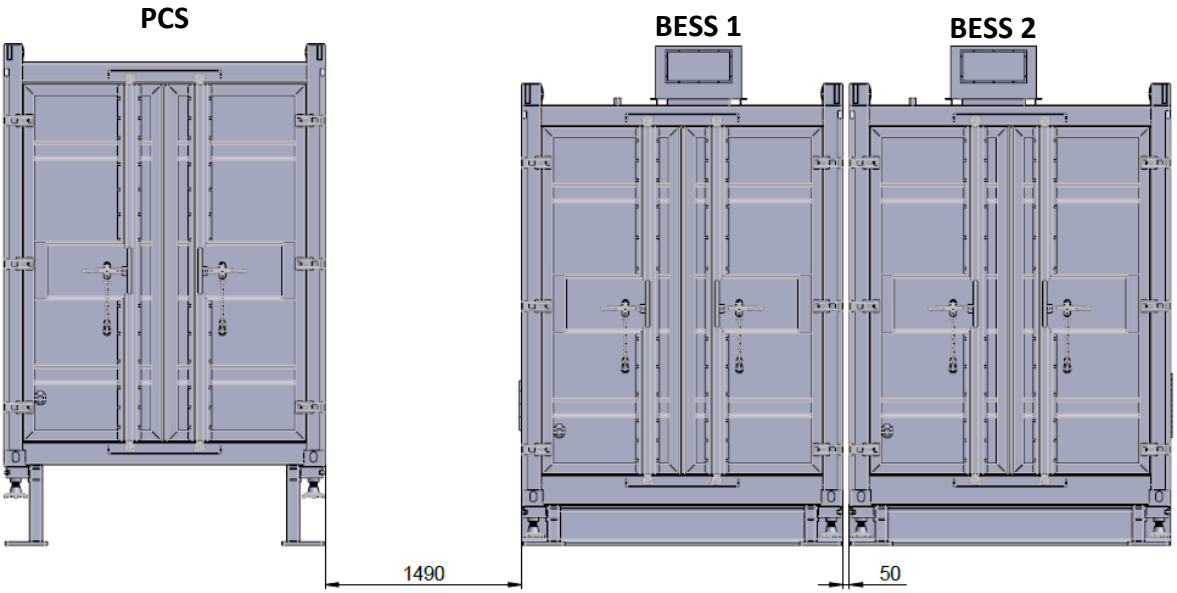


Figure 53: Distances between containers

11.2.2 Cable Outlets

Overall System

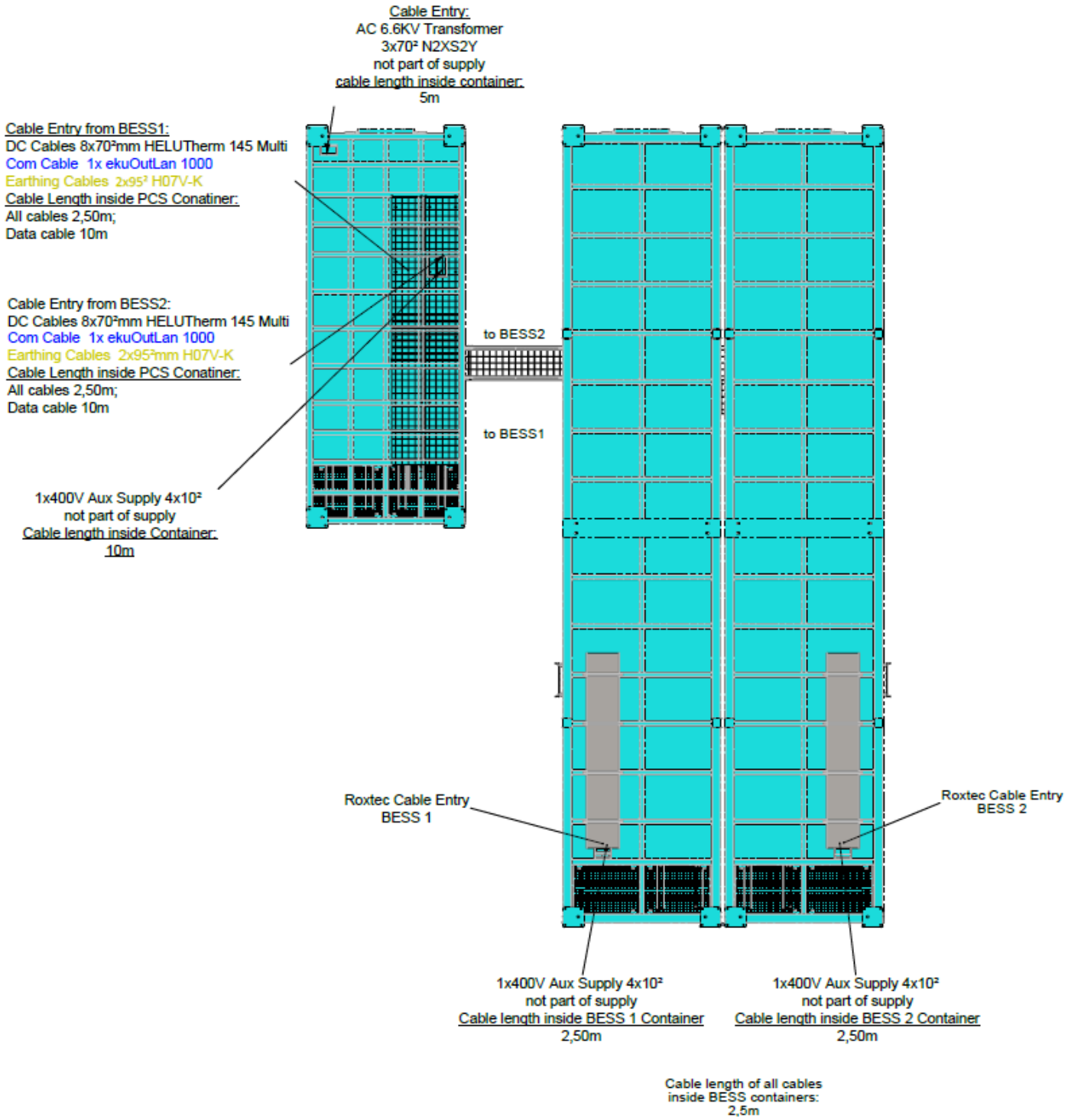


Figure 54: Cable outlets – Overall system (Bottom view)

11.2.2.1 PCS Container

Cable interface 1 (Roxtec cable gland)
- DC power cables
- Communication cables
- 400 V AC aux. cables

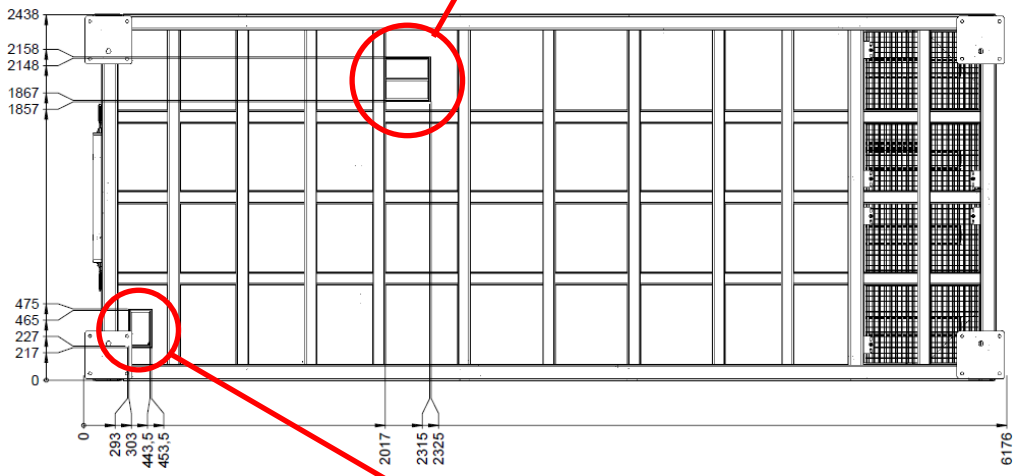


Figure 55: Cable outlets – PCS (Bottom view)

Cable interface 2 (Roxtec cable gland)
- 6.6 kV MV cables

11.2.2.2 BESS 1 Container

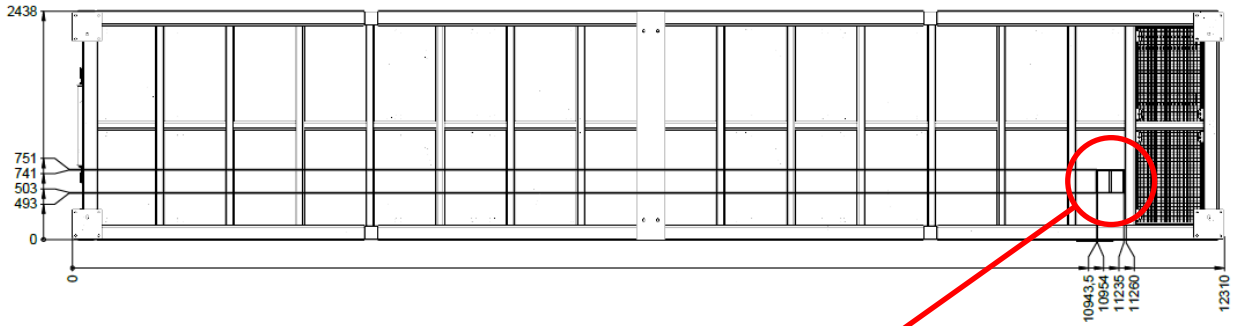


Figure 56: Cable outlets – BESS 1 (Bottom view)

Cable interface (Roxtec cable gland)
- DC power cables
- Communication cables
- 400 V AC aux. cables

11.2.2.3 BESS 2 Container

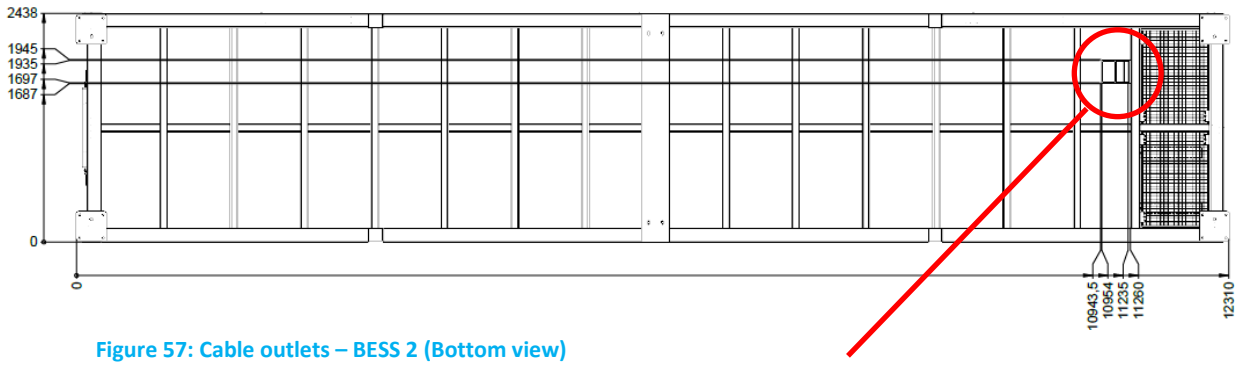


Figure 57: Cable outlets – BESS 2 (Bottom view)

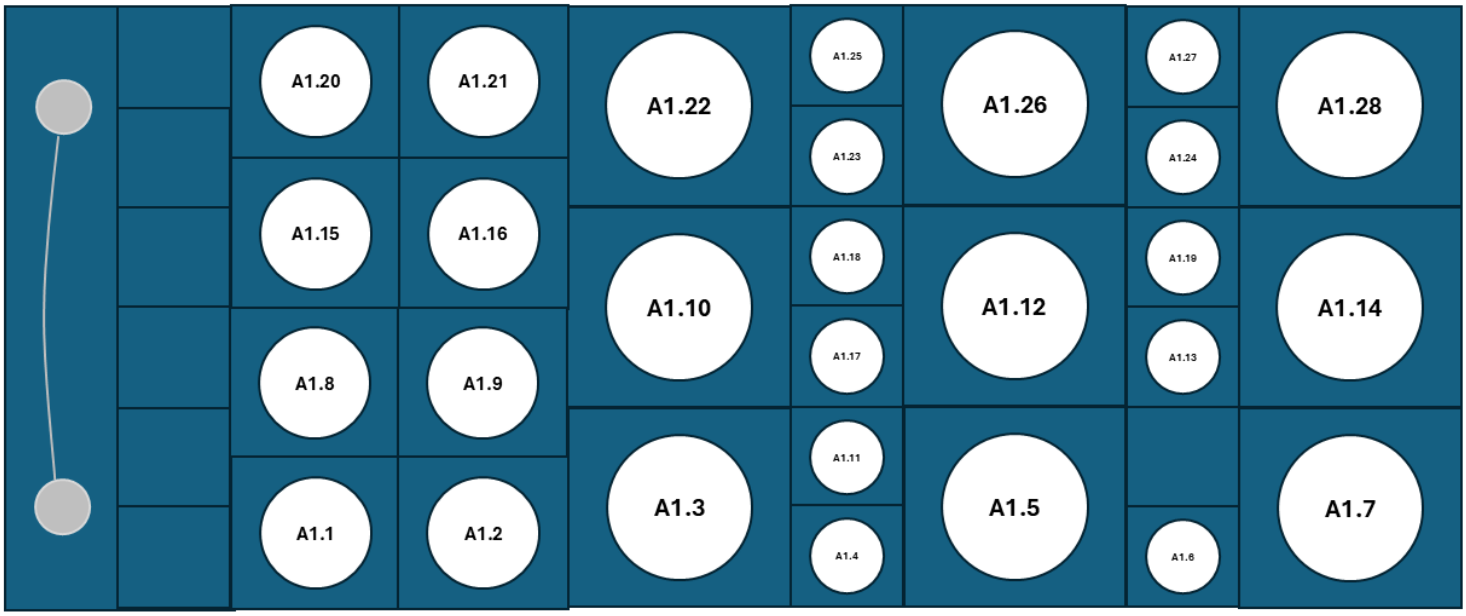
Cable interface (Roxtec cable gland)

- DC power cables
- Communication cables
- 400 V AC aux. cables

11.2.3 Cable Gland Description

11.2.3.1 PCS Container

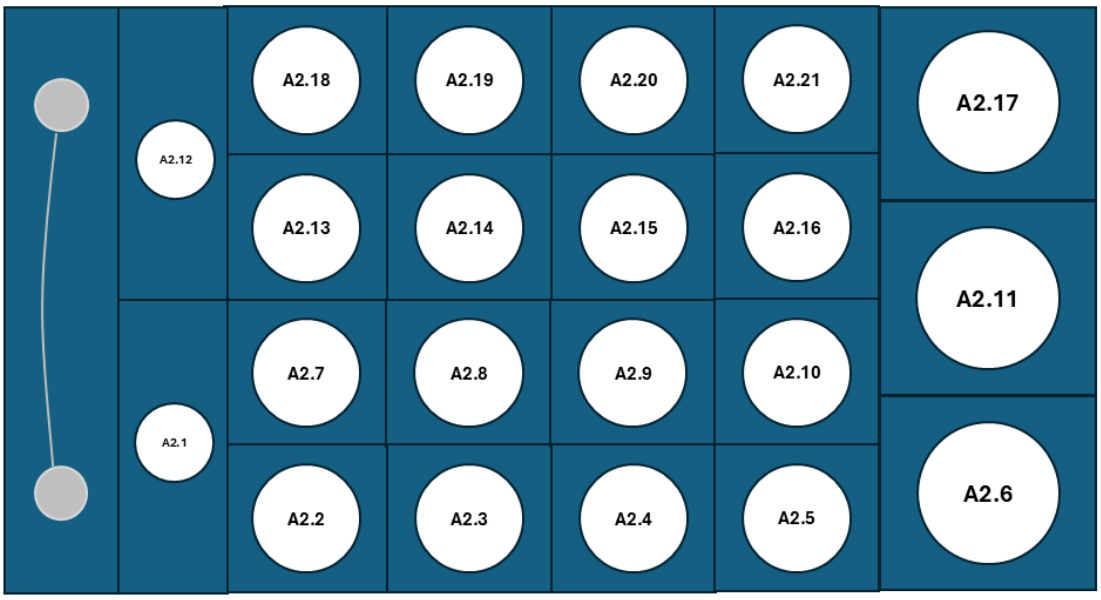
Cable interface – PCS – Comm and Aux 1



PCS – Comm and Aux 1

Pos.	Cable Type	Cable Category	OD (mm / [“])	Module Type
A1:2		COM Cable Ethernet	4 [0.157“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:4	*	P320 PLC / B400-NET-001.01	4 [0.157“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:5		85002CEC	4 [0.157“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:9		COM Cable Ethernet	4 [0.157“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:11	*	P320 PLC / B400-NET-001.02	4 [0.157“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:12		85001-CEC	4 [0.157“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:13	H07V-K 1x 95 mm²	Earthing Cable	11 [0.433“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:15		COM Cable Ethernet	4 [0.157“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:16	**	P320 PLC / B400-FGS-002	4 [0.157“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:18		C-85-XS-001 / B400-SIS-001	4 [0.157“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:19	H07V-K 1x 95 mm²	Earthing Cable	11 [0.433“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:20		COM Cable Ethernet	4 [0.157“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:21	**	P320 PLC / B400-SIS-001	4 [0.157“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:23	***	82006-CEC	4 [0.157“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:24	H07V-K 1x 95 mm²	Earthing Cable	11 [0.433“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:25	***	82007-CEC	4 [0.157“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:26		83011-CEL / 84W2	4 [0.157“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:27	H07V-K 1x 95 mm²	Earthing Cable	11 [0.433“]	RM 20W40 3.5-16.5 [0.138“-0.650“]

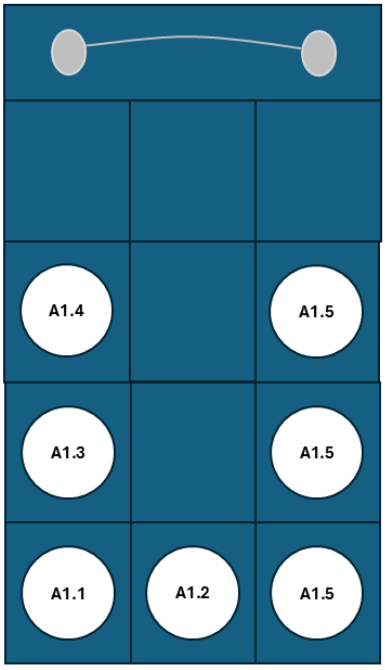
Cable interface – PCS – Comm and Aux 2



PCS – Comm and Aux 2

Pos.	Cable Type	Cable Category	OD (mm / [“])	Module Type
A2:2	Solarflex-X 1x 70	DC Cable - DC+4_3 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:3	Solarflex-X 1x 70	DC Cable - DC-4_3 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:4	Solarflex-X 1x 70	DC Cable - DC+3_1 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:5	Solarflex-X 1x 70	DC Cable - DC-3_1 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:7	Solarflex-X 1x 70	DC Cable - DC+4_2 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:8	Solarflex-X 1x 70	DC Cable - DC-4_2 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:9	Solarflex-X 1x 70	DC Cable - DC+2_3 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:10	Solarflex-X 1x 70	DC Cable - DC-2_3 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:13	Solarflex-X 1x 70	DC Cable - DC+4_1 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:14	Solarflex-X 1x 70	DC Cable - DC-4_1 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:15	Solarflex-X 1x 70	DC Cable - DC+2_2 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:16	Solarflex-X 1x 70	DC Cable - DC-2_2 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:18	Solarflex-X 1x 70	DC Cable - DC+3_3 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:19	Solarflex-X 1x 70	DC Cable - DC-3_3 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:20	Solarflex-X 1x 70	DC Cable - DC+2_1 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:21	Solarflex-X 1x 70	DC Cable - DC-2_1 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]

Cable interface 2 (MV Transformer)

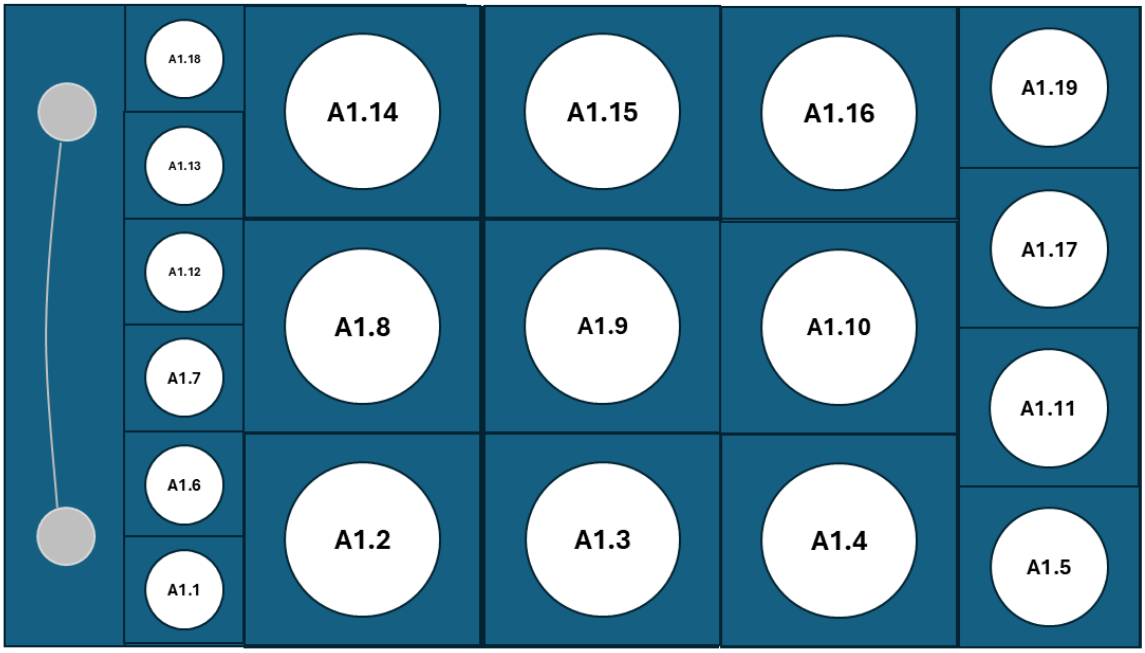


PCS – MV Transformer

Pos.	Cable ID	Name	Cable Category	OD (mm / [“])	Module Type
A1:1	1	82005 – L2	AC 6.6 kV Transformer	10 [0.394“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:2	4	82005 – L3	AC 6.6 kV Transformer	10 [0.394“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:3	5	82005 – L1	AC 6.6 kV Transformer	10 [0.394“]	RM 20W40 3.5-16.5 [0.138“-0.650“]

11.2.3.2 BESS 1

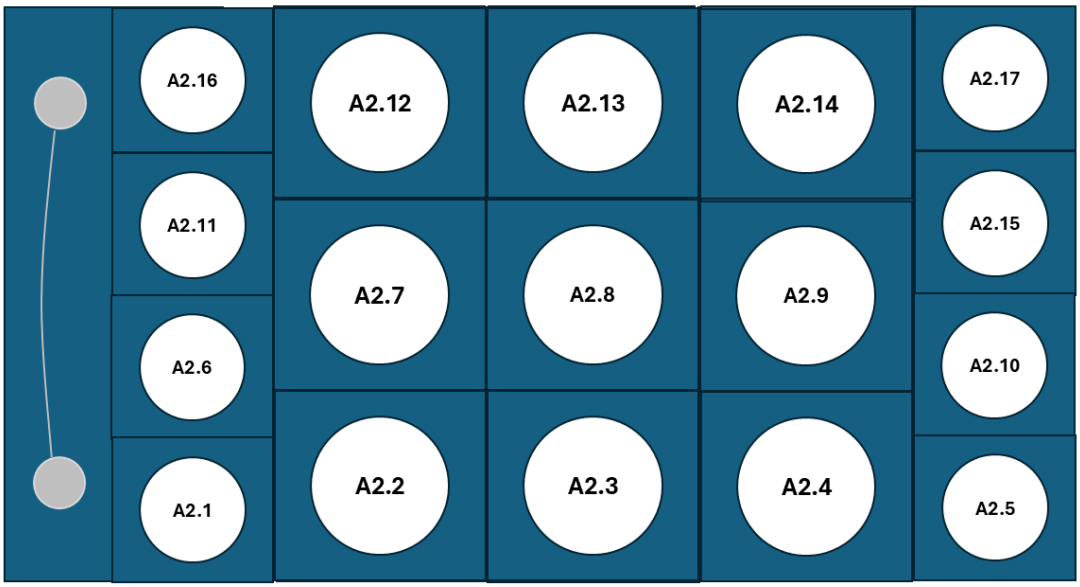
Cable interface 1 - BESS 1



BESS 1 - 1

Pos.	Cable Type	Cable Category	OD (mm / [“])	Module Type
A1:1	H07V-K 1x 95 mm²	Earthing Cable	11 [0.433“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:5	4x 10 mm²	400 V Aux Supply – 83015-CEL	4 [0.157“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:6	H07V-K 1x 95 mm²	Earthing Cable	11 [0.433“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:7		COM Cable - ETH	4 [0.157“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:12		COM Cable - UNIT_1 PROFINET	4 [0.157“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:13		COM Cable - UNIT_3 PROFINET	4 [0.157“]	RM 20W40 3.5-16.5 [0.138“-0.650“]

Cable interface 2 - BESS 1

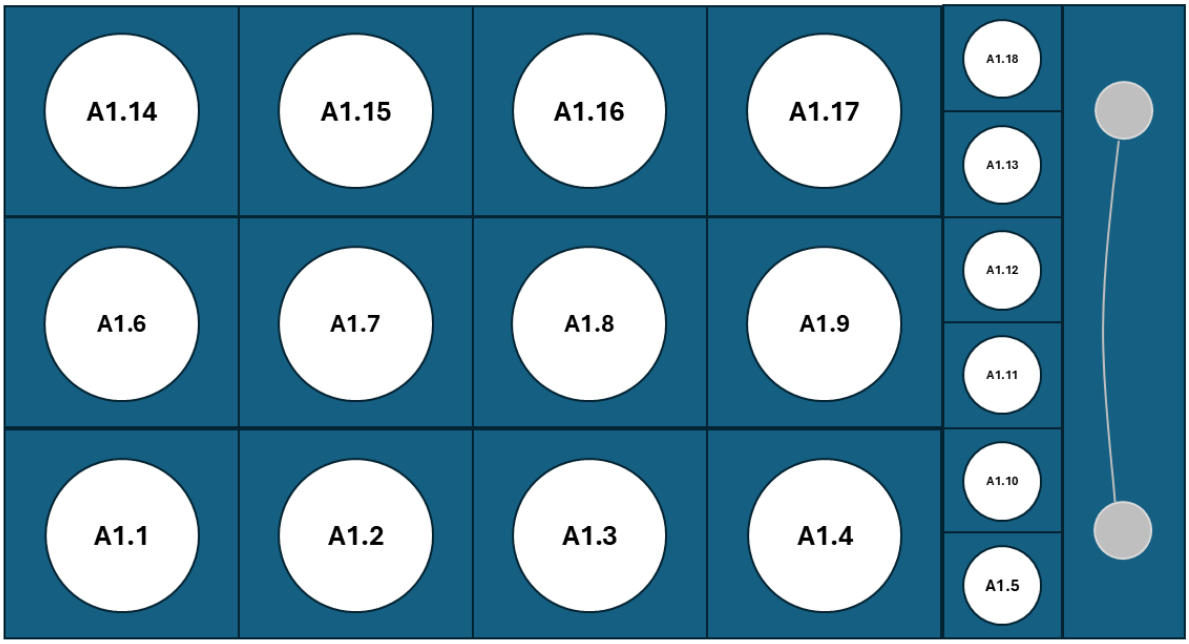


BESS 1 - 2

Pos.	Cable Type	Cable Category	OD (mm / [“])	Module Type
A2:1	Solarflex-X 1x 70	DC Cable - DC-2_2 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:5	Solarflex-X 1x 70	DC Cable - DC+2_3 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:6	Solarflex-X 1x 70	DC Cable - DC+2_2 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:10	Solarflex-X 1x 70	DC Cable - DC-2_3 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:11	Solarflex-X 1x 70	DC Cable - DC-2_1 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:15	Solarflex-X 1x 70	DC Cable - DC-3_1 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:16	Solarflex-X 1x 70	DC Cable - DC+2_1 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:17	Solarflex-X 1x 70	DC Cable - DC+3_1 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]

11.2.3.3 BESS 2

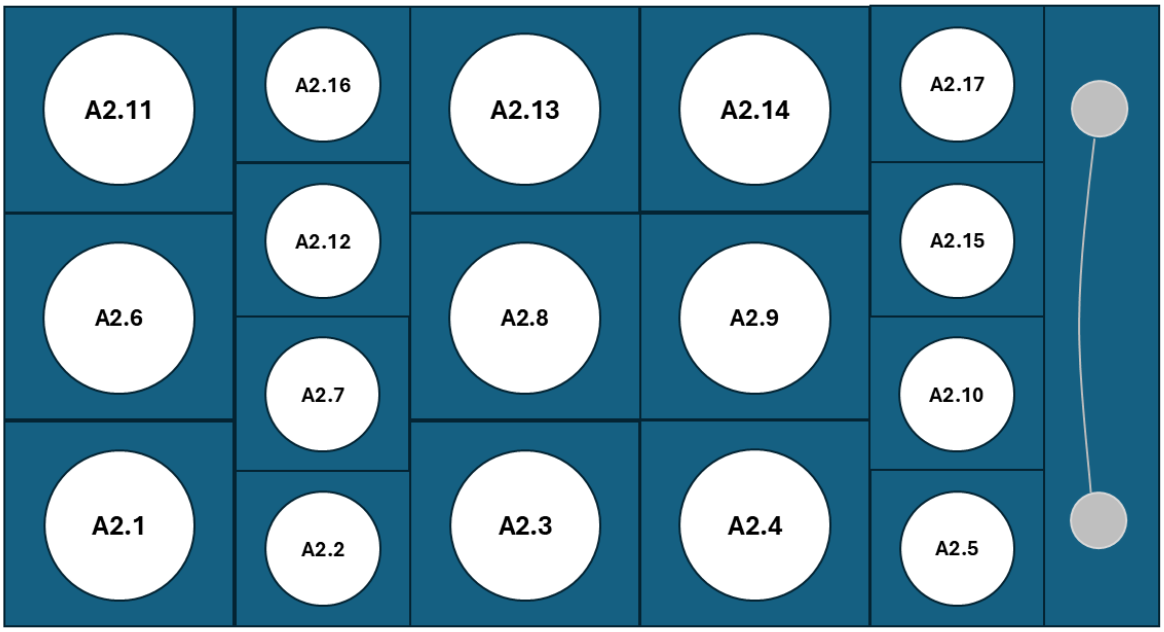
Cable interface 1 - BESS 2



BESS 2 - 1

Pos.	Cable Type	Cable Category	OD (mm / [“])	Module Type
A1:1	4x 10 mm²	400 V Aux Supply – 83014-CEL	4 [0.157“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:5	H07V-K 1x 95 mm²	Earthing Cable	11 [0.433“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:10	H07V-K 1x 95 mm²	Earthing Cable	11 [0.433“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:12		COM Cable - ETH	4 [0.157“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:13		COM Cable - UNIT_2 PROFINET	4 [0.157“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A1:18		COM Cable – ET200 Unit_1 (not connected)	4 [0.157“]	RM 20W40 3.5-16.5 [0.138“-0.650“]

Cable interface 2 - BESS 2



BESS 2 - 2

Pos.	Cable Type	Cable Category	OD (mm / [“])	Module Type
A2:2	Solarflex-X 1x 70	DC Cable - DC+4_3 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:5	Solarflex-X 1x 70	DC Cable - DC+3_3 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:7	Solarflex-X 1x 70	DC Cable - DC-4_3 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:10	Solarflex-X 1x 70	DC Cable - DC-3_3 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:12	Solarflex-X 1x 70	DC Cable - DC-4_2 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:15	Solarflex-X 1x 70	DC Cable - DC+4_1 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:16	Solarflex-X 1x 70	DC Cable - DC+4_2 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]
A2:17	Solarflex-X 1x 70	DC Cable - DC-4_1 BAT	9.5 [0.374“]	RM 20W40 3.5-16.5 [0.138“-0.650“]

11.2.4 AC Connection

⚠ DANGER

Before performing work on the BESS, make sure the system is disconnected from all power supplies, the feed-in disconnectors are open and secured against unintentional reclosing.

NOTICE

- ➜ Comply with the minimum cable cross-sections indicated in the wiring diagram provided.
- ➜ Always secure AC power cables with adequate strain relief in order to prevent the removal of the power cables from the AC connections after installation.

To connect the 620 V AC network, the system provides AC, PE and N connection busbars within the **AC_DC cabinet** *(see circuit diagram and following figure, ① to ⑤)*.

Also refer to the provided circuit diagram (*see section 1.2 "Applicable Documents"*) when connecting the BESS to the AC grid.

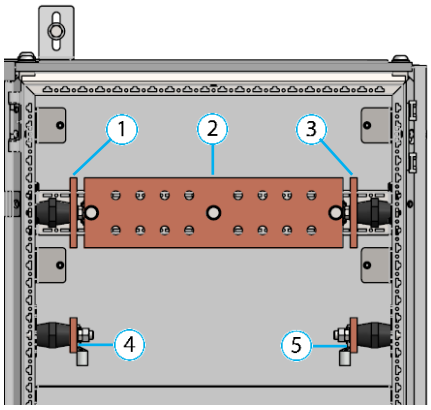


Figure 58: AC grid connection busbars inside AC_DC cabinet

Pos.	Description	Identifier
①	AC grid connection busbar L1	78W1
②	AC grid connection busbar L2	78W2
③	AC grid connection busbar L3	78W3
④	AC grid connection busbar N	78W5
⑤	AC grid connection busbar PE	78W4

Table 36: AC grid connection busbars inside AC_DC cabinet

Task 1: **Connect the AC grid supply cables to the designated AC grid connection busbars inside the AC_DC cabinet *(see wiring diagram and illustration below)*.**

Step 1 : Lead the customer-side AC grid supply cables through the recess provided in the container floor from below into the container interior.

Step 2 : Lead AC grid supply cables through the recess provided in the cabinet floor of the AC_DC cabinet from below to the inside of the cabinet.

Step 3 : Locate the 78W1, 78W2 and 78W3 AC connection and the PE and N busbars inside the AC_DC cabinet (*see illustration above,* ① - ⑤).

Step 4 : Screw the three grid phase cables L1, L2, L3 and the PE and N cable to the corresponding connection busbars inside the AC_DC cabinet (*see illustration and table above,* ① - ⑤) using appropriate cable lugs, screws, nuts and washers.

Step 5 : Apply the torque specified by the screw connection manufacturer to the connection.

Step 6 : Check connections for tightness.

✓ **The AC grid supply cables were successfully connected to the corresponding AC grid connection busbars in the AC_DC cabinet.**

11.2.5 Higher-Level Controller Connection

⚠ DANGER

Before performing work on the BESS, make sure the system is disconnected from all power supplies, the feed-in disconnectors are open and secured against unintentional reclosing.

The converter system is mainly controlled and monitored via the customers´ higher-level controller. The higher-level controller is connected to the BESS main controller via a PROFINET interface. Therefore, a network isolator (114A1) is provided inside the control cabinet 1 (CTRL_1) of the converter system, to which the higher-level controller can be connected via an Ethernet line.

To connect the higher-level controller to the converter controller via Ethernet line, proceed as follows:

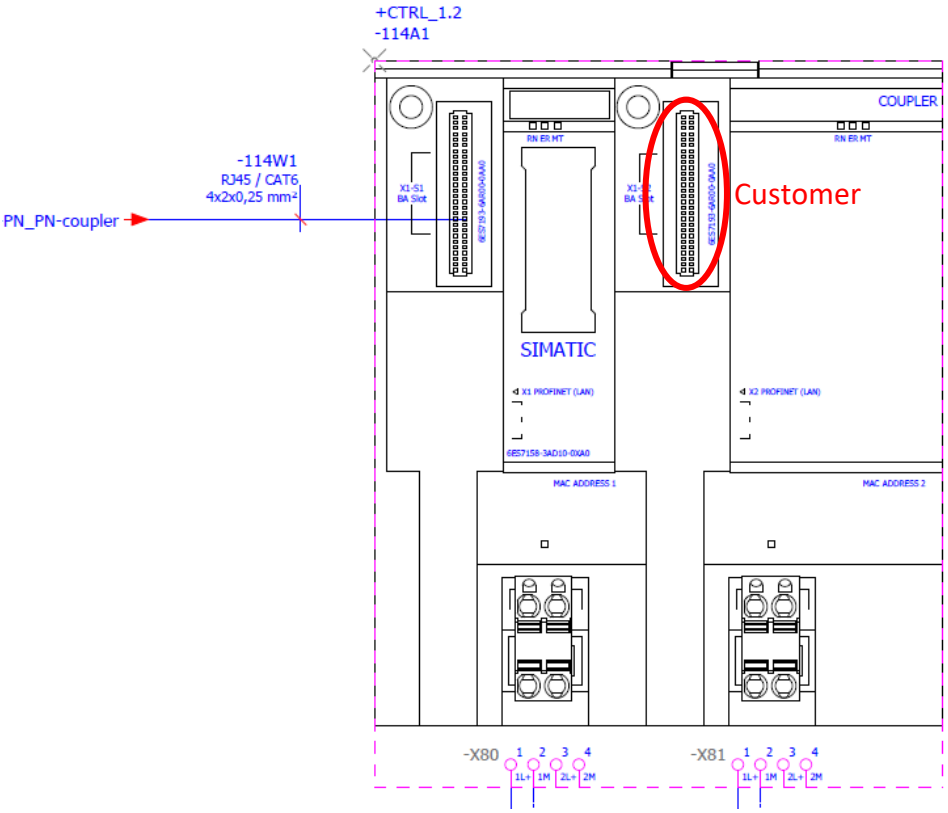


Figure 59: Network isolator 114A1 inside CTRL_1 cabinet

Task 1: **Connect the customer-side higher-level controller to the BESS main controller cabinet (*see circuit diagram and illustration above*).**

Step 1 : Lead the Ethernet cable coming from the external, higher-level controller through the recess in the bottom of the control cabinet 1 (CTRL_1) into the cabinet interior.

Step 2 : Locate the network isolator (114A1) inside the control cabinet.

Step 3 : Connect the external Ethernet cable to the free port of the network isolator.

✓ **The higher-level controller has been successfully connected to the BESS main controller via Ethernet cable.**

12 Pre-Commissioning

Follow the steps below for preparations prior to commissioning of the converter:

Do not operate!	Lock and tag power switches and controller devices
⚠ DANGER 	Disconnect power and block operation controller devices. Follow national laws regarding Occupational Safety and Health. 1. Identify the energy source(s). 2. Isolate the energy source(s). 3. Determine voltage-free status. 4. Ground device or equipment to protect from short circuiting and from shocks. 5. Lock and Tag the energy source(s). 6. Prove that the equipment isolation is effective. 7. When required, apply lock-out device or clamp and secure with padlock(s).

12.1 Activate Motor Contactors and Fuses

Task 1: Activate motor contactors and test auxiliary voltages

Set the main switch on the control cabinet door to ON position. ☐

Activate the motor contactors inside the converters system cabinets. ☐

Check the 400 V AC power supply using the corresponding terminals inside CTRL cabinet. ☐

Task 2: Switch on fuses

Switch on all 24/230/400V AC/DC fuses inside the cabinets. ☐

Install the fuses for the UPS supply. ☐

Check, whether the 24 V DC voltage has the correct polarity and magnitude. ☐

Switch on all the 24 V DC fuses (130F1) if not already activated (green indicator lights indicate activated fuse). ☐

After this action all the control devices indicator lights in the control cabinet including the main PLC Siemens SIMOTION P320 should glow green, indicating that these parts are activated and working.

12.2 Check Power Cables

Inspect wiring for proper installation and connection. See wiring diagram for detailed information about the wiring. ☐

12.3 Check Communication Cables

Inspect wiring for proper installation and connection. See wiring diagram for detailed information about the wiring. ☐

Communication between main PLC and converter is established. ☐

12.4 Cooling System Preparations

The cooling system is set under 3 bar air pressure for at least 1 hour. The system pressure must not decrease within that time. ☐

The system is filled with coolant under working pressure of 3 bar and checked for leakage for at least an hour. ☐

13 Commissioning

Follow the steps below for commissioning of the BESS:

Task 1: **Converter Commissioning**

Step 1 : Make sure that the customer-side mains is switched off and decoupled from the converter system.

Step 2 : Make sure that all the work and action instructions listed in section 11 "Mounting" have been carried out.

Step 3 : Follow all instructions listed in section 14.4.

✓ **The BESS is now ready for operation.**

14 Operation

⚠ DANGER	
	Do not enter the container if the warning light is on (red light) ➜ It is only allowed to enter the container if the warning light indicated that it is safe to enter the container (green light) ➜ If the warning light is completely off (no green or red light) consider that it is not safe to enter the container. Before entering the container, make sure that there is no fire inside and no harmful atmosphere

NOTICE	
	• Staying in the container during operation is not permitted, except to turn-off the system in case of emergency • Use the remote interface to start the converter • Do always switch off the converter if you go inside the container

14.1 Operating Panel

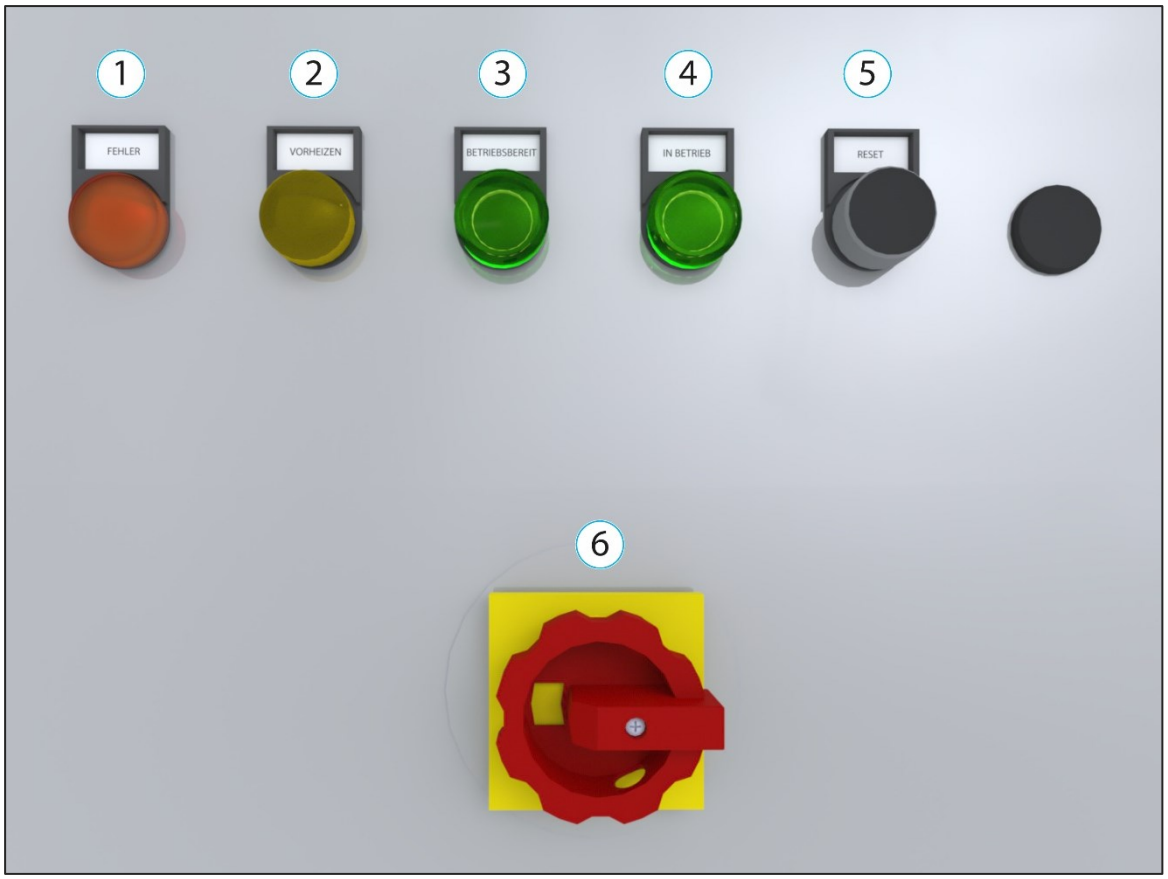


Figure 60: Operating panel

14.2 Indicator Lights

Pos.	Indicator Light	Description
①	**Fault**	**Flashing light** A warning of the converter main controller is present. The converter remains in operation. Constantly glowing: A fault has been detected by the converter main controller. The BESS does not function correctly.
②	**Preheating**	**Flashing light** The cooling liquid is preheated until the set cooling liquid temperature has been reached. Constantly glowing: The coolant temperature has reached the set temperature and is maintained for a set time span (defined in controller). **Light off:** The cooling liquid temperature was maintained for the time span defined in the controller. The preheating process is finished.
③	**Ready for Operation**	**Flashing light** The DC-link of the converter is pre-charging until the set voltage has been reached. **Constantly glowing:**

		The DC-link is precharged to the set voltage and the power switches are closed.
④	**Operating**	**Constantly glowing:** The converter´s IGBTs are enabled. The converter is operating.

Table 37: Indicator lights

14.3 Control Elements

Pos.	Control Element	Description
⑤	**Reset** *Push button*	Resets an existing fault of the main controller and the emergency stop relay.
⑥	**Main switch** *Rotary Switch*	Main switch 480 V power supply for converter control electronics.

Table 38: Control Elements

14.4 Switching on the BESS

Carry out the following steps to switch on the BESS:

Task 1: **Switch on the BESS**
Step 1 : Make sure that the external emergency stop button (customer side, if present) is not activated.
Step 2 : Switch the main switch (*see figure 60,* ⑥) to the "ON" position.

Note 1: If the temperature inside the control cabinet falls below 15°C, the internal control cabinet heating is automatically switched on. The main control is only enabled after the temperature limit value of >5°C has been reached.
Note 2: Once the BESS control system has started up, the function commands transmitted by the higher-level control system are executed.
Note 3: If the BESS control unit detects an error, the red "Fault" indicator (①) lights up.

Step 3 : Check the BESS control system for error messages via the higher-level control system (customer side using WebVisu or communication interface).
Step 4 : Resolve the error(s) if possible.
Step 5 : After successful troubleshooting, acknowledge the error by sending a "Reset" command via the higher-level control system (customer side via WebVisu or communication interface) or the reset button on the CTRL cabinet (⑤*)*.

	For detailed information on the control commands, such as the reset command, which are transmitted to the BESS control system via the customer's higher-level control system, please refer to the document "Description of data profiles" (*see section 1.2 "Applicable Documents"*).

	The control bits described below can be set simultaneously and are automatically processed by the control system in the correct sequence.

Step 6 : Set the **converter_heatup_enable** bit to **TRUE** via the communication interface of the external control room or via the WebVisu. The signal initiates the preheating process of the cooling system. This process normally takes 20 minutes. The "Preheating" indication light illuminates (*see figure 60,* ②).
Step 7 : As soon as all temperatures are within the permissible range, the "Preheating" indication light goes off.
Step 8 : Set the **converter_charge_enable** bit to **TRUE** via the communication interface of the external control room or via the WebVisu. The signal initiates precharging of the DC link and the "Ready for operation" indication light (③) starts to flash. As soon as the DC link is pre-charged, the main switch responsible for the DC link control is switched on and the "Ready for operation" indication light (③) starts to light up constantly.
Step 9 : Set the **converter_modes_enable** bit to **TRUE** via the communication interface of the external control room or via the WebVisu. The signal activates the pulse enable of the grid IGBT´s.
Step 10 : If no errors have occurred, the BESS starts normal operation and the "Operation" indication light (④) lights up constantly.

Step 11 : The detailed procedure for switching on the converter system must be carried out in accordance with the document "Description of data profiles" (*see section 1.2 "Applicable Documents")*. The sequence of the individual steps is shown on the "Flow Chart" tab.

✓ **The BESS is now switched on and in operation.**

14.5 Switching off the BESS

Follow the steps below in order to switch-off the converter:

⚠ DANGER	
	**Electric shock hazard!** **Do not perform maintenance work on a live system.** After switching off the converter, the DC-link of the converter still carries dangerous voltages, which may cause death or severe injuries if touched or short circuit. ➜ Before performing work on the converter, deenergize the converter, wait for 30 minutes until the installed capacitors are discharged and check the voltage-free status of the DC-link by using a 2-pole voltage tester. ➜ It is not allowed to open the cabinet doors before the converter system has been de-energized and the capacitors are discharged. ➜ It is not allowed to perform any work on the converter before the system has been de-energized.

⚠ DANGER	
	**Electric shock hazard!** **Do not perform maintenance work on the converter system, before the converter system has been disconnected from all power sources.** After switching off the converter, the connected DC power cables of the battery strings, the DC connection busbars in the AC_DC cabinet and the DC switch & fuse units continue to carry dangerous voltages that can cause death or serious injury if touched or short-circuited. ➜ Before starting work inside the converter cabinets, de-energize the converter system as described in section 14.6 “De-Energizing”, wait for 30 minutes until the installed capacitors are discharged and check the voltage-free status of the DC-link by using a 2-pole voltage tester. ➜ Disconnect the DC power cables from the converter system using suitable DC disconnecting devices before carrying out any work in the cabinets of the converter system. ➜ Before disconnecting the DC power cables from the DC connection busbars, always check for voltage-free status of the DC power cables, since dangerous electric arcs may lead to severe injuries or death when disconnecting the power cables.

⚠ DANGER	
	**Electric shock hazard!** **Do not perform any work on the MV switchgear and the MV transformer before the PLC container has been disconnected from all voltage sources.** After switching off the converter, the connected MV transformer, the MV switchgear, its connecting cables and terminals continue to carry dangerous voltages which, if touched or short-circuited, can cause death or serious injury. ➜ Before working on the medium voltage components of the converter container, de-energize the converter system as described in section 14.6 “De-Energizing”. ➜ Disconnect the AC mains connection by opening the MV switchgear. ➜ Before disconnecting the AC power cables from the AC connection busbars, always check the voltage-free status of the AC power cables, otherwise dangerous arcs can cause serious injury or death when disconnecting the power cables.

⚠ DANGER	
	**Electric shock hazard!** **Do not perform any maintenance work on the converter system before the AC circuit breaker and MV switchgear have been switched off and protected against unintentional reclosure.** ➜ Before starting work inside the converter cabinets, the AC circuit breaker 80Q1 must be switched off and protected against unintentional reclosure as described in section 14.8.3 “Protect the CB Against Unintentional Reclosing”. ➜ Before you start working inside the control cabinets, the medium-voltage switchgear must be switched off and protected against unintentional reclosure.

Task 1: **Switch off the BESS.**

Step 1 : To switch off the converter, carry out the steps in reverse order according to the document "Description of the data profiles" in the "Flow chart" tab (*see section 1.2 “Applicable Documents”*).

Step 2 : Set the **converter_modes_enable** bit to **FALSE** via the communication interface of the external control room or via the WebVisu. The signal deactivates the pulse enable of the grid IGBT´s.

Step 3 : Set the **converter_charge_enable** bit to **FALSE** via the communication interface of the external control room or via the WebVisu. The signal opens the main switch and initiates the discharge of the DC link. As soon as the main switch is open, the "Ready for operation" indication light goes off (*see figure 60,* ③).

⚠ DANGER	
	**Risk of injury due to electric shock!** **Discharging the DC link takes several minutes. The "Ready for operation" indication light is not an indicator of a fully discharged DC link. Do not carry out any work on BESS before the DC link has been completely discharged.** ➜ Wait until the DC link is completely discharged and check that it is de-energized as described in section 14.7 "Check Voltage-Free Status of DC Link ".

Step 4 : Set the **converter_heatup_enable** bit to **FALSE** via the communication interface of the external control room or via the WebVisu. The signal switches off the water cooling of the converter after a run-on time of 2 minutes.

Step 5 : Switch the main switch on the converter control cabinet (*see figure 60,* ⑥) to the "OFF" position.

✓ **The BESS is now switched off.**



The UPS can be switched off by pulling the blade type fuse of the UPS unit.

14.6 De-Energizing

Carry out the following steps to de-energize the BESS system:

⚠ DANGER	
	**Electric shock hazard!** **Do not perform maintenance work on a live system.** After switching off the converter, the DC-link of the converter still carries dangerous voltages, which may cause death or severe injuries if touched or short circuit. ➜ Before performing work on the converter, deenergize the converter, wait for 30 minutes until the installed capacitors are discharged and check the voltage-free status of the DC-link by using a 2-pole voltage tester. ➜ It is not allowed to open the cabinet doors before the converter system has been de-energized and the capacitors are discharged. ➜ It is not allowed to perform any work on the converter before the system has been de-energized.

⚠ DANGER	
	**Electric shock hazard!** **Do not perform maintenance work on the converter system, before the converter system has been disconnected from all power sources.** After switching off the converter, the connected DC power cables of the battery strings, the DC connection busbars in the AC_DC cabinet and the DC switch & fuse units continue to carry dangerous voltages that can cause death or serious injury if touched or short-circuited. ➜ Before starting work inside the converter cabinets, de-energize the converter system as described in section 14.6 “De-Energizing”, wait for 30 minutes until the installed capacitors are discharged and check the voltage-free status of the DC-link by using a 2-pole voltage tester. ➜ Disconnect the DC power cables from the converter system using suitable DC disconnecting devices before carrying out any work in the cabinets of the converter system. ➜ Before disconnecting the DC power cables from the DC connection busbars, always check for voltage-free status of the DC power cables, since dangerous electric arcs may lead to severe injuries or death when disconnecting the power cables.

⚠ DANGER	
	**Electric shock hazard!** **Do not perform any work on the MV switchgear and the MV transformer before the PLC container has been disconnected from all voltage sources.** After switching off the converter, the connected MV transformer, the MV switchgear, its connecting cables and terminals continue to carry dangerous voltages which, if touched or short-circuited, can cause death or serious injury. ➜ Before working on the medium voltage components of the converter container, de-energize the converter system as described in section 14.6 “De-Energizing”. ➜ Disconnect the AC mains connection by opening the MV switchgear. ➜ Before disconnecting the AC power cables from the AC connection busbars, always check the voltage-free status of the AC power cables, otherwise dangerous arcs can cause serious injury or death when disconnecting the power cables.

⚠ DANGER	
	**Electric shock hazard!** **Do not perform any maintenance work on the converter system before the AC circuit breaker and MV switchgear have been switched off and protected against unintentional reclosure.** ➜ Before starting work inside the converter cabinets, the AC circuit breaker 80Q1 must be switched off and protected against unintentional reclosure as described in section 14.8.3 "Protect the CB Against Unintentional Reclosing". ➜ Before you start working inside the control cabinets, the medium-voltage switchgear must be switched off and protected against unintentional reclosure.

Task 1: **De-energize the BESS**

Step 1 : Switch-off the converter system like explained in section 14.4.

Step 2 : Secure the AC circuit breaker(s) from unintentional reclosure, like explained in section 14.9.3.

Step 3 : Decouple the customer AC connection from the converter system using a suitable disconnection device.

Step 4 : Wait for 30 minutes until the converters´ DC link is discharged and check the voltage-free status of the DC-link by using a suitable 2-pole voltage tester.

✓ **The BESS is now switched off and de-energized.**

14.7 Check Voltage-Free Status of DC Link



The DC link voltage can be up to 1300 VDC. Make sure that the measuring device for testing the absence of voltage in the DC link is suitable for this voltage range.



For converter systems with more than one DC link, the following steps must be carried out to check the absence of DC link voltage on each DC link.

The following steps must be followed to check that the DC link is de-energized:

Step 1 : After switching off the system, check the DC link voltage on the WebVisu or via the communication interface of the external control room.

Step 2 : Check that the DC link is de-energized at the HVIO measuring fuse 173F2 between connections 2 and 4 in the CTRL cabinet.

Step 3 : In addition, check that the DC link is de-energized at the HVIO measuring fuse 173F2 by measuring between connection 2 and N (or PE) in the CTRL cabinet.

Step 4 : In addition, check that the DC link is de-energized at the HVIO measuring fuse 173F2 by measuring between connection 4 and N (or PE) in the CTRL cabinet.

Step 5 : Check that there is no voltage on the DC link between a DC- connection (*see figure below*, ①) and DC+ connection (②) of the PowerStack.

➜ For switch cabinets with more than one installed PowerStack, access to the DC link connections is at the bottom stack.
➜ The DC+ connections are positioned slightly to the rear compared to the DC connections.

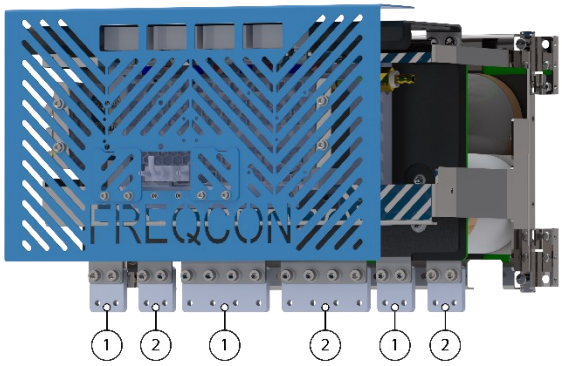


Figure 61: DC- connections ① and DC+ connections ② on the PowerStack (figure may differ from the actual design)

14.8 AC Circuit Breaker

NOTICE

The AC main circuit breaker(s) must not be switched manually!
Do not switch the AC main circuit breaker manually under any circumstances, as this could damage the breaker and the equipment.

The converter system is equipped with an individual 3WL circuit breaker, in order to disconnect the connected grid from the BESS systems electric circuit.

The main circuit-breaker(s) is/are located in the CIR cabinet (*see section 4.4.3 "Internal Components"*).

To protect the circuit breaker against unauthorized switching and to protect the maintenance and operator personnel, the circuit breakers contain a number of locking devices.

For instructions on how to secure the circuit-breaker(s) against reclosing, see section 14.8.3.

Detailed information can be found in the manufacturer's documentation for the circuit-breaker (*see also section 1.2 "Applicable documents"*):

Document type	Document Name	File Name
Operating instructions AC circuit breaker	3ZX1812-0WL00-0AN4	3ZX1812-0WL00-0AN4_online_201806140915326928

14.8.1 Circuit Breaker Components

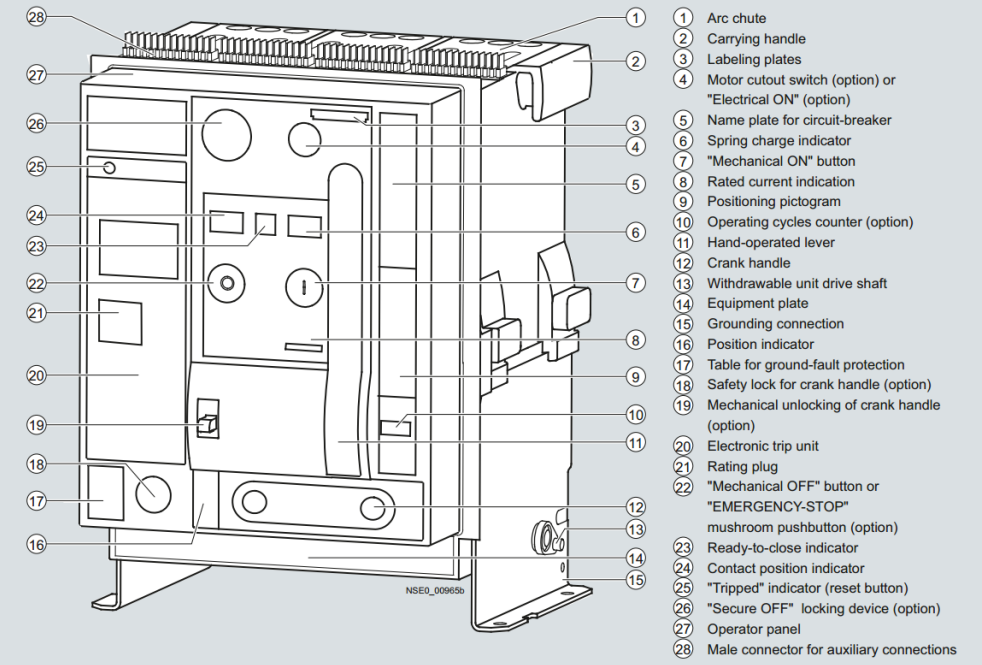
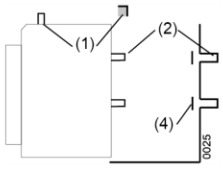
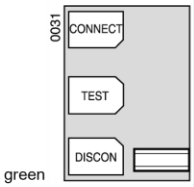
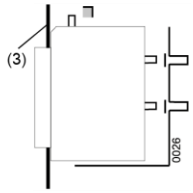
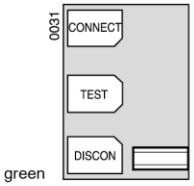
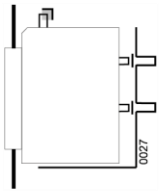
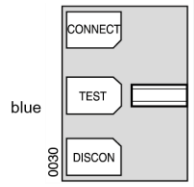
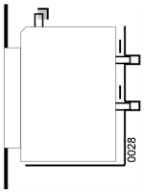
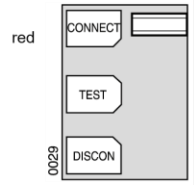


Figure 62: Circuit breaker components

14.8.2 Positions of CB in the Guide Frame

	Diagram	Positon indicator	Power circuit	Auxiliary circuit	Cubicle door	Shutter
Maintenance position			disconnected	disconnected	open	closed
Disconnected position			disconnected	disconnected	closed	closed
Test position			disconnected	connected	closed	closed
Connected position			connected	connected	closed	open

(1) Auxiliary circuit
(2) Primary circuit
(3) Cubicle door
(4) Shutter

Figure 63: Circuit breaker positions

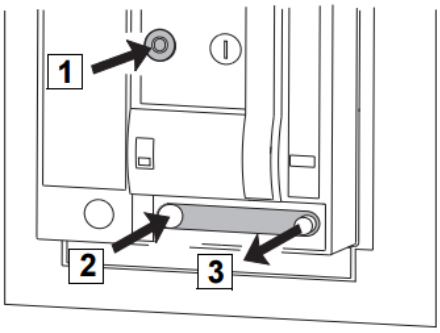
14.8.3 Protect the CB Against Unintentional Reclosing

Drawing out of the racking handle can be prevented by fitting a maximum of three padlocks. The circuit breaker is then locked against moving.

Task 1: **Unlocking the racking handle/ Withdrawing racking handle.**

Step 1 : OPEN circuit breaker.

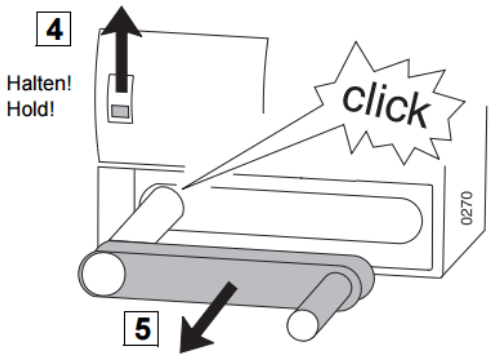
Step 2 : Push the crank.



Step 3 : Pull out handle.

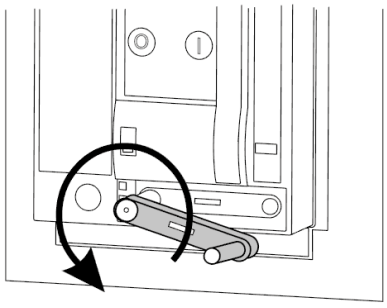
Step 4 : Lift and hold the control lever.

Step 5 : Pull out the crank.

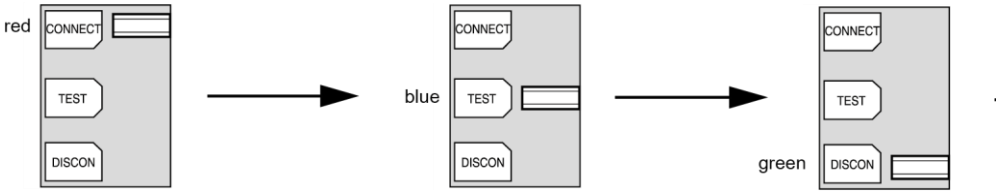


Task 2: Racking circuit breaker into the disconnected position.

Step 1 : Rack the handle until the disconnected position is indicated by the position indicator (green).



Position indicatior

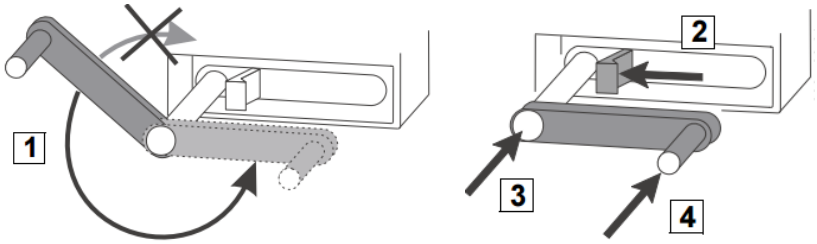


Task 3: Push in the racking handle.

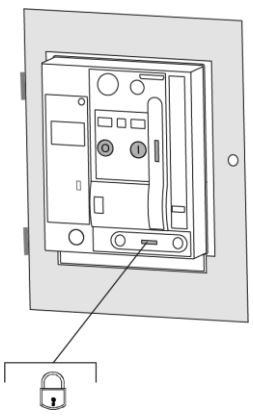
Step 1 : Bring the racking handle to the position indicated in the illustration below.

Step 2 : Push in the crank.

Step 3 : Push in the handle.



Task 4: Lock the racking handle with one or more padlocks.



14.9 DC Fuse Switch Disconnectors

NOTICE	
	**The DC fuse switch disconnectors must not be switched manually!** Do not switch the DC fuse switch disconnectors manually under any circumstances, as this could damage the breaker and the equipment.

Each of the battery storage cabinets is equipped with a DC fuse switch disconnector, in order to disconnect the corresponding battery cabinet from the electric circuit of the BESS.

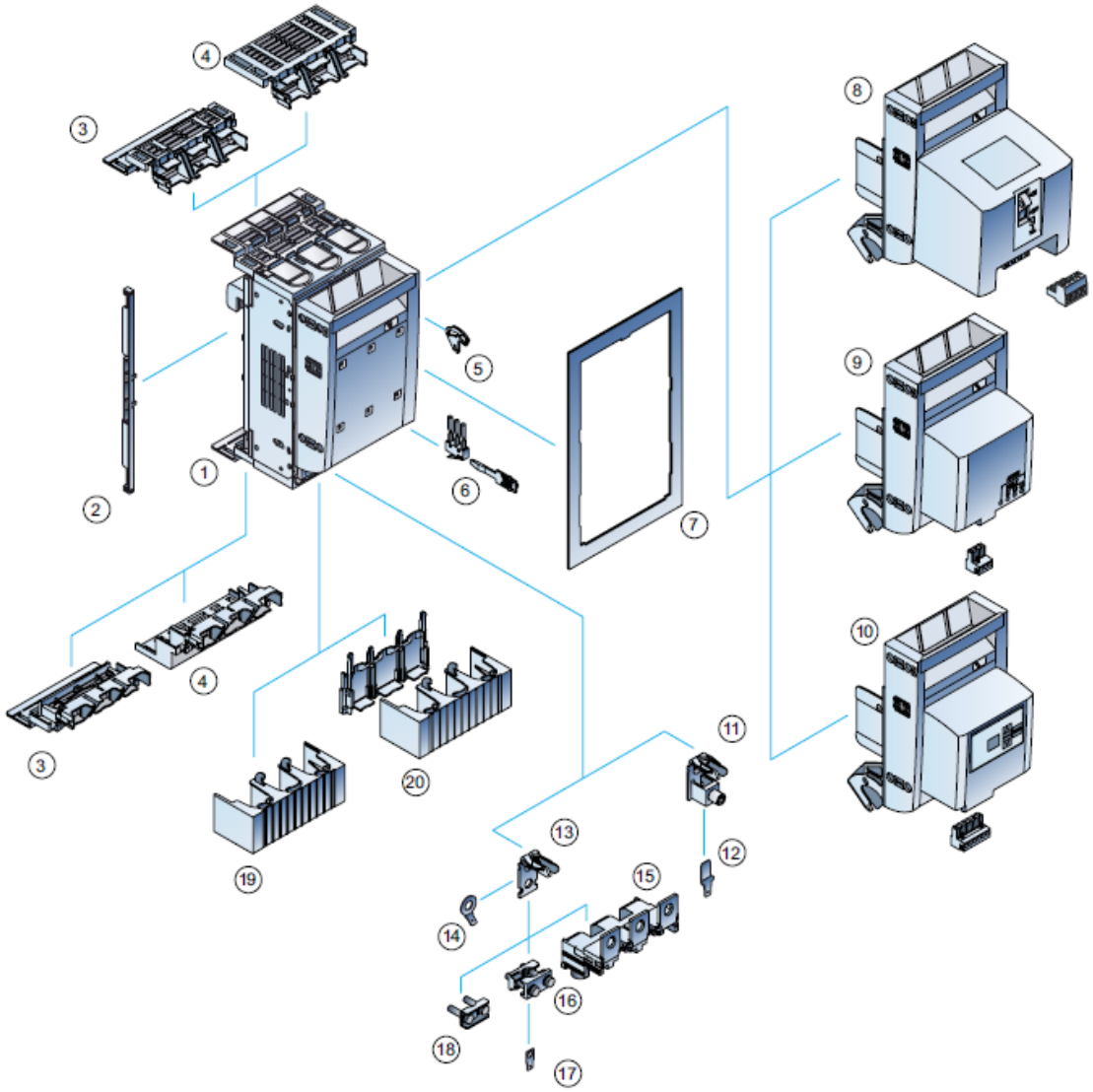
A DC fuse switch-disconnector is located on the mounting plate at the bottom of each battery cabinet.

To protect the DC fuse switch disconnector against unauthorized switching and to protect the maintenance personnel, the disconnector is provided with locking devices.

For instructions on how to prevent unintentional reclosing of the DC fuse switch disconnector, *see section 14.9.3, "Protect the DC Disconnector Against Unintentional Reclosing"*.

For detailed information regarding the DC fuse switch disconnector, refer to the original manufacturer manual (*see section 1.2 "Applicable Documents"*).

14.9.1 Fuse Disconnector Components



① SENTRON 3NP1 fuse switch disconnector
② Cover support
③ Reach-round protection for mounting onto Siemens busbar system
④ Reach-round protection for mounting onto Rittal busbar system
⑤ Locking device
⑥ Auxiliary switch with actuator
⑦ Molded plastic cover
⑧ Handle unit with mechanical fuse monitoring (MFM)
⑨ Handle unit with electronic fuse monitoring (EFM 10)
⑩ Handle unit with electronic fuse monitoring (EFM 20/25)
⑪ Box terminal
⑫ Auxiliary conductor terminal for box terminal
⑬ Blade terminal
⑭ Auxiliary conductor terminal for blade terminal
⑮ Deep-drawn terminal module
⑯ Prism terminal
⑰ Auxiliary conductor terminal for prism terminal
⑱ Saddle terminal
⑲ Terminal cover
⑳ Terminal cover with reach-round protection on the back

Figure 64: Circuit breaker components

14.9.2 Locking Device

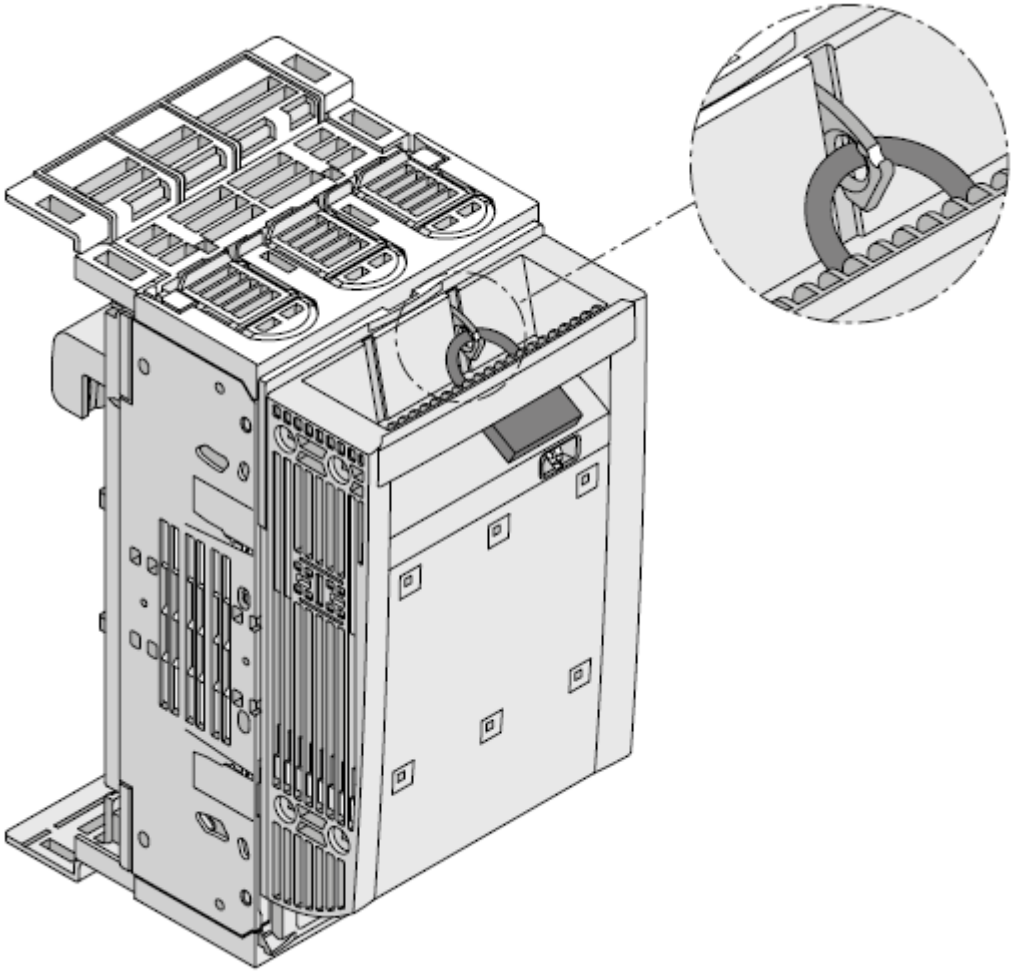


Figure 65: Locking device

14.9.3 Protect the DC Disconnector Against Unintentional Reclosing

You can lock the 3NP1 fuse switch disconnector to protect it against unauthorized actuation.
Either an eye (optional accessory, see below) and a padlock (shackle diameter: 6 mm) or two padlocks (shackle diameter: 2x 3 mm) are required for this purpose. The padlocks are not supplied with the fuse switch disconnector.

NOTICE
You can open the handle unit of a fuse switch disconnector that has been locked with an eye and one padlock by force in order to trip an emergency stop (rupture point on the eye).

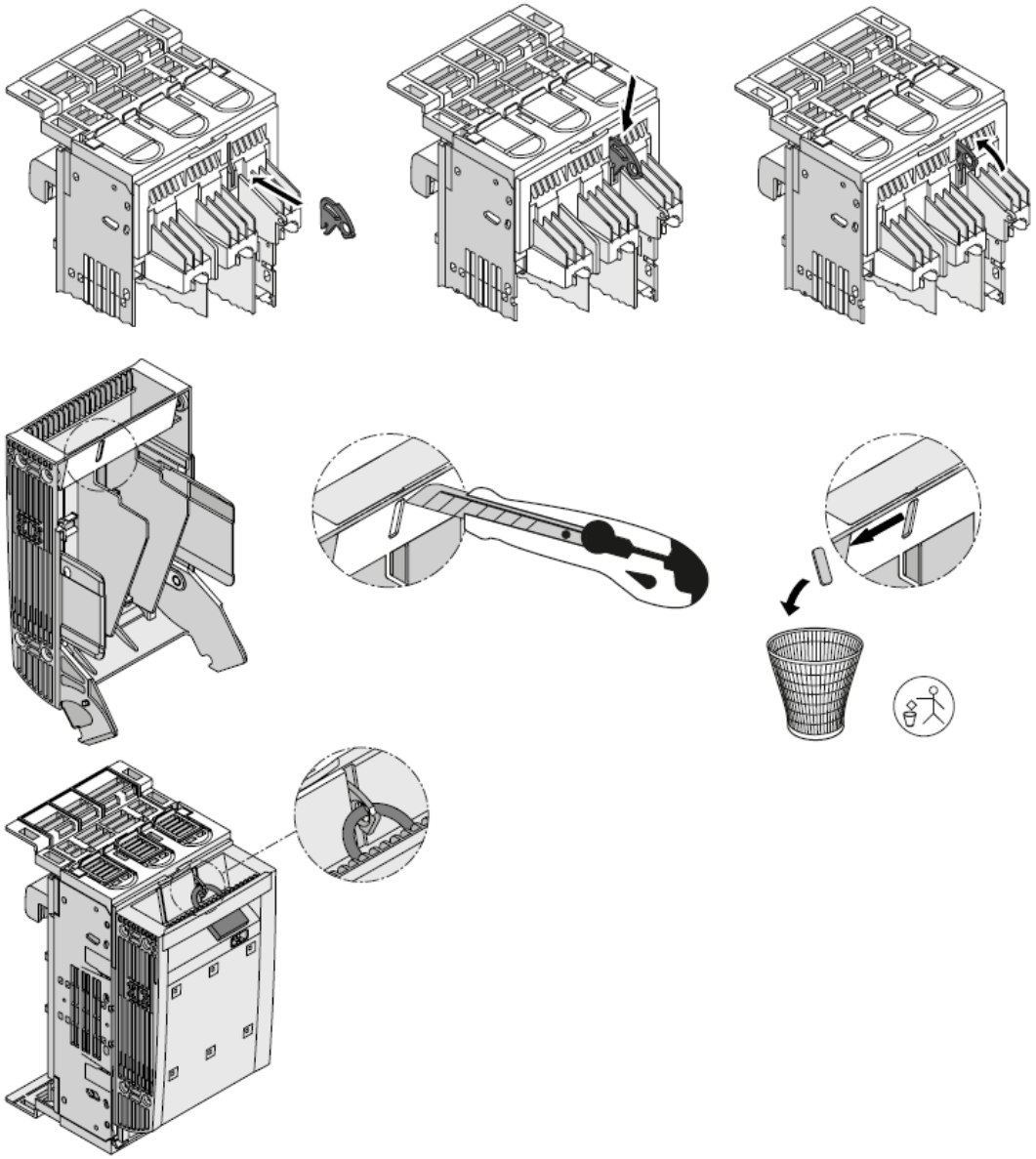


Figure 66: Secure fuse switch-disconnector against unintentional reclosing

15 Monitoring

PIII Converter Control Module

The converter system is equipped with two converter control interfaces.

PIII Indicator Lights

LED	Color	Label	Description
1	red	**UDC max**	DC-link voltage exceeded maximum value
2	red	**Imod max**	Current of one or more IGBT´s exceeded maximum value
3	red	**Error IGBT 1**	Error detected on IGBT 1
4	red	**Error IGBT 2**	Error detected on IGBT 2
5	red	**Error IGBT 3**	Error detected on IGBT 3
6	red	**Error IGBT 4**	Error detected on IGBT 4
7	red	**Error IGBT 5**	Error detected on IGBT 5
8	red	**Error IGBT 6**	Error detected on IGBT 6
9	red	**Error IGBT 7**	Error detected on IGBT 7
10	green	**PWM Mode**	IGBT 1, IGBT 2 and IGBT 3 are working in PWM mode
11	green	**Enable**	IGBT 1 - 6 ready for operation
12	green	**Top 1**	Top 1 active
13	green	**Bot 1**	Bot 1 active
14	green	**Top 2**	Top 2 active
15	green	**Bot 2**	Bot 2 active
16	green	**Top 3**	Top 3 active
17	green	**Bot 3**	Bot 3 active
18	green	**Top 4**	Top 4 active
19	green	**Bot 4**	Bot 4 active
20	green	**Top 5**	Top 5 active
21	green	**Bot 5**	Bot 5 active
22	green	**Top 6**	Top 6 active
23	green	**Bot 6**	Bot 6 active
24	green	**Chopper Active**	Brake chopper is active
25	green	**Blinki**	Profinet communication between main PLC and PIII is established
26	green	**24 V Supply**	24V supply connected
27	green	**UL 1**	L1 voltage apparent
28	green	**UL 2**	L2 voltage apparent
29	green	**UL 3**	L3 voltage apparent
30	green	**Urec**	Booster voltage is apparent on rectifier
31	green	**UDC +**	DC link voltage is apparent
32	green	**Arc Detect**	Arc detection has tripped

Table 39: PIII indicator lights

16 Data transfer with higher-level controller

As described in section 4.2 "Data Interface", the BESS is controlled and monitored via the transfer of data with the customer's higher-level control system. Data transfer between BESS and the higher-level control system is performed via PROFINET protocol.

For external control and monitoring of the converter, it is necessary for the customer to have access to selected control and status variables stored in the converter controller, which can be read and overwritten by the customer's higher-level controller. For this purpose, predefined control profiles with the relevant control variables and status profiles with all relevant status variables are stored for the data transfer from BESS to the customer's higher-level controller.

For a detailed description of the individual data profiles, see Description of data profiles (*see section 1.2 "Applicable Documents"*).

17 Maintenance

The following describes the maintenance work that is necessary for trouble-free operation of the converter system (PCS) and Battery Energy Storage System (BESS). Maintenance intervals must be observed (*see section 17.2 "Maintenance* Schedule*"*).

If increased wear of individual components or functional groups is determined during regular inspections, the operator has to reduce the required maintenance intervals on the basis of the actual signs of wear. Changes compared to the normal operation (increased power consumption, temperatures, vibrations, noises, etc. or respond of monitoring systems) might indicate the functionality of the device is impaired. These then have to be subjected to an inspection by qualified personnel.

For information regarding maintenance of the BESS battery cabinets refer to document „20_Maintenance_Schedule“ (*see section 1.2 "Applicable Documents"*). Maintenance intervals provided in the maintenance schedule must be adhered.

⚠ DANGER	
	**Electric shock hazard!** **Do not perform maintenance work on a live system.** After switching off the converter, the DC-link of the converter still carries dangerous voltages, which may cause death or severe injuries if touched or short circuit. ➜ Before performing work on the converter, deenergize the converter, wait for 30 minutes until the installed capacitors are discharged and check the voltage-free status of the DC-link by using a 2-pole voltage tester. ➜ It is not allowed to open the cabinet doors before the converter system has been de-energized and the capacitors are discharged. ➜ It is not allowed to perform any work on the converter before the system has been de-energized.

⚠ DANGER	
	**Electric shock hazard!** **Do not perform maintenance work on the converter system, before the converter system has been disconnected from all power sources.** After switching off the converter, the connected DC power cables of the battery strings, the DC connection busbars in the AC_DC cabinet and the DC switch & fuse units continue to carry dangerous voltages that can cause death or serious injury if touched or short-circuited. ➜ Before starting work inside the converter cabinets, de-energize the converter system as described in section 14.6 “De-Energizing”, wait for 30 minutes until the installed capacitors are discharged and check the voltage-free status of the DC-link by using a 2-pole voltage tester. ➜ Disconnect the DC power cables from the converter system using suitable DC disconnecting devices before carrying out any work in the cabinets of the converter system. ➜ Before disconnecting the DC power cables from the DC connection busbars, always check for voltage-free status of the DC power cables, since dangerous electric arcs may lead to severe injuries or death when disconnecting the power cables.

⚠ DANGER	
	**Electric shock hazard!** **Do not perform any work on the MV switchgear and the MV transformer before the PLC container has been disconnected from all voltage sources.** After switching off the converter, the connected MV transformer, the MV switchgear, its connecting cables and terminals continue to carry dangerous voltages which, if touched or short-circuited, can cause death or serious injury. ➜ Before working on the medium voltage components of the converter container, de-energize the converter system as described in section 14.6 “De-Energizing”. ➜ Disconnect the AC mains connection by opening the MV switchgear. ➜ Before disconnecting the AC power cables from the AC connection busbars, always check the voltage-free status of the AC power cables, otherwise dangerous arcs can cause serious injury or death when disconnecting the power cables.

⚠ DANGER	
	**Electric shock hazard!** **Do not perform any maintenance work on the converter system before the AC circuit breaker and MV switchgear have been switched off and protected against unintentional reclosure.** ➜ Before starting work inside the converter cabinets, the AC circuit breaker 80Q1 must be switched off and protected against unintentional reclosure as described in section 14.8.3 “Protect the CB Against Unintentional Reclosing”. ➜ Before you start working inside the control cabinets, the medium-voltage switchgear must be switched off and protected against unintentional reclosure.

⚠ WARNING	
 	**Hazard by cooling liquid** The coolant used in the internal cooling system of the converter is harmful to human or animal health when touched or swallowed. ➜ Avoid oral ingestion of the coolant, since it can lead to harm to human or animal health. In case of accidental ingestion or eye contact with the coolant, seek immediate medical attention. ➜ Avoid skin contact with the coolant. ➜ Use appropriate eye protectors and protective gloves when working on the cooling system and during filling and draining of the cooling liquid.

NOTICE
Service and maintenance work on the BESS and cooling system must only be carried out by qualified and authorized personnel.

17.1 Preparations Prior Maintenance

The following safety precautions must be carried out before commencing service and maintenance work.

Non-observation of these safety instructions can cause injury to persons, damage to objects or malfunction or damage to the device itself.

Do not operate!	**Lock and tag power switches and controller devices**
⚠ DANGER 	Disconnect power and block operation controller devices. Follow national laws regarding Occupational Safety and Health. 1. Identify the energy source(s). 2. Isolate the energy source(s). 3. Determine voltage-free status. 4. Ground device or equipment to protect from short circuiting and from shocks. 5. Lock and Tag the energy source(s). 6. Prove that the equipment isolation is effective. 7. When required, apply lock-out device or clamp and secure with padlock(s).

17.2 Maintenance Schedule

Location	Component	Maintenance Work	Maintenance Interval	Description in
PCS Container CTRL cabinet	UPS battery	Functionality check	Once every 6 months	Section 17.3.1
PCS Container CTRL cabinet	UPS battery	Remove battery from battery unit	At storage temperatures below 0°C	Section 17.3.2
PCS Container All switch cabinets	Intake fan filters	Check the fan filters for contamination and replace if necessary	Once every 6 months	Section 17.4
All containers	Complete BESS system	Visual inspection	Once every 6 months / in case of a fault	Section 17.5
PCS Container CIR cabinet	Circuit breaker 3WL	Inspection	Once every 12 months	Section 17.6.1
		Replace arc-chute covers	After no more than three short-circuit interruptions	
		Replace arc chutes and contact system	Depending upon their condition	
		Replace operating system	Depending upon their condition	
PCS Container CTRL cabinet	PLC	Replace backup battery of Simotion PLC	Once every 4 years	Section 17.7
PCS Container COSY	Coolant	Exchange cooling liquid	Once every 5 years	Section 17.6
PCS Container COSY	Expansion vessel	Check pressure	Once every 5 years / When exchanging the cooling liquid / When error "pressure low" is apparent	Section 17.9
BESS Containers	Exhaust units	Inspection	Once every 6 months / in accordance with existing maintenance schedule	Section 17.11
BESS Containers	Fire dampers	Inspection	Once every 6 months / in accordance with existing maintenance schedule	Section 17.12
BESS Containers	H2 Sensors	Inspection	Once every 6 months	Section 17.13

Table 40: PCS Maintenance Schedule

17.3 UPS

17.3.1 UPS Functionality Check

(once every 6 months)

In order to check the functionality of the UPS device, the following steps must be performed:

Task 1: **Perform functionality check of the UPS device**

Step 1 : Set the main switch on the door of the control cabinet (*see figure 60,* ⑥) to the "OFF" position.

Step 2 : Locate the UPS module 102G1 inside the control cabinet (*see section 4.4.3*).
The yellow LED (*see figure below,* ④) on the front of the UPS module should glow, indicating that battery mode is active and the battery is discharging because the power supply is not available.

Step 3 : Wait for the buffer time set on the potentiometer on the front of the UPS module (②, default value: 6.6 min.).
During this time, check if the SoC bar graph (①) is displaying the current state of charge (SoC).

Note 4: During and after the test, the red LED (③) displaying an UPS alarm should not start glowing, since this would indicate an faulty or almost empty battery. In this case, the UPS battery must be replaced as described in the original manufacturer documentation.

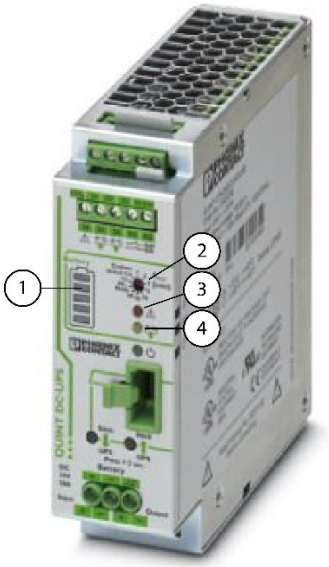


Figure 67: UPS module

Pos.	Description
①	Bar graph for displaying the current charging state of the power storage device
②	Buffer time setting: default: 6.6 min.
③	Red LED: alarm
④	Yellow LED: battery mode

Icon	Meaning of LEDs
⚠	Red LED on: UPS alarm due to one of the reasons: • battery almost empty • battery not detected • battery replacement required LED off: No UPS alarm, power supply available, normal operation.
🔋	Yellow LED on: Battery mode is ON, battery is discharging because power supply failed. LED off: Battery mode is OFF, i.e. mains available.
⏻	Green LED on: Mains is ON. LED off: Mains is OFF.

17.3.2 Removing the UPS battery

(At storage temperatures below 0°C)

NOTICE
The battery of the UPS unit must be removed at temperatures below 0°C.

In order to remove the battery from the energy storage device UPS-BAT/VRLA/24DC/12AH, the service mode of the UPS device must be activated.

Task 1: Activate service mode

The corresponding activation rights have to be granted for service mode activation and deactivation.

The service mode cannot be activated, while the QUINT-UPS runs in battery mode. The power supply must be available.

Step 1 : Depending on the granted activation rights, the service mode can be activated in three different ways:

1. By holding down both push buttons on the QUINT-UPS named "Stick -> UPS" and "UPS -> Stick" for at least 6 seconds.

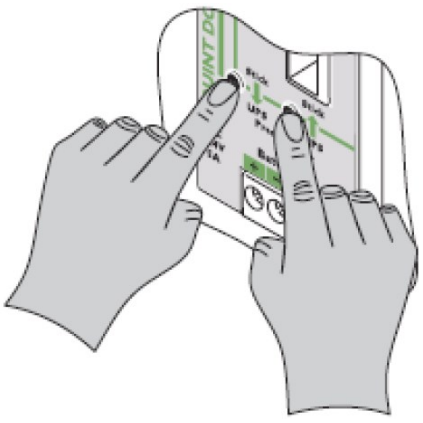


Figure 68: UPS control elements

2. By connecting a service stick (*see manufacturer manual*) to the Data port of the UPS.
3. By using the UPS-CONF (*see manufacturer manual*) software as follows:
   In the "Settings" group, select the "Service" item, and click the "On / Off" button near the "Activate service mode" text.

While the service mode is active

- the alarm status is activated,
- the charging current is interrupted,
- the status LED "Service mode active" in the UPS-CONF software ("Settings" group /"Service" item) is green

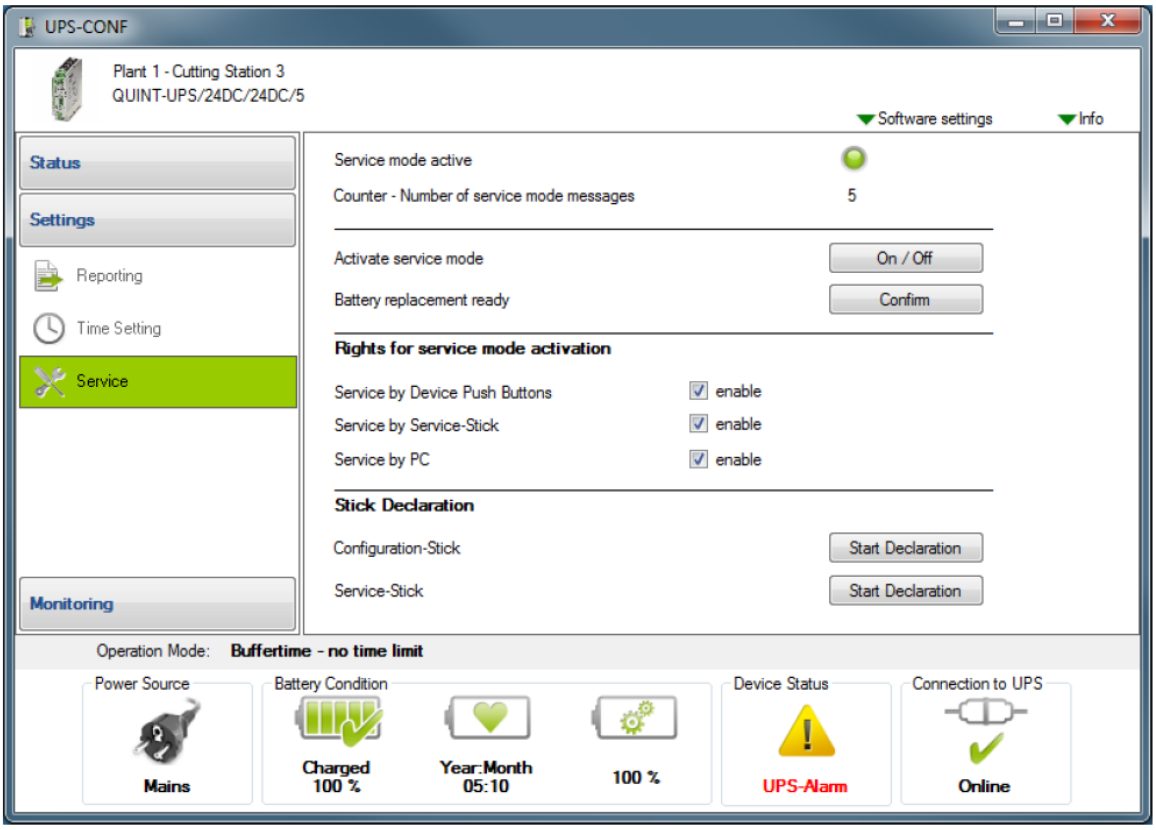


Figure 69: UPS CONF software

Task 2: Remove battery

⚠ DANGER
Before activating the service mode, read and obey carefully the safety instructions in the topic “Important safety notes” of the manufacturer manual.

⚠ DANGER
Watch polarity when connecting cables!

Step 1 : Activate the service mode by one of the ways described in Task 1.
Step 2 : Open battery module housing.
Step 3 : Remove fuses *(see illustration below)*.

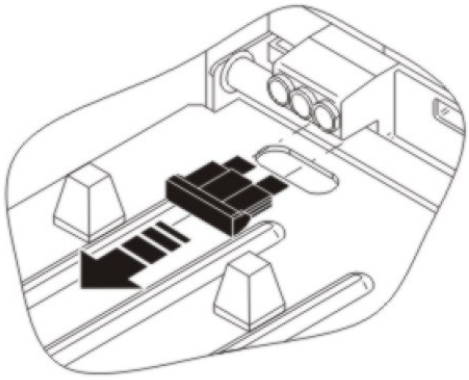


Figure 70: Remove UPS battery fuses

Step 4 : Remove cabling.
Step 5 : Remove battery.
Step 6 : Fix cabling inside housing.
Step 7 : Store the battery module together with the fuses.
Step 8 : Close battery module housing.

NOTICE
The battery and the fuses of the UPS unit must be reassembled before commissioning, recommissioning and operation of the MSC converter unit.

17.4 Changing the Intake Fan Filters

Check every 6 months, replace depending on degree of soiling)

The fan-and-filter unit and outlet filter are supplied as standard with a standard filter mat for the pre-filtering of dry, coarse dust and lint. In order to increase the protection category, and in the case of dust with a grain size of < 10 µm, we recommend the use of fine filter mats (optionally available).
The filter must be checked in regular intervals in accordance to the level of dust exposure and replaced as necessary.

⚠ DANGER

➜ Only change the filter mat while the fan rotor is stationary.
➜ Never insert your fingers into the fan rotor.

⚠ DANGER

The unit is live. Switch off the power supply before opening, and take suitable precautions against it being accidently switched back on.

NOTICE

Use only original Rittal filters which bear the Rittal logo in order to safeguard the designated protection category, air throughout and operating approvals.

To insert or replace the filter, proceed as follows (direction of airflow: drawing from outside and blowing into the enclosure):

Task 1: **Replace intake filter**
Step 1 : First press the catch of the louvred grill (Rittal logo) up slightly with one finger.
Step 2 : Once it is released, the louvred grill can be dropped open by approx. 70° or 90°.
Step 3 : If necessary, first place the fine filter mat into the housing.
Step 4 : Ensure that the open (roughened) side faces towards the louvred grill.
Step 5 : Insert the enclosed standard filter mat.
Step 6 : Ensure that the open side (without Rittal logo) faces towards the louvred grill.
Step 7 : Push the louvred grill back onto the enclosure until it snaps audibly into position.

17.5 Visual Inspection

(once every 12 months/in case of a fault)

Check the fan filters for contamination. Replace filters if necessary (*see section 17.4*).

Visually inspect the BESS cabinets for:

- Corrosion
- Damage
- Contamination

Electrical connections
Electrical connections must be checked for proper connection in order to ensure safe operation of the system and to prevent personnel from injuries due to electrical shock.

Corrosion
Corroded electrical connections must be replaced in order to maintain safe operation of the system and to prevent personnel from injuries due to electrical shock.

Damage
Damaged wires and clamps must be replaced immediately in order to maintain safe operation of the converter system and to prevent personnel from injuries due to electrical shock.

Contamination
Check the interior of the converter unit for contamination and dirt in order to prevent the internal components from short-circuiting and damage.

NOTICE
Do not use solvents for cleaning – especially on polycarbonate plastics. Use a vacuum cleaner to remove dirt or dust.

17.6 AC Circuit Breaker(s)

17.6.1 Inspection work

(once every 12 months)

The arc chutes and contact system of the circuit breaker(s) must be inspected according to these operation instructions. If a fault condition opens the circuit breaker(s), the circuit breaker(s) should be inspected before it is put back into service. Contact assemblies need to be changed according to their condition.

The switchgear operator has to determine inspection intervals depending on the breaker application conditions:

- min. 1 x per annum
- after interruption of heavy loads

During the inspection the following items must be examined:

- arc chutes and contact systems
- electrical and mechanical functionality of the breaker
- mechanical on- / off-functionality
- main and auxiliary circuits, function and connecting quality
- plausibility control of trip unit settings and correction, if necessary

Draw-Out guide frames with arc-chute covers installed, have to be replaced after no more than three short-circuit interruptions of the circuit breaker. If the breaker endurance is exhausted, then the breaker and old spare parts need to be disposed off, according to the effective legal regulations.
The arc chutes and the contact system must be replaced depending upon their condition.

Depending on the circuit breaker stress it may also be necessary to replace the operating system.

For detailed regarding the maintenance of the circuit breaker, refer to original manufacturers´ documentation (*see section 1.2 "Applicable Documents"*):

Document type	Document Name	File Name
Operating instructions	3ZX1812-0WL00-0AN4	3ZX1812-0WL00-0AN4_online_201806140915326928

17.7 Replace PLC Buffer Battery

17.7.1 Preventive maintenance

(every 4 years)

To maintain the high system availability, the manufacturer recommends the preventive replacement of the CMOS buffer battery, which is installed in the system PLC.

Component	Replacement interval
CMOS buffer battery	4 years

17.7.2 Replacing Backup Battery

NOTICE

The service life of the backup battery is approx. 5 - 8 years, depending on the ambient conditions.

Detailed information on maintenance can be found in the manufacturer's documentation for the Simotion P320-4 PLC *(see also section "Other applicable documents")*:

Document type	Document Name	File Name
Operating instructions	P320- 4 Commissioning and installation manual	P320_4_commissioning_en-EN

17.8 Exchanging the Cooling Liquid

(Every 5 years)

The cooling liquid inside the converter cooling system is to be exchanged as described in the following sections.

Like described in section 0, the converter cooling system is split up into two independent cooling systems for each converter system, allowing Converter System 1 and 2 independently from one another.

Therefore, each of the following steps must be performed for each cooling system separately.

NOTICE

- The cooling liquid inside the cooling system must be removed at least once every five years.
- Check the pressure on the expansion tank every time the cooling liquid is exchanged. The cooling system must be completely drained in order to perform a pressure check of the expansion tank (*see section17.9*).

NOTICE

The pump must not run dry as it might damage the pump.

17.8.1.1 Required Tools

The following table provides you with information regarding the tools required to perform maintenance work on the cooling system:

Amount	Tool	Description	Preferred Type	Manufacturer
3	Hose ½"	Length: 2 m, max. 50 bar	Variolux Silverline	Gardena
1	Filling pump	For glycol use, min. 2 bar pressure	Unistar 2000 A	ZUWA
1	Cooling liquid vessel	Min. 55 l capacity		
1	Inlet pressure gauge	For expansion tanks, digital	Art. No.: 512240122	OEG
1	Tank filler 400 ml	For increasing and testing the pressure in expansion tanks	Art. No.: 311779100	OEG
1	Adapter for tank filler	Adapter for screwing on the tank filler can	Art. No.: 512240126	OEG

Table 41: Required tools for cooling system maintenance

17.8.1.2 Allowed Coolants

The following table lists the suitable coolants for using in the cooling system. When exchanging the cooling liquid of the cooling system, only use a coolant listed in the table.

Please observe the manufacture's information regarding the cooling range of the designated cooling liquid.

Manufacturer	Type
NALCO AG	Varidos FSK
BASF AG	Glysantin G30
Clariant	Antifrogen N
Clariant	Antifrogen L
DOW	Dowcal 20
Zitrec	M-25 C

Table 42: Allowed coolants

17.8.1.3 Draining the cooling system

NOTICE

Check the pressure on the expansion tank every time the cooling liquid is exchanged. The cooling system must be empty in order to perform a pressure check of the expansion tank (*see section 17.9*).

⚠ WARNING



Hazard by cooling liquid

The coolant used in the internal cooling system of the converter is harmful to human or animal health when touched or swallowed.

- ➜ Avoid oral ingestion of the coolant, since it can lead to harm to human or animal health. In case of accidental ingestion or eye contact with the coolant, seek immediate medical attention.
- ➜ Avoid skin contact with the coolant.
- ➜ Use appropriate eye protectors and protective gloves when working on the cooling system and during filling and draining of the cooling liquid.

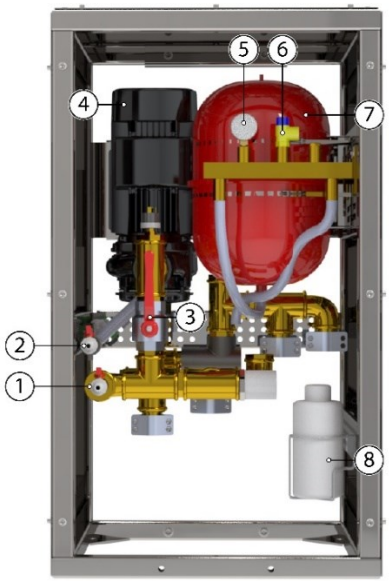


Figure 71: Cooling system components inside cooling system cabinet (COSY)

Pos.	Cooling system components
①	¾“ inlet flow connection with valve
②	"¾“ return flow connection with valve
③	Stop cock
④	Coolant pump
⑤	Manometer
⑥	Overpressure valve
⑦	Expansion vessel
⑧	Overflow vessel

Table 43: Cooling system components

Task 1: **Draining the cooling system**

Step 1 : Connect a pressure hose to the return flow connection of the cooling system inside the COSY cabinet (*see figure 71,* ②) and lead the end of the hose inside a suitable vessel.

Step 2 : Open the return flow valve (②).

Step 3 : The cooling liquid drains through the hose inside the vessel.

Step 4 : Wait until the cooling system is completely drained and then check it for any liquid remaining in the system.

17.8.2 Filling the Cooling System

⚠ WARNING	
	**Hazard by cooling liquid** The coolant used in the internal cooling system of the converter is harmful to human or animal health when touched or swallowed. ➜ Avoid oral ingestion of the coolant, since it can lead to harm to human or animal health. In case of accidental ingestion or eye contact with the coolant, seek immediate medical attention. ➜ Avoid skin contact with the coolant. ➜ Use appropriate eye protectors and protective gloves when working on the cooling system and during filling and draining of the cooling liquid.

Task 1: **Prepare Coolant**

Step 1 : The expansion tank must be pre-charged to 1 bar at approx. 20 °C on the gas side.

Step 2 : Use a suitable container to prepare approx. 55 liters of coolant with a ratio of 60% water and 40% glycol (with Antifrogen N). The actual amount needed depends on the length of the hoses used to connect the heat exchanger.

Step 3 : Open the cooling liquid container (e.g. Antifrogen N) and place it in close proximity to the converter cooling system.

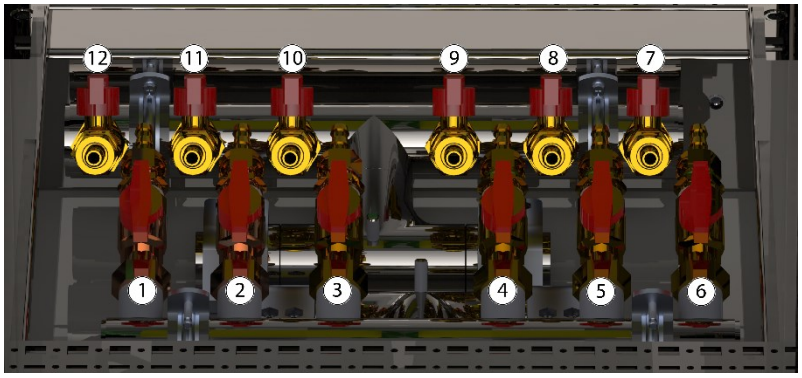


Figure 72: Water distributor, connections and valves in CON Cabinet

Pos.	Cooling System Component
①	Sub circuit with valve 1 - inlet flow
②	Sub circuit with valve 2 - inlet flow
③	Sub circuit with valve 3 - inlet flow
④	Sub circuit with valve 4 - inlet flow
⑤	Sub circuit with valve 5 - inlet flow

⑥	Sub circuit with valve 6 - inlet flow
⑦	Sub circuit with valve 6 - return flow
⑧	Sub circuit with valve 5 - return flow
⑨	Sub circuit with valve 4 - return flow
⑩	Sub circuit with valve 3 - return flow
⑪	Sub circuit with valve 2 - return flow
⑫	Sub circuit with valve 1 - return flow

Table 44: Cooling system – Coolant dispenser connections and valves inside CON cabinet

Task 2: Fill cooling system

NOTICE

Make sure that the pressure and suction hoses are completely immersed in the cooling liquid inside the cooling liquid container throughout the whole filling process, to avoid suction of air into the cooling circuit.

Step 1 : Connect the external filling pump and the cooling liquid canister using a suction hose.

Step 2 : Connect the external filling pump to the inlet flow connection *(see figure 71, ①)* with a pressure hose.

Step 3 : Open the valve on the top of the heat exchanger - if there are several heat exchangers, the valve of each heat exchanger must be opened *(see illustration below)*.

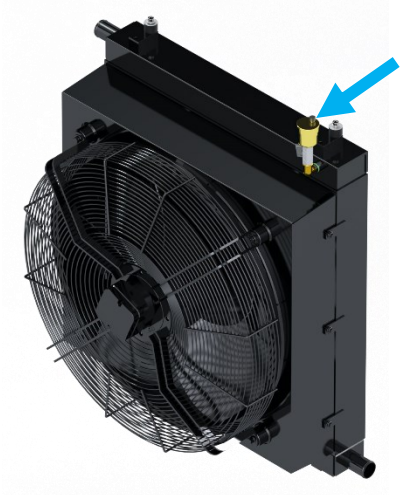


Figure 73: Valve on heat exchanger

Step 4 : Connect the return flow connection (*see figure 71,* ②) and the coolant canister with a pressure hose.

Step 5 : Close ALL valves of the sub-circuits on the water distributor of the CON cabinet (*see figure 72* ① - ⑥, ⑦ - ⑫).

Step 6 : Open the stop cock of the converter cooling system (*see figure 71,* ③).

Step 7 : Open the valves on the inlet flow connection and on the return flow connection.

Step 8 : Switch on the external filling pump and make sure that the intake hose is completely immersed in the cooling liquid inside the cooling liquid canister, so no air is sucked into the cooling circuit.

Step 9 : The main cooling circuit will be filled with coolant and the air will be removed from the circuit during this time. Wait until no more air bubbles are inside the cooling liquid canister.

Step 10 : Open the inlet flow and return flow valves of sub-circuit 1 (*see figure 72,* ① *and* ⑫).

Step 11 : Wait for 3 minutes. The sub cooling circuit will be filled with coolant and the air will be removed from the circuit during this time.

Step 12 : Shut off the inlet and return flow valve of sub circuit 1.

Step 13 : Proceed the same way for the remaining IGBT cooling circuits inside the CON cabinet.

Step 14 : Proceed the same way for the cooling circuits inside the IND cabinet.

Step 15 : Close the stopcock (*see figure 71,*③).

Step 16 : Open the valves of all connected sub-circuits.

Step 17 : Close the valve of the return flow connection (*see figure 71,* ②).

Step 18 : Wait until a pressure of 3 bar is indicated by the cooling systems´ manometer (*see figure 71,* ⑤). As soon as 3 bar have been reached, immediately shut off the inlet flow valve (*see figure 71,* ①).

Step 19 : Shut-off the external filling pump, but make sure the suction and pressure hose are still immersed in the cooling liquid inside the cooling liquid container.

Step 20 : Activate the coolant pump of the cooling system by switching on the motor protection circuit breaker 181Q1 inside the control cabinet and activate the contactor 139K2 inside the control cabinet using a suitable insulated tool.

Step 21 : Let the coolant pump run for 120 min.

Step 22 : Close the valve on the top of the heat exchanger(s) (*see figure 73*).

Step 23 : Deactivate the coolant pump of the cooling system by removing the insulated tool.

Step 24 : Check if the pressure on the cooling system manometer is indicated with 3 bar.

Step 25 : If the pressure indicated by the manometer is below 3 bar, switch the external filling pump back on an open the inlet flow valve.

Step 26 : As soon as a pressure of 3 bar has been reached, immediately shut-off the inlet flow valve and switch off the external filling pump.

Task 3: Perform a visual check of the entire cooling circuit for leaks.

17.9 Check pressure of expansion tank

Once every 5 years / When exchanging the cooling liquid / When error "pressure low" is apparent

NOTICE

The cooling system must be empty in order to perform a pressure check of the expansion tank (*see section 17.9*).

➜ Check the pressure on the expansion tank every time the cooling liquid is exchanged.

⚠ WARNING

Before performing maintenance work, make sure the system is off, cooled and not pressurized, all the electric parts are not energized, and the vessel is completely empty.

Maintenance of the expansion tank is to be performed according to the manual of the manufacturer.
ZILMET: manual_expansion_tank_537L_zilmet

Perform a pressure check of the expansion, checking that the pre-charge is at 1.5 bar.

- At least once every 5 years
- whenever the coolant of the water-cooling system is exchanged
- when converter controller reports the error message “pressure low”

The cooling system must be reduced to 0 bar in order to perform a pressure check of the expansion tank. **The necessary gas pressure is 1.5 bar**. If necessary, refill gas to 1.5 bar with compressed nitrogen. Exceptionally, the expansion tank can be filled up with compressed air. At the next maintenance the gas pre-charge pressure must be corrected with nitrogen.
The filling valve is similar to a filling valve of a car tire. Check the pressure with a tire gauge. Avoid unnecessary gas losses during testing.
See instructions below on how to perform a pressure check of the expansion tank and how to refill gas if necessary.

Task 1: **Check pressure of expansion tank**
In order to check the pressure of the expansion tank, the coolant inside the cooling systems´ circuits must be drained, until the manometer of the water-cooling system indicates a pressure of **0 bar**.

Step 1 : Drain the converter´s water cooling system like explained in section 17.8.1.3 until the manometer of the cooling system indicates a system pressure of 0 bar.

Step 2 : Connect the supplied tank filler with manometer and adapter (*see figure 75*) to the filling valve connection of the expansion vessel (*see figure 74*) and check if the nominal pressure of 1.5 bar is apparent.



Figure 74: Filling valve connection on expansion tank



Figure 75: Tank filler with manometer and adapter

NOTE: If the pressure indicated by the pressure gauge is below 1.5 bar, refill the expansion tank with gas, as described in the following:

Task 2: **Refill gas of expansion tank to 1.5 bar**

Step 1 : Connect the supplied tank filler with manometer and adapter to the filling valve connection of the expansion tank.

> **⚠ WARNING**
>
> Hold the tank filler bottle in upright position during the filling process. Don´t hold the bottle horizontally or tip the bottle during the filling process, since it could lead to injuries due to bursting material.

Step 2 : Refill gas until the connected pressure gauge is indicating a pressure of 1.5 bar.

Task 3: **Refill converter cooling system with coolant**

Step 1 : Refill the converter water-cooling system with cooling liquid like described in section 17.8.2 until the manometer of the water-cooling system indicates a pressure of 3 bar.

Step 2 : Let the coolant pump run for at least 1 hour.

Step 3 : Turn off- the internal coolant pump and check if the pressure indicated by the cooling system manometer is 3 bar.

Note: If the pressure is below 3 bar, refill cooling liquid until a pressure of 3 bar is indicated by the manometer of the water-cooling system.

17.10 Pump

⚠ WARNING

Make sure that escaping cooling water does not cause injury to persons or damage to the equipment.

- The internal pump parts are maintenance-free.
- It is important to keep the motor clean in order to ensure adequate cooling of the motor.
- If the pump is installed in dusty environments, it must be cleaned and checked regularly.
- Take the enclosure class of the motor into account when cleaning.
- The motor has maintenance-free, greased-for-life bearings.
- Pump bearings and shaft seal are maintenance free.

Maintenance of the pump is to be performed according to the manual of the manufacturer

Manufacturer:	Grundfos
Type:	CM10-2 A-R-A-E-AQQE
Manufacturer article no.:	99080211

Frost Protection

NOTICE

Before start-up after a period of inactivity, the pump and the suction pipe should be completely filled with liquid.

Pumps which are not being used during periods of frost should be drained to avoid damage.
Remove the filling and drain plugs from the pump (*see illustration below).*

Do not refit the plugs until the pump is taken into operation again.

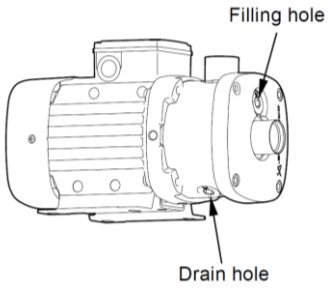


Figure 76: Position of filling hole and drain hole

17.11 Exhaust Units

Once every 6 months / fit in with existing service and maintenance plan

Periodically the extract unit must be electrically tested to ensure that the supply to the unit is continuous and that mechanically the FSD and motor open and close effectively.

It is recommended that this test be carried out twice yearly or to fit in with existing service and maintenance contracts.

The air flow failure switch should be checked for free movement and electrical conductance.

Refer to Puma technical sales leaflet for further information regarding dimensions, weights and unit performance and fan curves.

17.12 Fire Dampers

Once every 6 months / fit in with existing service and maintenance plan

The damper and motor require no service as such, but a periodic mechanical and electrical test of the working mechanisms should be carried out at least twice yearly, or to coincide with existing service and maintenance contracts.

See appropriate certified drawing of units for further information re: sizes etc.

17.13 H2 Sensors

Once every 6 months

The inspection must be carried out by trained service personnel.

The inspection intervals must be established in each individual case and shortened if necessary, depending on technical safety considerations, engineering conditions and the technical requirements of the equipment.

Contact Dräger service if you wish to take out a service contract and have any repairs carried out.

18 Container Repair

In case the container surface is damaged, repair the damaged surface as described in the following, to maintain the surface protection of the container.

18.1 Process Instructions (New Application)

Surface preparation according to DIN EN ISO 12944-4 sandblasting to surface preparation standard SA 2.5 (40 µm minimum roughness depth, medium roughness grade (G), angular blasting grit).

Primer:
REESA 2K-HS-Filling-Primer ZP
Material Nr.: 3D061
Color: ca. RAL 7035
Dry film thickness (DFT): 80 - 100 µm

Application process: spray application
Compressed air spraying, airless-spraying or electrostatic spraying according to technical data sheet.

- Processing is possible above ä minimum temperature of +8 °C. The critical dew point temperature must be exceeded by 3 °C.
- The mixing process of the 2K material must be carried out according to the enclosed technical data sheet.
- After a period of seven hours the mixed material must no longer be used and has to be disposed of, according to the legal regulations.

Topcoat:
REESA 2K-HS-PUR-OneCoat-Paint
Material Nr.: 6D062
Color: n. a.
Dry film thickness: 60 µm

Application process: spray application
Compressed air spraying, airless-spraying or electrostatic spraying according to technical data sheet.

- Furthermore, a forced drying period of 60 minutes at a temperature of +60 °C is possible. Processing is possible above ä minimum temperature of +8 °C. The critical dew point temperature must be exceeded by 3 °C. The complete reaction period of the topcoat is 7 days.
- The mixing process of the 2K material must be carried out according to the enclosed technical data sheet.
- After a period of seven hours the mixed material must no longer be used and has to be disposed of, according to the legal regulations.

18.2 Process instructions (Repair - damage down to the steel)

Surface preparation according to DIN EN ISO 12944-4 surface preparation standard PSt2:

- Removal of loose and labile coating particles.
- Removal of rust using a wire brush or sandpaper (grain size 180).
- Surface grinding of the damaged and uneven areas, as well as edge areas, using sandpaper (grain size 180) until even.
- Removal of all foreign and separating substances.

Primer:
REESA 2K-HS-Filling-Primer ZP
Material nr.: 30061
Color: ca. RAL 7035
Dry film thickness: 80 - 100 µm

Application process: spray application
Compressed air spraying, airless-spraying or electrostatic spraying according to technical data sheet.

Application process: brush application
Up to 3 coats may be required to achieve the DFT.
Intermediate drying time of the individual coats: 30 min.
Drying time between primer and topcoat: 2 hours.

- Processing is possible above ä minimum temperature of +8 °C. The critical dew point temperature must be exceeded by 3 °C.
- The mixing process of the 2K material must be carried out according to the enclosed technical data sheet.
- After a period of seven hours the mixed material must no longer be used and has to be disposed of, according to the legal regulations.

Topcoat:
REESA 2K-HS-PUR-One-Coat-Paint
Material Nr.: 60062
Color: n. a.
Dry film thickness: 60 µm

Application process: spray application
Compressed air spraying, airless-spraying or electrostatic spraying according to technical data sheet.

Application process: brush application
Up to two coats may be required to achieve the DFT.
Intermediate drying time of the individual coats: 30 min.

- Furthermore, a forced drying period of 60 minutes at a temperature of +60 °C is possible. Processing is possible above ä minimum temperature of +8 °C. The critical dew point temperature must be exceeded by 3 °C. The complete reaction period of the topcoat is 7 days.
- The mixing process of the 2K material must be carried out according to the enclosed technical data sheet.
- After a period of seven hours the mixed material must no longer be used and has to be disposed of, according to the legal regulations.

18.3 Process instructions (Repair - damage only within the topcoat)

Surface preparation according to DIN EN ISO 12944-4 surface preparation standard PSt2:

- Removal of loose and labile coating particles.
- Surface grinding of the damaged and uneven areas, as well as edge areas, using sandpaper (grain size 180) until even.
- Removal of all foreign and separating substances.

Topcoat:
REESA 2K-HS-PUR-One-Coat-Paint
Material Nr.: 60062
Color: n. a.
Dry film thickness: 60 - 80 µm

Application process: spray application
Compressed air spraying, airless-spraying or electrostatic spraying according to technical data sheet.

- Furthermore, a forced drying period of 60 minutes at a temperature of 60 °C is possible. Processing is possible above ä minimum temperature of +8 °C. The critical dew point temperature must be exceeded by 3 °C. The complete reaction period of the topcoat is 7 days.
- The mixing process of the 2K material must be carried out according to the enclosed technical data sheet.
- After a period of seven hours the mixed material must no longer be used and has to be disposed of, according to the legal regulations.

19 Settable Devices

The following table provides the manufacturer settings of the components listed in the table.

Location	Identifier	Settable Device	Setting
CIR	80Q1	AC circuit breaker 3WL I_N=1250 A / 690 V	$I_R = I_N \times 1.0$ $I_i = I_N \times 2.0$
CTRL_1	101Q1	Circuit-breaker for motor protection, 2.2 ... 3.2 A	3 A
CTRL_1	181Q1	Circuit-breaker for motor protection, 3.5 ... 5 A	5 A
CTRL_1	181Q2	Circuit-breaker for motor protection, 4.5 ... 6.3 A	4.5 A
CTRL_1	182Q1	Circuit-breaker for motor protection, 3.5 ... 5 A	5 A
CTRL_1	185B1	Thermostat -10°C … +50°C	15°C
CTRL_1	186B1	Thermostat -10°C … +50°C	5°C
CTRL_1	102G1	USV QUINT 24 V DC / 20 A	6.6 min
CTRL_1	101T1	TRIO-PS/3AC/24DC/40	26 V DC
BESS_1	101T1	TRIO-PS/3AC/24DC/40	26 V DC
BESS_1	101Q1	Circuit-breaker for motor protection, 2.2 ... 3.2 A	3 A
BESS_1	102G1	USV QUINT 24 V DC / 20 A	6.6 min
BESS_2	101T1	TRIO-PS/3AC/24DC/40	26 V DC
BESS_2	101Q1	Circuit-breaker for motor protection, 2.2 ... 3.2 A	3 A
BESS_2	102G1	USV QUINT 24 V DC / 20 A	6.6 min

Table 45: Settable devices

20 IP Addresses

The following table provides the IP-addresses set at delivery state of the listed components.

Component	IP Address
Main controller P320	192.168.5.10

Table 46: IP addresses of components

21 PLC

The following sections provide you with a description of the connection elements and the indicator lights of the PLC and gives you information regarding the handling of the unit.

For further information regarding the PLC, see device manual SIMOTION_P320-4 of the manufacturer.

21.1 Indicator Lights

The following table describes the indicator lights at the front panel of the P320 PLC.

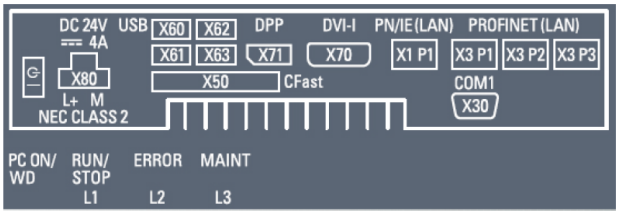


Figure 77: P320 PLC indicator lights

LED	Significance	State	Description
PC ON/ WD	Power supply	Green	BIOS ready to boot. Indicates the correct supply voltage of 3.3 V, 5 V and 12 V from the integrated power unit.
		OFF	Not relevant.
		Green/yellow flashing (1 Hz)	BIOS in POST, power switch on.
		Yellow	Idle state
RUN/STOP or L1	RUN STOP	Off	SIMOTION P Runtime is not running.
		Green	SIMOTION P320-4 in RUN.
		Yellow	SIMOTION P320-4 in STOP.
		Green/yellow: Flashes quickly (2 Hz)	DCP flashing
		Yellow: Flashes quickly (5 Hz)	FAULT state (only in combination with L2 and L3)
ERROR or L2 (SF PROFINET LED)	-	Off	SIMOTION P320-4 is working error-free.
	Error	Red: Continuous light	Bus error at the PROFINET interface.
		Red: Flashes quickly (2 Hz)	Erroneous configuration.

		Red: Flashes quickly (5 Hz)	FAULT state (only in combination with L1 and L3)
	INIT	Red: Flashes slowly (0.5 Hz)	During the INIT process, the SF PROFINET LED is con- trolled by the boot loader. The precise flashing behavior therefore cannot be determined and displayed. In the INIT state, 0.5 Hz flashing is displayed in the SI- MOTION P State. If no project has yet been loaded, 0.5 Hz flashing is also displayed for the INIT, which, in this case, is also retained in the Running state.
MAINT or L3 (SF LED)	-	Off	SIMOTION P320-4 is working error-free.
	Error	Red	An event has occurred which needs to be acknowledged (alarm, message, notification). (See Diagnostics Guide)
		Red: Flashes slowly (0.5 Hz)	License missing for licensed technology objects. Carry out the licensing to correct the error. Further information on the licensing can be found in the SIMOTION P320-4 E / SIMOTION P320-4 S Commissioning and Hardware Installation Manual.
		Red: Flashes quickly (5 Hz)	FAULT state (only in combination with L1 and L2) A fault has occurred to which the user program cannot respond. The following actions may be required to rectify the fault: ● Power OFF/ON ● Recommissioning

Table 47: P320 Indicator lights

21.2 Connection Elements

The following table describes the connection elements at the back side of the P320 PLC.

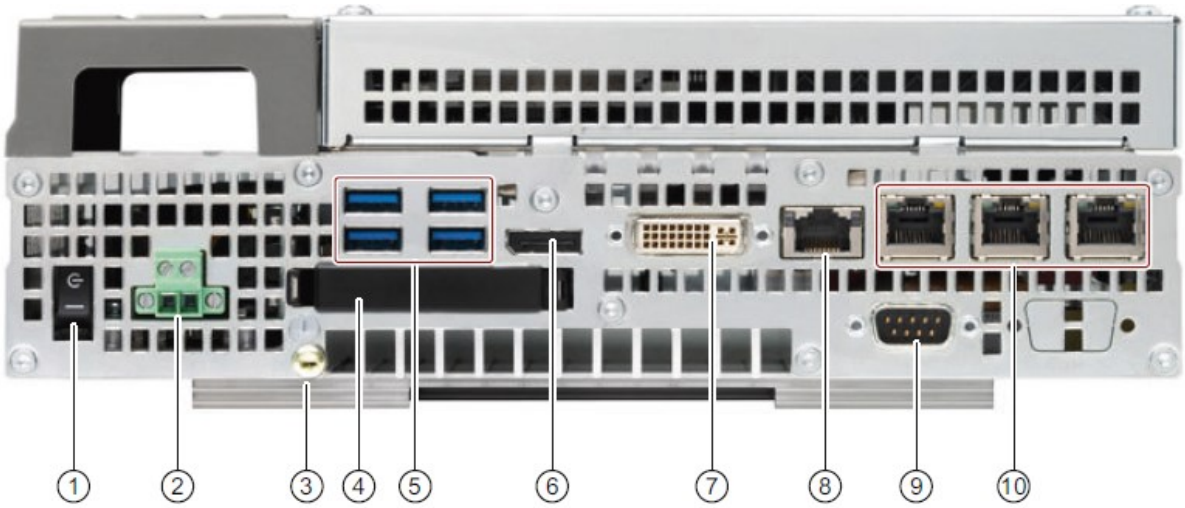


Figure 78: PLC connection elements

Pos.	Description	Description
①	On/off switch	Position OFF is the delivery state. The on/off switch does not isolate the device from the power supply.
②	24 VDC	24 VDC power supply connection
③	Protective conductor	Protective conductor terminal
④	Memory card slot	Cover for the CFast card
⑤	4 × USB 3.0	USB 3.0 high current, backward compatible with USB 2.0/1.1
⑥	Display port	Display port connection for digital monitor
⑦	DVI-I	DVI connector for CRT or LCD monitor with DVI interface
⑧	Ethernet	RJ45 Ethernet connection for 10/100/1000 Mbps
⑨	COM1	Serial interface
⑩	3 × PROFINET	PROFINET ports with three RJ45 sockets

Table 48: Table 38: PLC connection elements

21.3 PLC Connection

Follow the following steps to connect to the main PLC via PC or laptop.

Task 1: **Establish a connection to the PLC via PC or Laptop.**

Step 1 : Connect a PC or laptop via Ethernet cable to port X5 of Ethernet Switch 111A1 inside the CTRL cabinet (*see illustration below*).

Note 1: The connected PC or laptop and the converter PLC must be set to the same IP range.

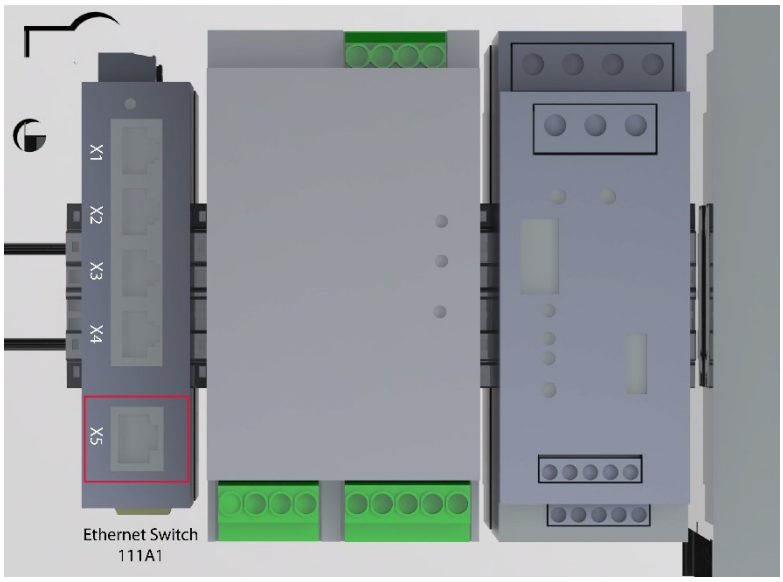


Figure 79: Ethernet Switch 111A1 - Port X5

21.4 Compiled Project Update

In case the PLC control software is not up to date at the time of commissioning, the control software must be updated.

Follow the following steps to perform a compiled project update of the main PLC.

Task 1: **Access the PLC user interface**
Step 1 : Connect to the PLC like described in section 21.3 “PLC“.
Step 2 : Open a web browser of your choice on the connected PLC or laptop
Step 3 : Type in the IP address of the PLC in the address field of your PC´s or laptop´s browser, followed by **/index.mwsl**.

Beispiel 1: 192.168.5.10/index.mwsl

The main controllers´ IP address set at delivery state is provided in Table 46.

Step 4 : The Simotion page “Home” will be displayed in the web browser of the connected PC or laptop.
✓ **The PLC user interface has been successfully accessed.**

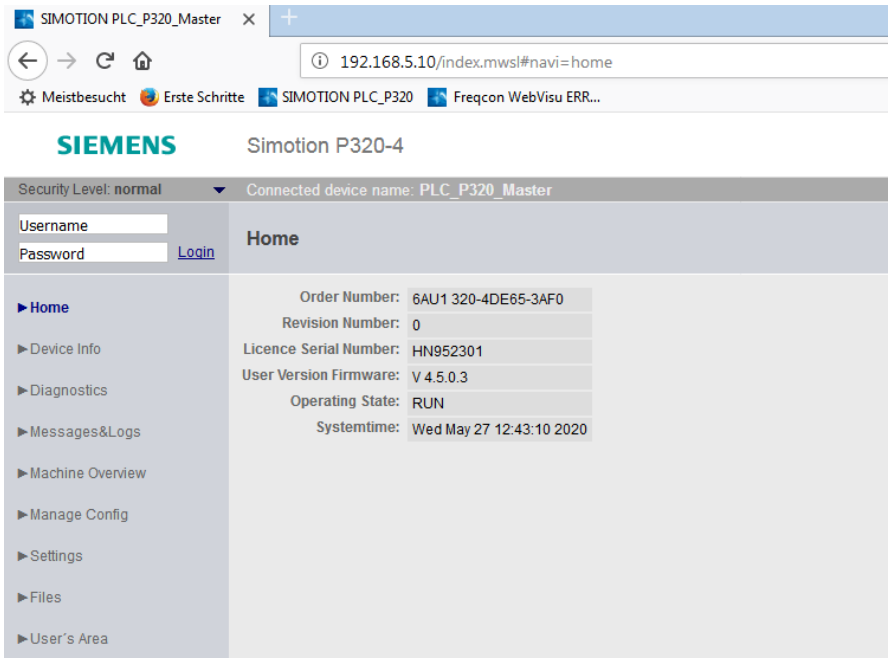


Figure 80: Connecting to the PLC user interface

Task 2: **Stop SIMOTION P320 operation.**

Step 1 : Connect to the PLC like described in section 21.3 “PLC“.

Step 2 : Select the "Settings" tab on the left-hand side of the visualization page (*see figure below,* ①).

Step 3 : In the new window, enter the following user data in the fields provided (case-sensitive):

Username: simotion

Password: simotion

Step 4 : Stop the PLC from running by clicking on the "STOP" button (②).

✓ **The PLC has been successfully stopped from operation.**

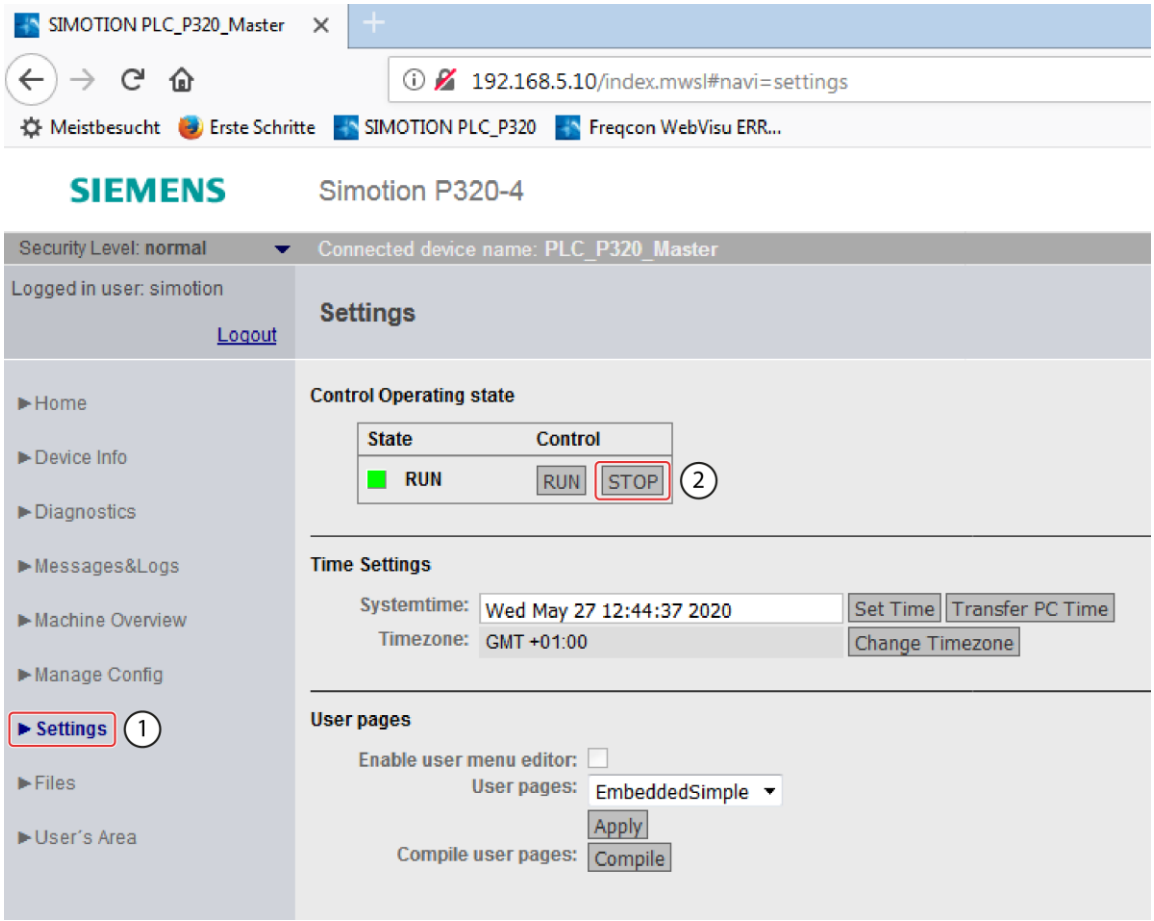


Figure 81: „Settings“ page

Task 3: **Load the compiled project ZIP archive to the SIMOTION P320 PLC**

Step 1 : Select “Manage Config” on the left site of the page (see *figure* below , ③).

Step 2 : Load the compiled project to the system by selecting the folder symbol (④).

Step 3 : Transfer the compiled project to the PLC by selecting the "Send update data" button (⑤).

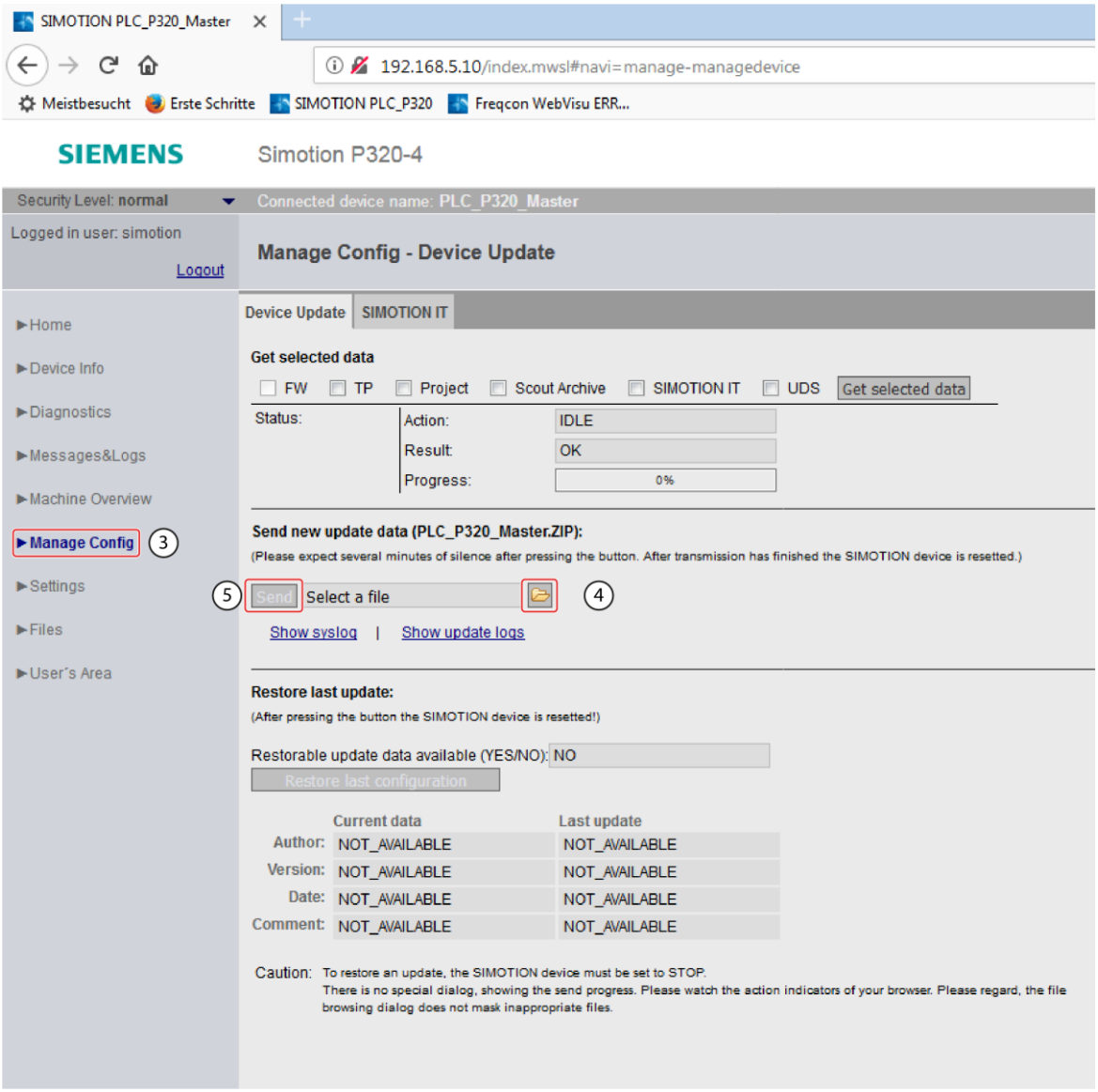


Figure 82: "Manage Config" page

Step 4 : Wait until the confirmation screen appears. The PLC reboots.

Step 5 : Wait for 5-7 minutes until the PLC has completed the reboot process.

Step 6 : Select the "Settings" tab.

Step 7 : Start the PLC by selecting the "RUN" button.

✓ **The PLC software has been successfully updated.**

22 WebVisu

FREQCON Web Visualization (WebVisu) provides granular control, real-time monitoring and visualization of key BESS functions. The WebVisu can be accessed either via the HMI touch panel on the control cabinet of the BESS or via a remote connection using a PC or laptop *(see section 22.1 "WebVisu remote connection")*.

The following sections provide you with information on handling and functionality and offer information on the individual WebVisu pages:

- Overview
- Overview DC-DC
- AC-DC Converter
- DC Link
- DC-DC Converter
- Converter Control
- Cooling
- Battery Overview
- Grid Protection Settings
- Init List
- Error List
- Action List

The individual pages can be selected by using the corresponding navigation buttons on the left side of every WebVisu page.

Note:

- Fields highlighted in grey can be adjusted by entering values inside the fields. Adjusted values are accepted by pressing the "Enter" key.
- Values must be entered in the fields without a unit.
- Fields with a white background indicate actual values.
- The selection of individual WebVisu pages depends on the user rights of the currently logged in user profile.

22.1 WebVisu remote connection

To connect to the WebVisu of the BESS via remote connection, carry out the following steps:

Task 1: **Establish a remote connection to the WebVisu of BESS**

Step 1 : Establish a connection to the PLC (main controller) in the control cabinet of the BESS by connecting a PC or laptop to the RJ45 socket of the network isolator (113T1) using an Ethernet cable.

Note 1: The connected PC or laptop and the PLC must be in the same IP range.

Step 2 : Open a web browser of your choice on the connected PLC or laptop.

Step 3 : Enter the IP address of the PLC in the address field of your PC´s or laptop´s browser.

Example: http://192.168.5.30

Note 2: The IP address of the main controller set at delivery is specified in Table 46.

Step 4 : The WebVisu page "Overview" is displayed in the web browser of the connected PC or laptop.

✓ **The remote connection to the WebVisu of BESS has been successfully established.**

22.2 Navigation

22.2.1 Home Button

The WebVisu "Overview" page can be displayed by selecting the "Home" button that appears on the left side of each WebVisu page *(see figure below)*.

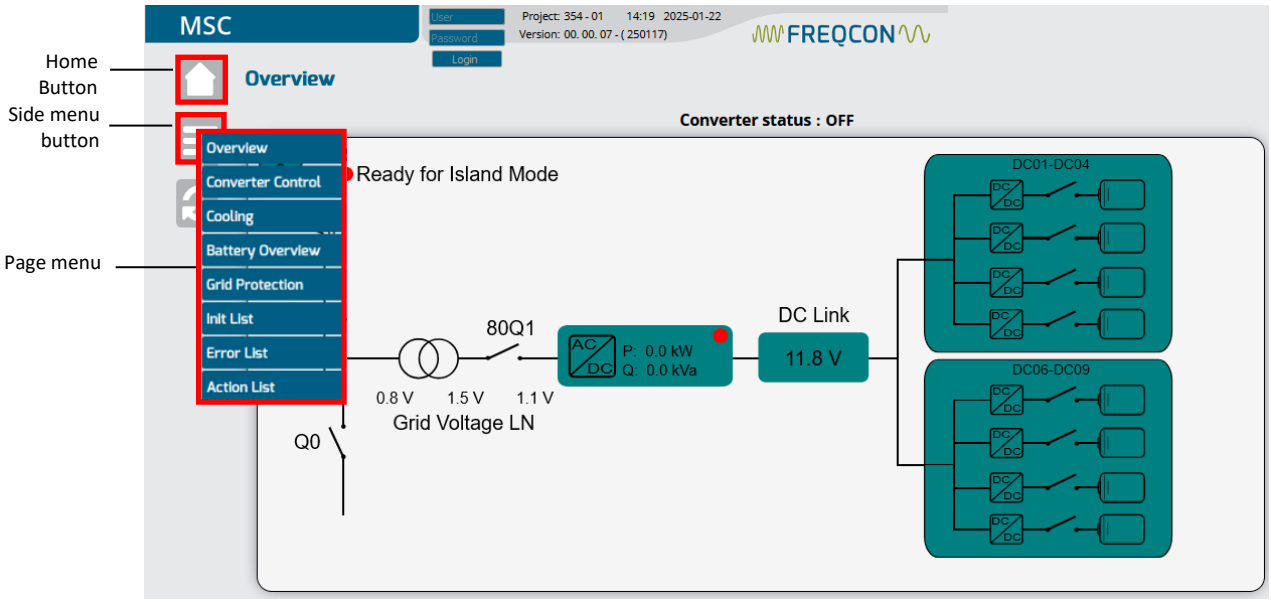


Figure 83: Navigation

22.2.2 Page Menu Button

The Page Menu is displayed via the Page Menu button that appears on every WebVisu page (*see figure 83*).

After selecting the Page Menu button, the Page Menu appears, where all WebVisu pages that can be selected with the respective user profile.

22.3 WebVisu User Interface

At the top of each WebVisu page, a user interface appears for each user (*see figure below*):

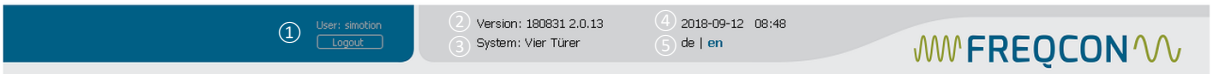


Figure 84: WebVisu user interface

The user interface provides the following information:

	Notification/Function	Description
①	User login	Type in the user profile name and password here. Press "Enter" to log in with a user profile. If a user profile is logged in, the current user profile is displayed here.
②	Version	Software version currently installed in the main control of the BESS
③	System	BESS-Identification number
④	Time/Date	Current time and date
⑤	Language selection	Choice between German and English display language

22.4 WebVisu Pages

22.4.1 Overview

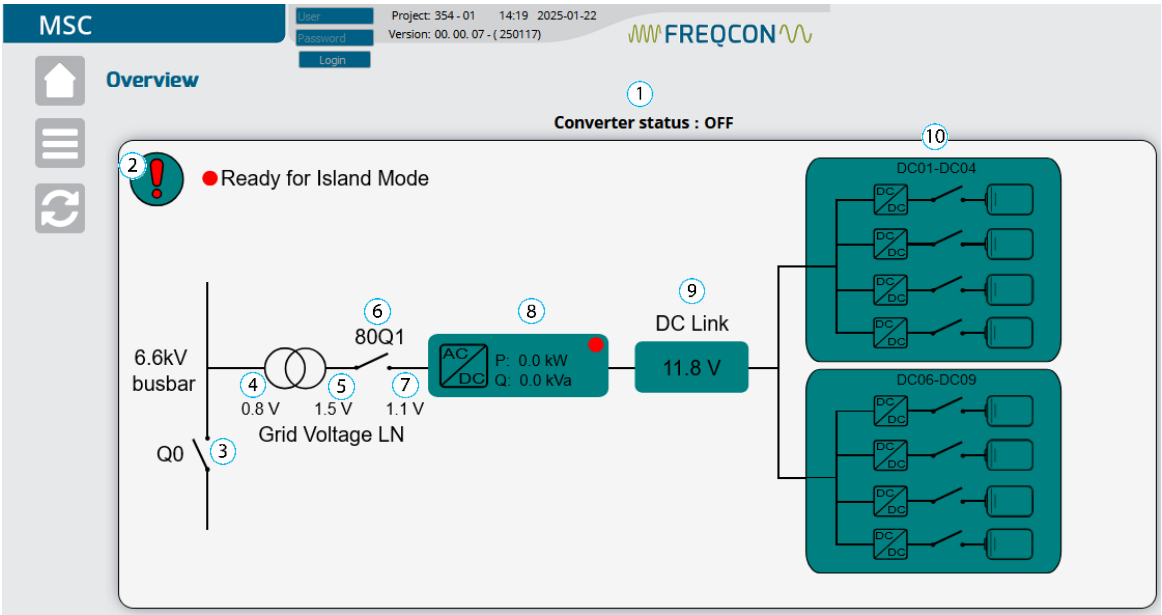


Figure 85: WebVisu page "Overview"

The "Overview" WebVisu page (*see figure above*) provides the user with a graphical overview of the main components of the BESS system and displays the following actual values:

	Description	Value
1	Converter status; for more detailed description see page “Converter control”	--
2	Green: no errors, red: errors; Clicking on the symbol takes you to the page "Error list"	--
3	MV Switch status	Open / closed
4	Voltage at the high-voltage side of the MV transformer	V
5	Voltage at the low-voltage side of the MV transformer	V
6	AC Circuit breaker 80Q1 (Switching state)	Open / closed
7	Voltage at the AC output of the converter	V
8	AC/DC Converter: active power and reactive power; Red: off, green: operation; Clicking on the symbol takes you to the page "AC-DC converter"	kW / kVA
9	DC Link voltage; Clicking on the symbol takes you to the page “DC Link”	V
10	DC/DC Converter; Clicking on the symbol takes you to the page "Overview DC-DC" of the DC Subsystems DC01-DC04 respectively DC06-DC09	--

22.4.2 Overview DC-DC

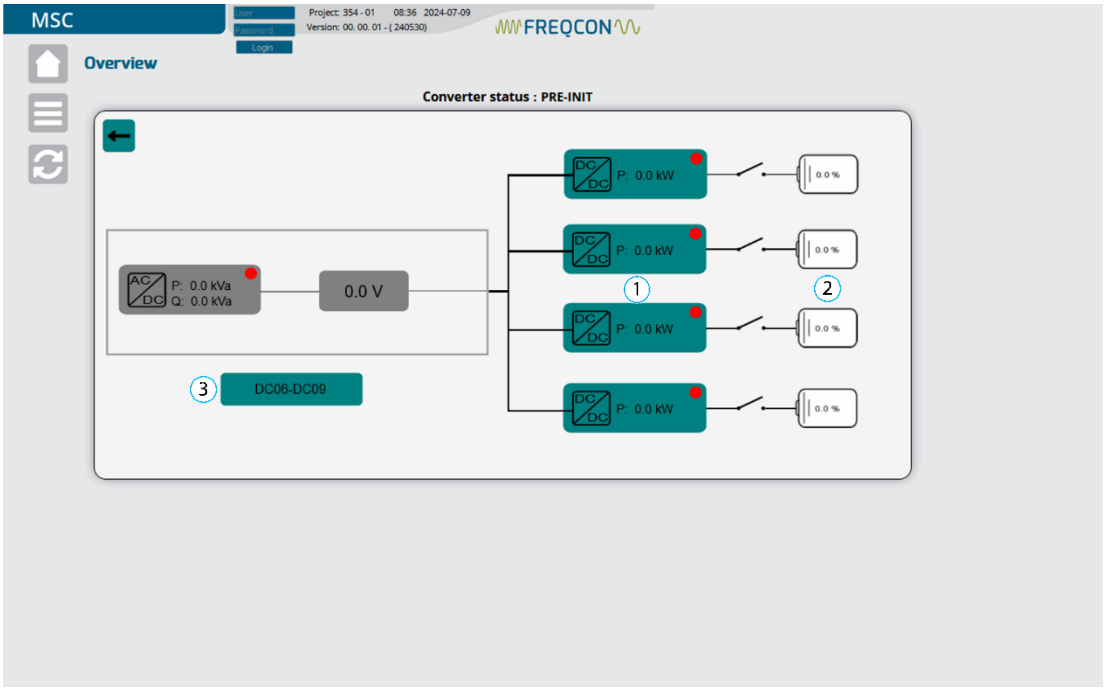


Figure 86: WebVisu page "Overview DC-DC"

The "Overview DC-DC" WebVisu page (*see figure above*) provides the user with a graphical overview of the main components of the BESS system and displays the following actual values:

	Description	Value
1	DC/DC Converter: active power (positive value: battery is charging, negative value: battery is discharging) Red: off; green: operation; Clicking on the symbol takes you to the page "DC-DC Converter" of the respective battery string	kW
2	State of charge	%
3	Switch to the page “Overview DC-DC” of the other DC Subsystem	--

22.4.3 AC-DC Converter

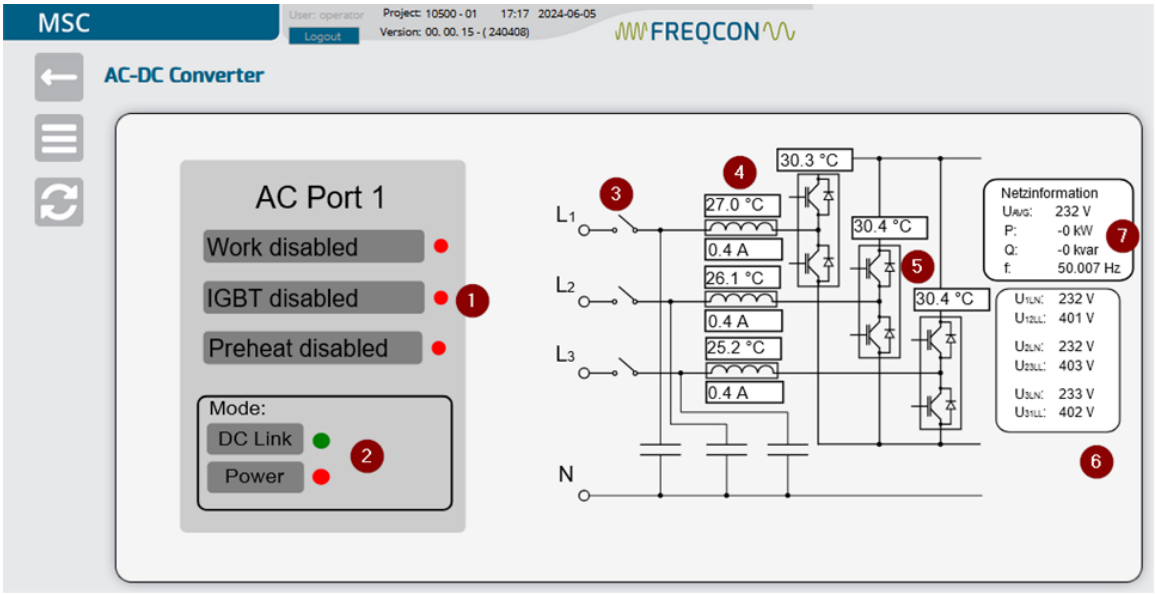


Figure 87: WebVisu page “AC-DC Converter"

	Description	Value
1	Working mode, not changeable	--
2	Control mode, not changeable	--
3	AC Circuit breaker	Open / closed
4	Inductor temperatures and phase currents through the IGBT and inductors	°C / A
5	IGBT temperatures	°C
6	String voltages and phase voltages at grid connection point	V
7	Grid information: Average voltage, active power, reactive power, grid frequency	V / kW / kvar / Hz

22.4.4 DC Link

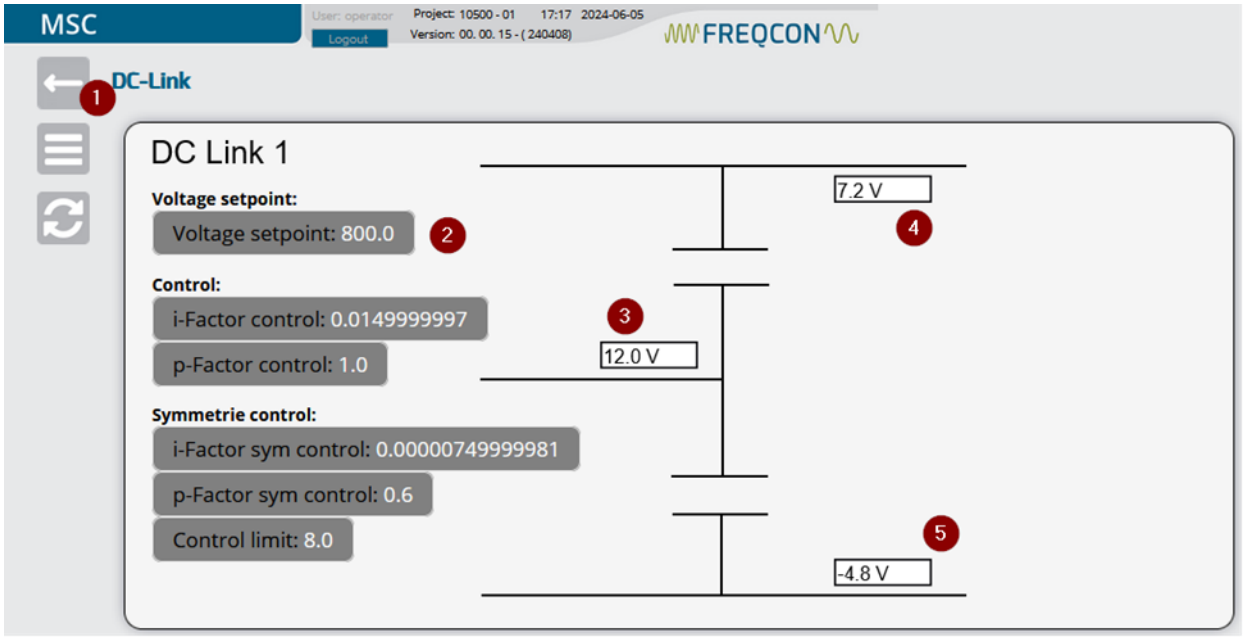


Figure 88: WebVisu page “DC Link"

	Description	Value
1	Back to “Overview”	--
2	DC link voltage setpoint, fixed value	V
3	Total DC link voltage	V
4	Positive DC link voltage	V
5	Negative DC link voltage	V

22.4.5 DC-DC Converter

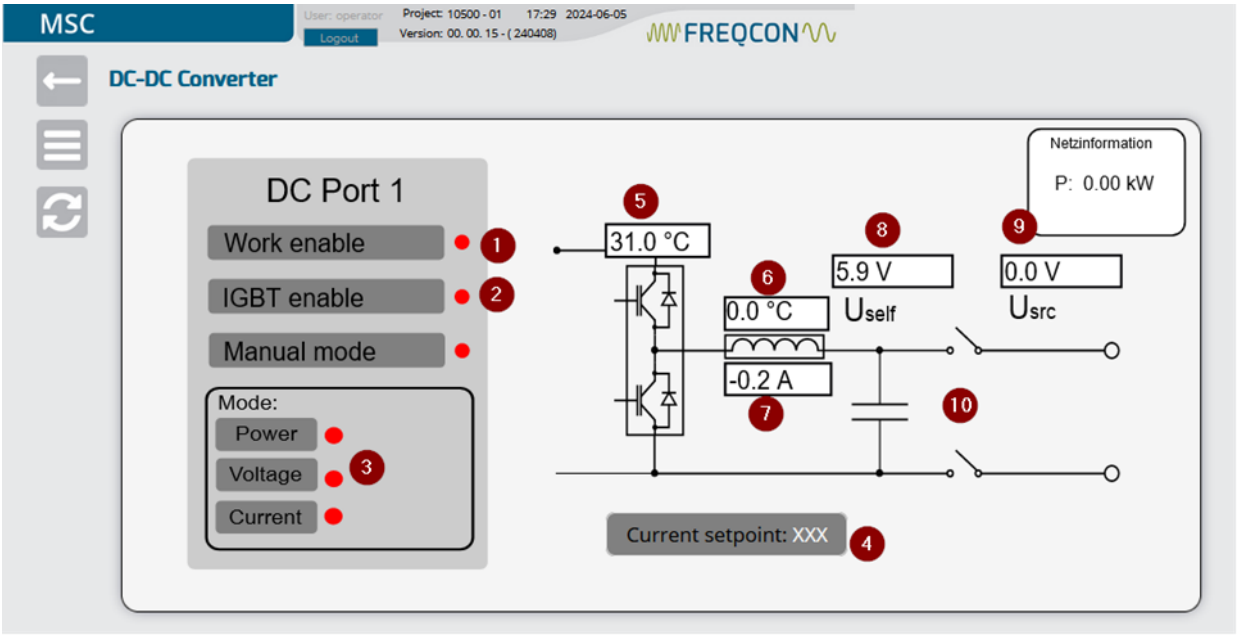


Figure 89: WebVisu page “DC-DC Converter"

	Description	Value
1	Status, not manually changeable	--
2	IGBT enabled	--
3	Control mode, not manually changeable	--
4	Manual setpoint, not available here	--
5	IGBT temperature	°C
6	Inductor temperature	°C
7	Current, filtered	A
8	Voltage at the filter capacitor	V
9	Voltage at the source	V
10	DC contactor (positive and negative)	Open / closed

22.4.6 Converter Control

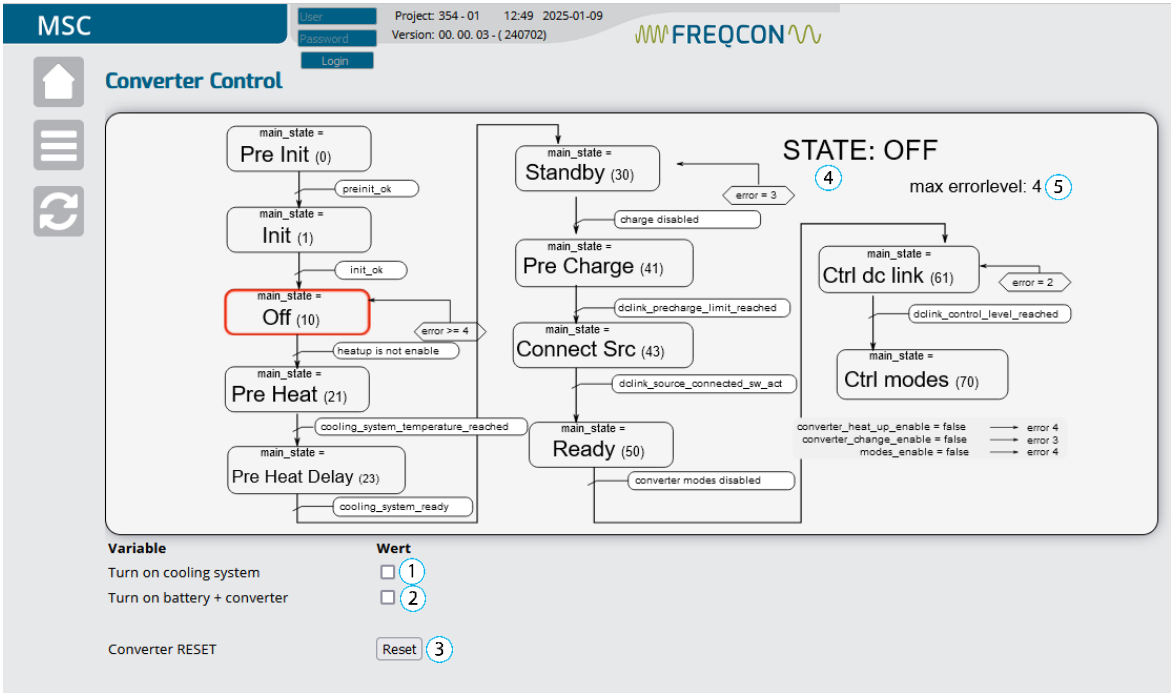


Figure 90: WebVisu page "Converter Control"

	Description	Value
1	Switch on cooling system, converter starts up to standby	--
2	Switch on converter and connect battery system	--
3	Reset converter error	--
4	The converter follows a step chain when it is switched on: Preinit: After switching on the PLC Init: Loading the initialization parameters from the memory card OFF: Converter is off Preheat: Coolant is heated to minimum temperature Preheat Delay: Temperature is held for a few minutes to reduce humidity caused by condensation on the components Standby: Cooling system is ready for use PreCharge: Charging of the DC link via resistors Connect Source: Switching on the mains switch S1 Ready: DC link is pre-charged and converter is connected to the mains, but IGBT is still off Ctrl DC Link: Switch on IGBT and regulate DC link voltage to nominal value Ctrl Modes: Normal operation	--
5	Error level 0 ... 1: Messages, warnings Error level 2: Shutdown of subsystems, e.g. a DC port Error level 3: Shutdown to standby, e.g. in the event of current or voltage overshoots, overtemperatures, etc.	--

22.4.7 Cooling

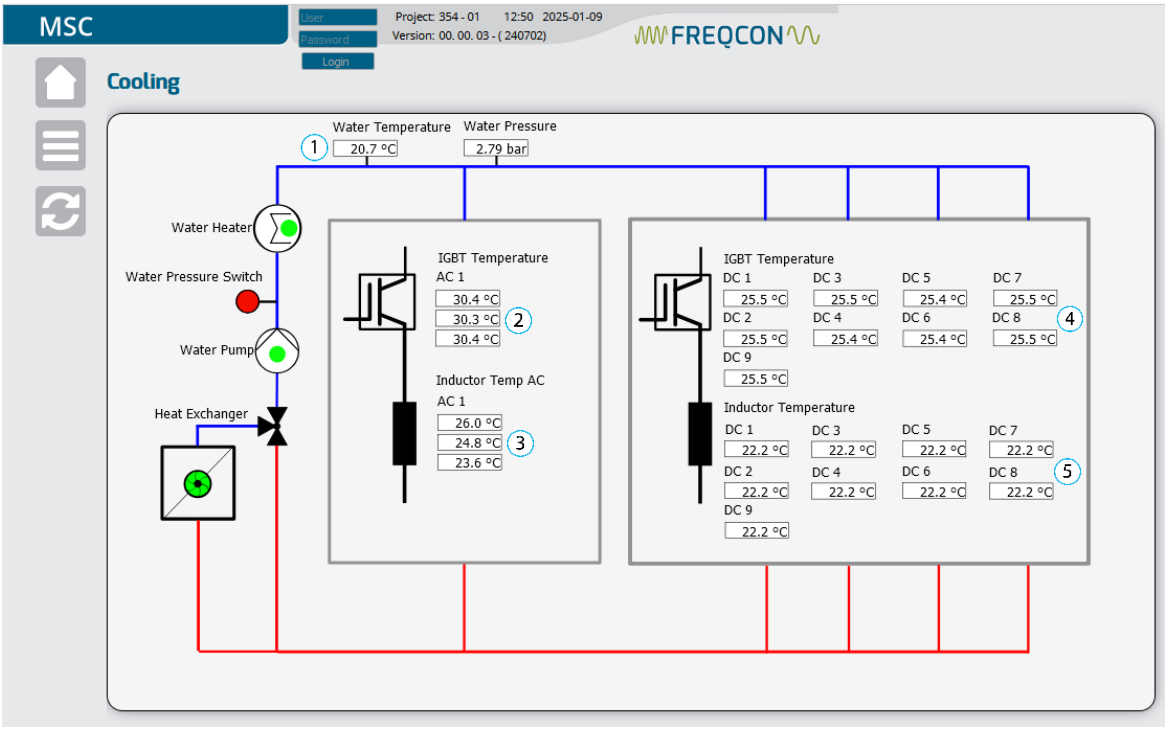


Figure 91: WebVisu page "Cooling"

The "Cooling" WebVisu pages provide the user with a graphical overview of the main components of the BESS cooling system:

- Cooling water heating element (water heater)
- Pressure switch
- Cooling water pump (water pump)
- Heat exchanger

The following actual values are displayed on the "Cooling" WebVisu page:

	Description	Value
1	Cooling water temperature inside the cooling system	°C
2	Temperatures of the AC IGBTs 1/2/3	°C
3	Temperatures of AC inductors 1/2/3	°C
4	IGBT temperatures of DC ports 1 - 8	°C
5	Inductor temperatures of DC ports 1 - 8	°C

22.4.8 Battery Overview

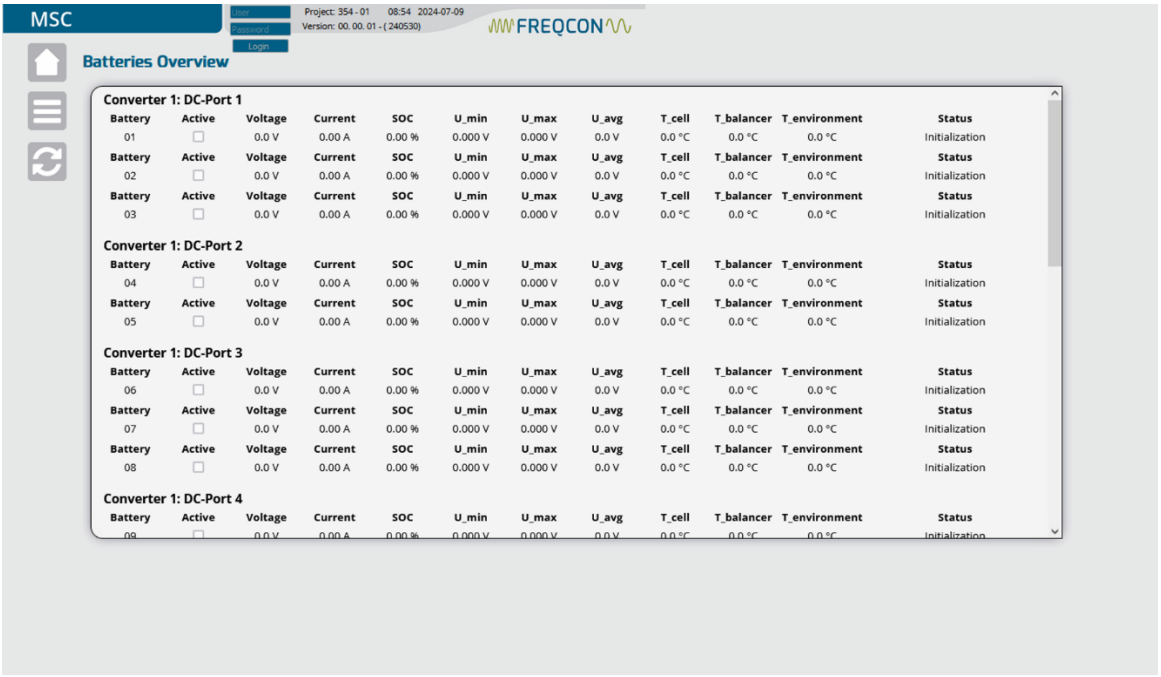


Figure 92: WebVisu page “Battery Overview"

The data is transmitted by the BMS as soon as the respective battery string is connected. If the string is disconnected from the converter system, the value "0" is displayed for current, voltage and SOC.

22.4.9 Grid Protection Settings

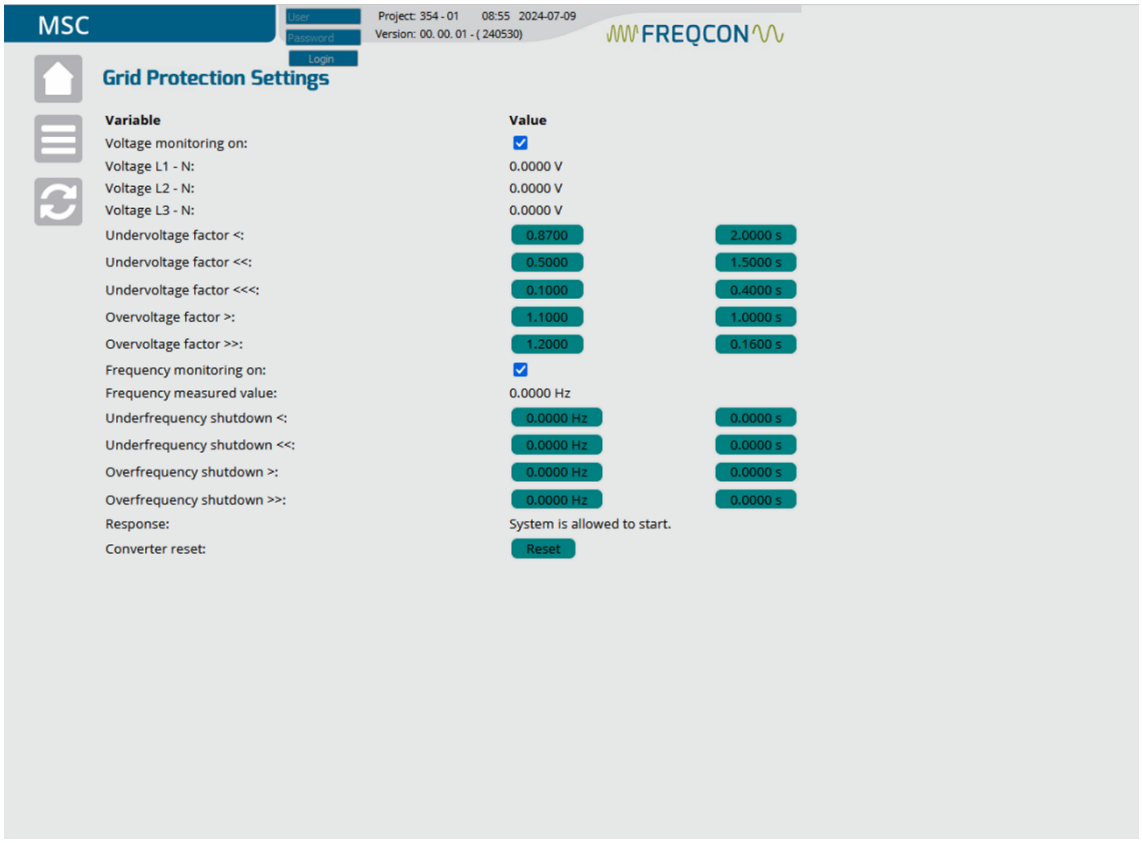


Figure 93: WebVisu page "Grid Protection Settings"

Changing the settings requires a logged in user "operator".

22.4.10 Init List

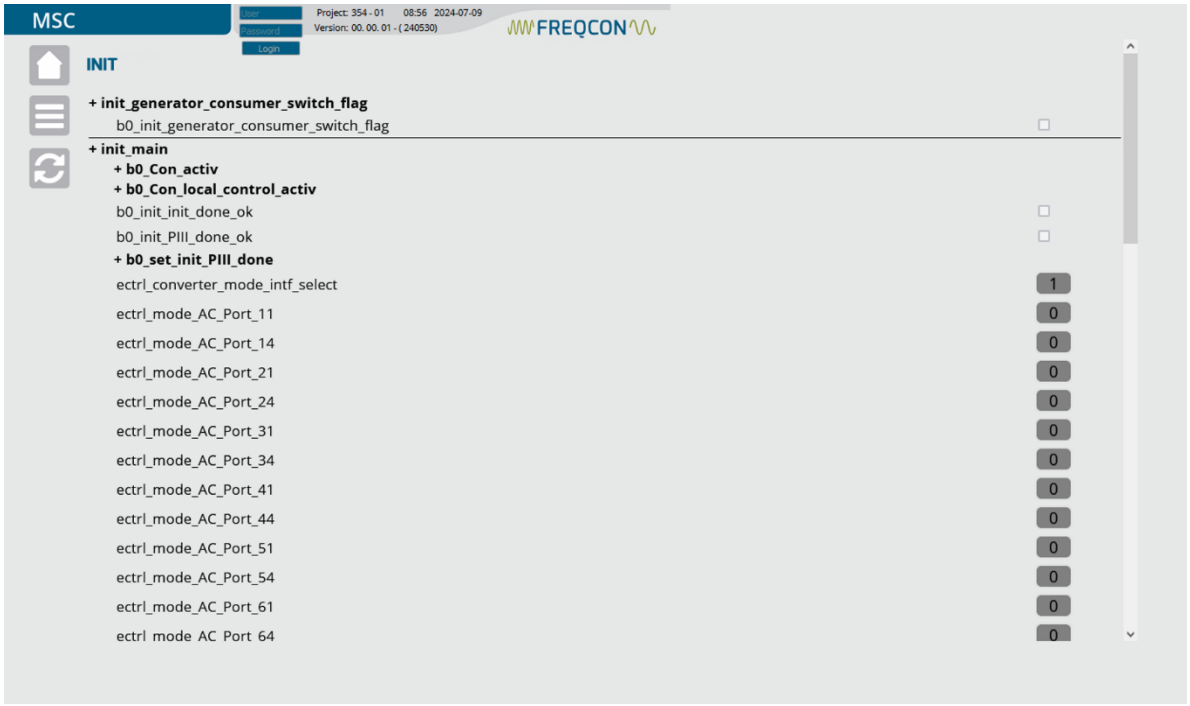


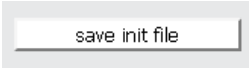
Figure 94: WebVisu page "Init List"

The WebVisu page "Init List" provides the user with an overview of all initialization values (Init values) stored in the BESS main controller.

The "Operator" user profile, as well as users who are not logged in with a profile, can only **check** the set Init values.
Only the **"Service"** and **"Factory"** user profiles can **adjust init values by** changing the value of the corresponding variable in the value field.

- ➜ To expand the parameter overview, click on the "+" sign in front of the corresponding init value.
- ➜ Fixed Init values are displayed on the right side of the corresponding Init parameter.
- ➜ To change the value, change the value inside the box and press „Enter“ on the keyboard of your PC or Laptop.
- ➜ The new value is set, but will be reset after a reboot of the controller.

Note:
To **permanently** adjust the init value, press "Enter" on your PC or laptop keyboard and then select the "Save init file" button at the bottom of the "Init" page. The selected value now remains saved even if the controller is restarted



22.4.11 Error List

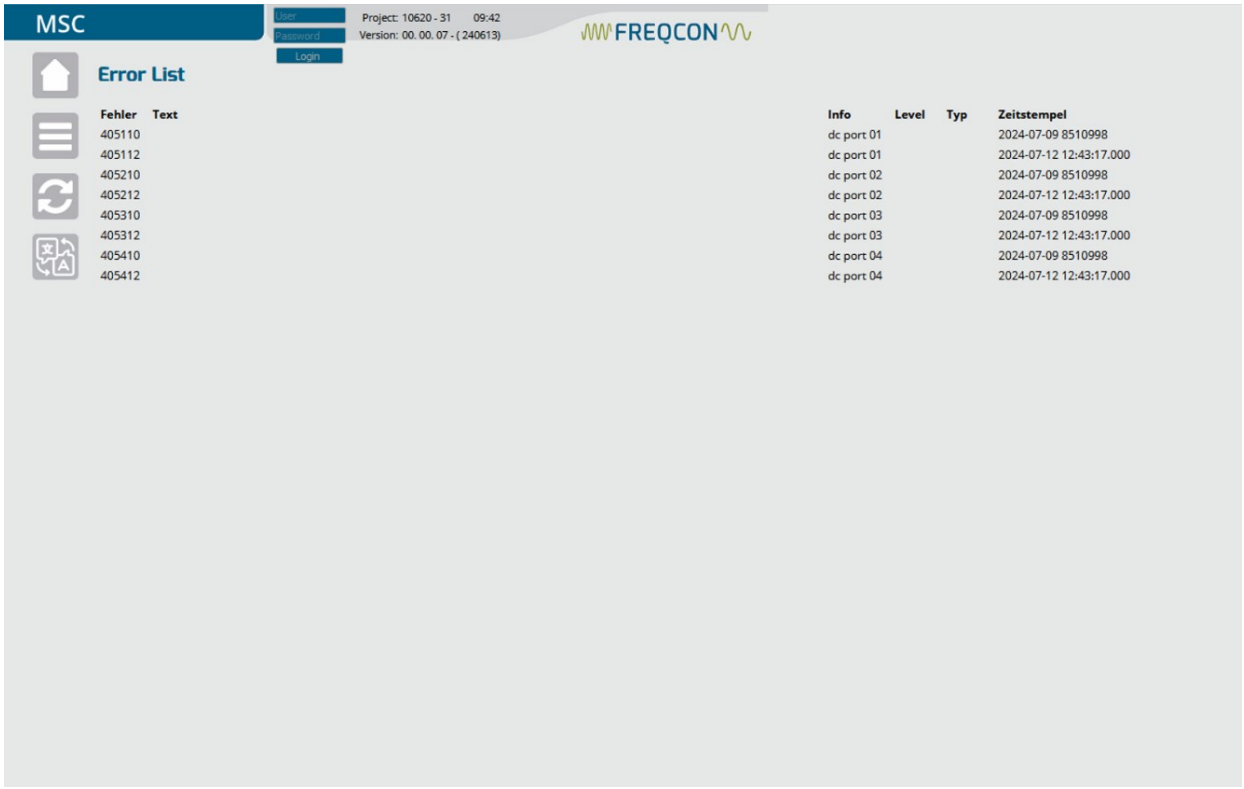


Figure 95: WebVisu page "Error list"

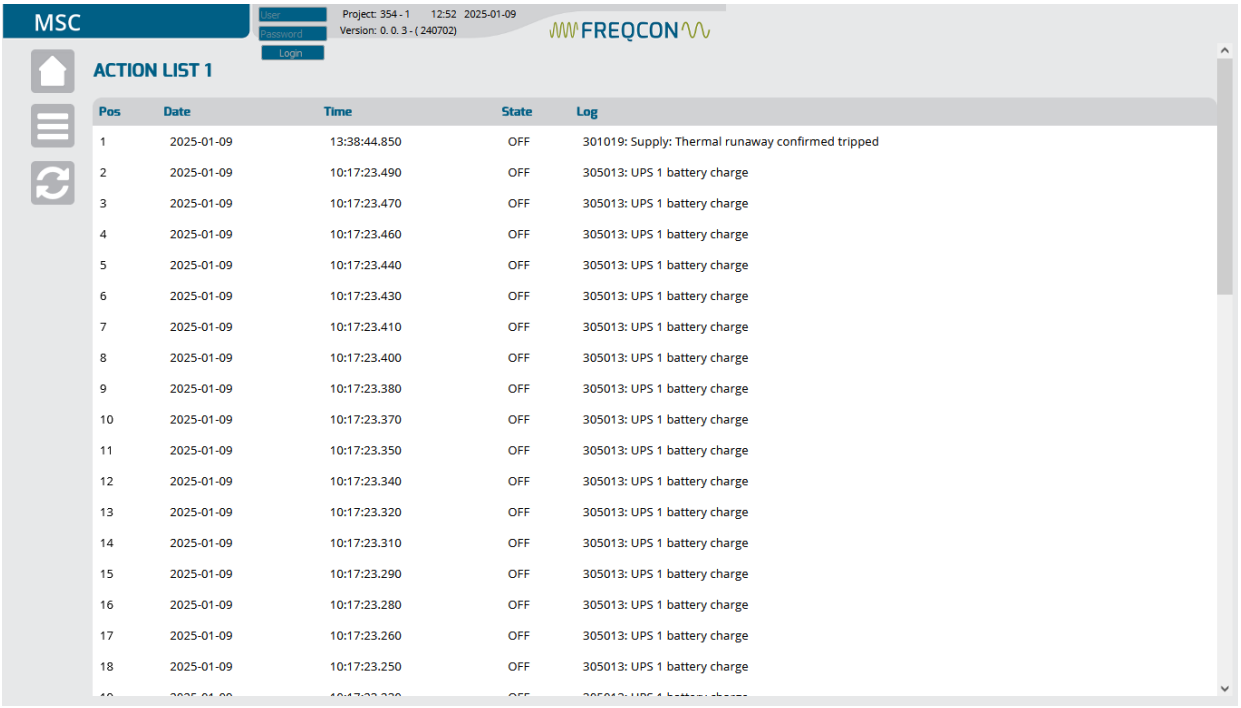
The WebVisu "Error List" page provides the user with a list of current system messages, warnings and errors.

The Error List shows only **current** system messages, warnings and errors. After a reset of a warning or error, these warning and error messages will not be any more displayed in the error list, if the warning or error is not anymore apparent.

The following information are provided inside the error list.

Name	Description
Error	Code of the individual message, warning or error.
Text	Description text for the individual message, warning or error.
Info	Additional information regarding the individual message, warning or error.
Level	Level of message, warning or error. **Note:** Level 1 to 4 are error levels and lead to a stop of the BESS system. For additional information regarding individual error messages, *see section 7.1* "Error Levels": Levels 0 and below are reporting and warning levels and do not cause the BESS system to stop.
Type	Indicates the message type of the individual message. Possible message types are: message, warning or error.
Time stamp	Indicates the time, at when the message, warning or error was detected by the controller.

22.4.12 Action List



Pos	Date	Time	State	Log
1	2025-01-09	13:38:44.850	OFF	301019: Supply: Thermal runaway confirmed tripped
2	2025-01-09	10:17:23.490	OFF	305013: UPS 1 battery charge
3	2025-01-09	10:17:23.470	OFF	305013: UPS 1 battery charge
4	2025-01-09	10:17:23.460	OFF	305013: UPS 1 battery charge
5	2025-01-09	10:17:23.440	OFF	305013: UPS 1 battery charge
6	2025-01-09	10:17:23.430	OFF	305013: UPS 1 battery charge
7	2025-01-09	10:17:23.410	OFF	305013: UPS 1 battery charge
8	2025-01-09	10:17:23.400	OFF	305013: UPS 1 battery charge
9	2025-01-09	10:17:23.380	OFF	305013: UPS 1 battery charge
10	2025-01-09	10:17:23.370	OFF	305013: UPS 1 battery charge
11	2025-01-09	10:17:23.350	OFF	305013: UPS 1 battery charge
12	2025-01-09	10:17:23.340	OFF	305013: UPS 1 battery charge
13	2025-01-09	10:17:23.320	OFF	305013: UPS 1 battery charge
14	2025-01-09	10:17:23.310	OFF	305013: UPS 1 battery charge
15	2025-01-09	10:17:23.290	OFF	305013: UPS 1 battery charge
16	2025-01-09	10:17:23.280	OFF	305013: UPS 1 battery charge
17	2025-01-09	10:17:23.260	OFF	305013: UPS 1 battery charge
18	2025-01-09	10:17:23.250	OFF	305013: UPS 1 battery charge

Figure 96: WebVisu page "Action list"

The WebVisu page "Action list" provides the user with an overview of the system events stored by the BESS controller.

The event list records the most important events and information of the BESS system, such as

- Plant operation
- Error messages
- Event messages
- Status messages

23 Troubleshooting

⚠ DANGER	
	**Electric shock due to low voltage** Severe irreparable damage to the nervous system, severe burns and death. ➜ In the event of faults, contact customer support. ➜ Have work on the energy storage device performed by service personnel only.

24 Dismantling and Disposal

24.1 Safety

For all work on the BESS observe the „Safety Instructions“ in section 2.

24.2 Dismantling

The end user is responsible for dismantling the energy storage device.

24.3 Disposal of Packaging Material

The proper disposal of packing materials is subject to national regulations and laws. If there are any doubts regarding the proper disposal of the packaging materials, ask a local disposal specialist or consult the local authorities.

The packaging my consist of the following materials:

- wooden frames
- pallets
- polyethylene foil
- plywood
- plastics
- silica gel

24.4 BESS Disposal

Always adhere the national regulations and laws regarding disposal or recycling.

⚠ WARNING	
	**Danger to life due to improper dismantling** In the case of improper dismantling, materials can slip, tip or shift, which can result in death, severe personal injury or material damage. ➜ Only qualified personal is allowed to dismantle and dispose, wearing suitable protective clothing. ➜ Before starting to dismantle, deenergize and ground the device. ➜ Also refer to section 10.1 "Unpacking" and section 10.2 “Transport”.

⚠ WARNING	
	Do not dispose the refrigerant of the external cooling unit in the atmosphere. It should be disposed of by companies dealing with special waste collection and recovery.

The batteries installed in the FREQCON BESS Container are subject to EU Directive 2006/66/EC on batteries and accumulators as well as spent batteries and accumulators.
They must be disposed of separately.
For this purpose, the batteries categorized as industrial batteries are not to be returned to the common take-back system but directly to the manufacturer FREQCON GmbH or a third-party company, qualified for this service.

Please note that the existing regulations for the transport of hazardous materials must be observed. The transport is the responsibility of the end user.

The end user is responsible for the following when disposing of batteries:

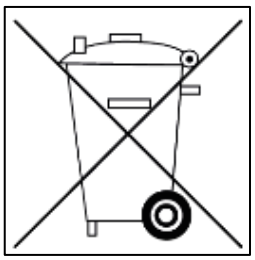
- Packaging
- Labeling
- Return transport to the manufacturer

After transport, the battery storage system must be disposed according to local regulations.
The energy storage device also contains electrical and electronic components that must be disposed of separately from other waste in accordance with local regulations and laws.

Pay particular care for the disposal or recycling of the following components:

- Batteries
- Circuit boards
- Electrical components
- Refrigerants

NOTE:
The transport of the battery modules installed inside the battery storage system underly strict regulations (UN 3480) and are only allowed to be transported by companies, qualified for this purpose.



The energy storage device also contains electrical and electronic components that must be disposed of separately from other waste in accordance with local regulations and laws.

Freqcon GmbH

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Customer:	Statron	
Project:	Shell Crosswind BESS FQ 1MW 5MWh Offshore	
Type:	BESS MSC-1000-620-8	
Product	CONVERTER CONTAINER	
Circuit diagram No:	10354_23A2007	20241203_V1.22

Producer (company):	Freqcon GmbH	53396
Project:	Shell Crosswind BESS FQ 1MW 5MWh Offshore	CT_Ausbau_1 53457 CT_Ausbau_2 53765
Type:	BESS MSC-1000-620-8	CONV 53399
Project manager:	Freqcon_CP	

created on:	17.09.2019			
edited on:	03.12.2024	edited by:	Freqcon_DG	total pages: 500

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FREQCON_INHALT_04_de_en

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	2	INDEX	05.11.2024	Freqcon_DG
	3	INDEX	05.11.2024	Freqcon_DG
	4	INDEX	05.11.2024	Freqcon_DG
	5	INDEX	05.11.2024	Freqcon_DG
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	7	INDEX	05.11.2024	Freqcon_DG
	8	INDEX	05.11.2024	Freqcon_DG
	9	INDEX	05.11.2024	Freqcon_DG
	10	INDEX	05.11.2024	Freqcon_DG
	11	INDEX	05.11.2024	Freqcon_DG
	12	INDEX	05.11.2024	Freqcon_DG
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	14	INDEX	05.11.2024	Freqcon_DG
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&EPC ++CONV +IND		Parts List Converter Inductor cabinet		
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&EPC ++CT +CTRL_1		Parts List Control cabinets Control cabinet 1		
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&EPC ++CT +CTRL_2.1		Parts List Control cabinets Control cabinet 2 Cabinet door		
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&EMB ++CONV		Cable list Converter		
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	14	CABEL LIST	05.11.2024	Freqcon_DG
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&EMB ++FAN		Cable list FAN		
	1	CABEL LIST	05.11.2024	Freqcon_DG
&EMB ++EXTERN		Cable list		
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&EMZ ++CONV +IND		Terminals Converter Inductor cabinet		
	1000	Klemmenleistenübersicht : =UNIT_01++CONV+IND-207L1.1 - =UNIT_01++CONV+IND-217L1.3	05.11.2024	Freqcon_DG
	2000	Klemmenplan =UNIT_01++CONV+IND-207L1.1	05.11.2024	Freqcon_DG
	2001	Klemmenplan =UNIT_01++CONV+IND-207L1.2	05.11.2024	Freqcon_DG
	2002	Klemmenplan =UNIT_01++CONV+IND-207L1.3	05.11.2024	Freqcon_DG
	2003	Klemmenplan =UNIT_01++CONV+IND-211L1.1	05.11.2024	Freqcon_DG
	2004	Klemmenplan =UNIT_01++CONV+IND-211L1.2	05.11.2024	Freqcon_DG
	2005	Klemmenplan =UNIT_01++CONV+IND-211L1.3	05.11.2024	Freqcon_DG
	2006	Klemmenplan =UNIT_01++CONV+IND-217L1.1	05.11.2024	Freqcon_DG
	2007	Klemmenplan =UNIT_01++CONV+IND-217L1.2	05.11.2024	Freqcon_DG
	2008	Klemmenplan =UNIT_01++CONV+IND-217L1.3	05.11.2024	Freqcon_DG
&EMZ ++CONV +CIR		Terminals Converter Circuit Breaker cabinet		
	1000	Klemmenleistenübersicht : =UNIT_01++CONV+CIR-227U1-X3.1 - =UNIT_01++CONV+CIR-237U1-X3.2	05.11.2024	Freqcon_DG
	2000	Klemmenplan =UNIT_01++CONV+CIR-227U1-X3.1	05.11.2024	Freqcon_DG
	2001	Klemmenplan =UNIT_01++CONV+CIR-227U1-X3.2	05.11.2024	Freqcon_DG
	2002	Klemmenplan =UNIT_01++CONV+CIR-227U1-X3.2	05.11.2024	Freqcon_DG

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	2004	Klemmenplan =UNIT_01++CONV+CIR-231U1-X3.2	05.11.2024	Freqcon_DG
	2005	Klemmenplan =UNIT_01++CONV+CIR-231U1-X3.2	05.11.2024	Freqcon_DG
	2006	Klemmenplan =UNIT_01++CONV+CIR-237U1-X3.1	05.11.2024	Freqcon_DG
	2007	Klemmenplan =UNIT_01++CONV+CIR-237U1-X3.2	05.11.2024	Freqcon_DG
	2008	Klemmenplan =UNIT_01++CONV+CIR-237U1-X3.2	05.11.2024	Freqcon_DG
&EMZ ++CONV +AC_DC		Terminals Converter AC and DC connection cabinet		
	1000	Klemmenleistenübersicht : =UNIT_01++CONV+AC_DC-X3.43 - =UNIT_01++CONV+AC_DC-X3.43	05.11.2024	Freqcon_DG
	2000	Klemmenplan =UNIT_01++CONV+AC_DC-X3.43	05.11.2024	Freqcon_DG
	2001	Klemmenplan =UNIT_01++CONV+AC_DC-X3.43	05.11.2024	Freqcon_DG
	2002	Klemmenplan =UNIT_01++CONV+AC_DC-X3.43	05.11.2024	Freqcon_DG
	2003	Klemmenplan =UNIT_01++CONV+AC_DC-X3.43	05.11.2024	Freqcon_DG
&EMZ ++CT		Terminals Control cabinets		
	1000	Klemmenleistenübersicht : =UNIT_01++CT+-XT1 - =UNIT_01++CT+-XT1	05.11.2024	Freqcon_DG
	2000	Klemmenplan =UNIT_01++CT+-XT1	05.11.2024	Freqcon_DG
	2001	Klemmenplan =UNIT_01++CT+-XT1	05.11.2024	Freqcon_DG
&EMZ ++CT +CTRL_1.3		Terminals Control cabinets Control cabinet 1 Main mounting plate		
	1000	Klemmenleistenübersicht : =UNIT_01++CT+CTRL_1.3-X1 - =UNIT_01++CT+CTRL_1.3-XV	05.11.2024	Freqcon_DG
	2000	Klemmenplan =UNIT_01++CT+CTRL_1.3-X1	05.11.2024	Freqcon_DG
	2001	Klemmenplan =UNIT_01++CT+CTRL_1.3-X3	05.11.2024	Freqcon_DG
	2002	Klemmenplan =UNIT_01++CT+CTRL_1.3-X3	05.11.2024	Freqcon_DG
	2003	Klemmenplan =UNIT_01++CT+CTRL_1.3-X3	05.11.2024	Freqcon_DG
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	2006	Klemmenplan =UNIT_01++CT+CTRL_1.3-X3.12	05.11.2024	Freqcon_DG
	2007	Klemmenplan =UNIT_01++CT+CTRL_1.3-X3.13	05.11.2024	Freqcon_DG
	2008	Klemmenplan =UNIT_01++CT+CTRL_1.3-X5	05.11.2024	Freqcon_DG
	2009	Klemmenplan =UNIT_01++CT+CTRL_1.3-X5	05.11.2024	Freqcon_DG
	2010	Klemmenplan =UNIT_01++CT+CTRL_1.3-X5.1	05.11.2024	Freqcon_DG
	2011	Klemmenplan =UNIT_01++CT+CTRL_1.3-150X1	05.11.2024	Freqcon_DG
	2012	Klemmenplan =UNIT_01++CT+CTRL_1.3-XDC1	05.11.2024	Freqcon_DG
	2013	Klemmenplan =UNIT_01++CT+CTRL_1.3-XDC1	05.11.2024	Freqcon_DG
	2014	Klemmenplan =UNIT_01++CT+CTRL_1.3-XDC2	05.11.2024	Freqcon_DG
	2015	Klemmenplan =UNIT_01++CT+CTRL_1.3-XDC2	05.11.2024	Freqcon_DG
	2016	Klemmenplan =UNIT_01++CT+CTRL_1.3-XDC2	05.11.2024	Freqcon_DG
	2017	Klemmenplan =UNIT_01++CT+CTRL_1.3-XDC3	05.11.2024	Freqcon_DG
	2018	Klemmenplan =UNIT_01++CT+CTRL_1.3-XDC4	05.11.2024	Freqcon_DG
	2019	Klemmenplan =UNIT_01++CT+CTRL_1.3-XDC5.1	05.11.2024	Freqcon_DG
	2020	Klemmenplan =UNIT_01++CT+CTRL_1.3-XDC5.2	05.11.2024	Freqcon_DG
	2021	Klemmenplan =UNIT_01++CT+CTRL_1.3-XE	05.11.2024	Freqcon_DG
	2022	Klemmenplan =UNIT_01++CT+CTRL_1.3-XT	05.11.2024	Freqcon_DG
	2023	Klemmenplan =UNIT_01++CT+CTRL_1.3-XT	05.11.2024	Freqcon_DG
	2024	Klemmenplan =UNIT_01++CT+CTRL_1.3-190XT1	05.11.2024	Freqcon_DG
	2025	Klemmenplan =UNIT_01++CT+CTRL_1.3-191XT1	05.11.2024	Freqcon_DG
	2026	Klemmenplan =UNIT_01++CT+CTRL_1.3-XV	05.11.2024	Freqcon_DG
	2027	Klemmenplan =UNIT_01++CT+CTRL_1.3-XV	05.11.2024	Freqcon_DG
&EMZ ++CT +CTRL_1.4		Terminals Control cabinets Control cabinet 1 Right side		
	1000	Klemmenleistenübersicht : =UNIT_01++CT+CTRL_1.4-350X1.21 - =UNIT_01++CT+CTRL_1.4-XV.20	05.11.2024	Freqcon_DG
	2000	Klemmenplan =UNIT_01++CT+CTRL_1.4-350X1.21	05.11.2024	Freqcon_DG

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Table of contents

FREQCON_INHALT_04_de_en

Assignment	Page	Page description	Date	Edited by
&EMZ ++CT +CTRL_1.4		Terminals Control cabinets Control cabinet 1 Right side		
	2001	Klemmenplan =UNIT_01++CT+CTRL_1.4-350X1.21	05.11.2024	Freqcon_DG
	2002	Klemmenplan =UNIT_01++CT+CTRL_1.4-XE2	05.11.2024	Freqcon_DG
	2003	Klemmenplan =UNIT_01++CT+CTRL_1.4-XV.20	05.11.2024	Freqcon_DG
	2004	Klemmenplan =UNIT_01++CT+CTRL_1.4-XV.20	05.11.2024	Freqcon_DG
&EMZ ++CT +CTRL_2.1		Terminals Control cabinets Control cabinet 2 Cabinet door		
	1000	Klemmenleistenübersicht : =UNIT_01++CT+CTRL_2.1-149X1 - =UNIT_01++CT+CTRL_2.1-149X1	05.11.2024	Freqcon_DG
	2000	Klemmenplan =UNIT_01++CT+CTRL_2.1-149X1	05.11.2024	Freqcon_DG
&EMZ ++FAN		Terminals FAN		
	1000	Klemmenleistenübersicht : =UNIT_01++FAN+-52G1-181X1 - =UNIT_01++FAN+-52G1-181X3	05.11.2024	Freqcon_DG
	2000	Klemmenplan =UNIT_01++FAN+-52G1-181X1	05.11.2024	Freqcon_DG
	2001	Klemmenplan =UNIT_01++FAN+-52G1-181X3	05.11.2024	Freqcon_DG

SPECIFICATION

TERMINAL STRIP

-XE1	MAIN POWER SUPPLY 600V AC
-XE2	DC POWER SUPPLY 1000V DC
-XE	MAIN POWER SUPPLY 400V AC
-X1	MAIN POWER 400V/230V AC
-X2	LIGHT CABINET 230V AC
-X3	CONTROL VOLTAGE 24V DC
-14X1	CONTROL VOLTAGE 24V DC (TO DC CONTACTORS)
-X5	LOW-VOLTAGE SIGNALS
-XDC0	24V DC POWER SUPPLY
-XDC1-4	CONTROL VOLTAGE 24V DC (UPS)
-XT	TRANSFER TERMINAL BLOCK 24V DC / 230V AC

WIRING COLOR

L1 / L2 / L3	=	BLACK
N	=	LIGHT BLUE (IEC) / GREY (UL)
PE	=	YELLOW-GREEN
EXTERNAL VOLTAGE	=	ORANGE
CONTROL VOLTAGE 24 V DC	=	DARK BLUE
ANALOG SIGNALS	=	WHITE

PLACE

+CTRL	=	Control cabinet
+CON	=	Converter cabinet
+IND	=	Inductor cabinet
+CIR	=	Circuit breaker cabinet
+COSY	=	Cooling System
+FAN	=	External fan

previous page: &EAB/14

next page: 6a

SPECIFICATION of grounding

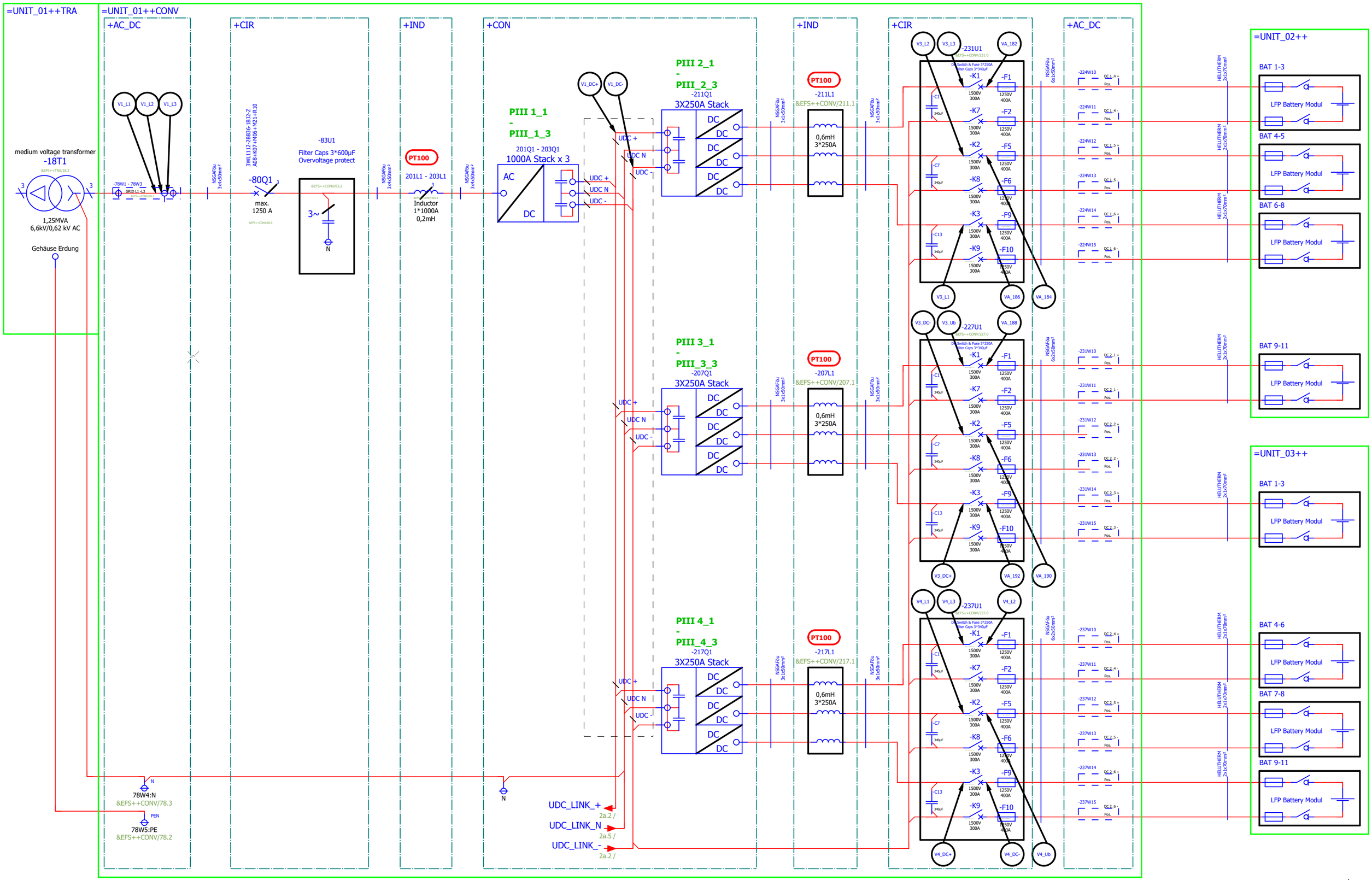
	from frame to			
1	**roof & side walls & doors**	**EVD_1**	**Flachband**	**2x25 mm²**
2	**frame**	**EVD_2**	**Flachband**	**2x25 mm²**
3	**base**	**EVD_3**	**Flachband**	**2x25 mm²**
4	**Mounting plate & partitions**	**EVD_4**	**H07-V-K**	**2x25 mm²**
5	**inductors**	**EVD_5**	**H07-V-k**	**2x25 mm²**
6	**Powerstack**	**EVD_6**	**H07-V-K**	**2x25 mm²**
7	**DC Switch & Fuse**	**EVD_7**	**H07-V-K**	**2x25 mm²**
8	**AC Filter**	**EVD_8**	**H07-V-K**	**2x25 mm²**
9	**circuit-breaker**	**EVD_9**	**H07-V-K**	**2x25 mm²**
10	**Freqcon_Fast_Disconektor**	**EVD_10**	**H07-V-K**	**2x25 mm²**
11	**Freqcon_Rectifier_Modul**	**EVD_11**	**H07-V-K**	**2x25 mm²**
12	**capacitor banks**	**EVD_12**	**H07-V-K**	**2x25 mm²**
13	**water distributor**	**EVD_13**	**H07-V-K**	**2x25 mm²**
14	**SPARE**	**EVD_14**	**H07-V-K**	**2x25 mm²**
15	**SPARE**	**EVD_15**	**H07-V-K**	**2x25 mm²**
16	**SPARE**	**EVD_16**	**H07-V-K**	**2x25 mm²**
17	**SPARE**	**EVD_17**	**H07-V-K**	**2x25 mm²**
18	**SPARE**	**EVD_18**	**H07-V-K**	**2x25 mm²**
	from door to			
19	**PROFINET IRT IGBT Interface**	**EVD_19**	**H07-V-K**	**1,5 mm²**
20	**HMI**	**EVD_20**	**H07-V-K**	**1,5 mm²**
21	**SPARE**	**EVD_21**	**H07-V-K**	**??? mm²**
22	**SPARE**	**EVD_22**	**H07-V-K**	**??? mm²**

previous page: 1a

next page: &EFA/1a

Editor	Freqcon_JD			Statron	FREQCON	Specification Earthing	20241203_V1.22	= UNIT_01	Converter Container 1
Date	14.06.2024	Norm						& EAC	Explanatory documents
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++	page: 6a
Date								+	total: 500

Single line diagram



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Editor	Freqcon_JD			Statron	FREQCON	SYSTEMS OVERVIEW	20241203_V1.22	= UNIT_01	Converter Container 1
Date	18.06.2024	Norm						& EFA	Single line diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++	page: 1a
Date								+	total: 500

Single line diagram

Control circuit

++CONV

++CT
+CTRL_1

CTRL

UDC_LINK_+ / 1a.4

UDC_LINK_- / 1a.4

UDC_LINK_N / 1a.4

+4

-173F2 &EFS++CT/173.2 10A

-173F3 &EFS++CT/173.4 1A

-173K2 1500V 30A DC

-173R3 500 Ohm 150 W

-173R4 500 Ohm 150 W

-173K1 1500V 30A DC

-173R1 500 Ohm 150 W

-173R2 500 Ohm 150 W

V1_DC-

V1_DC+

+4

V1_L1 V1_L2 V1_L3

-85U1 &EFS++CT/85.6 L1 L2 L3 DC+ DC-

-171F1 &EFS++CT/171.2 10A

-171K1 &EFS++CT/171.7 1500V 50A DC

-171K2 &EFS++CT/171.8 1500V 50A DC

-171R1 &EFS++CT/171.1 15 Ohm 300W

-171R2 &EFS++CT/171.2 15 Ohm 300W

Grid 400V
inc. overvotage fuse
& Fuse ??A(20A)

+3
Main mounting plate

1-6
-XE
1

-84F2

>+
CTRL_1.1
-84Q1

AC L1,L2,L3

101T1 &EFS++CT/101.2

24V DC supply unit

102G1 &EFS++CT/102.2
24V DC UPS

+24VDC GND

+ 24V DC
24V GND

-102G2 &EFS++CT/102.6 Battery

-103F1 - 103F4 &EFS++CT/103.2 F2, 10A 60VDC

-103F5 &EFS++CT/103.9 F2, 10A 60VDC

-186K1 &EFS++CT/186.6

-186B1 &EFS++CT/186.6

24V Supply
Main PLC
ET200SP

+24V DC
for Control Cabinet

24V GND

Precharge
Resistors

400V AC
Control Cabinet

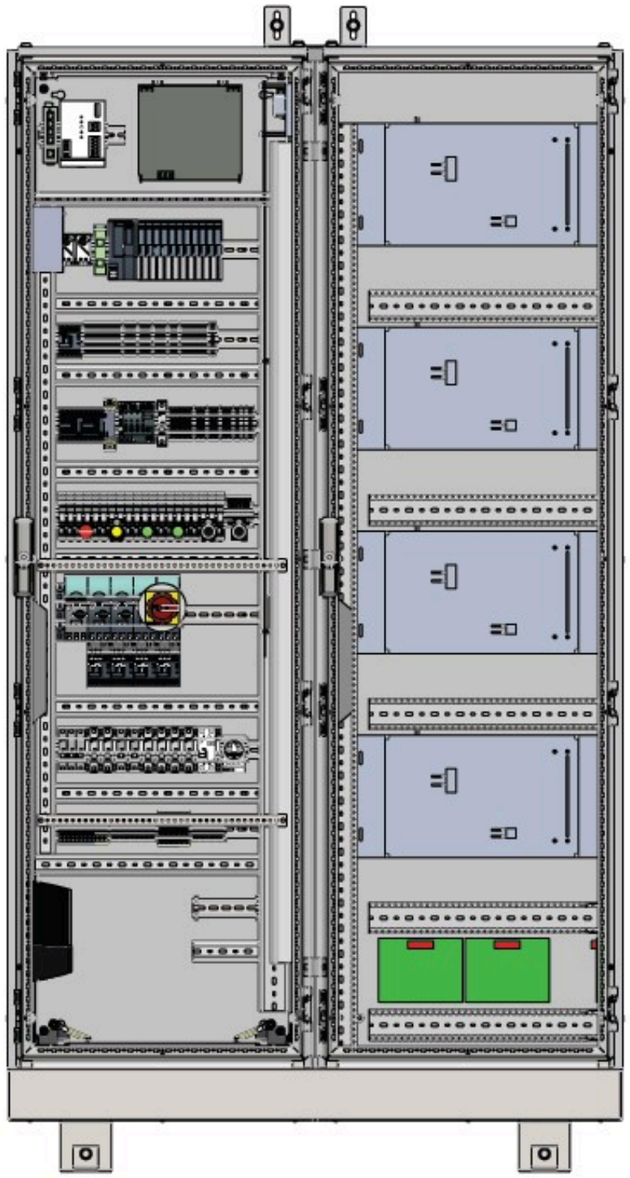
Thermostat
for start PLC

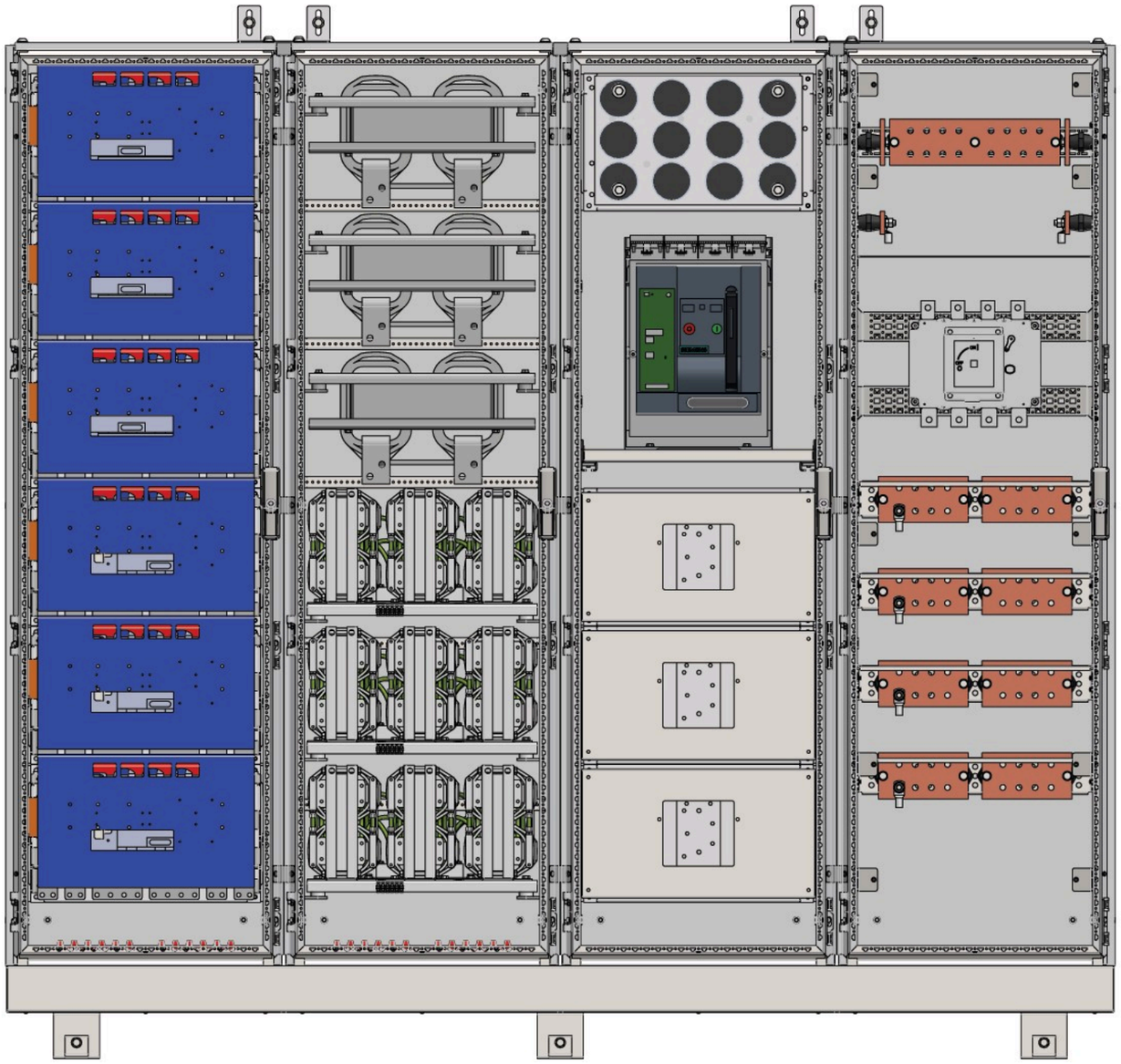
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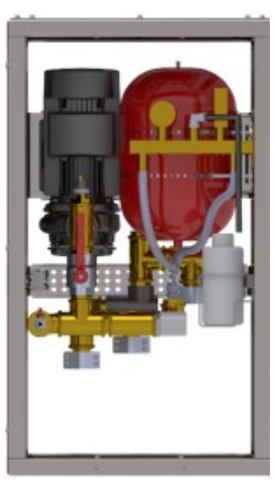
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Date	18.06.2024	Norm						& EFA Single line diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++	page: 2a
Date								+	total: 500

0	1	2	3	4	5	6	7	8	9









+CTRL_1
Control cabinet 1

+CTRL_2
Control cabinet 2

++CT Control cabinets

+CON
Converter cabinet

+IND
Inductor cabinet

+CIR
Circuit Breaker cabinet

+AC_DC
AC and DC connection cabinet

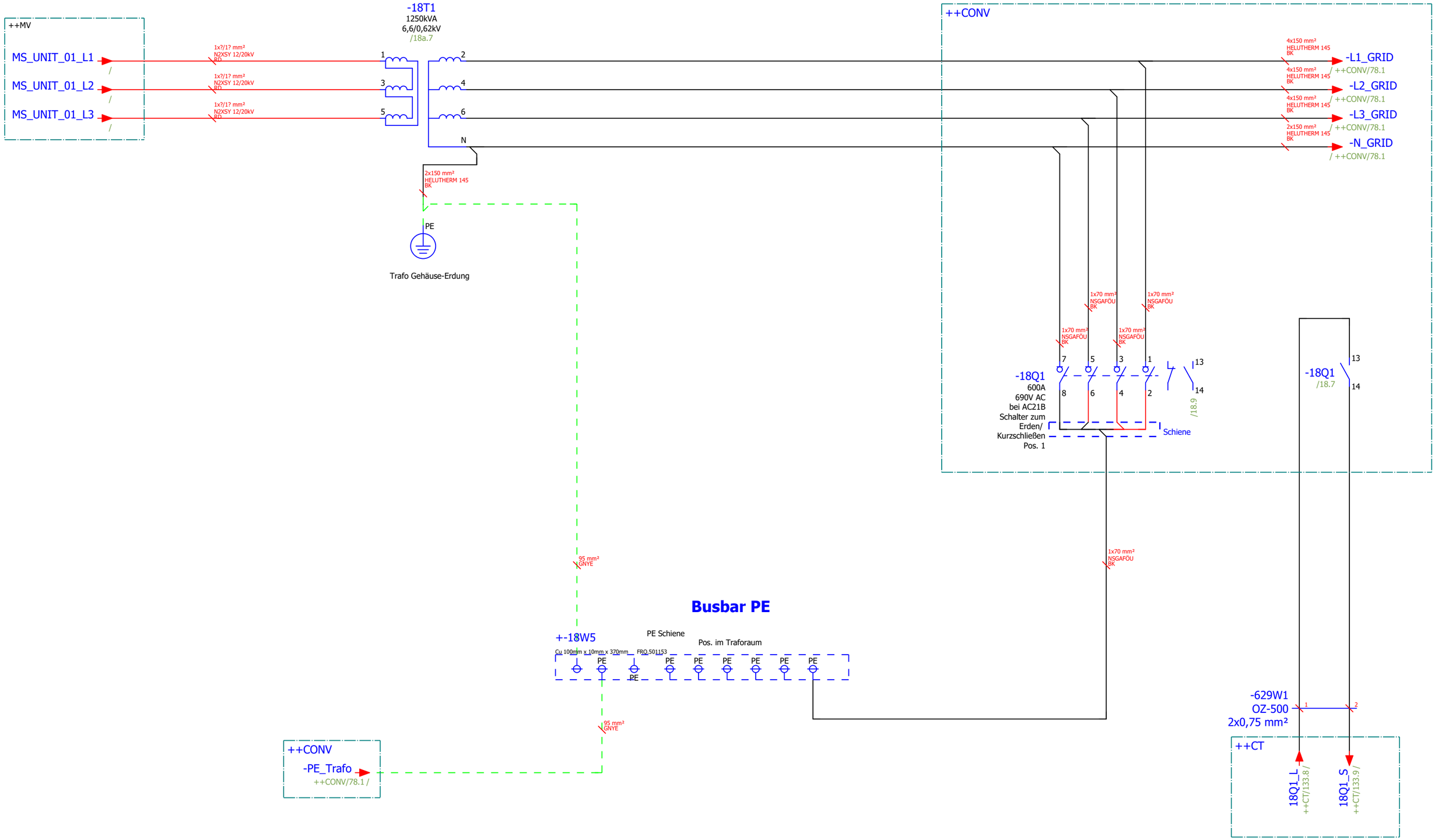
++CONV Converter

++FAN
FAN

previous page:
&EFA/2a

next page:
&EFS++TRA/18

Editor	Freqcon_DG			Statron	FREQCON	CABINETS OVERVIEW	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	05.11.2024	Norm						& ELU Cabinet Overview	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++	page: 5a
Date								+	total: 500



Earthing switch in On
Transformer 620V side

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&ELU++/5a

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18a

Editor	Freqcon_DG			Statron	FREQCON	MV-TRANSFORMER UNIT_01+02	20241203_V1.22	= UNIT_01 Converter Container 1
Date	05.11.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ TRA medium voltage transformer page: 18
Date								+ total: 500

++CT
+CTRL_1.2
-18B1
PWR07
Trafo-
Temperaturüberwachung
Pos: in Tür +ASC

SUPPLY
24-240V AC DC

ALARM

FAULT

FAN

PT100 SENSORS

CH 1

CH 2

CH 3

CH 4

40 41 42 4 5 6 7 8 9 1 2 3 4 5 6 13 14 15 16 17 18 19 20 21 22 23 24

0,75 mm² RT

-18W2
JZ-500
8G1,5 mm²

1 GNYE 2 3 4 5 6

-18W1
F-CY-OZ (LiY-CY)
10x1,5 mm²
500V
geschirmt

1 2 3 4 5 6 7 8 9

-18T1
/18.2

3x PT100 Fühler in NS-Wicklung Trafo

CH 3 CH 2 CH 1

3 2 1 3 2 1 3 2 1

++CT

-1L+3 ++CT/103.2/
-1PE5 ++CT/103.4/
-1M6 ++CT/103.3/
-PreAlarm ++CT/133.0/
-Trip ++CT/133.0/
-Fault ++CT/133.0/
-Fan ++CT/133.0/

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18

next page:
++CONV/78

Editor	Freqcon_DG			Statron	FREQCON	TEMPERATURE TRANSFORMER UNIT_01+02	20241203_V1.22	= UNIT_01	Converter Container 1
Date	05.11.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ TRA	medium voltage transformer
Date								+	

page: 18a
total: 500

Grid Busbars L1, L2, L3

++TRA

-L1_GRID ++TRA/18.9 /
-L2_GRID ++TRA/18.9 /
-L3_GRID ++TRA/18.9 /

+AC_DC-78W1 GRID L1 Pos. 1/ Links
Cu 100mm x 10mm x 370mm FRQ.52163 &EFA++/1a.0
+AC_DC-78W2 GRID L2 Pos. 1/ Mitte
Cu 100mm x 10mm x 370mm FRQ.52163
+AC_DC-78W3 GRID L3 Pos. 1/ Rechts
Cu 100mm x 10mm x 370mm FRQ.52163

4x50 mm² NSGAFöu BK → -L1CON1 / 80.0
4x50 mm² NSGAFöu BK → -L2CON1 / 80.0
4x50 mm² NSGAFöu BK → -L3CON1 / 80.0

25 mm² NSGAFöu BK
+AC_DC -78F1 690Vac 100A gL/gG NH00 /78.8
1 3 5 / 2 4 6 / 13 21 / 14 22

-1F2 / ++CT/127.4
F3 / 238b.9
-238W7 OZ-500 2x0,75 mm² /238a.2 — 0,75 mm² BU
+AC_DC -X3.43 20 19
-78W7 OZ-500 2x0,75 mm² 1 2
+AC_DC 13 14
+AC_DC -78F1 /78.6

+AC_DC -78F2 Typ 1 + Typ 2 400/690 V~ L1 L2 L3 PE PE
+AC_DC -78F3 20A, aR 1 3 5 / 2 4 6
-78W6 OZ-600 3x2,5 mm² 0,6kV/1kV 1 2 3
-CHA_L1 ++CT/85.1 /
-CHA_L2 ++CT/85.1 /
-CHA_L3 ++CT/85.1 /

35 mm² GNYE

Busbars N

-N_GRID ++TRA/18.9 /

+AC_DC-78W4 GRID N &EFA++/1a.1 Pos. unten Links
Cu 50mm x 10mm x 370mm FRQ.50622
16 mm² NSGA Föu BK
-AC_F_N.1 83.3 /
-AC_F_N.2 83.3 /
-AC_F_N.3 83.3 /
2x50 mm² NSGAFöu BK → GRID_N / 99.5

Busbars PE

-PE_Trafo ++TRA/18.2 /

+AC_DC-78W5 GRID PE &EFA++/1a.1 Pos. unten rechts
Cu 100mm x 10mm x 370mm FRQ.50070
PE PE PE PE PE PE PE PE PE PE PE PE PE PE

95 mm² GNYE
35 mm² GNYE

PE_2_1 238a.1 /
PE_2_2 238a.4 /
PE_2_3 238a.8 /
PE_3_1 228.1 /
PE_3_2 228.4 /
PE_3_3 228.8 /
PE_4_1 238b.1 /
PE_4_2 238b.4 /
PE_4_3 238b.8 /

=UNIT_02 PE_BAT_CONV_1 =UNIT_02++Container/278.5 /
=UNIT_03 PE_BAT_CONV_2 =UNIT_03++Container/278.5 /

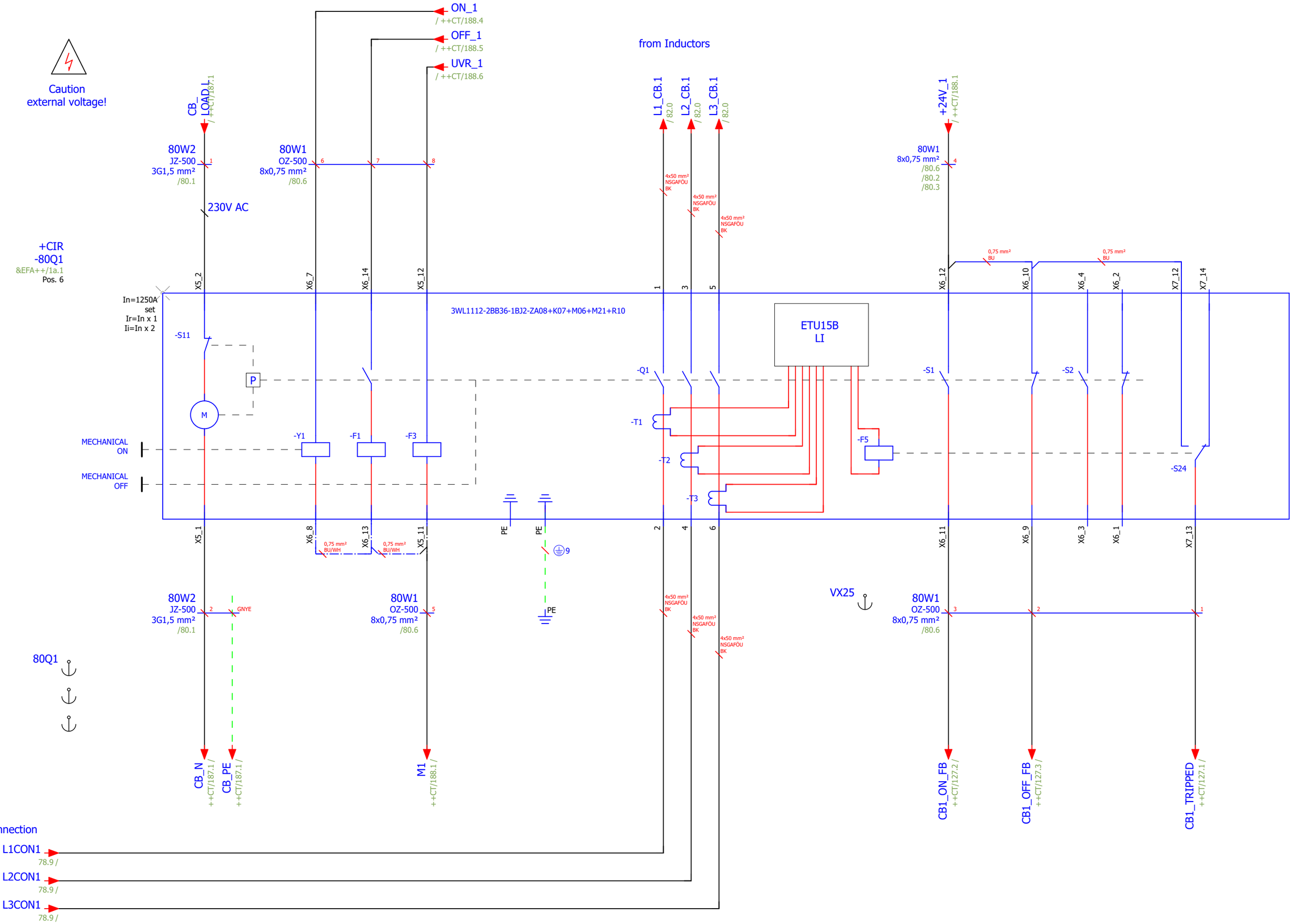
PE Container
PE Cabinet base frame front side
PE Cabinet base frame back side

Einspeisung_IEC_Seite 78
Einbauort_Sicherung in Connection cabinet
400V TYP 1

previous page: ++TRA/18a
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Editor	Freqcon_JD			Statron	FREQCON	GRID CONNECTION	20241203_V1.22	= UNIT_01	Converter Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV	Converter
Date								+	

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total: 500

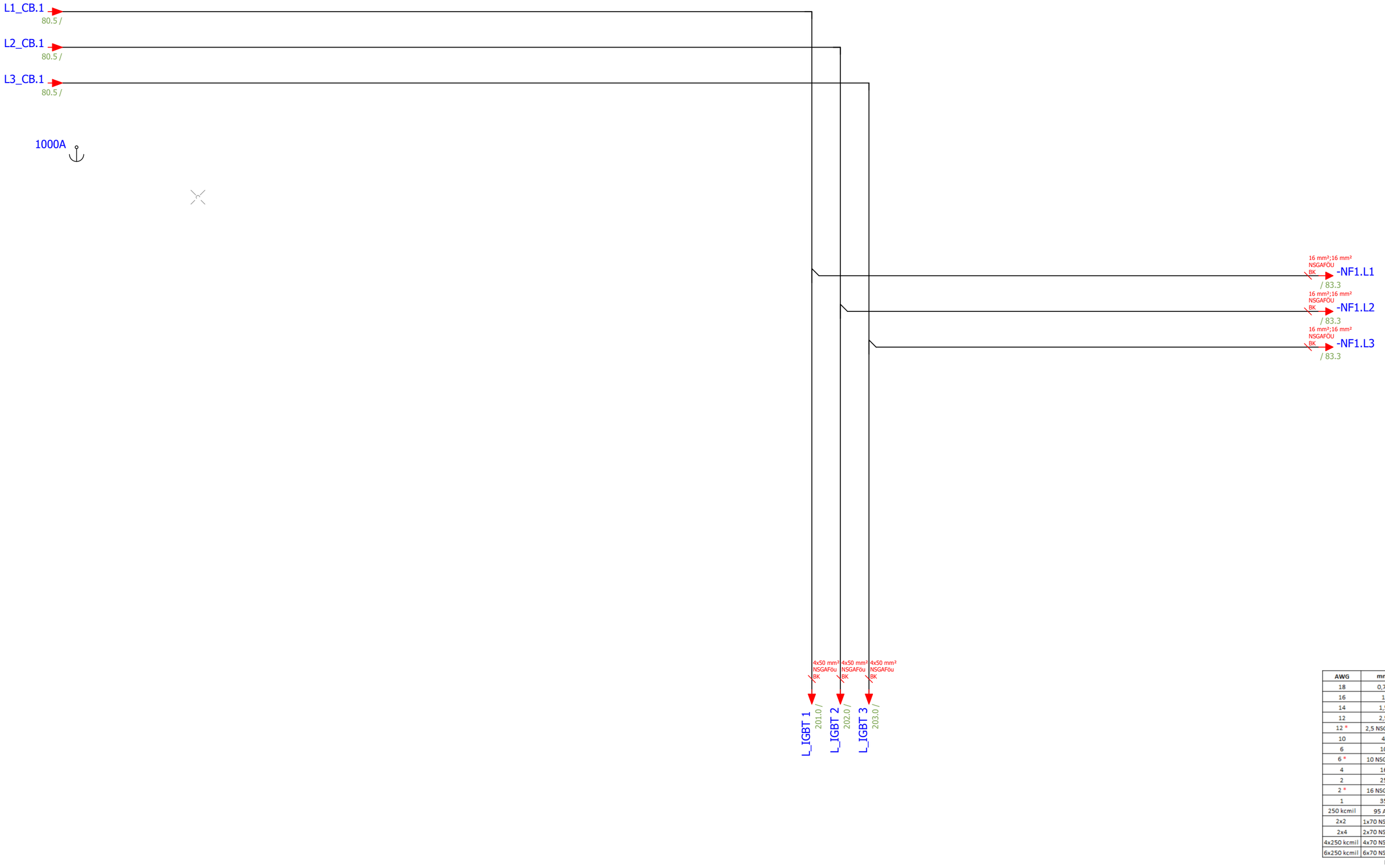


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Editor	Freqcon_JD			Statron	FREQCON	BG CIRCUIT BREAKER 1000A AC GRID	20241203_V1.22	= UNIT_01	Converter Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV	Converter
Date								+	

page: 80
total: 500



AWG	mm²
18	0,75
16	1
14	1,5
12	2,5
12 *	2,5 NSGAFÖu
10	4
6	10
6 *	10 NSGAFÖu
4	16
2	25
2 *	16 NSGAFÖu
1	35
250 kcmil	95 ALU
2x2	1x70 NSGAFÖu
2x4	2x70 NSGAFÖu
4x250 kcmil	4x70 NSGAFÖu
6x250 kcmil	6x70 NSGAFÖu

*cable into seperate UL protective tube

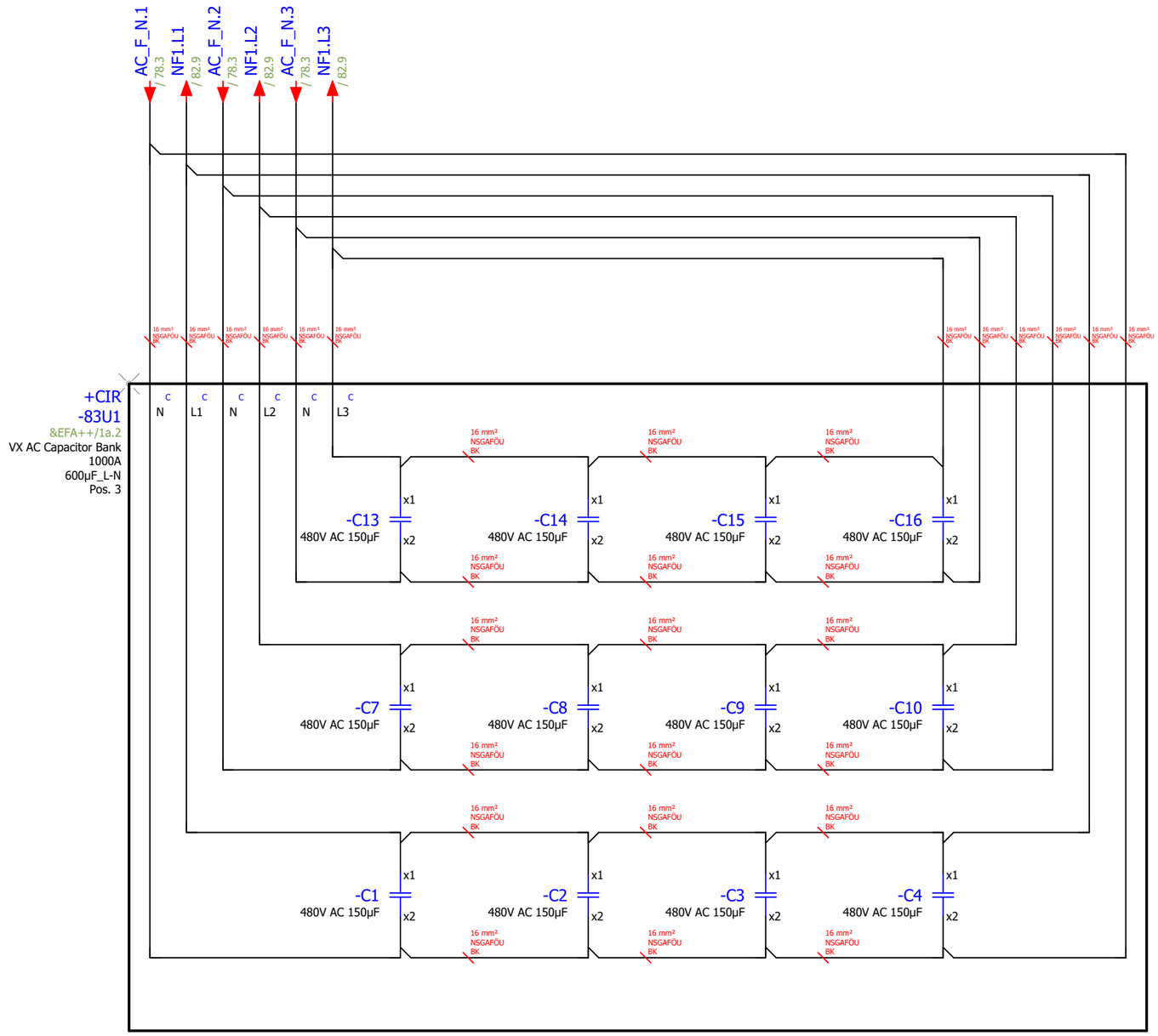
previous page:
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83

Editor	Freqcon_JD			Statron	FREQCON	PI INDUCTORS GRID SIDE	20241203_V1.22	= UNIT_01	Converter Container 1	
Date	18.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV	Converter	page: 82
Date								+		total: 500

to polarity bar

behind main breaker



AWG	mm²	
18	0,75	
16	1	
14	1,5	
12	2,5	
12 *	2,5 NSGAFöu	
10	4	
6	10	
6 *	10 NSGAFöu	
4	16	
2	25	
2 *	16 NSGAFöu	
1	35	
250 kcmil	95 ALU	
2x2	1x70 NSGAFöu	
2x4	2x70 NSGAFöu	
4x250 kcmil	4x70 NSGAFöu	
6x250 kcmil	6x70 NSGAFöu	

*cable into seperate UL protective tube

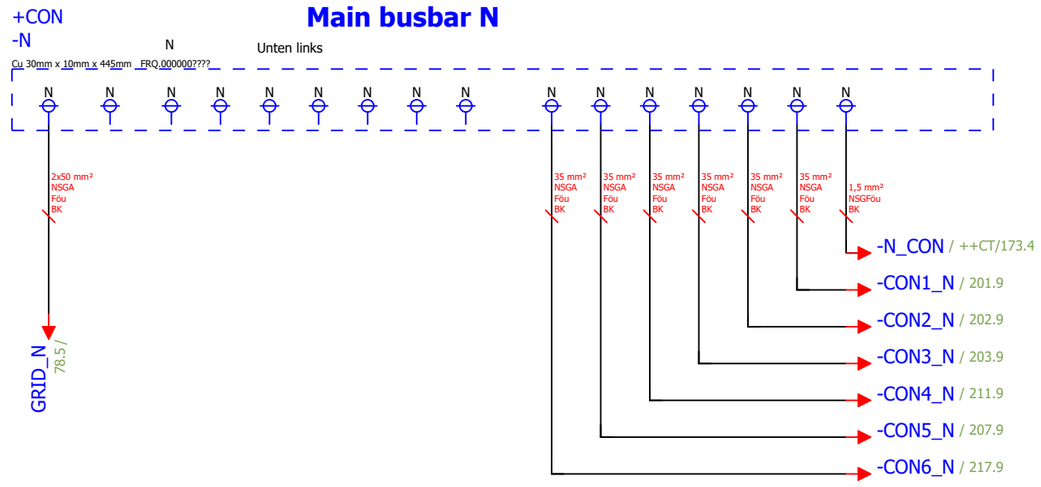
83U1

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next page: 99

Editor	Freqcon_JD			Statron	FREQCON	GRID AC FILTER 3* 600 µF + OVERVOLTAGE PROTECTOR	20241203_V1.22	= UNIT_01 Converter Container 1
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV Converter page: 83
Date								+ total: 500

in converter cabinet



1000A

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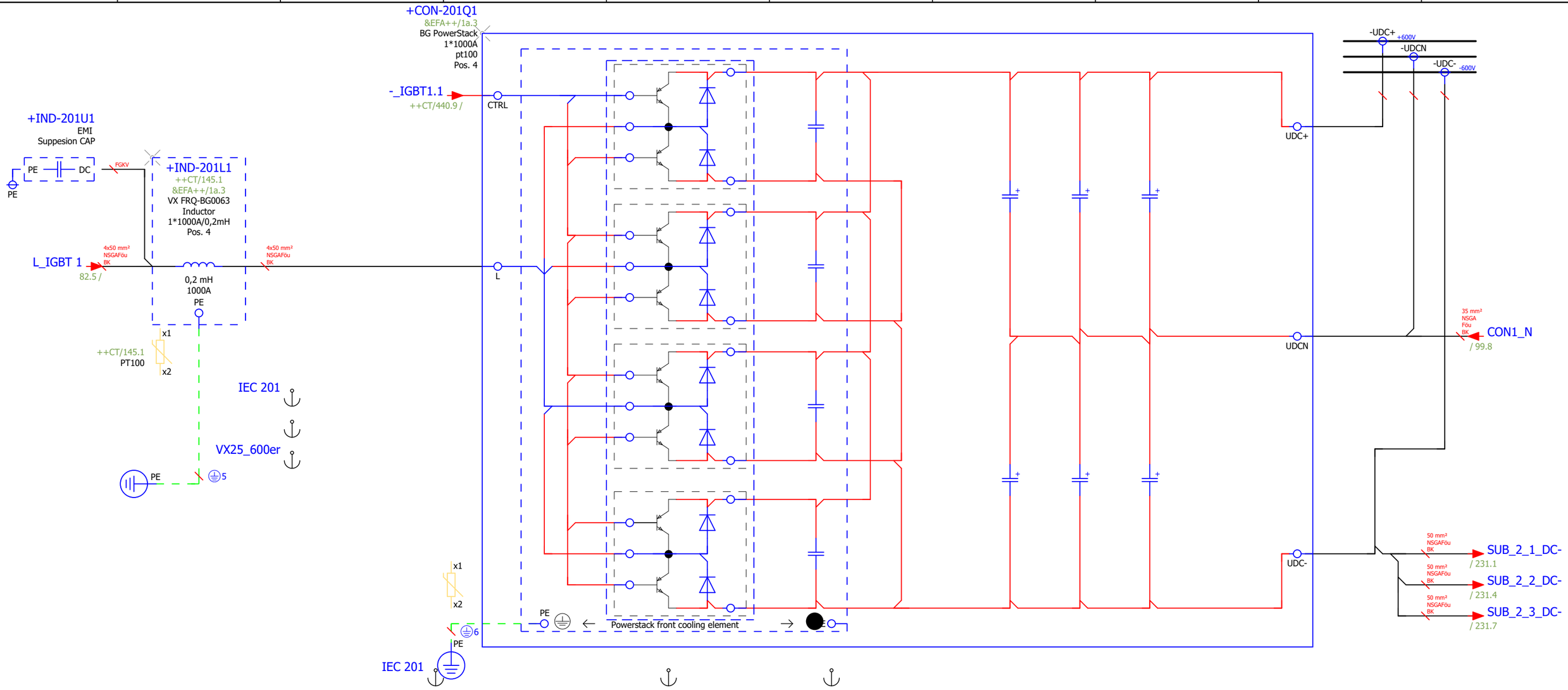
Editor	Freqcon_JD			Statron	FREQCON	BUSBARS N, PE	20241203_V1.22	= UNIT_01 Converter Container 1
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV Converter page: 99
Date								+ total: 500

Power Circuits

Pages 200 - 299

- Converter cabinet
- Inductor cabinet
- Circuit Breaker cabinet

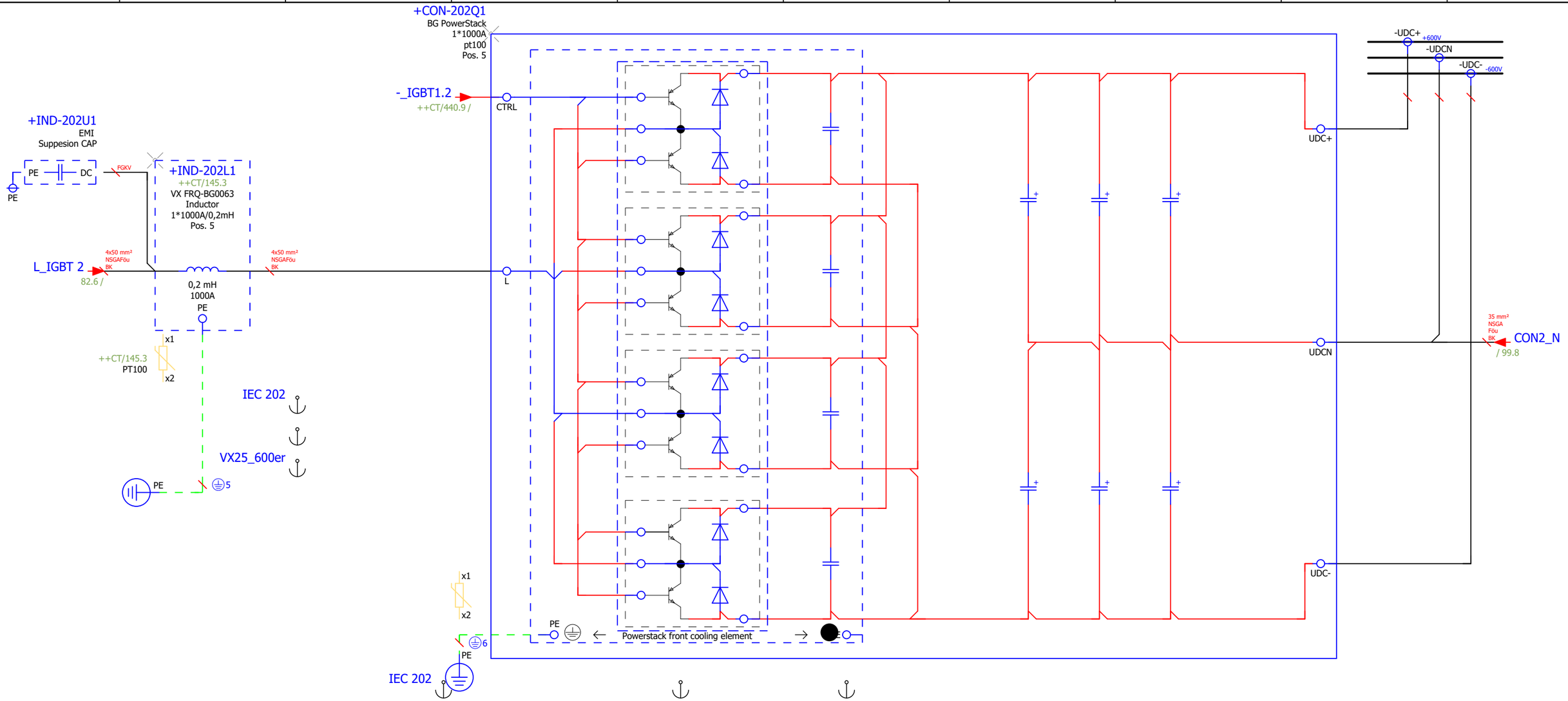
Editor	Freqcon_JD			Statron	FREQCON	POWER CIRCUITS COVER PAGE	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	14.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV Converter	page: 200
Date								+	total: 500



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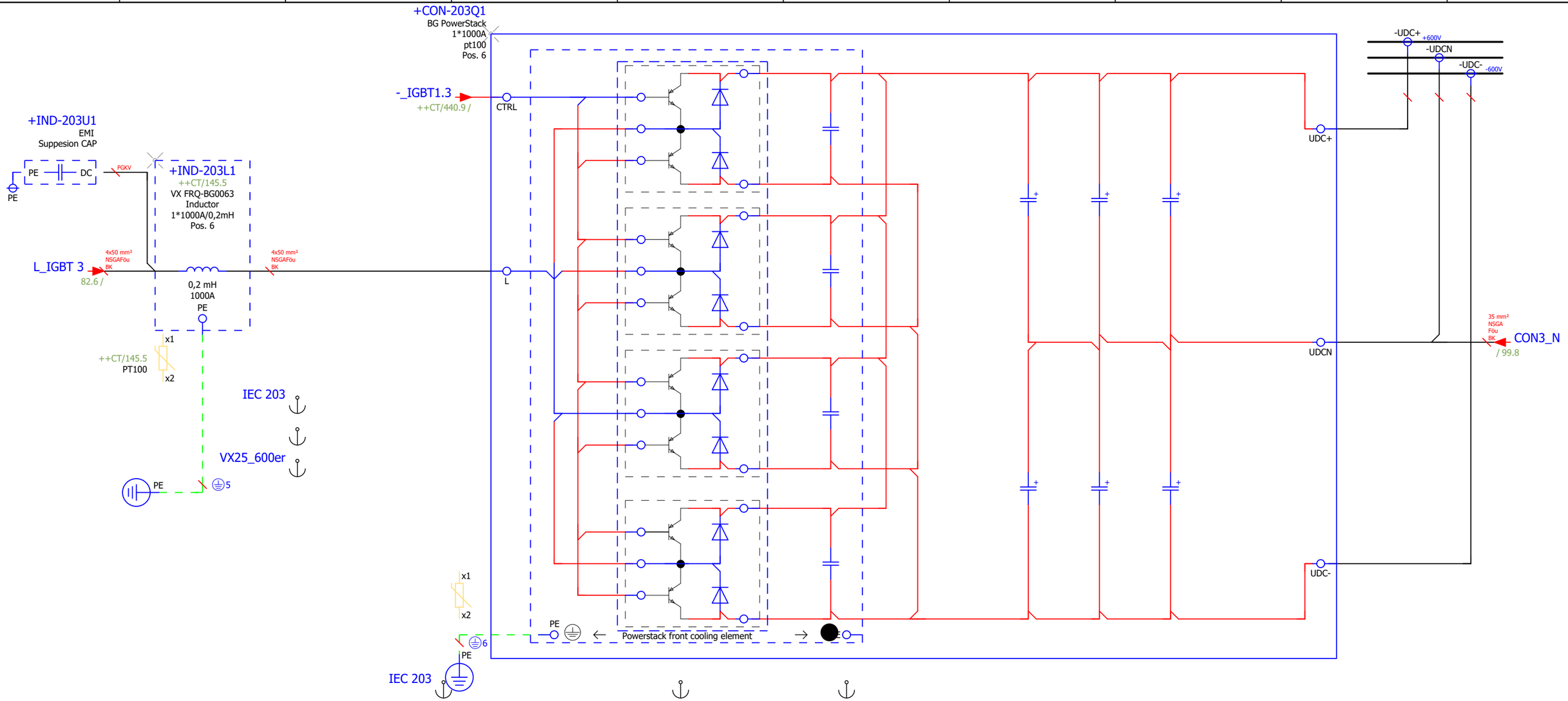
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Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV	Converter page: 201
Date								+	total: 500



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Editor	Freqcon_JD			Statron		IGBT & INDUCTOR FOR GRID PHASE 2	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	18.06.2024				FREQCON			& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV Converter	page: 202
Date								+	total: 500



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Editor	Freqcon_JD			Statron		IGBT & INDUCTOR FOR GRID PHASE 3	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV Converter	page: 203
Date								+	total: 500

0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9

+CON-207Q1
&EFA++/1a.4
VX BG PowerStack
3*250A
Pos. 1

-_IGBT3.1_2
207.9 /
CTRL

+IND-207L1
&EFA++/1a.5
VX FRQ-BG0060
Inductor
3*250A/0,6mH
Pos. 1

L_IGBT 3_1
227.0 /
50 mm² NSGAFöu BK
0,6mH
50 mm² NSGAFöu BK
L:1

L_IGBT 3_2
227.3 /
50 mm² NSGAFöu BK
0,6mH
50 mm² NSGAFöu BK
L:2

L_IGBT 3_3
227.6 /
50 mm² NSGAFöu BK
0,6mH
50 mm² NSGAFöu BK
L:3

PE.1 PE.2 PE.3

IEC 204 DC

++CT/146.5
PT100
x1 x2
++CT/146.7
x1 x2
++CT/147.1
x1 x2

VX25

PE
5

x1
x2
6
PE

IEC 204

-UDC+ +600V
-UDCN
-UDC- -600V

UDC+
UDCN
UDC-

35 mm² NSGA Föu BK
CON5_N
/ 99.8

+CON-207Q1-U1
FRQ-M00080-1
Pos. 1

-_IGBT3.1
++CT/442.9 /
X1
25-POL SUB-D SOCKET

-_IGBT3.2
++CT/442.9 /
X2
25-POL SUB-D SOCKET

-_IGBT3.3
++CT/442.9 /
X3
25-POL SUB-D SOCKET

SKiiP 3 Adapter

FRQ-M00080
FREQCON

Shield connect by a ring cable lug
SH

X4
26-POL Stiftleiste (für Flachband) SOCKET
-_IGBT3.1_2
/ 207.3

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203

next page:
211

Editor	Freqcon_JD			Statron	FREQCON	IGBT & INDUCTOR SUB 3_1 - 3_3	20241203_V1.22	= UNIT_01	Converter Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV	Converter
Date								+	

page: 207
total: 500

+CON-211Q1
&EFA++/1a.4
VX BG PowerStack
3*250A
Pos. 2

-_IGBT2.1_2
211.9 /
CTRL

+IND-211L1
&EFA++/1a.5
VX FRQ-BG0060
Inductor
3*250A/0,6mH
Pos. 2

L_IGBT 2_1
231.0 /
50 mm² NSGAFöu BK
0,6mH
L:1

L_IGBT 2_2
231.3 /
50 mm² NSGAFöu BK
0,6mH
L:2

L_IGBT 2_3
231.6 /
50 mm² NSGAFöu BK
0,6mH
L:3

PE.1 PE.2 PE.3

IEC 211 DC

++CT/145.7
PT100
x1 x2
++CT/146.1
++CT/146.3

VX25

PE
5

x1 x2
6
PE

IEC 211

-UDC+ +600V
-UDCN
-UDC- -600V

UDC+
UDCN
UDC-

35 mm² NSGA Föu BK
CON4_N
/ 99.8

+CON-211Q1-U1
FRQ-M00080-1
Pos. 1

-_IGBT2.1
++CT/441.9 /
X1
25-POL SUB-D SOCKET

-_IGBT2.2
++CT/441.9 /
X2
25-POL SUB-D SOCKET

-_IGBT2.3
++CT/441.9 /
X3
25-POL SUB-D SOCKET

SKiiP 3 Adapter

FRQ-M00080
FREQCON

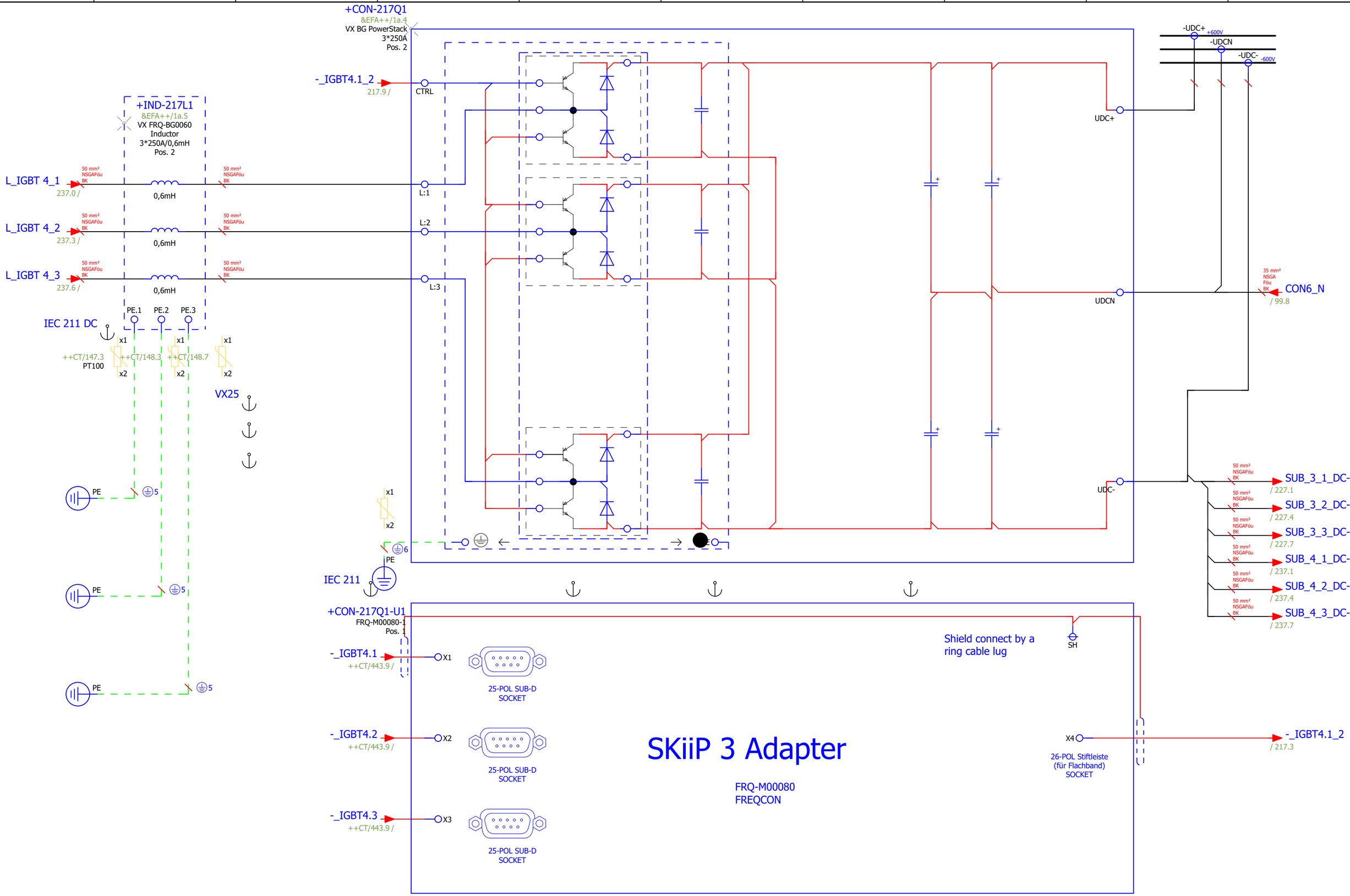
Shield connect by a ring cable lug
SH

X4
26-POL Stiftleiste (für Flachband) SOCKET
-_IGBT2.1_2
/ 211.3

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next page: 217

Editor	Freqcon_JD			Statron	FREQCON	IGBT & INDUCTOR SUB 2_1 -2_3	20241203_V1.22	= UNIT_01	Converter Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV	Converter
Date								+	

page: 211
total: 500



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next page: 227

Editor	Freqcon_JD			Statron	FREQCON	IGBT & INDUCTOR SUB 4_1 -4_3	20241203_V1.22	= UNIT_01 Converter Container 1
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV Converter page: 217
Date								+ total: 500

VX25
224

Spare connections,
if the BSU
will be from here
20A supplied.

* cable intro seperate UL protrctive tube

+CIR
-227U1
/227.a.0
&EFA++/1a.6
VX DC
switch
and Fuse
3*250A
1000V
Pos. 1

L_IGBT 3_1 / 207.0
SUB_3_1_V / ++CT/163.9
SUB_3_1_DC- / 217.9
SUB_3_1_V.1 / ++CT/162.9
L_IGBT 3_2 / 207.0
SUB_3_2_V / ++CT/163.9
SUB_3_2_DC- / 217.9
SUB_3_2_V.1 / ++CT/162.9
L_IGBT 3_3 / 207.0
SUB_3_3_V / ++CT/163.9
SUB_3_3_DC- / 217.9
SUB_3_3_V.1 / ++CT/162.9

227W1 OZ-600 2x0,75 mm²
227W2 OZ-600 2x0,75 mm²
227W3 OZ-600 2x0,75 mm²

50 mm² NSGAFöu BK

PE
PE
Rear mounting plate
7

IGBT1 1+ | V_IGBT1 1+ | UDC [1]- | V_DC1 1+ | V_DC 1-
IGBT2 2+ | V_IGBT2 2+ | UDC [2]- | V_DC2 2+
IGBT3 3+ | V_IGBT3 3+ | UDC [3]- | V_DC3 3+

F3 1A
F4 1A [20A, aR (BSU)]
F0 [20A, aR (BSU)]
F7 1A
F8 1A
F11 1A
F12 1A

2,5 mm² NSGAFöu BK

-C1 -C7 -C13
x1 x2
340µF, 1320V DC
Epcos

16 mm² NSGAFöu BK

Front mounting plate
PE
16 mm² FGKV
-U1
EMI
Suppesion CAP
16 mm² in Shrin-kable Tube FGKV

-K1 /227.a.1 1500V 300A
-K7 /227.a.3 1500V 300A
-K2 /227.a.2 1500V 300A
-K8 /227.a.4 1500V 300A
-K3 /227.a.2 1500V 300A
-K9 /227.a.5 1500V 300A

70 mm² NSGAFöu BK

-F1 /227.a.7 1250V 400A 1KN/110 HLS
-F2 /227.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS
-F5 /227.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS
-F6 /227.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS
-F9 /227.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS
-F10 /227.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS

IEC
Datenblatt

DC1 + / DC1 -
DC2 + / DC2 -
DC3 + / DC3 -

AWG	mm²	*cable into seperate UL protective tube	AWG	mm²
18	0,75		2	25
16	1		2 *	16 NSGAFöu
14	1,5		1	35
12	2,5		250 kcmil	95 ALU
12 *	2,5 NSGAFöu		2x2	1x70 NSGAFöu
10	4		2x4	2x70 NSGAFöu
6	10		4x250 kcmil	4x70 NSGAFöu
6 *	10 NSGAFöu		6x250 kcmil	6x70 NSGAFöu
4	16			

*2
The single conductor
must be placed
in the protective tube

+AC_DC-227W10 Cu 100mm x 10mm x 195mm FRQ.50604
SUB 3_1 + Pos. =UNIT_02
DC+3_1_BAT / =UNIT_02++ASC/678.7
+AC_DC-227W11 Cu 100mm x 10mm x 195mm FRQ.50604
SUB 3_1 - Pos.
DC-3_1_BAT / =UNIT_02++ASC/678.7
DC-3_1 / 228.1

+AC_DC-227W12 Cu 100mm x 10mm x 195mm FRQ.50604
SUB 3_2 + Pos.
+AC_DC-227W13 Cu 100mm x 10mm x 195mm FRQ.50604
SUB 3_2 - Pos.
DC-3_2 / 228.4

+AC_DC-227W14 Cu 100mm x 10mm x 195mm FRQ.50604
SUB 3_3 + Pos. =UNIT_03
DC+3_3_BAT / =UNIT_03++ASC/678.0
+AC_DC-227W15 Cu 100mm x 10mm x 195mm FRQ.50604
SUB 3_3 - Pos.
DC-3_3_BAT / =UNIT_03++ASC/678.0
DC-3_3 / 228.8

EEC

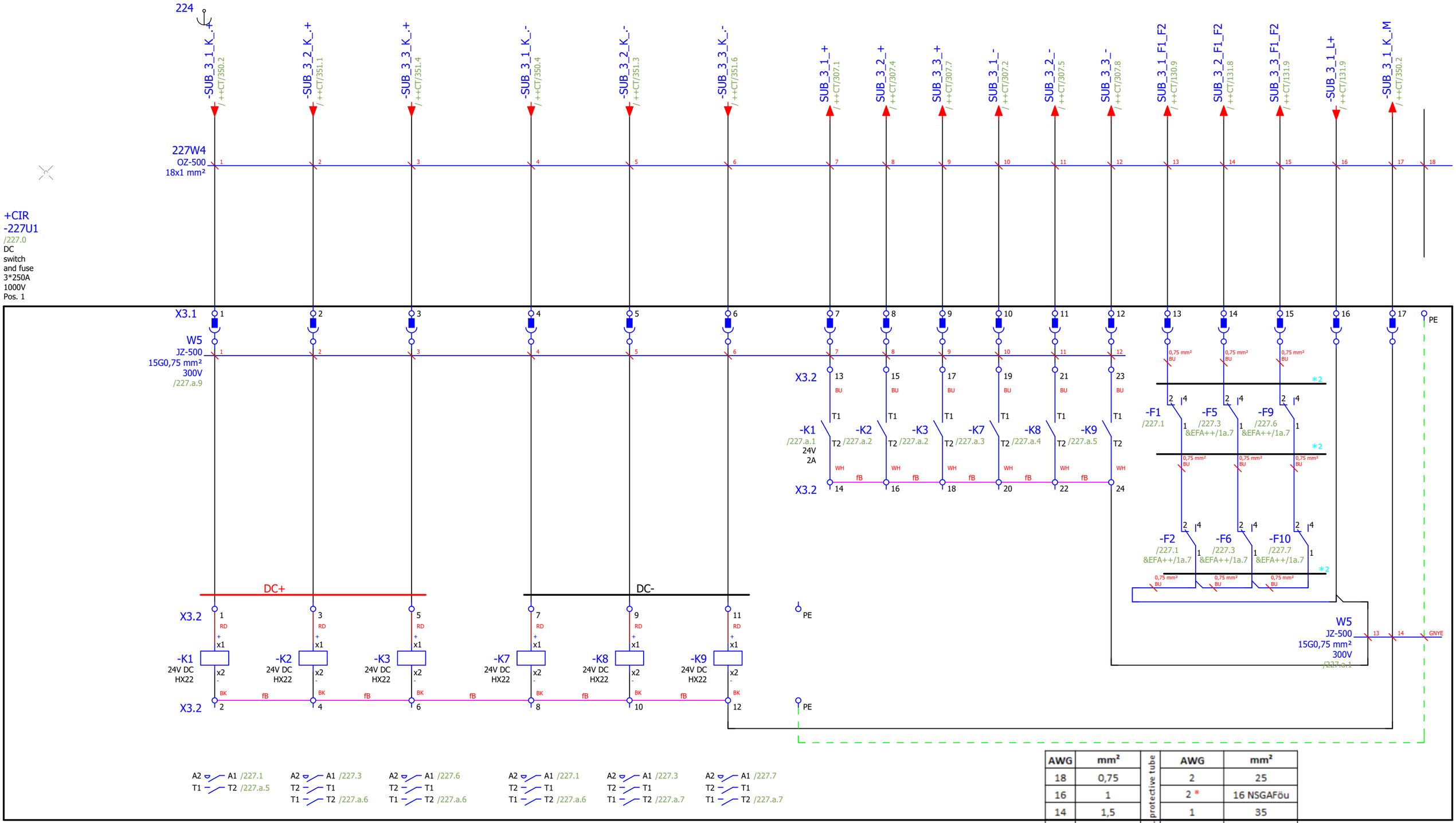
DC+3_1 / 228.1
DC+3_2 / 228.4
DC+3_3 / 228.7

DC+ and DC- Busbars
in Connection cabinet

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next page: 227.a

Editor	Freqcon_JD			Statron	FREQCON	SUBSYSTEM 3_1 - 3_1 DC 3 x 250A	20241203_V1.22
Date	18.06.2024						
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007
Date							

=	UNIT_01	Converter Container 1	
&	EFS	Circuit diagram	
++	CONV	Converter	page: 227
+			total: 500



AWG	mm²	cable into seperate UL protective tube	AWG	mm²
18	0,75		2	25
16	1		2 *	16 NSGAFöu
14	1,5		1	35
12	2,5		250 kcmil	95 ALU
12 *	2,5 NSGAFöu		2x2	1x70 NSGAFöu
10	4		2x4	2x70 NSGAFöu
6	10		4x250 kcmil	4x70 NSGAFöu
6 *	10 NSGAFöu		6x250 kcmil	6x70 NSGAFöu
4	16	*		

*2 The single conductor must be placed in the protective tube

IEC

previous page: 227

next page: 228

Editor	Freqcon_JD			Statron	FREQCON	SUBSYSTEM 3_1 - 3_1 DC 3 x 250A	20241203_V1.22
Date	18.06.2024						
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007
Date							

=	UNIT_01	Converter Container 1
&	EFS	Circuit diagram
++	CONV	Converter
+		

page: 227.a

total: 500

DC+ and DC- Busbars

DC+3_1 / 227.1
DC-3_1 / 227.1
PE_3_1 / 78.4

IEC

25 mm² NSGAFÖU BK
25 mm² NSGAFÖU BK
35 mm² GNYE

F1
238a.9 /

0,75 mm² BU

+AC_DC
-X3.43

7 8

-228W1
OZ-500
2x0,75 mm²
0,6kV / 1kV

1 2

+AC_DC
-228F1

L+/- L-/+ PE PE'

11 12 14

Blitzstrom- / Überspannungsableiter

PHOENIX CONTACT

SURGE ARRESTER
DC SUBSYSTEM 3_1

DC+ and DC- Busbars

DC+3_2 / 227.3
DC-3_2 / 227.4
PE_3_2 / 78.4

25 mm² NSGAFÖU BK
25 mm² NSGAFÖU BK
35 mm² GNYE

0,75 mm² BU

9 10

-228W2
OZ-500
2x0,75 mm²
0,6kV / 1kV

1 2

+AC_DC
-228F2

L+/- L-/+ PE PE'

11 12 14

Blitzstrom- / Überspannungsableiter

PHOENIX CONTACT

SURGE ARRESTER
DC SUBSYSTEM 3_2

DC+ and DC- Busbars

DC+3_3 / 227.6
DC-3_3 / 227.7
PE_3_3 / 78.4

25 mm² NSGAFÖU BK
25 mm² NSGAFÖU BK
35 mm² GNYE

0,75 mm² BU

F2
/ 238b.2

11 12

-228W3
OZ-500
2x0,75 mm²
0,6kV / 1kV

1 2

+AC_DC
-228F3

L+/- L-/+ PE PE'

11 12 14

Blitzstrom- / Überspannungsableiter

PHOENIX CONTACT

SURGE ARRESTER
DC SUBSYSTEM 3_3

in Connection cabinet

previous page:
227.a

next page:
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Editor	Freqcon_JD			Statron	FREQCON	DC SURGE ARRESTER 3_1 - 3_3	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV Converter	page: 228
Date								+	total: 500

VX25

221

Spare connections,
if the BSU
will be from here
20A supplied.

* cable intro seperate UL protrctive tube

+CIR
-231U1
/231.a.0
&EFA++/1a.6
VX DC
switch
and Fuse
3*250A
1000V
Pos. 2

L_IGBT 2_1 / 211.0 — 231W1 OZ-600 2x0,75 mm² 1 — IGBT1 1+ — F3 1A — -C1 340µF, 1320V DC Epcos — DC+2_1 / 238a.1
SUB_2_1_V / ++CT/163.9 — 231W1 OZ-600 2x0,75 mm² 2 — V_IGBT1 1+ — F4 1A [20A, aR (BSU)] — +AC_DC-231W10 — SUB 2_1 + — =UNIT_02 — DC+2_1_BAT / =UNIT_02++ASC/678.0
SUB_2_1_DC- / 201.9 — UDC [1]- — F0 [20A, aR (BSU)] — +AC_DC-231W11 — SUB 2_1 - — DC-2_1_BAT / =UNIT_02++ASC/678.0 — DC-2_1 / 238a.1
SUB_2_1_V.1 / ++CT/162.9 — V_DC1 1+ — V_DC 1-

L_IGBT 2_2 / 211.0 — 231W2 OZ-600 2x0,75 mm² 1 — IGBT2 2+ — F7 1A — -C7 340µF, 1320V DC Epcos — DC+2_2 / 238a.4
SUB_2_2_V / ++CT/163.9 — 231W2 OZ-600 2x0,75 mm² 2 — V_IGBT2 2+ — +AC_DC-231W12 — SUB 2_2 + — =UNIT_02 — DC+2_2_BAT / =UNIT_02++ASC/678.2
SUB_2_2_DC- / 201.9 — UDC [2]- — F8 1A — +AC_DC-231W13 — SUB 2_2 - — DC-2_2_BAT / =UNIT_02++ASC/678.2 — DC-2_2 / 238a.4
SUB_2_2_V.1 / ++CT/162.9 — V_DC2 2+

L_IGBT 2_3 / 211.0 — 231W3 OZ-600 2x0,75 mm² 1 — IGBT3 3+ — F11 1A — -C13 340µF, 1320V DC Epcos — DC+2_3 / 238a.7
SUB_2_3_V / ++CT/163.9 — 231W3 OZ-600 2x0,75 mm² 2 — V_IGBT3 3+ — +AC_DC-231W14 — SUB 2_3 + — =UNIT_02 — DC+2_3_BAT / =UNIT_02++ASC/678.5
SUB_2_3_DC- / 201.9 — UDC [3]- — F12 1A — +AC_DC-231W15 — SUB 2_3 - — DC-2_3_BAT / =UNIT_02++ASC/678.5 — DC-2_3 / 238a.8
SUB_2_3_V.1 / ++CT/162.9 — V_DC3 3+

Front mounting plate — PE — -U1 EMI Suppesion CAP — PE — Front mounting plate — PE

-K1 /231.a.1 1500V 300A — -K7 /231.a.3 1500V 300A
-K2 /231.a.2 1500V 300A — -K8 /231.a.4 1500V 300A
-K3 /231.a.2 1500V 300A — -K9 /231.a.5 1500V 300A

-F1 /231.a.7 1250V 400A 1KN/110 HLS Datenblatt
-F2 /231.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS
-F5 /231.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS
-F6 /231.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS
-F9 /231.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS
-F10 /231.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS

IEC

*2
The single conductor
must be placed
in the protective tube

AWG	mm²	*cable into seperate UL protective tube	AWG	mm²
18	0,75		2	25
16	1		2 *	16 NSGAFöu
14	1,5		1	35
12	2,5		250 kcmil	95 ALU
12 *	2,5 NSGAFöu		2x2	1x70 NSGAFöu
10	4		2x4	2x70 NSGAFöu
6	10		4x250 kcmil	4x70 NSGAFöu
6 *	10 NSGAFöu		6x250 kcmil	6x70 NSGAFöu
4	16			

DC+ and DC- Busbars
in Connection cabinet

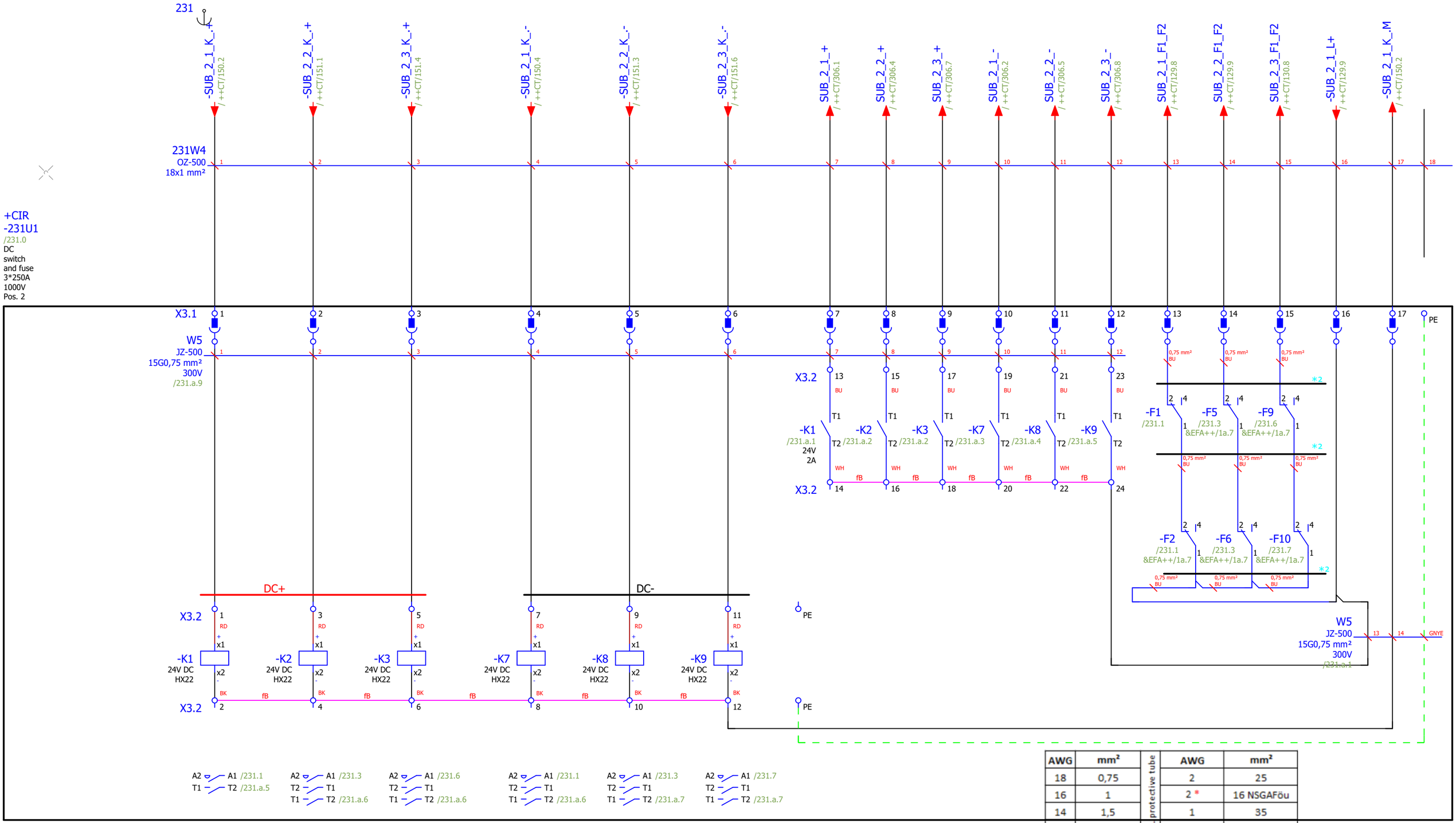
EEC

previous page:
228

next page:
231.a

Editor	Freqcon_JD			Statron	FREQCON	SUBSYSTEM 2_1 - 2_3 DC 3 x 250A	20241203_V1.22
Date	18.06.2024						
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007
Date							

=	UNIT_01	Converter Container 1	
&	EFS	Circuit diagram	
++	CONV	Converter	page: 231
+			total: 500



AWG	mm²	* cable into seperate UL protective tube	AWG	mm²
18	0,75		2	25
16	1		2 *	16 NSGAFöu
14	1,5		1	35
12	2,5		250 kcmil	95 ALU
12 *	2,5 NSGAFöu		2x2	1x70 NSGAFöu
10	4		2x4	2x70 NSGAFöu
6	10		4x250 kcmil	4x70 NSGAFöu
6 *	10 NSGAFöu		6x250 kcmil	6x70 NSGAFöu
4	16			

*2 The single conductor must be placed in the protective tube

IEC

previous page: 231

next page: 237

Editor	Freqcon_JD			Statron	FREQCON	SUBSYSTEM 2_1 - 2_3 DC 3 x 250A	20241203_V1.22
Date	18.06.2024						= UNIT_01 Converter Container 1
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			& EFS Circuit diagram
Date						10354_23A2007	++ CONV Converter page: 231.a
							+ total: 500

0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9

VX25
224

Spare connections,
if the BSU
will be from here
20A supplied.

* cable intro seperate UL protrctive tube

+CIR
-237U1
/237.a.0
&EFA++/1a.6
VX DC
switch
and Fuse
3*250A
1000V
Pos. 3

L_IGBT 4_1 / 217.0
SUB_4_1_V / ++CT/164.9
SUB_4_1_DC- / 217.9
SUB_4_1_V.1 / ++CT/164.9
L_IGBT 4_2 / 217.0
SUB_4_2_V / ++CT/164.9
SUB_4_2_DC- / 217.9
SUB_4_2_V.1 / ++CT/164.9
L_IGBT 4_3 / 217.0
SUB_4_3_V / ++CT/164.9
SUB_4_3_DC- / 217.9
SUB_4_3_V.1 / ++CT/164.9

237W1 OZ-600 2x0,75 mm²
237W1 OZ-600 2x0,75 mm²
237W2 OZ-600 2x0,75 mm²
237W2 OZ-600 2x0,75 mm²
237W3 OZ-600 2x0,75 mm²
237W3 OZ-600 2x0,75 mm²

50 mm² NSGAFöu BK

PE
PE
Rear mounting plate
7

IGBT1 1+ | V_IGBT1 1+ | V_DC1 1+ | V_DC 1- | UDC [1]- | IGBT2 2+ | V_IGBT2 2+ | V_DC2 2+ | UDC [2]- | IGBT3 3+ | V_IGBT3 3+ | V_DC3 3+ | UDC [3]-

F3 1A
F4 1A [20A, aR (BSU)]
F0 [20A, aR (BSU)]
F7 1A
F8 1A
F11 1A
F12 1A

2,5 mm² NSGAFöu BK

-C1
-C7
-C13
x1 x2
340µF, 1320V DC Epcos

16 mm² NSGAFöu BK

Front mounting plate
-U1
EMI
Suppesion CAP
16 mm² FGKV
1 2 3 4 5 6
16 mm² in Shrin-kable Tube FGKV

-K1 /237.a.1 1500V 300A
-K7 /237.a.3 1500V 300A
-K2 /237.a.2 1500V 300A
-K8 /237.a.4 1500V 300A
-K3 /237.a.2 1500V 300A
-K9 /237.a.5 1500V 300A

70 mm² NSGAFöu BK

-F1 /237.a.7 1250V 400A 1KN/110 HLS Datenblatt
-F2 /237.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS
-F5 /237.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS
-F6 /237.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS
-F9 /237.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS
-F10 /237.a.8 &EFA++/1a.7 1250V 400A 1KN/110 HLS

IEC

DC1 + | DC1 - | DC2 + | DC2 - | DC3 + | DC3 -

*2
The single conductor
must be placed
in the protective tube

AWG	mm²	* cable into seperate UL protective tube	AWG	mm²
18	0,75		2	25
16	1		2 *	16 NSGAFöu
14	1,5		1	35
12	2,5		250 kcmil	95 ALU
12 *	2,5 NSGAFöu		2x2	1x70 NSGAFöu
10	4		2x4	2x70 NSGAFöu
6	10		4x250 kcmil	4x70 NSGAFöu
6 *	10 NSGAFöu		6x250 kcmil	6x70 NSGAFöu
4	16			

+AC_DC-237W10 SUB 4_1 + Pos. =UNIT_03 → DC+4_1_BAT / =UNIT_03++ASC/678.2
+AC_DC-237W11 SUB 4_1 - Pos. → DC-4_1_BAT / =UNIT_03++ASC/678.2
+AC_DC-237W12 SUB 4_2 + Pos. =UNIT_03 → DC+4_2_BAT / =UNIT_03++ASC/678.5
+AC_DC-237W13 SUB 4_2 - Pos. → DC-4_2_BAT / =UNIT_03++ASC/678.5
+AC_DC-237W14 SUB 4_3 + Pos. =UNIT_03 → DC+4_3_BAT / =UNIT_03++ASC/678.7
+AC_DC-237W15 SUB 4_3 - Pos. → DC-4_3_BAT / =UNIT_03++ASC/678.7

Cu 100mm x 10mm x 195mm FRQ.50604 &EFA++/1a.7 =UNIT_03&EFA++/1a.0
Cu 100mm x 10mm x 195mm FRQ.50604 &EFA++/1a.7 =UNIT_03&EFA++/1a.5

DC+4_1 / 238b.1
DC-4_1 / 238b.1
DC+4_2 / 238b.4
DC-4_2 / 238b.4
DC+4_3 / 238b.7
DC-4_3 / 238b.8

EEC

DC+ and DC- Busbars
in Connection cabinet

previous page: 231.a
next page: 237.a

Editor	Freqcon_JD			Statron	FREQCON	SUBSYSTEM 4_1 - 4_3 DC 3 x 250A	20241203_V1.22
Date	18.06.2024						10354_23A2007
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			
Date							

=	UNIT_01	Converter Container 1	
&	EFS	Circuit diagram	
++	CONV	Converter	page: 237
+			total: 500

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-SUB_4_1_K_.+ /++CT/352.1
-SUB_4_2_K_.+ /++CT/353.1
-SUB_4_3_K_.+ /++CT/353.4
-SUB_4_1_K_.- /++CT/352.3
-SUB_4_2_K_.- /++CT/353.3
-SUB_4_3_K_.- /++CT/353.6
SUB_4_1_+ /++CT/308.1
SUB_4_2_+ /++CT/308.4
SUB_4_3_+ /++CT/308.7
SUB_4_1_- /++CT/308.2
SUB_4_2_- /++CT/308.5
SUB_4_3_- /++CT/308.8
SUB_4_1_F1_F2 /++CT/132.7
SUB_4_2_F1_F2 /++CT/132.8
SUB_4_3_F1_F2 /++CT/132.9
-SUB_4_1_L+ /++CT/132.9
-SUB_4_1_K_.M /++CT/352.2

237W4
OZ-500
18x1 mm²

+CIR
-237U1
/237.0
DC
switch
and fuse
3*250A
1000V
Pos. 3

X3.1

W5
JZ-500
15G0,75 mm²
300V
/237.a.9

X3.2

-K1 /237.a.1 24V 2A
-K2 /237.a.2
-K3 /237.a.2
-K7 /237.a.3
-K8 /237.a.4
-K9 /237.a.5

DC+
DC-
PE

-K1 -K2 -K3 -K7 -K8 -K9
24V DC HX22

-F1 /237.1
-F5 /237.3 &EFA++/1a.7
-F9 /237.6 &EFA++/1a.7
-F2 /237.1 &EFA++/1a.7
-F6 /237.3 &EFA++/1a.7
-F10 /237.7 &EFA++/1a.7

0,75 mm² BU
*2

W5
JZ-500
15G0,75 mm²
300V
/237.a.1
13 14 GNYE

A2 A1 /237.1
T1 T2 /237.a.5
A2 A1 /237.3
T2 T1
T1 T2 /237.a.6
A2 A1 /237.6
T2 T1
T1 T2 /237.a.6
A2 A1 /237.1
T2 T1
T1 T2 /237.a.6
A2 A1 /237.3
T2 T1
T1 T2 /237.a.7
A2 A1 /237.7
T2 T1
T1 T2 /237.a.7

AWG	mm²	* cable into seperate UL protective tube	AWG	mm²
18	0,75		2	25
16	1		2 *	16 NSGAFöu
14	1,5		1	35
12	2,5		250 kcmil	95 ALU
12 *	2,5 NSGAFöu		2x2	1x70 NSGAFöu
10	4		2x4	2x70 NSGAFöu
6	10		4x250 kcmil	4x70 NSGAFöu
6 *	10 NSGAFöu		6x250 kcmil	6x70 NSGAFöu
4	16			

*2 The single conductor must be placed in the protective tube

IEC

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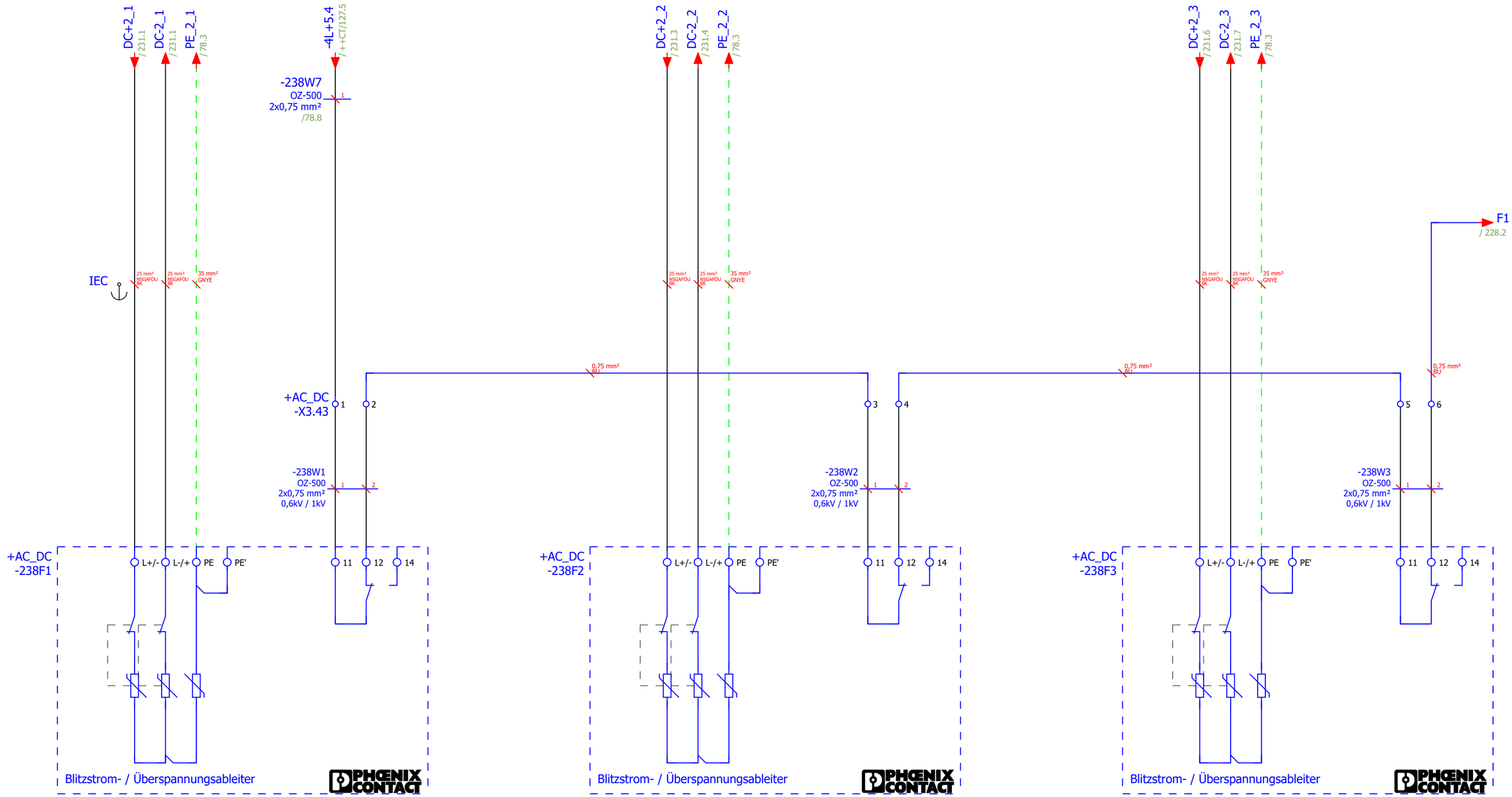
next page: 238a

Editor	Freqcon_DG			Statron	FREQCON	SUBSYSTEM 4_1 - 4_3 DC 3 x 250A	20241203_V1.22
Date	29.07.2024						= UNIT_01 Converter Container 1
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			& EFS Circuit diagram
Date						10354_23A2007	++ CONV Converter page: 237.a
							+ total: 500

DC+ and DC- Busbars

DC+ and DC- Busbars

DC+ and DC- Busbars



SURGE ARRESTER
DC SUBSYSTEM 2_1

SURGE ARRESTER
DC SUBSYSTEM 2_2

SURGE ARRESTER
DC SUBSYSTEM 2_3

in Connection cabinet

previous page:
237.a

next page:
238b

Editor	Freqcon_JD			Statron	FREQCON	DC SURGE ARRESTER 2_1 - 2_3	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV Converter	page: 238a
Date								+	total: 500

DC+ and DC- Busbars

DC+4_1 / 237.1
DC-4_1 / 237.1
PE_4_1 / 78.4

IEC

25 mm² NSGAFÖU BK
25 mm² NSGAFÖU BK
35 mm² GNYE

F2
228.9 /

0,75 mm² BU

+AC_DC
-X3.43
13 14

-238W4
OZ-500
2x0,75 mm²
0,6kV / 1kV
1 2

+AC_DC
-238F4
L+/- L-/+ PE PE'
11 12 14

Blitzstrom- / Überspannungsableiter
PHOENIX CONTACT

SURGE ARRESTER
DC SUBSYSTEM 4_1

DC+ and DC- Busbars

DC+4_2 / 237.3
DC-4_2 / 237.4
PE_4_2 / 78.4

25 mm² NSGAFÖU BK
25 mm² NSGAFÖU BK
35 mm² GNYE

0,75 mm² BU

15 16

-238W5
OZ-500
2x0,75 mm²
0,6kV / 1kV
1 2

+AC_DC
-238F5
L+/- L-/+ PE PE'
11 12 14

Blitzstrom- / Überspannungsableiter
PHOENIX CONTACT

SURGE ARRESTER
DC SUBSYSTEM 4_2

DC+ and DC- Busbars

DC+4_3 / 237.6
DC-4_3 / 237.7
PE_4_3 / 78.5

25 mm² NSGAFÖU BK
25 mm² NSGAFÖU BK
35 mm² GNYE

F3
/ 78.9

0,75 mm² BU

17 18

-238W6
OZ-500
2x0,75 mm²
0,6kV / 1kV
1 2

+AC_DC
-238F6
L+/- L-/+ PE PE'
11 12 14

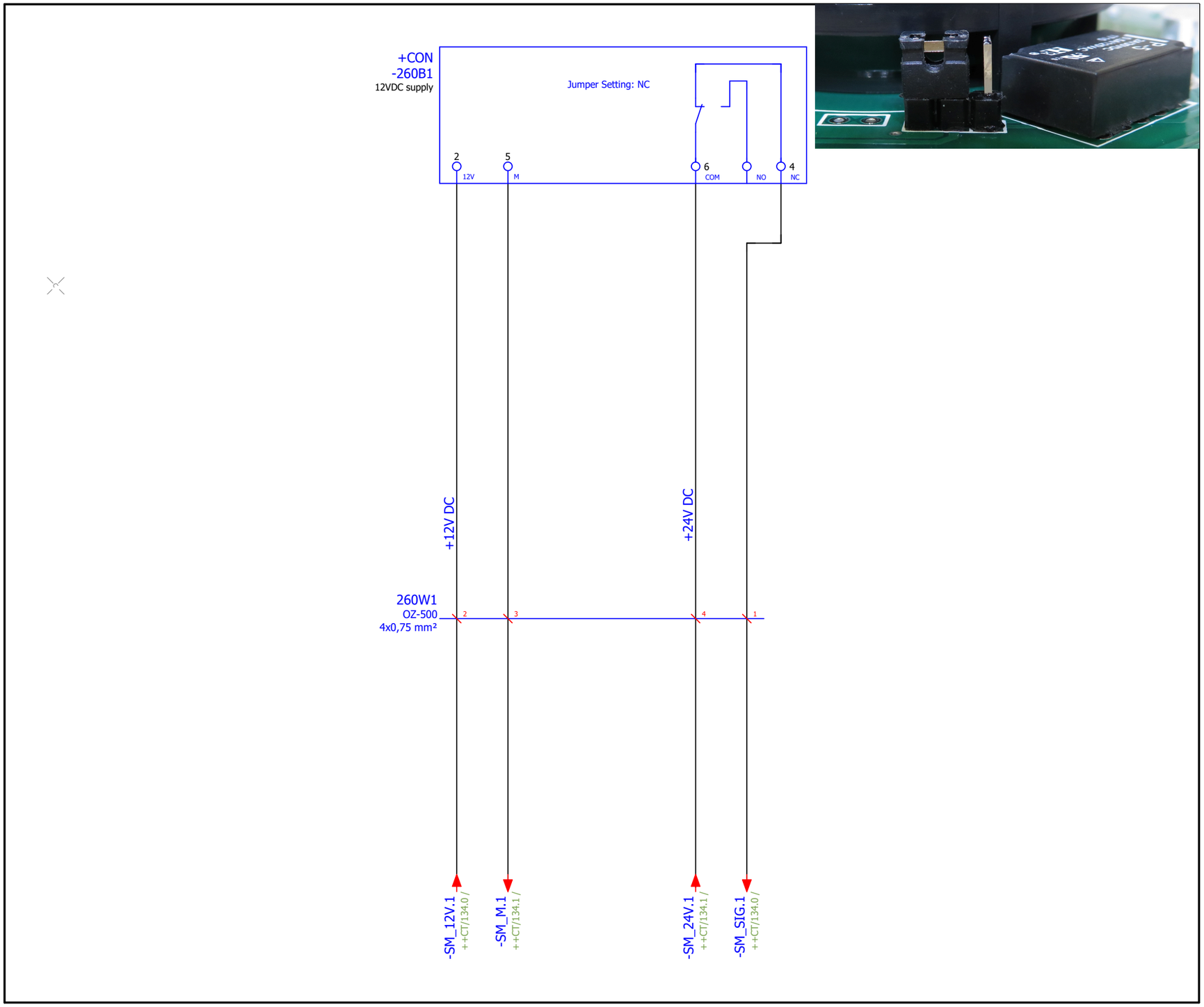
Blitzstrom- / Überspannungsableiter
PHOENIX CONTACT

SURGE ARRESTER
DC SUBSYSTEM 4_3

in Connection cabinet

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next page: 260

Editor	Freqcon_JD			Statron	FREQCON	DC SURGE ARRESTER 4_1 - 4_3	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV Converter	page: 238b
Date								+	total: 500

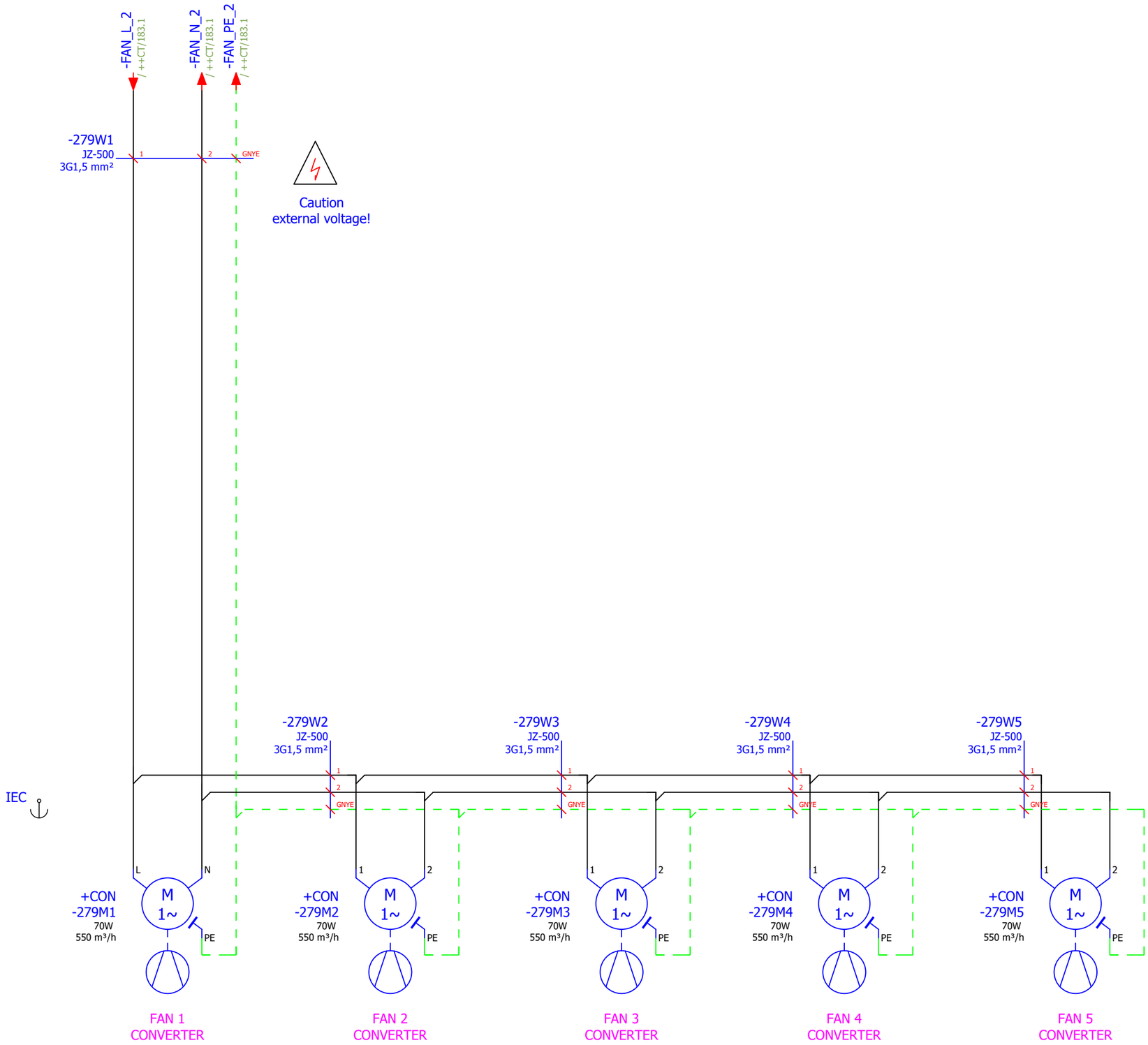


SMOKE DETECTOR
+CON CABINET

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238b

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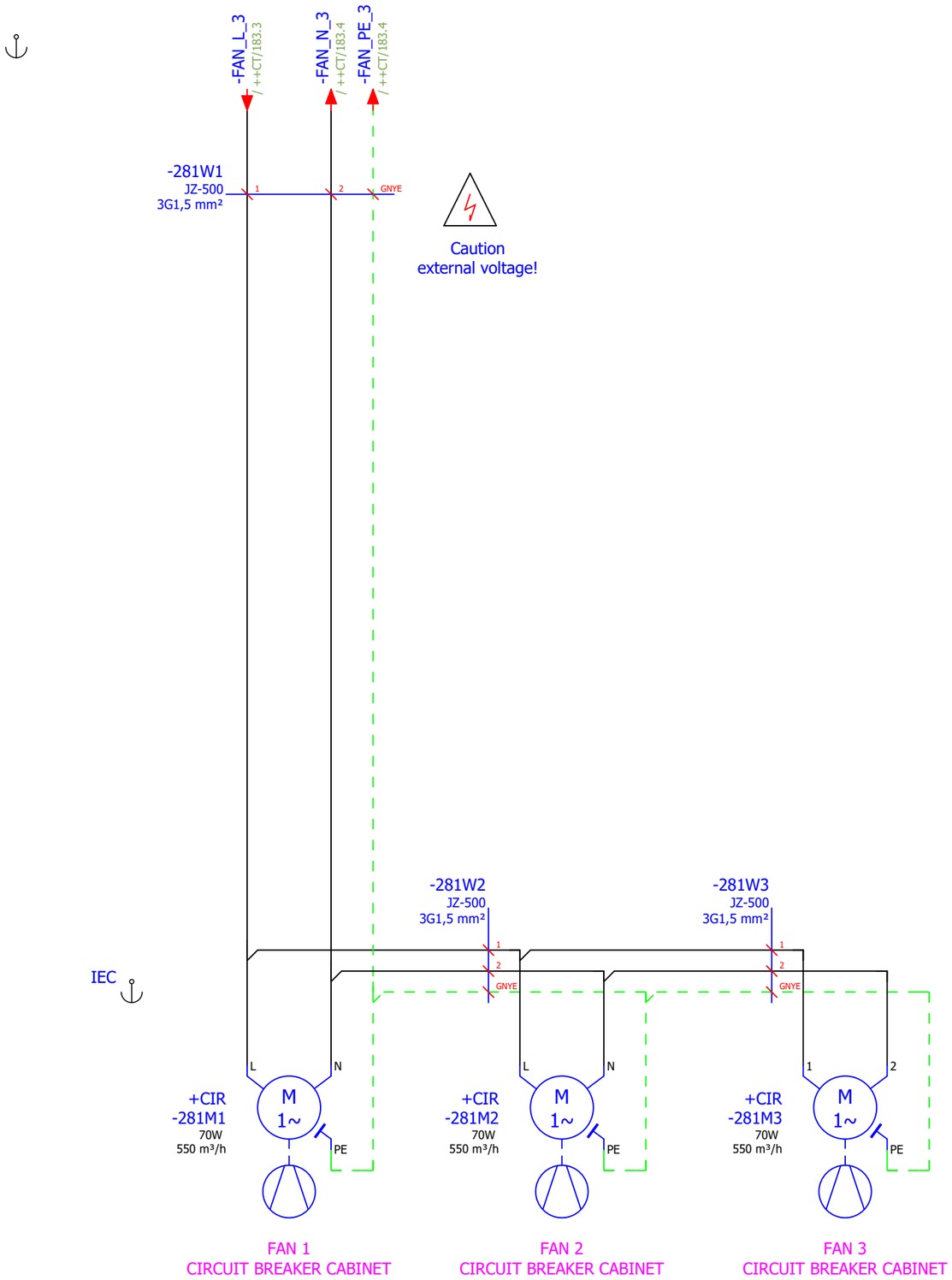
Editor	Freqcon_JD			Statron	FREQCON	SMOKE DETECTOR	20241203_V1.22	= UNIT_01	Converter Container 1	
Date	18.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV	Converter	page: 260
Date								+		total: 500



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260

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281

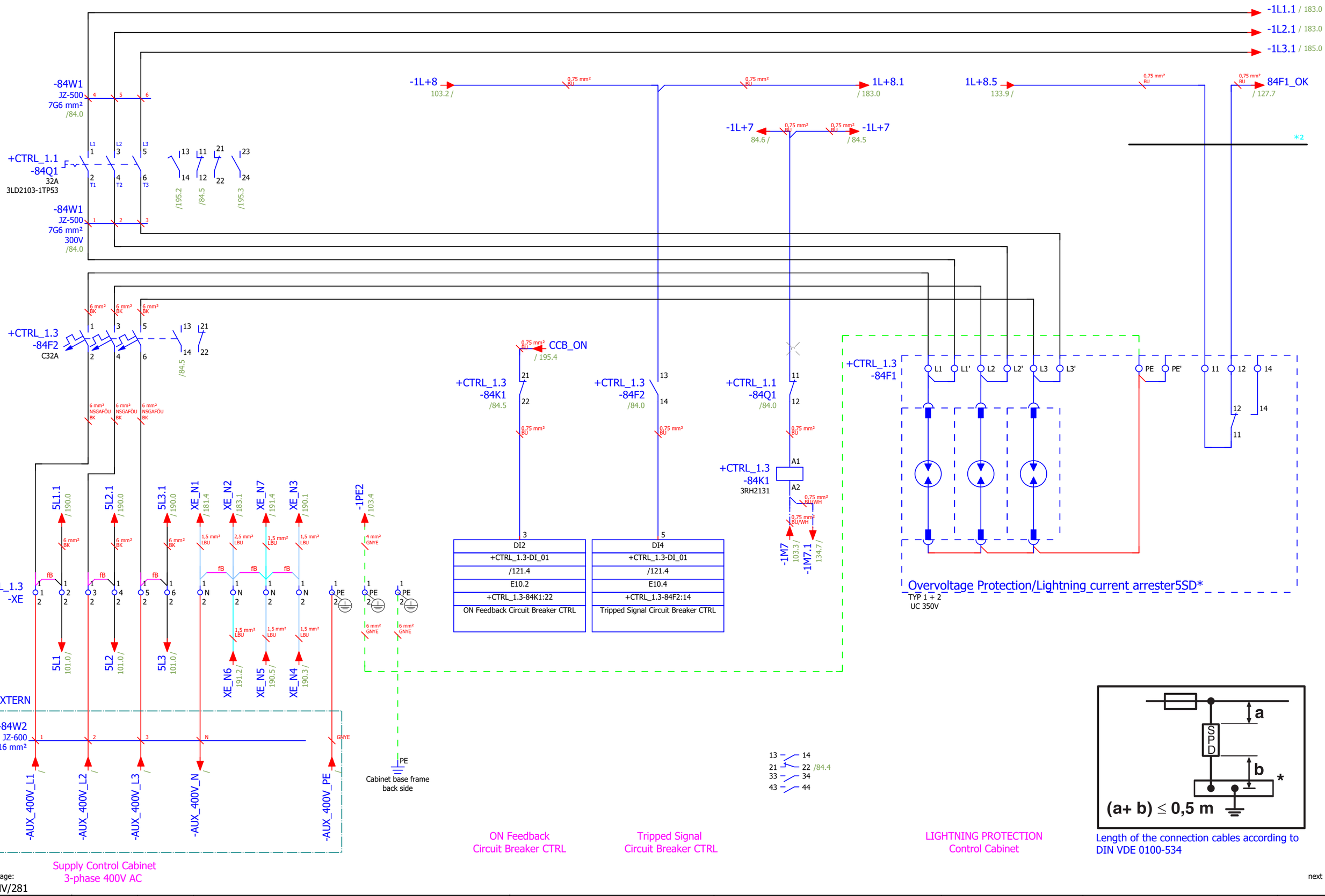
Editor	Freqcon_JD			Statron	FREQCON	CONVERTER CABINET CLIMATE	20241203_V1.22	= UNIT_01	Converter Container 1	
Date	18.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV	Converter	page: 279
Date								+		total: 500



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279

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++CT/84

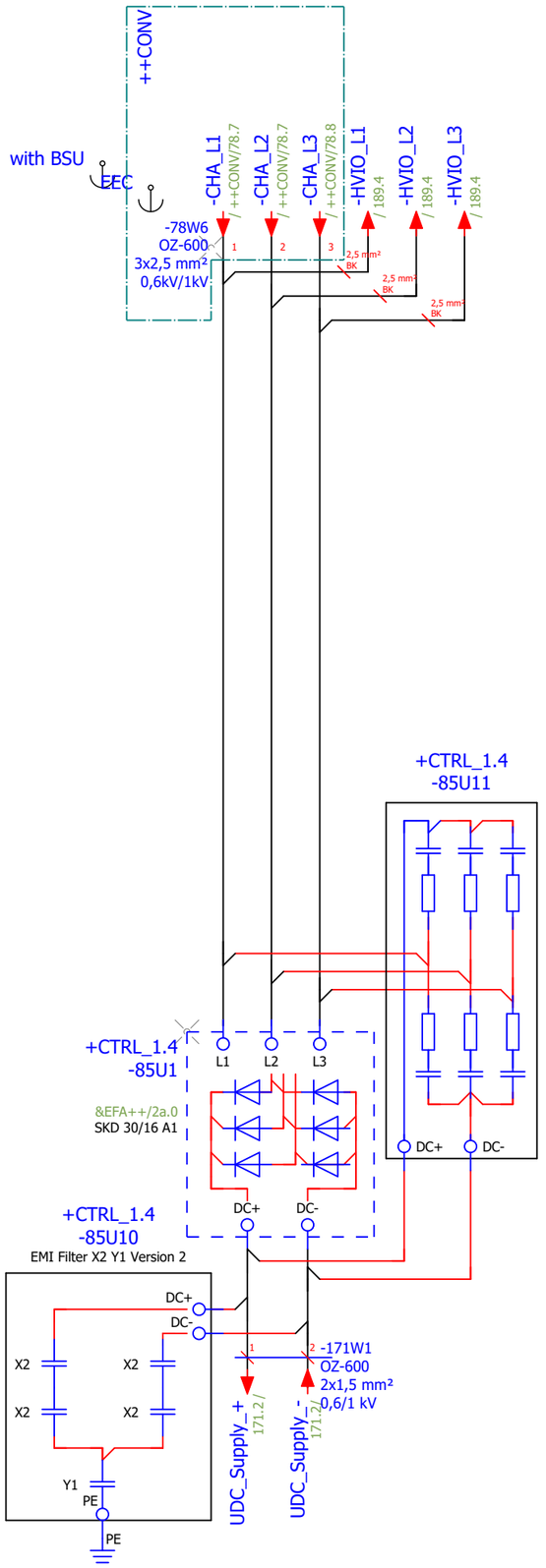
Editor	Freqcon_JD			Statron	FREQCON	CIRCUIT BREAKER CABINET CLIMATE	20241203_V1.22	= UNIT_01	Converter Container 1	
Date	18.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV	Converter	page: 281
Date								+		total: 500



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++CONV/281

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Editor	Freqcon_DG			Statron	FREQCON	FEEDING CONTROL CABINET (CTRL)	20241203_V1.22	= UNIT_01	Converter Container 1	
Date	29.07.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 84
Date								+		total: 500



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earthing via cooling element

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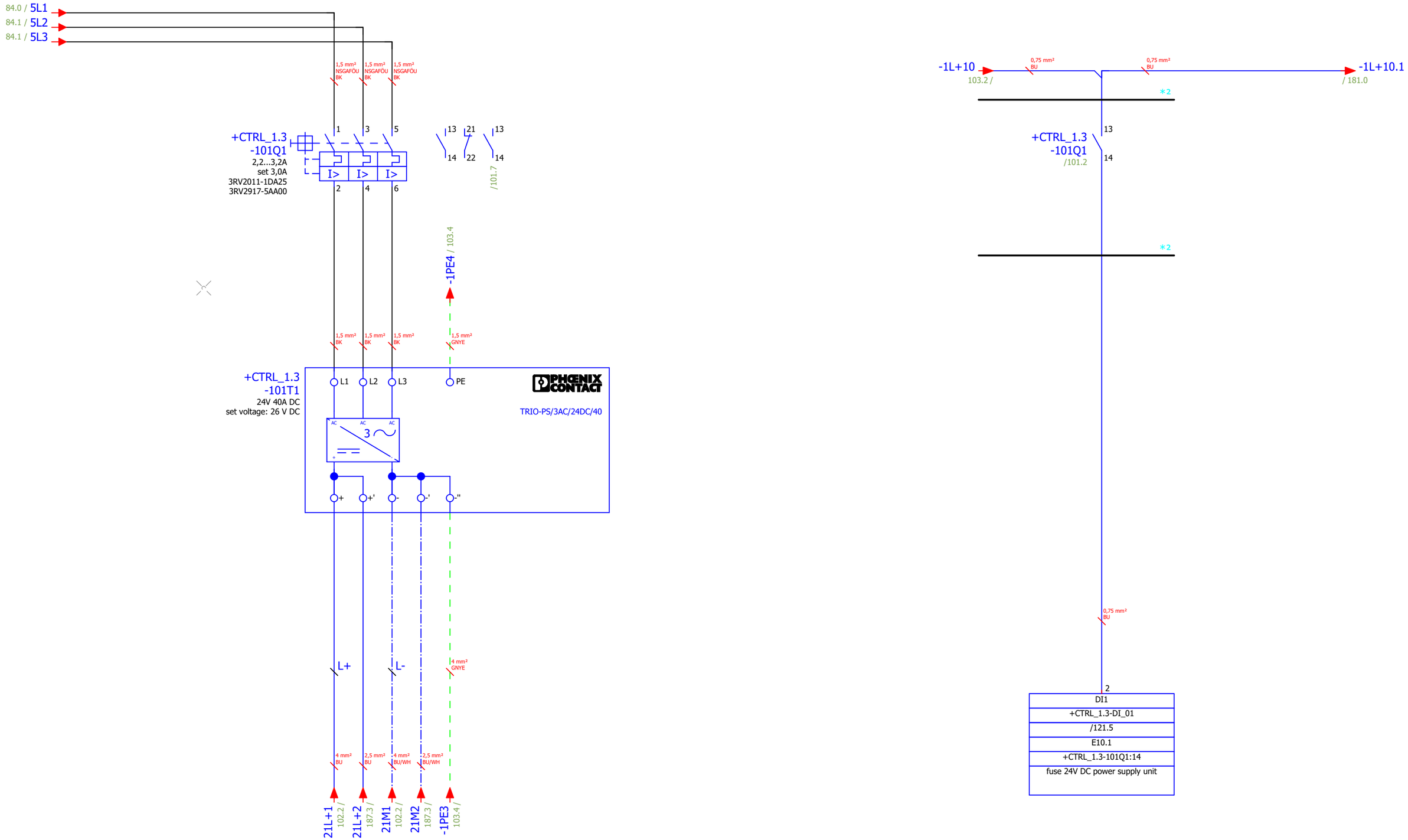
Editor	Freqcon_DG			Statron	FREQCON	SUPPLY UDC	20241203_V1.22	= UNIT_01	Converter Container 1	
Date	29.07.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 85
Date								+		total: 500

Control Cabinet

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*2

The single conductor must be placed in the protective tube

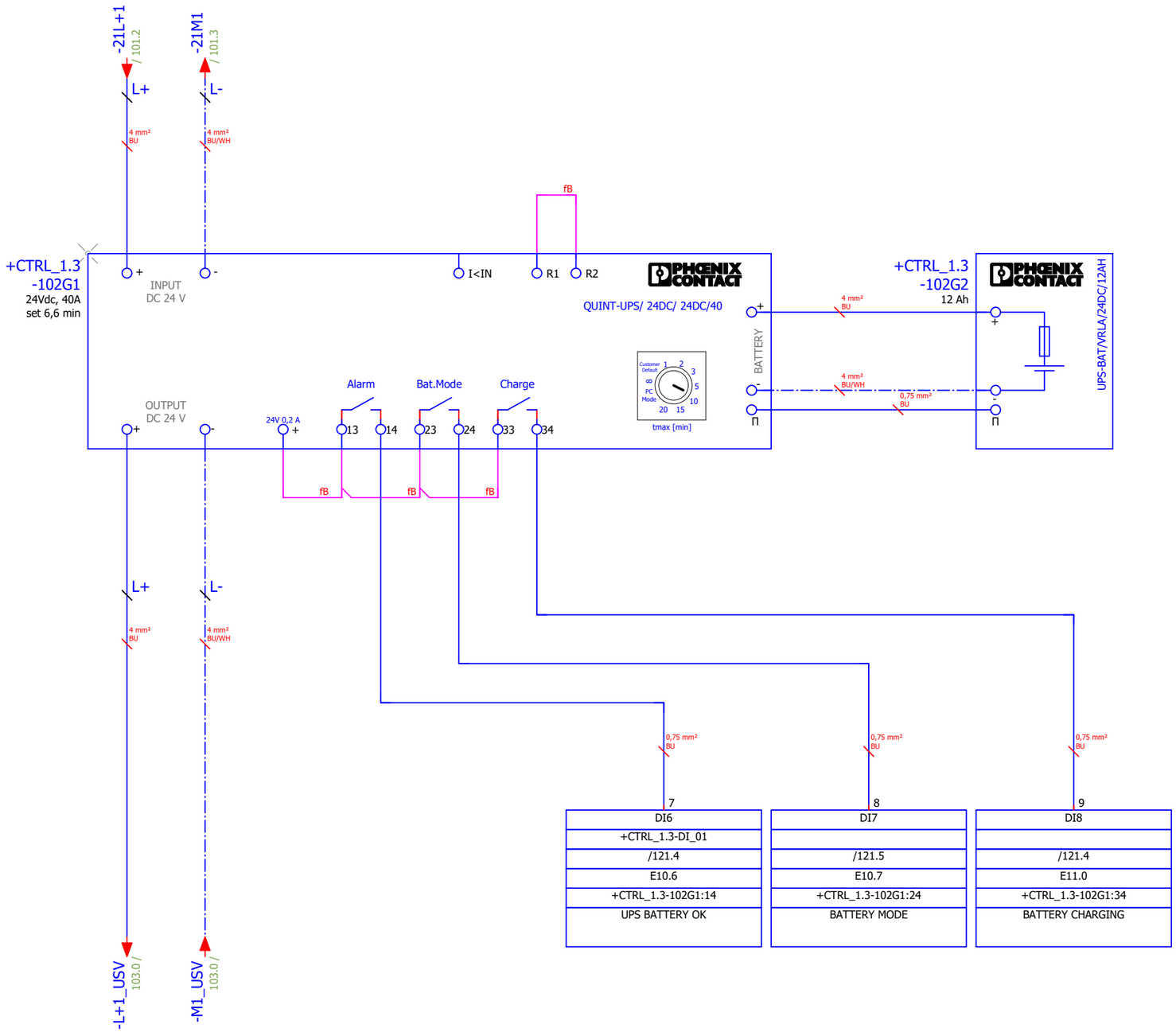
fuse
24V DC power supply unit

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Power supply unit from 400V AC

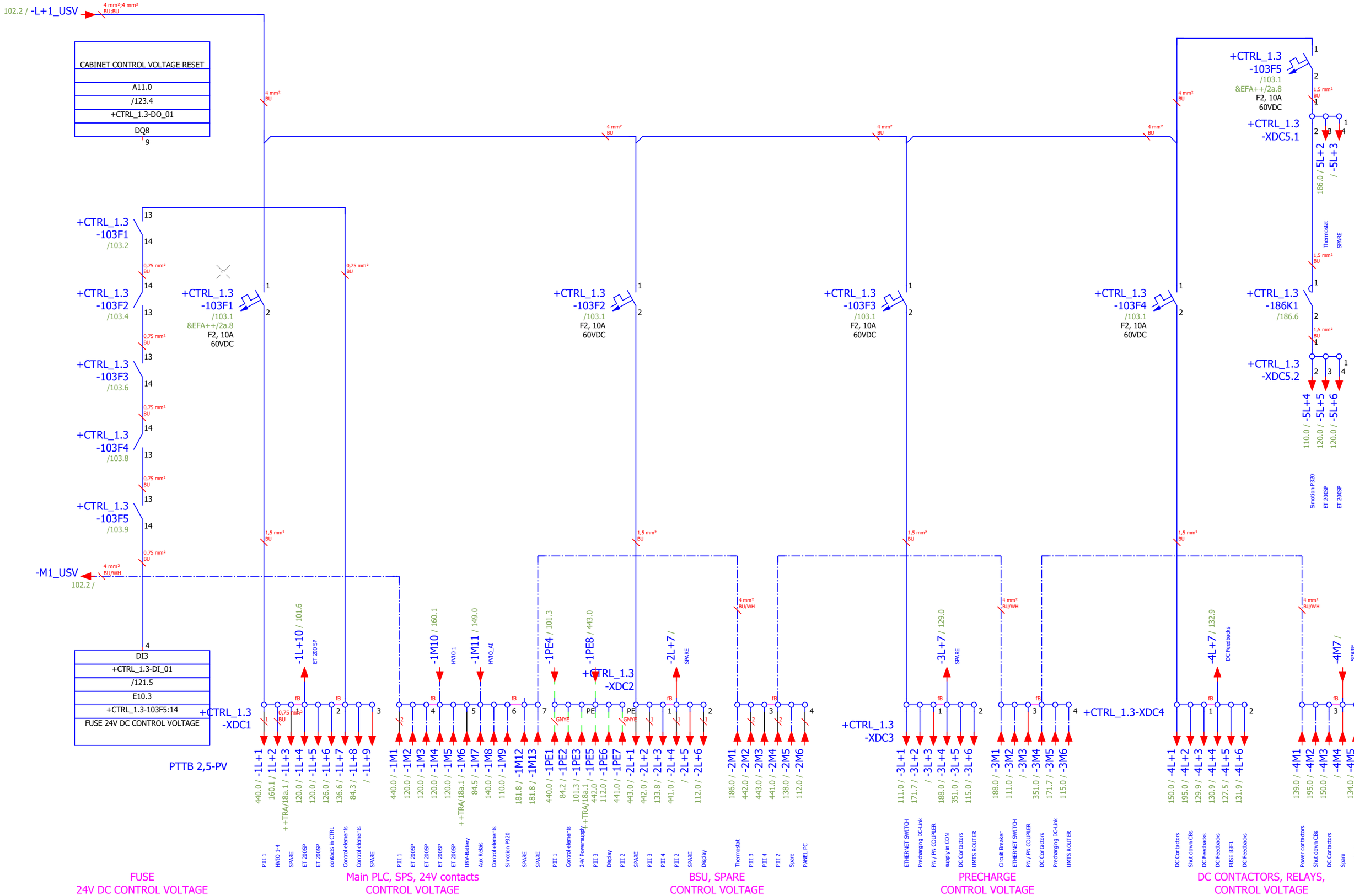
next page: 102

Editor	Freqcon_DG			Statron	FREQCON	CONTROL VOLTAGE POWER SUPPLY UNIT	20241203_V1.22	= UNIT_01	Converter Container 1
Date	05.11.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets page: 101
Date								+	total: 500



UPS BATTERY OK | BATTERY MODE | BATTERY CHARGING

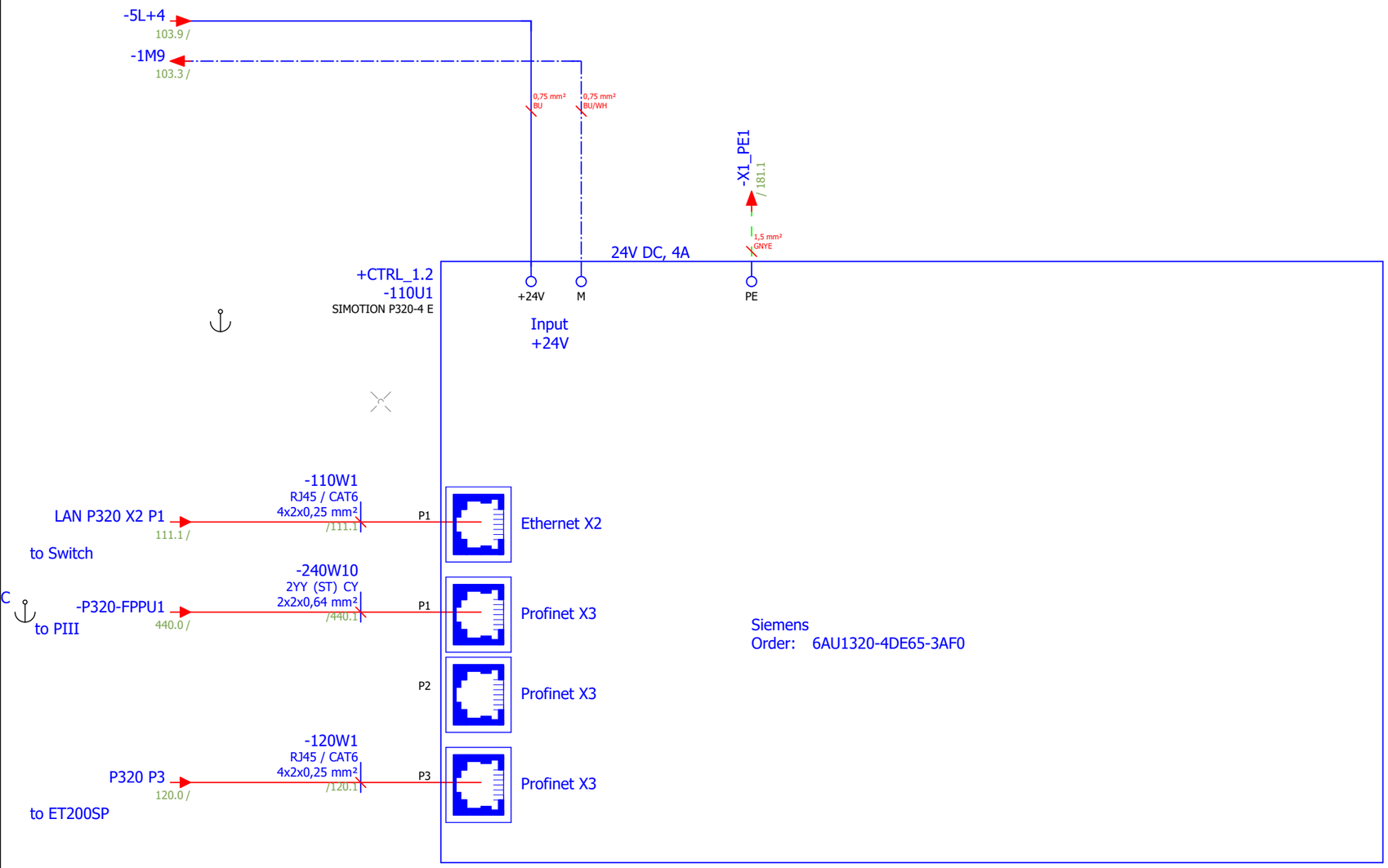
Editor	Freqcon_JD			Statron	FREQCON	CONTROL VOLTAGE UPS	20241203_V1.22	= UNIT_01 Converter Container 1
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets page: 102
Date								+ total: 500



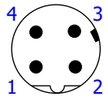
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Editor	Freqcon_DG			Statron	FREQCON	CONTROL VOLTAGE FUSE	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	29.07.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 103
Date								+	total: 500



Plug with D-coded



Top view of the pinheader

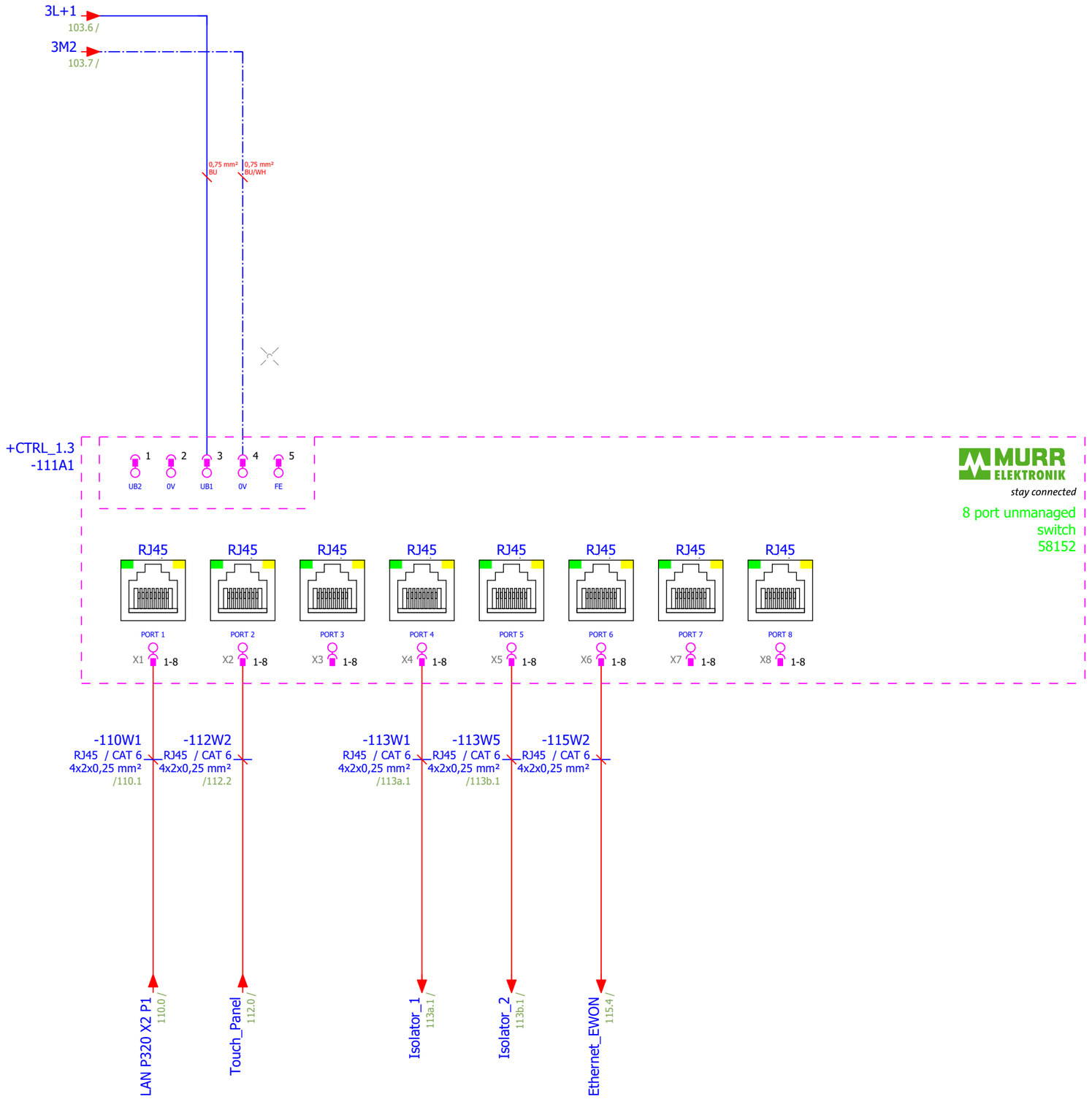
Signal	Colour	RJ45	M12 plug
TD+	yellow	1	1
TD-	orange	2	3
RD+	white	3	2
RD-	blue	6	4

Connection P320 -- PIII

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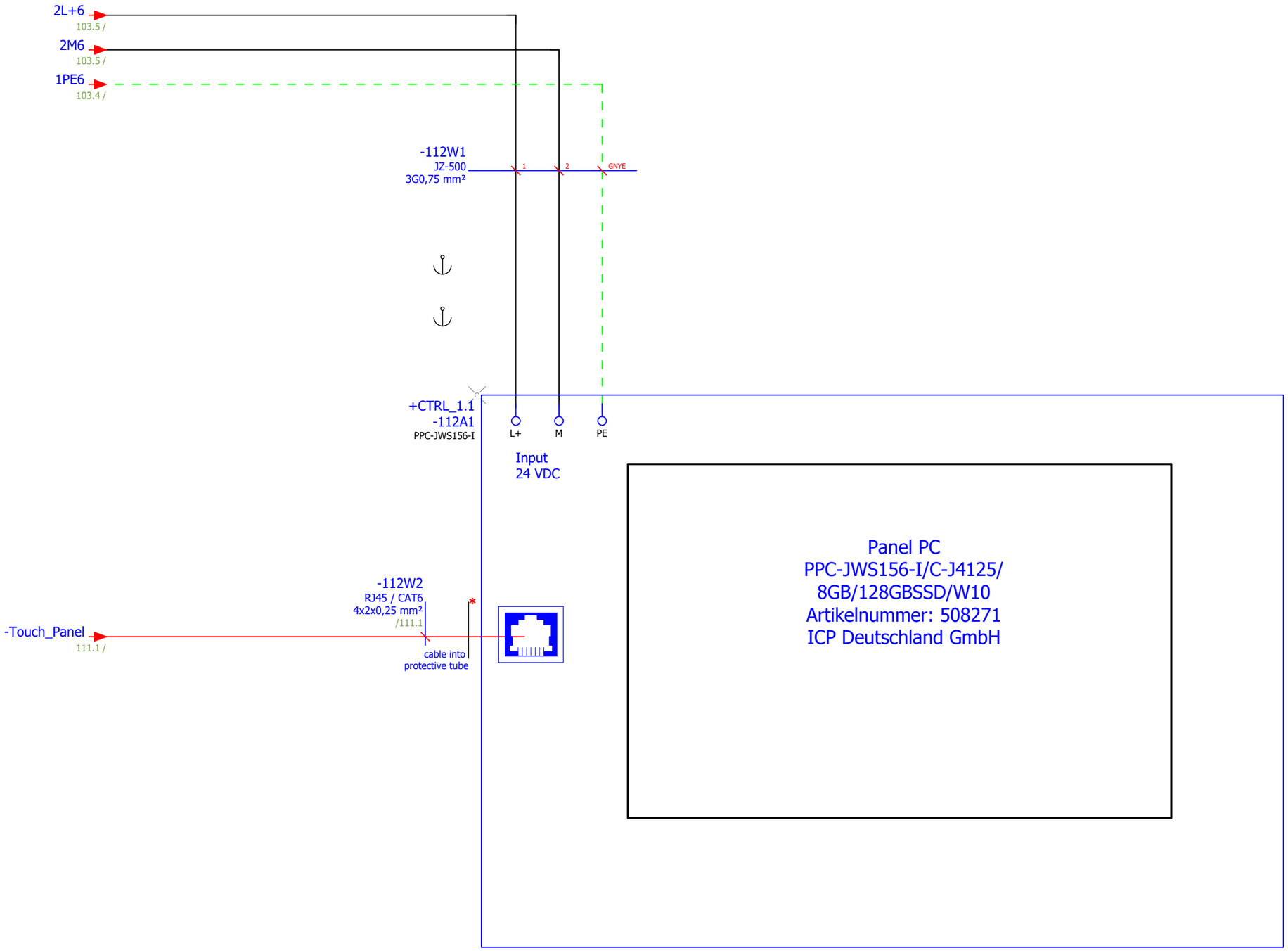
Editor	Freqcon_JD			Statron	FREQCON	MAIN PLC	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	20.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 110
Date								+	total: 500



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Editor	Freqcon_JD			Statron	FREQCON	ETHERNET SWITCH	20241203_V1.22	= UNIT_01	Converter Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets page: 111
Date								+	total: 500

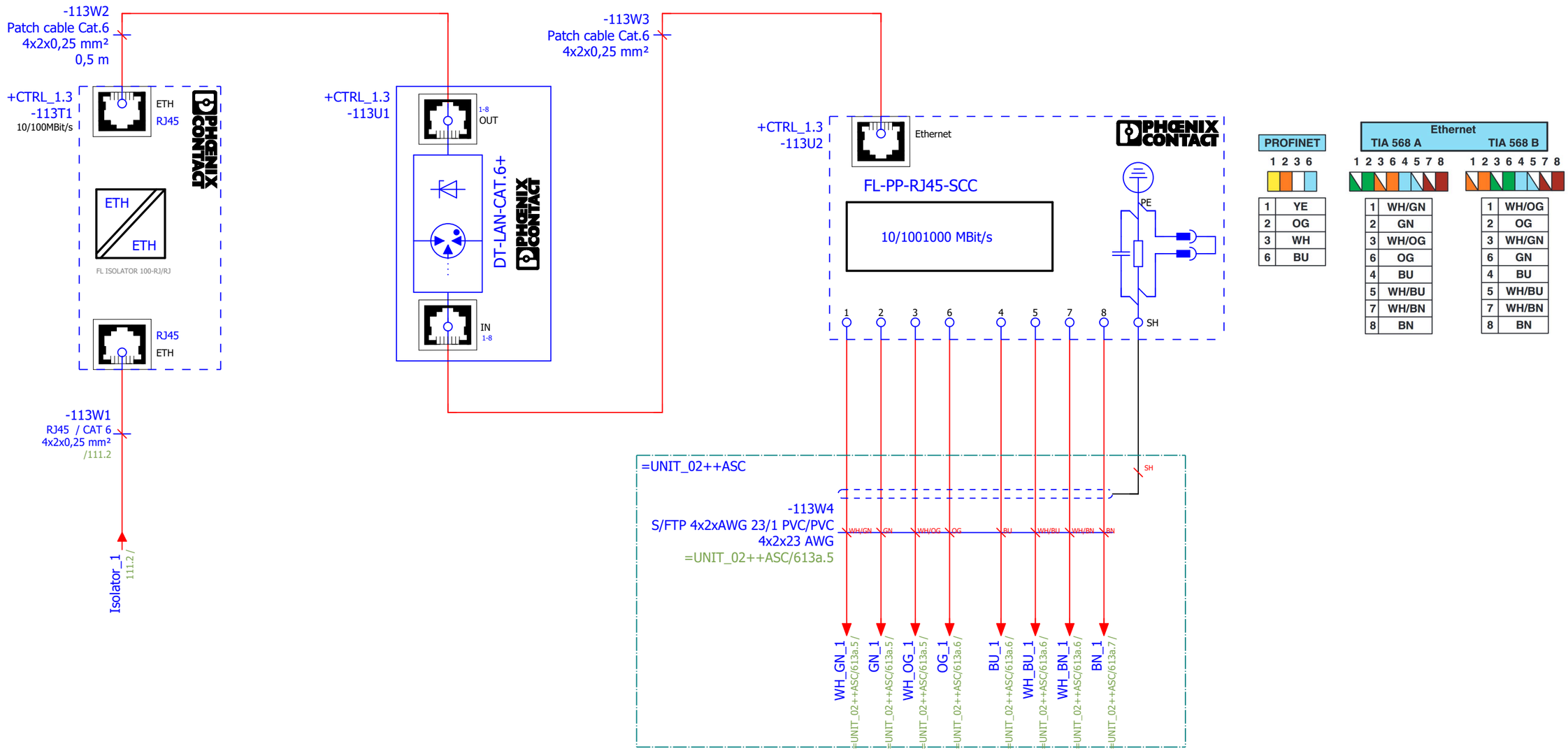


PANEL PC

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113a

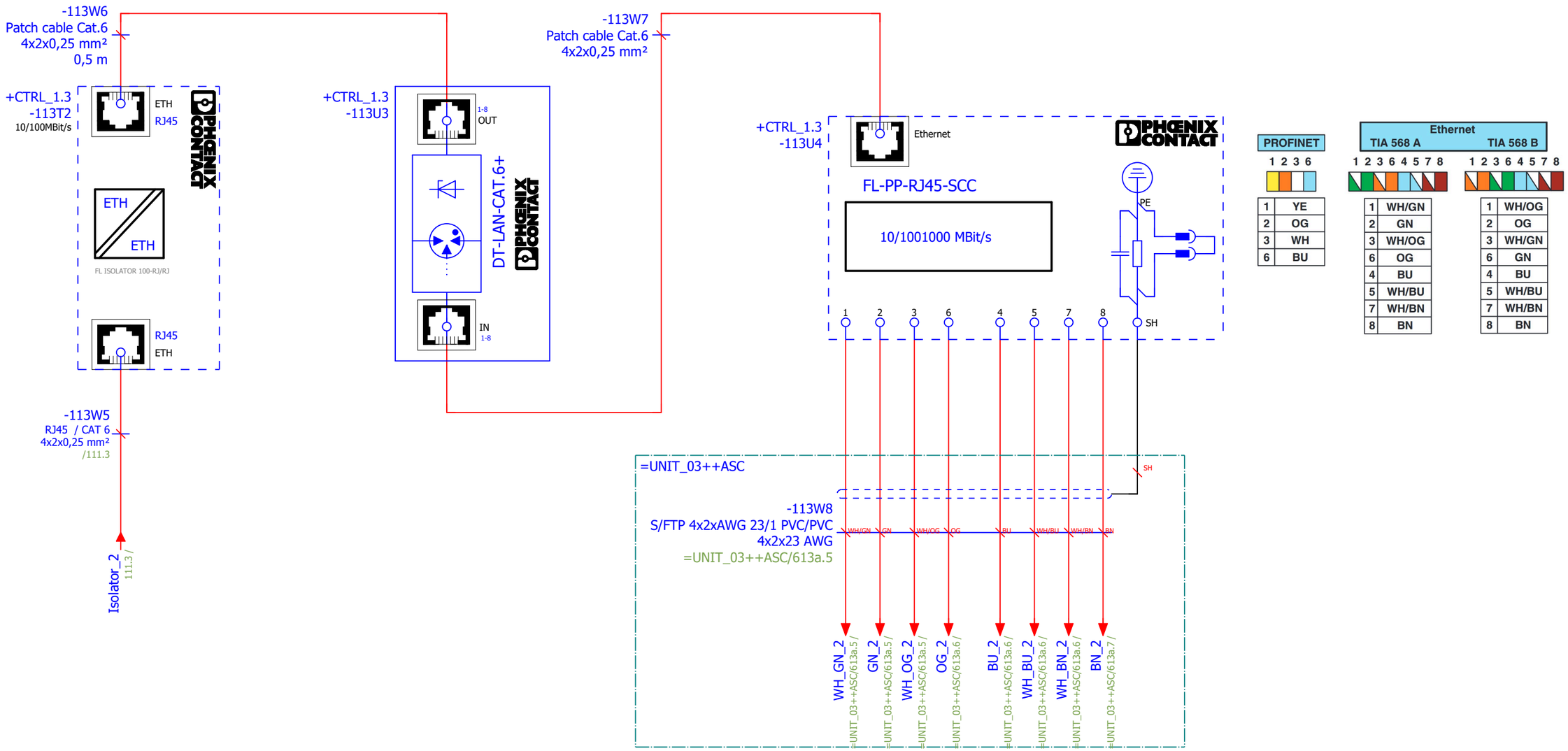
Editor	Freqcon_JD			Statron	FREQCON	PANEL PC HMI	20241203_V1.22	= UNIT_01	Converter Container 1	
Date	18.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 112
Date								+		total: 500



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113b

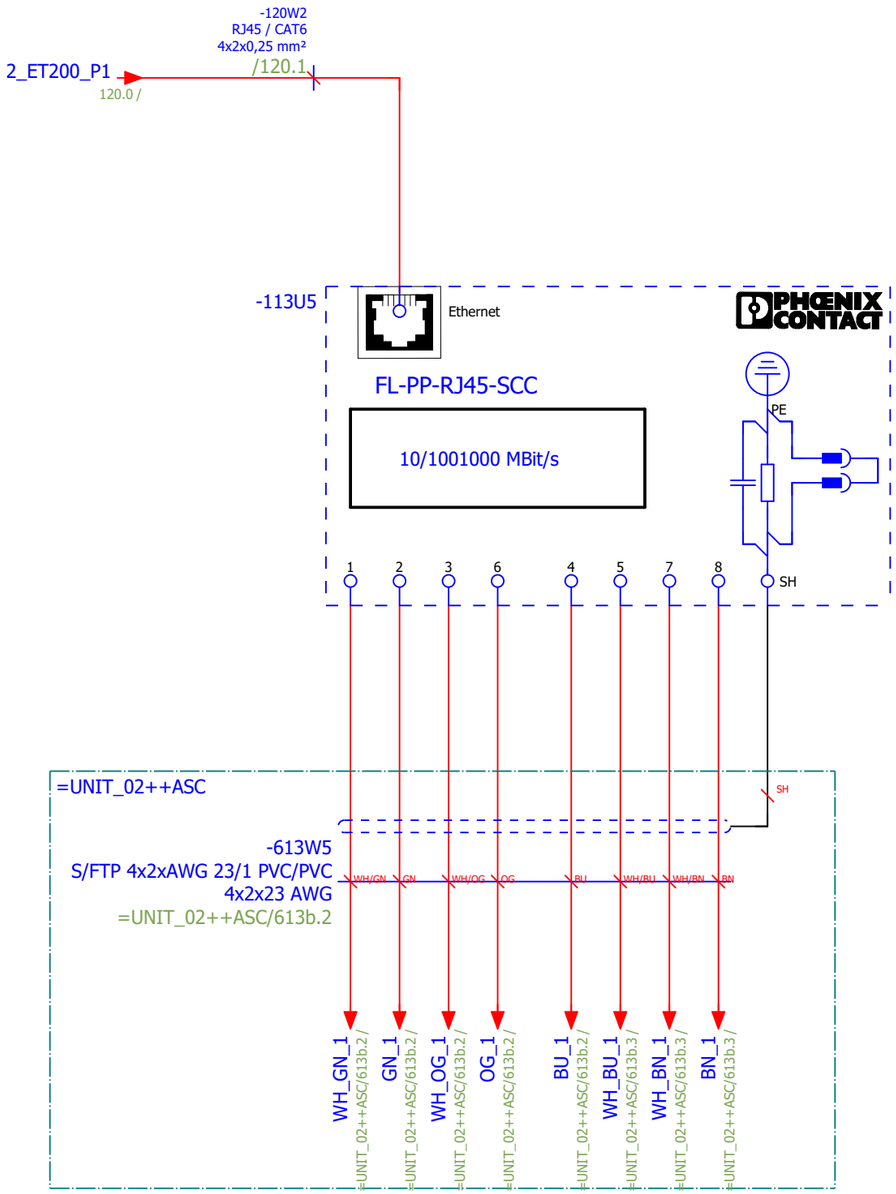
Editor	Freqcon_JD			Statron	FREQCON	ETHERNET / PROFINET ISOLATOR	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 113a
Date								+	total: 500



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113a

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113c

Editor	Freqcon_JD			Statron	FREQCON	ETHERNET / PROFINET ISOLATOR	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 113b
Date								+	total: 500



PROFINET

1	YE
2	OG
3	WH
6	BU

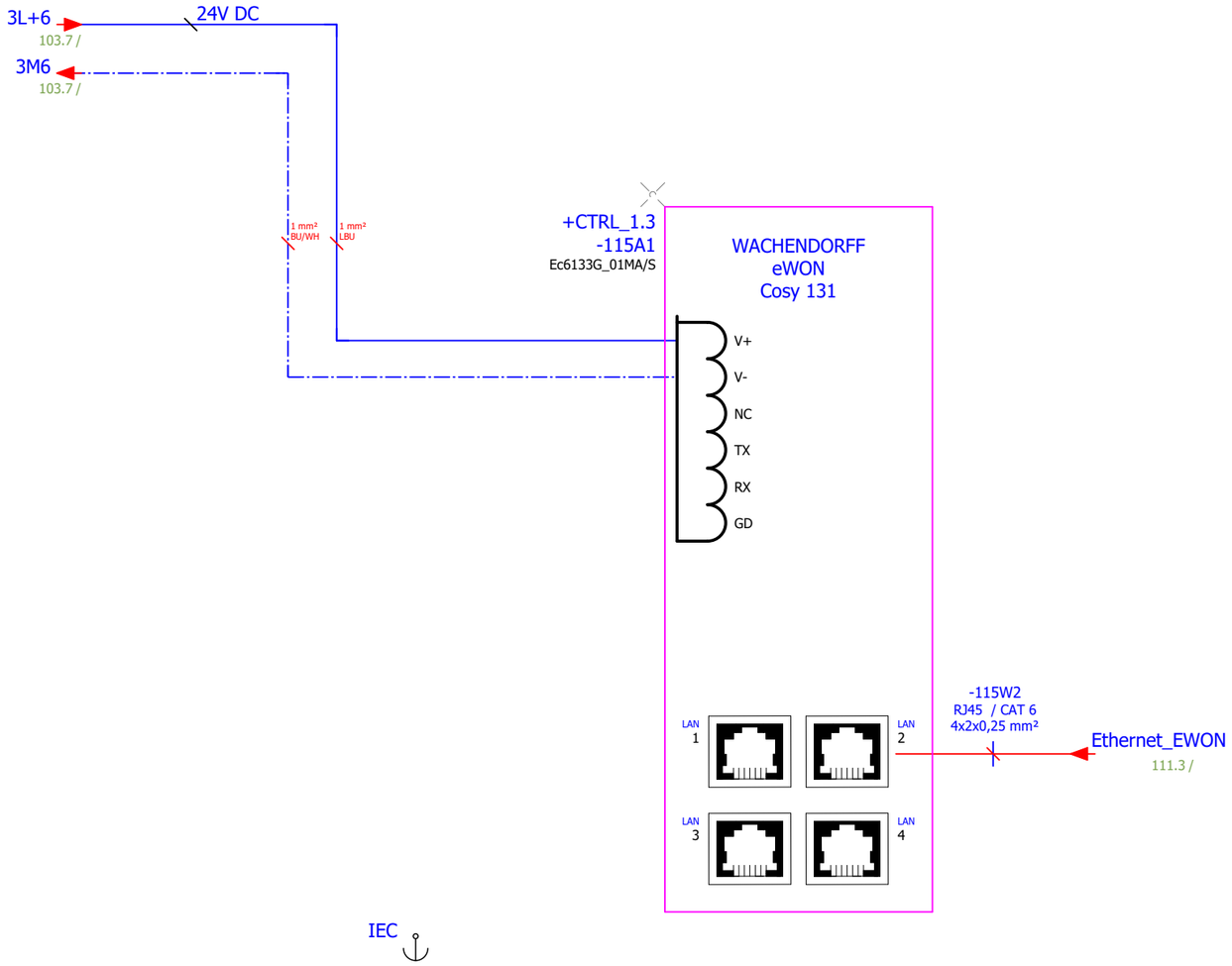
Ethernet

TIA 568 A		TIA 568 B	
1	WH/GN	1	WH/OG
2	GN	2	OG
3	WH/OG	3	WH/GN
6	OG	6	GN
4	BU	4	BU
5	WH/BU	5	WH/BU
7	WH/BN	7	WH/BN
8	BN	8	BN

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Editor	Freqcon_DG			Statron		PROFINET	20241203_V1.22	= UNIT_01	Converter Container 1	
Date	25.11.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 113c
Date								+		total: 500

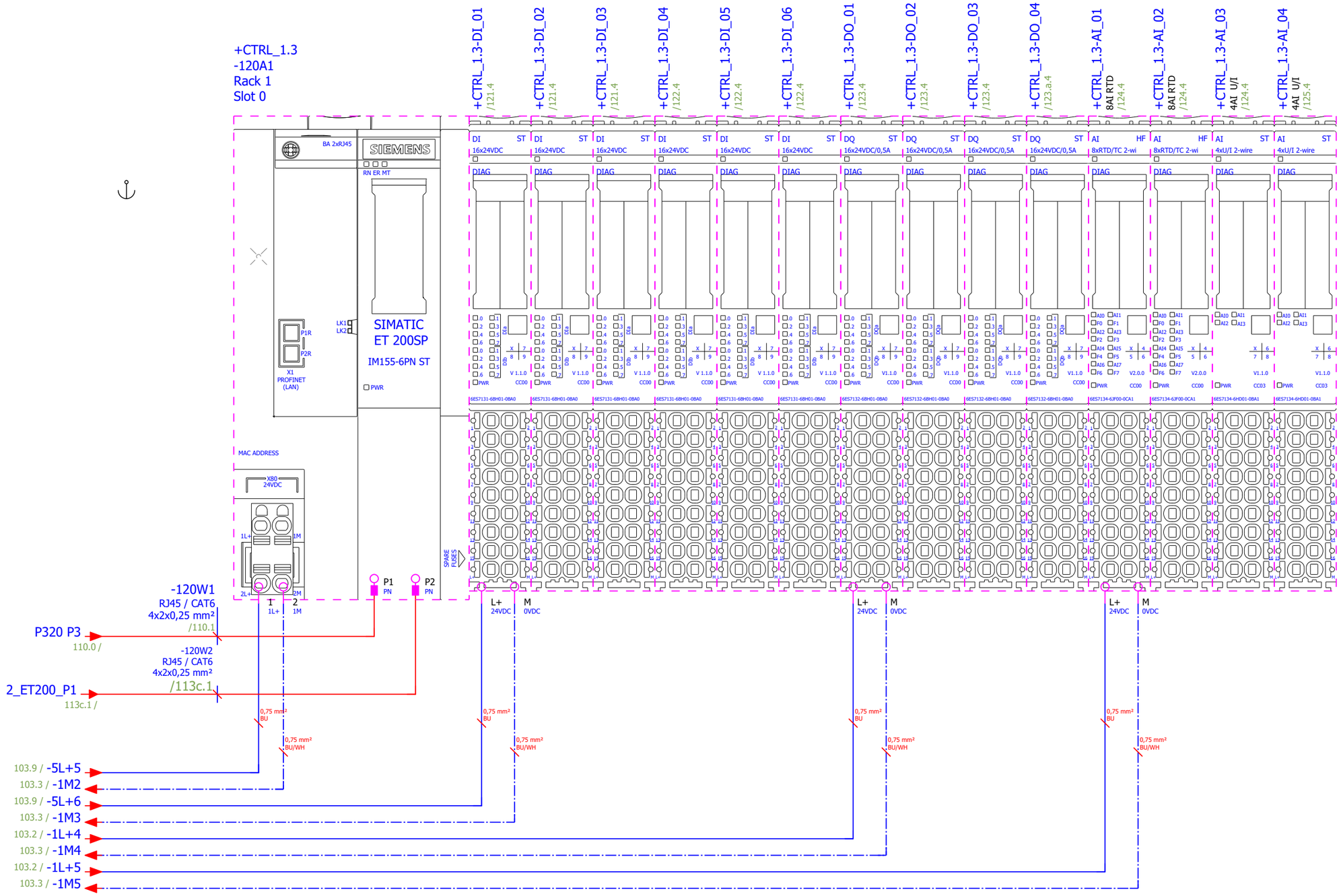


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113c

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Editor	Freqcon_JD			Statron	FREQCON	UMTS ROUTER	20241203_V1.22	= UNIT_01	Converter Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets
Date								+	

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Editor	Freqcon_DG			Statron	FREQCON	ET200 24V DC	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	25.11.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 120
Date								+	total: 500

+CTRL_1.3-DI_01

/120.3

		DI0 1 E10.0	E10.1 2 DI1	/101.7	fuse 24V DC power supply unit
ON Feedback Circuit Breaker CTRL	/84.4	DI2 3 E10.2	E10.3 4 DI3	/103.1	FUSE 24V DC CONTROL VOLTAGE
Tripped Signal Circuit Breaker CTRL	/84.5	DI4 5 E10.4	E10.5 6 DI5	/127.7	LIGHTNING PROTECTION in Control Cabinet OPTIONAL
UPS BATTERY OK	/102.5	DI6 7 E10.6	E10.7 8 DI7	/102.6	BATTERY MODE
BATTERY CHARGING	/102.7	DI8 9 E11.0	E11.1 10 DI9	/126.1	RESET -126S1
FUSE FOR PUMP	/181.2	DI10 11 E11.2	E11.3 12 DI11	/182.2	FAN 1 HEAT EXCHANGER
FUSE FOR HEATER	/181.5	DI12 13 E11.4	E11.5 14 DI13		
Fuse Fans CON, IND Cabinets	/183.6	DI14 15 E11.6	E11.7 16 DI15	/185.9	supply light, fan, heater, power unit in cabinet
	/120.3	24VDC L+	M 0VDC	/120.3	

+CTRL_1.3-DI_02

/120.3

FAULT SIGNAL SAFETY RELAY	/195.4	DI0 1 E12.0	E12.1 2 DI1	/187.6	FUSES SUPPLY FOR CIRCUIT BREAKER 1+2
CB 1 ON GRID	/127.2	DI2 3 E12.2	E12.3 4 DI3	/127.3	CB 1 OFF GRID
CB 1 Tripped GRID	/127.1	DI4 5 E12.4	E12.5 6 DI5	/127.4	FUSE AND LIGHTNING PROTECTION
Smoke detector CON	/134.0	DI6 7 E12.6	E12.7 8 DI7	/129.0	SUBSYSTEM 2_1_DC + Contactor K1 is on
SUBSYSTEM 2_1_DC -Contactor K7 is on	/129.1	DI8 9 E13.0	E13.1 10 DI9	/129.2	SUBSYSTEM 2_2_DC + Contactor K2 is on
SUBSYSTEM 2_2_DC -Contactor K8 is on	/129.3	DI10 11 E13.2	E13.3 12 DI11	/129.4	SUBSYSTEM 2_3_DC + Contactor K3 is on
SUBSYSTEM 2_3_DC -Contactor K9 is on	/129.5	DI12 13 E13.4	E13.5 14 DI13	/129.6	SUBSYSTEM 2_3_DC + SPARE
SUBSYSTEM 2_DC -SPARE	/129.7	DI14 15 E13.6	E13.7 16 DI15	/129.8	SUBSYSTEM 2_1_DC FUSE OK
		24VDC L+	M 0VDC		

+CTRL_1.3-DI_03

/120.3

SUBSYSTEM 2_2_DC FUSE OK	/129.9	DI0 1 E14.0	E14.1 2 DI1	/130.0	SUBSYSTEM 3_1_DC + Contactor K1 is on
SUBSYSTEM 3_1_DC -Contactor K7 is on	/130.1	DI2 3 E14.2	E14.3 4 DI3	/130.2	SUBSYSTEM 3_2_DC + Contactor K2 is on
SUBSYSTEM 3_2_DC -Contactor K8 is on	/130.3	DI4 5 E14.4	E14.5 6 DI5	/130.4	SUBSYSTEM 3_3_DC + Contactor K3 is on
SUBSYSTEM 3_3_DC -Contactor K9 is on	/130.5	DI6 7 E14.6	E14.7 8 DI7	/130.6	SUBSYSTEM 3_DC + SPARE
SUBSYSTEM 3_DC -SPARE	/130.7	DI8 9 E15.0	E15.1 10 DI9	/130.8	SUBSYSTEM 2_DC FUSE OK
SUBSYSTEM 3_1_DC FUSE OK	/130.9	DI10 11 E15.2	E15.3 12 DI11	/131.0	SUBSYSTEM 4_1_DC + Contactor K1 is on
SUBSYSTEM 4_1_DC -Contactor K7 is on	/131.1	DI12 13 E15.4	E15.5 14 DI13	/131.2	SUBSYSTEM 4_2_DC + Contactor K2 is on
SUBSYSTEM 4_2_DC -Contactor K8 is on	/131.3	DI14 15 E15.6	E15.7 16 DI15	/131.4	SUBSYSTEM 4_3_DC + Contactor K3 is on
		24VDC L+	M 0VDC		

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+CTRL_1.3-DI_04

/120.4

SPARE	/133.1	DI0 1	E16.0	E16.1 2 DI1	/133.2	SPARE
SPARE	/133.3	DI2 3	E16.2	E16.3 4 DI3	/133.4	TRIP
Earthing switch in On Transformer 620V side	/133.9	DI4 5	E16.4	E16.5 6 DI5		
		DI6 7	E16.6	E16.7 8 DI7		
		DI8 9	E17.0	E17.1 10 DI9		
Fuse 230V AC for Container Air Conditioning	/133.6	DI10 11	E17.2	E17.3 12 DI11	/128.1	CB 2 Tripped ISLAND GRID
CB 2 ON ISLAND GRID	/128.2	DI12 13	E17.4	E17.5 14 DI13	/128.3	CB 2 OFF ISLAND GRID
FUSE AND LIGHTNING PROTECTION 2	/128.4	DI14 15	E17.6	E17.7 16 DI15	/182.5	FAN 2 HEAT EXCHANGER (OPTIONAL)
		24VDC L+		M 0VDC		

+CTRL_1.3-DI_05

/120.4

SUBSYSTEM 4_3_DC -Contactor K9 is on	/131.5	DI0 1	E18.0	E18.1 2 DI1	/131.6	SUBSYSTEM 4_DC + SPARE
SUBSYSTEM 4_DC -SPARE	/131.7	DI2 3	E18.2	E18.3 4 DI3	/131.8	SUBSYSTEM 3_2_DC FUSE OK
SUBSYSTEM 3_3_DC FUSE OK	/131.9	DI4 5	E18.4	E18.5 6 DI5	/132.0	
	/132.1	DI6 7	E18.6	E18.7 8 DI7	/132.2	
	/132.3	DI8 9	E19.0	E19.1 10 DI9	/132.4	
	/132.5	DI10 11	E19.2	E19.3 12 DI11	/132.6	
SUBSYSTEM 4_1_DC FUSE OK	/132.7	DI12 13	E19.4	E19.5 14 DI13	/132.8	SUBSYSTEM 4_2_DC FUSE OK
SUBSYSTEM 4_3_DC FUSE OK	/132.9	DI14 15	E19.6	E19.7 16 DI15		
		24VDC L+		M 0VDC		

+CTRL_1.3-DI_06

/120.4

Shut-down to BESS	/136.6	DI0 1	E20.0	E20.1 2 DI1		
		DI2 3	E20.2	E20.3 4 DI3		
		DI4 5	E20.4	E20.5 6 DI5		
		DI6 7	E20.6	E20.7 8 DI7		
incoming CB is open	/136.8	DI8 9	E21.0	E21.1 10 DI9	/136.9	cmd island mode
		DI10 11	E21.2	E21.3 12 DI11		
		DI12 13	E21.4	E21.5 14 DI13		
		DI14 15	E21.6	E21.7 16 DI15		
		24VDC L+		M 0VDC		

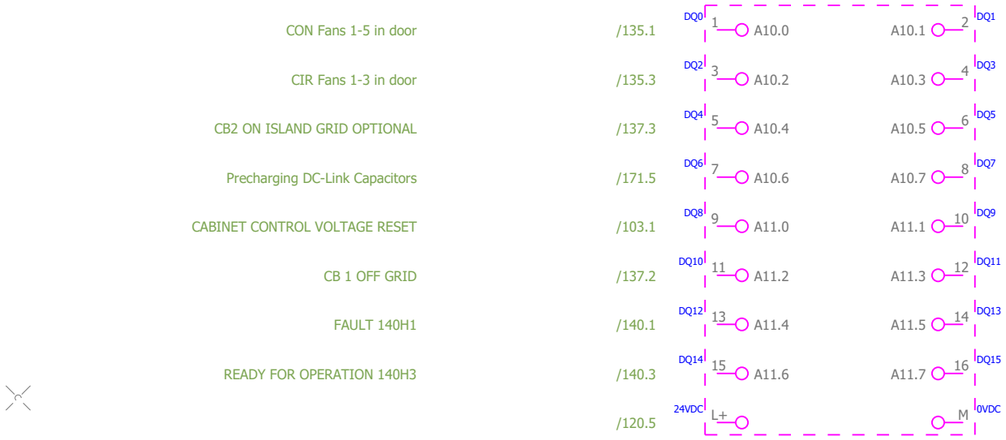
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Editor	Freqcon_JD			Statron		ET200SP DIGITAL INPUTS DI_04 + DI_05	20241203_V1.22	= UNIT_01	Converter Container 1	
Date	14.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 122
Date								+		total: 500

+CTRL_1.3-DO_01

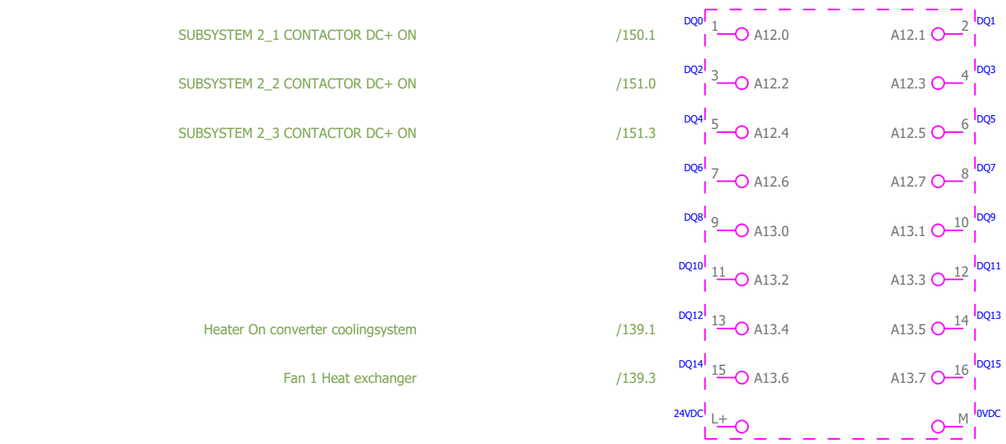
/120.5



CON Fans 1-5 in door	/135.1			/135.2	FAN 1 Control cabinet
CIR Fans 1-3 in door	/135.3			/135.4	SPARE 230V
CB2 ON ISLAND GRID OPTIONAL	/137.3			/137.4	CB 2 OFF ISLAND GRID OPTIONAL
Precharging DC-Link Capacitors	/171.5			/173.6	Discharge CON
CABINET CONTROL VOLTAGE RESET	/103.1			/137.1	CB1 ON GRID
CB 1 OFF GRID	/137.2			/189.1	GRID FAULT
FAULT 140H1	/140.1			/140.2	PREHEATING 140H2
READY FOR OPERATION 140H3	/140.3			/140.4	OPERATING 140H4
	/120.5			/120.5	

+CTRL_1.3-DO_02

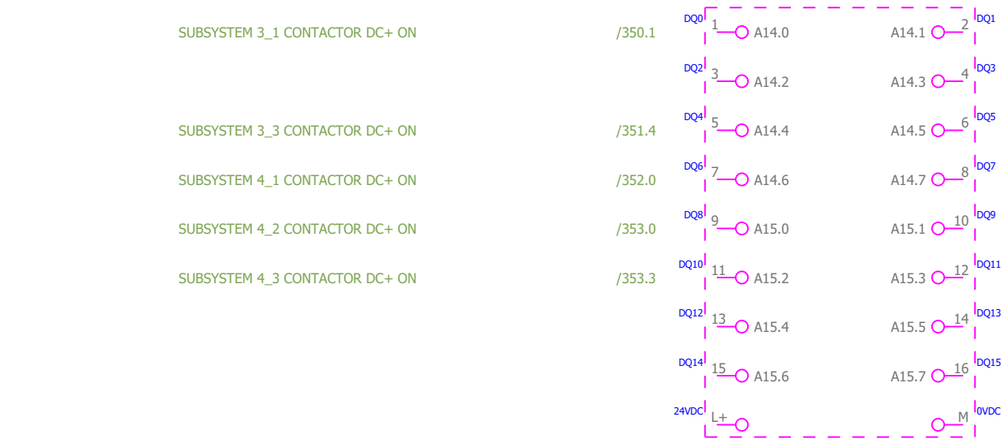
/120.5



SUBSYSTEM 2_1 CONTACTOR DC+ ON	/150.1			/150.3	SUBSYSTEM 2_1 CONTACTOR DC-ON
SUBSYSTEM 2_2 CONTACTOR DC+ ON	/151.0			/151.2	SUBSYSTEM 2_2 CONTACTOR DC-ON
SUBSYSTEM 2_3 CONTACTOR DC+ ON	/151.3			/151.5	SUBSYSTEM 2_3 CONTACTOR DC-ON
				/135.5	SPARE
				/139.4	Fan 2 Heat exchanger optional
Heater On converter coolingsystem	/139.1			/139.2	Pump converter coolingsystem
Fan 1 Heat exchanger	/139.3			/134.8	Reset the smoke detectors

+CTRL_1.3-DO_03

/120.5



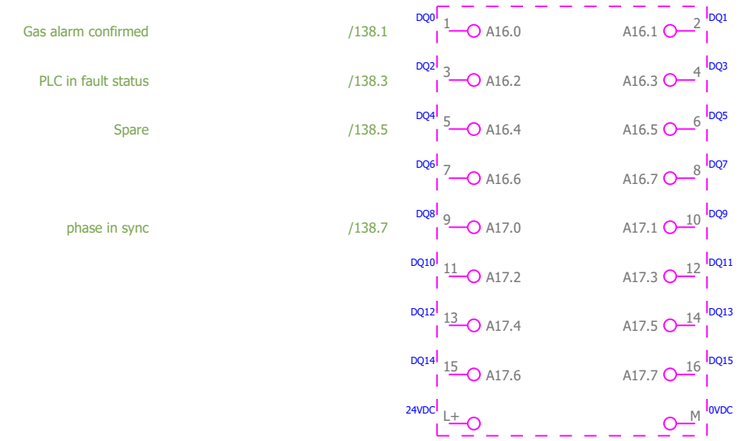
SUBSYSTEM 3_1 CONTACTOR DC+ ON	/350.1			/350.3	SUBSYSTEM 3_1 CONTACTOR DC-ON
SUBSYSTEM 3_3 CONTACTOR DC+ ON	/351.4			/351.5	SUBSYSTEM 3_3 CONTACTOR DC-ON
SUBSYSTEM 4_1 CONTACTOR DC+ ON	/352.0			/352.2	SUBSYSTEM 4_1 CONTACTOR DC-ON
SUBSYSTEM 4_2 CONTACTOR DC+ ON	/353.0			/353.2	SUBSYSTEM 4_2 CONTACTOR DC-ON
SUBSYSTEM 4_3 CONTACTOR DC+ ON	/353.3			/353.5	SUBSYSTEM 4_3 CONTACTOR DC-ON

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+CTRL_1.3-DO_04

/120.6



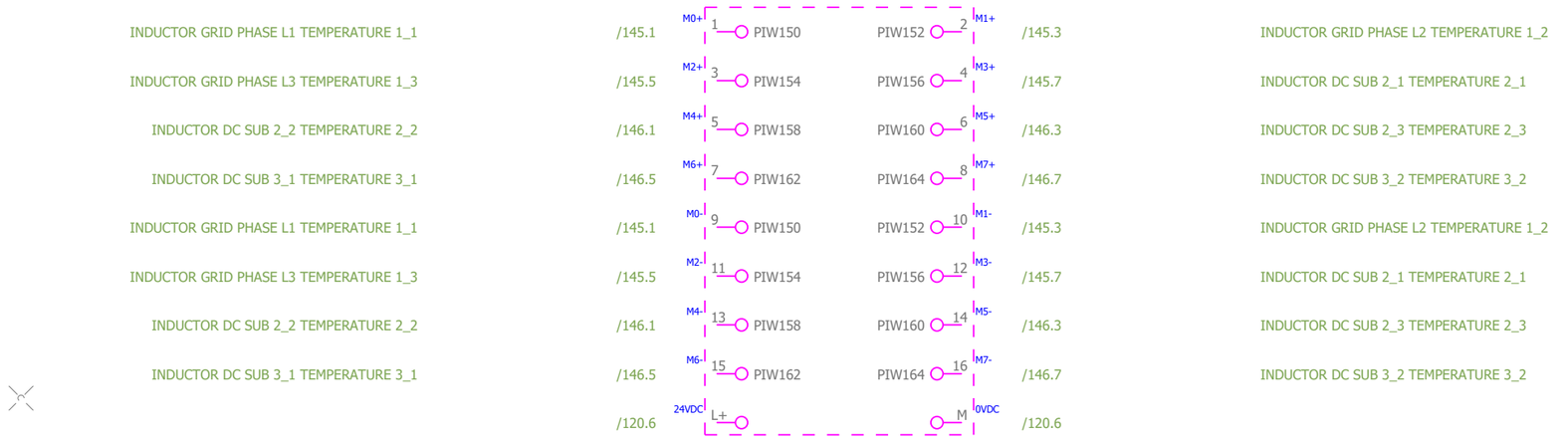
previous page: 123

next page: 124

Editor	Freqcon_JD			Statron	FREQCON	ET200SP DIGITAL OUTPUTS DO_01 - DO_03	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 123.a
Date								+	total: 500

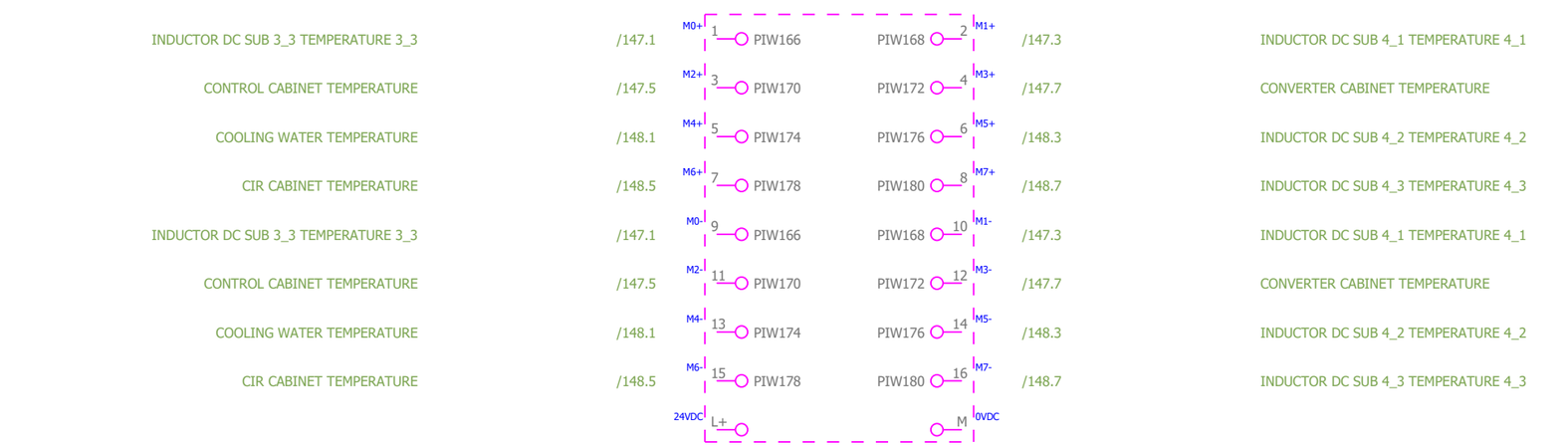
+CTRL_1.3-AI_01

/120.6



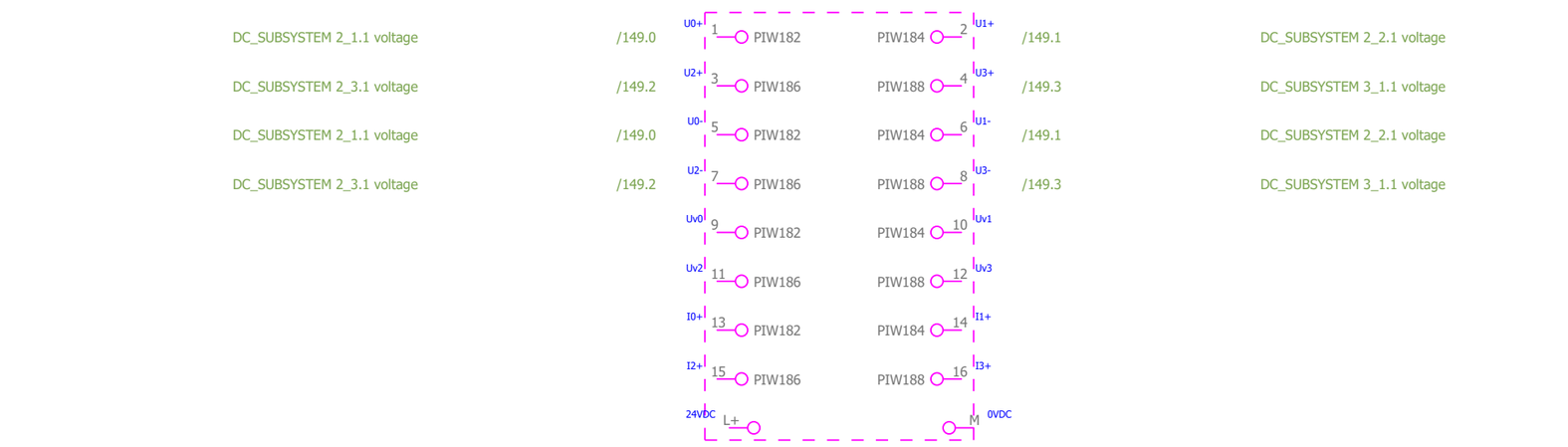
+CTRL_1.3-AI_02

/120.6



+CTRL_1.3-AI_03

/120.7



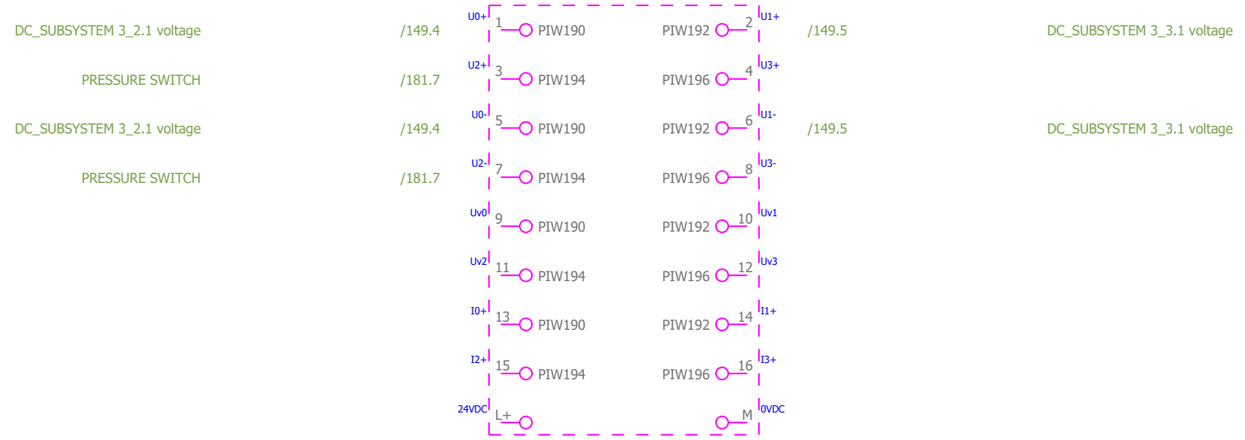
previous page: 123.a

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Editor	Freqcon_JD			Statron	FREQCON	ET200SP ANALOG INPUTS AI_01 - AI_03	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	14.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 124
Date								+	total: 500

+CTRL_1.3-AI_04

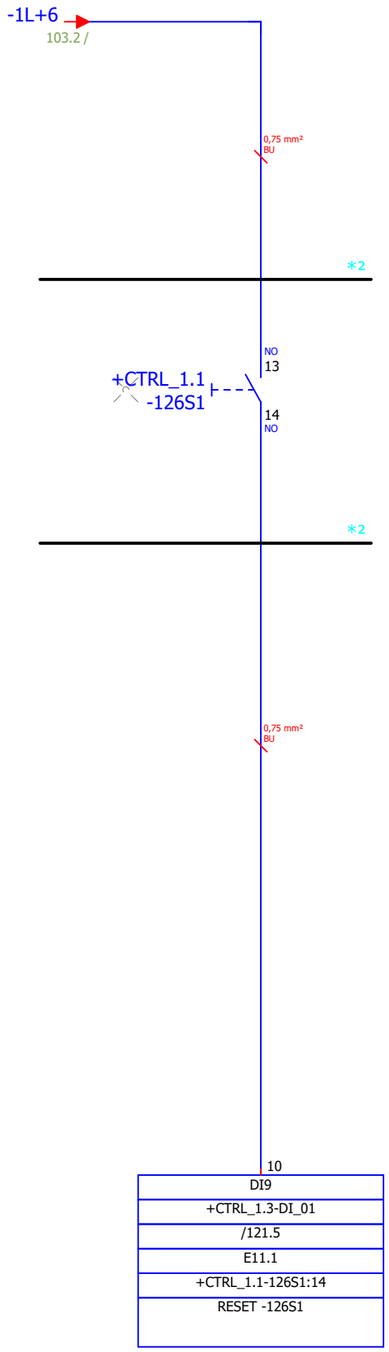
/120.7



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Editor	Freqcon_JD			Statron	FREQCON	ET200SP ANALOG INPUTS AI_04	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	14.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 125
Date								+	total: 500



RESET
-126S1

*2
The single conductor
must be placed
in the protective tube

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Editor	Freqcon_JD			Statron	FREQCON	INPUTS CONTROL ELEMENTS	20241203_V1.22	= UNIT_01	Converter Container 1	
Date	02.07.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 126
Date								+		total: 500

EC

3WL

++CONV

-CB1_TRIPPED / ++CONV/80.8

-CB1_ON_FB / ++CONV/80.7

-CB1_OFF_FB / ++CONV/80.7

-1F2 / ++CONV/78.9

-4L+5.4 / ++CONV/238a.2

-80W1
OZ-500
8x0,75 mm²

-238W7
OZ-500
2x0,75 mm²

-24V_Signal / 189.5

-4L+5.3 / 134.0

84F1_OK / 84.9

+CTRL_1.3
-X3

fB

bridge

0,75 mm²
BU

-4L+5 / 103.8

-4L+5.1 / 128.5

DI14	DI2	DI3	DI5	DI5
+CTRL_1.3-DI_02	+CTRL_1.3-DI_02			+CTRL_1.3-DI_01
/121.4	/121.4	/121.5	/121.5	/121.5
E12.4	E12.2	E12.3	E12.5	E10.5
++CONV+CIR-80Q1:X7_13	++CONV+CIR-80Q1:X6_11	++CONV+CIR-80Q1:X6_9	++CONV+AC_DC-78F1:13	+CTRL_1.3-84F1:12
CB 1 Tripped GRID	CB 1 ON GRID	CB 1 OFF GRID	FUSE AND LIGHTNING PROTECTION	LIGHTNING PROTECTION in Control Cabinet OPTIONAL

Info:
true = not fail,
false = cb tripped
CB = Circuit Breaker

CB 1 Tripped GRID

CB 1 ON GRID

CB 1 OFF GRID

FUSE AND LIGHTNING PROTECTION

LIGHTNING PROTECTION in Control Cabinet OPTIONAL

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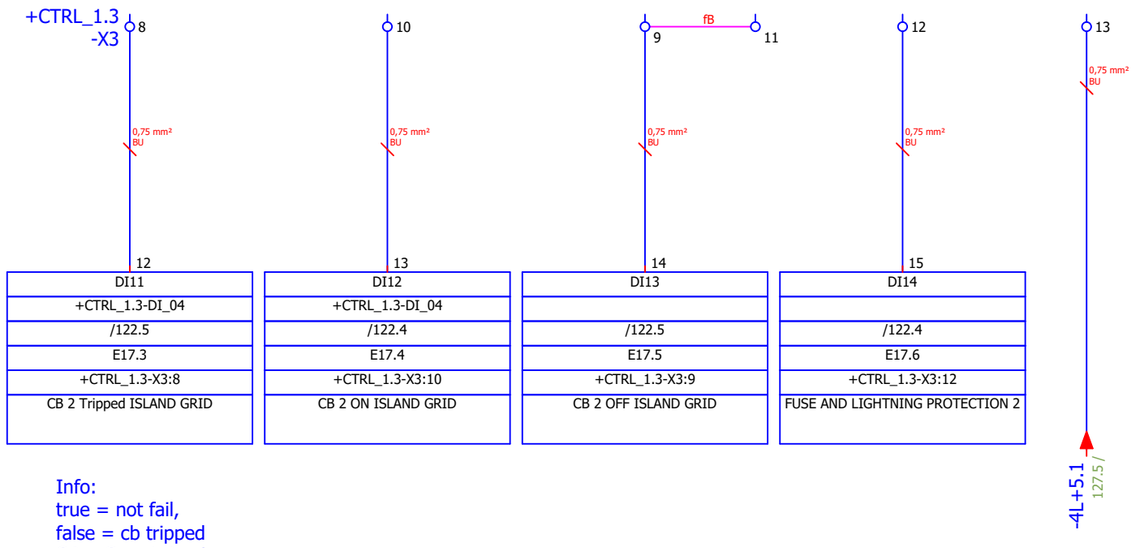
next page: 128

Editor	Freqcon_JD			Statron	FREQCON	DIGITAL INPUTS CB 1	20241203_V1.22	= UNIT_01	Converter Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets
Date								+	

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total: 500

0	1	2	3	4	5	6	7	8	9



Info:
true = not fail,
false = cb tripped
CB = Circuit Breaker

CB 2 Tripped ISLAND GRID

CB 2 ON ISLAND GRID

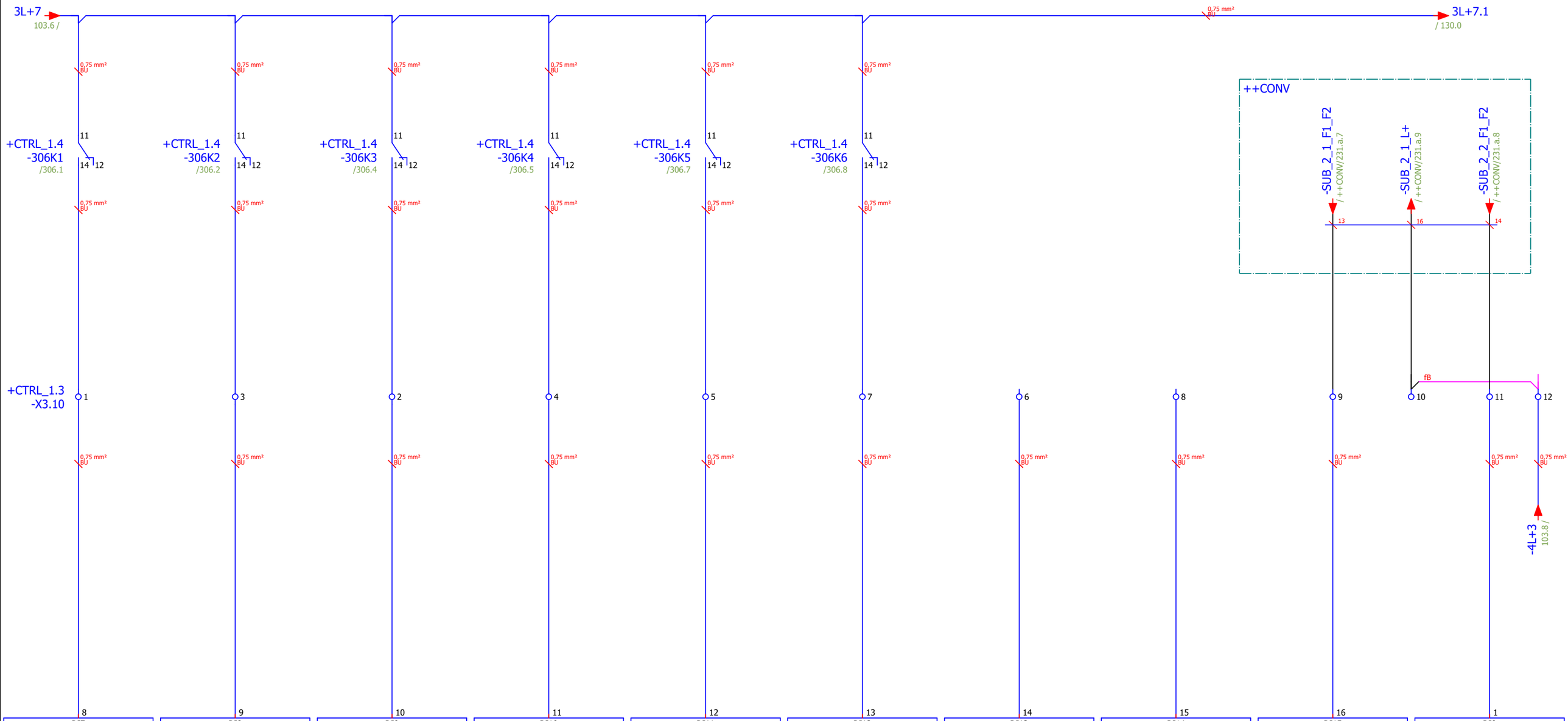
CB 2 OFF ISLAND GRID

FUSE AND LIGHTNING PROTECTION 2

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Editor	Freqcon_JD			Statron		DIGITAL INPUTS CB 2	20241203_V1.22	= UNIT_01	Converter Container 1	
Date	18.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 128
Date								+		total: 500



8	9	10	11	12	13	14	15	16	1
DI7	DI8	DI9	DI10	DI11	DI12	DI13	DI14	DI15	DI0
+CTRL_1.3-DI_02	+CTRL_1.3-DI_02	+CTRL_1.3-DI_02	+CTRL_1.3-DI_02	+CTRL_1.3-DI_02	+CTRL_1.3-DI_02	+CTRL_1.3-DI_02	+CTRL_1.3-DI_02	+CTRL_1.3-DI_02	+CTRL_1.3-DI_03
/121.5	/121.4	/121.5	/121.4	/121.5	/121.4	/121.5	/121.4	/121.5	/121.4
E12.7	E13.0	E13.1	E13.2	E13.3	E13.4	E13.5	E13.6	E13.7	E14.0
+CTRL_1.4-306K1:14	+CTRL_1.4-306K2:14	+CTRL_1.4-306K3:14	+CTRL_1.4-306K4:14	+CTRL_1.4-306K5:14	+CTRL_1.4-306K6:14	+CTRL_1.3-X3.10:6	+CTRL_1.3-X3.10:8	++CONV+CIR-231U1-F1:2	++CONV+CIR-231U1-F5:2
SUBSYSTEM 2_1_DC + Contactor K1 is on	SUBSYSTEM 2_1_DC -Contactor K7 is on	SUBSYSTEM 2_2_DC + Contactor K2 is on	SUBSYSTEM 2_2_DC -Contactor K8 is on	SUBSYSTEM 2_3_DC + Contactor K3 is on	SUBSYSTEM 2_3_DC -Contactor K9 is on	SUBSYSTEM 2_3_DC + SPARE	SUBSYSTEM 2_DC -SPARE	SUBSYSTEM 2_1_DC FUSE OK	SUBSYSTEM 2_2_DC FUSE OK

Feedback of DC Contactors

SUBSYSTEM 2_1_DC + Contactor K1 is on

SUBSYSTEM 2_1_DC - Contactor K7 is on

SUBSYSTEM 2_2_DC + Contactor K2 is on

SUBSYSTEM 2_2_DC - Contactor K8 is on

SUBSYSTEM 2_3_DC + Contactor K3 is on

SUBSYSTEM 2_3_DC - Contactor K9 is on

SUBSYSTEM 2_3_DC + SPARE

SUBSYSTEM 2_DC - SPARE

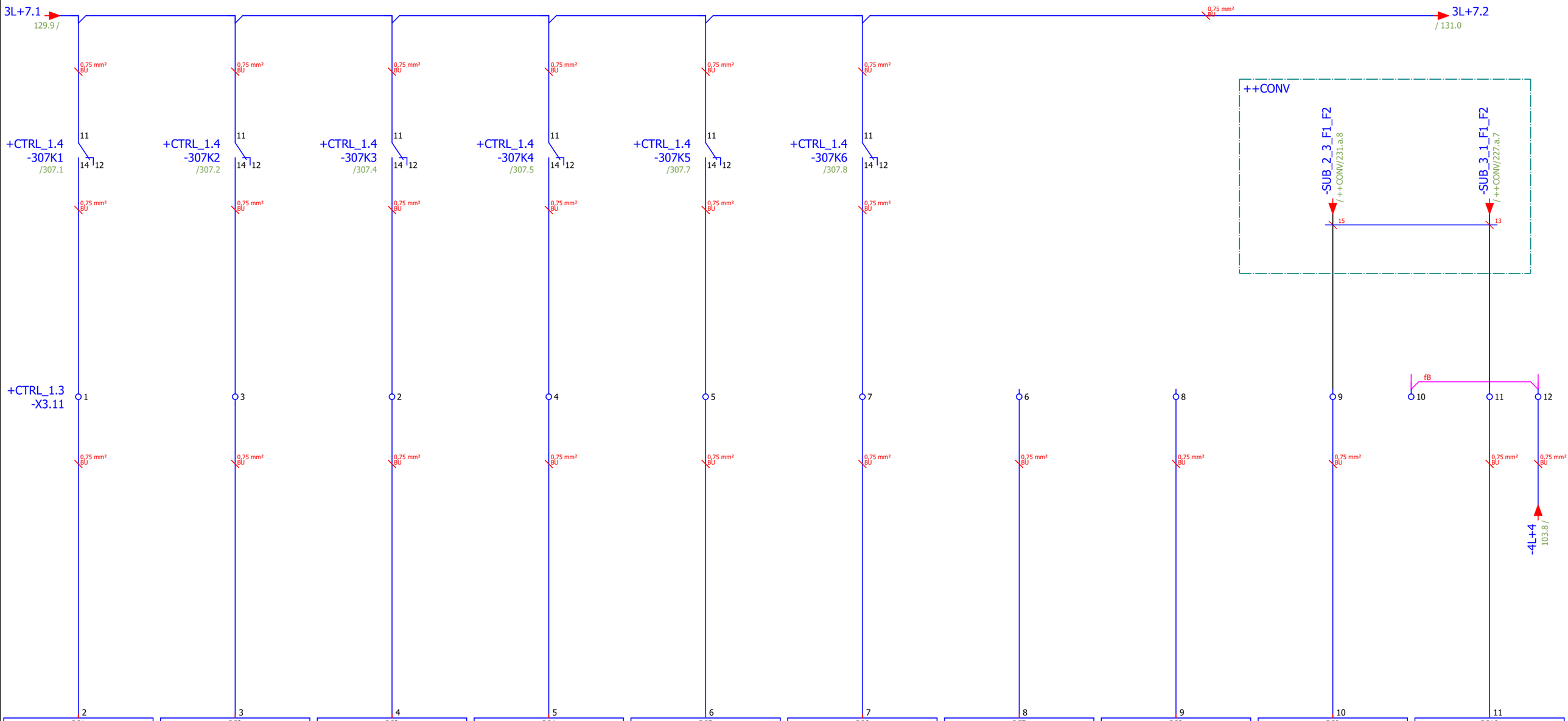
SUBSYSTEM 2_1_DC FUSE OK

SUBSYSTEM 2_2_DC FUSE OK

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Editor	Freqcon_JD			Statron	FREQCON	DIGITAL INPUTS SUBSYSTEM 2_1 / 2_2	20241203_V1.22	= UNIT_01 Converter Container 1
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets page: 129
Date								+ total: 500



2	3	4	5	6	7	8	9	10	11
DI1	DI2	DI3	DI4	DI5	DI6	DI7	DI8	DI9	DI10
+CTRL_1.3-DI_03	+CTRL_1.3-DI_03	+CTRL_1.3-DI_03	+CTRL_1.3-DI_03	+CTRL_1.3-DI_03	+CTRL_1.3-DI_03	+CTRL_1.3-DI_03	+CTRL_1.3-DI_03	+CTRL_1.3-DI_03	+CTRL_1.3-DI_03
/121.5	/121.4	/121.5	/121.4	/121.5	/121.4	/121.5	/121.4	/121.5	/121.4
E14.1	E14.2	E14.3	E14.4	E14.5	E14.6	E14.7	E15.0	E15.1	E15.2
+CTRL_1.4-307K1:14	+CTRL_1.4-307K2:14	+CTRL_1.4-307K3:14	+CTRL_1.4-307K4:14	+CTRL_1.4-307K5:14	+CTRL_1.4-307K6:14	+CTRL_1.3-X3.11:6	+CTRL_1.3-X3.11:8	++CONV+CIR-231U1-F9:2	++CONV+CIR-227U1-F1:2
SUBSYSTEM 3_1_DC + Contactor K1 is on	SUBSYSTEM 3_1_DC -Contactor K7 is on	SUBSYSTEM 3_2_DC + Contactor K2 is on	SUBSYSTEM 3_2_DC -Contactor K8 is on	SUBSYSTEM 3_3_DC + Contactor K3 is on	SUBSYSTEM 3_3_DC -Contactor K9 is on	SUBSYSTEM 3_DC + SPARE	SUBSYSTEM 3_DC -SPARE	SUBSYSTEM 2_DC FUSE OK	SUBSYSTEM 3_1_DC FUSE OK

Feedback of DC Contactors

SUBSYSTEM 3_1_DC + Contactor K1 is on

SUBSYSTEM 3_1_DC - Contactor K7 is on

SUBSYSTEM 3_2_DC + Contactor K2 is on

SUBSYSTEM 3_2_DC - Contactor K8 is on

SUBSYSTEM 3_3_DC + Contactor K3 is on

SUBSYSTEM 3_3_DC - Contactor K9 is on

SUBSYSTEM 3_DC + SPARE

SUBSYSTEM 3_DC - SPARE

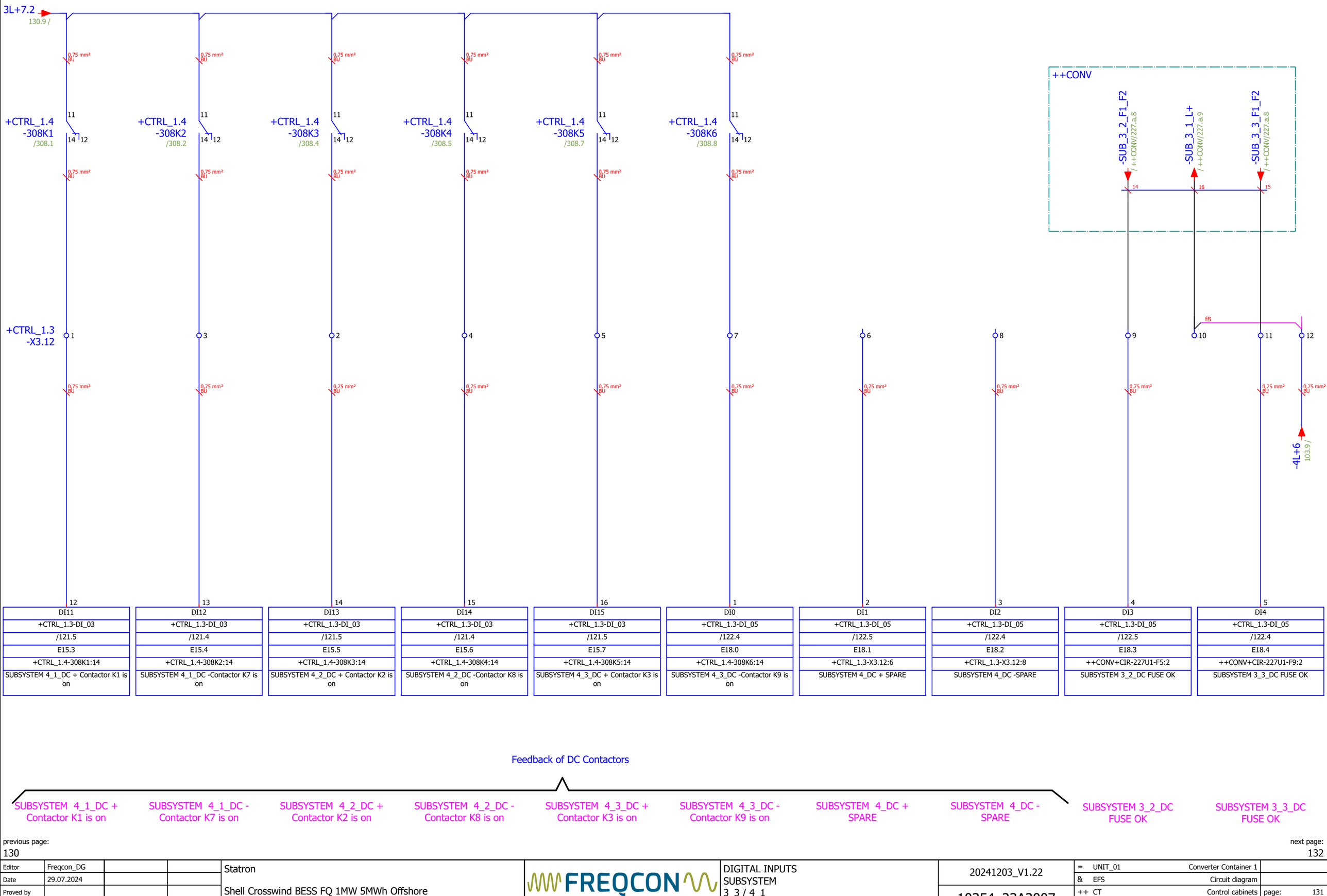
SUBSYSTEM 2_DC FUSE OK

SUBSYSTEM 3_1_DC FUSE OK

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Editor	Freqcon_JD			Statron	FREQCON	DIGITAL INPUTS SUBSYSTEM 2_3 / 3_1	20241203_V1.22	= UNIT_01 Converter Container 1
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets page: 130
Date								+ total: 500



Feedback of DC Contactors

SUBSYSTEM 4_1_DC + Contactor K1 is on

SUBSYSTEM 4_1_DC - Contactor K7 is on

SUBSYSTEM 4_2_DC + Contactor K2 is on

SUBSYSTEM 4_2_DC - Contactor K8 is on

SUBSYSTEM 4_3_DC + Contactor K3 is on

SUBSYSTEM 4_3_DC - Contactor K9 is on

SUBSYSTEM 4_DC + SPARE

SUBSYSTEM 4_DC - SPARE

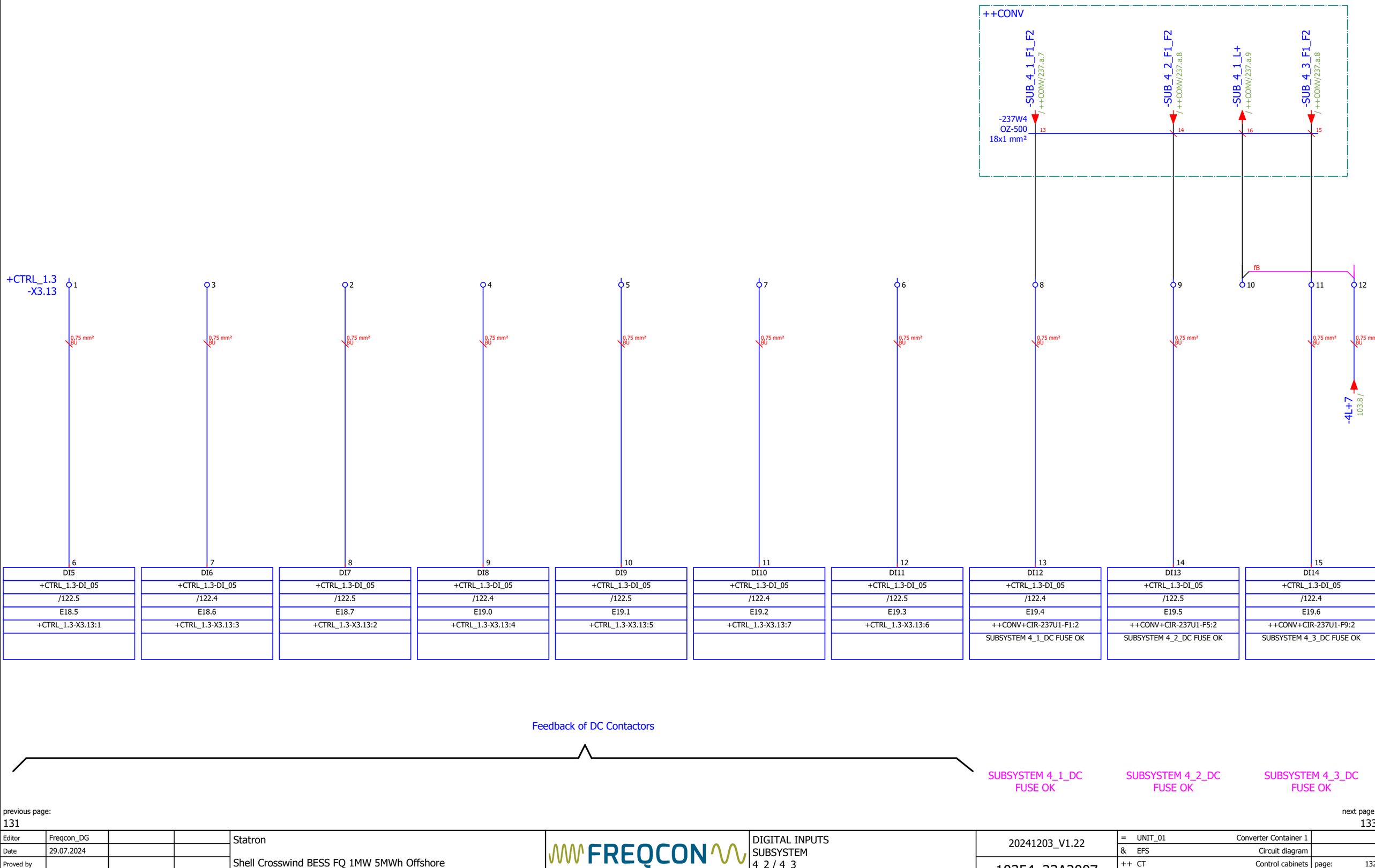
SUBSYSTEM 3_2_DC FUSE OK

SUBSYSTEM 3_3_DC FUSE OK

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Editor	Freqcon_DG			Statron	FREQCON	DIGITAL INPUTS SUBSYSTEM 3_3 / 4_1	20241203_V1.22	= UNIT_01 Converter Container 1
Date	29.07.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets page: 131
Date								+ total: 500



Feedback of DC Contactors

SUBSYSTEM 4_1_DC FUSE OK

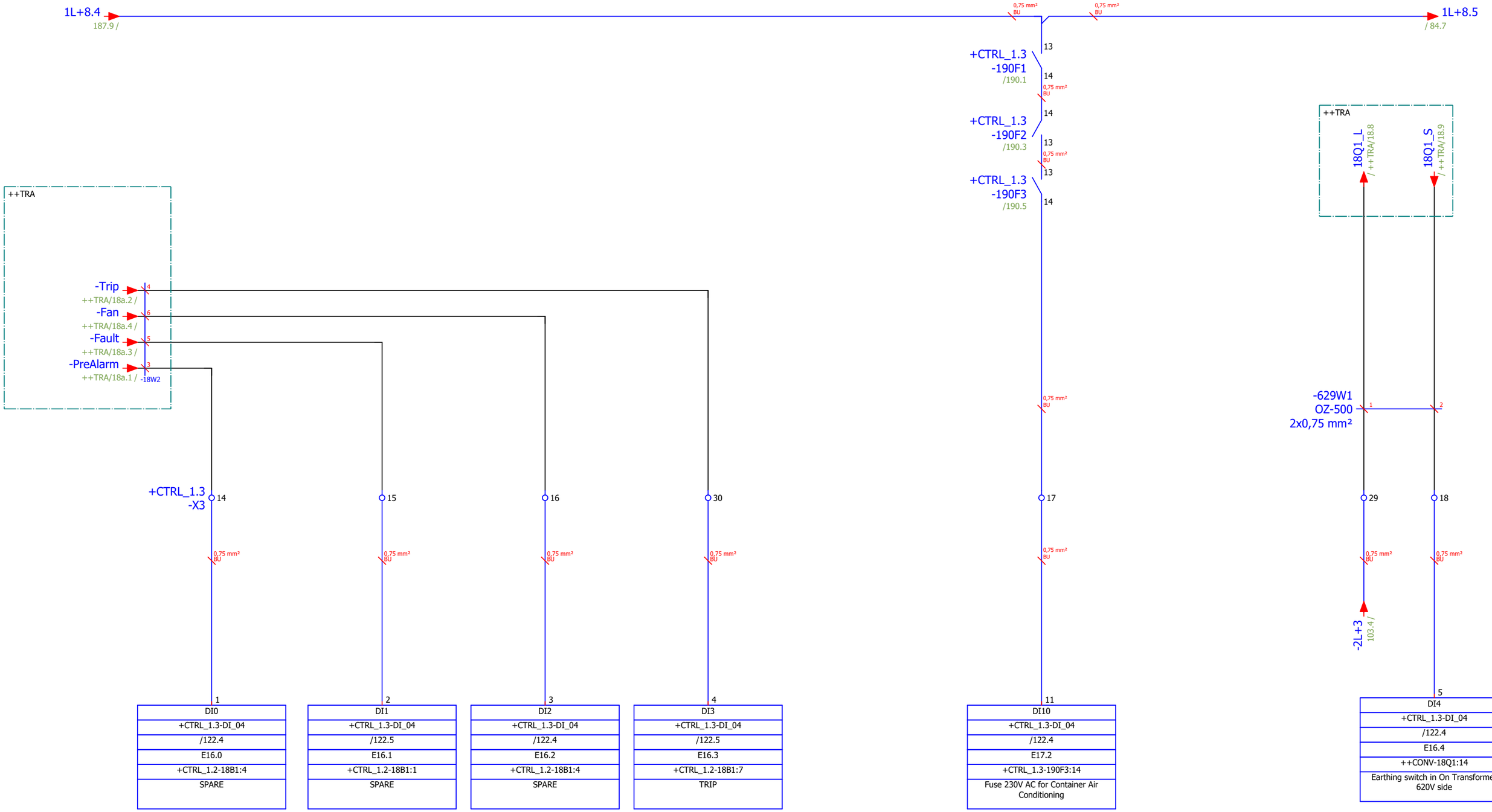
SUBSYSTEM 4_2_DC FUSE OK

SUBSYSTEM 4_3_DC FUSE OK

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Editor	Freqcon_DG			Statron	FREQCON	DIGITAL INPUTS SUBSYSTEM 4_2 / 4_3	20241203_V1.22	= UNIT_01	Converter Container 1
Date	29.07.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets page: 132
Date								+	total: 500



SPARE

SPARE

SPARE

TRIP

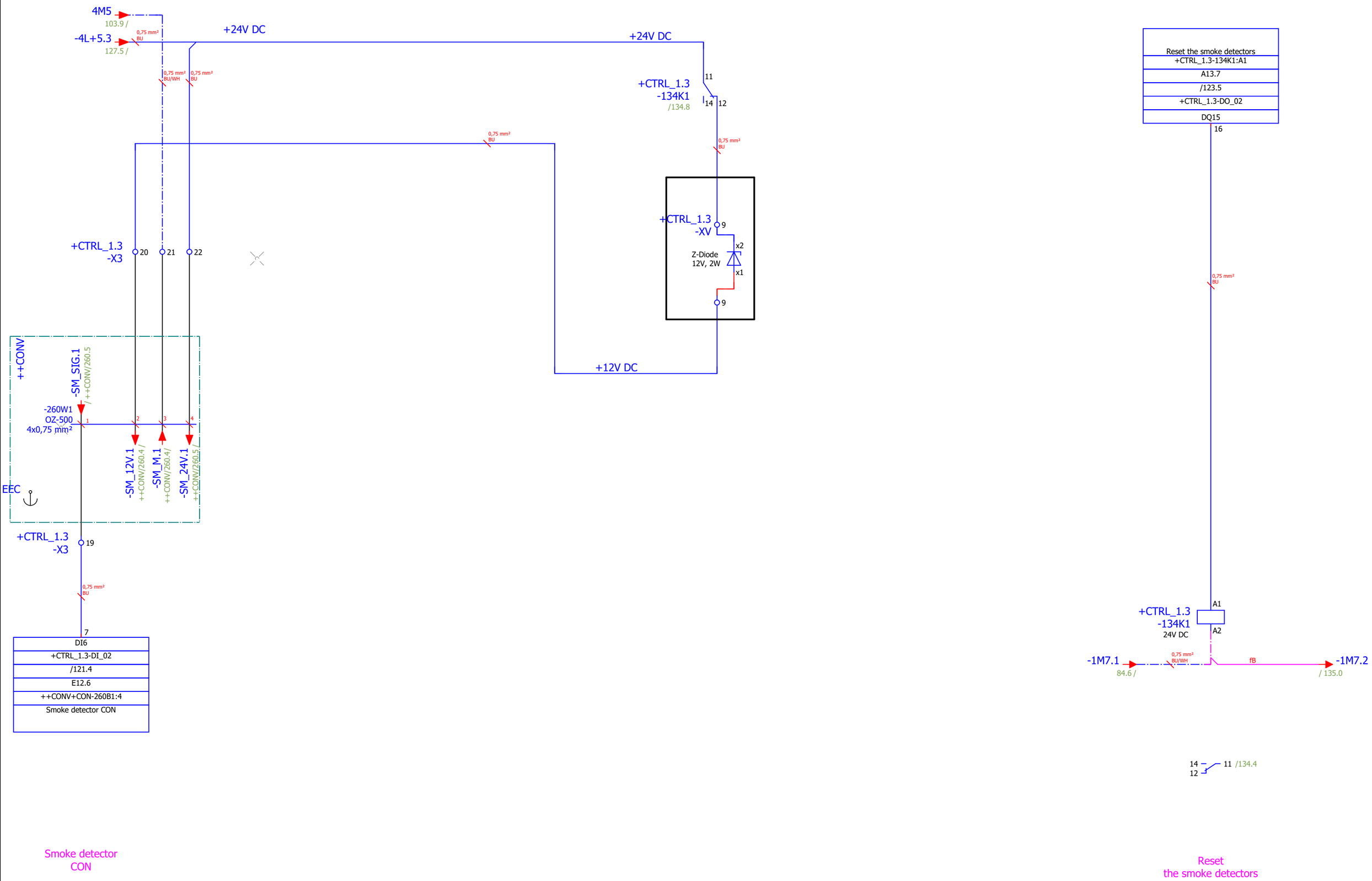
Fuse 230V AC for Container Air Conditioning

Earthing switch in On Transformer 620V side

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Editor	Freqcon_DG			Statron	FREQCON	DIGITAL INPUTS SPARE	20241203_V1.22	= UNIT_01	Converter Container 1
Date	05.11.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets page: 133
Date								+	total: 500



Smoke detector CON

Reset the smoke detectors

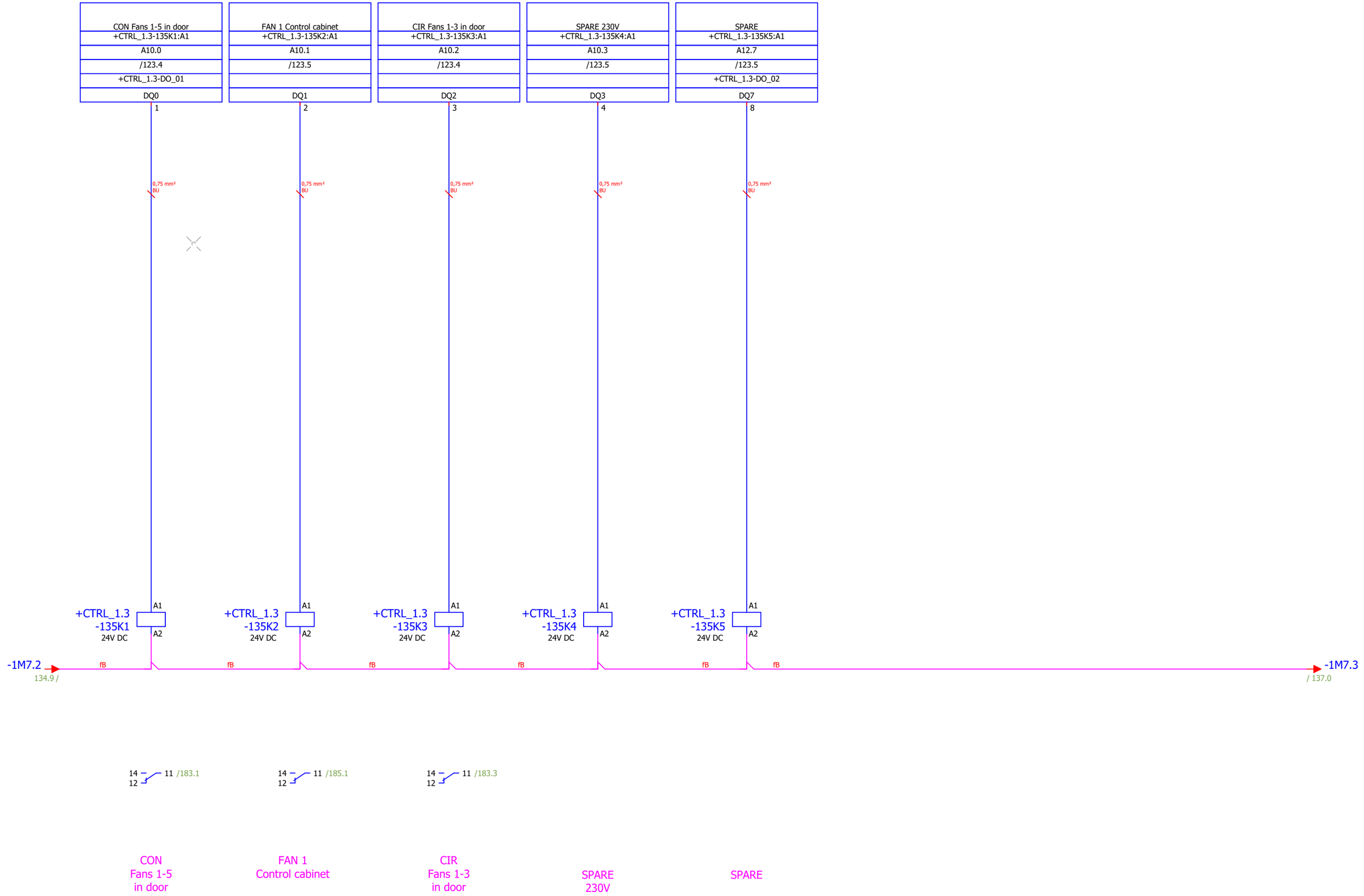
previous page: 133

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Editor	Freqcon_JD			Statron	FREQCON	DIGITAL INPUTS SMOKE DETECTORS	20241203_V1.22	= UNIT_01	Converter Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets
Date								+	

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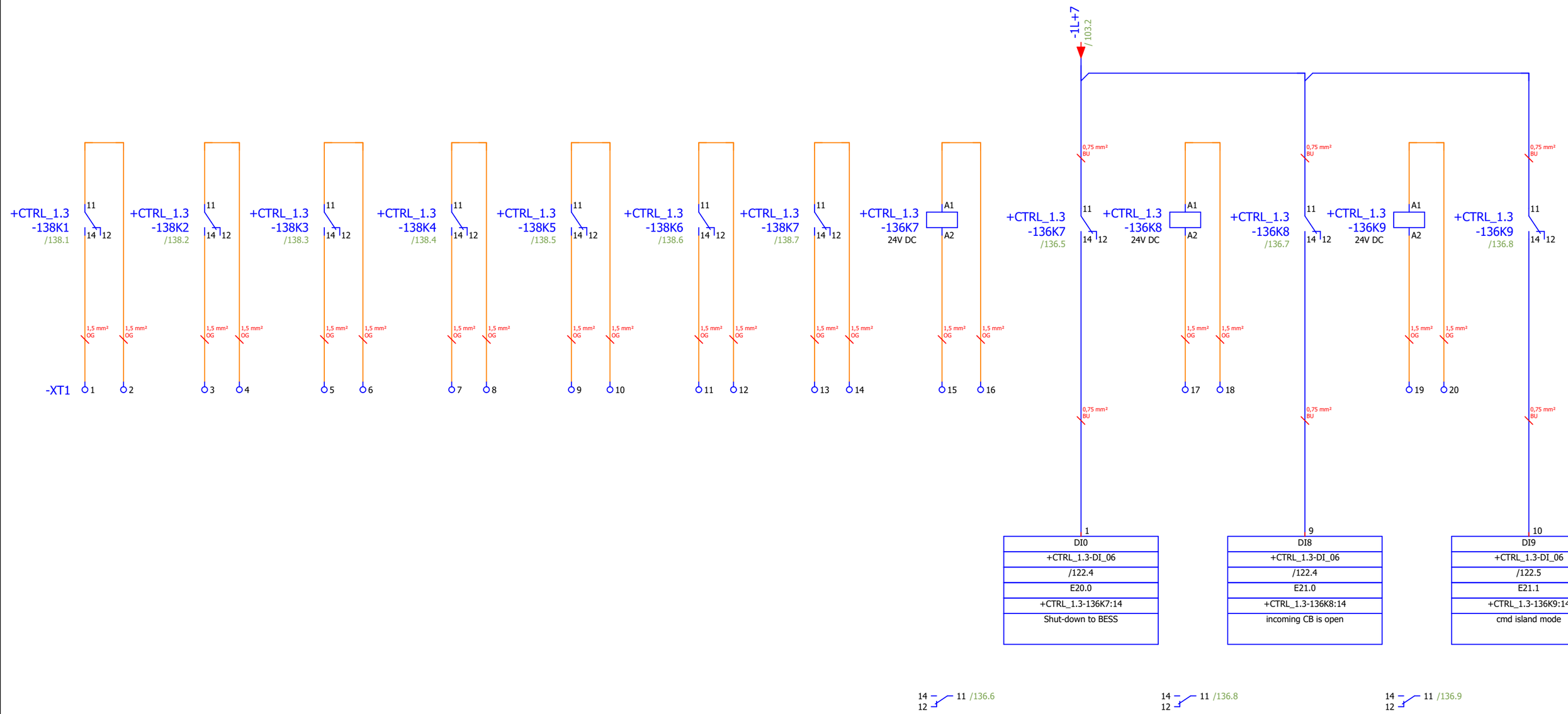
total: 500



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Editor	Freqcon_JD			Statron	FREQCON	OUTPUTS FAN	20241203_V1.22	= UNIT_01	Converter Container 1
Date	19.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets page: 135
Date								+	total: 500

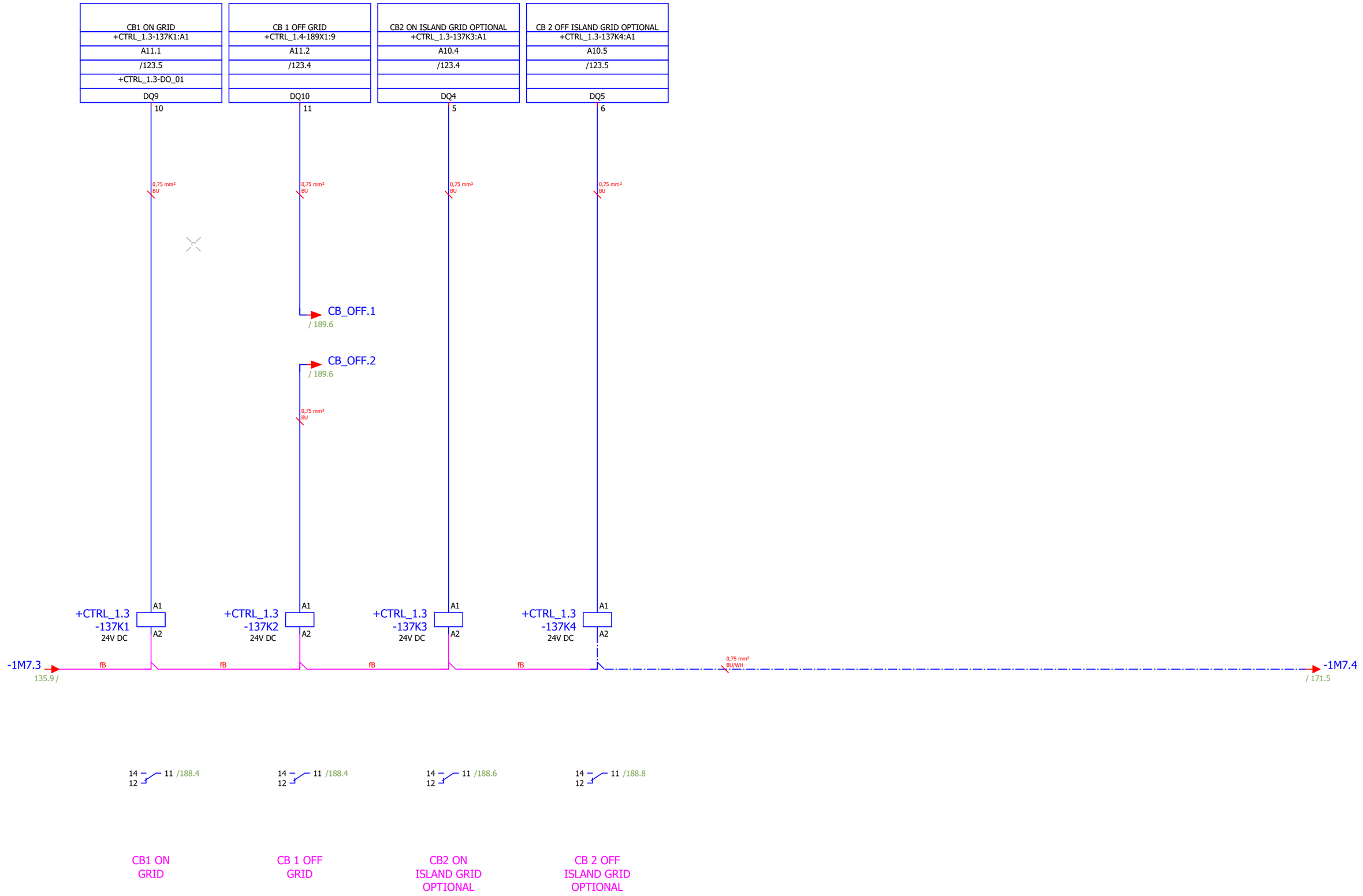


Gas confirmed FGS | Smoke confirmed FGS | PLC fault status SIS | Thermal runaway SIS | Spare | Spare | phase in sync | Shut-down to BESS | Shut-down to BESS | incoming CB is openincoming CB is open | cmd island mode | cmd island mode

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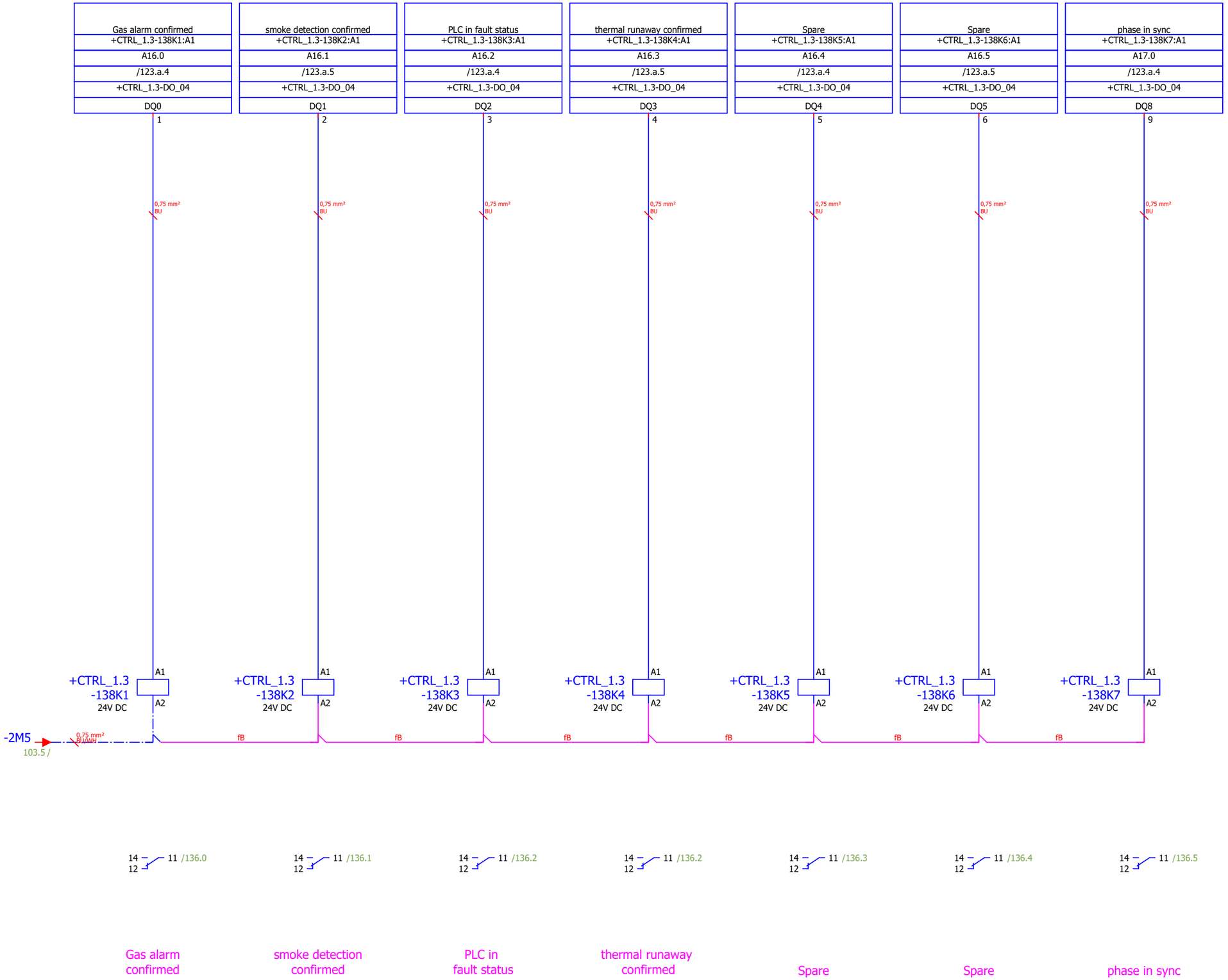
Editor	Freqcon_DG			Statron	FREQCON	OUTPUTS COMMUNICATION	20241203_V1.22	= UNIT_01 Converter Container 1
Date	12.09.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets page: 136
Date								+ total: 500



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Editor	Freqcon_JD			Statron	FREQCON	OUTPUTS CIRCUIT BREAKER	20241203_V1.22	= UNIT_01	Converter Container 1	
Date	18.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 137
Date								+		total: 500

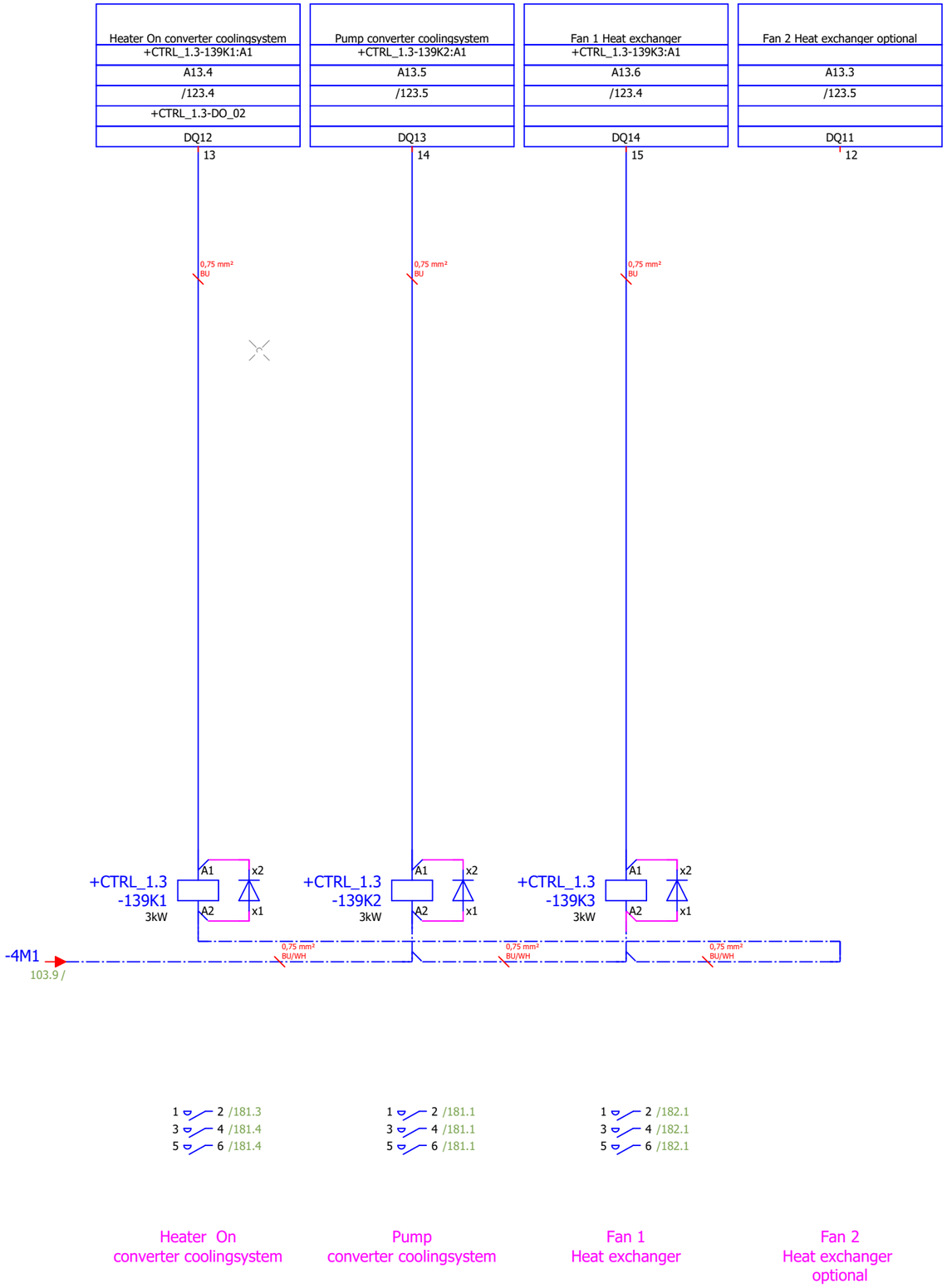


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Editor	Freqcon_JD			Statron	FREQCON	OUTPUTS CONTROL ELEMENTS	20241203_V1.22	= UNIT_01	Converter Container 1	
Date	03.07.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 138
Date								+		total: 500

0	1	2	3	4	5	6	7	8	9

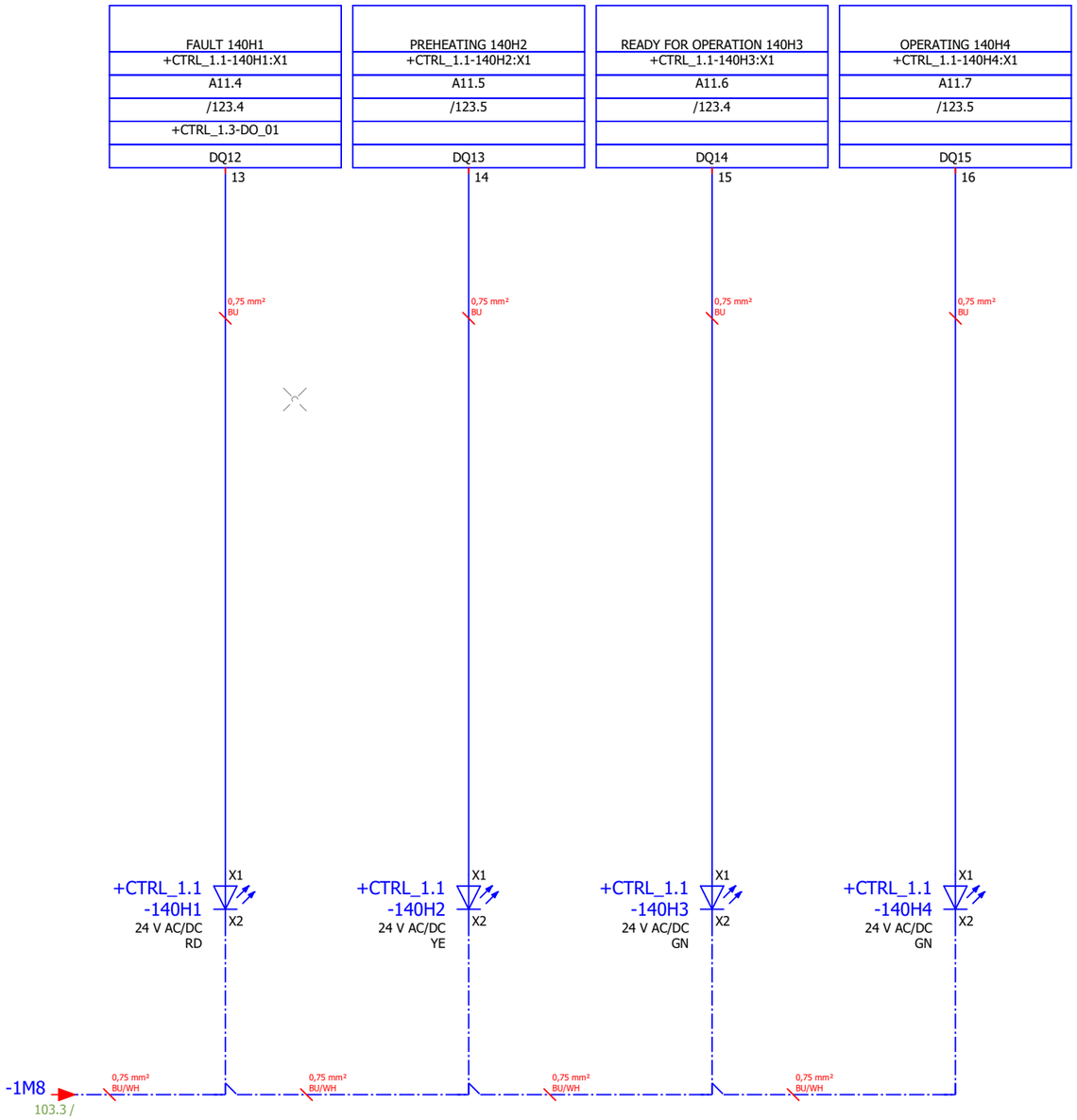


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Editor	Freqcon_JD			Statron	FREQCON	OUTPUTS COOLING	20241203_V1.22	= UNIT_01	Converter Container 1
Date	14.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets
Date								+	

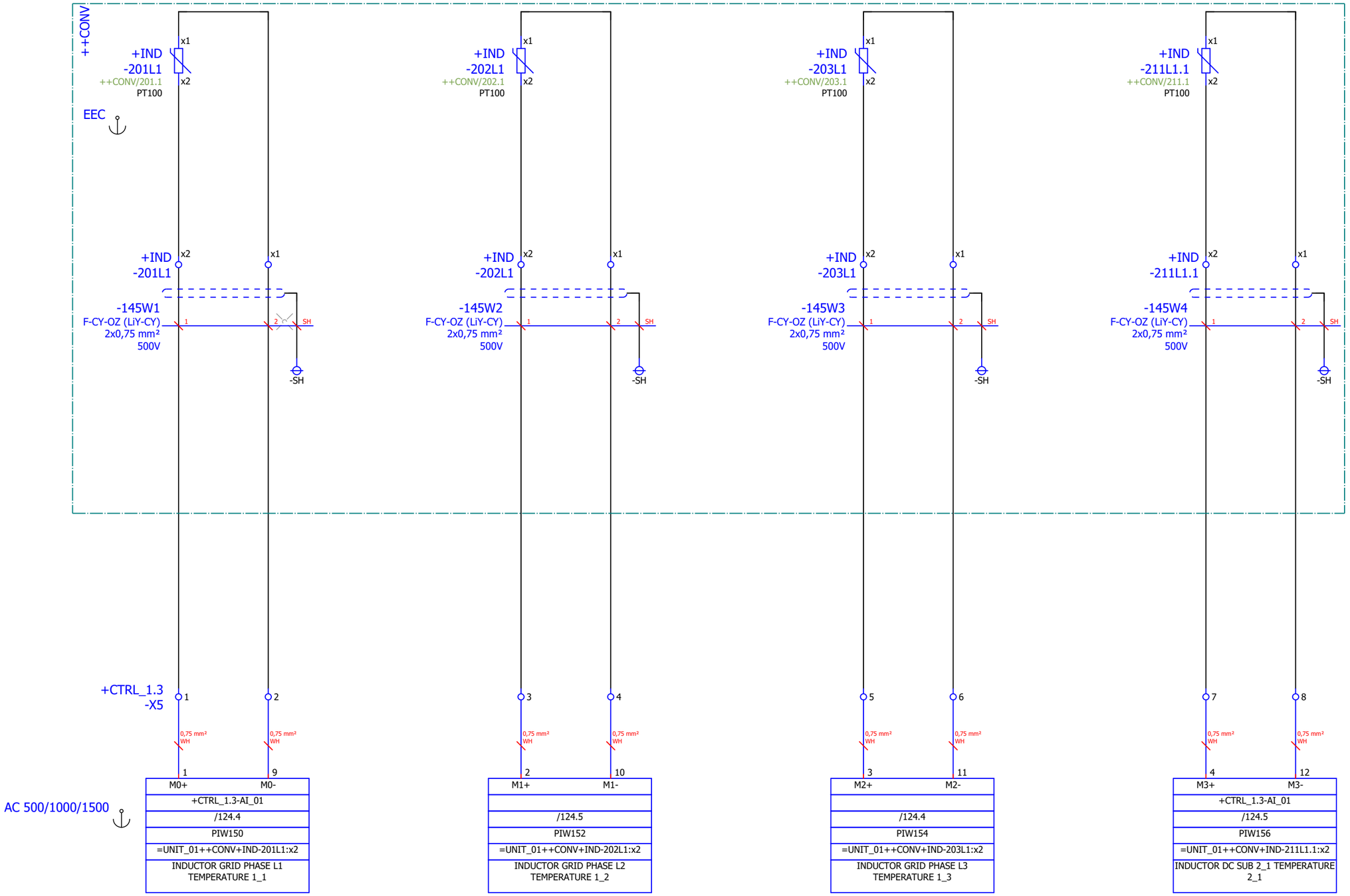
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total: 500



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Editor	Freqcon_JD			Statron	FREQCON	OUTPUTS CONTROL ELEMENTS	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	14.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 140
Date								+	total: 500



INDUCTOR GRID PHASE L1 TEMPERATURE 1_1

INDUCTOR GRID PHASE L2 TEMPERATURE 1_2

INDUCTOR GRID PHASE L3 TEMPERATURE 1_3

INDUCTOR DC SUB 2_1 TEMPERATURE 2_1

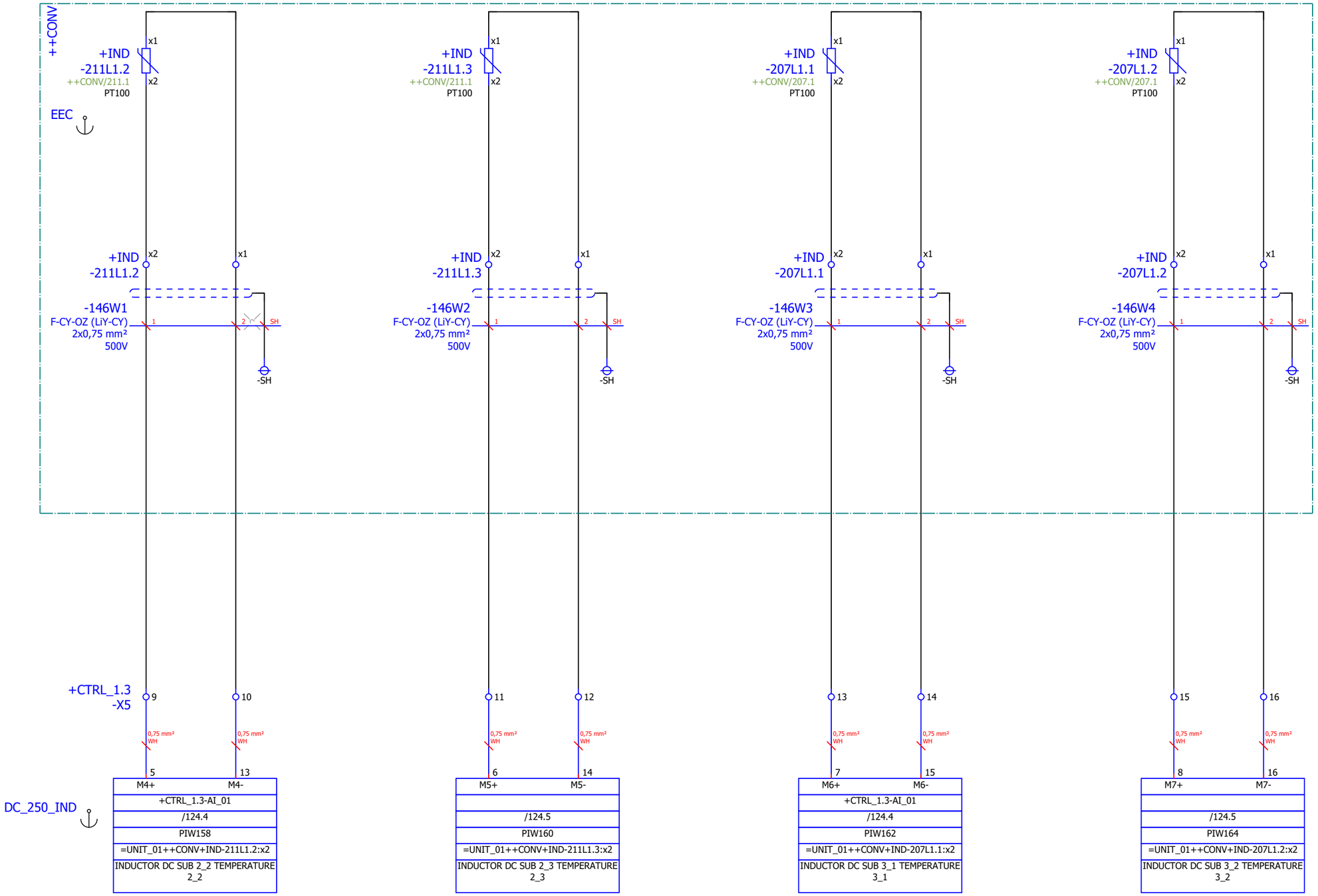
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Editor	Freqcon_JD			Statron	FREQCON	ANALOG INPUTS (TEMPERATURE SUBSYSTEM 1_1 -1_3)	20241203_V1.22	= UNIT_01	Converter Container 1
Date	14.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets
Date								+	

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INDUCTOR
DC SUB 2_2
TEMPERATURE 2_2

INDUCTOR
DC SUB 2_3
TEMPERATURE 2_3

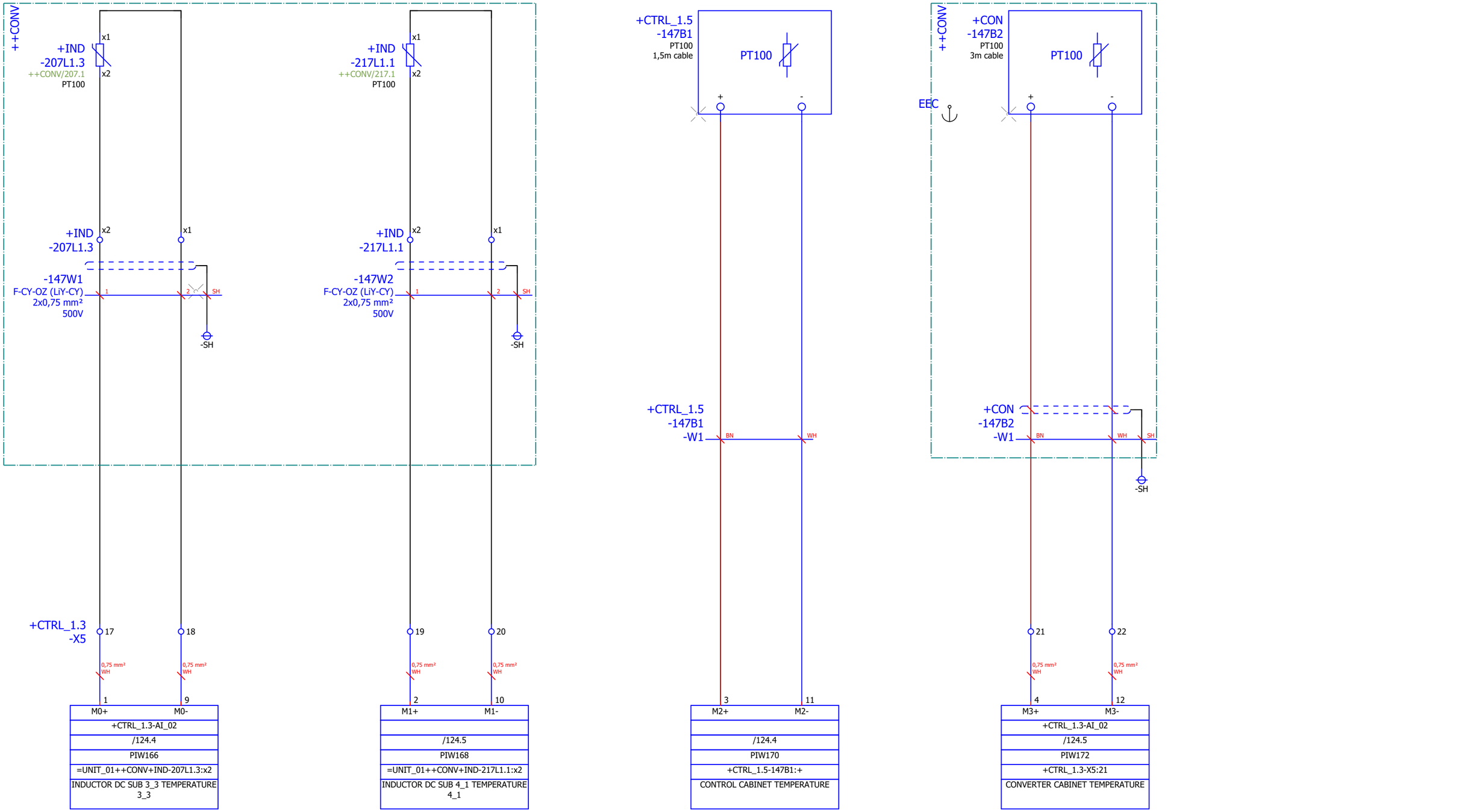
INDUCTOR
DC SUB 3_1
TEMPERATURE 3_1

INDUCTOR
DC SUB 3_2
TEMPERATURE 3_2

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Editor	Freqcon_JD			Statron	FREQCON	ANALOG INPUTS (TEMPERATURE SUBSYSTEM 1_4 -1_6)	20241203_V1.22	= UNIT_01	Converter Container 1	
Date	18.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 146
Date								+		total: 500



INDUCTOR DC SUB 3_3 TEMPERATURE 3_3

INDUCTOR DC SUB 4_1 TEMPERATURE 4_1

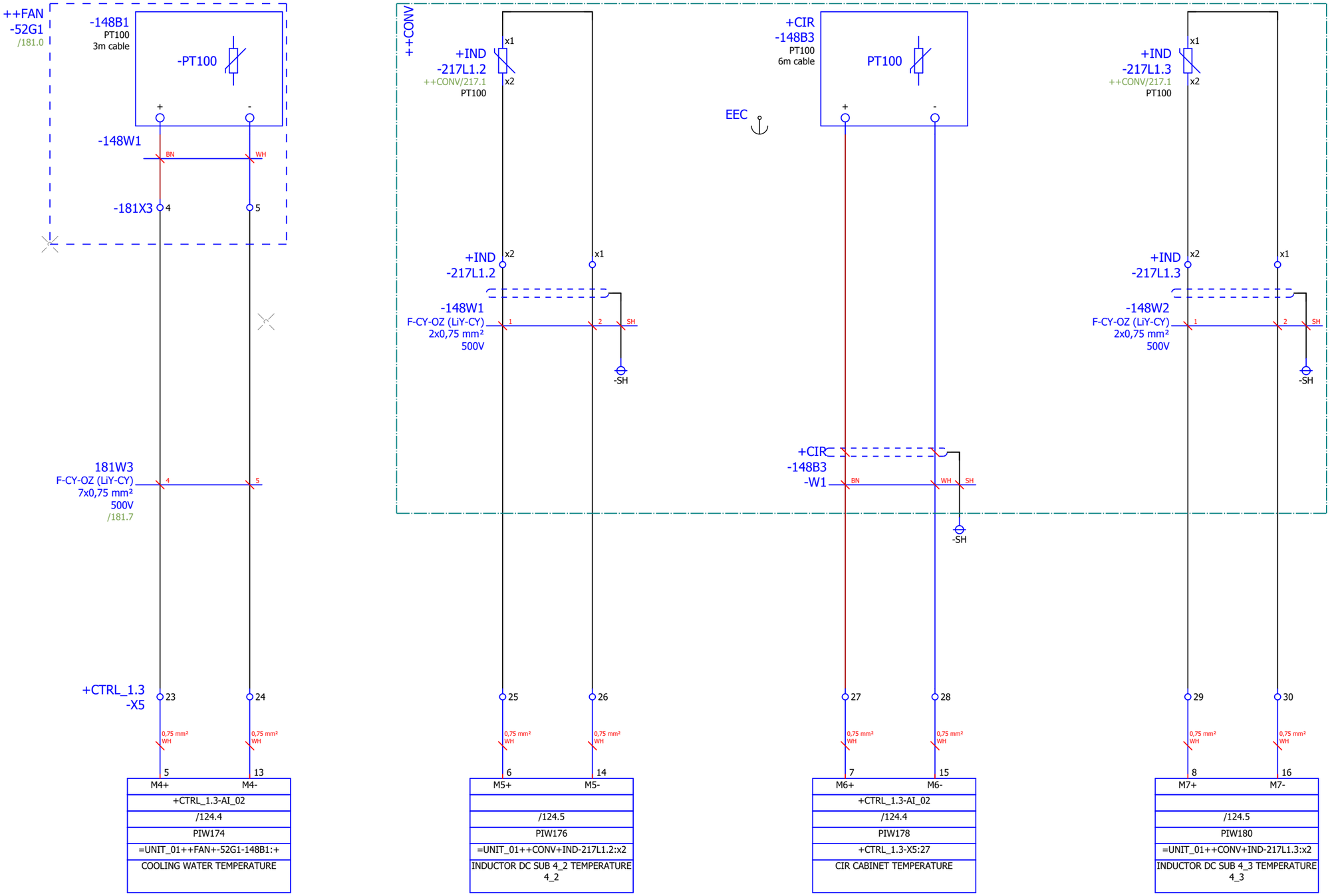
CONTROL CABINET TEMPERATURE

CONVERTER CABINET TEMPERATURE

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Editor	Freqcon_JD			Statron	FREQCON	ANALOG INPUTS CABINET TEMPERATURE	20241203_V1.22	= UNIT_01	Converter Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets page: 147
Date								+	total: 500



COOLING WATER TEMPERATURE

INDUCTOR DC SUB 4_2 TEMPERATURE 4_2

CIR CABINET TEMPERATURE

INDUCTOR DC SUB 4_3 TEMPERATURE 4_3

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Editor	Freqcon_JD			Statron	FREQCON	ANALOG INPUTS COOLING WATER TEMPERATURE	20241203_V1.22	= UNIT_01	Converter Container 1	
Date	18.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 148
Date								+		total: 500

-1M11
103.3 /

+CTRL_1.3
-X5.1

fB

1 2

0,75 mm² BU/WH

0,75 mm² WH

1	5	2	6	3	7	4	8	1	5	2	6
U0+	U0-	U1+	U1-	U2+	U2-	U3+	U3-	U0+	U0-	U1+	U1-
+CTRL_1.3-AI_03			+CTRL_1.3-AI_03				+CTRL_1.3-AI_04		+CTRL_1.3-AI_04		
/124.4	/124.5	/124.4	/124.5	/124.5	/125.4	/125.5					
PIW182	PIW184	PIW186	PIW188	PIW190	PIW192						
+CTRL_1.4-149U1:15	+CTRL_1.4-149U1:16	+CTRL_1.4-149U1:17	+CTRL_1.4-149U1:20	+CTRL_1.4-149U1:19	+CTRL_1.4-149U1:18						
DC_SUBSYSTEM 2_1.1 voltage	DC_SUBSYSTEM 2_2.1 voltage	DC_SUBSYSTEM 2_3.1 voltage	DC_SUBSYSTEM 3_1.1 voltage	DC_SUBSYSTEM 3_2.1 voltage	DC_SUBSYSTEM 3_3.1 voltage						

+CTRL_1.4
-149U1
PXC.2959609

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27

Adapter Sub-D 25 Pin Buchse
Terminalblock 27 Pin

25-POL SUB-D SOCKET

11X3

-149W1
pre-assembled D-Sub cable 1:1
/162.7
/ 162.9

HVIO_AN

DC_SUBSYSTEM 2_1.1 voltage

DC_SUBSYSTEM 2_2.1 voltage

DC_SUBSYSTEM 2_3.1 voltage

DC_SUBSYSTEM 3_1.1 voltage

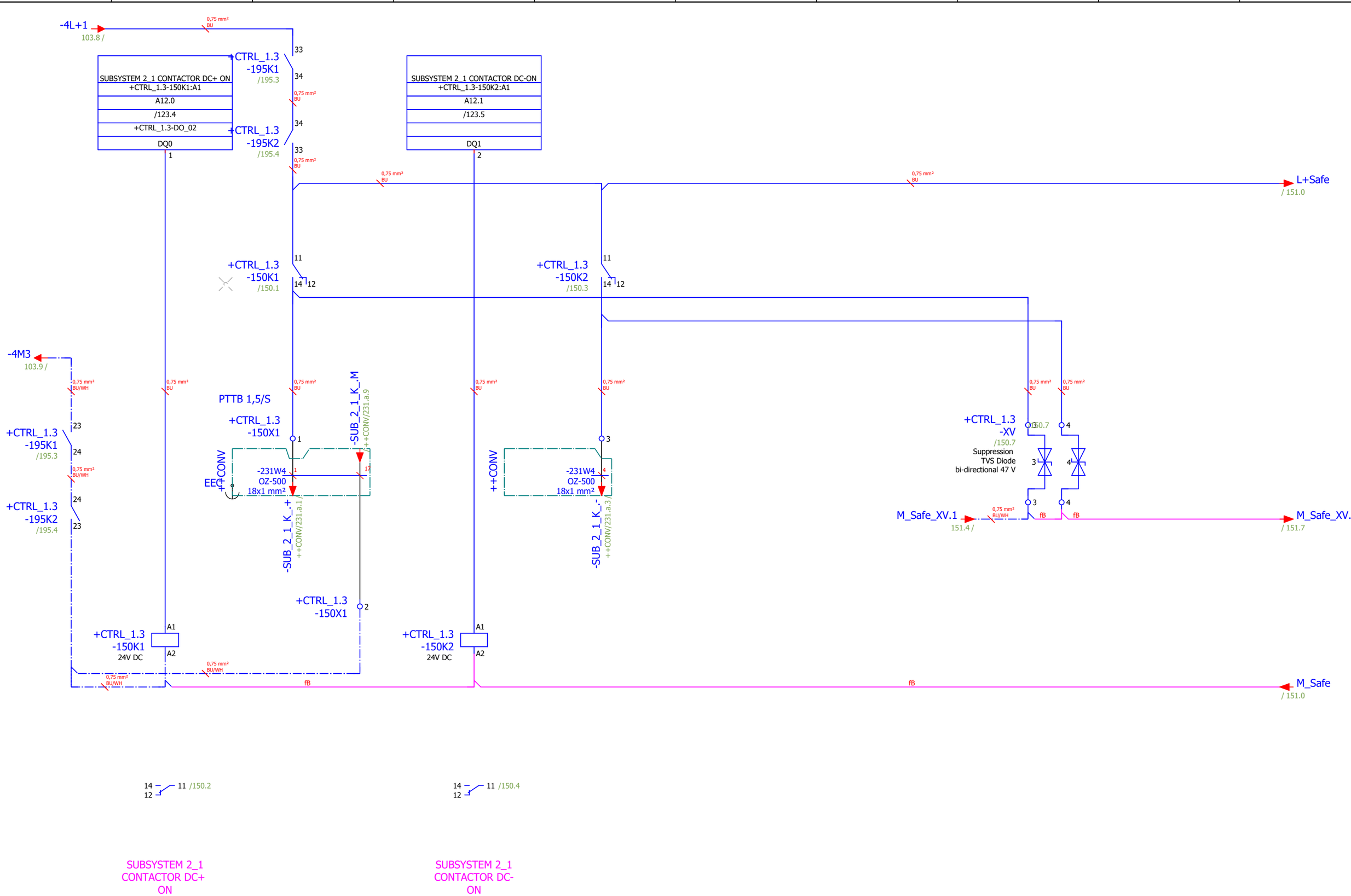
DC_SUBSYSTEM 3_2.1 voltage

DC_SUBSYSTEM 3_3.1 voltage

Voltage measurement

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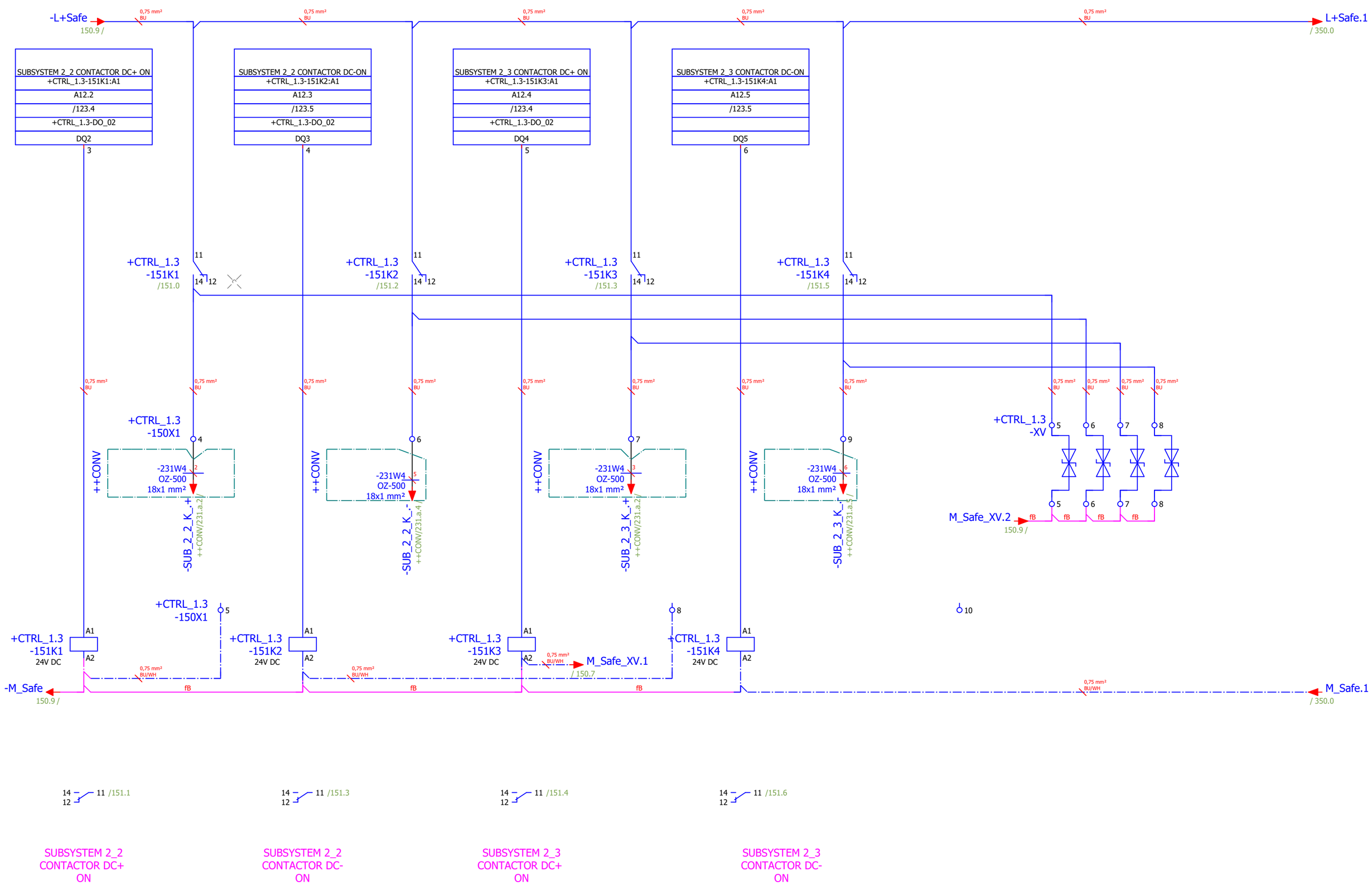
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Editor	Freqcon_JD			Statron	FREQCON	OUTPUTS DC CONTACTORS 2_1	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 150
Date								+	total: 500



14 12 11 /151.1

14 12 11 /151.3

14 12 11 /151.4

14 12 11 /151.6

SUBSYSTEM 2_2 CONTACTOR DC+ ON

SUBSYSTEM 2_2 CONTACTOR DC- ON

SUBSYSTEM 2_3 CONTACTOR DC+ ON

SUBSYSTEM 2_3 CONTACTOR DC- ON

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Editor	Freqcon_JD			Statron	FREQCON	OUTPUTS DC CONTACTORS 2_2, 2_3	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 151
Date								+	total: 500

0	1	2	3	4	5	6	7	8	9

* cable intro seperate UL protrctive tube

-UDC+_PreCharg
1,5 mm² BK
/ 173.3
-UDC-_PreCharg
1,5 mm² BK
/ 173.3

-UL3.HVIO / 189.4
-UL2.HVIO / 189.4
-UL1.HVIO / 189.4

-HVIO_1_N
173.3 /

-HVIO_2_N
/ 173.3

2,5 mm² LBU
2,5 mm² BK
2,5 mm² BK
2,5 mm² BK

+CTRL_2.1
-160U1
FRQ-M00029-1
HVIO 5.0
ISO
N-DC N-AC

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15 (AC) UN	16	17	18	19 L3	20	21	22	23 L2	24	25	26	27 L1	28	29	30	31	32 UB	33	34	35	36 DC-	37	38	39	40 DC+	41	42	44 (DC) UN

HIGH VOLTAGE I/O MODULE V5.0
FREQCON GmbH

25-POL SUB-D
SOCKET
11X3

+
-

-HVIO_1_L+
/ 161.1
-HVIO_1_L-
/ 161.1

-240W7
pre-assembled D-Sub cable 1:1
/440.8

-HVIO_1
/ 440.9

0,75 mm² BU
0,75 mm² BU/WH

IEC

1L+2
103.2 /

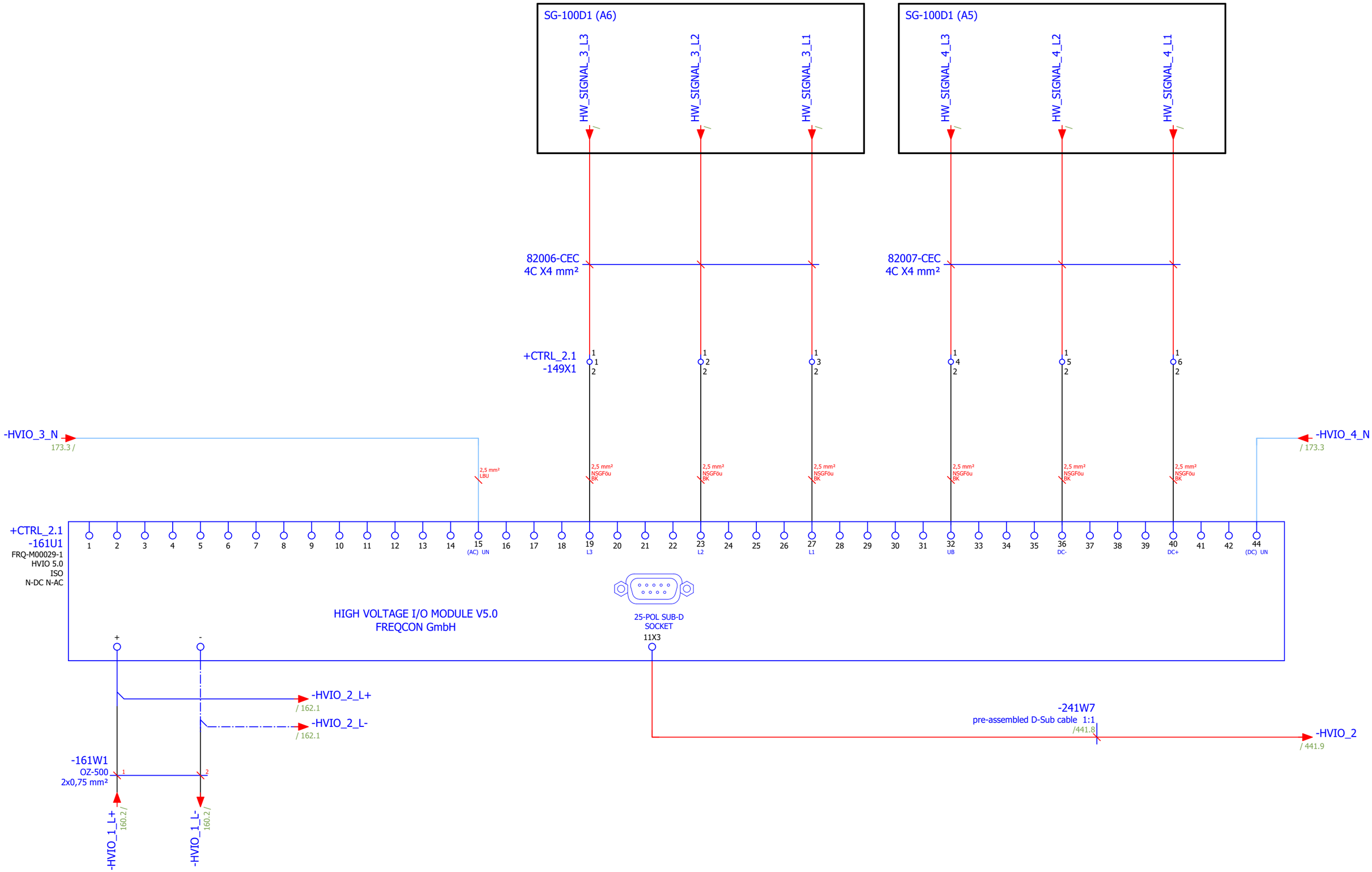
1M10
103.3 /

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Measuring: Grid side voltage / DC-Link

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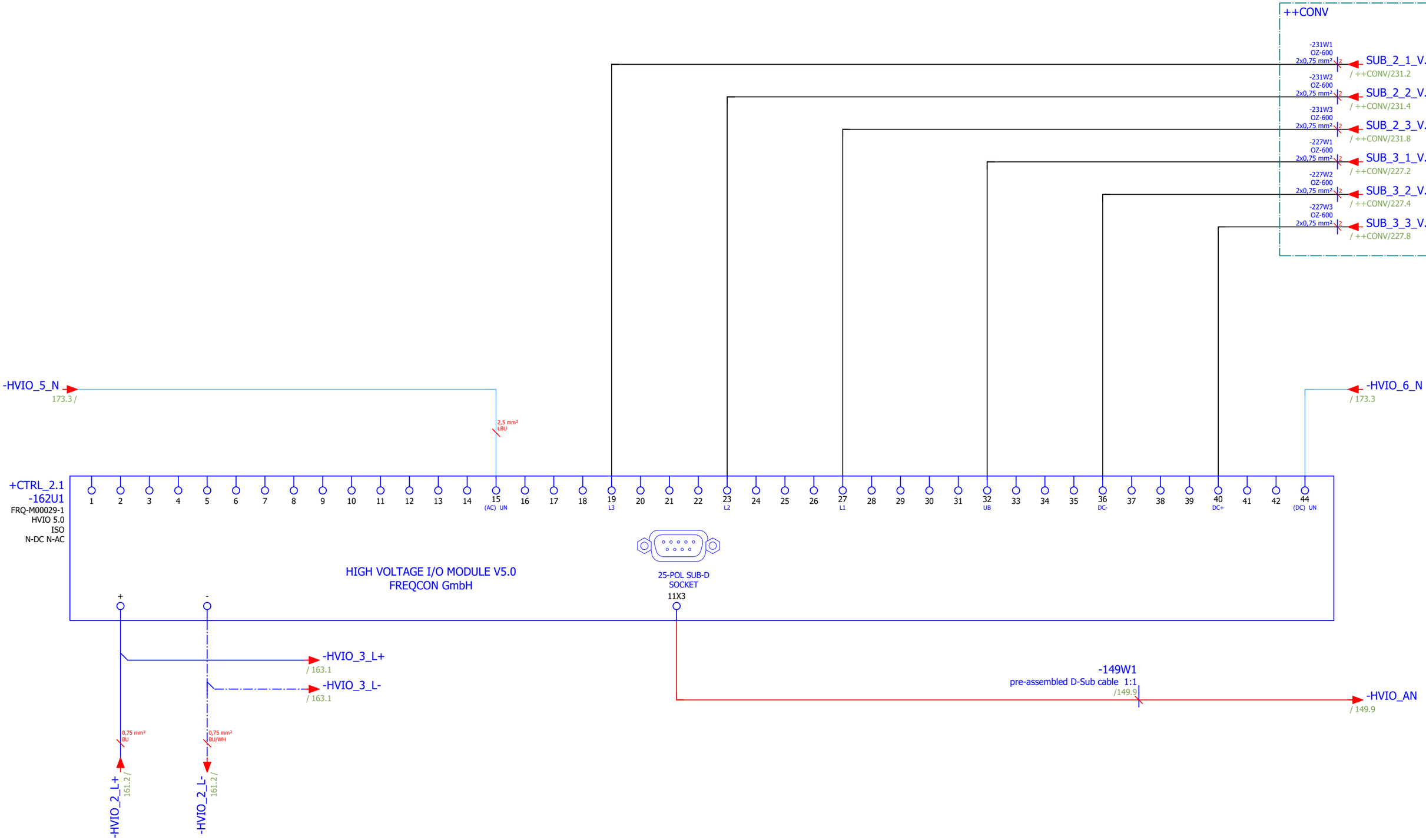
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Date	29.07.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 160
Date								+		total: 500



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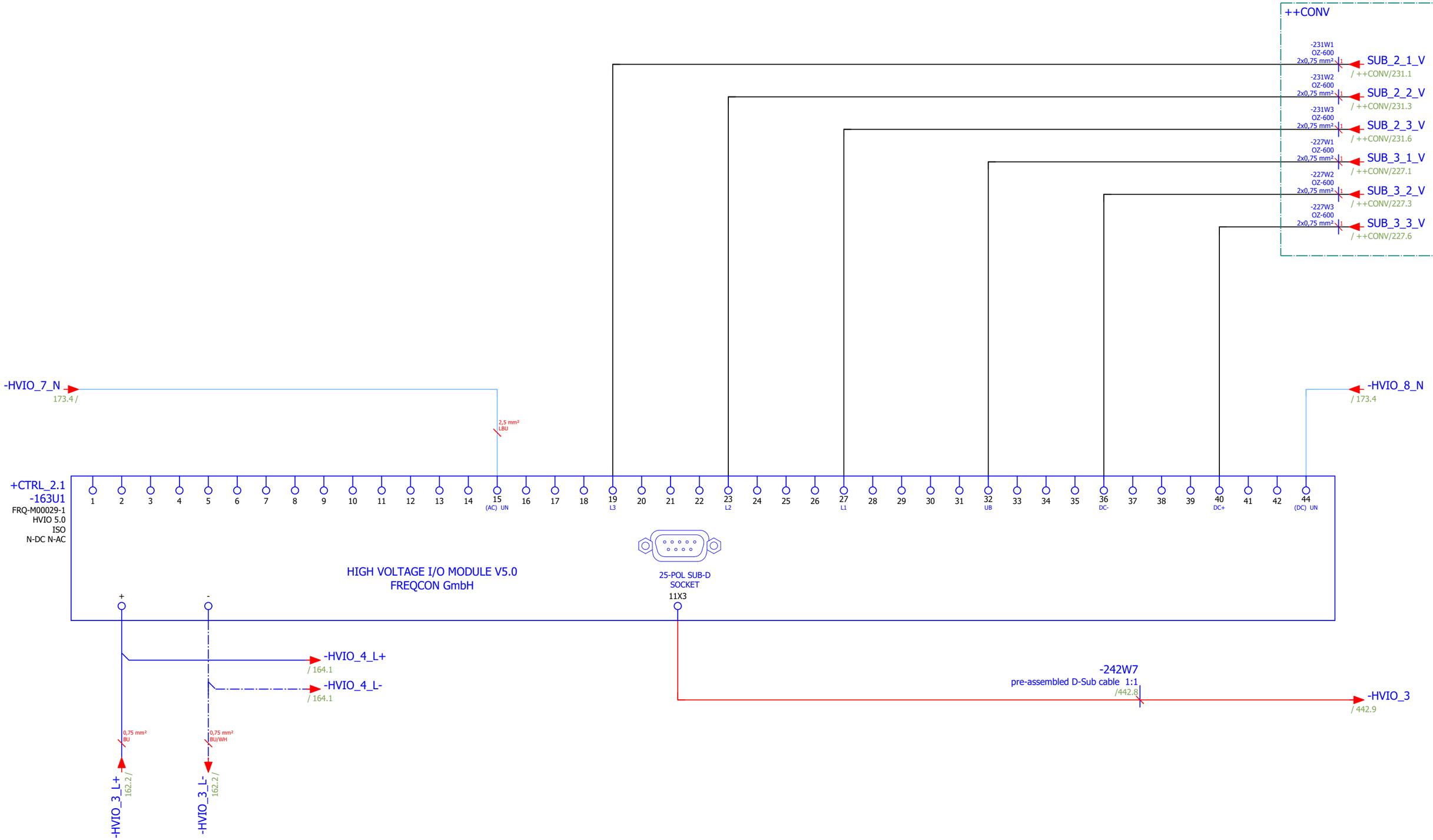
Editor	Freqcon_DG			Statron	FREQCON	INTERFACE HVIO 2	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	05.11.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 161
Date								+	total: 500



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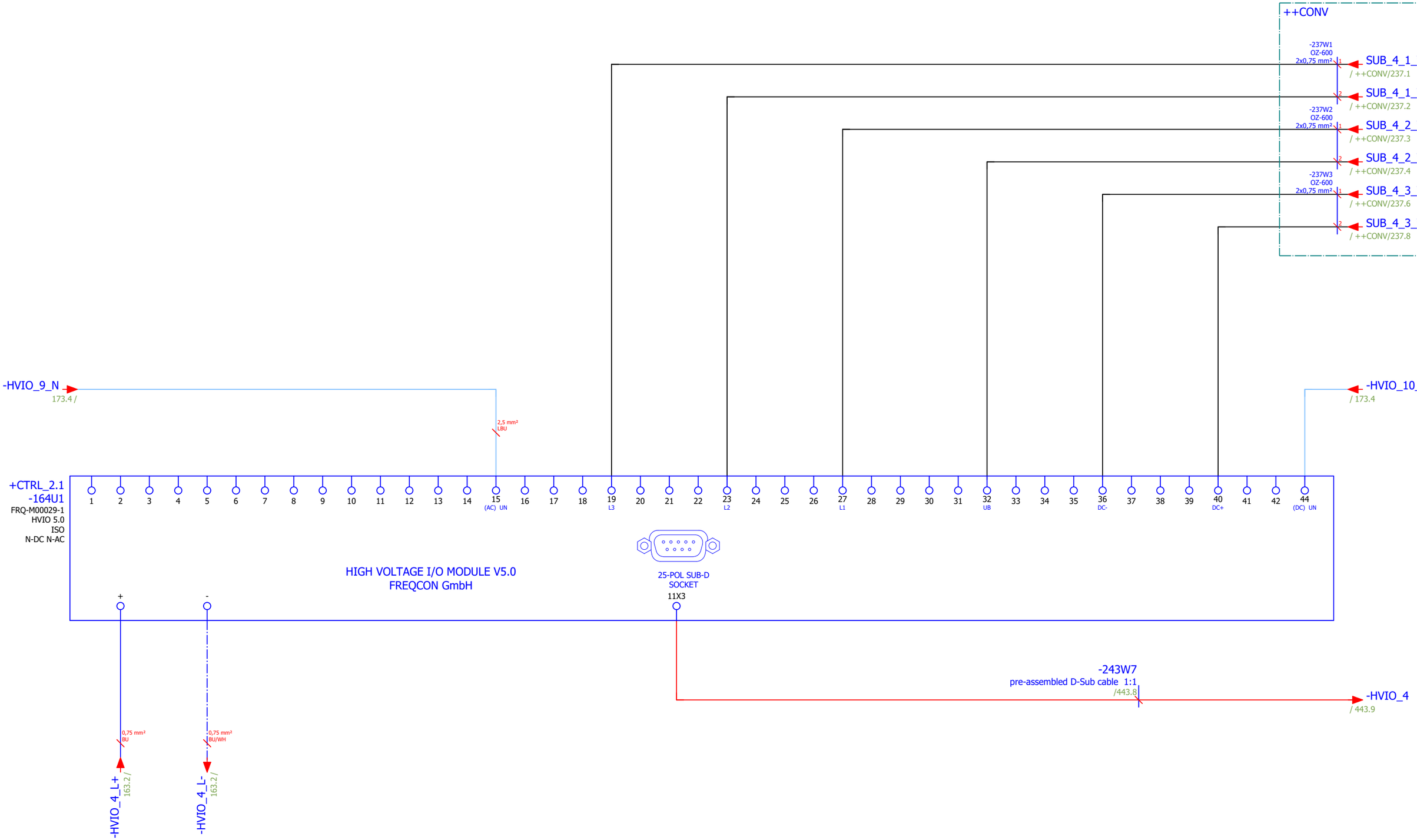
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Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 162
Date								+	total: 500



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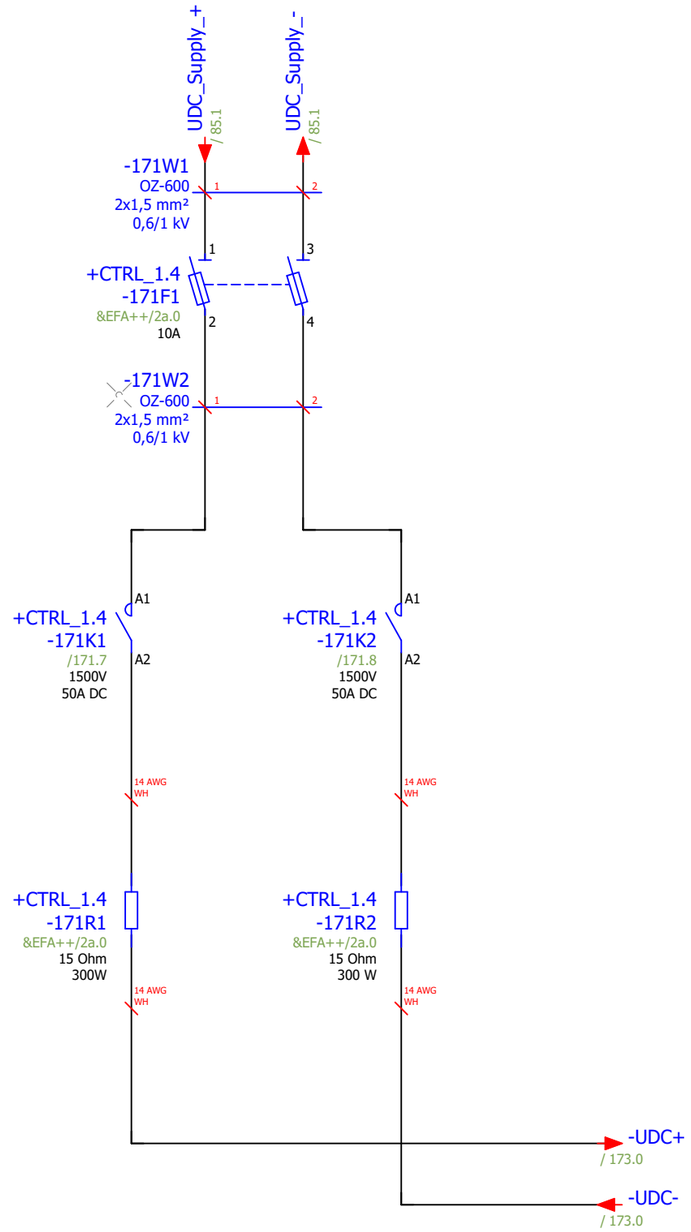
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Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 163
Date								+	total: 500



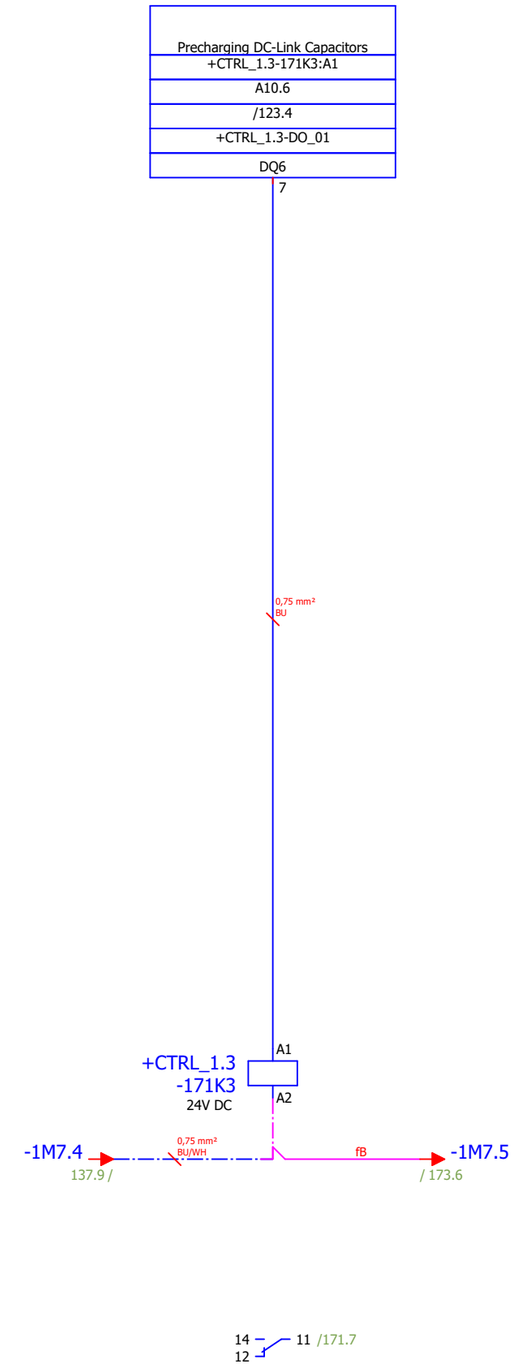
previous page:
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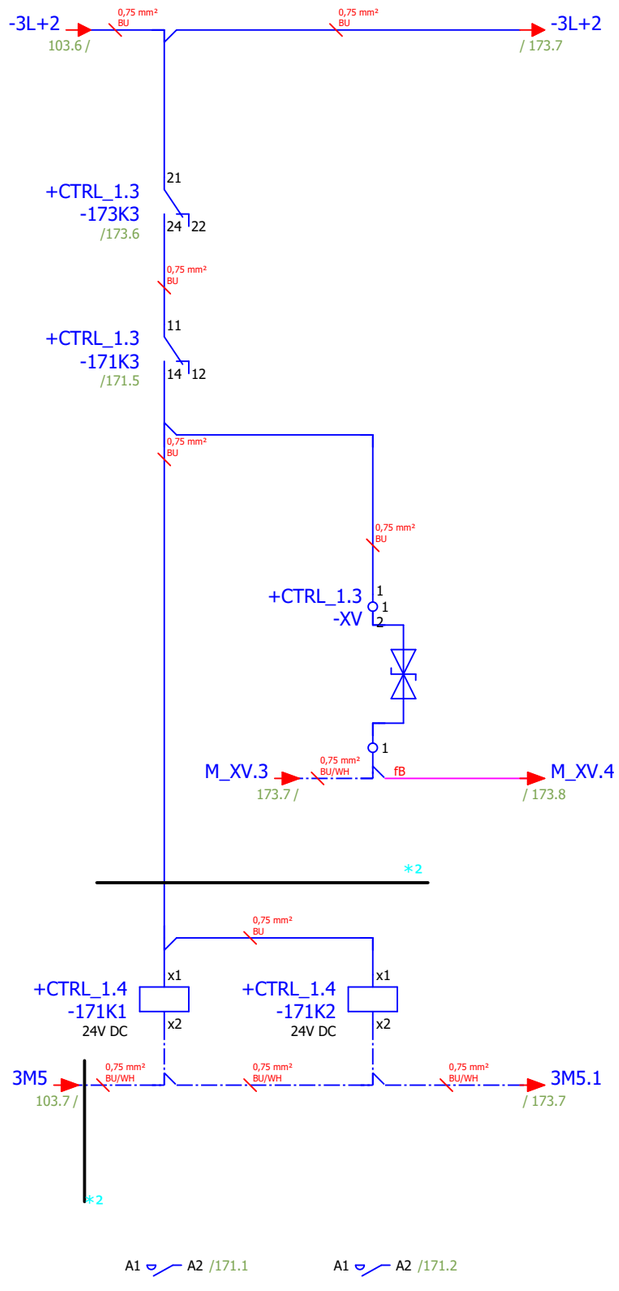
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Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 164
Date								+	total: 500



RESISTORS
FOR PRECHARGING
from Grid or Battery or DC-Link



Precharging
DC-Link Capacitors

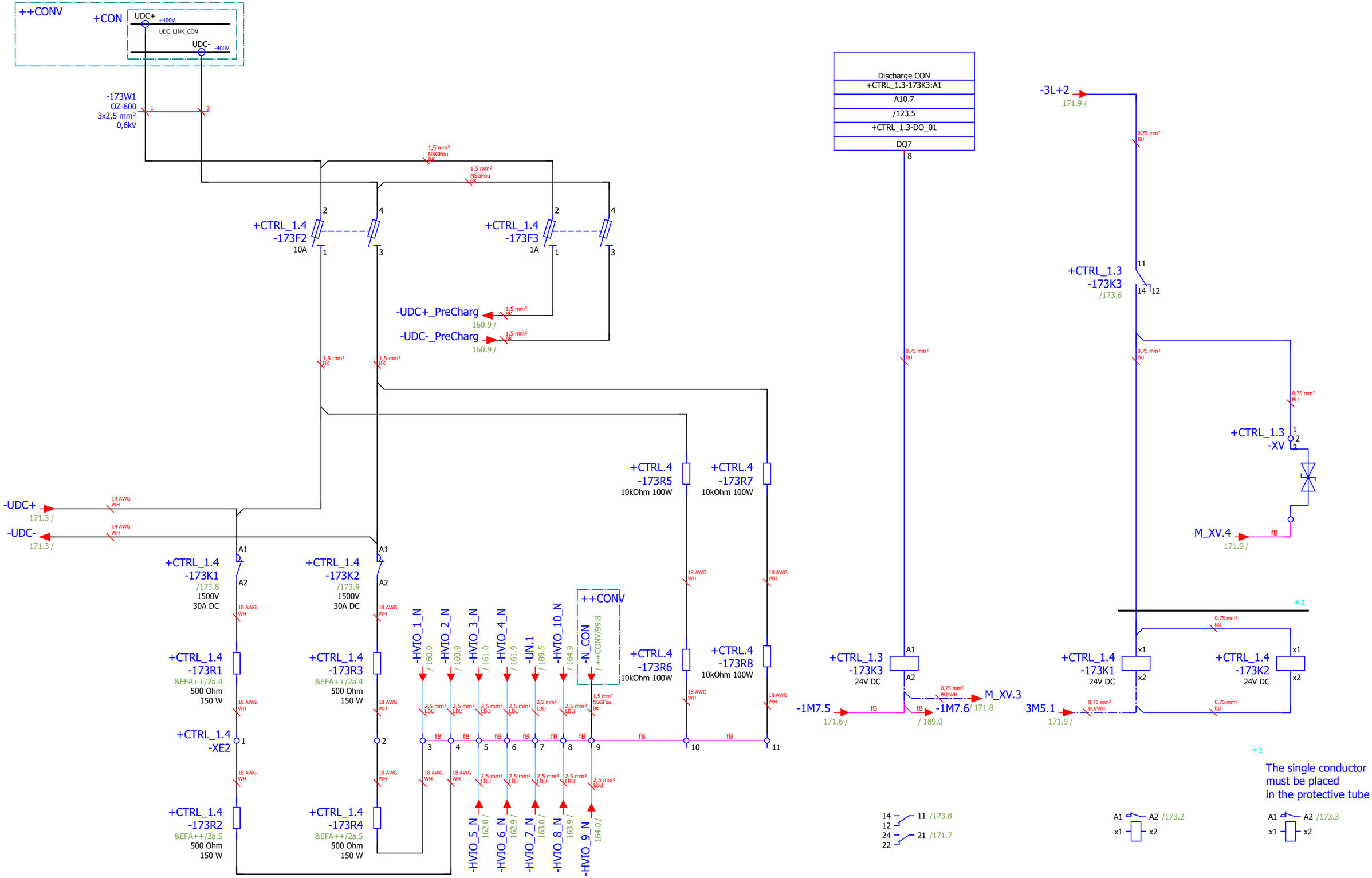


*2 The single conductor must be placed in the protective tube

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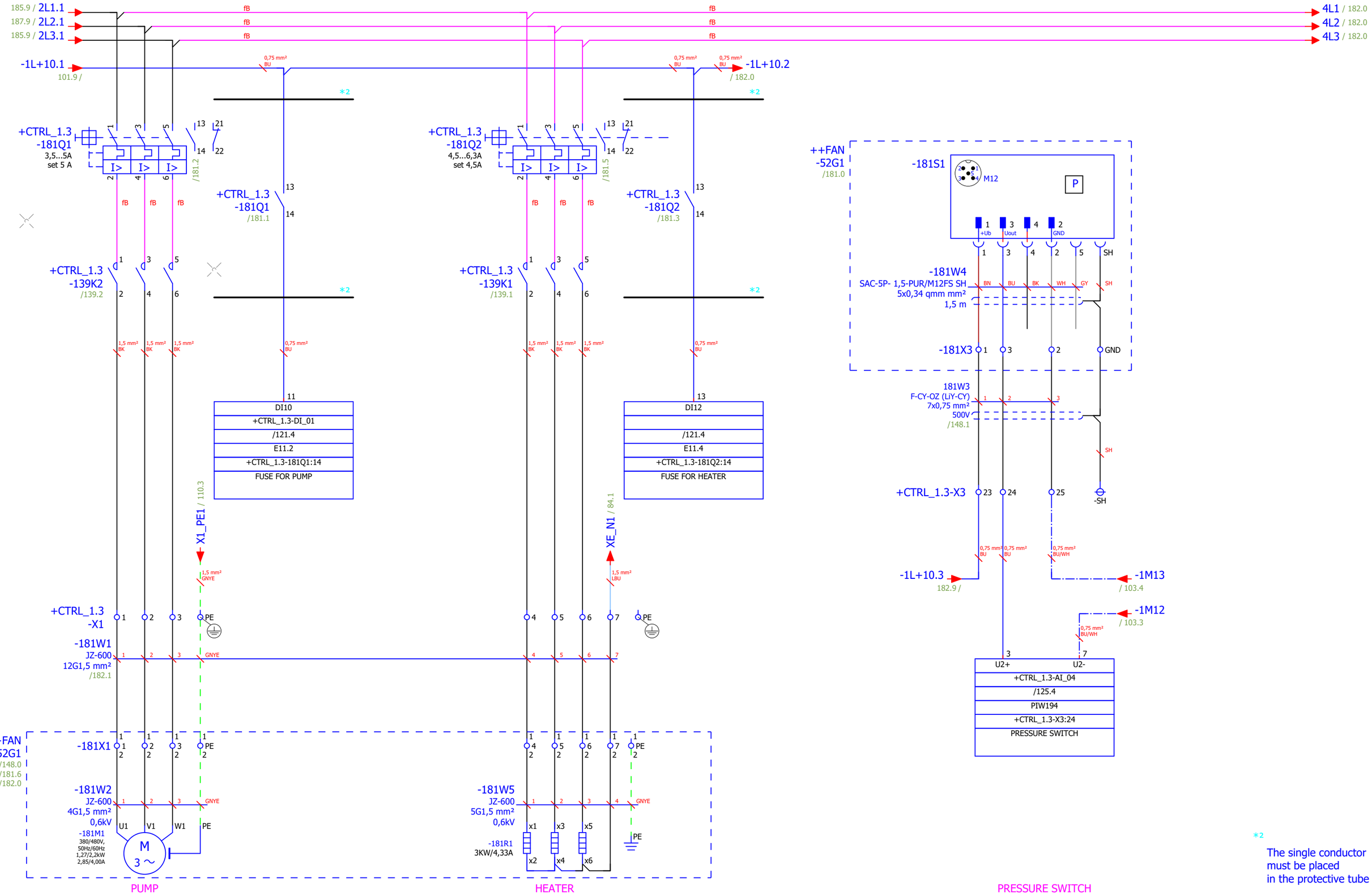
Editor	Freqcon_JD			Statron	FREQCON	PRE-CHARGING UDC	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 171
Date								+	total: 500



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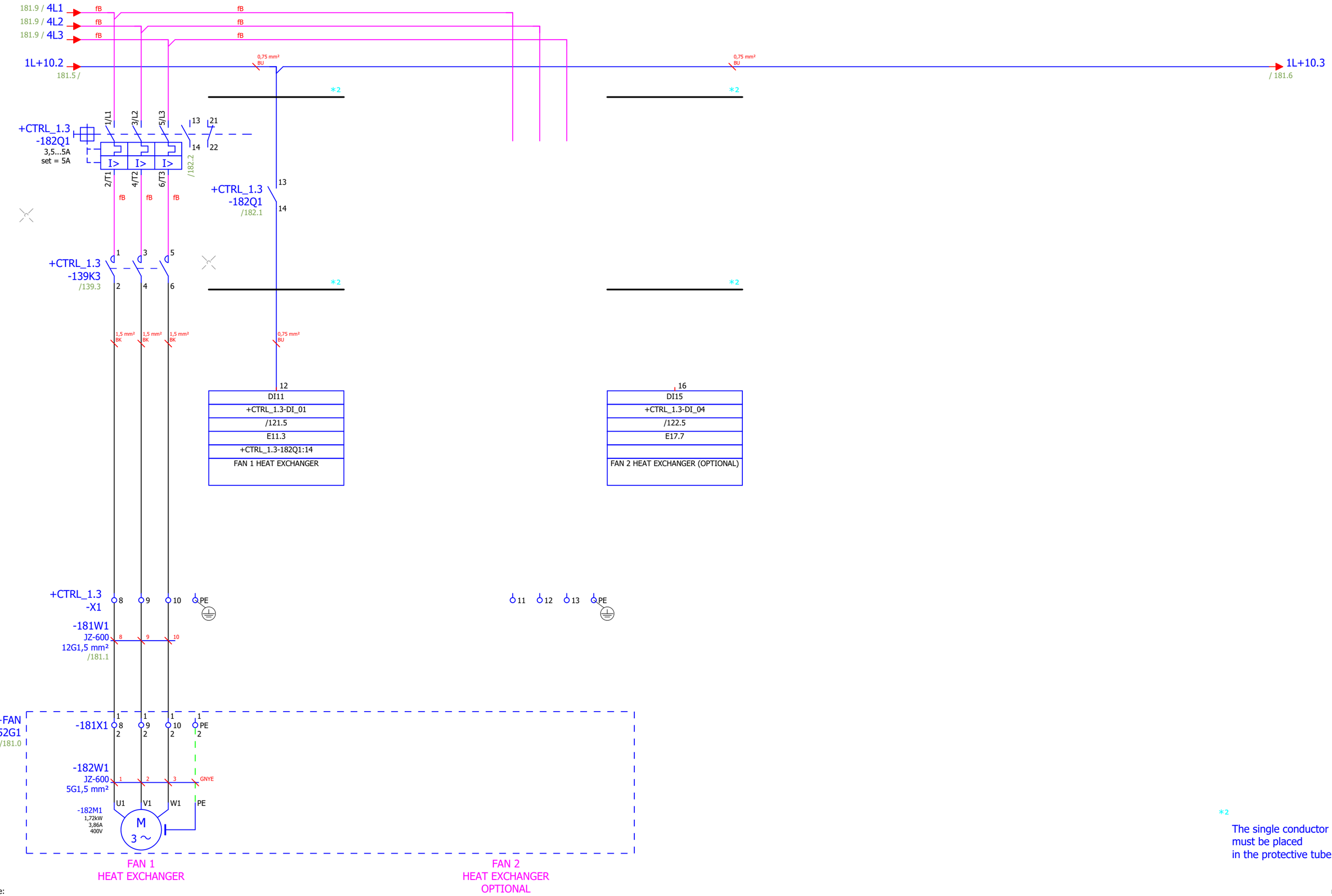
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Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 173
Date								+	total: 500



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Editor	Freqcon_DG			Statron	FREQCON	WATER SYSTEM	20241203_V1.22	= UNIT_01	Converter Container 1
Date	29.07.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets page: 181
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Editor	Freqcon_JD			Statron	FREQCON	HEAT EXCHANGER	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 182
Date								+	total: 500

84.9 / 1L1.1
84.9 / 1L2.1
fB
1L1.2 / 185.0
1L2.2 / 187.0

-1L+8.1
84.6 /
0,75 mm² BU
-1L+8.2
/ 185.8

+CTRL_1.3
-183F1
C16A
/183.6
+CTRL_1.3
-183F2
C10A
/183.6

*2
+CTRL_1.3
-183F1
/183.1
0,75 mm² BU
*2
+CTRL_1.3
-183F2
/183.3
0,75 mm² BU
*2

1,5 mm² BK

+CTRL_1.3
-135K1
/135.1
XE_N2 / 84.1
+CTRL_1.3
-135K3
/135.3

1,5 mm² BK
2,5 mm² LBU

fB
fB
FB_XT.4-6
/ 185.1

PT 2,5 +CTRL_1.3
-XT
PE
PE

++CONV
-279W1
JZ-500
3G1,5 mm²
GNYE
-FAN_L_2 ++CONV/279.1/
-FAN_N_2 ++CONV/279.1/
-FAN_PE_2 ++CONV/279.1/
EEC

++CONV
-281W1
JZ-500
3G1,5 mm²
GNYE
-FAN_L_3 ++CONV/281.1/
-FAN_N_3 ++CONV/281.1/
-FAN_PE_3 ++CONV/281.1/
EEC

DI14
+CTRL_1.3-DI_01
/121.4
E11.6
+CTRL_1.3-183F2:13
Fuse Fans CON, IND Cabinets

CON
Fans 1-5
in door

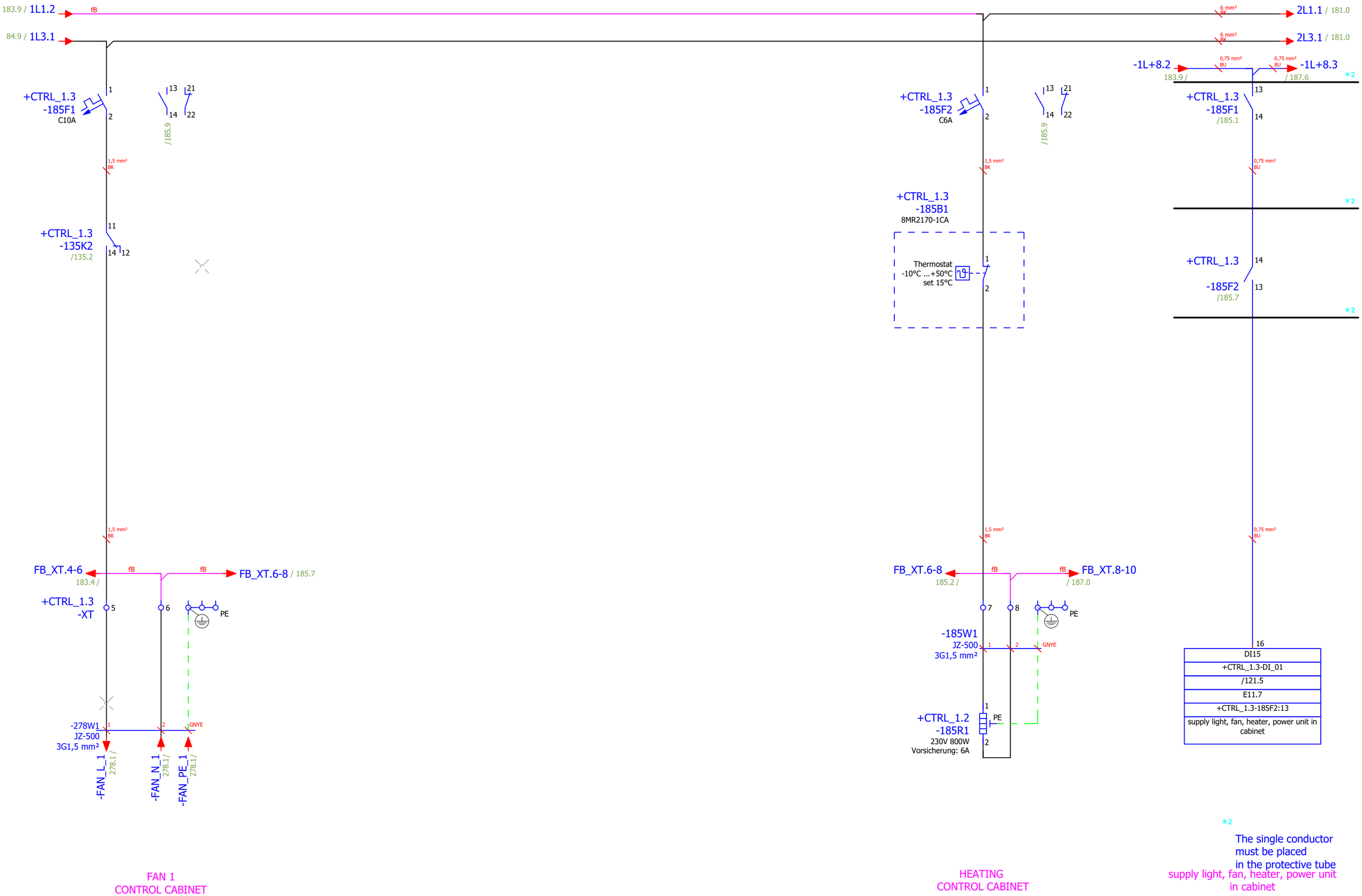
CIR
Fans 1-3
in door

*2
The single conductor
must be placed
in the protective tube

previous page: 182
next page: 185

Editor	Freqcon_DG			Statron	FREQCON	Supply for cabinet fan	20241203_V1.22	= UNIT_01	Converter Container 1
Date	29.07.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets
Date								+	

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total: 500



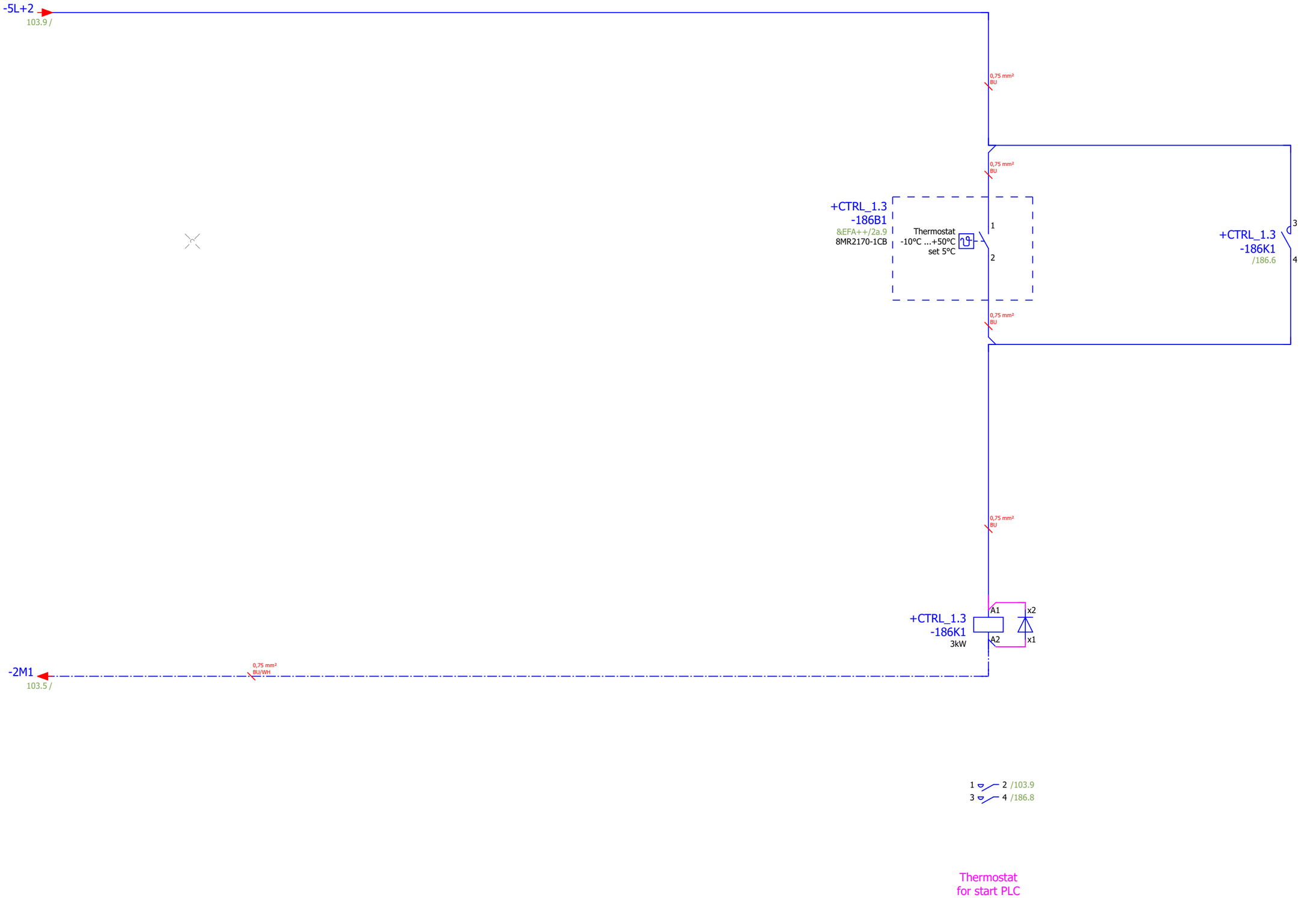
FAN 1
CONTROL CABINET

HEATING
CONTROL CABINET

previous page: 183

next page: 186

Editor	Freqcon_JD			Statron	FREQCON	FAN / HEATING CONTROL CABINET	20241203_V1.22	= UNIT_01	Converter Container 1	
Date	18.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 185
Date								+		total: 500

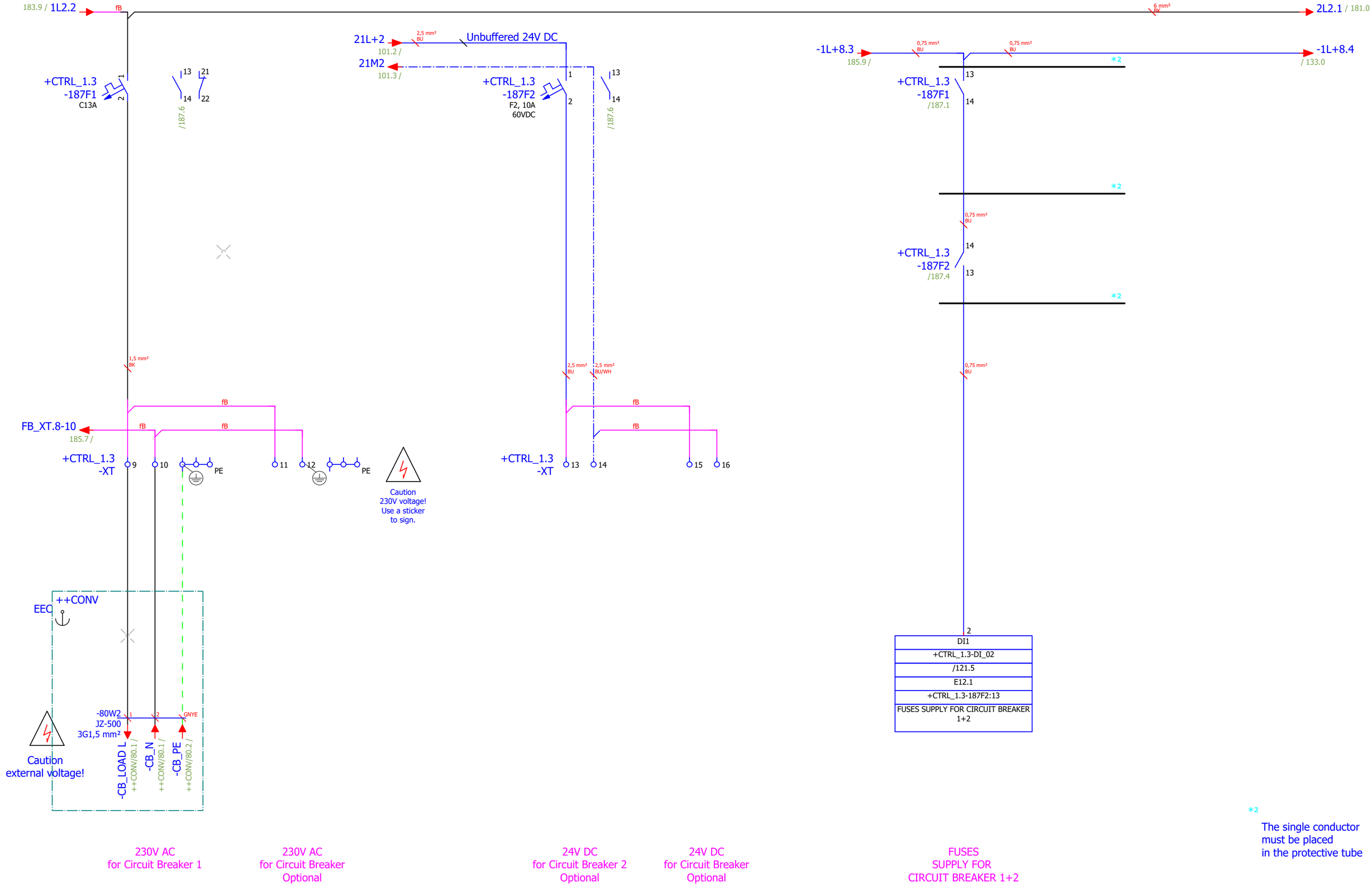


previous page: 185

next page: 187

Editor	Freqcon_JD			Statron	FREQCON	THERMOSTAT	20241203_V1.22	= UNIT_01	Converter Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets
Date								+	

page: 186
total: 500



230V AC
for Circuit Breaker 1

230V AC
for Circuit Breaker
Optional

24V DC
for Circuit Breaker 2
Optional

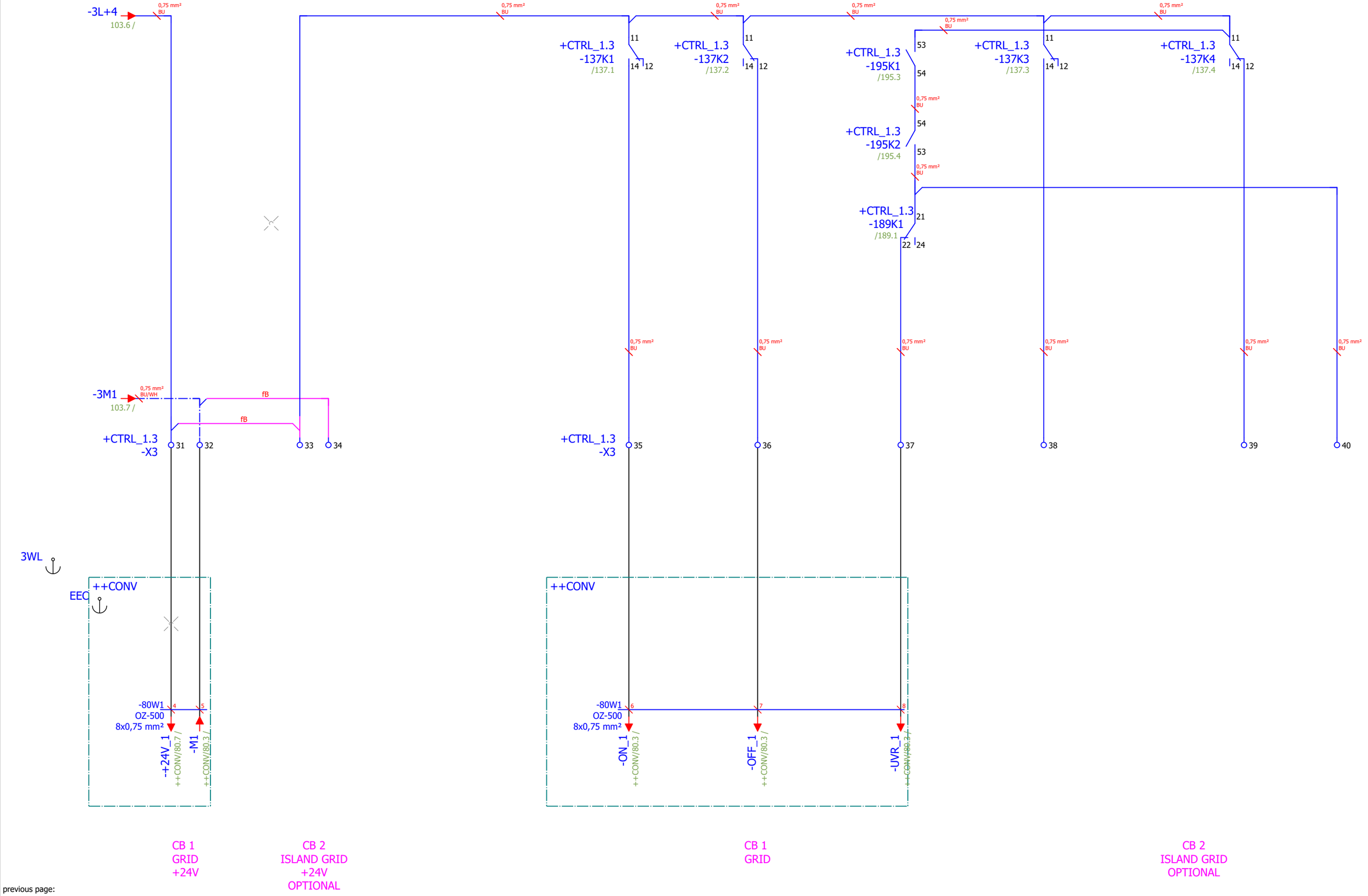
24V DC
for Circuit Breaker
Optional

FUSES
SUPPLY FOR
CIRCUIT BREAKER 1+2

previous page: 186

next page: 188

Editor	Freqcon_JD			Statron	FREQCON	24V DC SUPPLY CB	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 187
Date								+	total: 500



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next page: 189

Editor	Freqcon_JD			Statron	FREQCON	24V DC SUPPLY CON / CB GRID	20241203_V1.22	= UNIT_01	Converter Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets
Date								+	

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total: 500

GRID FAULT
+CTRL_1.3-189K1:A1
A11.3
/123.5
+CTRL_1.3-DO_01
DQ11
12

0,75 mm² BU

+CTRL_1.3
-189K1
24V DC
A1
A2

-1M7.6
173.6 /
fB
0,75 mm² BU/WH
-M_(GND)
/ 189.5

14
12
11 /189.6
24
22
21 /188.6

GRID FAULT

Voltage inputs
3 phases 620V AC

Grid Circuit Breaker:
if OFF then 24V;
if ON then 0V

Grid OK

-UL1.HVIO / 160.5
-UL2.HVIO / 160.5
-UL3.HVIO / 160.4
-UN.1 / 173.4
-24V_Signal / 127.4
-M_(GND) / 189.1
+CTRL_1.3 -189K1 /189.1
11
12
14
CB_OFF.1 / 137.2

2,5 mm² BK
2,5 mm² BK
2,5 mm² BK
2,5 mm² LBU
0,75 mm² BU
0,75 mm² BU/WH
0,75 mm² BU
0,75 mm² BU
0,75 mm² BU

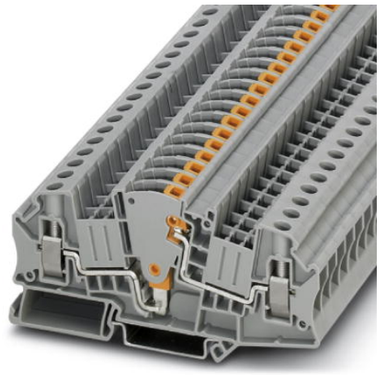
+CTRL_1.4
-189X1
Test disconnect
terminal block
Phoenix Contact
PTME 6

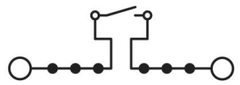
1 2 3 4 5 6 7 8 9

2,5 mm² BK
2,5 mm² BK
2,5 mm² BK
0,75 mm² BU

-HVIO_L1 85.1 /
-HVIO_L2 85.1 /
-HVIO_L3 85.2 /
CB_OFF.2 137.2 /

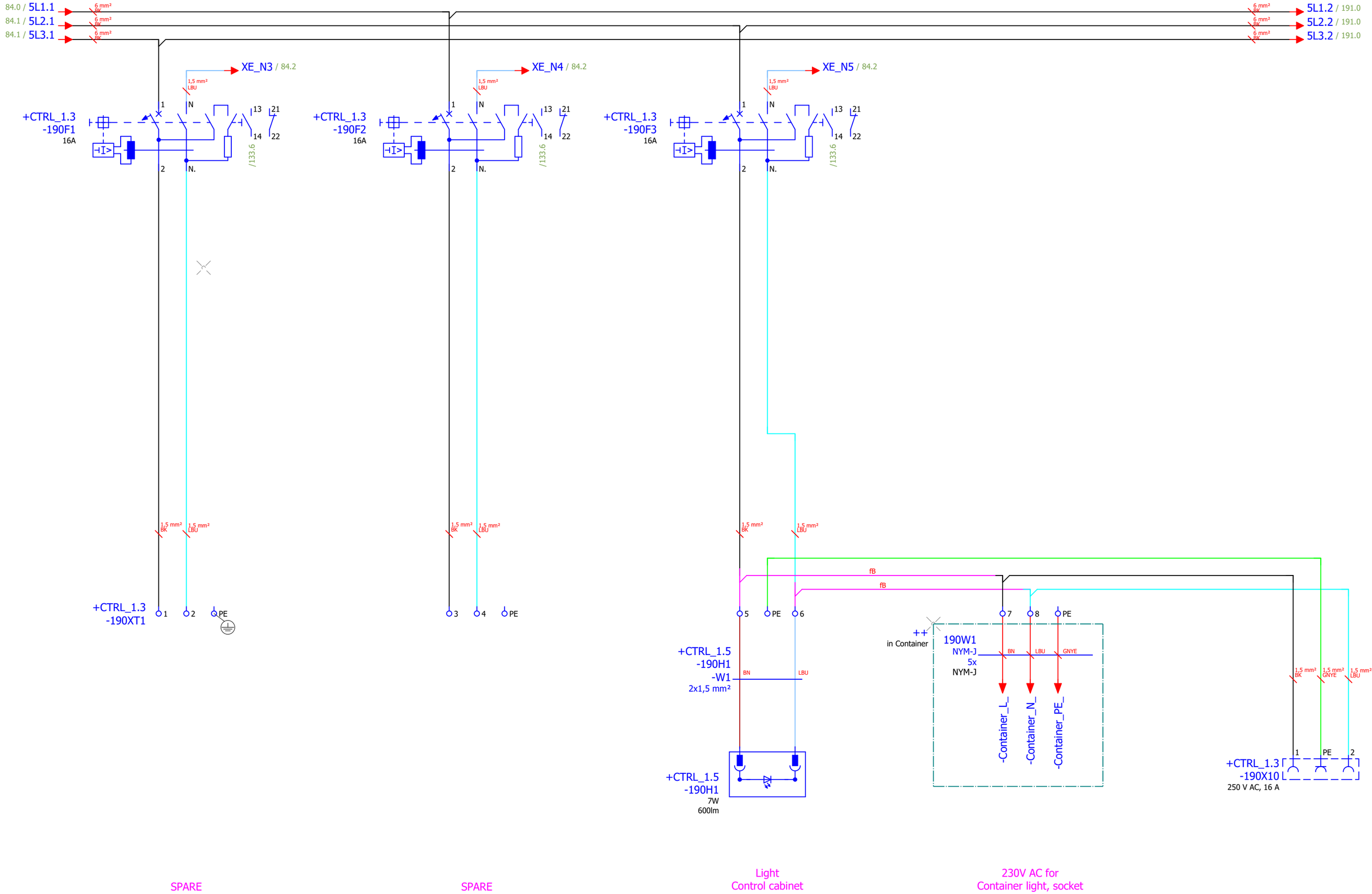
Relais
Circuit Breaker
OFF





Test terminal block for protection tests

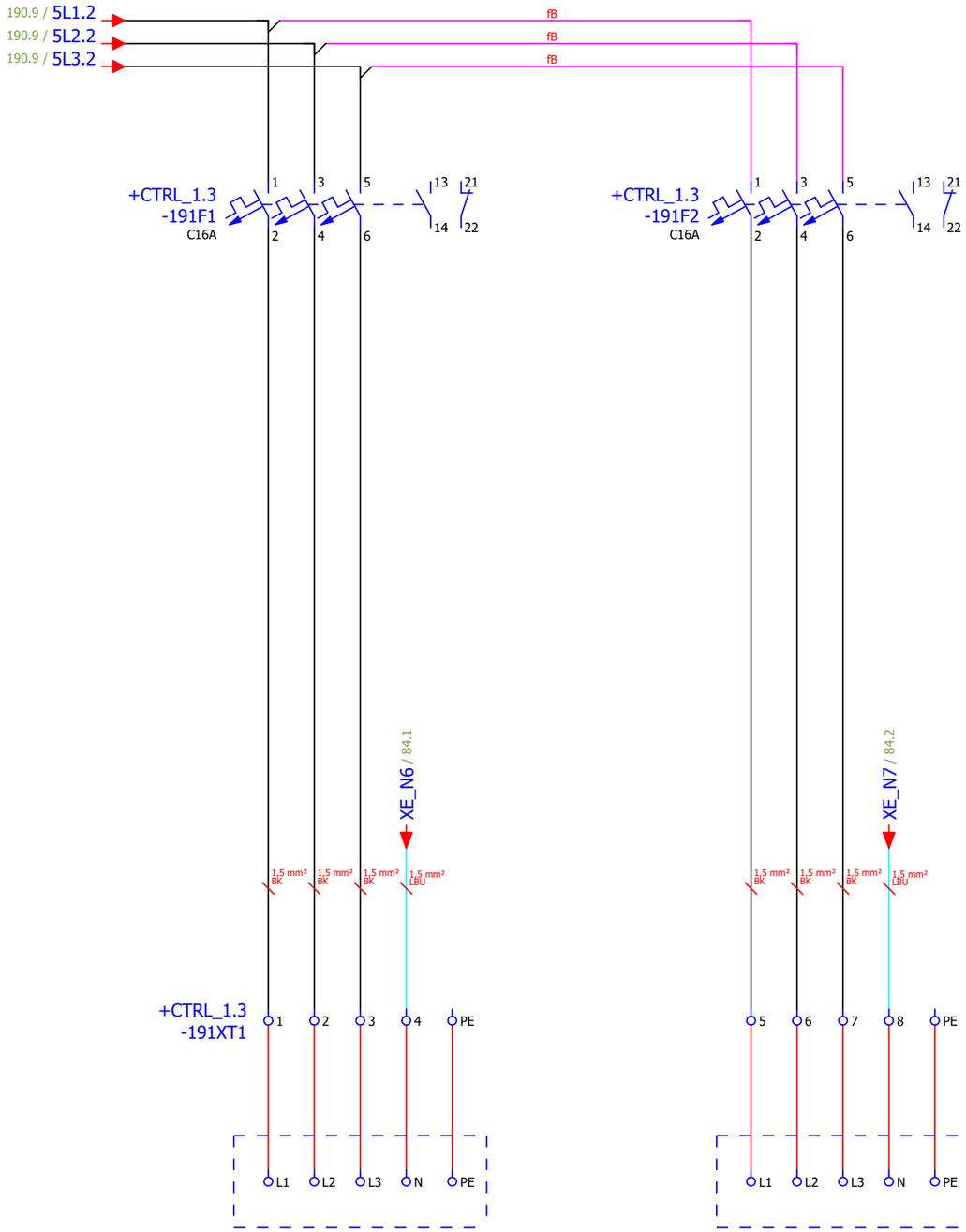
Editor	Freqcon_JD			Statron	FREQCON	TEST TERMINAL BLOCK	20241203_V1.22	= UNIT_01 Converter Container 1
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets page: 189
Date								+ total: 500



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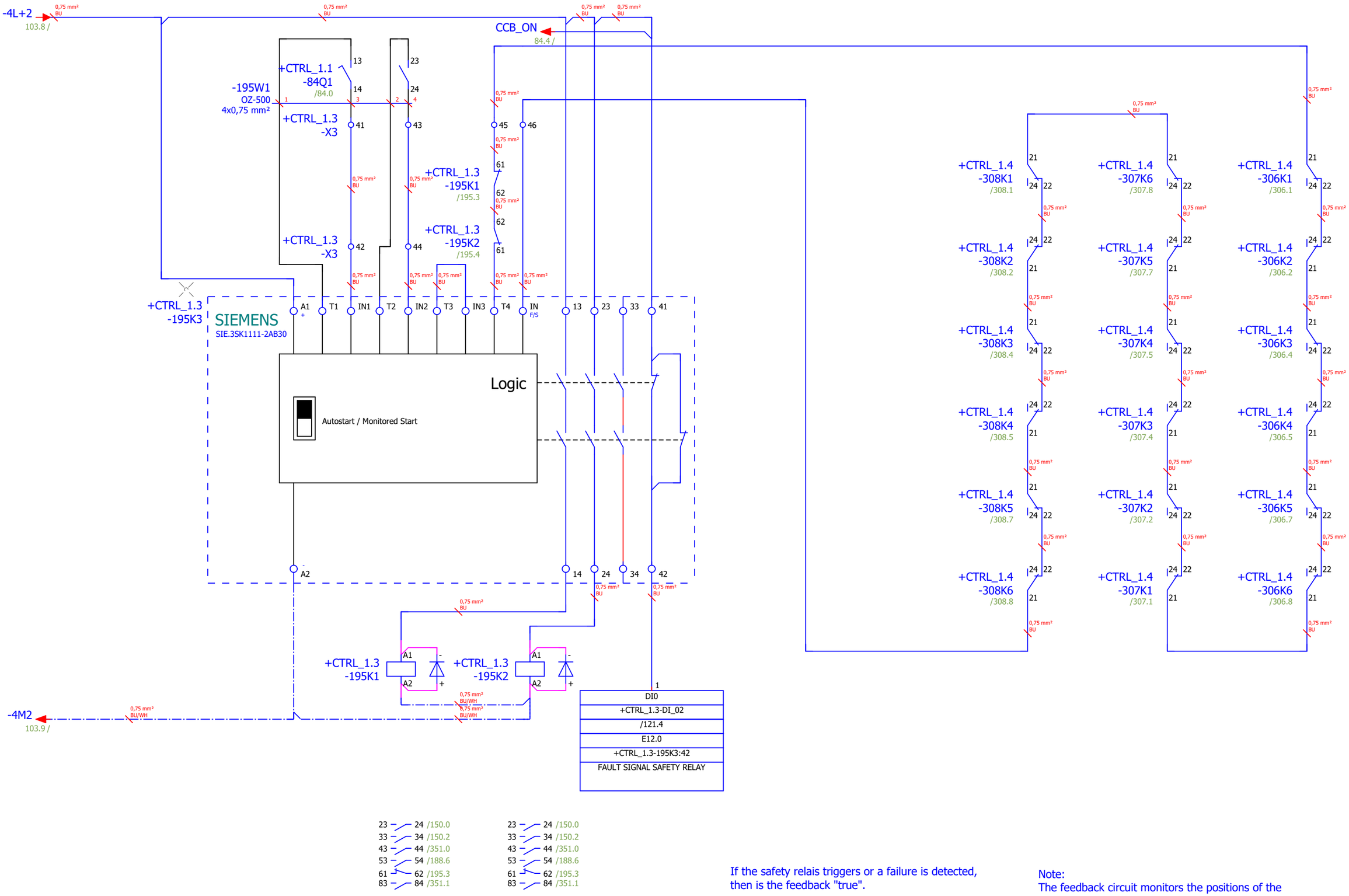
next page: 191

Editor	Freqcon_DG			Statron	FREQCON	CONTAINER COOLING, LIGHT 230V SUPPLY	20241203_V1.22	= UNIT_01	Converter Container 1
Date	29.07.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets page: 190
Date								+	total: 500



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23 — 24 /150.0
33 — 34 /150.2
43 — 44 /351.0
53 — 54 /188.6
61 — 62 /195.3
83 — 84 /351.1

23 — 24 /150.0
33 — 34 /150.2
43 — 44 /351.0
53 — 54 /188.6
61 — 62 /195.3
83 — 84 /351.1

SHUTDOWN CIRCUIT BREAKERS / DC CONTACTORS

FAULT SIGNAL SAFETY RELAY

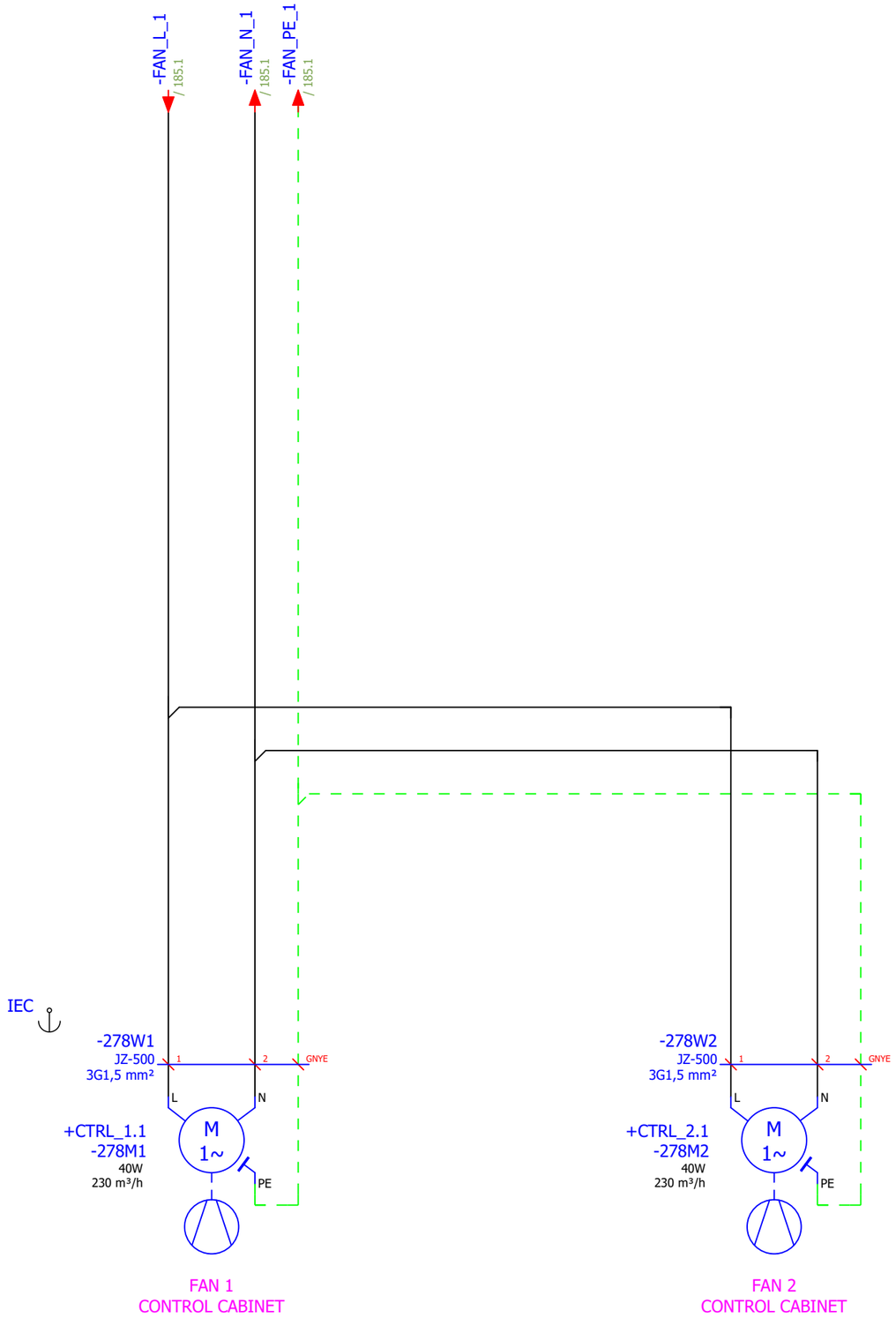
If the safety relais triggers or a failure is detected, then is the feedback "true".

Note:
The feedback circuit monitors the positions of the positive-guided NC contacts on the contactors 195K1 and 195K2. If one of their contacts latsches, then it is not possible to switch the contactors back on.

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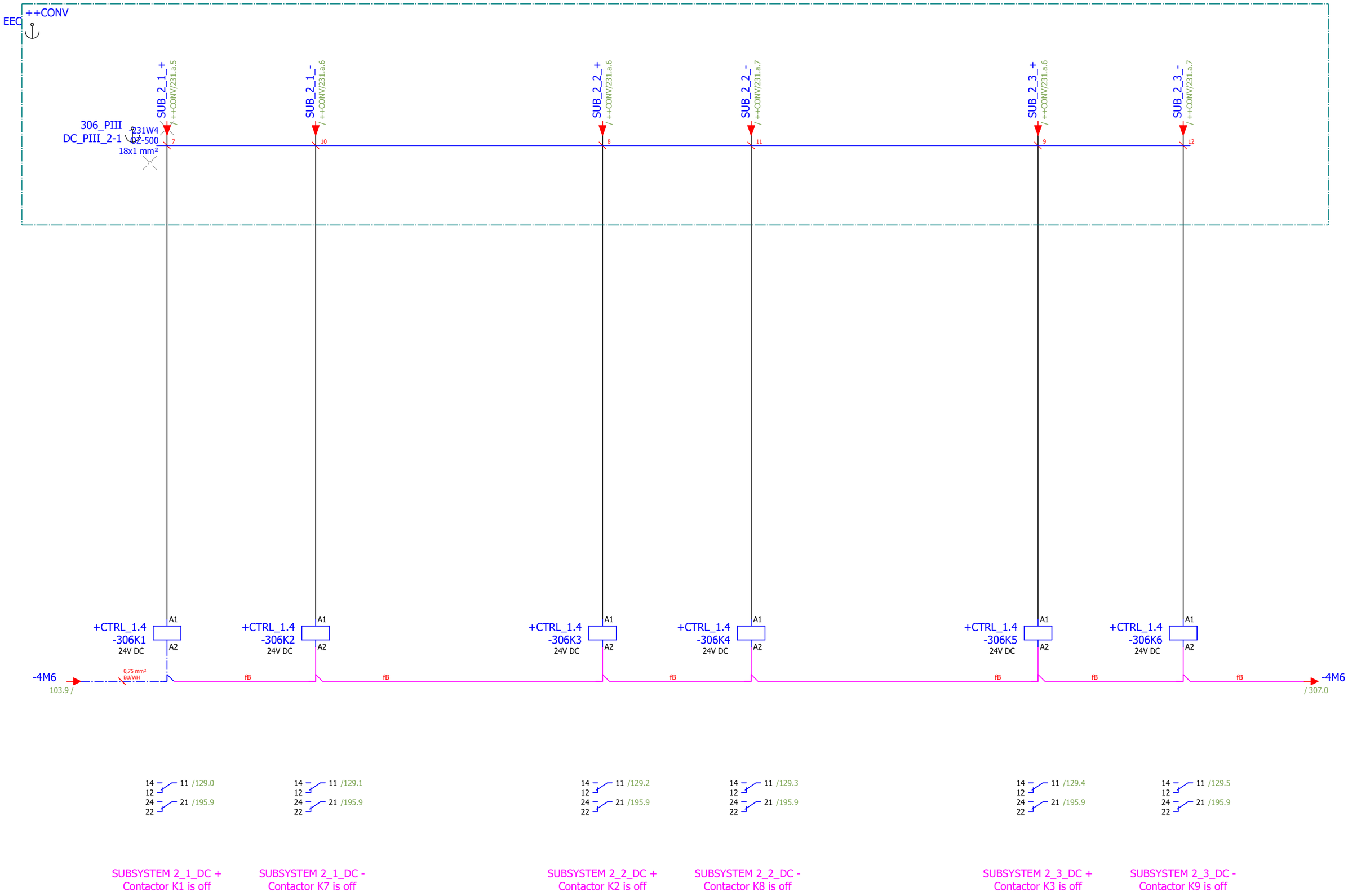
Editor	Freqcon_DG			Statron	FREQCON	SHUTDOWN CIRCUIT BREAKERS, DC CONTACTORS	20241203_V1.22	= UNIT_01 Converter Container 1
Date	29.07.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets page: 195
Date								+ total: 500



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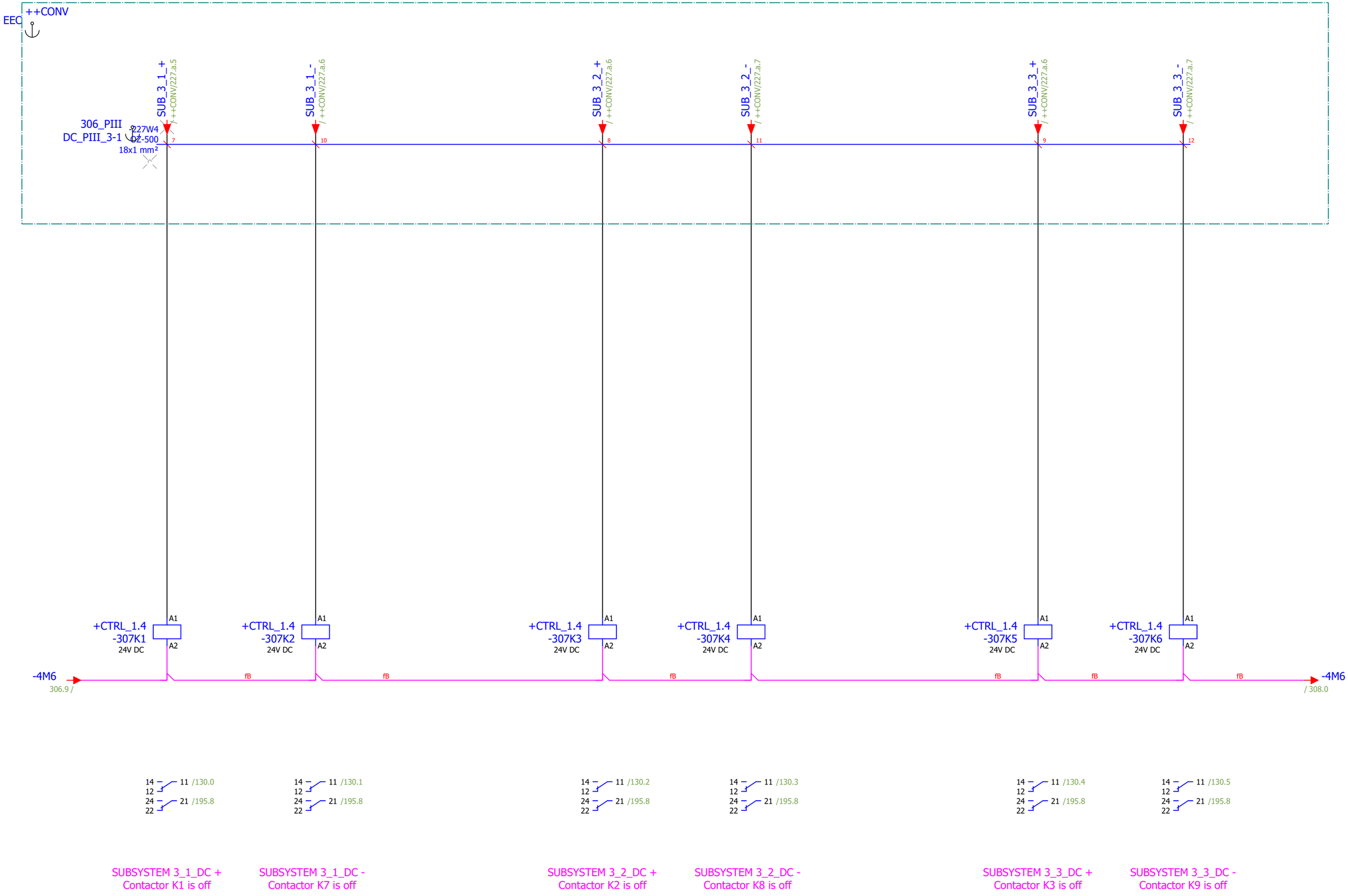
Editor	Freqcon_DG			Statron	FREQCON	CONTROL CABINET CLIMATE	20241203_V1.22	= UNIT_01	Converter Container 1	
Date	29.07.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 278
Date								+		total: 500



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278

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307

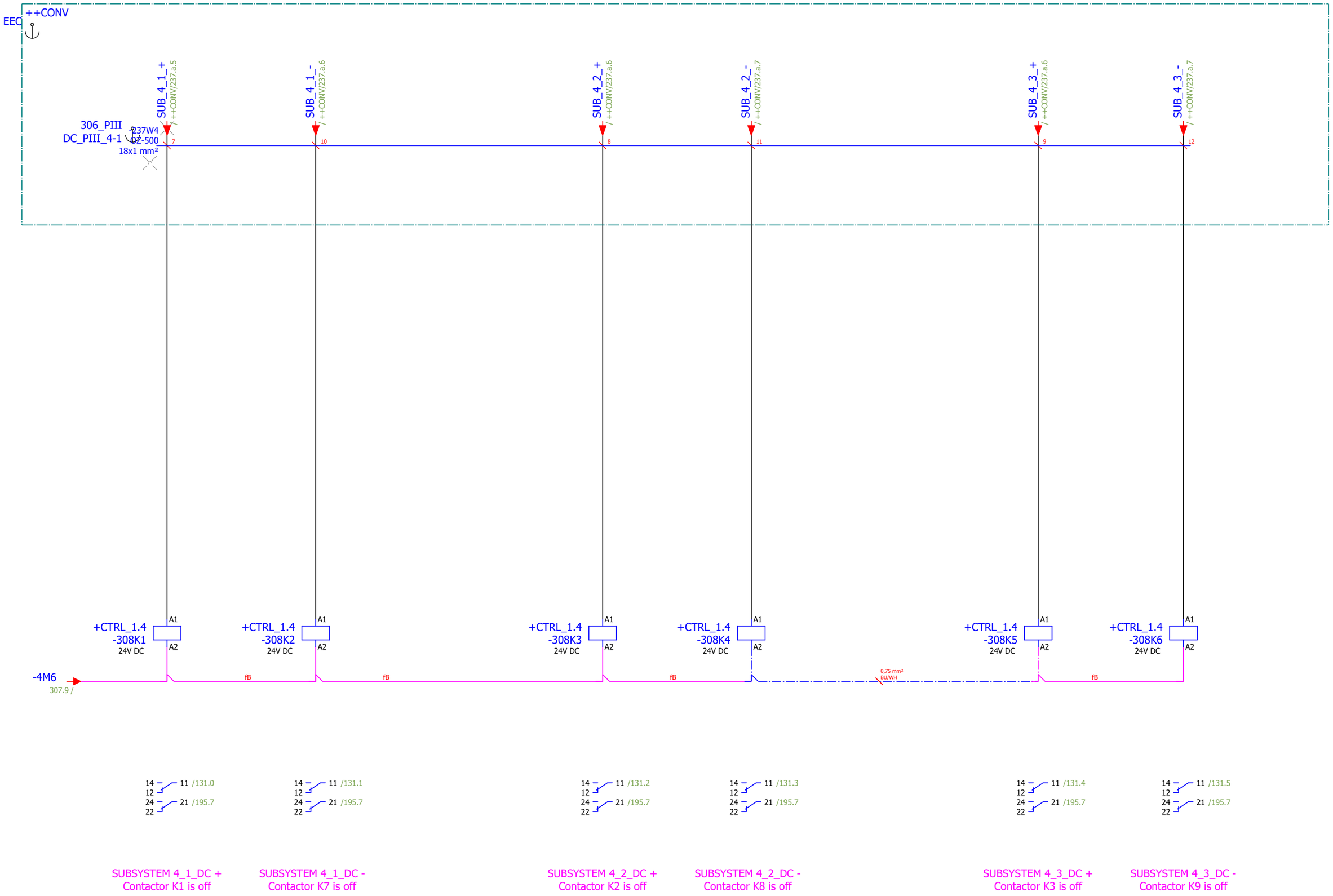
Editor	Freqcon_JD			Statron	FREQCON	Feedback DC contactors 1_4 - 1_6	20241203_V1.22	= UNIT_01	Converter Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets page: 306
Date								+	total: 500



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306

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308

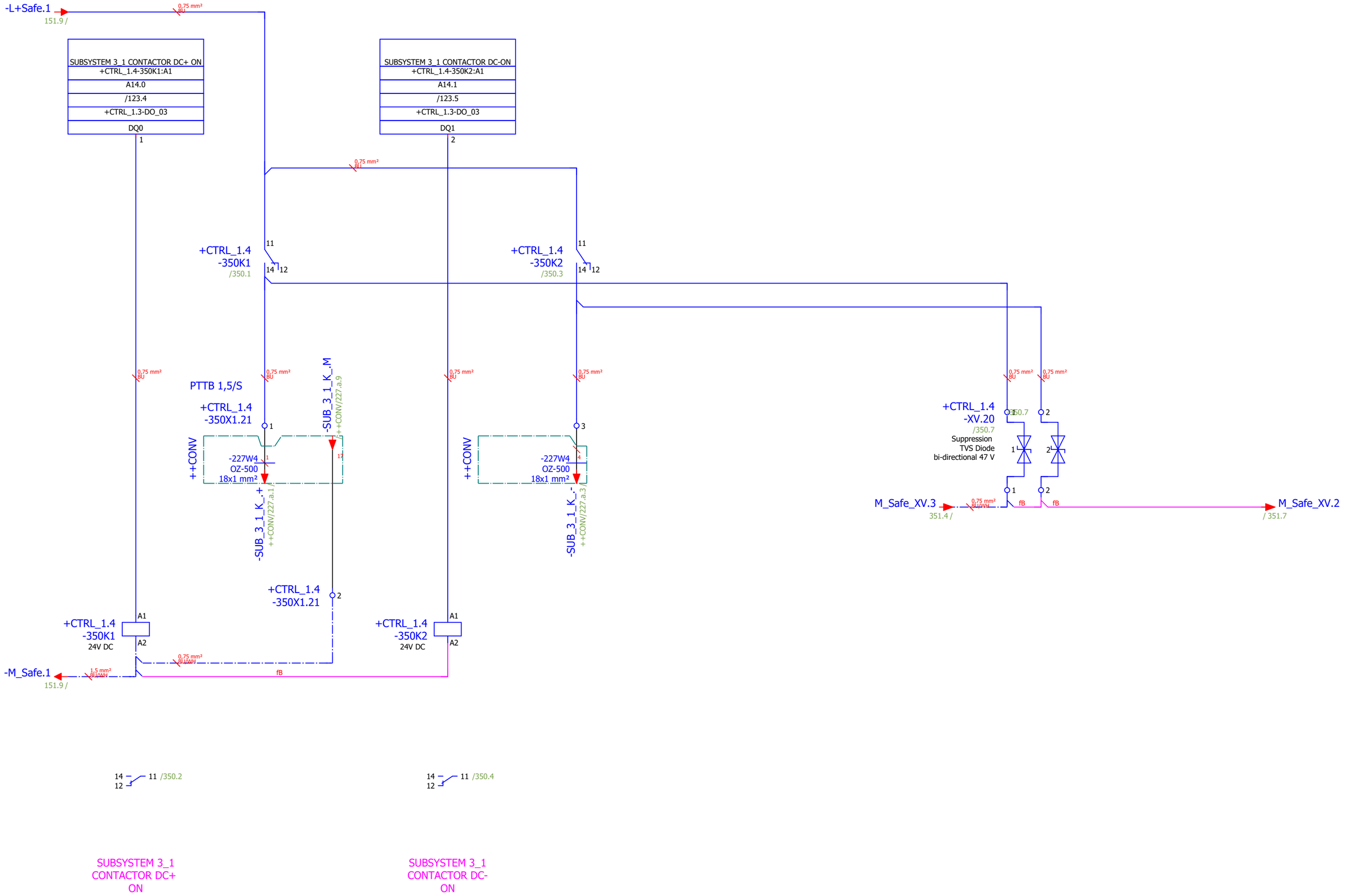
Editor	Freqcon_JD			Statron	FREQCON	Feedback DC contactors 2_1 - 2_3	20241203_V1.22	= UNIT_01	Converter Container 1	
Date	18.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 307
Date								+		total: 500



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Editor	Freqcon_DG			Statron	FREQCON	Feedback DC contactors 2_4 - 2_6	20241203_V1.22	= UNIT_01	Converter Container 1
Date	29.07.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets page: 308
Date								+	total: 500



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Editor	Freqcon_JD			Statron	FREQCON	OUTPUTS DC CONTACTORS SUBSYSTEM 3_1	20241203_V1.22	= UNIT_01	Converter Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets
Date								+	

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total: 500

-3L+5
103.7 /

0,75 mm² BU

+CTRL_1.3
-195K1
/195.3

83
84

+CTRL_1.3
-195K2
/195.4

84
83

SUBSYSTEM 3_3 CONTACTOR DC+ ON
+CTRL_1.4-351K3:A1
A14.4
/123.4
+CTRL_1.3-DO_03
DQ4
5

SUBSYSTEM 3_3 CONTACTOR DC-ON
+CTRL_1.4-351K4:A1
A14.5
/123.5
DQ5
6

L+Safe.2
/ 352.0

+CTRL_1.4
-351K1
/351.1

+CTRL_1.4
-351K2
/351.2

+CTRL_1.4
-351K3
/351.4

+CTRL_1.4
-351K4
/351.5

11
14
12

-3M4
103.7 /

0,75 mm² BU/WH

+CTRL_1.3
-195K1
/195.3

43
44

+CTRL_1.3
-195K2
/195.4

44
43

+CTRL_1.4
-350X1.21

4
6
7
9

++CONV

-227W4
OZ-500
18x1 mm²

-SUB_3_2_K_+
++CONV/227.a.2/

-SUB_3_2_K_-
++CONV/227.a.4/

-SUB_3_3_K_+
++CONV/227.a.2/

-SUB_3_3_K_-
++CONV/227.a.5/

+CTRL_1.4
-XV.20
/351.7
Suppression
TVS Diode
bi-directional 47 V

/351.7
/351.8
/351.8

3
4
5
6

M_Safe_XV.2
350.9 /

fB

M_Safe_XV.4
/ 352.7

+CTRL_1.4
-350X1.21

5
8
10

+CTRL_1.4
-351K1
24V DC

+CTRL_1.4
-351K2
24V DC

+CTRL_1.4
-351K3
24V DC

+CTRL_1.4
-351K4
24V DC

A1
A2

M_Safe_XV.3
/ 350.7

M_Safe.2
/ 352.0

14
12
11 /351.1

14
12
11 /351.3

14
12
11 /351.4

14
12
11 /351.6

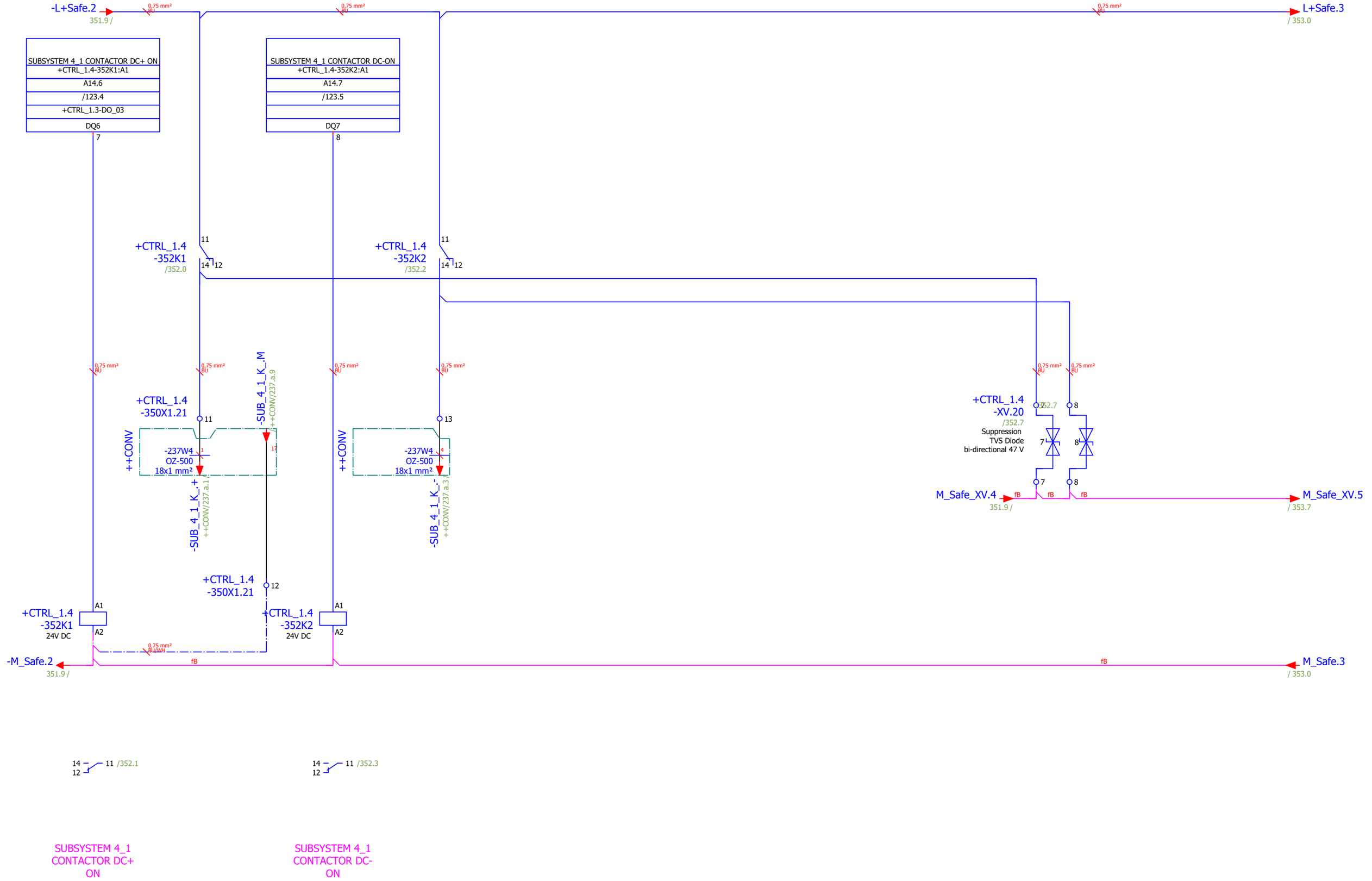
SUBSYSTEM 3_3
CONTACTOR DC+
ON

SUBSYSTEM 3_3
CONTACTOR DC-
ON

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Editor	Freqcon_DG			Statron	FREQCON	OUTPUTS DC CONTACTORS SUBSYSTEM 3_2 - 3_3	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	29.07.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 351
Date								+	total: 500

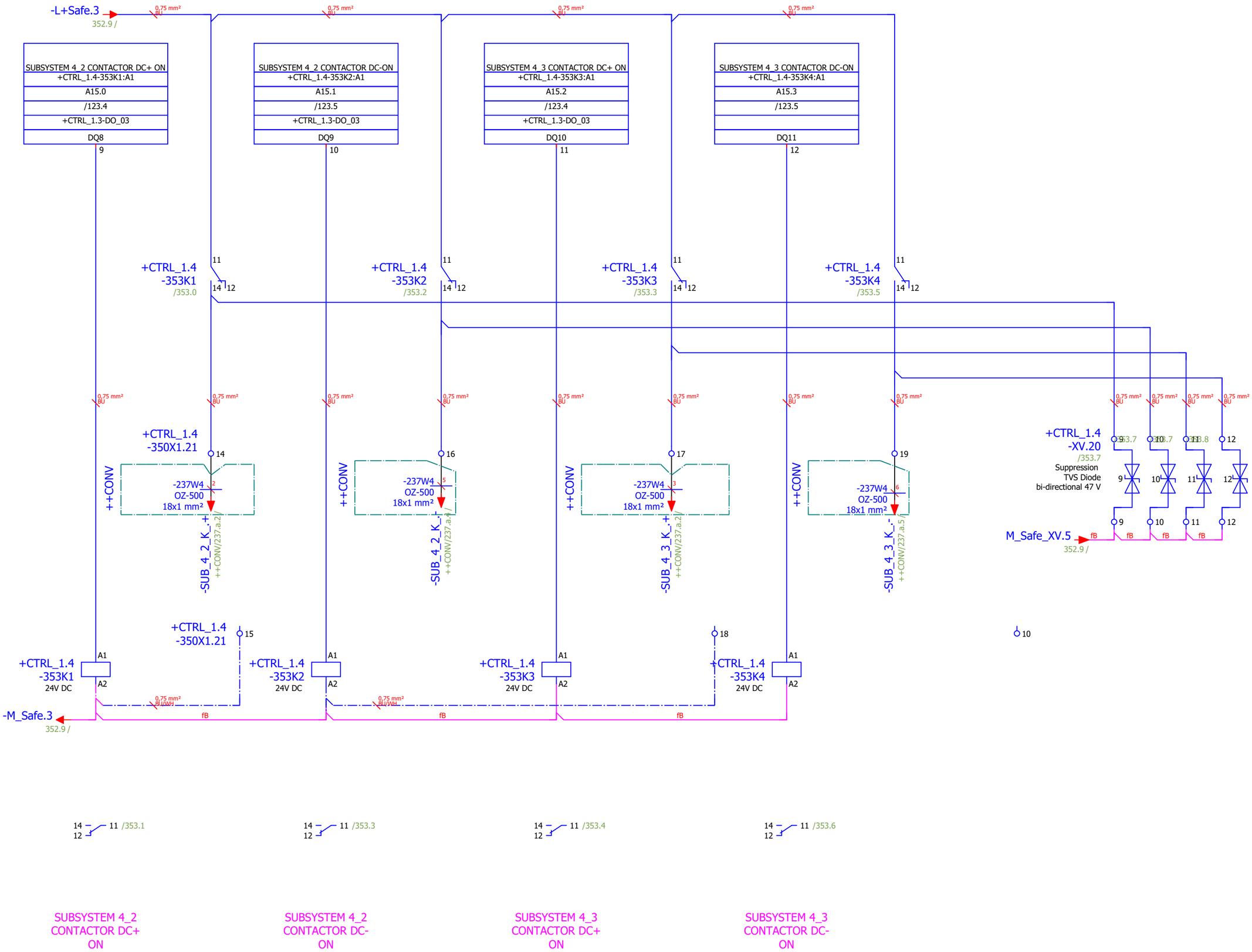


previous page: 351

next page: 353

Editor	Freqcon_DG			Statron	FREQCON	OUTPUTS DC CONTACTORS SUBSYSTEM 4_1	20241203_V1.22	= UNIT_01	Converter Container 1
Date	29.07.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets
Date								+	

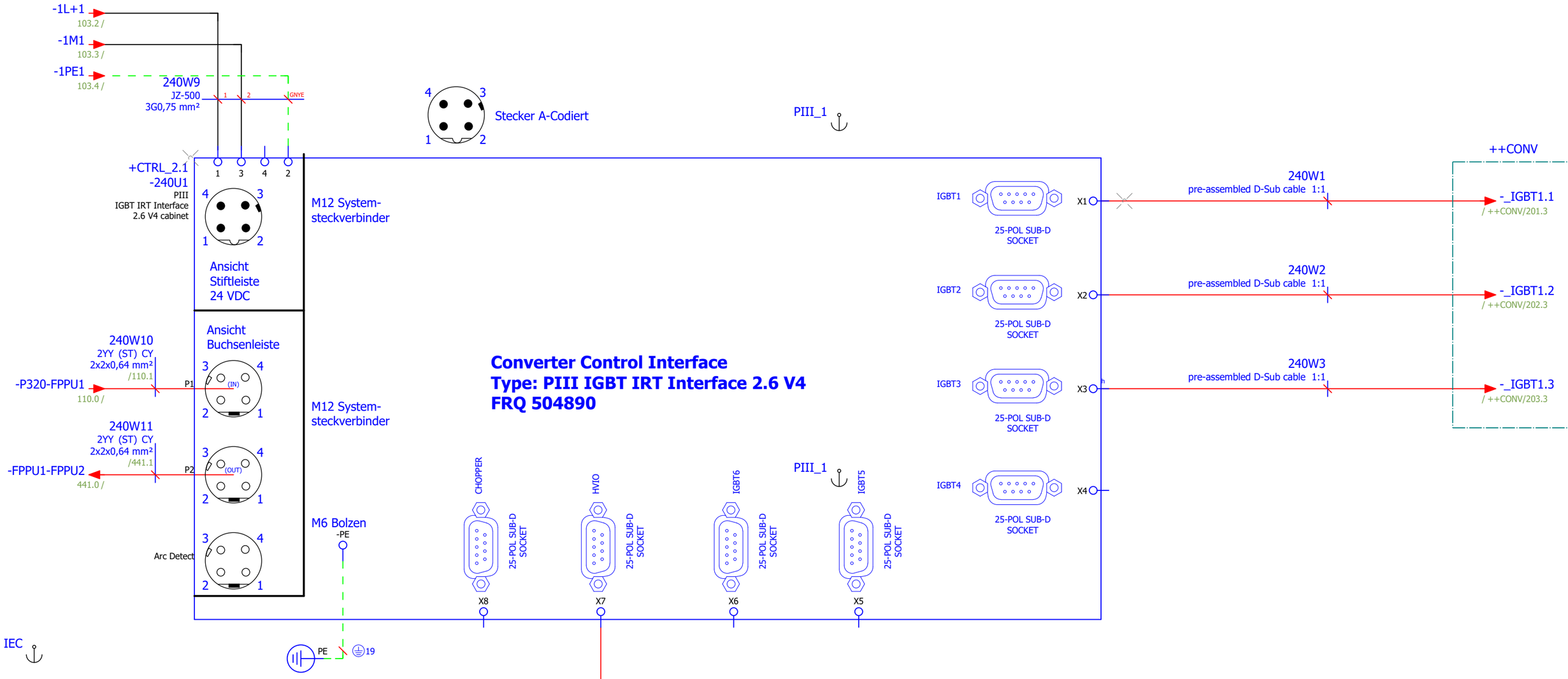
page: 352
total: 500



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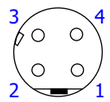
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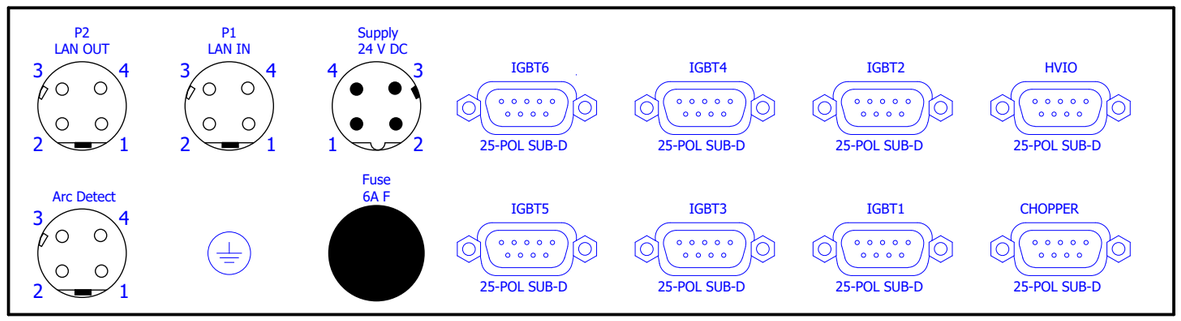
Editor	Freqcon_DG			Statron	FREQCON	OUTPUTS DC CONTACTORS SUBSYSTEM 4_2 - 4_3	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	29.07.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 353
Date								+	total: 500



Signal	Colour	M12 Plug	M12 Plug
TD+	yellow	1	1
TD-	orange	3	3
RD+	white	2	2
RD-	blue	4	4

Connection PIII -- P320

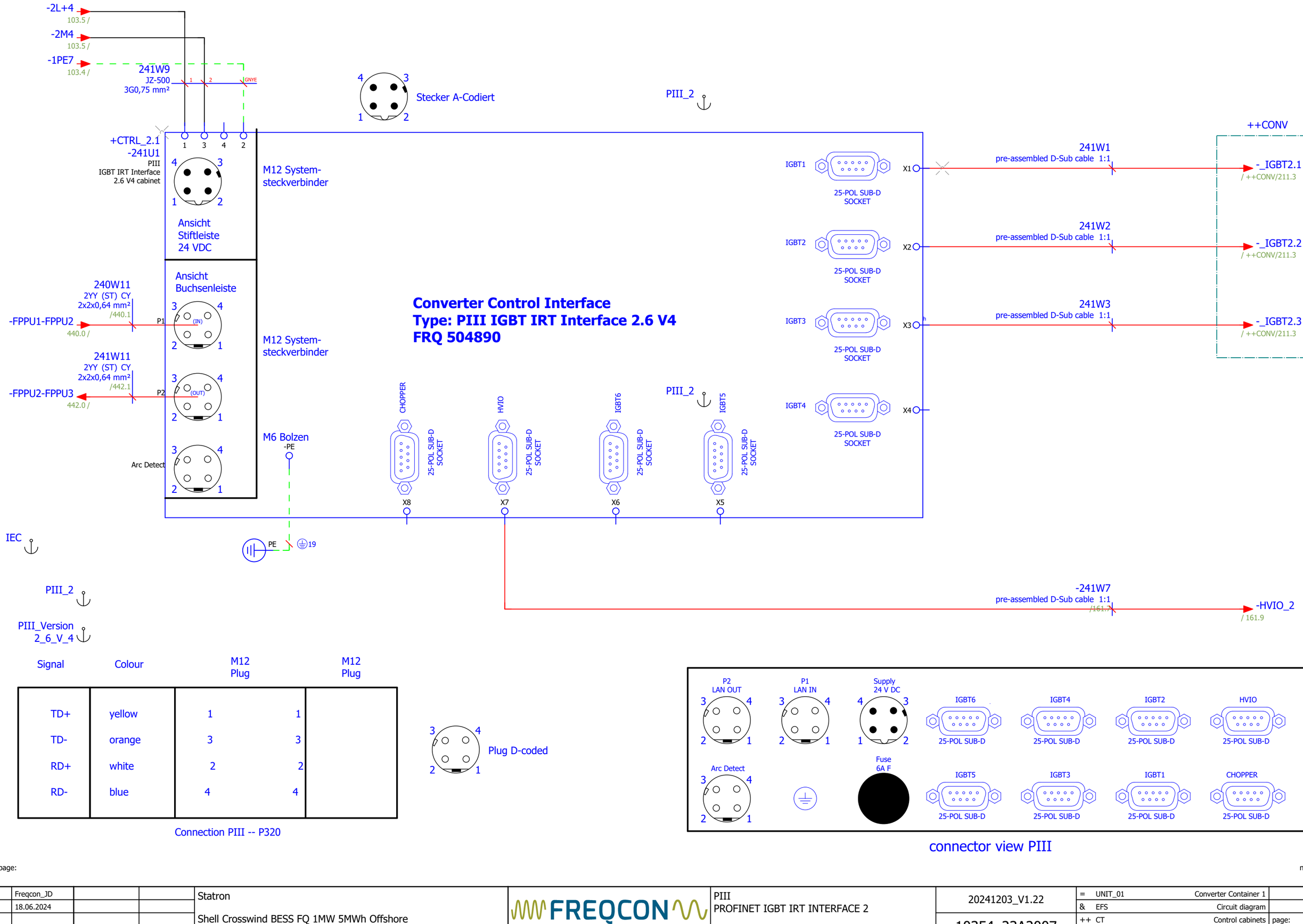




connector view PIII

previous page: 353
next page: 441

Editor	Freqcon_JD			Statron	FREQCON	PIII PROFINET IGBT IRT INTERFACE 1	20241203_V1.22	= UNIT_01 Converter Container 1
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets page: 440
Date								+ total: 500



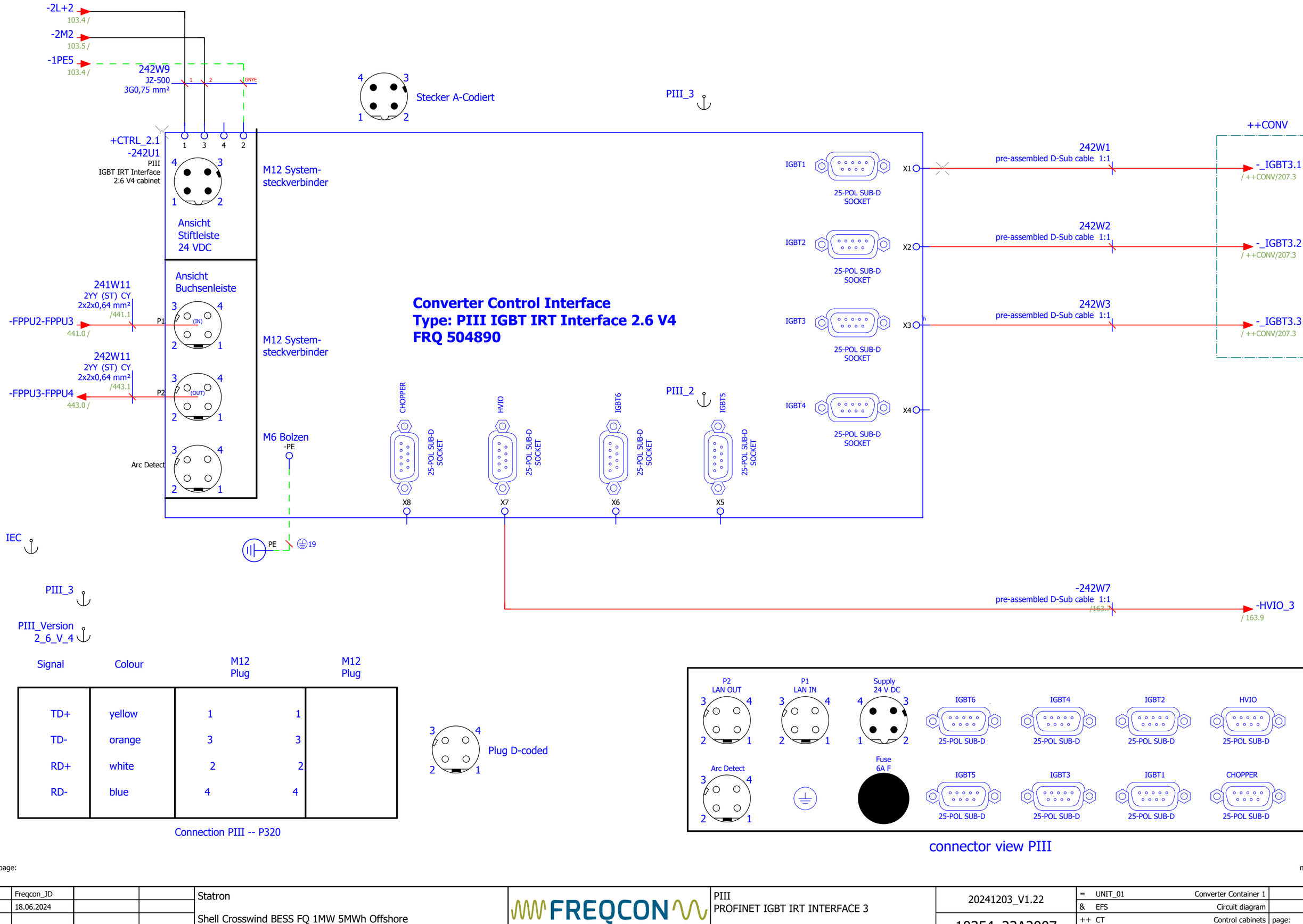
Signal	Colour	M12 Plug	M12 Plug
TD+	yellow	1	1
TD-	orange	3	3
RD+	white	2	2
RD-	blue	4	4

Connection PIII -- P320

connector view PIII

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next page: 442

Editor	Freqcon_JD			Statron	FREQCON	PIII PROFINET IGBT IRT INTERFACE 2	20241203_V1.22	= UNIT_01 Converter Container 1
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets page: 441
Date								+ total: 500



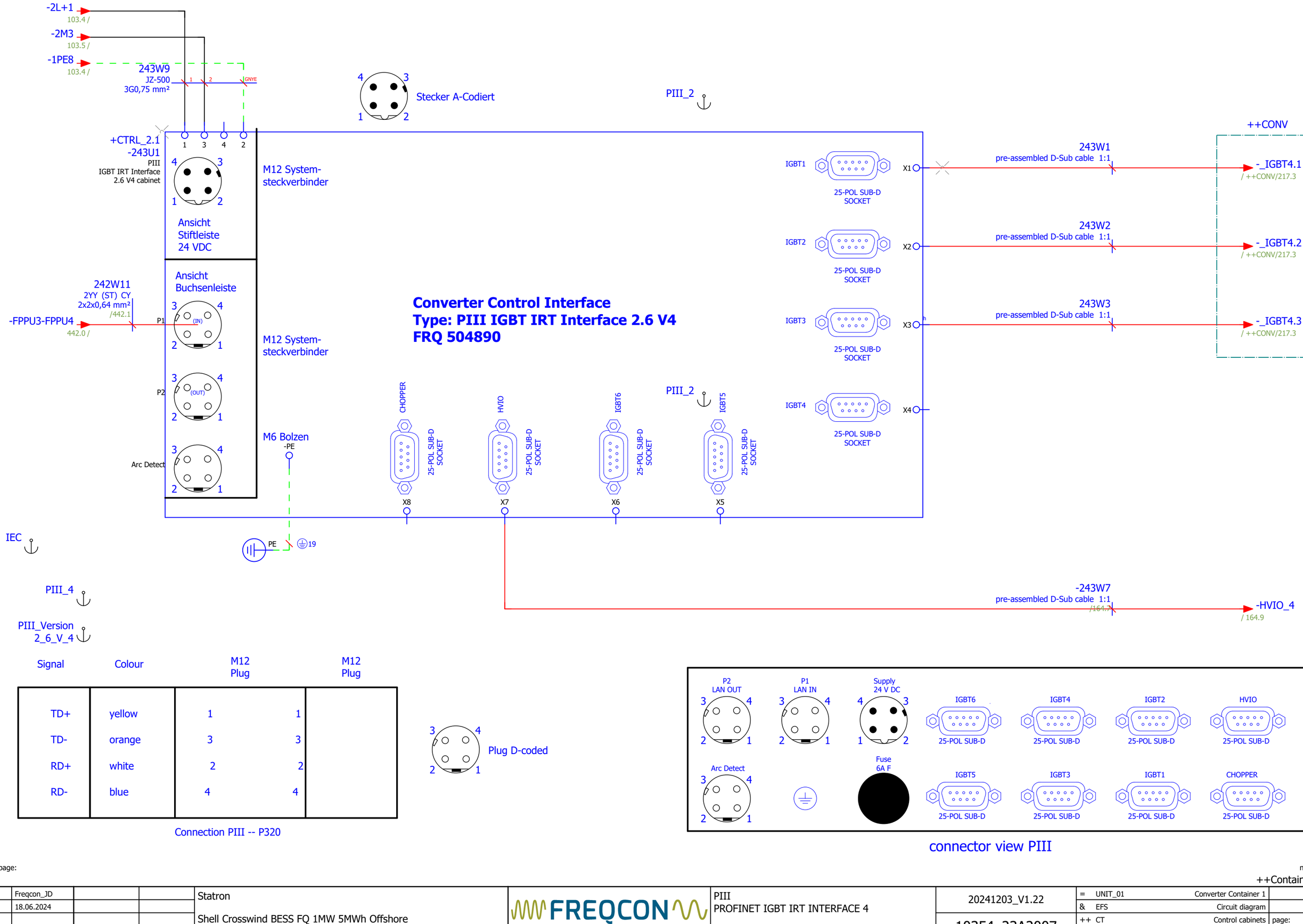
Signal	Colour	M12 Plug	M12 Plug
TD+	yellow	1	1
TD-	orange	3	3
RD+	white	2	2
RD-	blue	4	4

Connection PIII -- P320

connector view PIII

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next page: 443

Editor	Freqcon_JD			Statron	FREQCON	PIII PROFINET IGBT IRT INTERFACE 3	20241203_V1.22	= UNIT_01	Converter Container 1	
Date	18.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 442
Date								+		total: 500



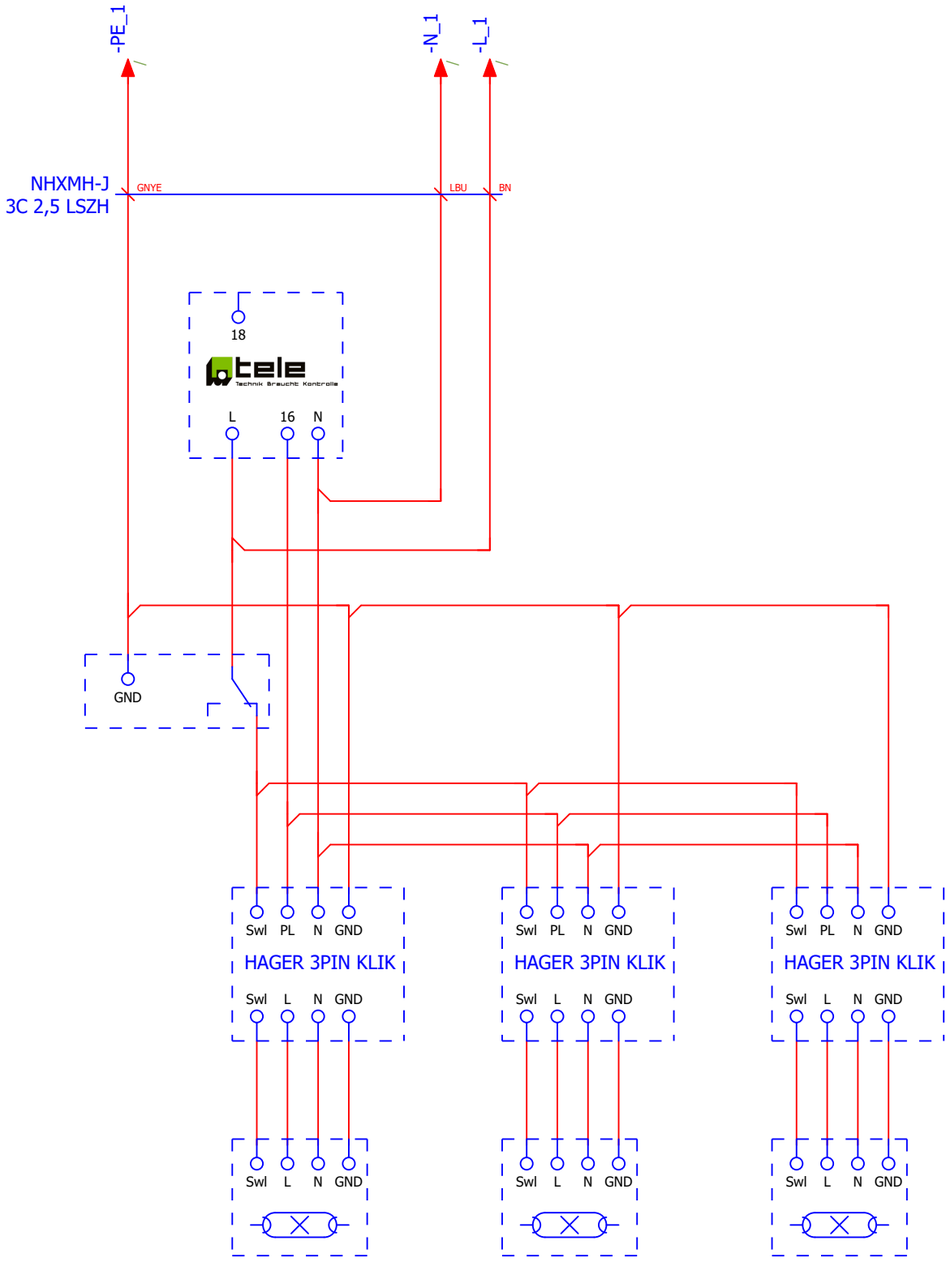
Signal	Colour	M12 Plug	M12 Plug
TD+	yellow	1	1
TD-	orange	3	3
RD+	white	2	2
RD-	blue	4	4

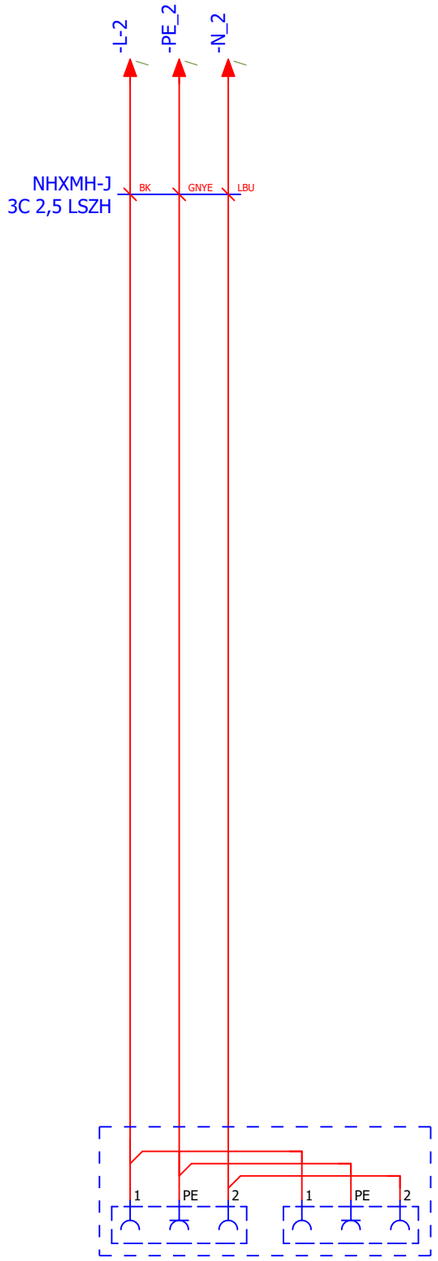
Connection PIII -- P320

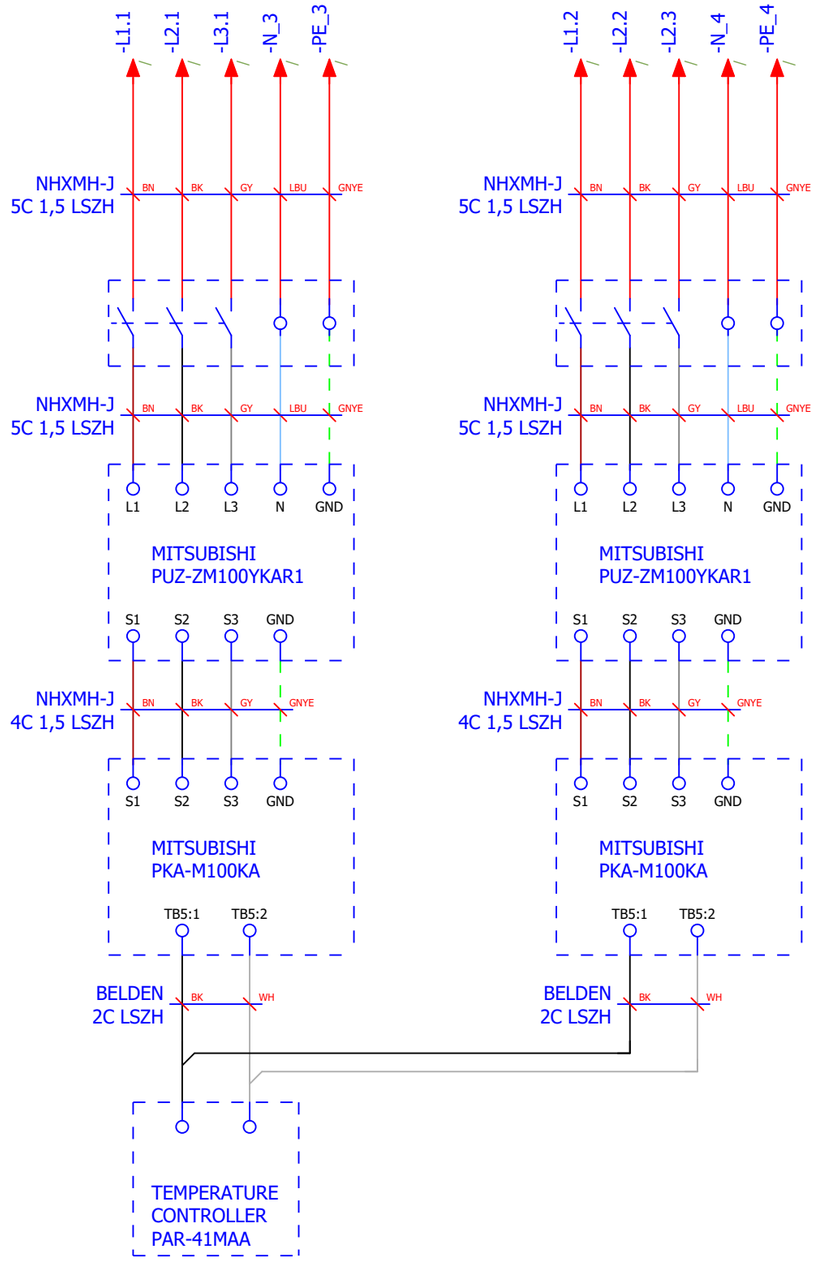
connector view PIII

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Editor	Freqcon_JD			Statron	FREQCON	PIII PROFINET IGBT IRT INTERFACE 4	20241203_V1.22	= UNIT_01 Converter Container 1
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets page: 443
Date								+ total: 500







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&EPC++TRA/1

Editor	Freqcon_JD			Statron	FREQCON	CONTAINER INSTALLATION	20241203_V1.22	= UNIT_01	Converter Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container	page: 190
Date								+	total: 500

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-18T1 &EFS/18.2	1	TMC Transformer 3150kVA-6300V/620V-50Hz-AL-IP00		TMC Transformers	508555	
-18W5 &EFS/18.3	1	Anschlussschiene;100x370mm;Zeichnung 501153B	501153	Freqcon GmbH	501153	

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-18Q1 &EFS++TRA/18.7	1	Switch-disconnector S6000, AC 600A at 690V AC (AC21B), size 2, 4-pole, to attach to the mounting plate	S6-08003NDO	Pronutec GmbH	10172	
-18Q1 &EFS++TRA/18.7	1	Auxiliary contacts S6000 SIZE 2	D5LAU01	Pronutec GmbH	503044	
-18Q1 &EFS++TRA/18.7	1	Direct handle S6000 SIZE 2	DS-LI21	Pronutec GmbH	503039	

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Editor	Freqcon_DG			Statron	FREQCON	PARTS LIST	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	05.11.2024							& EPC Parts List	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV Converter	page: 1
Date								+	total: 500

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-147B2 &EFS++CT+/147.7	1	Temperature sensor PT100, cable 3m Silicon	H2-012030-SDS	Fühler Direkt	500648	
-201Q1 &EFS+/201.3	1	*** VX BG PowerStack 1*1000A*** with SkiiP 2414 GB12E4-4DUW	52872	Freqcon GmbH	52872	
-201Q1 &EFS+/201.3	1	D SUB ADAPTER, PLUG-RECEPTACLE, 25-POL, L-COM DG9025MF1	506157	Freqcon GmbH	506157	
-201Q1 &EFS+/201.3	1	SKiiP 2414 GB17E4-4DUW, 1*1000 A	20603236	Semikron	501558	X
-201Q1 &EFS+/201.3	2	Mini feed-through terminal block, Push in, MPT 1,5/S	3248100	Phoenix Contact	501024	X
-201Q1 &EFS+/201.3	2	End clamp CLIPFIX 15	3022263	Phoenix Contact	500935	X
-201Q1 &EFS+/201.3	1	End cover D-MPT 1,5/S	3248120	Phoenix Contact	500899	X
-201Q1-C &EFS+/201.5	4	Snubber capacitor 470nF 5% 1500V Version for SkiiP module (SL)	KPF-271 REV-01	Alcon Electronics Pvt. Ltd.	501406	X
-201Q1-C &EFS+/201.6	1	Film Capacitor 1500µF 700VDC, with PT100 temperature sensor	1025314-54097	FTCap GmbH	504740	X
-201Q1-C &EFS+/201.6;&EFS+/201.7	3	Film Capacitor 1500µF 700VDC	1025173-54097	FTCap GmbH	500662	X
-201Q1-C &EFS+/201.6;&EFS+/201.7	2	Film Capacitor 1500µF 700VDC EC1500µ700d116165KF6_1	1025170-54097	FTCap GmbH	500661	X
-202Q1 &EFS+/202.3	1	*** VX BG PowerStack 1*1000A*** with SkiiP 2414 GB12E4-4DUW	52872	Freqcon GmbH	52872	
-202Q1 &EFS+/202.3	1	D SUB ADAPTER, PLUG-RECEPTACLE, 25-POL, L-COM DG9025MF1	506157	Freqcon GmbH	506157	
-202Q1 &EFS+/202.3	1	SKiiP 2414 GB17E4-4DUW, 1*1000 A	20603236	Semikron	501558	X
-202Q1 &EFS+/202.3	2	Mini feed-through terminal block, Push in, MPT 1,5/S	3248100	Phoenix Contact	501024	X
-202Q1 &EFS+/202.3	2	End clamp CLIPFIX 15	3022263	Phoenix Contact	500935	X
-202Q1 &EFS+/202.3	1	End cover D-MPT 1,5/S	3248120	Phoenix Contact	500899	X
-202Q1-C &EFS+/202.5	4	Snubber capacitor 470nF 5% 1500V Version for SkiiP module (SL)	KPF-271 REV-01	Alcon Electronics Pvt. Ltd.	501406	X
-202Q1-C &EFS+/202.6	1	Film Capacitor 1500µF 700VDC, with PT100 temperature sensor	1025314-54097	FTCap GmbH	504740	X

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Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-202Q1-C &EFS+/202.6;&EFS+/202.7	3	Film Capacitor 1500µF 700VDC	1025173-54097	FTCap GmbH	500662	X
-202Q1-C &EFS+/202.6;&EFS+/202.7	2	Film Capacitor 1500µF 700VDC EC1500µ700d116165KF6_1	1025170-54097	FTCap GmbH	500661	X
-203Q1 &EFS+/203.3	1	*** VX BG PowerStack 1*1000A*** with SkiiP 2414 GB12E4-4DUW	52872	Freqcon GmbH	52872	
-203Q1 &EFS+/203.3	1	D SUB ADAPTER, PLUG-RECEPTACLE, 25-POL, L-COM DG9025MF1	506157	Freqcon GmbH	506157	
-203Q1 &EFS+/203.3	1	SKiiP 2414 GB17E4-4DUW, 1*1000 A	20603236	Semikron	501558	X
-203Q1 &EFS+/203.3	2	Mini feed-through terminal block, Push in, MPT 1,5/S	3248100	Phoenix Contact	501024	X
-203Q1 &EFS+/203.3	2	End clamp CLIPFIX 15	3022263	Phoenix Contact	500935	X
-203Q1 &EFS+/203.3	1	End cover D-MPT 1,5/S	3248120	Phoenix Contact	500899	X
-203Q1-C &EFS+/203.5	4	Snubber capacitor 470nF 5% 1500V Version for SkiiP module (SL)	KPF-271 REV-01	Alcon Electronics Pvt. Ltd.	501406	X
-203Q1-C &EFS+/203.6	1	Film Capacitor 1500µF 700VDC, with PT100 temperature sensor	1025314-54097	FTCap GmbH	504740	X
-203Q1-C &EFS+/203.6;&EFS+/203.7	3	Film Capacitor 1500µF 700VDC	1025173-54097	FTCap GmbH	500662	X
-203Q1-C &EFS+/203.6;&EFS+/203.7	2	Film Capacitor 1500µF 700VDC EC1500µ700d116165KF6_1	1025170-54097	FTCap GmbH	500661	X
-207Q1 &EFS+/207.3	1	*** VX BG PowerStack 3*250A***	52867	Freqcon GmbH	52867	
-207Q1 &EFS+/207.3	1	SKiiP 603 GD172-3DK1470	20452470	Semikron	501559	X
-207Q1 &EFS+/207.3	2	Mini feed-through terminal block, Push in, MPT 1,5/S	3248100	Phoenix Contact	501024	X
-207Q1 &EFS+/207.3	2	End clamp CLIPFIX 15	3022263	Phoenix Contact	500935	X
-207Q1 &EFS+/207.3	1	End cover D-MPT 1,5/S	3248120	Phoenix Contact	500899	X
-207Q1-C &EFS+/207.5	3	Snubber capacitor 470nF 5% 1500V Version for SkiiP module (SL)	KPF-271 REV-01	Alcon Electronics Pvt. Ltd.	501406	X
-207Q1-C &EFS+/207.6	1	Film Capacitor 1500µF 700VDC, with PT100 temperature sensor	1025314-54097	FTCap GmbH	504740	X

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-207Q1-C &EFS+/207.6;&EFS+/207.7	2	Film Capacitor 1500µF 700VDC	1025173-54097	FTCap GmbH	500662	X
-207Q1-C &EFS+/207.7	1	Film Capacitor 1500µF 700VDC EC1500µ700d116165KF6_1	1025170-54097	FTCap GmbH	500661	X
-207Q1-U1 &EFS+/207.3	1	SKiiP 3 I Adapter	FRQ-M00080-1	Freqcon GmbH	500426	
-211Q1 &EFS+/211.3	1	*** VX BG PowerStack 3*250A***	52867	Freqcon GmbH	52867	
-211Q1 &EFS+/211.3	1	SKiiP 603 GD172-3DK1470	20452470	Semikron	501559	X
-211Q1 &EFS+/211.3	2	Mini feed-through terminal block, Push in, MPT 1,5/S	3248100	Phoenix Contact	501024	X
-211Q1 &EFS+/211.3	2	End clamp CLIPFIX 15	3022263	Phoenix Contact	500935	X
-211Q1 &EFS+/211.3	1	End cover D-MPT 1,5/S	3248120	Phoenix Contact	500899	X
-211Q1-C &EFS+/211.5	3	Snubber capacitor 470nF 5% 1500V Version for SkiiP module (SL)	KPF-271 REV-01	Alcon Electronics Pvt. Ltd.	501406	X
-211Q1-C &EFS+/211.6	1	Film Capacitor 1500µF 700VDC, with PT100 temperature sensor	1025314-54097	FTCap GmbH	504740	X
-211Q1-C &EFS+/211.6;&EFS+/211.7	2	Film Capacitor 1500µF 700VDC	1025173-54097	FTCap GmbH	500662	X
-211Q1-C &EFS+/211.7	1	Film Capacitor 1500µF 700VDC EC1500µ700d116165KF6_1	1025170-54097	FTCap GmbH	500661	X
-211Q1-U1 &EFS+/211.3	1	SKiiP 3 I Adapter	FRQ-M00080-1	Freqcon GmbH	500426	
-217Q1 &EFS+/217.3	1	*** VX BG PowerStack 3*250A***	52867	Freqcon GmbH	52867	
-217Q1 &EFS+/217.3	1	SKiiP 603 GD172-3DK1470	20452470	Semikron	501559	X
-217Q1 &EFS+/217.3	1	DC Adapter 3.3535 (EN-AW 5754) Alu	51524	Freqcon GmbH	51524	
-217Q1 &EFS+/217.3	2	Mini feed-through terminal block, Push in, MPT 1,5/S	3248100	Phoenix Contact	501024	X
-217Q1 &EFS+/217.3	2	End clamp CLIPFIX 15	3022263	Phoenix Contact	500935	X
-217Q1 &EFS+/217.3	1	End cover D-MPT 1,5/S	3248120	Phoenix Contact	500899	X

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-217Q1-C &EFS+/217.5	3	Snubber capacitor 470nF 5% 1500V Version for SkiiP module (SL)	KPF-271 REV-01	Alcon Electronics Pvt. Ltd.	501406	X
-217Q1-C &EFS+/217.6	1	Film Capacitor 1500µF 700VDC, with PT100 temperature sensor	1025314-54097	FTCap GmbH	504740	X
-217Q1-C &EFS+/217.6;&EFS+/217.7	2	Film Capacitor 1500µF 700VDC	1025173-54097	FTCap GmbH	500662	X
-217Q1-C &EFS+/217.7	1	Film Capacitor 1500µF 700VDC EC1500µ700d116165KF6_1	1025170-54097	FTCap GmbH	500661	X
-217Q1-U1 &EFS+/217.3	1	SKiiP 3 I Adapter	FRQ-M00080-1	Freqcon GmbH	500426	
-260B1 &EFS+/260.3	1	Optical smoke detector 12V, with alarm relais	130-60-457	ABUS Security-Center GmbH & Co. KG	500713	X
-279M1 &EFS+/279.1	1	SK TopTherm fan-and-filter unit, 550/600 m³/h, 230 V, 1~, 50/60 Hz, 70W	3243100	Rittal	500596	X
-279M2 &EFS+/279.2	1	SK TopTherm fan-and-filter unit, 550/600 m³/h, 230 V, 1~, 50/60 Hz, 70W	3243100	Rittal	500596	X
-279M3 &EFS+/279.3	1	SK TopTherm fan-and-filter unit, 550/600 m³/h, 230 V, 1~, 50/60 Hz, 70W	3243100	Rittal	500596	X
-279M4 &EFS+/279.5	1	SK TopTherm fan-and-filter unit, 550/600 m³/h, 230 V, 1~, 50/60 Hz, 70W	3243100	Rittal	500596	X
-279M5 &EFS+/279.6	1	SK TopTherm fan-and-filter unit, 550/600 m³/h, 230 V, 1~, 50/60 Hz, 70W	3243100	Rittal	500596	X
-N &EFS+/99.5	2	Busbar holder for busbars 12x 5 (10)-30x 5 (10) and 6x 6 mm	8US1923-1AA01	Siemens	501271	X

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Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-201L1 &EFS+/201.1	1	*** VX Single phase line Inductor, I= 1x 1000 A LN= 0,2mH ***	53053	Freqcon GmbH	53053	
-201L1 &EFS+/201.1	1	Inductor, 1050A, 0.2mH, 690V, 50/60Hz, 1-phas, 1x PT100, water-cooled	36231	Trafotek Oy	500889	X
-201U1 &EFS+/201.0	1	EMI Suppresion CAP DC	FRQ-M00110	Freqcon GmbH	500449	
-202L1 &EFS+/202.1	1	*** VX Single phase line Inductor, I= 1x 1000 A LN= 0,2mH ***	53053	Freqcon GmbH	53053	
-202L1 &EFS+/202.1	1	Inductor, 1050A, 0.2mH, 690V, 50/60Hz, 1-phas, 1x PT100, water-cooled	36231	Trafotek Oy	500889	X
-202U1 &EFS+/202.0	1	EMI Suppresion CAP DC	FRQ-M00110	Freqcon GmbH	500449	
-203L1 &EFS+/203.1	1	*** VX Single phase line Inductor, I= 1x 1000 A LN= 0,2mH ***	53053	Freqcon GmbH	53053	
-203L1 &EFS+/203.1	1	Inductor, 1050A, 0.2mH, 690V, 50/60Hz, 1-phas, 1x PT100, water-cooled	36231	Trafotek Oy	500889	X
-203U1 &EFS+/203.0	1	EMI Suppresion CAP DC	FRQ-M00110	Freqcon GmbH	500449	
-207L1 &EFS+/207.1	1	*** VX Trible phase line Inductor, I= 3x 250A LN= 0,6mH ***	53046	Freqcon GmbH	53046	
-207L1 &EFS+/207.1	1	3x Single phase line reactor, UN=690 V, 50/60 Hz, LN=0,6 mH, I=263,0 A	37106B	Trafotek Oy	501204	X
-211L1 &EFS+/211.1	1	*** VX Trible phase line Inductor, I= 3x 250A LN= 0,6mH ***	53046	Freqcon GmbH	53046	
-211L1 &EFS+/211.1	1	3x Single phase line reactor, UN=690 V, 50/60 Hz, LN=0,6 mH, I=263,0 A	37106B	Trafotek Oy	501204	X
-217L1 &EFS+/217.1	1	*** VX Trible phase line Inductor, I= 3x 250A LN= 0,6mH ***	53046	Freqcon GmbH	53046	
-217L1 &EFS+/217.1	1	3x Single phase line reactor, UN=690 V, 50/60 Hz, LN=0,6 mH, I=263,0 A	37106B	Trafotek Oy	501204	X

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Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-80Q1 &EFS+/80.0	1	*** VX BG Circuit Breaker IEC 1000 A ***	52955	Freqcon GmbH	52955	
-80Q1 &EFS+/80.1	1	Circuit breaker 3WL1112, 1250A, 42kA 690V, size 1, 3-pole, IEC, ETU15B, withdrawable	3WL1112-2BB36-1BJ2-ZA08+K07+M06+M21+R10	Siemens	501430	X
-83U1 &EFS+/83.2	1	*** VX BG AC Capacitor Bank 3 * 600µF ***	52918	Freqcon GmbH	52918	
-83U1-C1 &EFS+/83.4	1	CAPACITORS MKP AC B32362 150µF 680V AC / 480V rms	B32362A4157J080	EPCOS AG	500663	X
-83U1-C2 &EFS+/83.5	1	CAPACITORS MKP AC B32362 150µF 680V AC / 480V rms	B32362A4157J080	EPCOS AG	500663	X
-83U1-C3 &EFS+/83.5	1	CAPACITORS MKP AC B32362 150µF 680V AC / 480V rms	B32362A4157J080	EPCOS AG	500663	X
-83U1-C4 &EFS+/83.6	1	CAPACITORS MKP AC B32362 150µF 680V AC / 480V rms	B32362A4157J080	EPCOS AG	500663	X
-83U1-C7 &EFS+/83.4	1	CAPACITORS MKP AC B32362 150µF 680V AC / 480V rms	B32362A4157J080	EPCOS AG	500663	X
-83U1-C8 &EFS+/83.5	1	CAPACITORS MKP AC B32362 150µF 680V AC / 480V rms	B32362A4157J080	EPCOS AG	500663	X
-83U1-C9 &EFS+/83.5	1	CAPACITORS MKP AC B32362 150µF 680V AC / 480V rms	B32362A4157J080	EPCOS AG	500663	X
-83U1-C10 &EFS+/83.6	1	CAPACITORS MKP AC B32362 150µF 680V AC / 480V rms	B32362A4157J080	EPCOS AG	500663	X
-83U1-C13 &EFS+/83.4	1	CAPACITORS MKP AC B32362 150µF 680V AC / 480V rms	B32362A4157J080	EPCOS AG	500663	X
-83U1-C14 &EFS+/83.5	1	CAPACITORS MKP AC B32362 150µF 680V AC / 480V rms	B32362A4157J080	EPCOS AG	500663	X
-83U1-C15 &EFS+/83.5	1	CAPACITORS MKP AC B32362 150µF 680V AC / 480V rms	B32362A4157J080	EPCOS AG	500663	X
-83U1-C16 &EFS+/83.6	1	CAPACITORS MKP AC B32362 150µF 680V AC / 480V rms	B32362A4157J080	EPCOS AG	500663	X
-148B3 &EFS++CT+/148.5	1	Temperature sensor PT100, cable 6m Silicon	H2-012060-SDS	Fühler Direkt	500649	
-227U1 &EFS+/227.0	1	*** VX BG DC switch and Fuse 3*250A 1000V***	52882	Freqcon GmbH	52882	
-227U1-C1 &EFS+/227.1	1	CAPACITORS MKP DC B2562 340µF 1320V DC	B25620C1347K321	EPCOS AG	501405	X
-227U1-C7 &EFS+/227.3	1	CAPACITORS MKP DC B2562 340µF 1320V DC	B25620C1347K321	EPCOS AG	501405	X

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Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-227U1-C13 &EFS+/227.7	1	CAPACITORS MKP DC B2562 340µF 1320V DC	B25620C1347K321	EPCOS AG	501405	X
-227U1-F0 &EFS+/227.2	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-227U1-F1 &EFS+/227.1	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-227U1-F1 &EFS+/227.1	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-227U1-F1 &EFS+/227.1	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-227U1-F2 &EFS+/227.1	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-227U1-F2 &EFS+/227.1	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-227U1-F2 &EFS+/227.1	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-227U1-F3 &EFS+/227.1	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-227U1-F3 &EFS+/227.1	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-227U1-F3 &EFS+/227.1	1	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-227U1-F4 &EFS+/227.2	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-227U1-F4 &EFS+/227.2	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-227U1-F5 &EFS+/227.3	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-227U1-F5 &EFS+/227.3	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-227U1-F5 &EFS+/227.3	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-227U1-F6 &EFS+/227.3	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-227U1-F6 &EFS+/227.3	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-227U1-F6 &EFS+/227.3	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X

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Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-227U1-F7 &EFS+/227.3	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-227U1-F7 &EFS+/227.3	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-227U1-F8 &EFS+/227.4	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-227U1-F8 &EFS+/227.4	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-227U1-F9 &EFS+/227.6	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-227U1-F9 &EFS+/227.6	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-227U1-F9 &EFS+/227.6	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-227U1-F10 &EFS+/227.7	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-227U1-F10 &EFS+/227.7	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-227U1-F10 &EFS+/227.7	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-227U1-F11 &EFS+/227.6	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-227U1-F11 &EFS+/227.6	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-227U1-F12 &EFS+/227.8	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-227U1-F12 &EFS+/227.8	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-227U1-F12 &EFS+/227.8	1	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-227U1-K1 &EFS+/227.a.1	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-227U1-K2 &EFS+/227.a.2	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-227U1-K3 &EFS+/227.a.2	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-227U1-K7 &EFS+/227.a.3	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-227U1-K8 &EFS+/227.a.4	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-227U1-K9 &EFS+/227.a.5	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-227U1-U1 &EFS+/227.4	1	EMI Suppresion CAP L1-L3; N; DC + & -	FRQ-M00111	Freqcon GmbH	500450	X
-227U1-X3.1 &EFS+/227.a.0;&EFS+/227.a.9	0					
-227U1-X3.1 &EFS+/227.a.1...&EFS+/227.a.9	17	Feed-through terminal block Push-in PT 2,5/1P	3210033	Phoenix Contact	501390	X
-227U1-X3.1 &EFS+/227.a.1	1	Plug Push-in, 1 Pol., 0,14 mm² - 4 mm², PP-H 2,5/1-L	3210062	Phoenix Contact	504126	X
-227U1-X3.1 &EFS+/227.a.1	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	X
-227U1-X3.1 &EFS+/227.a.1;&EFS+/227.a.9	2	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-227U1-X3.1 &EFS+/227.a.1;&EFS+/227.a.9	2	Latching PR	3040559	Phoenix Contact	504066	X
-227U1-X3.1 &EFS+/227.a.2...&EFS+/227.a.9	15	Plug Push-in, 1 Pol., 0,14 mm² - 4 mm², PP-H 2,5/1-M	3210091	Phoenix Contact	504129	X
-227U1-X3.1 &EFS+/227.a.9	1	Plug Push-in, 1 Pol., 0,14 mm² - 4 mm², PP-H 2,5/1-R	3210127	Phoenix Contact	10044	X
-227U1-X3.2 &EFS+/227.a.0	0					
-227U1-X3.2 &EFS+/227.a.1...&EFS+/227.a.7	13	Multi-level terminal block	3208511	Phoenix Contact	500560	X
-227U1-X3.2 &EFS+/227.a.1	1	End and partition plate for terminal block	3208579	Phoenix Contact	500504	X
-227U1-X3.2 &EFS+/227.a.1;&EFS+/227.a.7	2	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-227U1-X3.2 &EFS+/227.a.1;&EFS+/227.a.5	2	Plug-in bridge FBS 10-3,5	3213056	Phoenix Contact	501171	X
-231U1 &EFS+/231.0	1	*** VX BG DC switch and Fuse 3*250A 1000V***	52882	Freqcon GmbH	52882	
-231U1-C1 &EFS+/231.1	1	CAPACITORS MKP DC B2562 340µF 1320V DC	B25620C1347K321	EPCOS AG	501405	X
-231U1-C7 &EFS+/231.3	1	CAPACITORS MKP DC B2562 340µF 1320V DC	B25620C1347K321	EPCOS AG	501405	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-231U1-C13 &EFS+/231.7	1	CAPACITORS MKP DC B2562 340µF 1320V DC	B25620C1347K321	EPCOS AG	501405	X
-231U1-F0 &EFS+/231.2	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-231U1-F1 &EFS+/231.1	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-231U1-F1 &EFS+/231.1	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-231U1-F1 &EFS+/231.1	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-231U1-F2 &EFS+/231.1	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-231U1-F2 &EFS+/231.1	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-231U1-F2 &EFS+/231.1	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-231U1-F3 &EFS+/231.1	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-231U1-F3 &EFS+/231.1	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-231U1-F3 &EFS+/231.1	1	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-231U1-F4 &EFS+/231.2	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-231U1-F4 &EFS+/231.2	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-231U1-F5 &EFS+/231.3	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-231U1-F5 &EFS+/231.3	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-231U1-F5 &EFS+/231.3	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-231U1-F6 &EFS+/231.3	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-231U1-F6 &EFS+/231.3	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-231U1-F6 &EFS+/231.3	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-231U1-F7 &EFS+/231.3	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-231U1-F7 &EFS+/231.3	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-231U1-F8 &EFS+/231.4	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-231U1-F8 &EFS+/231.4	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-231U1-F9 &EFS+/231.6	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-231U1-F9 &EFS+/231.6	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-231U1-F9 &EFS+/231.6	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-231U1-F10 &EFS+/231.7	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-231U1-F10 &EFS+/231.7	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-231U1-F10 &EFS+/231.7	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-231U1-F11 &EFS+/231.6	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-231U1-F11 &EFS+/231.6	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-231U1-F12 &EFS+/231.8	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-231U1-F12 &EFS+/231.8	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-231U1-F12 &EFS+/231.8	1	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-231U1-K1 &EFS+/231.a.1	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-231U1-K2 &EFS+/231.a.2	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-231U1-K3 &EFS+/231.a.2	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-231U1-K7 &EFS+/231.a.3	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-231U1-K8 &EFS+/231.a.4	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-231U1-K9 &EFS+/231.a.5	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-231U1-U1 &EFS+/231.4	1	EMI Suppresion CAP L1-L3; N; DC + & -	FRQ-M00111	Freqcon GmbH	500450	X
-231U1-X3.1 &EFS+/231.a.0;&EFS+/231.a.9	0					
-231U1-X3.1 &EFS+/231.a.1...&EFS+/231.a.9	17	Feed-through terminal block Push-in PT 2,5/1P	3210033	Phoenix Contact	501390	X
-231U1-X3.1 &EFS+/231.a.1	1	Plug Push-in, 1 Pol., 0,14 mm² - 4 mm², PP-H 2,5/1-L	3210062	Phoenix Contact	504126	X
-231U1-X3.1 &EFS+/231.a.1	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	X
-231U1-X3.1 &EFS+/231.a.1;&EFS+/231.a.9	2	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-231U1-X3.1 &EFS+/231.a.1;&EFS+/231.a.9	2	Latching PR	3040559	Phoenix Contact	504066	X
-231U1-X3.1 &EFS+/231.a.2...&EFS+/231.a.9	15	Plug Push-in, 1 Pol., 0,14 mm² - 4 mm², PP-H 2,5/1-M	3210091	Phoenix Contact	504129	X
-231U1-X3.1 &EFS+/231.a.9	1	Plug Push-in, 1 Pol., 0,14 mm² - 4 mm², PP-H 2,5/1-R	3210127	Phoenix Contact	10044	X
-231U1-X3.2 &EFS+/231.a.0	0					
-231U1-X3.2 &EFS+/231.a.1...&EFS+/231.a.7	13	Multi-level terminal block	3208511	Phoenix Contact	500560	X
-231U1-X3.2 &EFS+/231.a.1	1	End and partition plate for terminal block	3208579	Phoenix Contact	500504	X
-231U1-X3.2 &EFS+/231.a.1;&EFS+/231.a.7	2	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-231U1-X3.2 &EFS+/231.a.1;&EFS+/231.a.5	2	Plug-in bridge FBS 10-3,5	3213056	Phoenix Contact	501171	X
-237U1 &EFS+/237.0	1	*** VX BG DC switch and Fuse 3*250A 1000V***	52882	Freqcon GmbH	52882	
-237U1-C1 &EFS+/237.1	1	CAPACITORS MKP DC B2562 340µF 1320V DC	B25620C1347K321	EPCOS AG	501405	X
-237U1-C7 &EFS+/237.3	1	CAPACITORS MKP DC B2562 340µF 1320V DC	B25620C1347K321	EPCOS AG	501405	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-237U1-C13 &EFS+/237.7	1	CAPACITORS MKP DC B2562 340µF 1320V DC	B25620C1347K321	EPCOS AG	501405	X
-237U1-F0 &EFS+/237.2	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-237U1-F1 &EFS+/237.1	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-237U1-F1 &EFS+/237.1	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-237U1-F1 &EFS+/237.1	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-237U1-F2 &EFS+/237.1	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-237U1-F2 &EFS+/237.1	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-237U1-F2 &EFS+/237.1	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-237U1-F3 &EFS+/237.1	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-237U1-F3 &EFS+/237.1	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-237U1-F3 &EFS+/237.1	1	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-237U1-F4 &EFS+/237.2	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-237U1-F4 &EFS+/237.2	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-237U1-F5 &EFS+/237.3	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-237U1-F5 &EFS+/237.3	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-237U1-F5 &EFS+/237.3	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-237U1-F6 &EFS+/237.3	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-237U1-F6 &EFS+/237.3	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-237U1-F6 &EFS+/237.3	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-237U1-F7 &EFS+/237.3	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-237U1-F7 &EFS+/237.3	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-237U1-F8 &EFS+/237.4	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-237U1-F8 &EFS+/237.4	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-237U1-F9 &EFS+/237.6	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-237U1-F9 &EFS+/237.6	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-237U1-F9 &EFS+/237.6	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-237U1-F10 &EFS+/237.7	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-237U1-F10 &EFS+/237.7	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-237U1-F10 &EFS+/237.7	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-237U1-F11 &EFS+/237.6	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-237U1-F11 &EFS+/237.6	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-237U1-F12 &EFS+/237.8	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-237U1-F12 &EFS+/237.8	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-237U1-F12 &EFS+/237.8	1	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-237U1-K1 &EFS+/237.a.1	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-237U1-K2 &EFS+/237.a.2	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-237U1-K3 &EFS+/237.a.2	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-237U1-K7 &EFS+/237.a.3	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-237U1-K8 &EFS+/237.a.4	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-237U1-K9 &EFS+/237.a.5	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-237U1-U1 &EFS+/237.4	1	EMI Suppresion CAP L1-L3; N; DC + & -	FRQ-M00111	Freqcon GmbH	500450	X
-237U1-X3.1 &EFS+/237.a.0;&EFS+/237.a.9	0					
-237U1-X3.1 &EFS+/237.a.1...&EFS+/237.a.9	17	Feed-through terminal block Push-in PT 2,5/1P	3210033	Phoenix Contact	501390	X
-237U1-X3.1 &EFS+/237.a.1	1	Plug Push-in, 1 Pol., 0,14 mm² - 4 mm², PP-H 2,5/1-L	3210062	Phoenix Contact	504126	X
-237U1-X3.1 &EFS+/237.a.1	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	X
-237U1-X3.1 &EFS+/237.a.1;&EFS+/237.a.9	2	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-237U1-X3.1 &EFS+/237.a.1;&EFS+/237.a.9	2	Latching PR	3040559	Phoenix Contact	504066	X
-237U1-X3.1 &EFS+/237.a.2...&EFS+/237.a.9	15	Plug Push-in, 1 Pol., 0,14 mm² - 4 mm², PP-H 2,5/1-M	3210091	Phoenix Contact	504129	X
-237U1-X3.1 &EFS+/237.a.9	1	Plug Push-in, 1 Pol., 0,14 mm² - 4 mm², PP-H 2,5/1-R	3210127	Phoenix Contact	10044	X
-237U1-X3.2 &EFS+/237.a.0	0					
-237U1-X3.2 &EFS+/237.a.1...&EFS+/237.a.7	13	Multi-level terminal block	3208511	Phoenix Contact	500560	X
-237U1-X3.2 &EFS+/237.a.1	1	End and partition plate for terminal block	3208579	Phoenix Contact	500504	X
-237U1-X3.2 &EFS+/237.a.1;&EFS+/237.a.7	2	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-237U1-X3.2 &EFS+/237.a.1;&EFS+/237.a.5	2	Plug-in bridge FBS 10-3,5	3213056	Phoenix Contact	501171	X
-281M1 &EFS+/281.1	1	SK TopTherm fan-and-filter unit, 550/600 m³/h, 230 V, 1~, 50/60 Hz, 70W	3243100	Rittal	500596	X
-281M2 &EFS+/281.2	1	SK TopTherm fan-and-filter unit, 550/600 m³/h, 230 V, 1~, 50/60 Hz, 70W	3243100	Rittal	500596	X
-281M3 &EFS+/281.3	1	SK TopTherm fan-and-filter unit, 550/600 m³/h, 230 V, 1~, 50/60 Hz, 70W	3243100	Rittal	500596	X

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Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-78F1 &EFS+/78.6	1	Fuse switch disconnector 3NP1, 3-pole, NH00, 160 A, for mounting plate, flat terminal, Fuse monitoring: electromechanical	3NP11331CA11	Siemens	500738	
-78F1 &EFS+/78.6	3	Fuse link 690V AC, 100A, NH00, gL/gG, UL recognized, Bussmann	100NHG00B-690	Gemballa Electronics	501539	
-78F2 &EFS+/78.6	1	SURGE ARRESTER [Typ 1 + Typ 2] PP BC TNC 50-400/690	374504	LEUTRON GmbH	10055	
-78F3 &EFS+/78.7;&EFS+/78.8	3	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	
-78F3 &EFS+/78.7;&EFS+/78.8	3	SITOR cylindrical fuse link, 10 x 38 mm, 20 A, aR, Un AC: 600 V, Un DC: 700 V, DC according to UL	3NC1020	Siemens	501545	
-78W1 &EFS+/78.3	1	*** BG connection rail 100x370 ***	53190	Freqcon GmbH	53190	
-78W2 &EFS+/78.3	0	*** BG connection rail 100x370 ***	53190	Freqcon GmbH	53190	
-78W3 &EFS+/78.3	0	*** BG connection rail 100x370 ***	53190	Freqcon GmbH	53190	
-78W4 &EFS+/78.3	1	*** VX BG PE + N busbar 50x380 - 600 MTS ***	53290	Freqcon GmbH	53290	
-78W5 &EFS+/78.2	1	*** BG connection rail 100x370 ***	50070	Freqcon GmbH	50070	
-227W10 &EFS+/227.1	1	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-227W11 &EFS+/227.1	0	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-227W12 &EFS+/227.4	1	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-227W13 &EFS+/227.4	0	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-227W14 &EFS+/227.7	1	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-227W15 &EFS+/227.7	0	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-228F1 &EFS+/228.0	1	Lightning/surge arrester type 1/2 2P 1500VDC	2905640	Phoenix Contact	501130	
-228F2 &EFS+/228.4	1	Lightning/surge arrester type 1/2 2P 1500VDC	2905640	Phoenix Contact	501130	
-228F3 &EFS+/228.7	1	Lightning/surge arrester type 1/2 2P 1500VDC	2905640	Phoenix Contact	501130	

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-231W10 &EFS+/231.1	1	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-231W11 &EFS+/231.1	0	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-231W12 &EFS+/231.4	1	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-231W13 &EFS+/231.4	0	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-231W14 &EFS+/231.7	1	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-231W15 &EFS+/231.7	0	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-237W10 &EFS+/237.1	1	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-237W11 &EFS+/237.1	0	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-237W12 &EFS+/237.4	1	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-237W13 &EFS+/237.4	0	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-237W14 &EFS+/237.7	1	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-237W15 &EFS+/237.7	0	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-238F1 &EFS+/238a.0	1	Lightning/surge arrester type 1/2 2P 1500VDC	2905640	Phoenix Contact	501130	
-238F2 &EFS+/238a.4	1	Lightning/surge arrester type 1/2 2P 1500VDC	2905640	Phoenix Contact	501130	
-238F3 &EFS+/238a.7	1	Lightning/surge arrester type 1/2 2P 1500VDC	2905640	Phoenix Contact	501130	
-238F4 &EFS+/238b.0	1	Lightning/surge arrester type 1/2 2P 1500VDC	2905640	Phoenix Contact	501130	
-238F5 &EFS+/238b.4	1	Lightning/surge arrester type 1/2 2P 1500VDC	2905640	Phoenix Contact	501130	
-238F6 &EFS+/238b.7	1	Lightning/surge arrester type 1/2 2P 1500VDC	2905640	Phoenix Contact	501130	
-X3.43	20	Multi-level terminal block	3208511	Phoenix Contact	500560	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-XT1 &EFS/136.0...&EFS/136.8	20	Feed-through terminal block	3209510	Phoenix Contact	500583	
-XT1 &EFS/136.0	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	
-XT1 &EFS/136.0	2	End bracket for terminal block	3022276	Phoenix Contact	500588	
-XT1 &EFS/136.0	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	

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Date	05.11.2024							& EPC Parts List	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 1
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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-84Q1 &EFS+/84.0	1	EMERGENCY STOP SWITCH	3LD2203-1TP53	Siemens	500810	X
-84Q1 &EFS+/84.0	1	Auxiliary switch	3LD9200-5B	Siemens	504922	X
-112A1 &EFS+/112.2	1	Panel PC 15,6" PPC-JWS156-J4125	PPC-JWS156-I/C-J4125/8GB/128GBSSD/W10	ICP	508475	
-126S1 &EFS+/126.1	1	PUSHBUTTON, BLACK, 1 NO	3SU1100-0AB10-3BA0	Siemens	10026	X
-126S1 &EFS+/126.1	1	Marker carriers - CARRIER-EMP 22 (27X12,5)	0827446	Phoenix Contact	500751	X
-140H1 &EFS+/140.1	1	Complete device, round, indicator light RED	3SU1102-6AA20-3AA0	Siemens	10019	X
-140H1 &EFS+/140.1	1	Marker carriers - CARRIER-EMP 22 (27X12,5)	0827446	Phoenix Contact	500751	X
-140H2 &EFS+/140.2	1	Complete device, round, indicator light YELLOW	3SU1102-6AA30-3AA0	Siemens	10021	X
-140H2 &EFS+/140.2	1	Marker carriers - CARRIER-EMP 22 (27X12,5)	0827446	Phoenix Contact	500751	X
-140H3 &EFS+/140.3	1	Complete device, round, indicator light GREEN	3SU1102-6AA40-3AA0	Siemens	10023	X
-140H3 &EFS+/140.3	1	Marker carriers - CARRIER-EMP 22 (27X12,5)	0827446	Phoenix Contact	500751	X
-140H4 &EFS+/140.4	1	Complete device, round, indicator light GREEN	3SU1102-6AA40-3AA0	Siemens	10023	X
-140H4 &EFS+/140.4	1	Marker carriers - CARRIER-EMP 22 (27X12,5)	0827446	Phoenix Contact	500751	X
-278M1 &EFS+/278.1	1	SK TopTherm fan-and-filter unit, 230/250 m³/h, 230 V, 1~, 50/60 Hz, 40W	3241100	Rittal	500594	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-110U1 &EFS+/110.2	1	SIMOTION P320-4 BOX WITH INTEL CORE I3 PROZESSOR; 2 X 1,6 GHZ	6AU1320-4DE65-3AF0	Siemens	500789	
-110U1 &EFS+/110.2	1	Connector RJ45, 4 Pol., Profinet, VS-PN-RJ45-5-Q/IP20	1658435	Phoenix Contact	500806	X
-114A1 &EFS+/114.4	1	SIMATIC PN/PN Coupler	6ES7158-3AD10-0XA0	Siemens	10138	
-114A1 &EFS+/114.4	2	BA 2XRJ45	6ES7193-6AR00-0AA0	Siemens	505628	
-185R1 &EFS+/185.7	1	SK Enclosure heater, 800/870 W, 230 V, 1~, 50/60 Hz, WHD: 103x200x103 mm	3105400	Rittal	500621	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-84F1 &EFS+/84.6	1	Combination arrester type 1+2, UC 350V AC, 3-pole, FM, for TNC systems	5SD7443-1	Siemens	504070	
-84F2 &EFS+/84.0	1	SENTRON Miniature circuit breaker	5SY4332-7	Siemens	505272	X
-84F2 &EFS+/84.0	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	X
-84K1 &EFS+/84.5	1	CONTACTOR RELAY, 3NO+1NC DC 24V, mit Diode integriert	3RH2131-2FB40	Siemens	501288	X
-101Q1 &EFS+/101.2	1	CIRCUIT-BREAKER SPRING-L. CONN. 3.2A	3RV2011-1DA25	Siemens	501432	X
-101Q1 &EFS+/101.2	1	CABLE CONNECTOR SIZE S00	3RV2917-5AA00	Siemens	500797	X
-101Q1 &EFS+/101.2	1	3-PHASE BUSBAR W. INFEED	3RV2917-1A	Siemens	500799	X
-101Q1 &EFS+/101.2	1	3-phase busbar including extension connector for 3 circuit breakers Size S00 and S0	3RV2917-4B	Siemens	504254	X
-101T1 &EFS+/101.2	1	Power supply unit	2866404	Phoenix Contact	502745	X
-102G1 &EFS+/102.2	1	Uninterruptible power supply	2320241	Phoenix Contact	501836	X
-102G2 &EFS+/102.6	1	Energy storage UPS-BAT/VRLA/24DC/12AH	2320322	Phoenix Contact	501229	X
-103F1 &EFS+/103.2	1	Device circuit breaker 230VAC / 60VDC, 3kA, 1-pole, AS, F2, 10A	5SY1710-4	Siemens	10086	X
-103F2 &EFS+/103.4	1	Device circuit breaker 230VAC / 60VDC, 3kA, 1-pole, AS, F2, 10A	5SY1710-4	Siemens	10086	X
-103F3 &EFS+/103.6	1	Device circuit breaker 230VAC / 60VDC, 3kA, 1-pole, AS, F2, 10A	5SY1710-4	Siemens	10086	X
-103F4 &EFS+/103.8	1	Device circuit breaker 230VAC / 60VDC, 3kA, 1-pole, AS, F2, 10A	5SY1710-4	Siemens	10086	X
-103F5 &EFS+/103.9	1	Device circuit breaker 230VAC / 60VDC, 3kA, 1-pole, AS, F2, 10A	5SY1710-4	Siemens	10086	X
-111A1 &EFS+/111.0	1	Tree 8TX Metall - Unmanaged Switch - 8 Ports	58152	Murrelektronik	10287	
-113T1 &EFS+/113a.1	1	Network isolators - FL ISOLATOR 100-RJ/RJ	2313931	Phoenix Contact	501464	
-113T1 &EFS+/113a.1	1	0,5m Cat.6 PiMF-Patchcabel, green	PATCH-C6 05 GN	reichelt elektronik GmbH & Co. KG	504395	

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-113T2 &EFS+/113b.1	1	Network isolators - FL ISOLATOR 100-RJ/RJ	2313931	Phoenix Contact	501464	
-113T2 &EFS+/113b.1	1	0,5m Cat.6 PiMF-Patchcabel, green	PATCH-C6 05 GN	reichelt elektronik GmbH & Co. KG	504395	
-113U1 &EFS+/113a.3	1	Surge protection device	2881007	Phoenix Contact	504791	
-113U2 &EFS+/113a.5	1	Patch panel, connection field: one RJ45 socket on 8 spring-cage connection terminals	2901642	Phoenix Contact	10214	
-113U3 &EFS+/113b.3	1	Surge protection device	2881007	Phoenix Contact	504791	
-113U4 &EFS+/113b.5	1	Patch panel, connection field: one RJ45 socket on 8 spring-cage connection terminals	2901642	Phoenix Contact	10214	
-115A1 &EFS+/115.3	1	Router Ewon Cosy 131, 4G + VPN router, supply 24 VDC UMTS router	WEC6133G	Wachendorff Prozesstechnik GmbH & Co. KG	506838alt	
-120A1 &EFS+/120.1	1	SIMATIC ET 200SP, PROFINET Interface-Module, IM 155-6 PN ST, bundle of Server module + Busadapter	6ES7155-6AA01-0BN0	Siemens	501554	X
-134K1 &EFS+/134.8	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-134K1 &EFS+/134.8	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-135K1 &EFS+/135.1	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-135K1 &EFS+/135.1	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-135K2 &EFS+/135.2	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-135K2 &EFS+/135.2	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-135K3 &EFS+/135.3	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-135K3 &EFS+/135.3	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-135K4 &EFS+/135.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-135K4 &EFS+/135.4	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-135K5 &EFS+/135.5	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-135K5 &EFS+/135.5	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-136K7 &EFS+/136.5	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-136K8 &EFS+/136.7	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-136K9 &EFS+/136.8	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-137K1 &EFS+/137.1	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-137K1 &EFS+/137.1	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-137K2 &EFS+/137.2	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-137K2 &EFS+/137.2	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-137K3 &EFS+/137.3	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-137K3 &EFS+/137.3	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-137K4 &EFS+/137.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-137K4 &EFS+/137.4	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-138K1 &EFS+/138.1	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-138K1 &EFS+/138.1	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-138K2 &EFS+/138.2	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-138K2 &EFS+/138.2	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-138K3 &EFS+/138.3	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-138K3 &EFS+/138.3	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-138K4 &EFS+/138.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-138K4 &EFS+/138.4	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-138K5 &EFS+/138.5	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-138K5 &EFS+/138.5	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-138K6 &EFS+/138.6	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-138K6 &EFS+/138.6	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-138K7 &EFS+/138.7	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-138K7 &EFS+/138.7	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-139K1 &EFS+/139.1	1	CONTACTOR,AC3:3KW 1NO DC24V M. DIODE	3RT2015-2FB41	Siemens	501516	X
-139K2 &EFS+/139.2	1	CONTACTOR,AC3:3KW 1NO DC24V M. DIODE	3RT2015-2FB41	Siemens	501516	X
-139K3 &EFS+/139.3	1	CONTACTOR,AC3:3KW 1NO DC24V M. DIODE	3RT2015-2FB41	Siemens	501516	X
-150K1 &EFS+/150.1	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-150K1 &EFS+/150.1	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-150K2 &EFS+/150.3	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-150K2 &EFS+/150.3	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-150X1 &EFS+/150.1	1	End and partition plate for terminal block	3208579	Phoenix Contact	500504	X
-150X1 &EFS+/150.1	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-150X1 &EFS+/150.2;&EFS+/150.4;&EFS+/151.1;&EFS+/151.4;&EFS+/151.6	5	Multi-level terminal block	3208511	Phoenix Contact	500560	X
-151K1 &EFS+/151.0	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-151K1 &EFS+/151.0	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-151K2 &EFS+/151.2	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-151K2 &EFS+/151.2	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-151K3 &EFS+/151.3	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-151K3 &EFS+/151.3	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-151K4 &EFS+/151.5	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-151K4 &EFS+/151.5	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-171K3 &EFS+/171.5	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-171K3 &EFS+/171.5	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-173K3 &EFS+/173.6	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-173K3 &EFS+/173.6	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-181Q1 &EFS+/181.1	1	MOTOR PROTECTION S00, A-release 3.5...5 A, N-release 65 A, Spring-type terminal, auxiliary switches 1NO+1NC	3RV2011-1FA25	Siemens	500740	
-181Q1 &EFS+/181.1	1	Link module spring-type Electrical and mechanical for 3RV2011 and 3RT201	3RA2911-2AA00	Siemens	500845	
-181Q1 &EFS+/181.1	1	CABLE CONNECTOR SIZE S00	3RV2917-5AA00	Siemens	500797	
-181Q2 &EFS+/181.3	1	MOTOR PROTECTION S00, A-release 4.5...6.3 A, N-release 82 A, Spring-type terminal, auxiliary switches 1NO+1NC	3RV2011-1GA25	Siemens	500671	
-181Q2 &EFS+/181.3	1	Link module spring-type Electrical and mechanical for 3RV2011 and 3RT201	3RA2911-2AA00	Siemens	500845	
-181Q2 &EFS+/181.3	1	CABLE CONNECTOR SIZE S00	3RV2917-5AA00	Siemens	500797	
-182Q1 &EFS+/182.1	1	MOTOR PROTECTION S00, A-release 3.5...5 A, N-release 65 A, Spring-type terminal, auxiliary switches 1NO+1NC	3RV2011-1FA25	Siemens	500740	
-182Q1 &EFS+/182.1	1	Link module spring-type Electrical and mechanical for 3RV2011 and 3RT201	3RA2911-2AA00	Siemens	500845	
-182Q1 &EFS+/182.1	1	CABLE CONNECTOR SIZE S00	3RV2917-5AA00	Siemens	500797	

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-183F1 &EFS+/183.1	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	X
-183F1 &EFS+/183.1	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	X
-183F1 &EFS+/183.1	1	Pin busbar touch-safe, 16 mm2 3x 1-phase+AUX, 1016 mm long	5ST3714	Siemens	503364	X
-183F1 &EFS+/183.1	2	End cap for pin busbars 2 - 3-phase	5ST3750	Siemens	503570	X
-183F2 &EFS+/183.3	1	CIRCUIT BREAKER 10KA 1POL C10	5SY4110-7	Siemens	500681	X
-183F2 &EFS+/183.3	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	X
-185B1 &EFS+/185.6	1	Thermostat NC contact, -10 to 50 °C	8MR2170-1CA	Siemens	500816	X
-185F1 &EFS+/185.1	1	CIRCUIT BREAKER 10KA 1POL C10	5SY4110-7	Siemens	500681	X
-185F1 &EFS+/185.1	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	X
-185F2 &EFS+/185.7	1	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682	X
-185F2 &EFS+/185.7	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	X
-186B1 &EFS+/186.6	1	Thermostat NO contact, -10 to 50 °C	8MR2170-1CB	Siemens	501577	X
-186K1 &EFS+/186.6	1	CONTACTOR,AC3:3KW 1NO DC24V M. DIODE	3RT2015-2FB41	Siemens	501516	X
-187F1 &EFS+/187.1	1	CIRCUIT BREAKER 230/400V 10KA 1POL C13	5SY4113-7	Siemens	504323	X
-187F1 &EFS+/187.1	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	X
-187F2 &EFS+/187.4	1	Device circuit breaker 230VAC / 60VDC, 3kA, 1-pole, AS, F2, 10A	5SY1710-4	Siemens	10086	X
-189K1 &EFS+/189.1	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-190F1 &EFS+/190.1	1	RCBO elm, TYP A, 230V, 10KA, 1 Pol.+N, 30mA, C, 16A	5SU1354-7KK16	Siemens	500765	X
-190F1 &EFS+/190.1	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-190F1 &EFS+/190.1	1	Handle coupler for residual current miniature circuit breaker D=70 mm	5ST3805-1	Siemens	500608	X
-190F2 &EFS+/190.3	1	RCBO elm, TYP A, 230V, 10KA, 1 Pol.+N, 30mA, C, 16A	5SU1354-7KK16	Siemens	500765	X
-190F2 &EFS+/190.3	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	X
-190F2 &EFS+/190.3	1	Handle coupler for residual current miniature circuit breaker D=70 mm	5ST3805-1	Siemens	500608	X
-190F3 &EFS+/190.5	1	RCBO elm, TYP A, 230V, 10KA, 1 Pol.+N, 30mA, C, 16A	5SU1354-7KK16	Siemens	500765	X
-190F3 &EFS+/190.5	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	X
-190F3 &EFS+/190.5	1	Handle coupler for residual current miniature circuit breaker D=70 mm	5ST3805-1	Siemens	500608	X
-190X10 &EFS+/190.9	1	5TE6 REG Socket Outlets, 16 A	5TE6800	Siemens	503215	X
-190XT1 &EFS+/190.0	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	X
-190XT1 &EFS+/190.0	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	X
-190XT1 &EFS+/190.1;&EFS+/190.3;&EFS+/190.5;&EFS+/190.7	4	Feed-through terminal block	3209510	Phoenix Contact	500583	X
-190XT1 &EFS+/190.1;&EFS+/190.3;&EFS+/190.5;&EFS+/190.7	4	Feed-through terminal block	3209523	Phoenix Contact	500584	X
-190XT1 &EFS+/190.1;&EFS+/190.5	3	Plug-in bridge FBS 2-5	3030161	Phoenix Contact	505211	X
-190XT1 &EFS+/190.1;&EFS+/190.3;&EFS+/190.5;&EFS+/190.7	4	Ground terminal block	3209536	Phoenix Contact	500813	X
-191F1 &EFS+/191.1	1	CIRCUIT BREAKER 10KA 3POL C16	5SY4316-7	Siemens	503340	X
-191F1 &EFS+/191.1	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	X
-191F2 &EFS+/191.3	1	CIRCUIT BREAKER 10KA 3POL C16	5SY4316-7	Siemens	503340	X
-191F2 &EFS+/191.3	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	X
-191XT1 &EFS+/191.1;&EFS+/191.3	6	Feed-through terminal block Push-in PT 6	3211813	Phoenix Contact	501388	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-191XT1 &EFS+/191.1	1	End and partition plate for terminal block	3212044	Phoenix Contact	500503	X
-191XT1 &EFS+/191.1	2	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-191XT1 &EFS+/191.2;&EFS+/191.4	2	Feed-through terminal block Push-in PT 6 BU	3211819	Phoenix Contact	500585	X
-191XT1 &EFS+/191.2;&EFS+/191.4	2	Ground modular terminal block Push-in PT 6-PE	3211822	Phoenix Contact	500725	X
-195K1 &EFS+/195.3	1	SIRIUS contactor relay	3RH2362-2BB40	Siemens	501287	X
-195K1 &EFS+/195.3	1	SURGE SUPPRESSOR, DIODE COMBINATION, DC 12...250V, F. CONT. RELAYS A. MOTOR CONT. SZ S00	3RT29161EH00	Siemens	500534	X
-195K2 &EFS+/195.4	1	SIRIUS contactor relay	3RH2362-2BB40	Siemens	501287	X
-195K2 &EFS+/195.4	1	SURGE SUPPRESSOR, DIODE COMBINATION, DC 12...250V, F. CONT. RELAYS A. MOTOR CONT. SZ S00	3RT29161EH00	Siemens	500534	X
-195K3 &EFS+/195.1	1	SIRIUS SAFETY RELAY STD RELAY 3NO+1NC	3SK1111-2AB30	Siemens	501260	X
-AI_01 &EFS+/120.6	1	ET 200SP, AI 8XRTD/TC 2-WIRE HF	6ES7134-6JF00-0CA1	Siemens	501550	X
-AI_01 &EFS+/120.6	1	BASEUNIT TYPE A0, BU15-P16+A0+2D	6ES7193-6BP00-0DA0	Siemens	500786	X
-AI_02 &EFS+/120.6	1	ET 200SP, AI 8XRTD/TC 2-WIRE HF	6ES7134-6JF00-0CA1	Siemens	501550	X
-AI_02 &EFS+/120.6	1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787	X
-AI_03 &EFS+/120.7	1	ET 200SP, AI 4XU/I 2-WIRE ST, PU 1	6ES7134-6HD01-0BA1	Siemens	505054	X
-AI_03 &EFS+/120.7	1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787	X
-AI_04 &EFS+/120.7	1	ET 200SP, AI 4XU/I 2-WIRE ST, PU 1	6ES7134-6HD01-0BA1	Siemens	505054	X
-AI_04 &EFS+/120.7	1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787	X
-DI_01 &EFS+/120.3	1	ET 200SP, DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	Siemens		X
-DI_01 &EFS+/120.3	1	BASEUNIT TYPE A0, BU15-P16+A0+2D	6ES7193-6BP00-0DA0	Siemens	500786	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-DI_02 &EFS+/120.3	1	ET 200SP, DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	Siemens		X
-DI_02 &EFS+/120.3	1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787	X
-DI_03 &EFS+/120.3	1	ET 200SP, DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	Siemens		X
-DI_03 &EFS+/120.3	1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787	X
-DI_04 &EFS+/120.4	1	ET 200SP, DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	Siemens		X
-DI_04 &EFS+/120.4	1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787	X
-DI_05 &EFS+/120.4	1	ET 200SP, DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	Siemens		X
-DI_05 &EFS+/120.4	1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787	X
-DI_06 &EFS+/120.4	1	ET 200SP, DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	Siemens		X
-DI_06 &EFS+/120.4	1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787	X
-DO_01 &EFS+/120.5	1	ET 200SP, DQ 16x 24V DC/0,5A ST, PU 1	6ES7132-6BH01-0BA0	Siemens	504397	X
-DO_01 &EFS+/120.5	1	BASEUNIT TYPE A0, BU15-P16+A0+2D	6ES7193-6BP00-0DA0	Siemens	500786	X
-DO_02 &EFS+/120.5	1	ET 200SP, DQ 16x 24V DC/0,5A ST, PU 1	6ES7132-6BH01-0BA0	Siemens	504397	X
-DO_02 &EFS+/120.5	1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787	X
-DO_03 &EFS+/120.5	1	ET 200SP, DQ 16x 24V DC/0,5A ST, PU 1	6ES7132-6BH01-0BA0	Siemens	504397	
-DO_03 &EFS+/120.5	1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787	
-DO_04 &EFS+/120.6	1	ET 200SP, DQ 16x 24V DC/0,5A ST, PU 1	6ES7132-6BH01-0BA0	Siemens	504397	
-DO_04 &EFS+/120.6	1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787	
-X1 &EFS+/181.0	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-X1 &EFS+/181.0	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	X
-X1 &EFS+/181.1;&EFS+/181.3;&EFS+/181.4;&EFS+/182.1;&EFS+/182.3;&EFS+/182.4	12	Feed-through terminal block	3209510	Phoenix Contact	500583	X
-X1 &EFS+/181.4	1	Feed-through terminal block	3209523	Phoenix Contact	500584	X
-X1 &EFS+/181.1;&EFS+/181.4;&EFS+/182.1;&EFS+/182.4	4	Ground terminal block	3209536	Phoenix Contact	500813	X
-X3 &EFS+/127.1	1	End and partition plate for terminal block	3208579	Phoenix Contact	500504	X
-X3 &EFS+/127.1	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-X3.10 &EFS+/129.0	1	End and partition plate for terminal block	3208579	Phoenix Contact	500504	X
-X3.10 &EFS+/129.0	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-X3.10 &EFS+/129.0;&EFS+/129.2;&EFS+/129.4;&EFS+/129.6;&EFS+/129.8;&EFS+/129.9	6	Multi-level terminal block	3208511	Phoenix Contact	500560	X
-X3.10 &EFS+/129.0;&EFS+/129.4;&EFS+/129.6;&EFS+/129.9	4	Plug-in bridge FBS 3-3,5	3213027	Phoenix Contact	503102	X
-X3.11 &EFS+/130.0	1	End and partition plate for terminal block	3208579	Phoenix Contact	500504	X
-X3.11 &EFS+/130.0	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-X3.11 &EFS+/130.0;&EFS+/130.2;&EFS+/130.4;&EFS+/130.6;&EFS+/130.8;&EFS+/130.9	6	Multi-level terminal block	3208511	Phoenix Contact	500560	X
-X3.11 &EFS+/130.0;&EFS+/130.4;&EFS+/130.6;&EFS+/130.9	4	Plug-in bridge FBS 3-3,5	3213027	Phoenix Contact	503102	X
-X3.12 &EFS+/131.0	1	End and partition plate for terminal block	3208579	Phoenix Contact	500504	X
-X3.12 &EFS+/131.0	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-X3.12 &EFS+/131.0;&EFS+/131.2;&EFS+/131.4;&EFS+/131.6;&EFS+/131.8;&EFS+/131.9	6	Multi-level terminal block	3208511	Phoenix Contact	500560	X
-X3.12 &EFS+/131.0;&EFS+/131.6	4	Plug-in bridge FBS 3-3,5	3213027	Phoenix Contact	503102	X
-X3.13 &EFS+/132.0	1	End and partition plate for terminal block	3208579	Phoenix Contact	500504	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-X3.13 &EFS+/132.0	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-X3.13 &EFS+/132.0;&EFS+/132.2;&EFS+/132.4;&EFS+/132.6;&EFS+/132.8;&EFS+/132.9	6	Multi-level terminal block	3208511	Phoenix Contact	500560	X
-X3.13 &EFS+/132.0;&EFS+/132.6	4	Plug-in bridge FBS 3-3,5	3213027	Phoenix Contact	503102	X
-X3	21	Multi-level terminal block	3208511	Phoenix Contact	500560	X
-X3 &EFS+/127.1;&EFS+/127.5;&EFS+/128.3;&EFS+/188.1	5	Plug-in bridge FBS 2-3,5	3213014	Phoenix Contact	500802	X
-X5 &EFS+/145.0	1	End and partition plate for terminal block	3208579	Phoenix Contact	500504	X
-X5 &EFS+/145.0	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-X5.1 &EFS+/149.0	1	End and partition plate for terminal block	3211634	Phoenix Contact	500505	X
-X5.1 &EFS+/149.0	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-X5.1 &EFS+/149.0;&EFS+/149.2	2	Multi-level terminal block	3210583	Phoenix Contact	501385	X
-X5.1 &EFS+/149.0	1	Plug-in bridge FBS 2-5	3030161	Phoenix Contact	505211	X
-X5	15	Multi-level terminal block	3208511	Phoenix Contact	500560	X
-XDC1 &EFS+/103.1	1	End and partition plate for terminal block	3211634	Phoenix Contact	500505	X
-XDC1 &EFS+/103.1	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-XDC1 &EFS+/103.2;&EFS+/103.3	7	Multi-level terminal block	3210583	Phoenix Contact	501385	X
-XDC1 &EFS+/103.2	1	Plug-in bridge FBS 3-5	3030174	Phoenix Contact	503103	X
-XDC1 &EFS+/103.3	1	Plug-in bridge FBS 4-5	3030187	Phoenix Contact	500801	X
-XDC1 &EFS+/103.4	2	Protective conductor double-level terminal block Push-in PTTB 2,5-PE	3210596	Phoenix Contact	501389	X
-XDC2 &EFS+/103.3	1	End and partition plate for terminal block	3211634	Phoenix Contact	500505	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-XDC2 &EFS+/103.3	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-XDC2 &EFS+/103.4;&EFS+/103.5	4	Multi-level terminal block	3210583	Phoenix Contact	501385	X
-XDC2 &EFS+/103.4;&EFS+/103.5	2	Plug-in bridge FBS 2-5	3030161	Phoenix Contact	505211	X
-XDC3 &EFS+/103.5	1	End and partition plate for terminal block	3211634	Phoenix Contact	500505	X
-XDC3 &EFS+/103.5	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-XDC3 &EFS+/103.6;&EFS+/103.7	4	Multi-level terminal block	3210583	Phoenix Contact	501385	X
-XDC3 &EFS+/103.6;&EFS+/103.7	2	Plug-in bridge FBS 2-5	3030161	Phoenix Contact	505211	X
-XDC4 &EFS+/103.7	1	End and partition plate for terminal block	3211634	Phoenix Contact	500505	X
-XDC4 &EFS+/103.7	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-XDC4 &EFS+/103.8;&EFS+/103.9	4	Multi-level terminal block	3210583	Phoenix Contact	501385	X
-XDC4 &EFS+/103.8;&EFS+/103.9	2	Plug-in bridge FBS 2-5	3030161	Phoenix Contact	505211	X
-XDC5.1 &EFS+/103.8	1	End and partition plate for terminal block	3211634	Phoenix Contact	500505	X
-XDC5.1 &EFS+/103.8	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-XDC5.1 &EFS+/103.9	1	Multi-level terminal block	3210583	Phoenix Contact	501385	X
-XDC5.2 &EFS+/103.8	1	End and partition plate for terminal block	3211634	Phoenix Contact	500505	X
-XDC5.2 &EFS+/103.8	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-XDC5.2 &EFS+/103.9	1	Multi-level terminal block	3210583	Phoenix Contact	501385	X
-XE &EFS+/84.0	1	End and partition plate for terminal block	3212044	Phoenix Contact	500503	X
-XE &EFS+/84.0	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-XE &EFS+/84.0;&EFS+/84.1	6	Feed-through terminal block Push-in PT 6	3211813	Phoenix Contact	501388	X
-XE &EFS+/84.0;&EFS+/84.1	3	Plug-in bridge FBS 2-8	3030284	Phoenix Contact	502068	X
-XE &EFS+/84.1;&EFS+/84.2	4	Feed-through terminal block Push-in PT 6 BU	3211819	Phoenix Contact	500585	X
-XE &EFS+/84.1	1	Plug-in bridge FBS 3-8	3030297	Phoenix Contact	501568	X
-XE &EFS+/84.2;&EFS+/84.3	3	Ground modular terminal block Push-in PT 6-PE	3211822	Phoenix Contact	500725	X
-XT &EFS+/183.0	1	End and partition plate for terminal block	3211634	Phoenix Contact	500505	X
-XT &EFS+/183.0	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-XT &EFS+/183.1;&EFS+/183.2;&EFS+/185.1;&EFS+/185.7;&EFS+/187.1;&EFS+/187.2;&EFS+/187.4;&EFS+/187.5	8	Multi-level terminal block	3210567	Phoenix Contact	501386	X
-XT &EFS+/183.1	1	Plug-in bridge FBS 10-5	3030213	Phoenix Contact	500547	X
-XT &EFS+/187.4	1	Plug-in bridge FBS 2-5	3030161	Phoenix Contact	505211	X
-XT &EFS+/183.1;&EFS+/183.4;&EFS+/185.1;&EFS+/185.7;&EFS+/187.1;&EFS+/187.2	6	Protective conductor double-level terminal block Push-in PTTB 2,5-PE	3210596	Phoenix Contact	501389	X
-XV &EFS+/171.8	1	End and partition plate for terminal block	3211003	Phoenix Contact	503382	X
-XV &EFS+/171.8	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	X
-XV &EFS+/134.5;&EFS+/150.7;&EFS+/151.7;&EFS+/151.8;&EFS+/171.8;&EFS+/173.9	9	Base terminal for component connector	3210185	Phoenix Contact	500828	X
-XV &EFS+/134.5;&EFS+/150.7;&EFS+/151.7;&EFS+/151.8;&EFS+/171.8;&EFS+/173.9	9	Component plug terminal block	3036796	Phoenix Contact	500533	X
-XV &EFS+/150.7;&EFS+/151.7;&EFS+/151.8;&EFS+/171.8;&EFS+/173.9	8	Suppression diode CB-417, 600W, 47V, -65...+175°C	P6KE47CA	reichelt elektronik GmbH & Co. KG	501574	X
-XV &EFS+/171.8	1	Plug-in bridge FBS 10-5	3030213	Phoenix Contact	500547	X
-XV &EFS+/134.5	1	Diode ZY12 - zener diode, DO-41, plastic, 12V, 2W	17060488	Distrelec Schuricht GmbH	500556	X

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-85U1 &EFS+/85.0	1	Power Bridge Rectifiers SKD 30/16A1, Vrrm = 1600V, Id = 30A	07122150	Semikron	501556	X
-85U10 &EFS+/85.0	1	EMI Filter X2 Y1 Version 2	505722	Freqcon GmbH	505722	X
-85U11 &EFS+/85.1	1	RC-Brückengleichrichter	507702	Freqcon GmbH	507702	
-149U1 &EFS+/149.5	1	Interface module	2959609	Phoenix Contact	501595	X
-171F1 &EFS+/171.2	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 2-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7023-4	Siemens	500780	X
-171F1 &EFS+/171.2	2	Fuse link 1000V AC/DC, 10A, 10x38mm, gR, 30kA	5019906-10	Schukat	501540	X
-171K1 &EFS+/171.7	1	DC contactor P115, 50A, 1500V DC, 1-pole, 24Vdc, SPST-NO	GIG/P115CDA	GIGAVAC	501487	X
-171K2 &EFS+/171.8	1	DC contactor P115, 50A, 1500V DC, 1-pole, 24Vdc, SPST-NO	GIG/P115CDA	GIGAVAC	501487	X
-171R1 &EFS+/171.1	1	Power Resistor 15R 10%(K) 300W, alu.-housing, VHPR/UL 300H	110072	Widap AG	501616	X
-171R2 &EFS+/171.2	1	Power Resistor 15R 10%(K) 300W, alu.-housing, VHPR/UL 300H	110072	Widap AG	501616	X
-173F2 &EFS+/173.2	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 2-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7023-4	Siemens	500780	X
-173F2 &EFS+/173.2	2	Fuse link 1000V AC/DC, 10A, 10x38mm, gR, 30kA	5019906-10	Schukat	501540	X
-173F3 &EFS+/173.4	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 2-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7023-4	Siemens	500780	X
-173F3 &EFS+/173.4	2	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-173K1 &EFS+/173.8	1	DC contactor PNC113, 30A, 1500V DC, 1-pole, 24Vdc, SPST-NC	GIG/PNC113CDA	GIGAVAC	501488	X
-173K2 &EFS+/173.9	1	DC contactor PNC113, 30A, 1500V DC, 1-pole, 24Vdc, SPST-NC	GIG/PNC113CDA	GIGAVAC	501488	X
-173R1 &EFS+/173.2	1	Power resistor 500R 10%(K) 150W, alu.-housing, VHPR/UL 200H	110073	Widap AG	501615	X
-173R2 &EFS+/173.2	1	Power resistor 500R 10%(K) 150W, alu.-housing, VHPR/UL 200H	110073	Widap AG	501615	X
-173R3 &EFS+/173.3	1	Power resistor 500R 10%(K) 150W, alu.-housing, VHPR/UL 200H	110073	Widap AG	501615	X

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Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-173R4 &EFS+/173.3	1	Power resistor 500R 10%(K) 150W, alu.-housing, VHPR/UL 200H	110073	Widap AG	501615	X
-189X1 &EFS+/189.4	9	Disconnect and test disconnect rail-mount terminal block	3035696	Phoenix Contact	54498	X
-189X1 &EFS+/189.4	9	Test adapter - PAIS-4-FIX GY	3032791	Phoenix Contact	501482	X
-189X1 &EFS+/189.4	1	End cover D-DTME 6	3034426	Phoenix Contact	505468	X
-189X1 &EFS+/189.4	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-306K1 &EFS+/306.1	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-306K1 &EFS+/306.1	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-306K2 &EFS+/306.2	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-306K2 &EFS+/306.2	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-306K3 &EFS+/306.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-306K3 &EFS+/306.4	2	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-306K4 &EFS+/306.5	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-306K4 &EFS+/306.5	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-306K5 &EFS+/306.7	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-306K5 &EFS+/306.7	2	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-306K6 &EFS+/306.8	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-306K6 &EFS+/306.8	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-307K1 &EFS+/307.1	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-307K1 &EFS+/307.1	2	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-307K2 &EFS+/307.2	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-307K2 &EFS+/307.2	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-307K3 &EFS+/307.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-307K3 &EFS+/307.4	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-307K4 &EFS+/307.5	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-307K4 &EFS+/307.5	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-307K5 &EFS+/307.7	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-307K5 &EFS+/307.7	2	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-307K6 &EFS+/307.8	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-307K6 &EFS+/307.8	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-308K1 &EFS+/308.1	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-308K1 &EFS+/308.1	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-308K2 &EFS+/308.2	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-308K2 &EFS+/308.2	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-308K3 &EFS+/308.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-308K3 &EFS+/308.4	2	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-308K4 &EFS+/308.5	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-308K4 &EFS+/308.5	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-308K5 &EFS+/308.7	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-308K5 &EFS+/308.7	2	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-308K6 &EFS+/308.8	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-308K6 &EFS+/308.8	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-350K1 &EFS+/350.1	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-350K1 &EFS+/350.1	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-350K2 &EFS+/350.3	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-350K2 &EFS+/350.3	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-350X1.21 &EFS+/350.1	1	End and partition plate for terminal block	3208579	Phoenix Contact	500504	
-350X1.21 &EFS+/350.1	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	
-350X1.21 &EFS+/350.1&EFS+/350.2&EFS+/350.4&EFS+/351.1&EFS+/351.3&EFS+/351.4&EFS+/352.1&EFS+/352.3&EFS+/353.1&EFS+/353.4&EFS+/352.4	9	Multi-level terminal block	3208511	Phoenix Contact	500560	
-350X1.21 &EFS+/352.1	0					
-351K1 &EFS+/351.1	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-351K1 &EFS+/351.1	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-351K2 &EFS+/351.2	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-351K2 &EFS+/351.2	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-351K3 &EFS+/351.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-351K3 &EFS+/351.4	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-351K4 &EFS+/351.5	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-351K4 &EFS+/351.5	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	

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Parts list

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-352K1 &EFS+/352.0	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-352K1 &EFS+/352.0	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-352K2 &EFS+/352.2	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-352K2 &EFS+/352.2	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-353K1 &EFS+/353.0	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-353K1 &EFS+/353.0	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-353K2 &EFS+/353.2	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-353K2 &EFS+/353.2	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-353K3 &EFS+/353.3	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-353K3 &EFS+/353.3	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-353K4 &EFS+/353.5	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-353K4 &EFS+/353.5	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-XE2 &EFS+/173.1	0					
-XE2 &EFS+/173.2...&EFS+/173.5	11	Feed-through terminal block Push-in PT 6	3211813	Phoenix Contact	501388	X
-XV.20 &EFS+/350.7;&EFS+/351.7;&EFS+/351.8;&EFS+/352.7;&EFS+/353.7;&EFS+/353.8	12	Base terminal for component connector	3210185	Phoenix Contact	500828	
-XV.20 &EFS+/350.7;&EFS+/351.7;&EFS+/351.8;&EFS+/352.7;&EFS+/353.7;&EFS+/353.8	12	Component plug terminal block	3036796	Phoenix Contact	500533	
-XV.20 &EFS+/350.7;&EFS+/351.7;&EFS+/351.8;&EFS+/352.7;&EFS+/353.7;&EFS+/353.8	12	Suppression diode CB-417, 600W, 47V, -65...+175°C	P6KE47CA	reichelt elektronik GmbH & Co. KG	501574	

Editor	Freqcon_DG			Statron	FREQCON	PARTS LIST	20241203_V1.22	= UNIT_01	Converter Container 1	
Date	05.11.2024							& EPC	Parts List	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 5
Date								+ CTRL_1.4	Right side	total: 500

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-147B1 &EFS+/147.5	1	Temperature sensor PT100, cable 1.5m, PVC	1101-6030-1211-110	S+S Regeltechnik GmbH	501787	X
-190H1 &EFS+/190.5	1	LED system light, Without socket, Length: 337 mm, Input voltage: 100 V - 240 V, 1~, 50 Hz/60 Hz	2500110	Rittal	10007	X
-190H1 &EFS+/190.5	1	Infeed, 2-pole (with socket, without connector), Input voltage: 100 V - 240 V, 1~, 50 Hz/60 Hz	2500420	Rittal	10009	X
-190H1 &EFS+/190.5	1	Door-Operated Switch, Input voltage: 230 V AC, 24 V DC, - 240 V, 1~, 50 Hz/60 Hz,	2500460	Rittal	500736	X

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Editor	Freqcon_DG			Statron	FREQCON	PARTS LIST	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	05.11.2024							& EPC Parts List	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 1
Date								+ CTRL_1.5 above	total: 500

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-20BG1 &EFS+/100.2	1	*** VX BG Steuerungseinheit IEC Standard-Batteriecontainer***	53550	Freqcon GmbH	53550	
-20BG1-X &EFS+/100.2	55	End bracket for terminal block	3022276	Phoenix Contact	500588	X

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-149X1 &EFS+/161.4...&EFS+/161.8	6	Feed-through terminal block Push-in PT 4	3211757	Phoenix Contact	500582	X
-149X1 &EFS+/161.4	1	End cover D-ST 4	3030420	Phoenix Contact	500502	
-149X1 &EFS+/161.4	2	End bracket for terminal block	3022276	Phoenix Contact	500588	
-149X1 &EFS+/161.4	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	
-160U1 &EFS+/160.0	1	HVIO Modul V5.0;ISO N-DC, N-AC	500390	Freqcon GmbH	500390	
-161U1 &EFS+/161.0	1	HVIO Modul V5.0;ISO N-DC, N-AC	500390	Freqcon GmbH	500390	
-162U1 &EFS+/162.0	1	HVIO Modul V5.0;ISO N-DC, N-AC	500390	Freqcon GmbH	500390	
-163U1 &EFS+/163.0	1	HVIO Modul V5.0;ISO N-DC, N-AC	500390	Freqcon GmbH	500390	
-164U1 &EFS+/164.0	1	HVIO Modul V5.0;ISO N-DC, N-AC	500390	Freqcon GmbH	500390	
-240U1 &EFS+/440.1	1	PIII IGBT IRT Interface 2.6 V4 cabinet	504890	Freqcon GmbH	504890	
-240U1 &EFS+/440.1	1	Connector screw connection, 4 Pol., 4 mm² - 6 mm², SACC-M12FS-4CON-PG7	1681114	Phoenix Contact	500805	
-240U1 &EFS+/440.1	1	Plug connector IE FC M12 PLUG PRO 2X2 M12	6GK1901-0DB20-6AA0	Siemens	500804	
-241U1 &EFS+/441.1	1	PIII IGBT IRT Interface 2.6 V4 cabinet	504890	Freqcon GmbH	504890	
-241U1 &EFS+/441.1	1	Connector screw connection, 4 Pol., 4 mm² - 6 mm², SACC-M12FS-4CON-PG7	1681114	Phoenix Contact	500805	
-241U1 &EFS+/441.1	2	Plug connector IE FC M12 PLUG PRO 2X2 M12	6GK1901-0DB20-6AA0	Siemens	500804	
-242U1 &EFS+/442.1	1	PIII IGBT IRT Interface 2.6 V4 cabinet	504890	Freqcon GmbH	504890	
-242U1 &EFS+/442.1	1	Connector screw connection, 4 Pol., 4 mm² - 6 mm², SACC-M12FS-4CON-PG7	1681114	Phoenix Contact	500805	
-242U1 &EFS+/442.1	2	Plug connector IE FC M12 PLUG PRO 2X2 M12	6GK1901-0DB20-6AA0	Siemens	500804	
-243U1 &EFS+/443.1	1	PIII IGBT IRT Interface 2.6 V4 cabinet	504890	Freqcon GmbH	504890	

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Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-243U1 &EFS+/443.1	1	Connector screw connection, 4 Pol., 4 mm² - 6 mm², SACC-M12FS-4CON-PG7	1681114	Phoenix Contact	500805	
-243U1 &EFS+/443.1	2	Plug connector IE FC M12 PLUG PRO 2X2 M12	6GK1901-0DB20-6AA0	Siemens	500804	
-278M2 &EFS+/278.3	1	SK TopTherm fan-and-filter unit, 230/250 m³/h, 230 V, 1~, 50/60 Hz, 40W	3241100	Rittal	500594	X

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Editor	Freqcon_DG			Statron	FREQCON	PARTS LIST	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	05.11.2024							& EPC Parts List	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 2
Date								+ CTRL_2.1 Cabinet door	total: 500

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-173R5 &EFS+/173.5	1	Power Resistor 100W 1% 10K J	160141	Widap AG	501614	
-173R6 &EFS+/173.5	1	Power Resistor 100W 1% 10K J	160141	Widap AG	501614	
-173R7 &EFS+/173.5	1	Power Resistor 100W 1% 10K J	160141	Widap AG	501614	
-173R8 &EFS+/173.5	1	Power Resistor 100W 1% 10K J	160141	Widap AG	501614	

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Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-52G1 &EFS++CT/181.0;&EFS++CT/181.7	0					
-52G1-148B1 &EFS++CT/148.1	1	Temperature sensor PT100, cable 3m, PVC	1101-6030-1231-110	S+S Regeltechnik GmbH	501575	X
-52G1-181M1 &EFS++CT/181.1	1	Pump CM10-2, 3x380V-415V, 50Hz, 1,27 kW, 2,85-2,9 A, 2.950 - 2.960 rpm / 440V-480V, 60Hz, 2,2 kW, 4,0-3,7A, 3.520-3.530 rpm	99080211	GRUNDFOS GmbH	501409	X
-52G1-181R1 &EFS++CT/181.3	1	Screw-in heater SEHK, 3kW, 400V	106066	Siekerkotte GmbH & Co. KG	500620	X
-52G1-181S1 &EFS++CT/181.7	0					
-52G1-181X1 &EFS++CT/181.0	0					
-52G1-181X1 &EFS++CT/181.1;&EFS++CT/181.3;&EFS++CT/181.4;&EFS++CT/182.1	9	Feed-through terminal block	3209510	Phoenix Contact	500583	X
-52G1-181X1 &EFS++CT/181.3	1	End and partition plate for terminal block	3211003	Phoenix Contact	503382	X
-52G1-181X1 &EFS++CT/181.3	1	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-52G1-181X1 &EFS++CT/181.4	1	Feed-through terminal block	3209523	Phoenix Contact	500584	X
-52G1-181X1 &EFS++CT/181.1;&EFS++CT/181.4;&EFS++CT/182.1	3	Ground terminal block	3209536	Phoenix Contact	500813	X
-52G1-181X3 &EFS++CT/148.1;&EFS++CT/181.7	2	Multi-level terminal block	3210567	Phoenix Contact	501386	X
-52G1-181X3 &EFS++CT/181.7	1	End and partition plate for terminal block	3211634	Phoenix Contact	500505	X
-52G1-181X3 &EFS++CT/181.7	2	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-52G1-181X3 &EFS++CT/181.7	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-52G1-182M1 &EFS++CT/182.1	1	Heat exchanger 40kW cooling capacity, alluminium, 1,72kW, 3,86A, 400V	FR6555950001	Bondioli & Pavesi S.p.A.	500850	X

Summarized parts list

Freqcon_ABAS_de_en

Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.
1	Anschlussschiene;100x370mm;Zeichnung 501153B	501153	Freqcon GmbH	501153
1	TMC Transformer 3150kVA-6300V/620V-50Hz-AL-IP00		TMC Transformers	508555

Editor	Freqcon_DG			Statron	FREQCON	SUMMARIZED PARTS LIST	20241203_V1.22	= UNIT_01	Converter Container 1
Date	05.11.2024							& EPA	Summarized part list
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ TRA	medium voltage transformer
Date								+	

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total: 500

Summarized parts list

Freqcon_ABAS_de_en

Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.
1	*** BG connection rail 100x370 ***	50070	Freqcon GmbH	50070
9	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604
1	DC Adapter 3.3535 (EN-AW 5754) Alu	51524	Freqcon GmbH	51524
3	*** VX BG PowerStack 3*250A***	52867	Freqcon GmbH	52867
3	*** VX BG PowerStack 1*1000A*** with SkiiP 2414 GB12E4-4DUW	52872	Freqcon GmbH	52872
3	*** VX BG DC switch and Fuse 3*250A 1000V***	52882	Freqcon GmbH	52882
1	*** VX BG AC Capacitor Bank 3 * 600µF ***	52918	Freqcon GmbH	52918
1	*** VX BG Circuit Breaker IEC 1000 A ***	52955	Freqcon GmbH	52955
3	*** VX Trible phase line Inductor, I= 3x 250A LN= 0,6mH ***	53046	Freqcon GmbH	53046
3	*** VX Single phase line Inductor, I= 1x 1000 A LN= 0,2mH ***	53053	Freqcon GmbH	53053
1	*** BG connection rail 100x370 ***	53190	Freqcon GmbH	53190
1	*** VX BG PE + N busbar 50x380 - 600 MTS ***	53290	Freqcon GmbH	53290
3	D SUB ADAPTER, PLUG-RECEPTACLE, 25-POL, L-COM DG9025MF1	506157	Freqcon GmbH	506157
3	SKiiP 3 I Adapter	FRQ-M00080-1	Freqcon GmbH	500426
3	EMI Suppresion CAP DC	FRQ-M00110	Freqcon GmbH	500449
1	Temperature sensor PT100, cable 3m Silicon	H2-012030-SDS	Fühler Direkt	500648
1	Temperature sensor PT100, cable 6m Silicon	H2-012060-SDS	Fühler Direkt	500649
3	Fuse link 690V AC, 100A, NH00, gL/gG, UL recognized, Bussmann	100NHG00B-690	Gemballa Electronics	501539

Summarized parts list

Freqcon_ABAS_de_en

Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.
1	SURGE ARRESTER [Typ 1 + Typ 2] PP BC TNC 50-400/690	374504	LEUTRON GmbH	10055
1	Auxiliary contacts S6000 SIZE 2	D5LAU01	Pronutec GmbH	503044
1	Direct handle S6000 SIZE 2	DS-LI21	Pronutec GmbH	503039
1	Switch-disconnector S6000, AC 600A at 690V AC (AC21B), size 2, 4-pole, to attach to the mounting plate	S6-08003NDO	Pronutec GmbH	10172
9	Lightning/surge arrester type 1/2 2P 1500VDC	2905640	Phoenix Contact	501130
3	SITOR cylindrical fuse link, 10 x 38 mm, 20 A, aR, Un AC: 600 V, Un DC: 700 V, DC according to UL	3NC1020	Siemens	501545
1	Fuse switch disconnector 3NP1, 3-pole, NH00, 160 A, for mounting plate, flat terminal, Fuse monitoring: electromechanical	3NP11331CA11	Siemens	500738
3	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779

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Summarized parts list

Freqcon_ABAS_de_en

Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.
1	*** VX BG Steuerungseinheit IEC Standard-Batteriecontainer***	53550	Freqcon GmbH	53550
4	PIII IGBT IRT Interface 2.6 V4 cabinet	504890	Freqcon GmbH	504890
1	RC-Brückengleichrichter	507702	Freqcon GmbH	507702
5	HVIO Modul V5.0;ISO N-DC, N-AC	500390	Freqcon GmbH	500390
1	Panel PC 15,6" PPC-JWS156-J4125	PPC-JWS156-I/C-J4125/8GB/128GBSSD/W10	ICP	508475
1	Tree 8TX Metall - Unmanaged Switch - 8 Ports	58152	Murrelektronik	10287
4	Connector screw connection, 4 Pol., 4 mm² - 6 mm², SACC-M12FS-4CON-PG7	1681114	Phoenix Contact	500805
2	Network isolators - FL ISOLATOR 100-RJ/RJ	2313931	Phoenix Contact	501464
2	Surge protection device	2881007	Phoenix Contact	504791
2	Patch panel, connection field: one RJ45 socket on 8 spring-cage connection terminals	2901642	Phoenix Contact	10214
38	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726
41	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803
2	0,5m Cat.6 PiMF-Patchcabel, green	PATCH-C6 05 GN	reichelt elektronik GmbH & Co. KG	504395
3	Link module spring-type Electrical and mechanical for 3RV2011 and 3RT201	3RA2911-2AA00	Siemens	500845
2	MOTOR PROTECTION S00, A-release 3.5...5 A, N-release 65 A, Spring-type terminal, auxiliary switches 1NO+1NC	3RV2011-1FA25	Siemens	500740
1	MOTOR PROTECTION S00, A-release 4.5...6.3 A, N-release 82 A, Spring-type terminal, auxiliary switches 1NO+1NC	3RV2011-1GA25	Siemens	500671
3	CABLE CONNECTOR SIZE S00	3RV2917-5AA00	Siemens	500797
1	Combination arrester type 1+2, UC 350V AC, 3-pole, FM, for TNC systems	5SD7443-1	Siemens	504070

Summarized parts list

Freqcon_ABAS_de_en

Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.
1	SIMOTION P320-4 BOX WITH INTEL CORE I3 PROZESSOR; 2 X 1,6 GHZ	6AU1320-4DE65-3AF0	Siemens	500789
2	ET 200SP, DQ 16x 24V DC/0,5A ST, PU 1	6ES7132-6BH01-0BA0	Siemens	504397
1	SIMATIC PN/PN Coupler	6ES7158-3AD10-0XA0	Siemens	10138
2	BA 2XRJ45	6ES7193-6AR00-0AA0	Siemens	505628
2	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787
7	Plug connector IE FC M12 PLUG PRO 2X2 M12	6GK1901-0DB20-6AA0	Siemens	500804
1	Router Ewon Cosy 131, 4G + VPN router, supply 24 VDC UMTS router	WEC6133G	Wachendorff Prozesstechnik G mbH & Co. KG	506838alt
4	Power Resistor 100W 1% 10K J	160141	Widap AG	501614

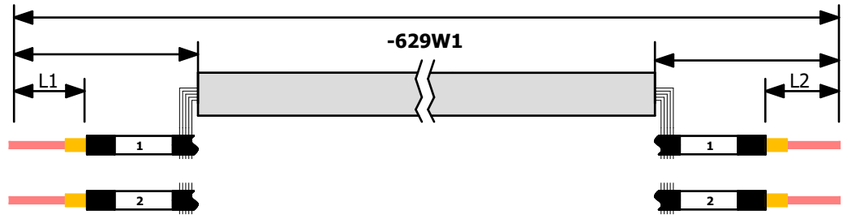
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Cable name =UNIT_01++TRA+-629W1
Cable type OZ-500 2x0,75 mm²
Free conductors

Cable parts HELU.10030
Order number 10030



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	++CT+CTRL_1.3-X3:29	Fuse 230V AC for Container Air Conditioning		
Control cabinet 1	++CT+CTRL_1.3-X3:18	Earthing switch in On Transformer 620V side		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		Fuse 230V AC for Container Air Conditioning	++CONV-18Q1:13	
		Earthing switch in On Transformer 620V side	++CONV-18Q1:14	

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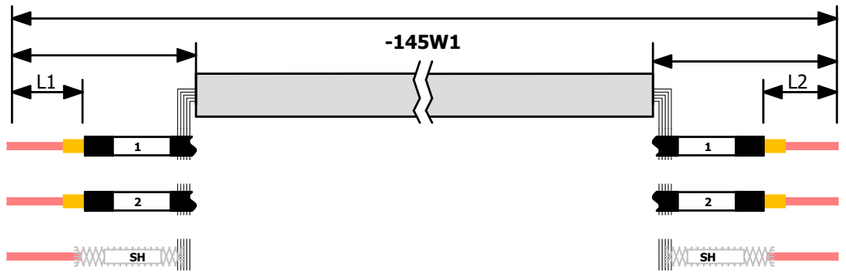
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Editor	Freqcon_DG			Statron		CABEL LIST	20241203_V1.22	= UNIT_01	Converter Container 1
Date	05.11.2024							& EMB	Cable list
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ TRA	medium voltage transformer
Date								+	

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total: 500

Cable name =UNIT_01++CONV+-145W1
Cable type F-CY-OZ (LiY-CY) 2x0,75 mm²
Free conductors

Cable parts HELU.16558
Order number 16558

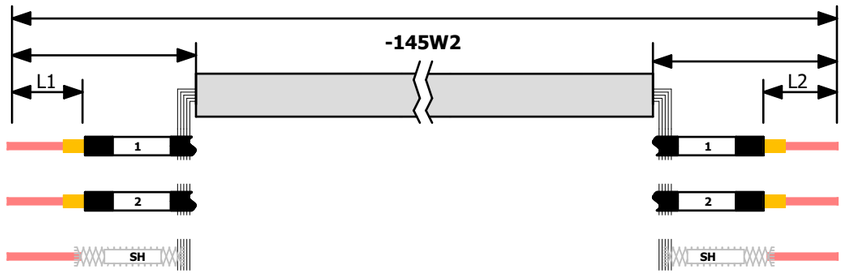


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Inductor cabinet	+IND-201L1:	INDUCTOR GRID PHASE L1 TEMPERATURE 1_1		
Inductor cabinet	+IND-201L1	=		
	-SH	=		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		INDUCTOR GRID PHASE L1	++CT+CTRL_1.3-X5:1	*Control cabinet 1*
		=	++CT+CTRL_1.3-X5:2	*Control cabinet 1*
		=		

Cable name =UNIT_01++CONV+-145W2
Cable type F-CY-OZ (LiY-CY) 2x0,75 mm²
Free conductors

Cable parts HELU.16558
Order number 16558

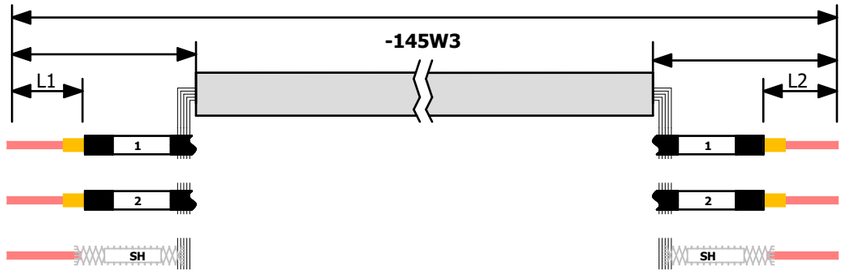


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Inductor cabinet	+IND-202L1:	INDUCTOR GRID PHASE L2 TEMPERATURE 1_2		
Inductor cabinet	+IND-202L1	=		
	-SH	=		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		INDUCTOR GRID PHASE L2	++CT+CTRL_1.3-X5:3	*Control cabinet 1*
		=	++CT+CTRL_1.3-X5:4	*Control cabinet 1*
		=		

Cable name =UNIT_01++CONV+-145W3
Cable type F-CY-OZ (LiY-CY) 2x0,75 mm²
Free conductors

Cable parts HELU.16558
Order number 16558

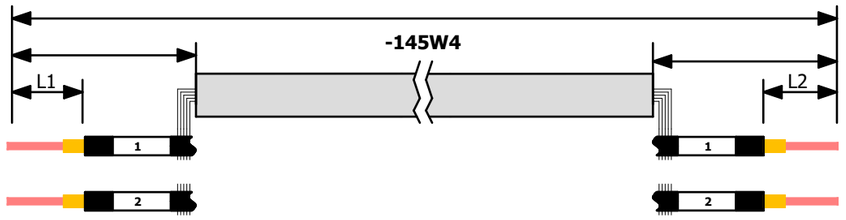


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Inductor cabinet	+IND-203L1:	INDUCTOR GRID PHASE L3 TEMPERATURE 1_3		
Inductor cabinet	+IND-203L1	=		
	-SH	=		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		INDUCTOR GRID PHASE L3	++CT+CTRL_1.3-X5:5	*Control cabinet 1*
		=	++CT+CTRL_1.3-X5:6	*Control cabinet 1*
		=		

Cable name =UNIT_01++CONV+-145W4
Cable type F-CY-OZ (LiY-CY) 2x0,75 mm²
Free conductors

Cable parts HELU.16558
Order number 16558



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Inductor cabinet	+IND-211L1.1:	INDUCTOR DC SUB 2_1 TEMPERATURE 2_1		
Inductor cabinet	+IND-211L1.1	=		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		INDUCTOR DC SUB 2_1	++CT+CTRL_1.3-X5:7	*Control cabinet 1*
		=	++CT+CTRL_1.3-X5:8	*Control cabinet 1*

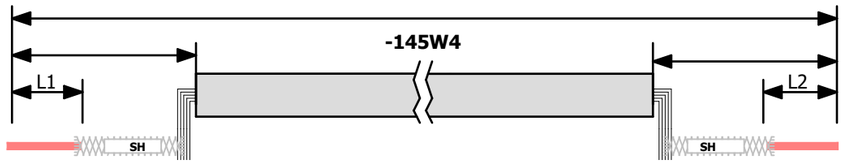
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Cable name =UNIT_01++CONV+-145W4
Cable type F-CY-OZ (LiY-CY) 2x0,75 mm²
Free conductors

Cable parts HELU.16558
Order number 16558

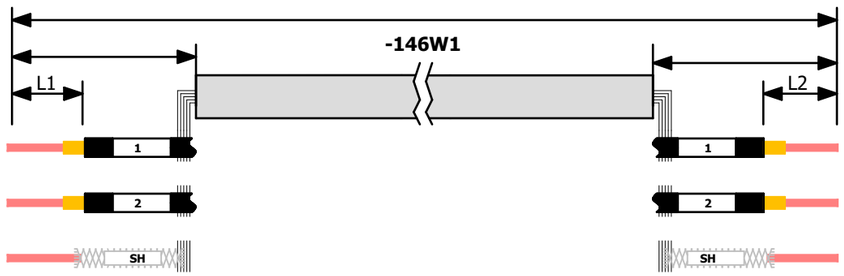


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-SH	INDUCTOR DC SUB 2_1 TEMPERATURE 2_1		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		INDUCTOR DC SUB 2_1		

Cable name =UNIT_01++CONV+-146W1
Cable type F-CY-OZ (LiY-CY) 2x0,75 mm²
Free conductors

Cable parts HELU.16558
Order number 16558

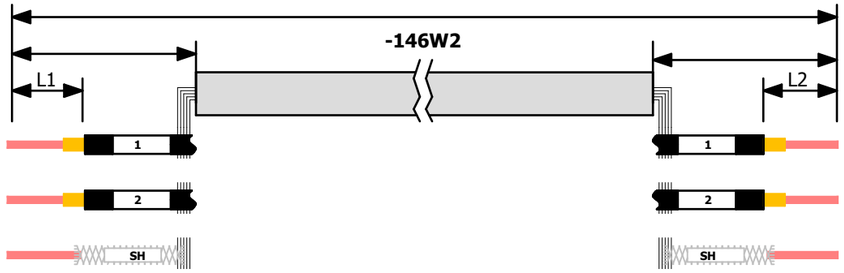


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Inductor cabinet	+IND-211L1.2	INDUCTOR DC SUB 2_2 TEMPERATURE 2_2		
Inductor cabinet	+IND-211L1.2	=		
	-SH	=		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		INDUCTOR DC SUB 2_2	++CT+CTRL_1.3-X5:9	***Control cabinet 1***
		=	++CT+CTRL_1.3-X5:10	***Control cabinet 1***
		=		

Cable name =UNIT_01++CONV+-146W2
Cable type F-CY-OZ (LiY-CY) 2x0,75 mm²
Free conductors

Cable parts HELU.16558
Order number 16558



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Inductor cabinet	+IND-211L1.3	INDUCTOR DC SUB 2_3 TEMPERATURE 2_3		
Inductor cabinet	+IND-211L1.3	=		
	-SH	=		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		INDUCTOR DC SUB 2_3	++CT+CTRL_1.3-X5:11	***Control cabinet 1***
		=	++CT+CTRL_1.3-X5:12	***Control cabinet 1***
		=		

Cable name =UNIT_01++CONV+-146W3
Cable type F-CY-OZ (LiY-CY) 2x0,75 mm²
Free conductors

Cable parts HELU.16558
Order number 16558



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Inductor cabinet	+IND-207L1.1	INDUCTOR DC SUB 3_1 TEMPERATURE 3_1		
Inductor cabinet	+IND-207L1.1	=		
	-SH	=		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		INDUCTOR DC SUB 3_1	++CT+CTRL_1.3-X5:13	***Control cabinet 1***
		=	++CT+CTRL_1.3-X5:14	***Control cabinet 1***
		=		

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Cable name =UNIT_01++CONV+-146W4
Cable type F-CY-OZ (LiY-CY) 2x0,75 mm²
Free conductors

Cable parts HELU.16558
Order number 16558

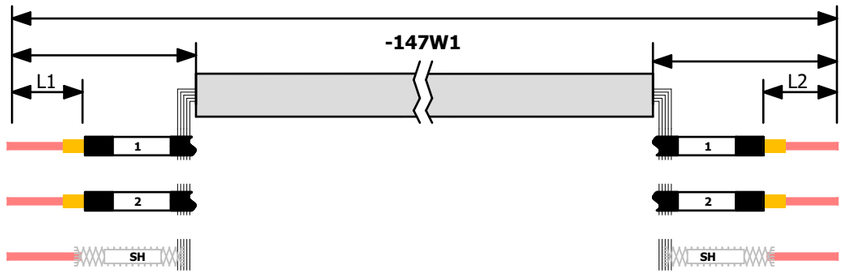


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Inductor cabinet	+IND-207L1.2	INDUCTOR DC SUB 3_2 TEMPERATURE 3_2		
Inductor cabinet	+IND-207L1.2	=		
	-SH	=		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		INDUCTOR DC SUB 3_2	++CT+CTRL_1.3-X5:15	*Control cabinet 1*
		=	++CT+CTRL_1.3-X5:16	*Control cabinet 1*
		=		

Cable name =UNIT_01++CONV+-147W1
Cable type F-CY-OZ (LiY-CY) 2x0,75 mm²
Free conductors

Cable parts HELU.16558
Order number 16558

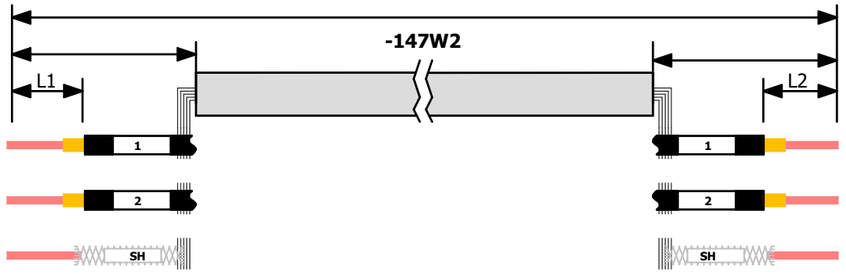


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Inductor cabinet	+IND-207L1.3:	INDUCTOR DC SUB 3_3 TEMPERATURE 3_3		
Inductor cabinet	+IND-207L1.3	=		
	-SH	=		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		INDUCTOR DC SUB 3_3	++CT+CTRL_1.3-X5:17	*Control cabinet 1*
		=	++CT+CTRL_1.3-X5:18	*Control cabinet 1*
		=		

Cable name =UNIT_01++CONV+-147W2
Cable type F-CY-OZ (LiY-CY) 2x0,75 mm²
Free conductors

Cable parts HELU.16558
Order number 16558

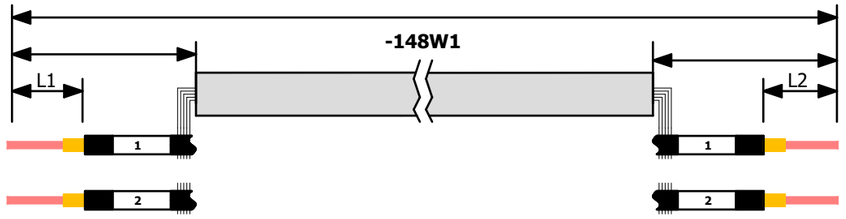


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Inductor cabinet	+IND-217L1.1:	INDUCTOR DC SUB 4_1 TEMPERATURE 4_1		
Inductor cabinet	+IND-217L1.1	=		
	-SH	=		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		INDUCTOR DC SUB 4_1	++CT+CTRL_1.3-X5:19	*Control cabinet 1*
		=	++CT+CTRL_1.3-X5:20	*Control cabinet 1*
		=		

Cable name =UNIT_01++CONV+-148W1
Cable type F-CY-OZ (LiY-CY) 2x0,75 mm²
Free conductors

Cable parts HELU.16558
Order number 16558



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Inductor cabinet	+IND-217L1.2:	INDUCTOR DC SUB 4_2 TEMPERATURE 4_2		
Inductor cabinet	+IND-217L1.2	=		

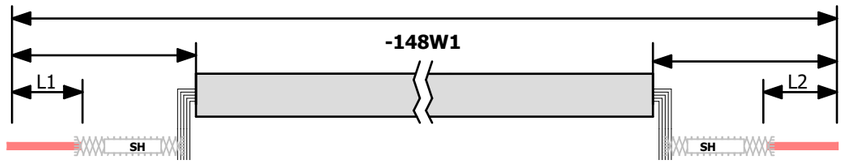
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		INDUCTOR DC SUB 4_2	++CT+CTRL_1.3-X5:25	*Control cabinet 1*
		=	++CT+CTRL_1.3-X5:26	*Control cabinet 1*

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Cable name =UNIT_01++CONV+-148W1
Cable type F-CY-OZ (LiY-CY) 2x0,75 mm²
Free conductors

Cable parts HELU.16558
Order number 16558

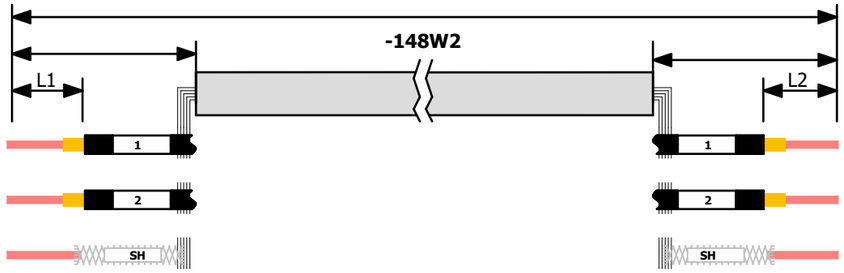


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-SH	INDUCTOR DC SUB 4_2 TEMPERATURE 4_2		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		INDUCTOR DC SUB 4_2		

Cable name =UNIT_01++CONV+-148W2
Cable type F-CY-OZ (LiY-CY) 2x0,75 mm²
Free conductors

Cable parts HELU.16558
Order number 16558

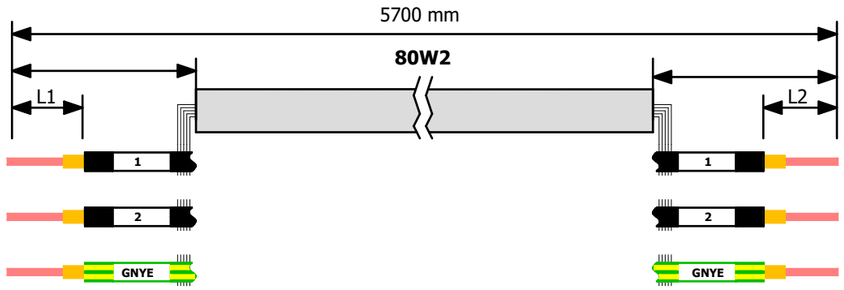


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Inductor cabinet	+IND-217L1.3:	INDUCTOR DC SUB 4_3 TEMPERATURE 4_3		
Inductor cabinet	+IND-217L1.3	=		
	-SH	=		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		INDUCTOR DC SUB 4_3	++CT+CTRL_1.3-X5:29	***Control cabinet 1***
		=	++CT+CTRL_1.3-X5:30	***Control cabinet 1***
		=		

Cable name =UNIT_01++CONV+-80W2
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts HELU.10091
Order number 10091

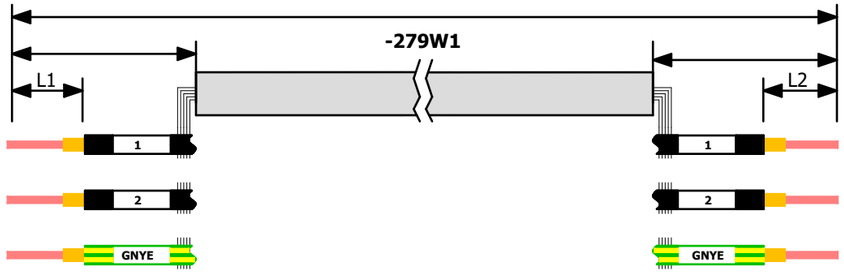


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	++CT+CTRL_1.3-XT:9	230V AC for Circuit Breaker 1	End splice	8 mm
Control cabinet 1	++CT+CTRL_1.3-XT:10	=	End splice	8 mm
Control cabinet 1	++CT+CTRL_1.3-XT:PE	=		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
8 mm	stripped	230V AC for Circuit Breaker 1	+CIR-80Q1:X5_2	***Circuit Breaker cabinet***
8 mm	stripped	=	+CIR-80Q1:X5_1	***Circuit Breaker cabinet***
		=		

Cable name =UNIT_01++CONV+-279W1
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts HELU.10091
Order number 10091



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	++CT+CTRL_1.3-XT:1	CON Fans 1-5 in door	stripped	8 mm
Control cabinet 1	++CT+CTRL_1.3-XT:2	=	stripped	8 mm
Control cabinet 1	++CT+CTRL_1.3-XT:PE	=	stripped	8 mm

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
8 mm	stripped	CON Fans 1-5	+CON-279M1:L	***Converter cabinet***
8 mm	stripped	=	+CON-279M1:N	***Converter cabinet***
8 mm	stripped	=	+CON-279M1:PE	***Converter cabinet***

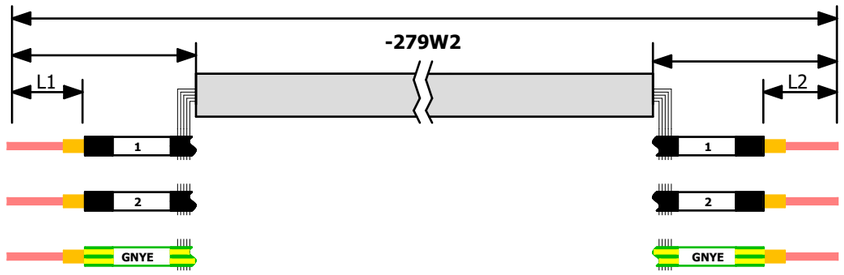
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FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_01++CONV+-279W2
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts HELU.10091
Order number 10091

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Converter cabinet	+CON-279M1:L	FAN 1 CONVERTER	stripped	8 mm
Converter cabinet	+CON-279M1:N	=	stripped	8 mm
Converter cabinet	+CON-279M1:PE	=	stripped	8 mm

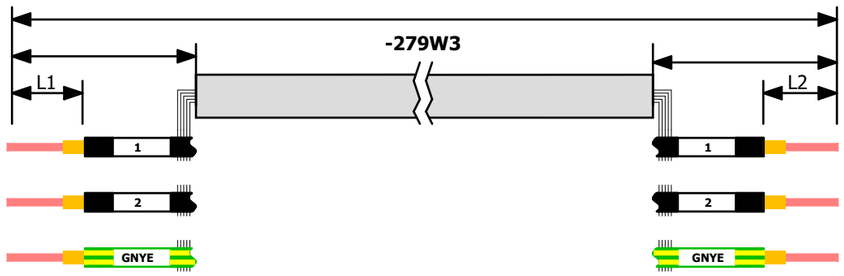


L2 [mm]	wire end handling	Function text target	Target	Mounting location:
8 mm	stripped	FAN 1 CONVERTER	+CON-279M2:1	*Converter cabinet*
8 mm	stripped	=	+CON-279M2:2	*Converter cabinet*
8 mm	stripped	=	+CON-279M2:PE	*Converter cabinet*

Cable name =UNIT_01++CONV+-279W3
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts HELU.10091
Order number 10091

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Converter cabinet	+CON-279M2:1	FAN 2 CONVERTER	stripped	8 mm
Converter cabinet	+CON-279M2:2	=	stripped	8 mm
Converter cabinet	+CON-279M2:PE	=	stripped	8 mm

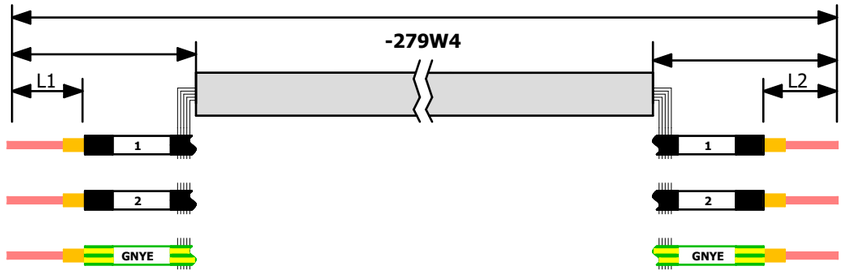


L2 [mm]	wire end handling	Function text target	Target	Mounting location:
8 mm	stripped	FAN 2 CONVERTER	+CON-279M3:1	*Converter cabinet*
8 mm	stripped	=	+CON-279M3:2	*Converter cabinet*
8 mm	stripped	=	+CON-279M3:PE	*Converter cabinet*

Cable name =UNIT_01++CONV+-279W4
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts HELU.10091
Order number 10091

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Converter cabinet	+CON-279M3:1	FAN 3 CONVERTER	stripped	8 mm
Converter cabinet	+CON-279M3:2	=	stripped	8 mm
Converter cabinet	+CON-279M3:PE	=	stripped	8 mm

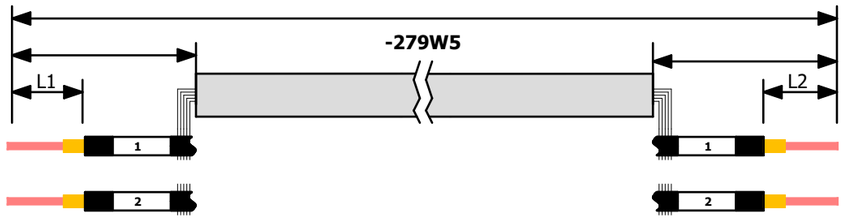


L2 [mm]	wire end handling	Function text target	Target	Mounting location:
8 mm	stripped	FAN 3 CONVERTER	+CON-279M4:1	*Converter cabinet*
8 mm	stripped	=	+CON-279M4:2	*Converter cabinet*
8 mm	stripped	=	+CON-279M4:PE	*Converter cabinet*

Cable name =UNIT_01++CONV+-279W5
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts HELU.10091
Order number 10091

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Converter cabinet	+CON-279M4:1	FAN 4 CONVERTER	stripped	8 mm
Converter cabinet	+CON-279M4:2	=	stripped	8 mm



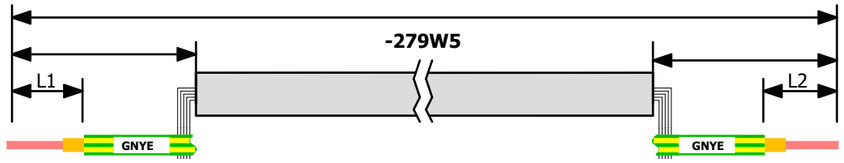
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
8 mm	stripped	FAN 4 CONVERTER	+CON-279M5:1	*Converter cabinet*
8 mm	stripped	=	+CON-279M5:2	*Converter cabinet*

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Cable name =UNIT_01++CONV+-279W5
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts HELU.10091
Order number 10091

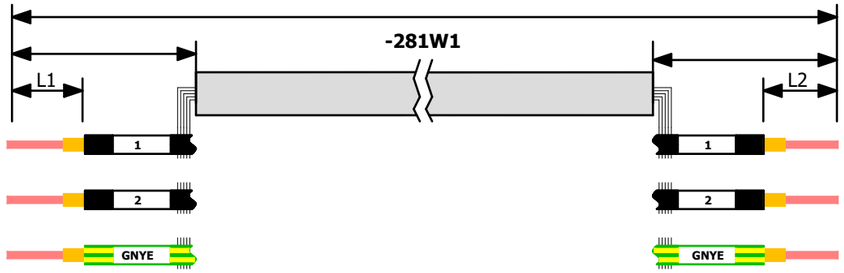


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Converter cabinet	+CON-279M4:PE	FAN 4 CONVERTER	stripped	8 mm

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
8 mm	stripped	FAN 4 CONVERTER	+CON-279M5:PE	*Converter cabinet*

Cable name =UNIT_01++CONV+-281W1
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts HELU.10091
Order number 10091



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	++CT+CTRL_1.3-XT:3	CON Fans 1-5 in door	stripped	8 mm
Control cabinet 1	++CT+CTRL_1.3-XT:4	CIR Fans 1-3 in door	stripped	8 mm
Control cabinet 1	++CT+CTRL_1.3-XT:PE	=	stripped	8 mm

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
8 mm	stripped	CON Fans 1-5	+CIR-281M1:L	*Circuit Breaker cabinet*
8 mm	stripped	CIR Fans 1-3	+CIR-281M1:N	*Circuit Breaker cabinet*
8 mm	stripped	=	+CIR-281M1:PE	*Circuit Breaker cabinet*

Cable name =UNIT_01++CONV+-281W2
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts HELU.10091
Order number 10091

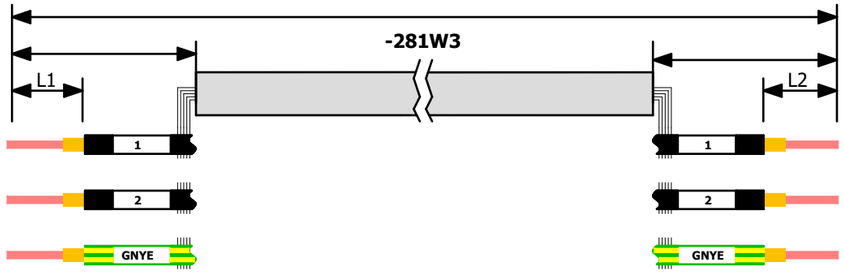


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Circuit Breaker cabinet	+CIR-281M1:L	FAN 1 CIRCUIT BREAKER CABINET	stripped	8 mm
Circuit Breaker cabinet	+CIR-281M1:N	=	stripped	8 mm
Circuit Breaker cabinet	+CIR-281M1:PE	=	stripped	8 mm

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
8 mm	stripped	FAN 1 CIRCUIT BREAKER CABINET	+CIR-281M2:L	*Circuit Breaker cabinet*
8 mm	stripped	=	+CIR-281M2:N	*Circuit Breaker cabinet*
8 mm	stripped	=	+CIR-281M2:PE	*Circuit Breaker cabinet*

Cable name =UNIT_01++CONV+-281W3
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts HELU.10091
Order number 10091



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Circuit Breaker cabinet	+CIR-281M2:L	FAN 2 CIRCUIT BREAKER CABINET	stripped	8 mm
Circuit Breaker cabinet	+CIR-281M2:N	=	stripped	8 mm
Circuit Breaker cabinet	+CIR-281M2:PE	=	stripped	8 mm

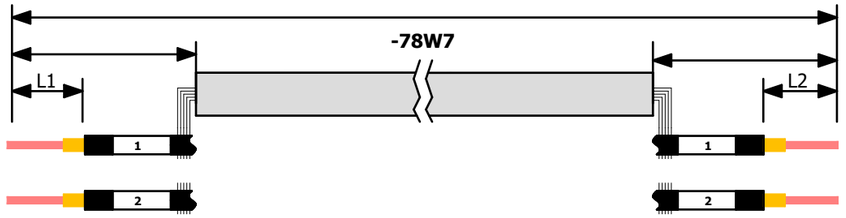
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
8 mm	stripped	FAN 2 CIRCUIT BREAKER CABINET	+CIR-281M3:1	*Circuit Breaker cabinet*
8 mm	stripped	=	+CIR-281M3:2	*Circuit Breaker cabinet*
8 mm	stripped	=	+CIR-281M3:PE	*Circuit Breaker cabinet*

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Cable name =UNIT_01++CONV+-78W7
Cable type OZ-500 2x0,75 mm²
Free conductors

Cable parts HELU.10030
Order number 10030

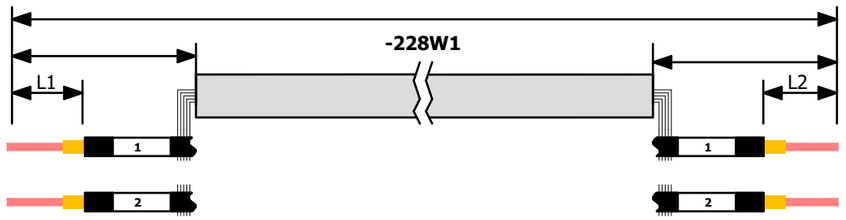


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
AC and DC connection cabinet	+AC_DC-X3.43:20			
AC and DC connection cabinet	+AC_DC-X3.43:19			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			+AC_DC-78F1:13	AC and DC connection cabinet
			+AC_DC-78F1:14	AC and DC connection cabinet

Cable name =UNIT_01++CONV+-228W1
Cable type OZ-500 2x0,75 mm²
Free conductors

Cable parts HELU.10030
Order number 10030



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
AC and DC connection cabinet	+AC_DC-X3.43:7	SURGE ARRESTER DC SUBSYSTEM 3_1		
AC and DC connection cabinet	+AC_DC-X3.43:8	=		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		SURGE ARRESTER DC SUBSYSTEM 3_1	+AC_DC-228F1:11	AC and DC connection cabinet
		=	+AC_DC-228F1:12	AC and DC connection cabinet

Cable name =UNIT_01++CONV+-228W2
Cable type OZ-500 2x0,75 mm²
Free conductors

Cable parts HELU.10030
Order number 10030

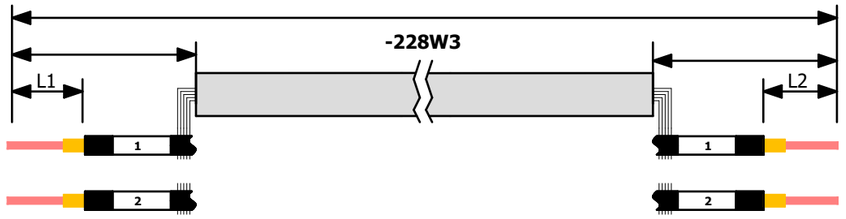


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
AC and DC connection cabinet	+AC_DC-X3.43:9	SURGE ARRESTER DC SUBSYSTEM 3_2		
AC and DC connection cabinet	+AC_DC-X3.43:10	=		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		SURGE ARRESTER DC SUBSYSTEM 3_2	+AC_DC-228F2:11	AC and DC connection cabinet
		=	+AC_DC-228F2:12	AC and DC connection cabinet

Cable name =UNIT_01++CONV+-228W3
Cable type OZ-500 2x0,75 mm²
Free conductors

Cable parts HELU.10030
Order number 10030



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
AC and DC connection cabinet	+AC_DC-X3.43:11	SURGE ARRESTER DC SUBSYSTEM 3_3		
AC and DC connection cabinet	+AC_DC-X3.43:12	=		

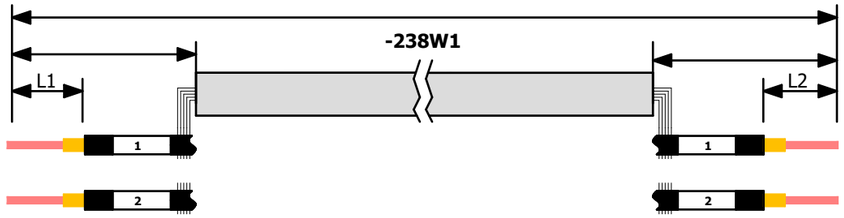
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		SURGE ARRESTER DC SUBSYSTEM 3_3	+AC_DC-228F3:11	AC and DC connection cabinet
		=	+AC_DC-228F3:12	AC and DC connection cabinet

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Cable name =UNIT_01++CONV+-238W1
Cable type OZ-500 2x0,75 mm²
Free conductors

Cable parts HELU.10030
Order number 10030

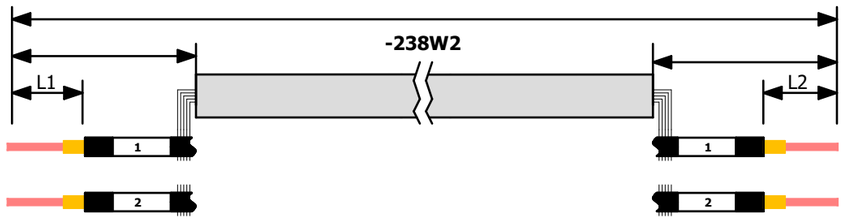


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
AC and DC connection cabinet	+AC_DC-X3.43:1	SURGE ARRESTER DC SUBSYSTEM 2_1		
AC and DC connection cabinet	+AC_DC-X3.43:2	=		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		SURGE ARRESTER DC SUBSYSTEM 2_1	+AC_DC-238F1:11	*AC and DC connection cabinet*
		=	+AC_DC-238F1:12	*AC and DC connection cabinet*

Cable name =UNIT_01++CONV+-238W2
Cable type OZ-500 2x0,75 mm²
Free conductors

Cable parts HELU.10030
Order number 10030

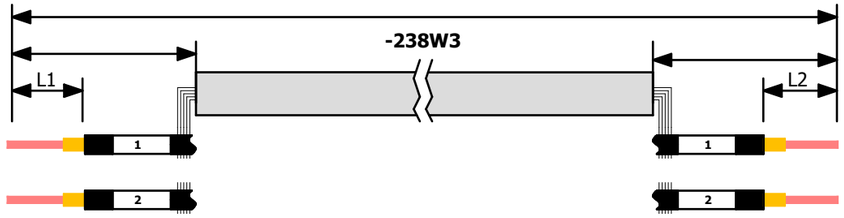


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
AC and DC connection cabinet	+AC_DC-X3.43:3	SURGE ARRESTER DC SUBSYSTEM 2_2		
AC and DC connection cabinet	+AC_DC-X3.43:4	=		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		SURGE ARRESTER DC SUBSYSTEM 2_2	+AC_DC-238F2:11	*AC and DC connection cabinet*
		=	+AC_DC-238F2:12	*AC and DC connection cabinet*

Cable name =UNIT_01++CONV+-238W3
Cable type OZ-500 2x0,75 mm²
Free conductors

Cable parts HELU.10030
Order number 10030

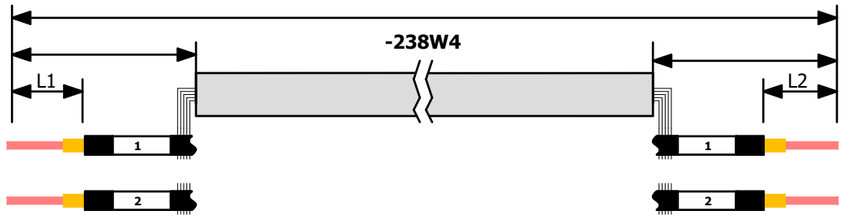


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
AC and DC connection cabinet	+AC_DC-X3.43:5	SURGE ARRESTER DC SUBSYSTEM 2_3		
AC and DC connection cabinet	+AC_DC-X3.43:6	=		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		SURGE ARRESTER DC SUBSYSTEM 2_3	+AC_DC-238F3:11	*AC and DC connection cabinet*
		=	+AC_DC-238F3:12	*AC and DC connection cabinet*

Cable name =UNIT_01++CONV+-238W4
Cable type OZ-500 2x0,75 mm²
Free conductors

Cable parts HELU.10030
Order number 10030



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
AC and DC connection cabinet	+AC_DC-X3.43:13	SURGE ARRESTER DC SUBSYSTEM 4_1		
AC and DC connection cabinet	+AC_DC-X3.43:14	=		

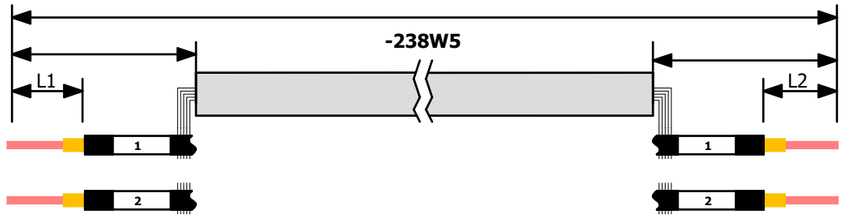
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		SURGE ARRESTER DC SUBSYSTEM 4_1	+AC_DC-238F4:11	*AC and DC connection cabinet*
		=	+AC_DC-238F4:12	*AC and DC connection cabinet*

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Cable name =UNIT_01++CONV+-238W5
Cable type OZ-500 2x0,75 mm²
Free conductors 2

Cable parts HELU.10030
Order number 10030

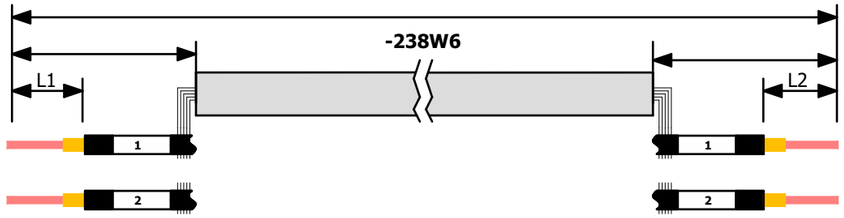


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
AC and DC connection cabinet	+AC_DC-X3.43:15	SURGE ARRESTER DC SUBSYSTEM 4_2		
AC and DC connection cabinet	+AC_DC-X3.43:16	=		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		SURGE ARRESTER DC SUBSYSTEM 4_2	+AC_DC-238F5:11	***AC and DC connection cabinet***
		=	+AC_DC-238F5:12	***AC and DC connection cabinet***

Cable name =UNIT_01++CONV+-238W6
Cable type OZ-500 2x0,75 mm²
Free conductors 2

Cable parts HELU.10030
Order number 10030

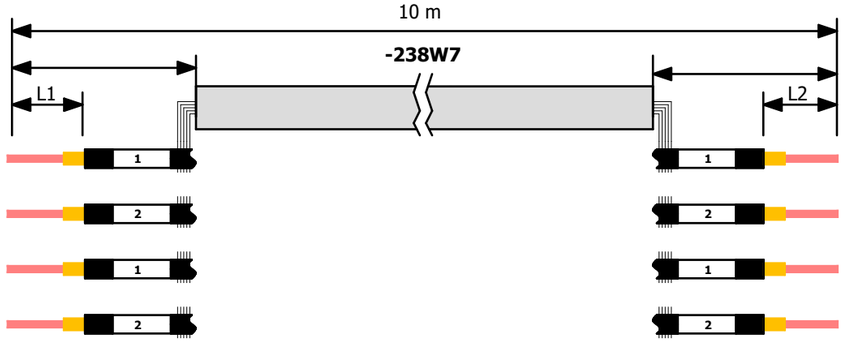


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
AC and DC connection cabinet	+AC_DC-X3.43:17	SURGE ARRESTER DC SUBSYSTEM 4_3		
AC and DC connection cabinet	+AC_DC-X3.43:18	=		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		SURGE ARRESTER DC SUBSYSTEM 4_3	+AC_DC-238F6:11	***AC and DC connection cabinet***
		=	+AC_DC-238F6:12	***AC and DC connection cabinet***

Cable name =UNIT_01++CONV+-238W7
Cable type OZ-500 2x0,75 mm²
Free conductors 2

Cable parts HELU.10030
Order number 10030;10030

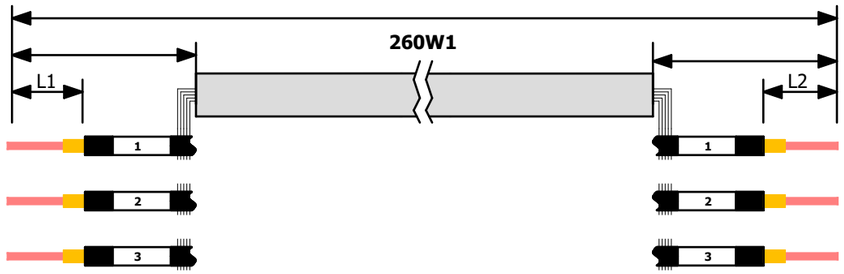


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
AC and DC connection cabinet	+AC_DC-X3.43:1	SURGE ARRESTER DC SUBSYSTEM 2_1	stripped	7mm
AC and DC connection cabinet	+AC_DC-X3.43:20		stripped	7mm

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
8mm	stripped	SURGE ARRESTER DC SUBSYSTEM 2_1	++CT+CTRL_1.3-X3:5	***Control cabinet 1***
8mm	stripped		++CT+CTRL_1.3-X3:6	***Control cabinet 1***

Cable name =UNIT_01++CONV+-260W1
Cable type OZ-500 4x0,75 mm²
Free conductors 3

Cable parts HELU.10034
Order number 10034



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	++CT+CTRL_1.3-X3:19	Smoke detector CON		
Control cabinet 1	++CT+CTRL_1.3-X3:20	=		
Control cabinet 1	++CT+CTRL_1.3-X3:21	=		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		Smoke detector CON	+CON-260B1:4	***Converter cabinet***
		=	+CON-260B1:2	***Converter cabinet***
		=	+CON-260B1:5	***Converter cabinet***

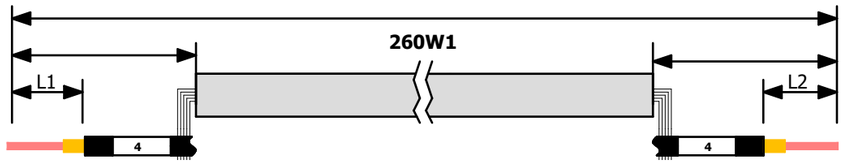
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Cable name =UNIT_01++CONV+-260W1
Cable type OZ-500 4x0,75 mm²
Free conductors

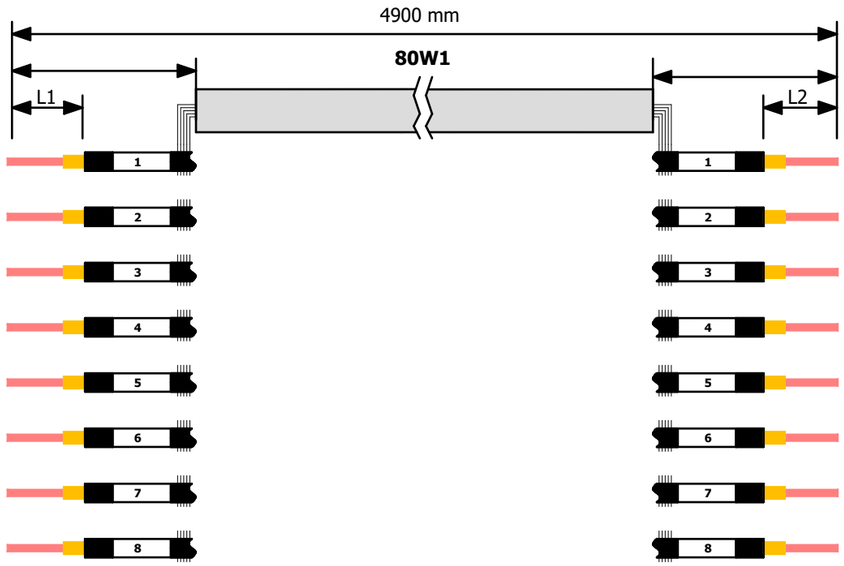
Cable parts HELU.10034
Order number 10034



Mounting location:	Source	Function text source	wire end handling	L1 [mm]	L2 [mm]	wire end handling	Function text target	Target	Mounting location:
Control cabinet 1	++CT+CTRL_1.3-X3:22	Smoke detector CON					Smoke detector CON	+CON-260B1:6	*Converter cabinet*

Cable name =UNIT_01++CONV+-80W1
Cable type OZ-500 8x0,75 mm²
Free conductors

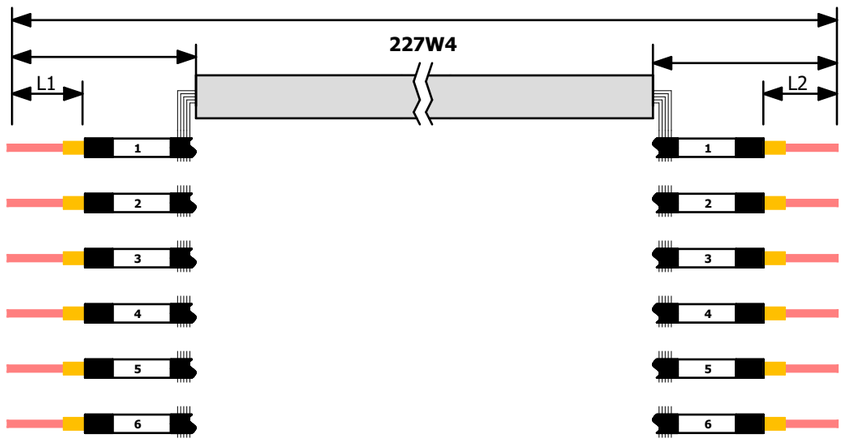
Cable parts HELU.10173
Order number 10173



Mounting location:	Source	Function text source	wire end handling	L1 [mm]	L2 [mm]	wire end handling	Function text target	Target	Mounting location:
Control cabinet 1	++CT+CTRL_1.3-X3:1	CB 1 Tripped GRID	stripped	8 mm	8 mm	stripped	CB 1 Tripped GRID	+CIR-80Q1:X7_13	*Circuit Breaker cabinet*
Control cabinet 1	++CT+CTRL_1.3-X3:2	CB 1 OFF GRID	stripped	8 mm	8 mm	stripped	CB 1 OFF GRID	+CIR-80Q1:X6_9	*Circuit Breaker cabinet*
Control cabinet 1	++CT+CTRL_1.3-X3:3	CB 1 ON GRID	stripped	8 mm	8 mm	stripped	CB 1 ON GRID	+CIR-80Q1:X6_11	*Circuit Breaker cabinet*
Control cabinet 1	++CT+CTRL_1.3-X3:31	CB 1 GRID +24V	stripped	8 mm	8 mm	stripped	CB 1 GRID	+CIR-80Q1:X6_12	*Circuit Breaker cabinet*
Control cabinet 1	++CT+CTRL_1.3-X3:32	=	stripped	8 mm	8 mm	stripped	=	+CIR-80Q1:X5_11	*Circuit Breaker cabinet*
Control cabinet 1	++CT+CTRL_1.3-X3:35	CB 2 ISLAND GRID +24V OPTIONAL	stripped	8 mm	8 mm	stripped	CB 2 ISLAND GRID	+CIR-80Q1:X6_7	*Circuit Breaker cabinet*
Control cabinet 1	++CT+CTRL_1.3-X3:36	CB 1 GRID	stripped	8 mm	8 mm	stripped	CB 1 GRID	+CIR-80Q1:X6_14	*Circuit Breaker cabinet*
Control cabinet 1	++CT+CTRL_1.3-X3:37	=	stripped	8 mm	8 mm	stripped	=	+CIR-80Q1:X5_12	*Circuit Breaker cabinet*

Cable name =UNIT_01++CONV+-227W4
Cable type OZ-500 18x1 mm²
Free conductors

Cable parts HELU.10174
Order number 10174



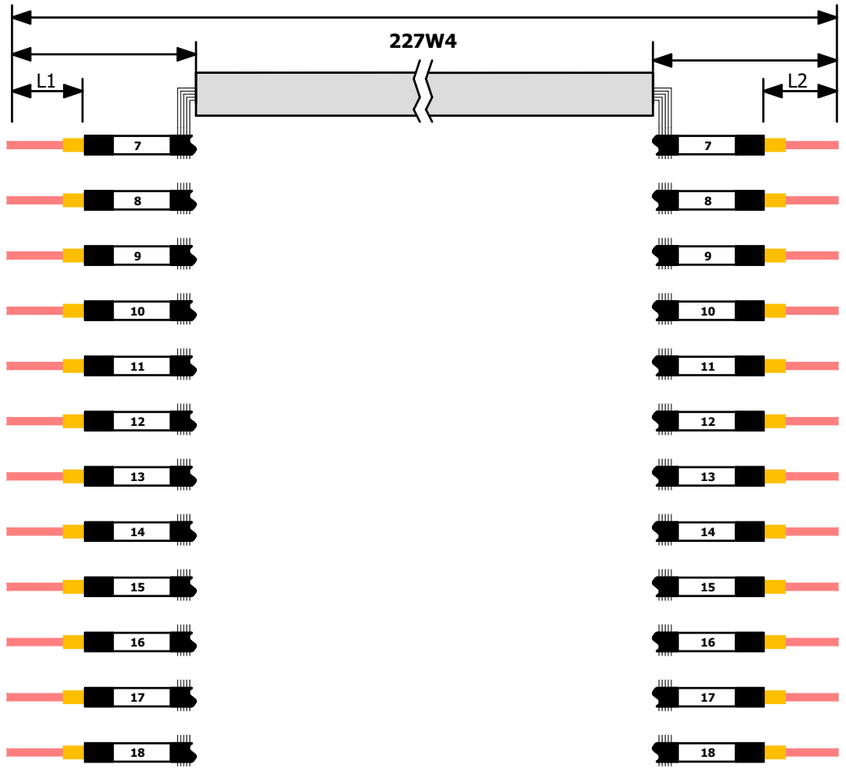
Mounting location:	Source	Function text source	wire end handling	L1 [mm]	L2 [mm]	wire end handling	Function text target	Target	Mounting location:
Circuit Breaker cabinet	+CIR-227U1-X3.1:1		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-350X1.21:1	*Control cabinet 1*
Circuit Breaker cabinet	+CIR-227U1-X3.1:2		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-350X1.21:4	*Control cabinet 1*
Circuit Breaker cabinet	+CIR-227U1-X3.1:3		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-350X1.21:7	*Control cabinet 1*
Circuit Breaker cabinet	+CIR-227U1-X3.1:4		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-350X1.21:3	*Control cabinet 1*
Circuit Breaker cabinet	+CIR-227U1-X3.1:5		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-350X1.21:6	*Control cabinet 1*
Circuit Breaker cabinet	+CIR-227U1-X3.1:6		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-350X1.21:9	*Control cabinet 1*

Editor	Freqcon_DG			Statron	FREQCON	CABEL LIST	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	05.11.2024							& EMB Cable list	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV Converter	page: 10
Date								+	total: 500

FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_01++CONV+-227W4
Cable type OZ-500 18x1 mm²
Free conductors

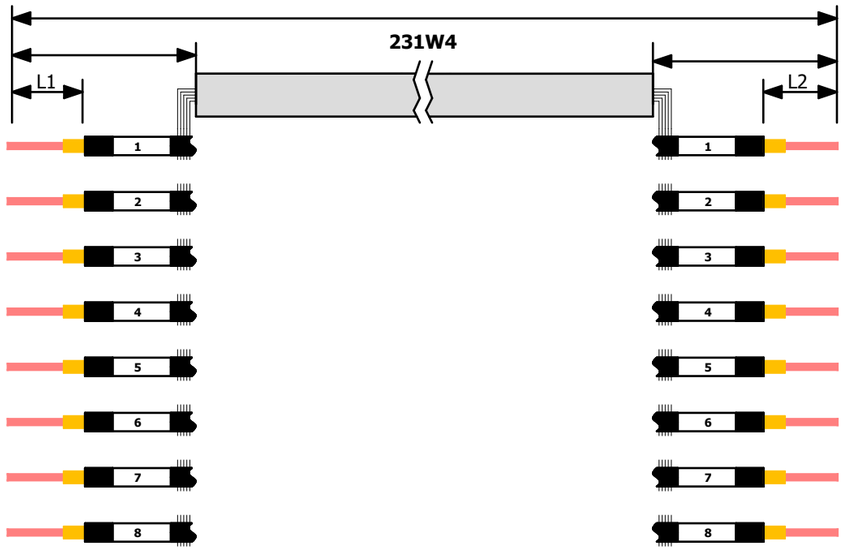
Cable parts HELU.10174
Order number 10174



Mounting location:	Source	Function text source	wire end handling	L1 [mm]	L2 [mm]	wire end handling	Function text target	Target	Mounting location:
Circuit Breaker cabinet	+CIR-227U1-X3.1:7		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-307K1:A1	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-227U1-X3.1:8		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-307K3:A1	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-227U1-X3.1:9		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-307K5:A1	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-227U1-X3.1:10		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-307K2:A1	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-227U1-X3.1:11		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-307K4:A1	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-227U1-X3.1:12		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-307K6:A1	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-227U1-X3.1:13		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.3-X3.11:11	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-227U1-X3.1:14		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.3-X3.12:9	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-227U1-X3.1:15		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.3-X3.12:11	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-227U1-X3.1:16		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.3-X3.12:10	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-227U1-X3.1:17		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-350X1.21:2	***Control cabinet 1***
			stripped	8 mm	8 mm	stripped			

Cable name =UNIT_01++CONV+-231W4
Cable type OZ-500 18x1 mm²
Free conductors

Cable parts HELU.10174
Order number 10174

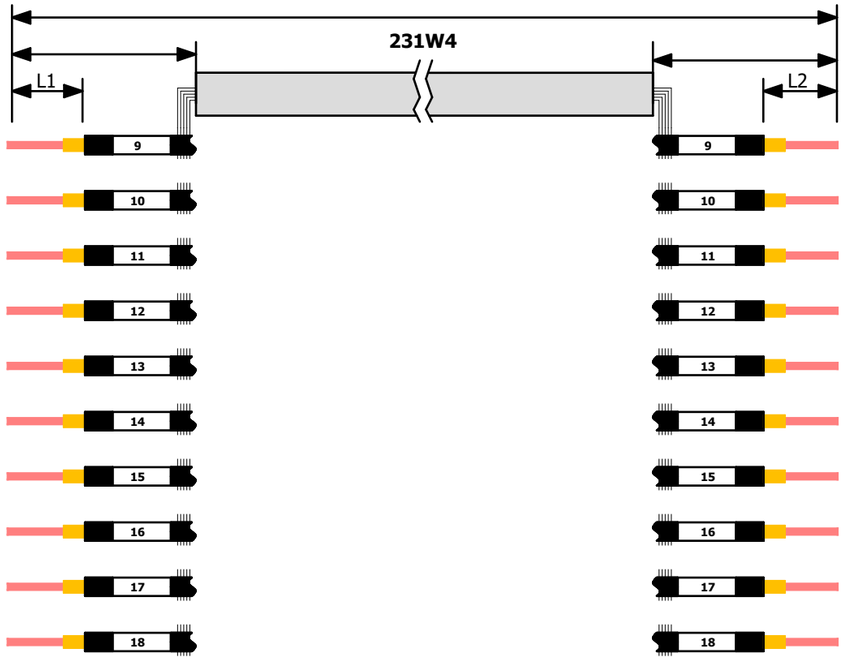


Mounting location:	Source	Function text source	wire end handling	L1 [mm]	L2 [mm]	wire end handling	Function text target	Target	Mounting location:
Circuit Breaker cabinet	+CIR-231U1-X3.1:1		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.3-150X1:1	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-231U1-X3.1:2		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.3-150X1:4	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-231U1-X3.1:3		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.3-150X1:7	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-231U1-X3.1:4		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.3-150X1:3	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-231U1-X3.1:5		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.3-150X1:6	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-231U1-X3.1:6		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.3-150X1:9	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-231U1-X3.1:7		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-306K1:A1	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-231U1-X3.1:8		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-306K3:A1	***Control cabinet 1***

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Cable name =UNIT_01++CONV+-231W4
Cable type OZ-500 18x1 mm²
Free conductors

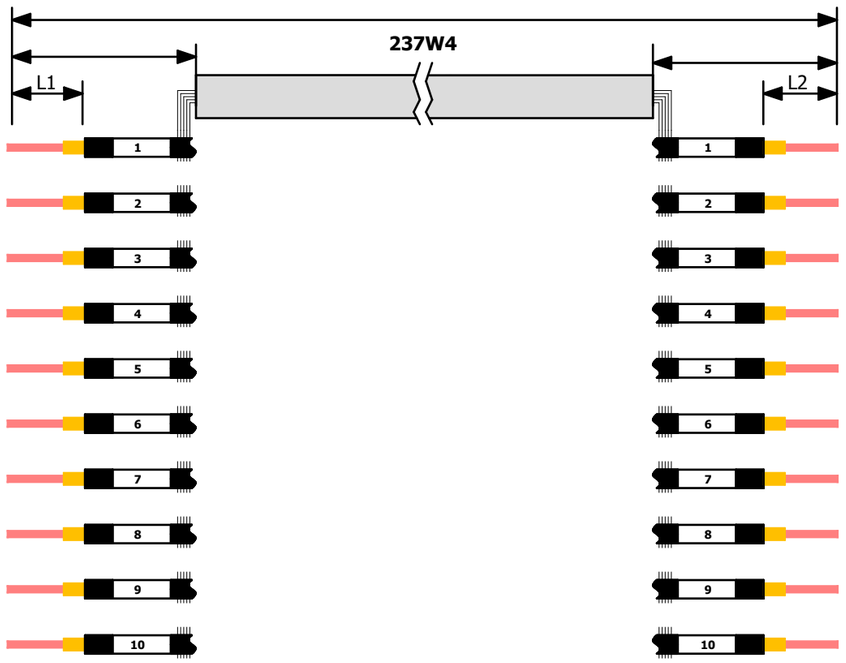
Cable parts HELU.10174
Order number 10174



Mounting location:	Source	Function text source	wire end handling	L1 [mm]	L2 [mm]	wire end handling	Function text target	Target	Mounting location:
Circuit Breaker cabinet	+CIR-231U1-X3.1:9		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-306K5:A1	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-231U1-X3.1:10		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-306K2:A1	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-231U1-X3.1:11		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-306K4:A1	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-231U1-X3.1:12		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-306K6:A1	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-231U1-X3.1:13		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.3-X3.10:9	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-231U1-X3.1:14		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.3-X3.10:11	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-231U1-X3.1:15		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.3-X3.11:9	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-231U1-X3.1:16		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.3-X3.10:10	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-231U1-X3.1:17		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.3-150X1:2	***Control cabinet 1***
			stripped	8 mm	8 mm	stripped			

Cable name =UNIT_01++CONV+-237W4
Cable type OZ-500 18x1 mm²
Free conductors

Cable parts HELU.10174
Order number 10174

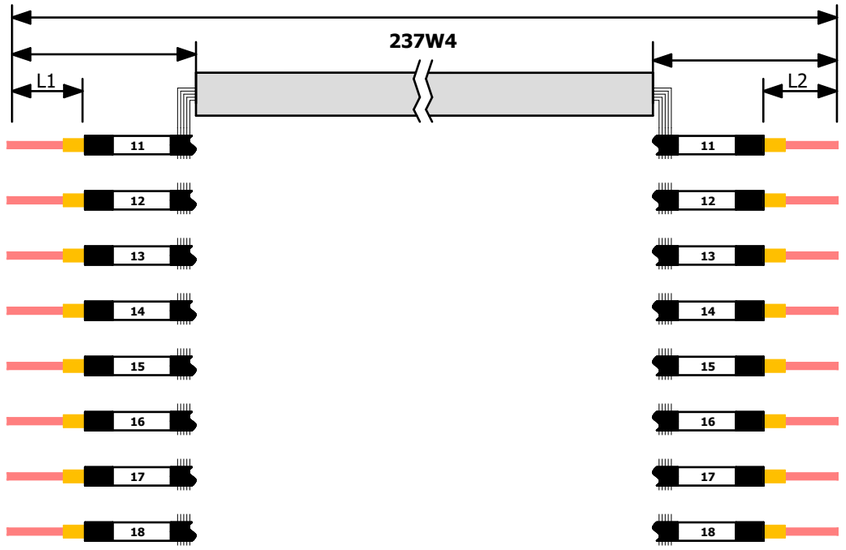


Mounting location:	Source	Function text source	wire end handling	L1 [mm]	L2 [mm]	wire end handling	Function text target	Target	Mounting location:
Circuit Breaker cabinet	+CIR-237U1-X3.1:1		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-350X1.21:11	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-237U1-X3.1:2		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-350X1.21:14	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-237U1-X3.1:3		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-350X1.21:17	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-237U1-X3.1:4		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-350X1.21:13	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-237U1-X3.1:5		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-350X1.21:16	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-237U1-X3.1:6		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-350X1.21:19	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-237U1-X3.1:7		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-308K1:A1	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-237U1-X3.1:8		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-308K3:A1	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-237U1-X3.1:9		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-308K5:A1	***Control cabinet 1***
Circuit Breaker cabinet	+CIR-237U1-X3.1:10		stripped	8 mm	8 mm	stripped		++CT+CTRL_1.4-308K2:A1	***Control cabinet 1***

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Cable name =UNIT_01++CONV+-237W4
Cable type OZ-500 18x1 mm²
Free conductors

Cable parts HELU.10174
Order number 10174

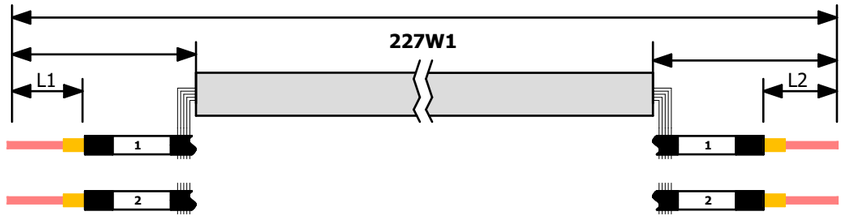


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Circuit Breaker cabinet	+CIR-237U1-X3.1:11		stripped	8 mm
Circuit Breaker cabinet	+CIR-237U1-X3.1:12		stripped	8 mm
Circuit Breaker cabinet	+CIR-237U1-X3.1:13		stripped	8 mm
Circuit Breaker cabinet	+CIR-237U1-X3.1:14		stripped	8 mm
Circuit Breaker cabinet	+CIR-237U1-X3.1:15		stripped	8 mm
Circuit Breaker cabinet	+CIR-237U1-X3.1:16		stripped	8 mm
Circuit Breaker cabinet	+CIR-237U1-X3.1:17		stripped	8 mm
			stripped	8 mm

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
8 mm	stripped		++CT+CTRL_1.4-308K4:A1	*Control cabinet 1*
8 mm	stripped		++CT+CTRL_1.4-308K6:A1	*Control cabinet 1*
8 mm	stripped		++CT+CTRL_1.3-X3.13:8	*Control cabinet 1*
8 mm	stripped		++CT+CTRL_1.3-X3.13:9	*Control cabinet 1*
8 mm	stripped		++CT+CTRL_1.3-X3.13:11	*Control cabinet 1*
8 mm	stripped		++CT+CTRL_1.3-X3.13:10	*Control cabinet 1*
8 mm	stripped		++CT+CTRL_1.4-350X1.21:12	*Control cabinet 1*
8 mm	stripped			

Cable name =UNIT_01++CONV+-227W1
Cable type OZ-600 2x0,75 mm²
Free conductors

Cable parts
Order number

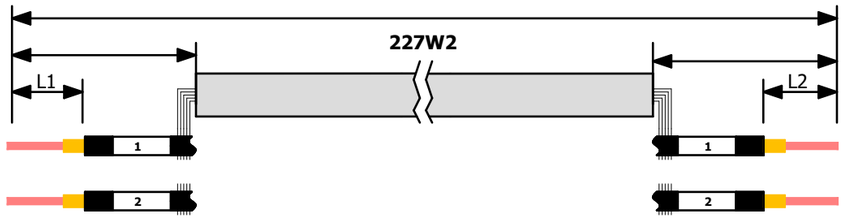


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Circuit Breaker cabinet	+CIR-227U1-F3:1			
Circuit Breaker cabinet	+CIR-227U1-F4:1			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++CT+CTRL_2.1-163U1:32	*Control cabinet 2*
			++CT+CTRL_2.1-162U1:32	*Control cabinet 2*

Cable name =UNIT_01++CONV+-227W2
Cable type OZ-600 2x0,75 mm²
Free conductors

Cable parts
Order number



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Circuit Breaker cabinet	+CIR-227U1-F7:1			
Circuit Breaker cabinet	+CIR-227U1-F8:1			

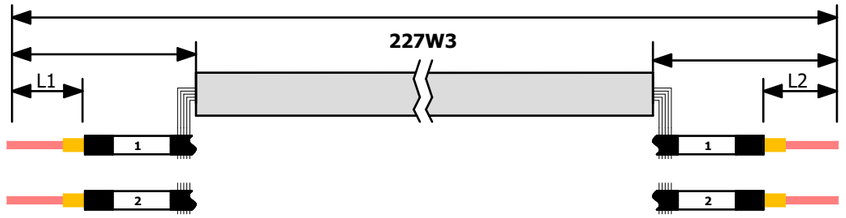
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++CT+CTRL_2.1-163U1:36	*Control cabinet 2*
			++CT+CTRL_2.1-162U1:36	*Control cabinet 2*

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Cable name =UNIT_01++CONV+-227W3
Cable type OZ-600 2x0,75 mm²
Free conductors

Cable parts
Order number

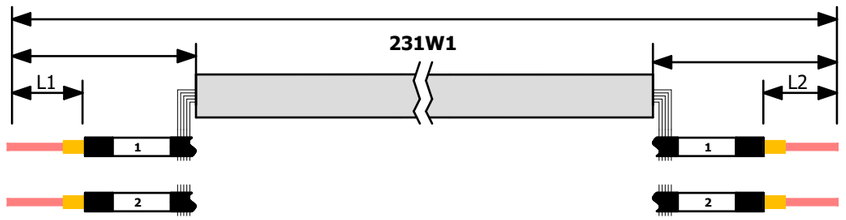


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Circuit Breaker cabinet	+CIR-227U1-F11:1			
Circuit Breaker cabinet	+CIR-227U1-F12:1			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++CT+CTRL_2.1-163U1:40	*Control cabinet 2*
			++CT+CTRL_2.1-162U1:40	*Control cabinet 2*

Cable name =UNIT_01++CONV+-231W1
Cable type OZ-600 2x0,75 mm²
Free conductors

Cable parts
Order number

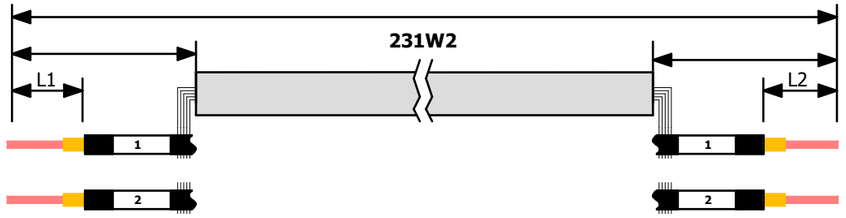


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Circuit Breaker cabinet	+CIR-231U1-F3:1			
Circuit Breaker cabinet	+CIR-231U1-F4:1			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++CT+CTRL_2.1-163U1:19	*Control cabinet 2*
			++CT+CTRL_2.1-162U1:19	*Control cabinet 2*

Cable name =UNIT_01++CONV+-231W2
Cable type OZ-600 2x0,75 mm²
Free conductors

Cable parts
Order number

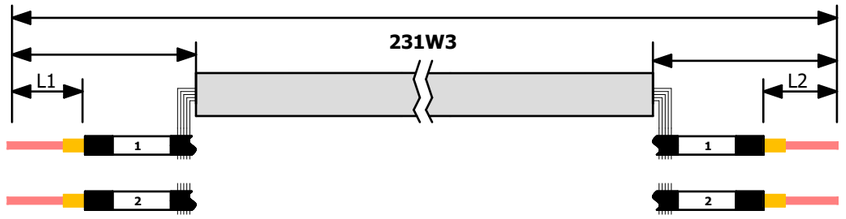


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Circuit Breaker cabinet	+CIR-231U1-F7:1			
Circuit Breaker cabinet	+CIR-231U1-F8:1			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++CT+CTRL_2.1-163U1:23	*Control cabinet 2*
			++CT+CTRL_2.1-162U1:23	*Control cabinet 2*

Cable name =UNIT_01++CONV+-231W3
Cable type OZ-600 2x0,75 mm²
Free conductors

Cable parts
Order number



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Circuit Breaker cabinet	+CIR-231U1-F11:1			
Circuit Breaker cabinet	+CIR-231U1-F12:1			

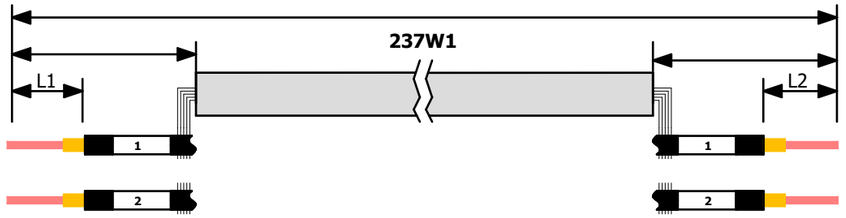
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++CT+CTRL_2.1-163U1:27	*Control cabinet 2*
			++CT+CTRL_2.1-162U1:27	*Control cabinet 2*

Editor	Freqcon_DG			Statron	FREQCON	CABEL LIST	20241203_V1.22	= UNIT_01	Converter Container 1	
Date	05.11.2024							& EMB	Cable list	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV	Converter	page: 14
Date								+		total: 500

FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_01++CONV+-237W1
Cable type OZ-600 2x0,75 mm²
Free conductors

Cable parts
Order number

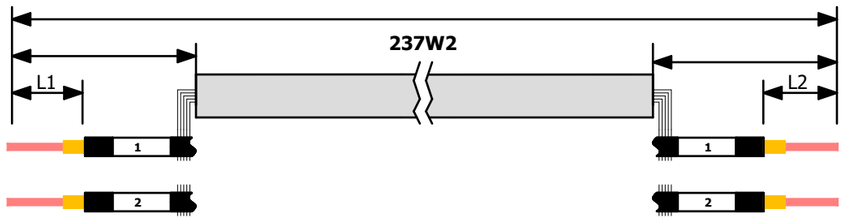


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Circuit Breaker cabinet	+CIR-237U1-F3:1			
Circuit Breaker cabinet	+CIR-237U1-F4:1			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++CT+CTRL_2.1-164U1:19	*Control cabinet 2*
			++CT+CTRL_2.1-164U1:23	*Control cabinet 2*

Cable name =UNIT_01++CONV+-237W2
Cable type OZ-600 2x0,75 mm²
Free conductors

Cable parts
Order number

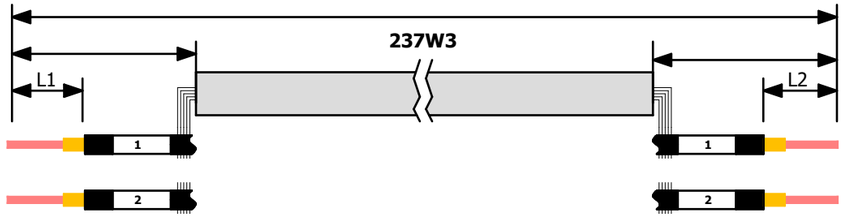


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Circuit Breaker cabinet	+CIR-237U1-F7:1			
Circuit Breaker cabinet	+CIR-237U1-F8:1			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++CT+CTRL_2.1-164U1:27	*Control cabinet 2*
			++CT+CTRL_2.1-164U1:32	*Control cabinet 2*

Cable name =UNIT_01++CONV+-237W3
Cable type OZ-600 2x0,75 mm²
Free conductors

Cable parts
Order number

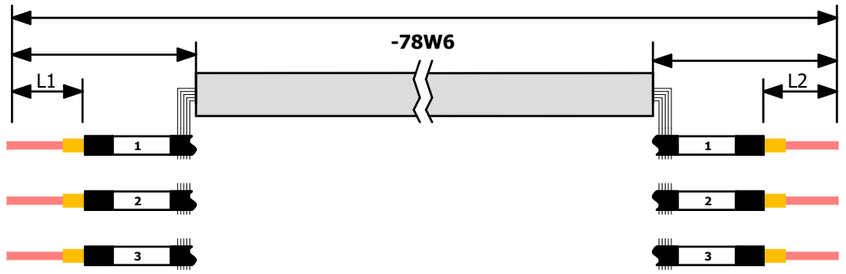


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Circuit Breaker cabinet	+CIR-237U1-F11:1			
Circuit Breaker cabinet	+CIR-237U1-F12:1			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++CT+CTRL_2.1-164U1:36	*Control cabinet 2*
			++CT+CTRL_2.1-164U1:40	*Control cabinet 2*

Cable name =UNIT_01++CONV+-78W6
Cable type OZ-600 3x2,5 mm²
Free conductors

Cable parts HELU.10691
Order number 10691



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
AC and DC connection cabinet	+AC_DC-78F3:2			
AC and DC connection cabinet	+AC_DC-78F3:4			
AC and DC connection cabinet	+AC_DC-78F3:6			

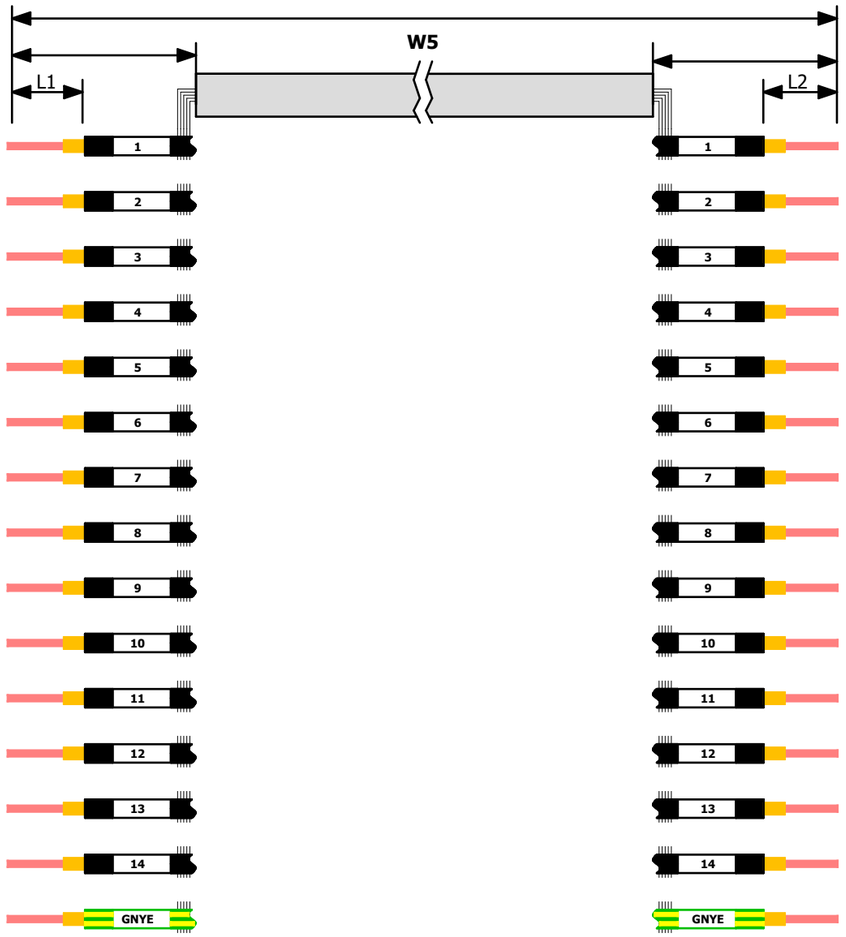
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++CT+CTRL_1.4-85U1:L1	*Control cabinet 1*
			++CT+CTRL_1.4-85U1:L2	*Control cabinet 1*
			++CT+CTRL_1.4-85U1:L3	*Control cabinet 1*

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next page: +CIR/1

FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_01++CONV+CIR-227U1-W5
Cable type JZ-500 15G0,75 mm²
Free conductors

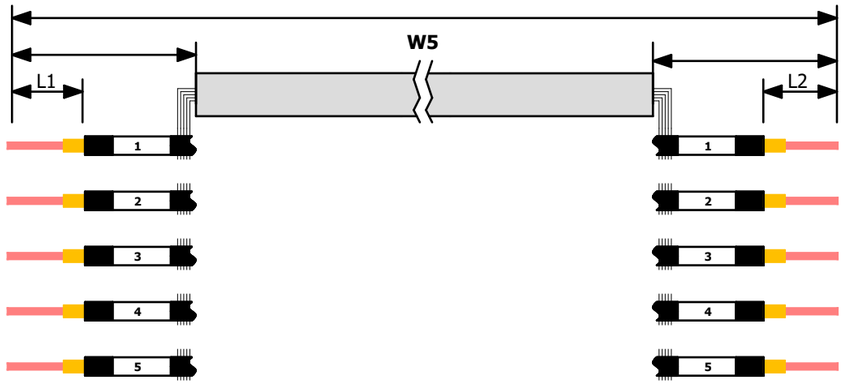
Cable parts HELU.10046
Order number 10046



Mounting location:	Source	Function text source	wire end handling	L1 [mm]	L2 [mm]	wire end handling	Function text target	Target	Mounting location:
Circuit Breaker cabinet	-227U1-X3.1:1							-227U1-X3.2:1	*Circuit Breaker cabinet*
Circuit Breaker cabinet	-227U1-X3.1:2							-227U1-X3.2:3	*Circuit Breaker cabinet*
Circuit Breaker cabinet	-227U1-X3.1:3							-227U1-X3.2:5	*Circuit Breaker cabinet*
Circuit Breaker cabinet	-227U1-X3.1:4							-227U1-X3.2:7	*Circuit Breaker cabinet*
Circuit Breaker cabinet	-227U1-X3.1:5							-227U1-X3.2:9	*Circuit Breaker cabinet*
Circuit Breaker cabinet	-227U1-X3.1:6							-227U1-X3.2:11	*Circuit Breaker cabinet*
Circuit Breaker cabinet	-227U1-X3.1:7							-227U1-X3.2:13	*Circuit Breaker cabinet*
Circuit Breaker cabinet	-227U1-X3.1:8							-227U1-X3.2:15	*Circuit Breaker cabinet*
Circuit Breaker cabinet	-227U1-X3.1:9							-227U1-X3.2:17	*Circuit Breaker cabinet*
Circuit Breaker cabinet	-227U1-X3.1:10							-227U1-X3.2:19	*Circuit Breaker cabinet*
Circuit Breaker cabinet	-227U1-X3.1:11							-227U1-X3.2:21	*Circuit Breaker cabinet*
Circuit Breaker cabinet	-227U1-X3.1:12							-227U1-X3.2:23	*Circuit Breaker cabinet*
Circuit Breaker cabinet	-227U1-X3.1:16							-227U1-X3.2:24	*Circuit Breaker cabinet*
Circuit Breaker cabinet	-227U1-X3.1:17							-227U1-X3.2:12	*Circuit Breaker cabinet*
Circuit Breaker cabinet	-227U1-X3.1:PE							-227U1-X3.2:PE	*Circuit Breaker cabinet*

Cable name =UNIT_01++CONV+CIR-231U1-W5
Cable type JZ-500 15G0,75 mm²
Free conductors

Cable parts HELU.10046
Order number 10046



Mounting location:	Source	Function text source	wire end handling	L1 [mm]	L2 [mm]	wire end handling	Function text target	Target	Mounting location:
Circuit Breaker cabinet	-231U1-X3.1:1							-231U1-X3.2:1	*Circuit Breaker cabinet*
Circuit Breaker cabinet	-231U1-X3.1:2							-231U1-X3.2:3	*Circuit Breaker cabinet*
Circuit Breaker cabinet	-231U1-X3.1:3							-231U1-X3.2:5	*Circuit Breaker cabinet*
Circuit Breaker cabinet	-231U1-X3.1:4							-231U1-X3.2:7	*Circuit Breaker cabinet*
Circuit Breaker cabinet	-231U1-X3.1:5							-231U1-X3.2:9	*Circuit Breaker cabinet*

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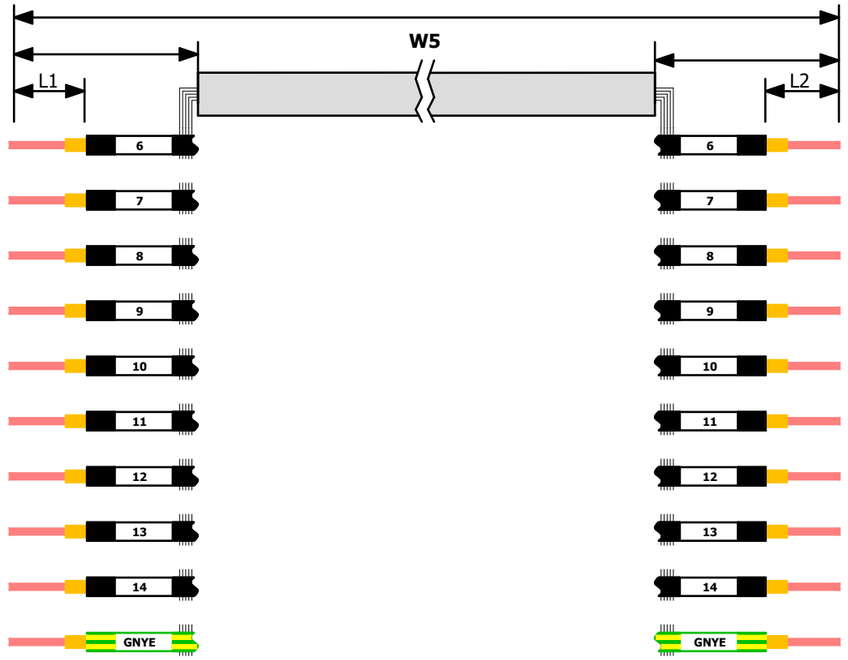
Editor	Freqcon_DG			Statron	FREQCON	CABEL LIST	20241203_V1.22	= UNIT_01	Converter Container 1	
Date	05.11.2024							& EMB	Cable list	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV	Converter	page: 1
Date								+ CIR	Circuit Breaker cabinet	total: 500

FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_01++CONV+CIR-231U1-W5
Cable type JZ-500 15G0,75 mm²
Free conductors

Cable parts HELU.10046
Order number 10046

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Circuit Breaker cabinet	-231U1-X3.1:6			
Circuit Breaker cabinet	-231U1-X3.1:7			
Circuit Breaker cabinet	-231U1-X3.1:8			
Circuit Breaker cabinet	-231U1-X3.1:9			
Circuit Breaker cabinet	-231U1-X3.1:10			
Circuit Breaker cabinet	-231U1-X3.1:11			
Circuit Breaker cabinet	-231U1-X3.1:12			
Circuit Breaker cabinet	-231U1-X3.1:16			
Circuit Breaker cabinet	-231U1-X3.1:17			
Circuit Breaker cabinet	-231U1-X3.1:PE			

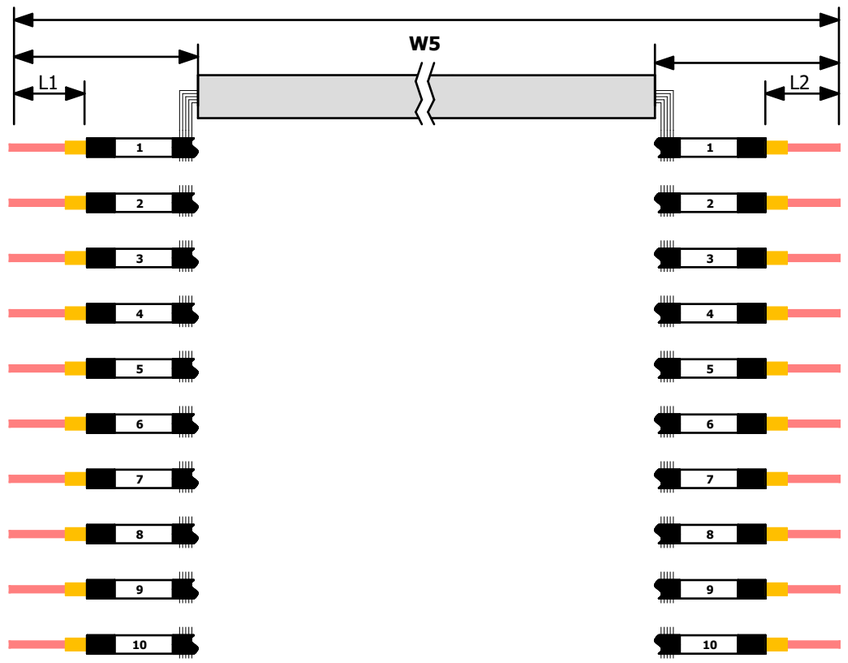


L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			-231U1-X3.2:11	*Circuit Breaker cabinet*
			-231U1-X3.2:13	*Circuit Breaker cabinet*
			-231U1-X3.2:15	*Circuit Breaker cabinet*
			-231U1-X3.2:17	*Circuit Breaker cabinet*
			-231U1-X3.2:19	*Circuit Breaker cabinet*
			-231U1-X3.2:21	*Circuit Breaker cabinet*
			-231U1-X3.2:23	*Circuit Breaker cabinet*
			-231U1-X3.2:24	*Circuit Breaker cabinet*
			-231U1-X3.2:12	*Circuit Breaker cabinet*
			-231U1-X3.2:PE	*Circuit Breaker cabinet*

Cable name =UNIT_01++CONV+CIR-237U1-W5
Cable type JZ-500 15G0,75 mm²
Free conductors

Cable parts HELU.10046
Order number 10046

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Circuit Breaker cabinet	-237U1-X3.1:1			
Circuit Breaker cabinet	-237U1-X3.1:2			
Circuit Breaker cabinet	-237U1-X3.1:3			
Circuit Breaker cabinet	-237U1-X3.1:4			
Circuit Breaker cabinet	-237U1-X3.1:5			
Circuit Breaker cabinet	-237U1-X3.1:6			
Circuit Breaker cabinet	-237U1-X3.1:7			
Circuit Breaker cabinet	-237U1-X3.1:8			
Circuit Breaker cabinet	-237U1-X3.1:9			
Circuit Breaker cabinet	-237U1-X3.1:10			



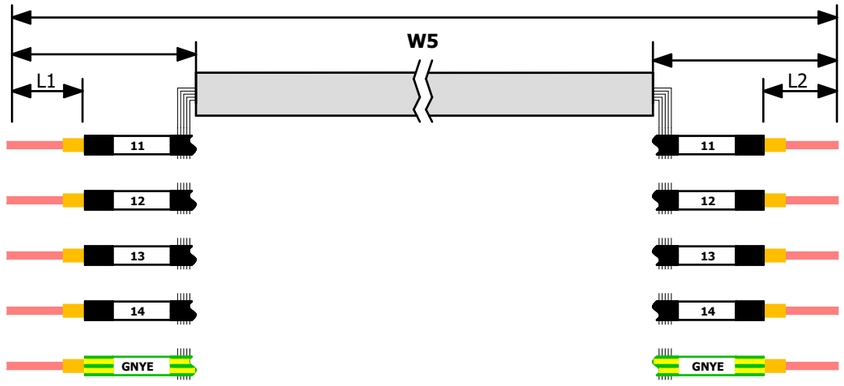
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			-237U1-X3.2:1	*Circuit Breaker cabinet*
			-237U1-X3.2:3	*Circuit Breaker cabinet*
			-237U1-X3.2:5	*Circuit Breaker cabinet*
			-237U1-X3.2:7	*Circuit Breaker cabinet*
			-237U1-X3.2:9	*Circuit Breaker cabinet*
			-237U1-X3.2:11	*Circuit Breaker cabinet*
			-237U1-X3.2:13	*Circuit Breaker cabinet*
			-237U1-X3.2:15	*Circuit Breaker cabinet*
			-237U1-X3.2:17	*Circuit Breaker cabinet*
			-237U1-X3.2:19	*Circuit Breaker cabinet*

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FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_01++CONV+CIR-237U1-W5
Cable type JZ-500 15G0,75 mm²
Free conductors

Cable parts HELU.10046
Order number 10046



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Circuit Breaker cabinet	-237U1-X3.1:11			
Circuit Breaker cabinet	-237U1-X3.1:12			
Circuit Breaker cabinet	-237U1-X3.1:16			
Circuit Breaker cabinet	-237U1-X3.1:17			
Circuit Breaker cabinet	-237U1-X3.1:PE			

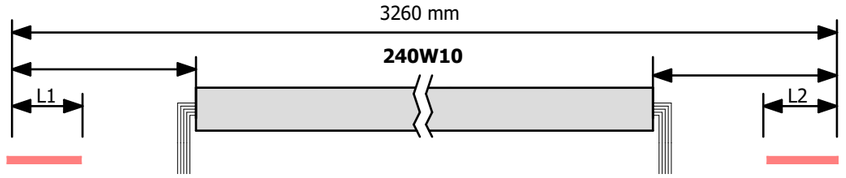
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			-237U1-X3.2:21	*Circuit Breaker cabinet*
			-237U1-X3.2:23	*Circuit Breaker cabinet*
			-237U1-X3.2:24	*Circuit Breaker cabinet*
			-237U1-X3.2:12	*Circuit Breaker cabinet*
			-237U1-X3.2:PE	*Circuit Breaker cabinet*

FRQ_Kabelplan_04_gro8_de_en

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next page: ++CT+/1

Cable name =UNIT_01++CT+-240W10
Cable type 2YY (ST) CY 2x2x0,64 mm²
Free conductors 2

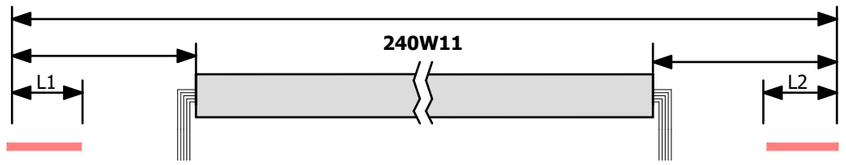


Cable parts
Order number

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	+CTRL_1.2-110U1:P1		Connector	

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Connector		+CTRL_2.1-240U1:P1	*Control cabinet 2*

Cable name =UNIT_01++CT+-240W11
Cable type 2YY (ST) CY 2x2x0,64 mm²
Free conductors 2

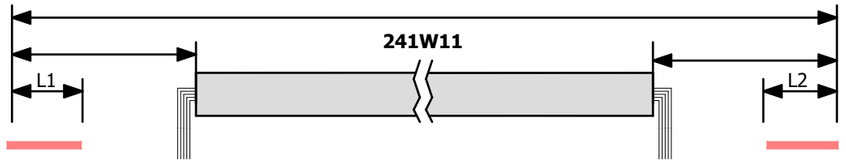


Cable parts
Order number

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 2	+CTRL_2.1-240U1:P2		Connector	

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Connector		+CTRL_2.1-241U1:P1	*Control cabinet 2*

Cable name =UNIT_01++CT+-241W11
Cable type 2YY (ST) CY 2x2x0,64 mm²
Free conductors 2

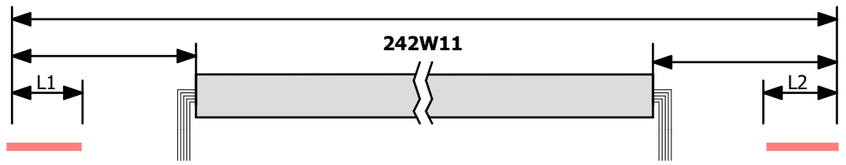


Cable parts
Order number

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 2	+CTRL_2.1-241U1:P2		Connector	

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Connector		+CTRL_2.1-242U1:P1	*Control cabinet 2*

Cable name =UNIT_01++CT+-242W11
Cable type 2YY (ST) CY 2x2x0,64 mm²
Free conductors 2

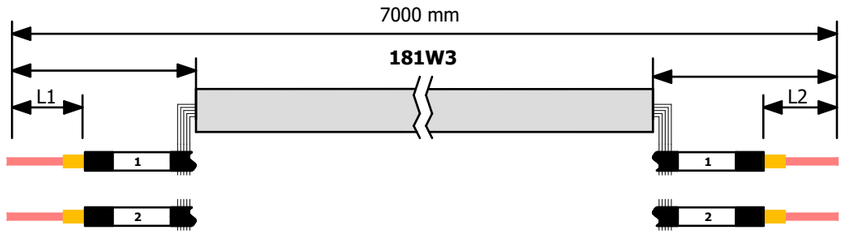


Cable parts
Order number

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 2	+CTRL_2.1-242U1:P2		Connector	

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Connector		+CTRL_2.1-243U1:P1	*Control cabinet 2*

Cable name =UNIT_01++CT+-181W3
Cable type F-CY-OZ (LiY-CY) 7x0,75 mm²
Free conductors 2



Cable parts HELU.16563
Order number 16563

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	+CTRL_1.3-X3:23	PRESSURE SWITCH	stripped	8 mm
Control cabinet 1	+CTRL_1.3-X3:24	=	stripped	8 mm

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Flat connector	PRESSURE SWITCH	++FAN-52G1-181X3:1	
	Flat connector	=	++FAN-52G1-181X3:3	

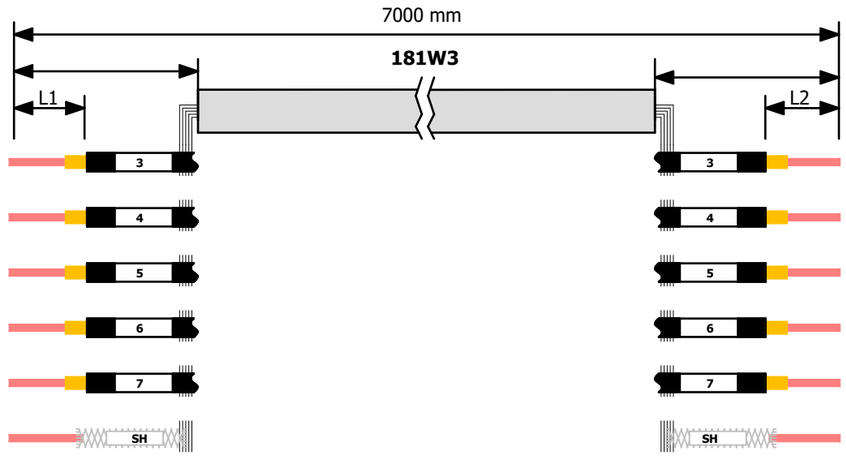
previous page: ++CONV+CIR/3
next page: 2

FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_01++CT+-181W3
Cable type F-CY-OZ (LiY-CY) 7x0,75 mm²
Free conductors 2

Cable parts HELU.16563
Order number 16563

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	+CTRL_1.3-X3:25	PRESSURE SWITCH	stripped	8 mm
Control cabinet 1	+CTRL_1.3-X5:23	COOLING WATER TEMPERATURE	End splice	8 mm
Control cabinet 1	+CTRL_1.3-X5:24	=	End splice	8 mm

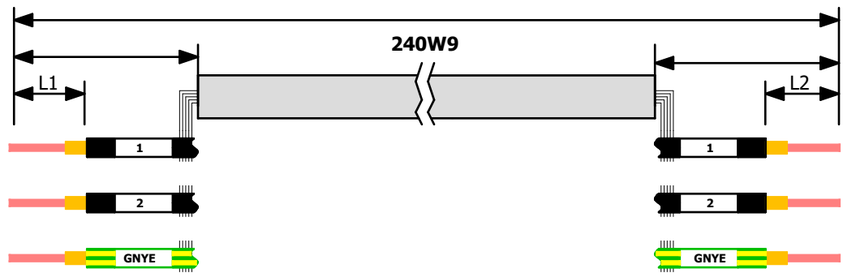


L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Flat connector	PRESSURE SWITCH	++FAN-52G1-181X3:2	
8 mm	stripped	COOLING WATER TEMPERATURE	++FAN-52G1-181X3:4	
8 mm	stripped	=	++FAN-52G1-181X3:5	

Cable name =UNIT_01++CT+-240W9
Cable type JZ-500 3G0,75 mm²
Free conductors 3

Cable parts HELU.10031
Order number 10031

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	+CTRL_1.3-XDC1:1	FUSE 24V DC CONTROL VOLTAGE	stripped	8 mm
Control cabinet 1	+CTRL_1.3-XDC1:4	Main PLC, SPS, 24V contacts CONTROL VOLTAGE	stripped	8 mm
Control cabinet 1	+CTRL_1.3-XDC1:PE	=	stripped	8 mm

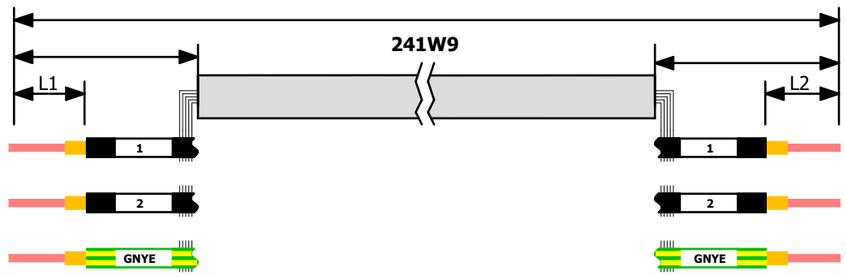


L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Connector	FUSE 24V DC CONTROL VOLTAGE	+CTRL_2.1-240U1:1	***Control cabinet 2***
	Connector	Main PLC, SPS, 24V contacts CONTROL VOLTAGE	+CTRL_2.1-240U1:3	***Control cabinet 2***
	Connector	=	+CTRL_2.1-240U1:2	***Control cabinet 2***

Cable name =UNIT_01++CT+-241W9
Cable type JZ-500 3G0,75 mm²
Free conductors 3

Cable parts HELU.10031
Order number 10031

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	+CTRL_1.3-XDC2:2	BSU, SPARE CONTROL VOLTAGE	stripped	8 mm
Control cabinet 1	+CTRL_1.3-XDC2:4	=	stripped	8 mm
Control cabinet 1	+CTRL_1.3-XDC1:PE	Main PLC, SPS, 24V contacts CONTROL VOLTAGE	stripped	8 mm



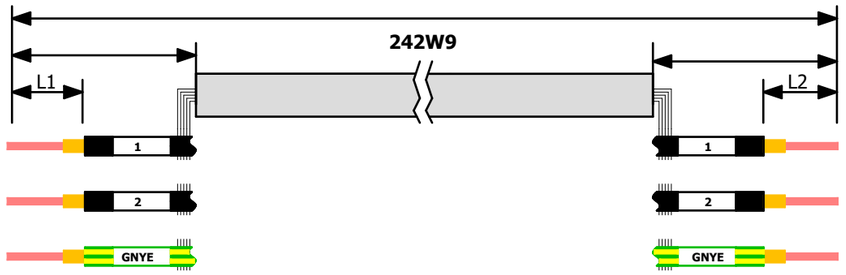
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Connector	BSU, SPARE CONTROL VOLTAGE	+CTRL_2.1-241U1:1	***Control cabinet 2***
	Connector	=	+CTRL_2.1-241U1:3	***Control cabinet 2***
	Connector	Main PLC, SPS, 24V contacts CONTROL VOLTAGE	+CTRL_2.1-241U1:2	***Control cabinet 2***

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Cable name =UNIT_01++CT+-242W9
Cable type JZ-500 3G0,75 mm²
Free conductors 2

Cable parts HELU.10031
Order number 10031

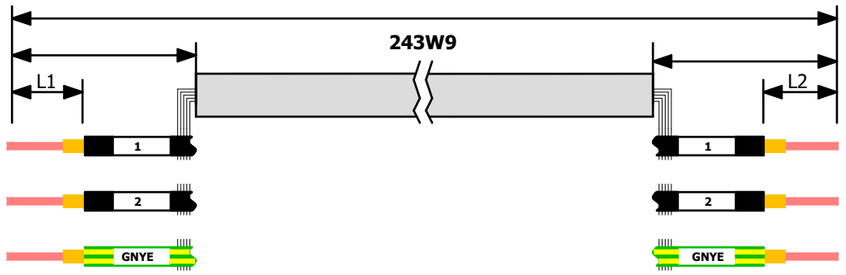


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	+CTRL_1.3-XDC2:1	Main PLC, SPS, 24V contacts CONTROL VOLTAGE	stripped	8 mm
Control cabinet 1	+CTRL_1.3-XDC2:3	BSU, SPARE CONTROL VOLTAGE	stripped	8 mm
Control cabinet 1	+CTRL_1.3-XDC1:PE	Main PLC, SPS, 24V contacts CONTROL VOLTAGE	stripped	8 mm

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Connector	Main PLC, SPS, 24V contacts CONTROL VOLTAGE	+CTRL_2.1-242U1:1	***Control cabinet 2***
	Connector	BSU, SPARE CONTROL VOLTAGE	+CTRL_2.1-242U1:3	***Control cabinet 2***
	Connector	Main PLC, SPS, 24V contacts CONTROL VOLTAGE	+CTRL_2.1-242U1:2	***Control cabinet 2***

Cable name =UNIT_01++CT+-243W9
Cable type JZ-500 3G0,75 mm²
Free conductors 2

Cable parts HELU.10031
Order number 10031

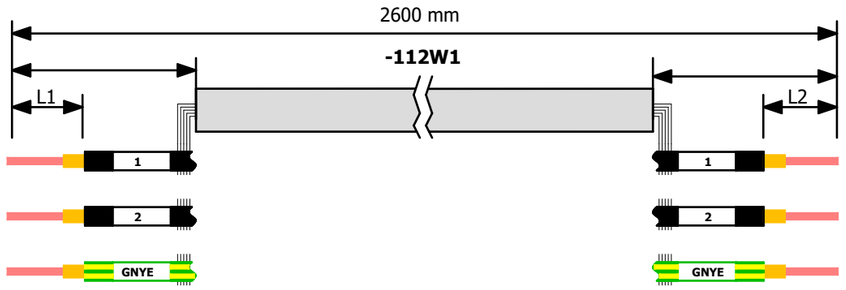


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	+CTRL_1.3-XDC2:1	Main PLC, SPS, 24V contacts CONTROL VOLTAGE	stripped	8 mm
Control cabinet 1	+CTRL_1.3-XDC2:3	BSU, SPARE CONTROL VOLTAGE	stripped	8 mm
Control cabinet 1	+CTRL_1.3-XDC1:PE	Main PLC, SPS, 24V contacts CONTROL VOLTAGE	stripped	8 mm

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Connector	Main PLC, SPS, 24V contacts CONTROL VOLTAGE	+CTRL_2.1-243U1:1	***Control cabinet 2***
	Connector	BSU, SPARE CONTROL VOLTAGE	+CTRL_2.1-243U1:3	***Control cabinet 2***
	Connector	Main PLC, SPS, 24V contacts CONTROL VOLTAGE	+CTRL_2.1-243U1:2	***Control cabinet 2***

Cable name =UNIT_01++CT+-112W1
Cable type JZ-500 3G0,75 mm²
Free conductors 2

Cable parts HELU.10031
Order number 10031

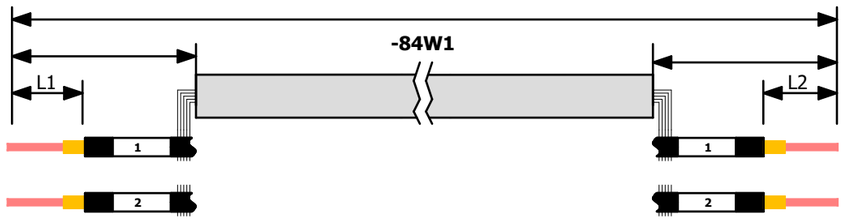


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	+CTRL_1.3-XDC2:2	BSU, SPARE CONTROL VOLTAGE		
Control cabinet 1	+CTRL_1.3-XDC2:4	=		
Control cabinet 1	+CTRL_1.3-XDC1:PE	Main PLC, SPS, 24V contacts CONTROL VOLTAGE		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		BSU, SPARE CONTROL VOLTAGE	+CTRL_1.1-112A1:L+	***Control cabinet 1***
		=	+CTRL_1.1-112A1:M	***Control cabinet 1***
		Main PLC, SPS, 24V contacts CONTROL VOLTAGE	+CTRL_1.1-112A1:PE	***Control cabinet 1***

Cable name =UNIT_01++CT+-84W1
Cable type JZ-500 7G6 mm²
Free conductors 1

Cable parts HELU.10150
Order number 10150



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	+CTRL_1.1-84Q1:2		stripped	8 mm
Control cabinet 1	+CTRL_1.1-84Q1:4		stripped	8 mm

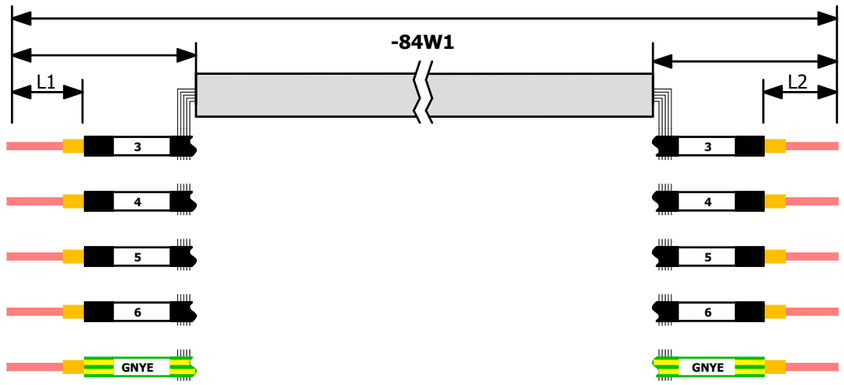
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
8 mm	End splice		+CTRL_1.3-84F1:L1'	***Control cabinet 1***
8 mm	End splice		+CTRL_1.3-84F1:L2'	***Control cabinet 1***

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Cable name =UNIT_01++CT+-84W1
Cable type JZ-500 7G6 mm²
Free conductors

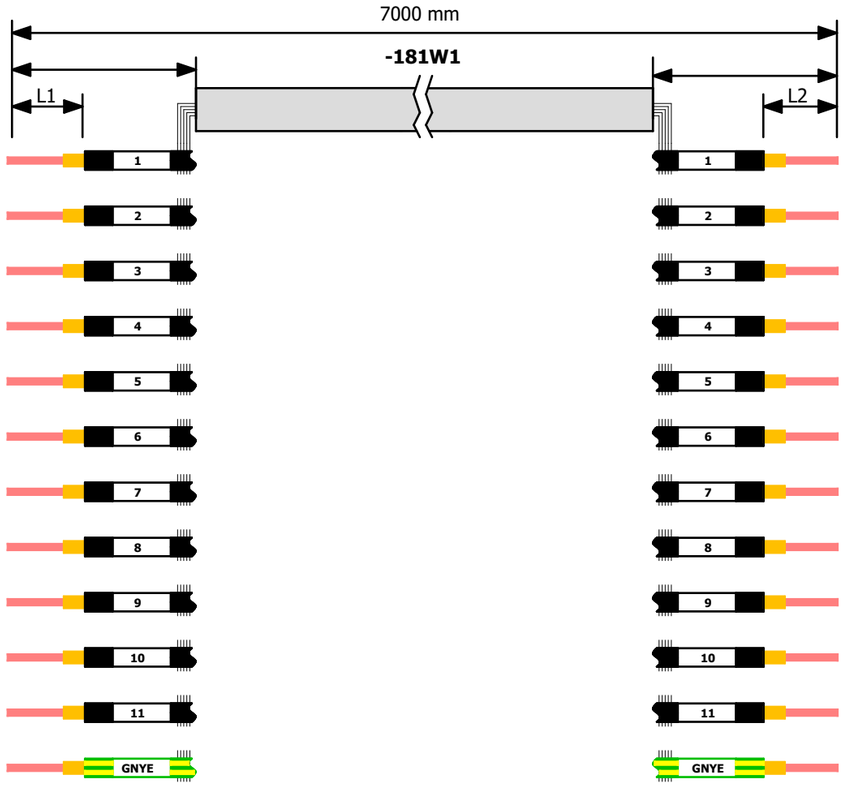
Cable parts HELU.10150
Order number 10150



Mounting location:	Source	Function text source	wire end handling	L1 [mm]	L2 [mm]	wire end handling	Function text target	Target	Mounting location:
Control cabinet 1	+CTRL_1.1-84Q1:6		stripped	8 mm	8 mm	End splice		+CTRL_1.3-84F1:L3'	Control cabinet 1
Control cabinet 1	+CTRL_1.1-84Q1:1		stripped	8 mm	8 mm	End splice		+CTRL_1.3-183F1:1	Control cabinet 1
Control cabinet 1	+CTRL_1.1-84Q1:3		stripped	8 mm	8 mm	End splice		+CTRL_1.3-183F2:1	Control cabinet 1
Control cabinet 1	+CTRL_1.1-84Q1:5		stripped	8 mm	8 mm	End splice		+CTRL_1.3-185F1:1	Control cabinet 1

Cable name =UNIT_01++CT+-181W1
Cable type JZ-600 12G1,5 mm²
Free conductors

Cable parts HELU.10670
Order number 10670



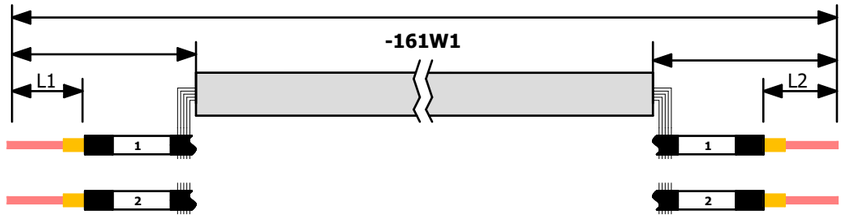
Mounting location:	Source	Function text source	wire end handling	L1 [mm]	L2 [mm]	wire end handling	Function text target	Target	Mounting location:
Control cabinet 1	+CTRL_1.3-X1:1	PUMP	stripped	8 mm	8 mm	stripped	PUMP	++FAN-52G1-181X1:1:1	
Control cabinet 1	+CTRL_1.3-X1:2	=	stripped	8 mm	8 mm	stripped	=	++FAN-52G1-181X1:2:1	
Control cabinet 1	+CTRL_1.3-X1:3	=	stripped	8 mm	8 mm	stripped	=	++FAN-52G1-181X1:3:1	
Control cabinet 1	+CTRL_1.3-X1:4	FUSE FOR PUMP	stripped	8 mm	8 mm	stripped	FUSE FOR PUMP	++FAN-52G1-181X1:4:1	
Control cabinet 1	+CTRL_1.3-X1:5	HEATER	stripped	8 mm	8 mm	stripped	HEATER	++FAN-52G1-181X1:5:1	
Control cabinet 1	+CTRL_1.3-X1:6	=	stripped	8 mm	8 mm	stripped	=	++FAN-52G1-181X1:6:1	
Control cabinet 1	+CTRL_1.3-X1:7	=	stripped	8 mm	8 mm	stripped	=	++FAN-52G1-181X1:7:1	
Control cabinet 1	+CTRL_1.3-X1:8	FAN 1 HEAT EXCHANGER	stripped	8 mm	8 mm	End splice	FAN 1 HEAT EXCHANGER	++FAN-52G1-181X1:8:1	
Control cabinet 1	+CTRL_1.3-X1:9	=	stripped	8 mm	8 mm	End splice	=	++FAN-52G1-181X1:9:1	
Control cabinet 1	+CTRL_1.3-X1:10	=	stripped	8 mm	8 mm	End splice	=	++FAN-52G1-181X1:10:1	
Control cabinet 1	+CTRL_1.3-X1:PE	PUMP	stripped	8 mm	8 mm	stripped	PUMP	++FAN-52G1-181X1:PE:1	

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Cable name =UNIT_01++CT+-161W1
Cable type OZ-500 2x0,75 mm²
Free conductors 2

Cable parts HELU.10030
Order number 10030

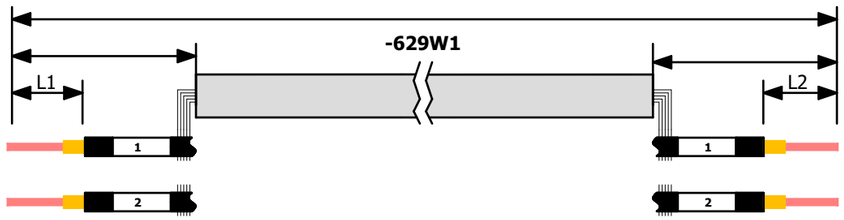


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 2	+CTRL_2.1-160U1:+			
Control cabinet 2	+CTRL_2.1-160U1:-			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			+CTRL_2.1-161U1:+	Control cabinet 2
			+CTRL_2.1-161U1:-	Control cabinet 2

Cable name =UNIT_01++CT+-629W1
Cable type OZ-500 2x0,75 mm²
Free conductors 2

Cable parts HELU.10030
Order number 10030



Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_01++CT+-195W1
Cable type OZ-500 4x0,75 mm²
Free conductors 8

Cable parts HELU.10034
Order number 10034

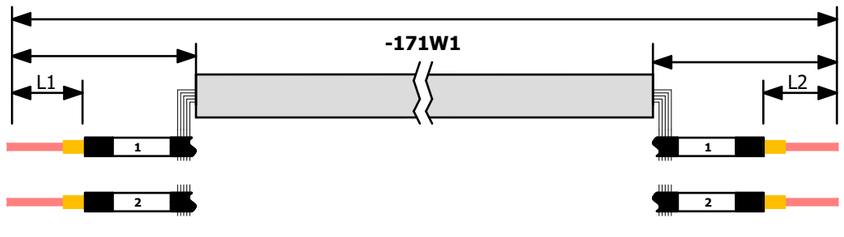


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	+CTRL_1.1-84Q1:13	SHUTDOWN CIRCUIT BREAKERS / DC CONTACTORS		
Control cabinet 1	+CTRL_1.1-84Q1:23			
Control cabinet 1	+CTRL_1.1-84Q1:14	SHUTDOWN CIRCUIT BREAKERS / DC CONTACTORS		
Control cabinet 1	+CTRL_1.1-84Q1:24			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		SHUTDOWN CIRCUIT BREAKERS / DC CONTACTORS	+CTRL_1.3-195K3:T1	Control cabinet 1
			+CTRL_1.3-195K3:T2	Control cabinet 1
		SHUTDOWN CIRCUIT BREAKERS / DC CONTACTORS	+CTRL_1.3-X3:41	Control cabinet 1
			+CTRL_1.3-X3:43	Control cabinet 1

Cable name =UNIT_01++CT+-171W1
Cable type OZ-600 2x1,5 mm²
Free conductors 2

Cable parts HELU.10656
Order number 10656



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	+CTRL_1.4-171F1:1			
Control cabinet 1	+CTRL_1.4-171F1:3			

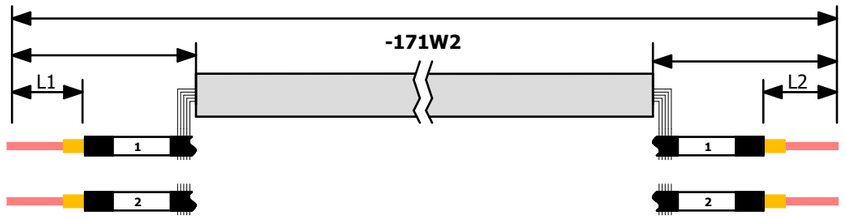
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			+CTRL_1.4-85U1:DC+	Control cabinet 1
			+CTRL_1.4-85U1:DC-	Control cabinet 1

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Cable name =UNIT_01++CT+-171W2
Cable type OZ-600 2x1,5 mm²
Free conductors 2

Cable parts HELU.10656
Order number 10656

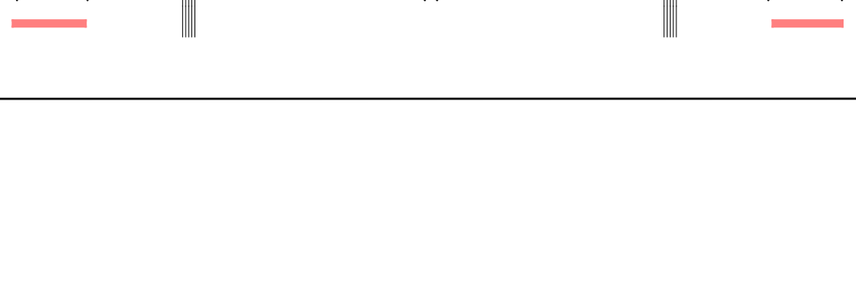


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	+CTRL_1.4-171F1:2			
Control cabinet 1	+CTRL_1.4-171F1:4			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			+CTRL_1.4-171K1:A1	*Control cabinet 1*
			+CTRL_1.4-171K2:A1	*Control cabinet 1*

Cable name =UNIT_01++CT+-173W1
Cable type OZ-600 3x2,5 mm²
Free conductors 3

Cable parts HELU.10691
Order number 10691

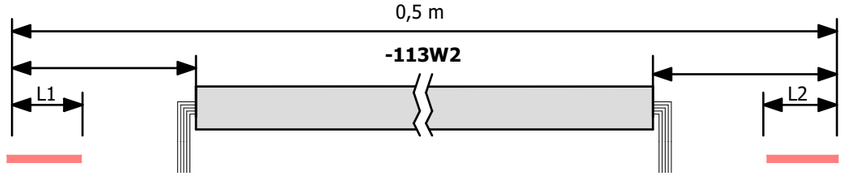


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Converter cabinet	++CONV+CON-UDC+			
Converter cabinet	++CONV+CON-UDC-			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			+CTRL_1.4-173F2:2	*Control cabinet 1*
			+CTRL_1.4-173F2:4	*Control cabinet 1*

Cable name =UNIT_01++CT+-113W2
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors 8

Cable parts REI.PATCH-C6 05 GN
Order number PATCH-C6 05 GN

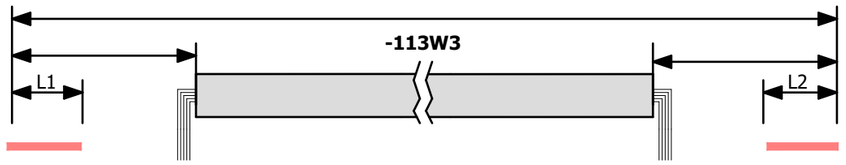


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	+CTRL_1.3-113T1:7			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			+CTRL_1.3-113U1:OUT	*Control cabinet 1*

Cable name =UNIT_01++CT+-113W3
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors 8

Cable parts
Order number



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	+CTRL_1.3-113U1:IN			

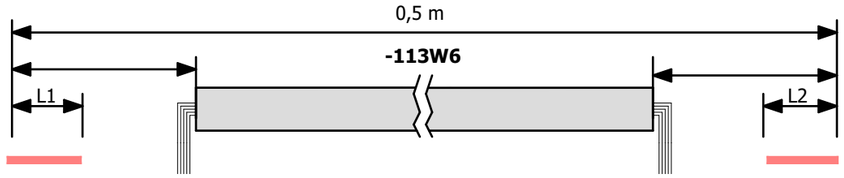
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			+CTRL_1.3-113U2:8	*Control cabinet 1*

Editor	Freqcon_DG			Statron	FREQCON	CABEL LIST	20241203_V1.22	= UNIT_01 Converter Container 1
Date	05.11.2024							& EMB Cable list
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets page: 6
Date								+ total: 500

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Cable name =UNIT_01++CT+-113W6
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors

Cable parts REI.PATCH-C6 05 GN
Order number PATCH-C6 05 GN

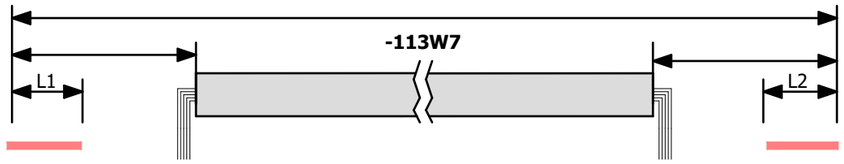


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	+CTRL_1.3-113T2:7			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			+CTRL_1.3-113U3:OUT	*Control cabinet 1*

Cable name =UNIT_01++CT+-113W7
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors

Cable parts
Order number

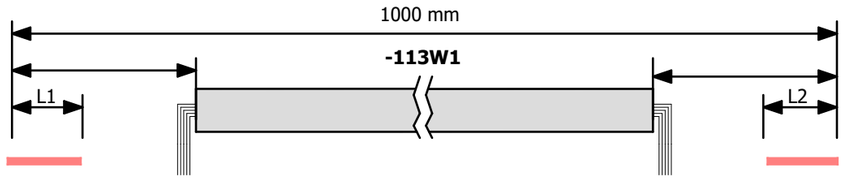


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	+CTRL_1.3-113U3:IN			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			+CTRL_1.3-113U4:8	*Control cabinet 1*

Cable name =UNIT_01++CT+-113W1
Cable type RJ45 / CAT 6 4x2x0,25 mm²
Free conductors

Cable parts
Order number

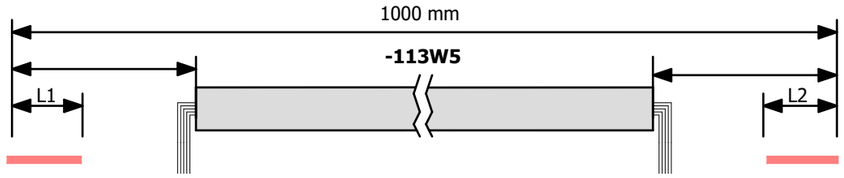


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	+CTRL_1.3-111A1:X4:1-8		RJ45 connector	

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	RJ45 connector		+CTRL_1.3-113T1:15	*Control cabinet 1*

Cable name =UNIT_01++CT+-113W5
Cable type RJ45 / CAT 6 4x2x0,25 mm²
Free conductors

Cable parts
Order number

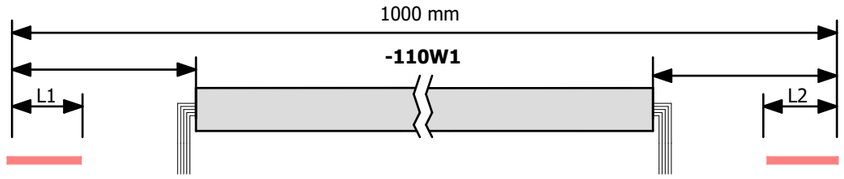


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	+CTRL_1.3-111A1:X5:1-8		RJ45 connector	

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	RJ45 connector		+CTRL_1.3-113T2:15	*Control cabinet 1*

Cable name =UNIT_01++CT+-110W1
Cable type RJ45 / CAT6 4x2x0,25 mm²
Free conductors

Cable parts
Order number



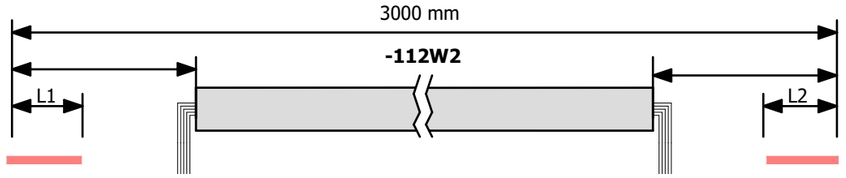
Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	+CTRL_1.2-110U1:P1		RJ45 connector	

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	RJ45 connector		+CTRL_1.3-111A1:X1:1-8	*Control cabinet 1*

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Cable name =UNIT_01++CT+-112W2
Cable type RJ45 / CAT6 4x2x0,25 mm²
Free conductors

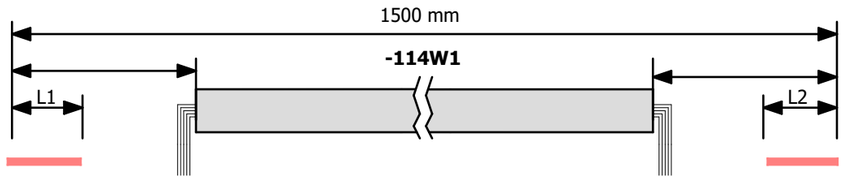


Cable parts
Order number

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	+CTRL_1.1-112A1		RJ45 connector	

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	RJ45 connector		+CTRL_1.3-111A1:X2:1-8	*Control cabinet 1*

Cable name =UNIT_01++CT+-114W1
Cable type RJ45 / CAT6 4x2x0,25 mm²
Free conductors

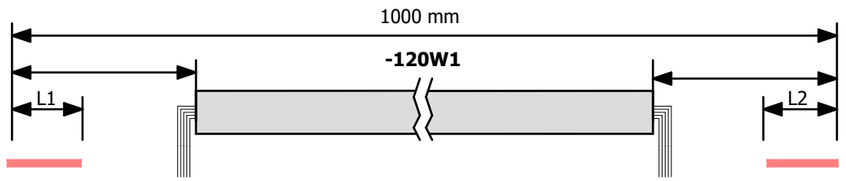


Cable parts
Order number

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	+CTRL_1.2-114A1		RJ45 connector	

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	RJ45 connector		=UNIT_03++ASC-620A1:-X1:P2	

Cable name =UNIT_01++CT+-120W1
Cable type RJ45 / CAT6 4x2x0,25 mm²
Free conductors

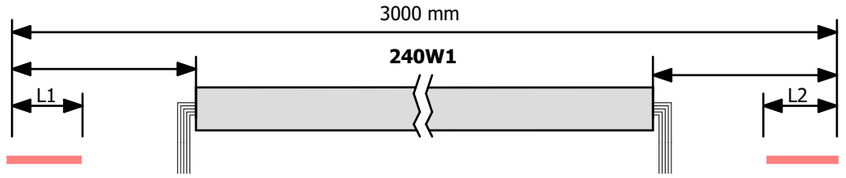


Cable parts
Order number

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	+CTRL_1.2-110U1:P3		RJ45 connector	

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	RJ45 connector		+CTRL_1.3-120A1:-X1:P1	*Control cabinet 1*

Cable name =UNIT_01++CT+-240W1
Cable type pre-assembled D-Sub cable 1:1
Free conductors

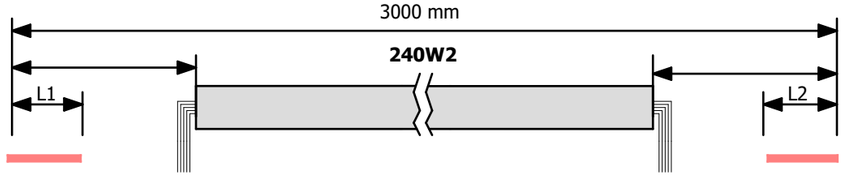


Cable parts
Order number

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Converter cabinet	++CONV+CON-201Q1:CTRL		Connector	

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Female connector		+CTRL_2.1-240U1:X1	*Control cabinet 2*

Cable name =UNIT_01++CT+-240W2
Cable type pre-assembled D-Sub cable 1:1
Free conductors



Cable parts
Order number

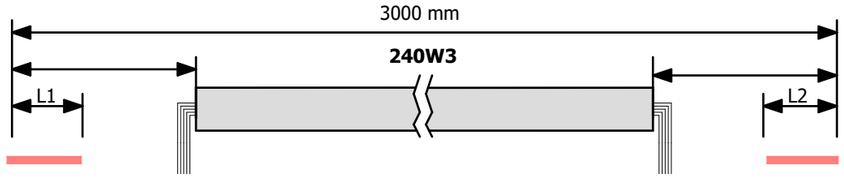
Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Converter cabinet	++CONV+CON-202Q1:CTRL		Connector	

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Female connector		+CTRL_2.1-240U1:X2	*Control cabinet 2*

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Cable name =UNIT_01++CT+-240W3
Cable type pre-assembled D-Sub cable 1:1
Free conductors

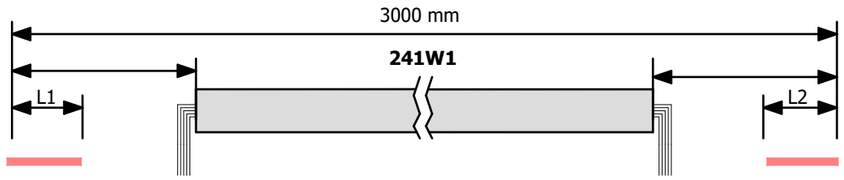


Cable parts
Order number

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Converter cabinet	++CONV+CON-203Q1:CTRL		Connector	

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Female connector		+CTRL_2.1-240U1:X3	***Control cabinet 2***

Cable name =UNIT_01++CT+-241W1
Cable type pre-assembled D-Sub cable 1:1
Free conductors

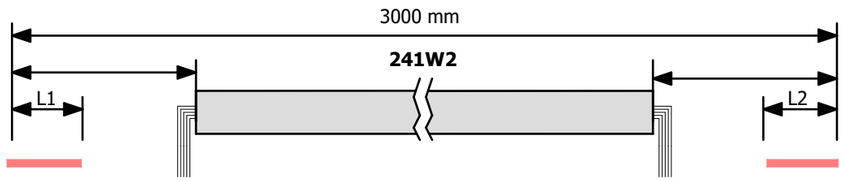


Cable parts
Order number

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Converter cabinet	++CONV+CON-211Q1-U1:X1		Connector	

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Female connector		+CTRL_2.1-241U1:X1	***Control cabinet 2***

Cable name =UNIT_01++CT+-241W2
Cable type pre-assembled D-Sub cable 1:1
Free conductors

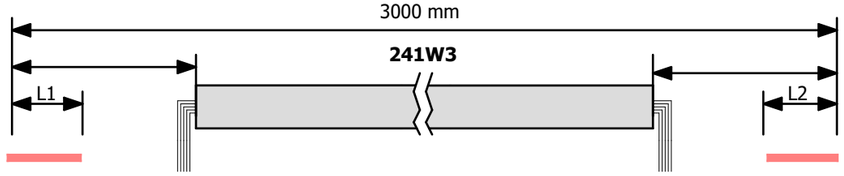


Cable parts
Order number

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Converter cabinet	++CONV+CON-211Q1-U1:X2		Connector	

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Female connector		+CTRL_2.1-241U1:X2	***Control cabinet 2***

Cable name =UNIT_01++CT+-241W3
Cable type pre-assembled D-Sub cable 1:1
Free conductors

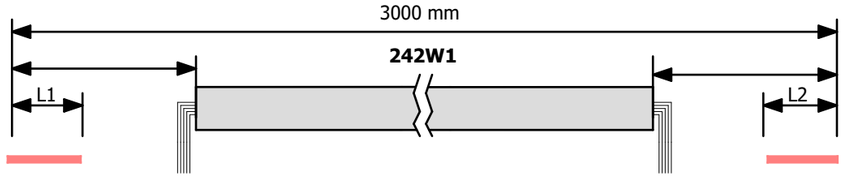


Cable parts
Order number

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Converter cabinet	++CONV+CON-211Q1-U1:X3		Connector	

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Female connector		+CTRL_2.1-241U1:X3	***Control cabinet 2***

Cable name =UNIT_01++CT+-242W1
Cable type pre-assembled D-Sub cable 1:1
Free conductors



Cable parts
Order number

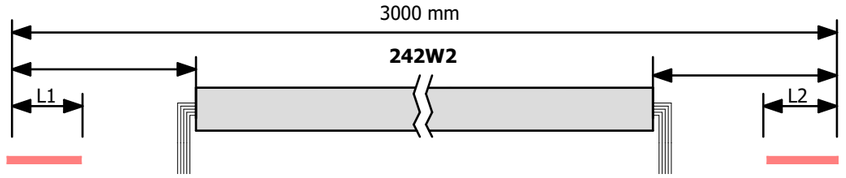
Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Converter cabinet	++CONV+CON-207Q1-U1:X1		Connector	

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Female connector		+CTRL_2.1-242U1:X1	***Control cabinet 2***

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Cable name =UNIT_01++CT+-242W2
Cable type pre-assembled D-Sub cable 1:1
Free conductors

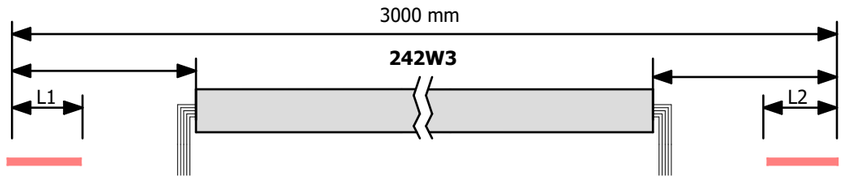


Cable parts
Order number

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Converter cabinet	++CONV+CON-207Q1-U1:X2		Connector	

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Female connector		+CTRL_2.1-242U1:X2	***Control cabinet 2***

Cable name =UNIT_01++CT+-242W3
Cable type pre-assembled D-Sub cable 1:1
Free conductors

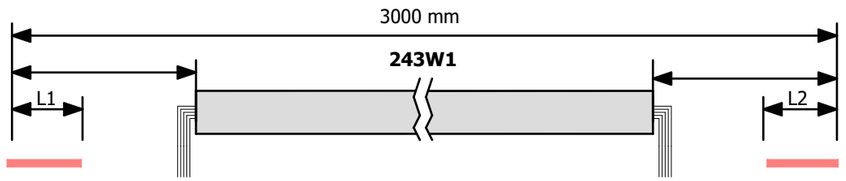


Cable parts
Order number

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Converter cabinet	++CONV+CON-207Q1-U1:X3		Connector	

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Female connector		+CTRL_2.1-242U1:X3	***Control cabinet 2***

Cable name =UNIT_01++CT+-243W1
Cable type pre-assembled D-Sub cable 1:1
Free conductors

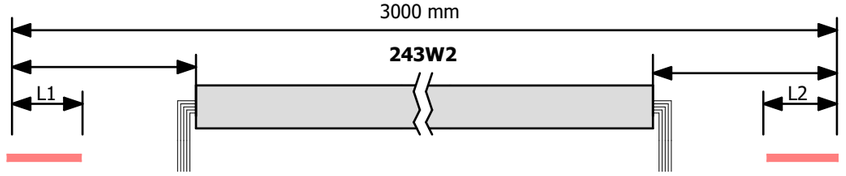


Cable parts
Order number

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Converter cabinet	++CONV+CON-217Q1-U1:X1		Connector	

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Female connector		+CTRL_2.1-243U1:X1	***Control cabinet 2***

Cable name =UNIT_01++CT+-243W2
Cable type pre-assembled D-Sub cable 1:1
Free conductors

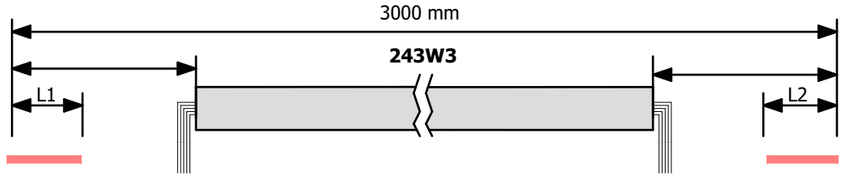


Cable parts
Order number

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Converter cabinet	++CONV+CON-217Q1-U1:X2		Connector	

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Female connector		+CTRL_2.1-243U1:X2	***Control cabinet 2***

Cable name =UNIT_01++CT+-243W3
Cable type pre-assembled D-Sub cable 1:1
Free conductors



Cable parts
Order number

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Converter cabinet	++CONV+CON-217Q1-U1:X3		Connector	

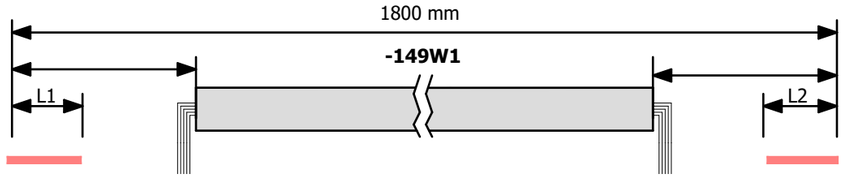
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Female connector		+CTRL_2.1-243U1:X3	***Control cabinet 2***

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next page: 11

FRQ_Kabelplan_04_gro8_de_en

Cable name =UNIT_01++CT+-149W1
Cable type pre-assembled D-Sub cable 1:1
Free conductors

Cable parts DIS.671476
Order number

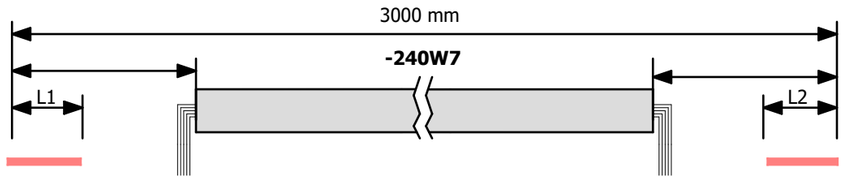


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	+CTRL_1.4-149U1:11X3		Connecor	

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Female connector		+CTRL_2.1-162U1:11X3	*Control cabinet 2*

Cable name =UNIT_01++CT+-240W7
Cable type pre-assembled D-Sub cable 1:1
Free conductors

Cable parts DIS.125-30-097
Order number 125-30-097

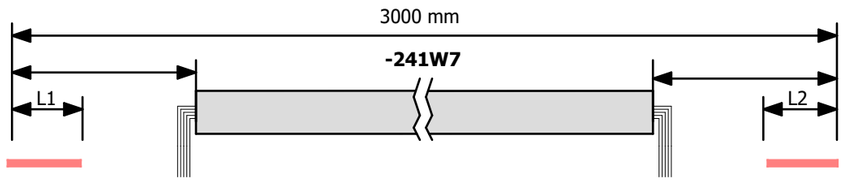


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 2	+CTRL_2.1-160U1:11X3		Connector	

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Connector		+CTRL_2.1-240U1:X7	*Control cabinet 2*

Cable name =UNIT_01++CT+-241W7
Cable type pre-assembled D-Sub cable 1:1
Free conductors

Cable parts DIS.125-30-097
Order number 125-30-097

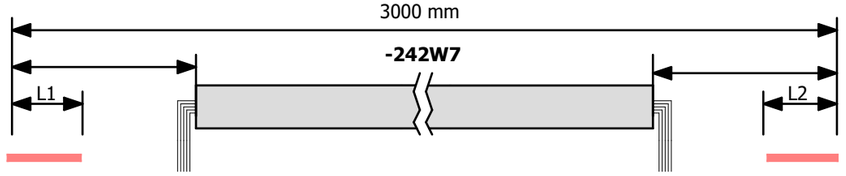


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 2	+CTRL_2.1-161U1:11X3		Connector	

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Connector		+CTRL_2.1-241U1:X7	*Control cabinet 2*

Cable name =UNIT_01++CT+-242W7
Cable type pre-assembled D-Sub cable 1:1
Free conductors

Cable parts DIS.125-30-097
Order number 125-30-097

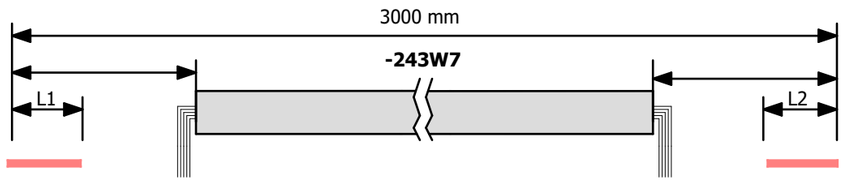


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 2	+CTRL_2.1-163U1:11X3		Connector	

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Connector		+CTRL_2.1-242U1:X7	*Control cabinet 2*

Cable name =UNIT_01++CT+-243W7
Cable type pre-assembled D-Sub cable 1:1
Free conductors

Cable parts DIS.125-30-097
Order number 125-30-097



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 2	+CTRL_2.1-164U1:11X3		Connector	

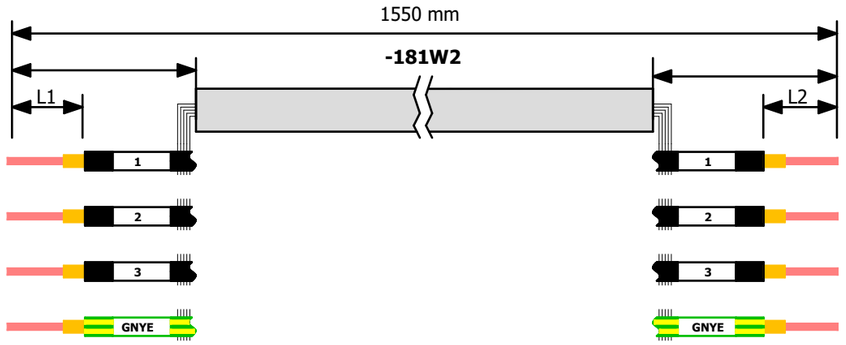
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	Connector		+CTRL_2.1-243U1:X7	*Control cabinet 2*

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next page: ++FAN/1

FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_01++FAN+-52G1-181W2
Cable type JZ-600 4G1,5 mm²
Free conductors

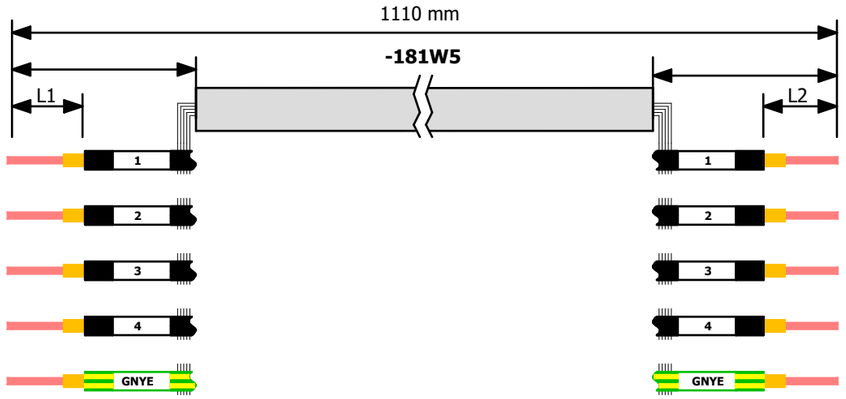
Cable parts HELU.10659
Order number 10659



Mounting location:	Source	Function text source	wire end handling	L1 [mm]	L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	-52G1-181X1:1:2	PUMP	stripped	8 mm	5 mm	Ring cable lug M4	PUMP	-52G1-181M1:U1	
	-52G1-181X1:2:2	=	stripped	8 mm	5 mm	Ring cable lug M4	=	-52G1-181M1:V1	
	-52G1-181X1:3:2	=	stripped	8 mm	5 mm	Ring cable lug M4	=	-52G1-181M1:W1	
	-52G1-181X1:PE:2	=	stripped	8 mm	5 mm	Ring cable lug M4	=	-52G1-181M1:PE	

Cable name =UNIT_01++FAN+-52G1-181W5
Cable type JZ-600 5G1,5 mm²
Free conductors

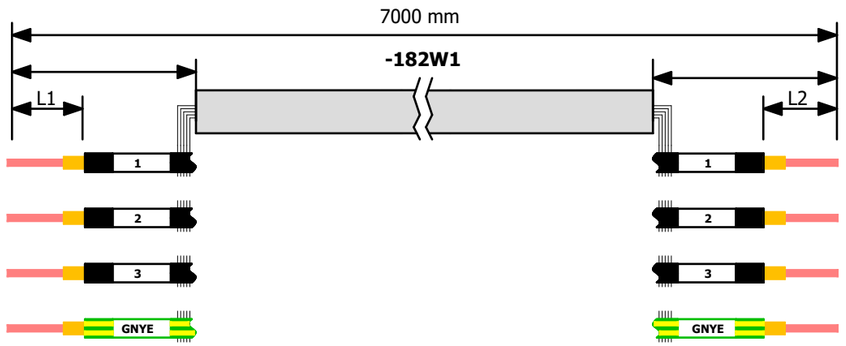
Cable parts HELU.10661
Order number 10661



Mounting location:	Source	Function text source	wire end handling	L1 [mm]	L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	-52G1-181X1:4:2	FUSE FOR PUMP	stripped	8 mm	5 mm	Ring cable lug M4	FUSE FOR PUMP	-52G1-181R1:x1	
	-52G1-181X1:5:2	HEATER	stripped	8 mm	5 mm	Ring cable lug M4	HEATER	-52G1-181R1:x3	
	-52G1-181X1:6:2	=	stripped	8 mm	5 mm	Ring cable lug M4	=	-52G1-181R1:x5	
	-52G1-181X1:7:2	=	stripped	8 mm	5 mm	Ring cable lug M4	=	-52G1-181R1:x6	
	-52G1-181X1:PE:2	=					=	-52G1-181R1:PE	

Cable name =UNIT_01++FAN+-52G1-182W1
Cable type JZ-600 5G1,5 mm²
Free conductors

Cable parts HELU.10659
Order number 10659



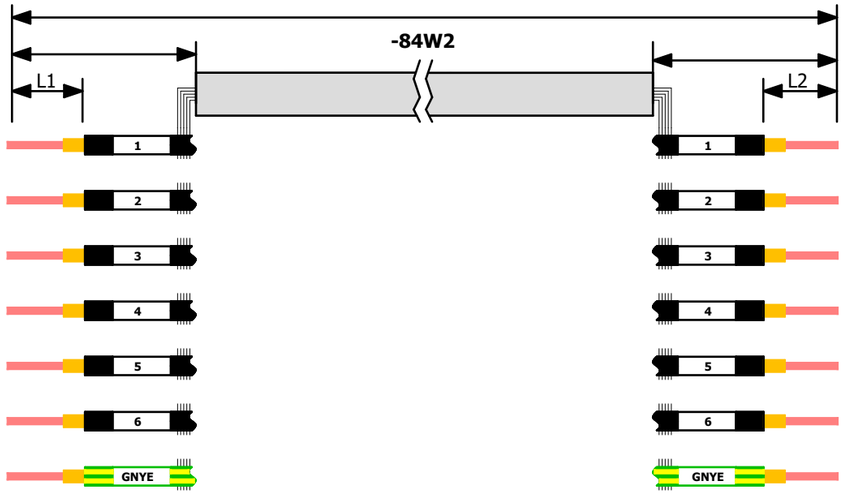
Mounting location:	Source	Function text source	wire end handling	L1 [mm]	L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	-52G1-181X1:8:2	FAN 1 HEAT EXCHANGER	stripped	8 mm	8 mm	End splice	FAN 1 HEAT EXCHANGER	-52G1-182M1:U1	
	-52G1-181X1:9:2	=	stripped	8 mm	8 mm	End splice	=	-52G1-182M1:V1	
	-52G1-181X1:10:2	=	stripped	8 mm	8 mm	End splice	=	-52G1-182M1:W1	
	-52G1-181X1:PE:2	=	stripped	8 mm	8 mm	End splice	=	-52G1-182M1:PE	

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next page: ++EXTERN/1

FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_01++EXTERN+-84W2
Cable type JZ-600 5G16 mm²
Free conductors 7

Cable parts HELU.10150
Order number 10150



Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

previous page:
++FAN/1

next page:
&EMZ++CONV+IND/1000

Editor	Freqcon_DG			Statron	FREQCON	CABEL LIST	20241203_V1.22	= UNIT_01 Converter Container 1	
Date	05.11.2024							& EMB Cable list	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ EXTERN	page: 1
Date								+	total: 500

FRQ_Kabelplan_04_groß_de_en

Terminal-strip overview

F14_001

Terminal strip	Terminal strip definition text	Terminals					Graphical page of terminal diagrams
		first	last	Total PE	Total N	Total number	
-207L1.1				0	0	2	=UNIT_01&EMZ++CONV+IND/2000
-207L1.2				0	0	2	=UNIT_01&EMZ++CONV+IND/2001
-207L1.3				0	0	2	=UNIT_01&EMZ++CONV+IND/2002
-211L1.1				0	0	2	=UNIT_01&EMZ++CONV+IND/2003
-211L1.2				0	0	2	=UNIT_01&EMZ++CONV+IND/2004
-211L1.3				0	0	2	=UNIT_01&EMZ++CONV+IND/2005
-217L1.1				0	0	2	=UNIT_01&EMZ++CONV+IND/2006
-217L1.2				0	0	2	=UNIT_01&EMZ++CONV+IND/2007
-217L1.3				0	0	2	=UNIT_01&EMZ++CONV+IND/2008

previous page:
&EMB++EXTERN+/1

next page:
2000

Terminal diagram

Freqcon_F13_001_02

Function text			-146W3	Cable name	Strip =UNIT_01++CONV+IND-207L1.1						Cable name												Page / column
			F-CY-OZ (LIY-CY)	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
INDUCTOR DC SUB 3_1 TEMPERATURE 3_1			1		++CT+CTRL_1.3-X5	13		,	-207L1.1	x2													&EFS++CT+/146.5
=			2		++CT+CTRL_1.3-X5	14		,	-207L1.1	x1													&EFS++CT+/146.5

Terminal diagram

Freqcon_F13_001_02

Function text			-146W4	Cable name	Strip =UNIT_01++CONV+IND-207L1.2						Cable name												Page / column
			F-CY-0Z (LIY-CY)	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
INDUCTOR DC SUB 3_2 TEMPERATURE 3_2			1		++CT+CTRL_1.3-X5	15		,	-207L1.2	x2													&EFS++CT+/146.7
=			2		++CT+CTRL_1.3-X5	16		,	-207L1.2	x1													&EFS++CT+/146.7

Terminal diagram

Freqcon_F13_001_02

Function text			-147W1	Cable name	Strip =UNIT_01++CONV+IND-207L1.3						Cable name												Page / column
			F-CY-0Z (LIY-CY)	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
INDUCTOR DC SUB 3_3 TEMPERATURE 3_3			1		++CT+CTRL_1.3-X5	17		,	-207L1.3	x2													&EFS++CT+/147.1
=			2		++CT+CTRL_1.3-X5	18		,	-207L1.3	x1													&EFS++CT+/147.1

Terminal diagram

Freqcon_F13_001_02

Function text			-145W4	Cable name	Strip =UNIT_01++CONV+IND-211L1.1						Cable name												Page / column
			F-CY-0Z (LIY-CY)	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
INDUCTOR DC SUB 2_1 TEMPERATURE 2_1			1		++CT+CTRL_1.3-X5	7		,	-211L1.1	x2													&EFS++CT+/145.7
=			2		++CT+CTRL_1.3-X5	8		,	-211L1.1	x1													&EFS++CT+/145.7

Terminal diagram

Freqcon_F13_001_02

Function text			-146W1	Cable name	Strip =UNIT_01++CONV+IND-211L1.2						Cable name												Page / column
			F-CY-0Z (LIY-CY)	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
INDUCTOR DC SUB 2_2 TEMPERATURE 2_2			1		++CT+CTRL_1.3-X5	9		,	-211L1.2	x2													&EFS++CT+/146.1
=			2		++CT+CTRL_1.3-X5	10		,	-211L1.2	x1													&EFS++CT+/146.1

Terminal diagram

Freqcon_F13_001_02

Function text			-146W2	Cable name	Strip =UNIT_01++CONV+IND-211L1.3						Cable name												Page / column
			F-CY-0Z (LIY-CY)	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
INDUCTOR DC SUB 2_3 TEMPERATURE 2_3			1		++CT+CTRL_1.3-X5	11		,	-211L1.3	x2													&EFS++CT+/146.3
=			2		++CT+CTRL_1.3-X5	12		,	-211L1.3	x1													&EFS++CT+/146.3

Terminal diagram

Freqcon_F13_001_02

Function text			-147W2	Cable name	Strip =UNIT_01++CONV+IND-217L1.1						Cable name												Page / column
			F-CY-0Z (LIY-CY)	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
INDUCTOR DC SUB 4_1 TEMPERATURE 4_1			1		++CT+CTRL_1.3-X5	19		,	-217L1.1	x2													&EFS++CT+/147.3
=			2		++CT+CTRL_1.3-X5	20		,	-217L1.1	x1													&EFS++CT+/147.3

previous page: 2005

next page: 2007

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_01++CONV+IND-217L1.1	20241203_V1.22	= UNIT_01 Converter Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV Converter — page: 2006
Date								+ IND Inductor cabinet — total: 500

Terminal diagram

Freqcon_F13_001_02

Function text			-148W1	Cable name	Strip =UNIT_01++CONV+IND-217L1.2						Cable name												Page / column
			F-CY-0Z (LIY-CY)	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
INDUCTOR DC SUB 4_2 TEMPERATURE 4_2			1		++CT+CTRL_1.3-X5	25		,	-217L1.2	x2													&EFS++CT+/148.3
=			2		++CT+CTRL_1.3-X5	26		,	-217L1.2	x1													&EFS++CT+/148.3

Terminal diagram

Freqcon_F13_001_02

Function text			-148W2	Cable name	Strip =UNIT_01++CONV+IND-217L1.3						Cable name												Page / column
			F-CY-OZ (LIY-CY)	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
INDUCTOR DC SUB 4_3 TEMPERATURE 4_3			1		++CT+CTRL_1.3-X5	29		,	-217L1.3	x2													&EFS++CT+/148.7
=			2		++CT+CTRL_1.3-X5	30		,	-217L1.3	x1													&EFS++CT+/148.7

Terminal-strip overview

F14_001

Terminal strip	Terminal strip definition text	Terminals					Graphical page of terminal diagrams
		first	last	Total PE	Total N	Total number	
-227U1-X3.1	DC Schalter + Sicherungen-Ansteuerungen und Rückmeldungen	1	PE	1	0	18	=UNIT_01&EMZ++CONV+CIR/2000
-227U1-X3.2	=	1	PE	2	0	52	=UNIT_01&EMZ++CONV+CIR/2001
-231U1-X3.1	=	1	PE	1	0	18	=UNIT_01&EMZ++CONV+CIR/2003
-231U1-X3.2	=	1	PE	2	0	52	=UNIT_01&EMZ++CONV+CIR/2004
-237U1-X3.1	=	1	PE	1	0	18	=UNIT_01&EMZ++CONV+CIR/2006
-237U1-X3.2	=	1	PE	2	0	52	=UNIT_01&EMZ++CONV+CIR/2007

previous page: +IND/2008

next page: 2000

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CONV+CIR-227U1-X3.1

DC Schalter + Sicherungen-Ansteuerungen und Rückmeldungen

Function text			-227W4	Cable name	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name	-227U1-W5	Page / column
			0Z-500	Cable type							Cable type	JZ-500	
			1		++CT+CTRL_1.4-350X1.21	1	1	,	-227U1-X3.2	1		1	&EFS+/227.a.1
			2		++CT+CTRL_1.4-350X1.21	4	2	,	-227U1-X3.2	3		2	&EFS+/227.a.2
			3		++CT+CTRL_1.4-350X1.21	7	3	,	-227U1-X3.2	5		3	&EFS+/227.a.2
			4		++CT+CTRL_1.4-350X1.21	3	4	,	-227U1-X3.2	7		4	&EFS+/227.a.3
			5		++CT+CTRL_1.4-350X1.21	6	5	,	-227U1-X3.2	9		5	&EFS+/227.a.4
			6		++CT+CTRL_1.4-350X1.21	9	6	,	-227U1-X3.2	11		6	&EFS+/227.a.5
			7		++CT+CTRL_1.4-307K1	A1	7	,	-227U1-X3.2	13		7	&EFS+/227.a.5
			8		++CT+CTRL_1.4-307K3	A1	8	,	-227U1-X3.2	15		8	&EFS+/227.a.6
			9		++CT+CTRL_1.4-307K5	A1	9	,	-227U1-X3.2	17		9	&EFS+/227.a.6
			10		++CT+CTRL_1.4-307K2	A1	10	,	-227U1-X3.2	19		10	&EFS+/227.a.6
			11		++CT+CTRL_1.4-307K4	A1	11	,	-227U1-X3.2	21		11	&EFS+/227.a.7
			12		++CT+CTRL_1.4-307K6	A1	12	,	-227U1-X3.2	23		12	&EFS+/227.a.7
			13		++CT+CTRL_1.3-X3.11	11	13	,	-227U1-F1	2			&EFS+/227.a.7
			14		++CT+CTRL_1.3-X3.12	9	14	,	-227U1-F5	2			&EFS+/227.a.8
			15		++CT+CTRL_1.3-X3.12	11	15	,	-227U1-F9	2			&EFS+/227.a.8
			16		++CT+CTRL_1.3-X3.12	10	16	,	-227U1-F2	1			&EFS+/227.a.9
									-227U1-X3.2	24		13	
			17		++CT+CTRL_1.4-350X1.21	2	17	,	-227U1-X3.2	12		14	&EFS+/227.a.9
							PE	,	-227U1-X3.2	PE		GNYE	&EFS+/227.a.9

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Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CONV+CIR-227U1-X3.2

DC Schalter + Sicherungen-Ansteuerungen und Rückmeldungen

Function text				Cable name	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name	-227U1-W5										Page / column
				Cable type							Cable type	JZ-500										
							1		-227U1-X3.1	1		1										&EFS+/227.a.1
							2															&EFS+/227.a.1
							3		-227U1-X3.1	2		2										&EFS+/227.a.2
							4															&EFS+/227.a.2
							5		-227U1-X3.1	3		3										&EFS+/227.a.2
							6															&EFS+/227.a.2
							7		-227U1-X3.1	4		4										&EFS+/227.a.3
							8															&EFS+/227.a.3
							9		-227U1-X3.1	5		5										&EFS+/227.a.4
							10															&EFS+/227.a.4
							11		-227U1-X3.1	6		6										&EFS+/227.a.5
							12		-227U1-X3.1	17		14										&EFS+/227.a.5
							13		-227U1-X3.1	7		7										&EFS+/227.a.5
							14															&EFS+/227.a.5
							15		-227U1-X3.1	8		8										&EFS+/227.a.6
							16															&EFS+/227.a.6
							17		-227U1-X3.1	9		9										&EFS+/227.a.6

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next page: 2002

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CONV+CIR-227U1-X3.2

DC Schalter + Sicherungen-Ansteuerungen und Rückmeldungen

Function text				Cable name	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name	-227U1-W5										Page / column
				Cable type							Cable type	JZ-500										
							18															&EFS+/227.a.6
							19		-227U1-X3.1	10		10										&EFS+/227.a.6
							20															&EFS+/227.a.6
							21		-227U1-X3.1	11		11										&EFS+/227.a.7
							22															&EFS+/227.a.7
							23		-227U1-X3.1	12		12										&EFS+/227.a.7
							24		-227U1-X3.1	16		13										&EFS+/227.a.7
							PE															&EFS+/227.a.5
							PE															&EFS+/227.a.5
							PE		-227U1-X3.1	PE		GNYE										&EFS+/227.a.5

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CONV+CIR-231U1-X3.1

DC Schalter + Sicherungen-Ansteuerungen und Rückmeldungen

Function text			-231W4	Cable name	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name	-231U1-W5	Page / column
			0Z-500	Cable type							Cable type	JZ-500	
			1		++CT+CTRL_1.3-150X1	1	1	,	-231U1-X3.2	1		1	&EFS+/231.a.1
			2		++CT+CTRL_1.3-150X1	4	2	,	-231U1-X3.2	3		2	&EFS+/231.a.2
			3		++CT+CTRL_1.3-150X1	7	3	,	-231U1-X3.2	5		3	&EFS+/231.a.2
			4		++CT+CTRL_1.3-150X1	3	4	,	-231U1-X3.2	7		4	&EFS+/231.a.3
			5		++CT+CTRL_1.3-150X1	6	5	,	-231U1-X3.2	9		5	&EFS+/231.a.4
			6		++CT+CTRL_1.3-150X1	9	6	,	-231U1-X3.2	11		6	&EFS+/231.a.5
			7		++CT+CTRL_1.4-306K1	A1	7	,	-231U1-X3.2	13		7	&EFS+/231.a.5
			8		++CT+CTRL_1.4-306K3	A1	8	,	-231U1-X3.2	15		8	&EFS+/231.a.6
			9		++CT+CTRL_1.4-306K5	A1	9	,	-231U1-X3.2	17		9	&EFS+/231.a.6
			10		++CT+CTRL_1.4-306K2	A1	10	,	-231U1-X3.2	19		10	&EFS+/231.a.6
			11		++CT+CTRL_1.4-306K4	A1	11	,	-231U1-X3.2	21		11	&EFS+/231.a.7
			12		++CT+CTRL_1.4-306K6	A1	12	,	-231U1-X3.2	23		12	&EFS+/231.a.7
			13		++CT+CTRL_1.3-X3.10	9	13	,	-231U1-F1	2			&EFS+/231.a.7
			14		++CT+CTRL_1.3-X3.10	11	14	,	-231U1-F5	2			&EFS+/231.a.8
			15		++CT+CTRL_1.3-X3.11	9	15	,	-231U1-F9	2			&EFS+/231.a.8
			16		++CT+CTRL_1.3-X3.10	10	16	,	-231U1-F2	1			&EFS+/231.a.9
									-231U1-X3.2	24		13	
			17		++CT+CTRL_1.3-150X1	2	17	,	-231U1-X3.2	12		14	&EFS+/231.a.9
							PE	,	-231U1-X3.2	PE		GNYE	&EFS+/231.a.9

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Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CONV+CIR-231U1-X3.2

DC Schalter + Sicherungen-Ansteuerungen und Rückmeldungen

Function text	Cable name	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type	Cable name	Cable type	Page / column
										-231U1-W5	JZ-500	
					1		-231U1-X3.1	1		1		&EFS+/231.a.1
					2							&EFS+/231.a.1
					3		-231U1-X3.1	2		2		&EFS+/231.a.2
					4							&EFS+/231.a.2
					5		-231U1-X3.1	3		3		&EFS+/231.a.2
					6							&EFS+/231.a.2
					7		-231U1-X3.1	4		4		&EFS+/231.a.3
					8							&EFS+/231.a.3
					9		-231U1-X3.1	5		5		&EFS+/231.a.4
					10							&EFS+/231.a.4
					11		-231U1-X3.1	6		6		&EFS+/231.a.5
					12		-231U1-X3.1	17		14		&EFS+/231.a.5
					13		-231U1-X3.1	7		7		&EFS+/231.a.5
					14							&EFS+/231.a.5
					15		-231U1-X3.1	8		8		&EFS+/231.a.6
					16							&EFS+/231.a.6
					17		-231U1-X3.1	9		9		&EFS+/231.a.6

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Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CONV+CIR-231U1-X3.2

DC Schalter + Sicherungen-Ansteuerungen und Rückmeldungen

Function text				Cable name	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name	-231U1-W5										Page / column
				Cable type							Cable type	JZ-500										
							18															&EFS+/231.a.6
							19		-231U1-X3.1	10		10										&EFS+/231.a.6
							20															&EFS+/231.a.6
							21		-231U1-X3.1	11		11										&EFS+/231.a.7
							22															&EFS+/231.a.7
							23		-231U1-X3.1	12		12										&EFS+/231.a.7
							24		-231U1-X3.1	16		13										&EFS+/231.a.7
							PE															&EFS+/231.a.5
							PE															&EFS+/231.a.5
									-231U1-X3.1	PE		GNYE										&EFS+/231.a.5

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CONV+CIR-237U1-X3.1

DC Schalter + Sicherungen-Ansteuerungen und Rückmeldungen

Function text			-237W4	Cable name	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name	-237U1-W5	Page / column
			QZ-500	Cable type							Cable type	JZ-500	
			1		++CT+CTRL_1.4-350X1.21	11	1	,	-237U1-X3.2	1		1	&EFS+/237.a.1
			2		++CT+CTRL_1.4-350X1.21	14	2	,	-237U1-X3.2	3		2	&EFS+/237.a.2
			3		++CT+CTRL_1.4-350X1.21	17	3	,	-237U1-X3.2	5		3	&EFS+/237.a.2
			4		++CT+CTRL_1.4-350X1.21	13	4	,	-237U1-X3.2	7		4	&EFS+/237.a.3
			5		++CT+CTRL_1.4-350X1.21	16	5	,	-237U1-X3.2	9		5	&EFS+/237.a.4
			6		++CT+CTRL_1.4-350X1.21	19	6	,	-237U1-X3.2	11		6	&EFS+/237.a.5
			7		++CT+CTRL_1.4-308K1	A1	7	,	-237U1-X3.2	13		7	&EFS+/237.a.5
			8		++CT+CTRL_1.4-308K3	A1	8	,	-237U1-X3.2	15		8	&EFS+/237.a.6
			9		++CT+CTRL_1.4-308K5	A1	9	,	-237U1-X3.2	17		9	&EFS+/237.a.6
			10		++CT+CTRL_1.4-308K2	A1	10	,	-237U1-X3.2	19		10	&EFS+/237.a.6
			11		++CT+CTRL_1.4-308K4	A1	11	,	-237U1-X3.2	21		11	&EFS+/237.a.7
			12		++CT+CTRL_1.4-308K6	A1	12	,	-237U1-X3.2	23		12	&EFS+/237.a.7
			13		++CT+CTRL_1.3-X3.13	8	13	,	-237U1-F1	2			&EFS+/237.a.7
			14		++CT+CTRL_1.3-X3.13	9	14	,	-237U1-F5	2			&EFS+/237.a.8
			15		++CT+CTRL_1.3-X3.13	11	15	,	-237U1-F9	2			&EFS+/237.a.8
			16		++CT+CTRL_1.3-X3.13	10	16	,	-237U1-F2	1			&EFS+/237.a.9
									-237U1-X3.2	24		13	
			17		++CT+CTRL_1.4-350X1.21	12	17	,	-237U1-X3.2	12		14	&EFS+/237.a.9
							PE	,	-237U1-X3.2	PE		GNYE	&EFS+/237.a.9

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Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_01++CONV+CIR-237U1-X3.1	20241203_V1.22	= UNIT_01 Converter Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV Converter — page: 2006
Date								+ CIR Circuit Breaker cabinet — total: 500

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CONV+CIR-237U1-X3.2

DC Schalter + Sicherungen-Ansteuerungen und Rückmeldungen

Function text				Cable name	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name	-237U1-W5										Page / column
				Cable type							Cable type	JZ-500										
							1		-237U1-X3.1	1		1										&EFS+/237.a.1
							2															&EFS+/237.a.1
							3		-237U1-X3.1	2		2										&EFS+/237.a.2
							4															&EFS+/237.a.2
							5		-237U1-X3.1	3		3										&EFS+/237.a.2
							6															&EFS+/237.a.2
							7		-237U1-X3.1	4		4										&EFS+/237.a.3
							8															&EFS+/237.a.3
							9		-237U1-X3.1	5		5										&EFS+/237.a.4
							10															&EFS+/237.a.4
							11		-237U1-X3.1	6		6										&EFS+/237.a.5
							12		-237U1-X3.1	17		14										&EFS+/237.a.5
							13		-237U1-X3.1	7		7										&EFS+/237.a.5
							14															&EFS+/237.a.5
							15		-237U1-X3.1	8		8										&EFS+/237.a.6
							16															&EFS+/237.a.6
							17		-237U1-X3.1	9		9										&EFS+/237.a.6

previous page: 2006

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Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CONV+CIR-237U1-X3.2

DC Schalter + Sicherungen-Ansteuerungen und Rückmeldungen

Function text				Cable name	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name	-237U1-W5										Page / column
				Cable type							Cable type	JZ-500										
							18															&EFS+/237.a.6
							19		-237U1-X3.1	10		10										&EFS+/237.a.6
							20															&EFS+/237.a.6
							21		-237U1-X3.1	11		11										&EFS+/237.a.7
							22															&EFS+/237.a.7
							23		-237U1-X3.1	12		12										&EFS+/237.a.7
							24		-237U1-X3.1	16		13										&EFS+/237.a.7
							PE															&EFS+/237.a.5
							PE															&EFS+/237.a.5
									-237U1-X3.1	PE		GNYE										&EFS+/237.a.5

Terminal-strip overview

F14_001

Terminal strip	Terminal strip definition text	Terminals					Graphical page of terminal diagrams
		first	last	Total PE	Total N	Total number	
-X3.43		1	20	0	0	60	=UNIT_01&EMZ++CONV+AC_DC/2000

previous page:
+CIR/2008

next page:
2000

Terminal diagram

Freqcon_F13_001_02

Function text	-238W3 OZ-500	-238W2 OZ-500	-238W1 OZ-500	Cable name / Cable type	Strip =UNIT_01++CONV+AC_DC-X3.43 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	-238W7 OZ-500	Page / column
SURGE ARRESTER DC SUBSYSTEM 2_1			1		-238F1	11	1	,	++CT+CTRL_1.3-X3	5		1	&EFS+/238a.2
								,					
								,					
SURGE ARRESTER DC SUBSYSTEM 2_1			2		-238F1	12	2	,	-X3.43	3			&EFS+/238a.2
								,					
								,					
SURGE ARRESTER DC SUBSYSTEM 2_2		1			-238F2	11	3	,	-X3.43	2			&EFS+/238a.5
								,					
								,					
SURGE ARRESTER DC SUBSYSTEM 2_2		2			-238F2	12	4	,	-X3.43	5			&EFS+/238a.5
								,					
								,					
SURGE ARRESTER DC SUBSYSTEM 2_3	1				-238F3	11	5	,	-X3.43	4			&EFS+/238a.9
								,					
								,					
SURGE ARRESTER DC SUBSYSTEM 2_3	2				-238F3	12	6	,	-X3.43	7			&EFS+/238a.9
								,					
								,					

Terminal diagram

Freqcon_F13_001_02

Function text	-228W3 OZ-500	-228W2 OZ-500	-228W1 OZ-500	Cable name / Cable type	Strip =UNIT_01++CONV+AC_DC-X3.43 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
SURGE ARRESTER DC SUBSYSTEM 3_1			1		-228F1	11	7	,	-X3.43	6		&EFS+/228.2
								,				
								,				
SURGE ARRESTER DC SUBSYSTEM 3_1			2		-228F1	12	8	,	-X3.43	9		&EFS+/228.2
								,				
								,				
SURGE ARRESTER DC SUBSYSTEM 3_2		1			-228F2	11	9	,	-X3.43	8		&EFS+/228.5
								,				
								,				
SURGE ARRESTER DC SUBSYSTEM 3_2		2			-228F2	12	10	,	-X3.43	11		&EFS+/228.5
								,				
								,				
SURGE ARRESTER DC SUBSYSTEM 3_3	1				-228F3	11	11	,	-X3.43	10		&EFS+/228.9
								,				
								,				
SURGE ARRESTER DC SUBSYSTEM 3_3	2				-228F3	12	12	,	-X3.43	13		&EFS+/228.9
								,				
								,				

Terminal diagram

Freqcon_F13_001_02

Function text	-238W6 OZ-500	-238W5 OZ-500	-238W4 OZ-500	Cable name / Cable type	Strip =UNIT_01++CONV+AC_DC-X3.43 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
SURGE ARRESTER DC SUBSYSTEM 4_1			1		-238F4	11	13	,	-X3.43	12		&EFS+/238b.2
								,				
								,				
SURGE ARRESTER DC SUBSYSTEM 4_1			2		-238F4	12	14	,	-X3.43	15		&EFS+/238b.2
								,				
								,				
SURGE ARRESTER DC SUBSYSTEM 4_2		1			-238F5	11	15	,	-X3.43	14		&EFS+/238b.5
								,				
								,				
SURGE ARRESTER DC SUBSYSTEM 4_2		2			-238F5	12	16	,	-X3.43	17		&EFS+/238b.5
								,				
								,				
SURGE ARRESTER DC SUBSYSTEM 4_3	1				-238F6	11	17	,	-X3.43	16		&EFS+/238b.9
								,				
								,				
SURGE ARRESTER DC SUBSYSTEM 4_3	2				-238F6	12	18	,	-X3.43	19		&EFS+/238b.9
								,				
								,				

Terminal diagram

Freqcon_F13_001_02

Function text			-78W7	Cable name	Strip =UNIT_01++CONV+AC_DC-X3.43						Cable name	-238W7										Page / column
			0Z-500	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type	0Z-500										
			2		-78F1	14	19	,	-X3.43	18												&EFS+/78.8
								,														
								,														
			1		-78F1	13	20	,	++CT+CTRL_1.3-X3	6		2										&EFS+/78.8
								,														
								,														

Terminal-strip overview

F14_001

Terminal strip	Terminal strip definition text	Terminals					Graphical page of terminal diagrams
		first	last	Total PE	Total N	Total number	
-XT1		1	20	0	0	40	=UNIT_01&EMZ++CT/2000

previous page:
++CONV+AC_DC/2003

next page:
2000

Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_01++CT+-XT1						Cable name												Page / column
				Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
Gas confirmed FGS							1	,	+CTRL_1.3-138K1	14													&EFS/136.0
								,															
Gas confirmed FGS							2	,	+CTRL_1.3-138K1	11													&EFS/136.0
								,															
Smoke confirmed FGS							3	,	+CTRL_1.3-138K2	14													&EFS/136.1
								,															
Smoke confirmed FGS							4	,	+CTRL_1.3-138K2	11													&EFS/136.1
								,															
PLC fault status SIS							5	,	+CTRL_1.3-138K3	14													&EFS/136.2
								,															
PLC fault status SIS							6	,	+CTRL_1.3-138K3	11													&EFS/136.2
								,															
PLC fault status SIS							7	,	+CTRL_1.3-138K4	14													&EFS/136.2
								,															
Spare							8	,	+CTRL_1.3-138K4	11													&EFS/136.3
								,															
Spare							9	,	+CTRL_1.3-138K5	14													&EFS/136.3
								,															
Spare							10	,	+CTRL_1.3-138K5	11													&EFS/136.3
								,															
Spare							11	,	+CTRL_1.3-138K6	14													&EFS/136.4
								,															
Spare							12	,	+CTRL_1.3-138K6	11													&EFS/136.4
								,															
phase in sync							13	,	+CTRL_1.3-138K7	14													&EFS/136.5
								,															
phase in sync							14	,	+CTRL_1.3-138K7	11													&EFS/136.5
								,															
phase in sync							15	,	+CTRL_1.3-136K7	A2													&EFS/136.5
								,															
Shut-down to BESS							16	,	+CTRL_1.3-136K7	A1													&EFS/136.6
								,															
incoming CB is open							17	,	+CTRL_1.3-136K8	A2													&EFS/136.7
								,															
incoming CB is open							18	,	+CTRL_1.3-136K8	A1													&EFS/136.7

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next page: 2001

Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_01++CT+-XT1						Cable name												Page / column
				Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
								,															
incoming CB is open							19	,	+CTRL_1.3-136K9	A2													&EFS/136.8
								,															
incoming CB is open							20	,	+CTRL_1.3-136K9	A1													&EFS/136.8
								,															

Terminal-strip overview

F14_001

Terminal strip	Terminal strip definition text	Terminals					Graphical page of terminal diagrams
		first	last	Total PE	Total N	Total number	
-X1	Hauptsteuerstromkreis 400V/230V AC	1	PE	8	1	34	=UNIT_01&EMZ++CT+CTRL_1.3/2000
-X3	CONTROL VOLTAGE 24V DC	1	46	0	0	85	=UNIT_01&EMZ++CT+CTRL_1.3/2001
-X3.10	Rückmeldung DC Schütze Subsystem 1_4	1	12	0	0	24	=UNIT_01&EMZ++CT+CTRL_1.3/2004
-X3.11	=	1	12	0	0	24	=UNIT_01&EMZ++CT+CTRL_1.3/2005
-X3.12	=	1	12	0	0	24	=UNIT_01&EMZ++CT+CTRL_1.3/2006
-X3.13	Rückmeldung DC Schütze Subsystem 1_6	1	12	0	0	24	=UNIT_01&EMZ++CT+CTRL_1.3/2007
-X5	Kleinspannungssignale	1	30	0	0	60	=UNIT_01&EMZ++CT+CTRL_1.3/2008
-X5.1	DC Subsystem Spannungsmessung	1	2	0	0	6	=UNIT_01&EMZ++CT+CTRL_1.3/2010
-150X1	Subsysteme DC Schütz EIN	1	10	0	0	20	=UNIT_01&EMZ++CT+CTRL_1.3/2011
-XDC1	Steuerspannung 24VDC (USV) DC1	1	PE	2	0	23	=UNIT_01&EMZ++CT+CTRL_1.3/2012
-XDC2	Steuerspannung 24VDC (USV) DC2	1	4	0	0	12	=UNIT_01&EMZ++CT+CTRL_1.3/2014
-XDC3	Steuerspannung 24VDC (USV) DC3	1	4	0	0	12	=UNIT_01&EMZ++CT+CTRL_1.3/2017
-XDC4	Steuerspannung 24VDC (USV) DC4	1	4	0	0	12	=UNIT_01&EMZ++CT+CTRL_1.3/2018
-XDC5.1	Steuerspannung 24VDC (USV) DC5.1	1	1	0	0	3	=UNIT_01&EMZ++CT+CTRL_1.3/2019
-XDC5.2	Steuerspannung 24VDC (USV) DC5.2	1	1	0	0	3	=UNIT_01&EMZ++CT+CTRL_1.3/2020
-XE	Hauptstromversorgung 400V AC	1	6	3	4	14	=UNIT_01&EMZ++CT+CTRL_1.3/2021
-XT	Transfer Klemmenblock 24VDC/230VAC	1	16	6	0	38	=UNIT_01&EMZ++CT+CTRL_1.3/2022
-190XT1	230VAC Beleuchtung/Klimaanlage Container/Schrank	1	PE	8	4	24	=UNIT_01&EMZ++CT+CTRL_1.3/2024
-191XT1		1	PE	2	2	10	=UNIT_01&EMZ++CT+CTRL_1.3/2025
-XV	Suppression TVS Diode	1	4	0	0	36	=UNIT_01&EMZ++CT+CTRL_1.3/2026

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Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.3-X1

Hauptsteuerstromkreis 400V/230V AC

Function text			-181W1	Cable name	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name	Page / column
			1Z-600	Cable type							Cable type	
PUMP			1		++FAN-52G1-181X1	1:1	1	,	-139K2	2		&EFS+/181.1
								,				
PUMP			2		++FAN-52G1-181X1	2:1	2	,	-139K2	4		&EFS+/181.1
								,				
PUMP			3		++FAN-52G1-181X1	3:1	3	,	-139K2	6		&EFS+/181.1
								,				
PUMP			GNYE		++FAN-52G1-181X1	PE:1	PE	,	+.2-110U1-PE			&EFS+/181.1
								,				
FUSE FOR PUMP			4		++FAN-52G1-181X1	4:1	4	,	-139K1	2		&EFS+/181.3
								,				
HEATER			5		++FAN-52G1-181X1	5:1	5	,	-139K1	4		&EFS+/181.4
								,				
HEATER			6		++FAN-52G1-181X1	6:1	6	,	-139K1	6		&EFS+/181.4
								,				
HEATER			7		++FAN-52G1-181X1	7:1	7	,	-XE	N:1		&EFS+/181.4
								,				
HEATER							PE	,				&EFS+/181.4
								,				
FAN 1 HEAT EXCHANGER			8		++FAN-52G1-181X1	8:1	8	,	-139K3	2		&EFS+/182.1
								,				
FAN 1 HEAT EXCHANGER			9		++FAN-52G1-181X1	9:1	9	,	-139K3	4		&EFS+/182.1
								,				
FAN 1 HEAT EXCHANGER			10		++FAN-52G1-181X1	10:1	10	,	-139K3	6		&EFS+/182.1
								,				
FAN 1 HEAT EXCHANGER							PE	,				&EFS+/182.1
								,				
FAN 2 HEAT EXCHANGER OPTIONAL							11	,				&EFS+/182.3
								,				
FAN 2 HEAT EXCHANGER OPTIONAL							12	,				&EFS+/182.4
								,				
FAN 2 HEAT EXCHANGER OPTIONAL							13	,				&EFS+/182.4
								,				
FAN 2 HEAT EXCHANGER OPTIONAL							PE	,				&EFS+/182.4
								,				

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Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_01++CT+CTRL_1.3-X1	20241203_V1.22
Date	05.11.2024						
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007
Date							

=	UNIT_01	Converter Container 1	
&	EMZ	Terminals	
++	CT	Control cabinets	page: 2000
+	CTRL_1.3	Main mounting plate	total: 500

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.3-X3

CONTROL VOLTAGE 24V DC

Function text	Cable name	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type	Cable name	++CONV-80W1	++CONV-238W7	Page / column
										OZ-500	OZ-500		
CB 1 Tripped GRID			-DI_02	5	1		++CONV+CIR-80Q1	X7_13		1			&EFS+/127.1
CB 1 OFF GRID			-DI_02	4	2		++CONV+CIR-80Q1	X6_9		2			&EFS+/127.3
CB 1 ON GRID			-DI_02	3	3		++CONV+CIR-80Q1	X6_11		3			&EFS+/127.2
FUSE AND LIGHTNING PROTECTION					4		+.4-189X1	5					&EFS+/127.4
=			-XDC4	2	5		++CONV+AC_DC-X3.43	1			1		&EFS+/127.5
FUSE AND LIGHTNING PROTECTION			-DI_02	6	6		++CONV+AC_DC-X3.43	20			2		&EFS+/127.4
=			-X3	13	7		-134K1	11					&EFS+/127.5
CB 2 Tripped ISLAND GRID			-DI_04	12	8								&EFS+/128.1
CB 2 OFF ISLAND GRID			-DI_04	14	9								&EFS+/128.3
CB 2 ON ISLAND GRID			-DI_04	13	10								&EFS+/128.2
FUSE AND LIGHTNING PROTECTION 2					11								&EFS+/128.4
FUSE AND LIGHTNING PROTECTION 2			-DI_04	15	12								&EFS+/128.4
=			-X3	7	13								&EFS+/128.5
SPARE			-DI_04	1	14		+.2-18B1	4					&EFS+/133.1
SPARE			-DI_04	2	15		+.2-18B1	1					&EFS+/133.2
SPARE			-DI_04	3	16		+.2-18B1	4					&EFS+/133.3
Fuse 230V AC for Container Air Conditioning			-DI_04	11	17		-190F3	14					&EFS+/133.6

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Terminal diagram

Freqcon_F13_001_02

Function text	++CONV-80W1 OZ-500	-181W3 F-CY-OZ (LIY-CY)	++CONV-260W1 OZ-500	Cable name Cable type	Strip =UNIT_01++CT+CTRL_1.3-X3 CONTROL VOLTAGE 24V DC Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name Cable type	++TRA-629W1 OZ-500	++CONV-260W1 OZ-500	-181W3 F-CY-OZ (LIY-CY)	Page / column
Earthing switch in On Transformer 620V side					-DI_04	5	18	,	++CONV-18Q1	14		2			&EFS+/133.9
Smoke detector CON					-DI_02	7	19	,	++CONV+CON-260B1	4			1		&EFS+/134.0
								,							
								,							
Smoke detector CON			2		++CONV+CON-260B1	2	20	,	-XV	9					&EFS+/134.0
=			3		++CONV+CON-260B1	5	21	,	-XDC4	4					&EFS+/134.1
								,							
								,							
Smoke detector CON			4		++CONV+CON-260B1	6	22	,	-134K1	11					&EFS+/134.1
PRESSURE SWITCH					-182Q1	13	23	,	++FAN-52G1-181X3	1				1	&EFS+/181.7
								,							
								,							
PRESSURE SWITCH		2			++FAN-52G1-181X3	3	24	,	-AI_04	3					&EFS+/181.7
=		3			++FAN-52G1-181X3	2	25	,	-XDC1	7					&EFS+/181.7
Fuse 230V AC for Container Air Conditioning					-XDC2	1	29	,	++CONV-18Q1	13		1			&EFS+/133.8
								,							
								,							
TRIP					-DI_04	4	30	,	+.2-18B1	7					&EFS+/133.4
CB 1 GRID +24V	4				++CONV+CIR-80Q1	X6_12	31		-XDC3	2					&EFS+/188.1
								,							
CB 1 GRID +24V	5				++CONV+CIR-80Q1	X5_11	32		-XDC3	3					&EFS+/188.1
CB 2 ISLAND GRID +24V OPTIONAL							33		-137K1	11					&EFS+/188.2
								,							
CB 2 ISLAND GRID +24V OPTIONAL							34								&EFS+/188.2
=	6				++CONV+CIR-80Q1	X6_7	35	,	-137K1	14					&EFS+/188.4
								,							
								,							
CB 1 GRID	7				++CONV+CIR-80Q1	X6_14	36	,	-137K2	12					&EFS+/188.5
=	8				++CONV+CIR-80Q1	X5_12	37	,	-189K1	22					&EFS+/188.6
								,							
								,							
CB 1 GRID							38	,	-137K3	14					&EFS+/188.6
CB 2 ISLAND GRID OPTIONAL							39	,	-137K4	12					&EFS+/188.8

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Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.3-X3

CONTROL VOLTAGE 24V DC

Function text	Cable name	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name	Cable type	-195W1	OZ-500	Page / column
						,							
						,							
CB 2 ISLAND GRID OPTIONAL					40	,	-189K1	21					&EFS+/188.8
SHUTDOWN CIRCUIT BREAKERS / DC CONTACTORS			-X3	42	41	,	+.1-84Q1	14			3		&EFS+/195.2
						,							
						,							
SHUTDOWN CIRCUIT BREAKERS / DC CONTACTORS			-195K3	IN1	42	,	-X3	41					&EFS+/195.2
=			-X3	44	43	,	+.1-84Q1	24			4		&EFS+/195.3
						,							
						,							
SHUTDOWN CIRCUIT BREAKERS / DC CONTACTORS			-195K3	IN2	44	,	-X3	43					&EFS+/195.3
=			-195K1	61	45	,	+.4-306K1	21					&EFS+/195.3
						,							
						,							
FAULT SIGNAL SAFETY RELAY			-195K3	IN	46	,	+.4-308K6	21					&EFS+/195.4

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Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_01++CT+CTRL_1.3-X3	20241203_V1.22	=	UNIT_01	Converter Container 1
Date	05.11.2024							&	EMZ	Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++	CT	Control cabinets
Date								+	CTRL_1.3	Main mounting plate

page: 2003

total: 500

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.3-X3.10

Rückmeldung DC Schütze Subsystem 1_4

Function text	Cable name	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type	Cable name ++CONV-231W4	OZ-500	Page / column
SUBSYSTEM 2_1_DC + Contactor K1 is on			-DI_02	8	1		+.4-306K1	14				&EFS+/129.0
SUBSYSTEM 2_2_DC + Contactor K2 is on			+.4-306K3	14	2		-DI_02	10				&EFS+/129.2
SUBSYSTEM 2_1_DC -Contactor K7 is on			+.4-306K2	14	3		-DI_02	9				&EFS+/129.1
SUBSYSTEM 2_2_DC -Contactor K8 is on			+.4-306K4	14	4		-DI_02	11				&EFS+/129.3
SUBSYSTEM 2_3_DC + Contactor K3 is on			-DI_02	12	5		+.4-306K5	14				&EFS+/129.4
SUBSYSTEM 2_3_DC + SPARE			-DI_02	14	6							&EFS+/129.6
SUBSYSTEM 2_3_DC -Contactor K9 is on			-DI_02	13	7		+.4-306K6	14				&EFS+/129.5
SUBSYSTEM 2_DC -SPARE			-DI_02	15	8							&EFS+/129.7
SUBSYSTEM 2_1_DC FUSE OK			-DI_02	16	9		++CONV+CIR-231U1-X3.1	13		13		&EFS+/129.8
SUBSYSTEM 2_2_DC FUSE OK					10		++CONV+CIR-231U1-X3.1	16		16		&EFS+/129.9
SUBSYSTEM 2_2_DC FUSE OK			-DI_03	1	11		++CONV+CIR-231U1-X3.1	14		14		&EFS+/129.9
=			-XDC4	1	12							&EFS+/129.9

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Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.3-X3.11

Rückmeldung DC Schütze Subsystem 1_4

Function text	Cable name	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type	Cable name	Cable type	++CONV-231W4	++CONV-227W4	Page / column
												OZ-500	OZ-500	
SUBSYSTEM 3_1_DC + Contactor K1 is on			-DI_03	2	1		+.4-307K1	14						&EFS+/130.0
SUBSYSTEM 3_2_DC + Contactor K2 is on			+.4-307K3	14	2		-DI_03	4						&EFS+/130.2
SUBSYSTEM 3_1_DC -Contactor K7 is on			+.4-307K2	14	3		-DI_03	3						&EFS+/130.1
SUBSYSTEM 3_2_DC -Contactor K8 is on			+.4-307K4	14	4		-DI_03	5						&EFS+/130.3
SUBSYSTEM 3_3_DC + Contactor K3 is on			-DI_03	6	5		+.4-307K5	14						&EFS+/130.4
SUBSYSTEM 3_DC + SPARE			-DI_03	8	6									&EFS+/130.6
SUBSYSTEM 3_3_DC -Contactor K9 is on			-DI_03	7	7		+.4-307K6	14						&EFS+/130.5
SUBSYSTEM 3_DC -SPARE			-DI_03	9	8									&EFS+/130.7
SUBSYSTEM 2_DC FUSE OK			-DI_03	10	9		++CONV+CIR-231U1-X3.1	15				15		&EFS+/130.8
SUBSYSTEM 3_1_DC FUSE OK					10									&EFS+/130.9
SUBSYSTEM 3_1_DC FUSE OK			-DI_03	11	11		++CONV+CIR-227U1-X3.1	13					13	&EFS+/130.9
=			-XDC4	2	12									&EFS+/130.9

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| | | | | | | | | | | | | | |

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.3-X3.12

Rückmeldung DC Schütze Subsystem 1_4

Function text	Cable name	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type	Cable name ++CONV-227W4	OZ-500	Page / column
SUBSYSTEM 4_1_DC + Contactor K1 is on			-DI_03	12	1		+.4-308K1	14				&EFS+/131.0
SUBSYSTEM 4_2_DC + Contactor K2 is on			+.4-308K3	14	2		-DI_03	14				&EFS+/131.2
SUBSYSTEM 4_1_DC -Contactor K7 is on			+.4-308K2	14	3		-DI_03	13				&EFS+/131.1
SUBSYSTEM 4_2_DC -Contactor K8 is on			+.4-308K4	14	4		-DI_03	15				&EFS+/131.3
SUBSYSTEM 4_3_DC + Contactor K3 is on			-DI_03	16	5		+.4-308K5	14				&EFS+/131.4
SUBSYSTEM 4_DC + SPARE			-DI_05	2	6							&EFS+/131.6
SUBSYSTEM 4_3_DC -Contactor K9 is on			-DI_05	1	7		+.4-308K6	14				&EFS+/131.5
SUBSYSTEM 4_DC -SPARE			-DI_05	3	8							&EFS+/131.7
SUBSYSTEM 3_2_DC FUSE OK			-DI_05	4	9		++CONV+CIR-227U1-X3.1	14		14		&EFS+/131.8
SUBSYSTEM 3_3_DC FUSE OK					10		++CONV+CIR-227U1-X3.1	16		16		&EFS+/131.9
=			-DI_05	5	11		++CONV+CIR-227U1-X3.1	15		15		&EFS+/131.9
SUBSYSTEM 3_3_DC FUSE OK			-XDC4	2	12							&EFS+/131.9

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Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.3-X3.13

Rückmeldung DC Schütze Subsystem 1_6

Function text	Cable name	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type	Cable name ++CONV-237W4	OZ-500	Page / column
			-DI_05	6	1							&EFS+/132.0
					2		-DI_05	8				&EFS+/132.2
					3		-DI_05	7				&EFS+/132.1
					4		-DI_05	9				&EFS+/132.3
			-DI_05	10	5							&EFS+/132.4
			-DI_05	12	6							&EFS+/132.6
			-DI_05	11	7							&EFS+/132.5
SUBSYSTEM 4_1_DC FUSE OK			-DI_05	13	8		++CONV+CIR-237U1-X3.1	13		13		&EFS+/132.7
SUBSYSTEM 4_2_DC FUSE OK			-DI_05	14	9		++CONV+CIR-237U1-X3.1	14		14		&EFS+/132.8
SUBSYSTEM 4_3_DC FUSE OK					10		++CONV+CIR-237U1-X3.1	16		16		&EFS+/132.9
=			-DI_05	15	11		++CONV+CIR-237U1-X3.1	15		15		&EFS+/132.9
SUBSYSTEM 4_3_DC FUSE OK			-XDC4	2	12							&EFS+/132.9

previous page: 2006

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Editor	Freqcon_DG			Statron		Klemmenplan =UNIT_01++CT+CTRL_1.3-X3.13	20241203_V1.22	= UNIT_01 Converter Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets page: 2007
Date								+ CTRL_1.3 Main mounting plate total: 500

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.3-X5

Kleinspannungssignale

Function text				Cable name	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name	++CONV-145W1	++CONV-145W2	++CONV-145W3	++CONV-145W4	++CONV-146W1	++CONV-146W2	++CONV-146W3	++CONV-146W4	++CONV-147W1			Page / column
				Cable type							Cable type	F-CY-OZ (LIY-CY)	F-CY-OZ (LIY-CY)	F-CY-OZ (LIY-CY)	F-CY-OZ (LIY-CY)	F-CY-OZ (LIY-CY)	F-CY-OZ (LIY-CY)	F-CY-OZ (LIY-CY)	F-CY-OZ (LIY-CY)	F-CY-OZ (LIY-CY)			
INDUCTOR GRID PHASE L1 TEMPERATURE 1_1					-AI_01	1	1	,	++CONV+IND-201L1			1											&EFS+/145.1
								,															
								,															
INDUCTOR GRID PHASE L1 TEMPERATURE 1_1					-AI_01	9	2	,	++CONV+IND-201L1			2											&EFS+/145.1
INDUCTOR GRID PHASE L2 TEMPERATURE 1_2					-AI_01	2	3	,	++CONV+IND-202L1				1										&EFS+/145.3
								,															
								,															
INDUCTOR GRID PHASE L2 TEMPERATURE 1_2					-AI_01	10	4	,	++CONV+IND-202L1				2										&EFS+/145.3
INDUCTOR GRID PHASE L3 TEMPERATURE 1_3					-AI_01	3	5	,	++CONV+IND-203L1					1									&EFS+/145.5
								,															
								,															
								,															
								,															
INDUCTOR GRID PHASE L3 TEMPERATURE 1_3					-AI_01	11	6	,	++CONV+IND-203L1					2									&EFS+/145.5
INDUCTOR DC SUB 2_1 TEMPERATURE 2_1					-AI_01	4	7	,	++CONV+IND-211L1.1						1								&EFS+/145.7
								,															
								,															
INDUCTOR DC SUB 2_1 TEMPERATURE 2_1					-AI_01	12	8	,	++CONV+IND-211L1.1						2								&EFS+/145.7
INDUCTOR DC SUB 2_2 TEMPERATURE 2_2					-AI_01	5	9	,	++CONV+IND-211L1.2							1							&EFS+/146.1
								,															
								,															
INDUCTOR DC SUB 2_2 TEMPERATURE 2_2					-AI_01	13	10	,	++CONV+IND-211L1.2							2							&EFS+/146.1
INDUCTOR DC SUB 2_3 TEMPERATURE 2_3					-AI_01	6	11	,	++CONV+IND-211L1.3								1						&EFS+/146.3
								,															
								,															
INDUCTOR DC SUB 2_3 TEMPERATURE 2_3					-AI_01	14	12	,	++CONV+IND-211L1.3								2						&EFS+/146.3
INDUCTOR DC SUB 3_1 TEMPERATURE 3_1					-AI_01	7	13	,	++CONV+IND-207L1.1									1					&EFS+/146.5
								,															
								,															
INDUCTOR DC SUB 3_1 TEMPERATURE 3_1					-AI_01	15	14	,	++CONV+IND-207L1.1									2					&EFS+/146.5
INDUCTOR DC SUB 3_2 TEMPERATURE 3_2					-AI_01	8	15	,	++CONV+IND-207L1.2										1				&EFS+/146.7
								,															
								,															
INDUCTOR DC SUB 3_2 TEMPERATURE 3_2					-AI_01	16	16	,	++CONV+IND-207L1.2										2				&EFS+/146.7
INDUCTOR DC SUB 3_3 TEMPERATURE 3_3					-AI_02	1	17	,	++CONV+IND-207L1.3											1			&EFS+/147.1
								,															
								,															

previous page: 2007

next page: 2009

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.3-X5

Kleinspannungssignale

Function text				Cable name	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name	++CONV-147W1	++CONV-147W2	-181W3	++CONV-148W1	++CONV-148W2							Page / column
				Cable type							Cable type	F-CY-OZ (LIY-CY)	F-CY-OZ (LIY-CY)	F-CY-OZ (LIY-CY)	F-CY-OZ (LIY-CY)	F-CY-OZ (LIY-CY)							
INDUCTOR DC SUB 3_3 TEMPERATURE 3_3					-AI_02	9	18	,	++CONV+IND-207L1.3			2											&EFS+/147.1
INDUCTOR DC SUB 4_1 TEMPERATURE 4_1					-AI_02	2	19	,	++CONV+IND-217L1.1				1										&EFS+/147.3
								,															
								,															
INDUCTOR DC SUB 4_1 TEMPERATURE 4_1					-AI_02	10	20	,	++CONV+IND-217L1.1				2										&EFS+/147.3
CONVERTER CABINET TEMPERATURE					-AI_02	4	21	,	++CONV+CON-147B2	+													&EFS+/147.7
								,															
								,															
CONVERTER CABINET TEMPERATURE					-AI_02	12	22	,	++CONV+CON-147B2	-													&EFS+/147.7
COOLING WATER TEMPERATURE					-AI_02	5	23	,	++FAN-52G1-181X3	4				4									&EFS+/148.1
								,															
COOLING WATER TEMPERATURE					-AI_02	5	23	,	++FAN-52G1-181X3	4				4									&EFS+/148.1
								,															
								,															
COOLING WATER TEMPERATURE					-AI_02	13	24	,	++FAN-52G1-181X3	5				5									&EFS+/148.1
INDUCTOR DC SUB 4_2 TEMPERATURE 4_2					-AI_02	6	25	,	++CONV+IND-217L1.2						1								&EFS+/148.3
								,															
								,															
INDUCTOR DC SUB 4_2 TEMPERATURE 4_2					-AI_02	14	26	,	++CONV+IND-217L1.2						2								&EFS+/148.3
CIR CABINET TEMPERATURE					-AI_02	7	27	,	++CONV+CIR-148B3	+													&EFS+/148.5
								,															
								,															
CIR CABINET TEMPERATURE					-AI_02	15	28	,	++CONV+CIR-148B3	-													&EFS+/148.5
INDUCTOR DC SUB 4_3 TEMPERATURE 4_3					-AI_02	8	29	,	++CONV+IND-217L1.3							1							&EFS+/148.7
								,															
								,															
INDUCTOR DC SUB 4_3 TEMPERATURE 4_3					-AI_02	16	30	,	++CONV+IND-217L1.3							2							&EFS+/148.7

previous page: 2008

next page: 2010

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_01++CT+CTRL_1.3-X5	20241203_V1.22	= UNIT_01 Converter Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets page: 2009
Date								+ CTRL_1.3 Main mounting plate total: 500

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.3-X5.1

DC Subsystem Spannungsmessung

Function text	Cable name	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type	Cable name	Page / column
DC_SUBSYSTEM 2_1.1 voltage			-AI_03	5	1		-AI_04	6			&EFS+/149.0
			-XDC1	6							
			-AI_03	6							
DC_SUBSYSTEM 2_3.1 voltage			-AI_03	7	2		+.4-149U1	14			&EFS+/149.2
			-AI_04	5							
			-AI_03	8							

previous page: 2009

next page: 2011

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.3-150X1

Subsysteme DC Schütz EIN

Function text			++CONV-231W4	Cable name	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name	++CONV-231W4	Page / column
			OZ-500	Cable type							Cable type	OZ-500	
SUBSYSTEM 2_1 CONTACTOR DC+ ON			1		++CONV+CIR-231U1-X3.1	1	1	,	-150K1	14			&EFS+/150.2
								,					
								,					
SUBSYSTEM 2_1 CONTACTOR DC+ ON					-195K2	23	2	,	++CONV+CIR-231U1-X3.1	17		17	&EFS+/150.2
SUBSYSTEM 2_1 CONTACTOR DC-ON			4		++CONV+CIR-231U1-X3.1	4	3	,	-150K2	14			&EFS+/150.4
								,					
								,					
SUBSYSTEM 2_2 CONTACTOR DC+ ON			2		++CONV+CIR-231U1-X3.1	2	4	,	-151K1	14			&EFS+/151.1
=					-151K1	A2	5	,					&EFS+/151.1
								,					
								,					
								,					
SUBSYSTEM 2_3 CONTACTOR DC+ ON			5		++CONV+CIR-231U1-X3.1	5	6	,	-151K2	14			&EFS+/151.3
=			3		++CONV+CIR-231U1-X3.1	3	7	,	-151K3	14			&EFS+/151.4
								,					
								,					
SUBSYSTEM 2_3 CONTACTOR DC+ ON					-151K2	A2	8	,					&EFS+/151.4
SUBSYSTEM 2_3 CONTACTOR DC-ON			6		++CONV+CIR-231U1-X3.1	6	9	,	-151K4	14			&EFS+/151.6
								,					
								,					
SUBSYSTEM 2_3 CONTACTOR DC-ON							10	,					&EFS+/151.6

previous page: 2010

next page: 2012

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_01++CT+CTRL_1.3-150X1	20241203_V1.22	= UNIT_01 Converter Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets page: 2011
Date								+ CTRL_1.3 Main mounting plate total: 500

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.3-XDC1

Steuerspannung 24VDC (USV) DC1

Function text	-240W9	1Z-500	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Page / column
FUSE 24V DC CONTROL VOLTAGE	1		+CTRL_2.1-240U1	1	1		-103F1	2	&EFS+/103.2
			+CTRL_2.1-160U1	+					
			+.2-18B1	40					
FUSE 24V DC CONTROL VOLTAGE			-DO_01	L+	2		-101Q1	13	&EFS+/103.2
			-AI_01	L+					
			+.1-126S1	13					
FUSE 24V DC CONTROL VOLTAGE			-136K7	11	3		-103F1	13	&EFS+/103.2
			-84F2	13					
Main PLC, SPS, 24V contacts CONTROL VOLTAGE	2		+CTRL_2.1-240U1	3	4		-102G1	OUTPUT DC 24 V:-	&EFS+/103.3
			-120A1	-X80:2					
			-DI_01	M					
Main PLC, SPS, 24V contacts CONTROL VOLTAGE			-DO_01	M	5		+CTRL_2.1-160U1	-	&EFS+/103.3
			-AI_01	M					
			+.2-18B1	42					
Main PLC, SPS, 24V contacts CONTROL VOLTAGE			-84K1	A2	6		-X5.1	1	&EFS+/103.3
			+.1-140H1	X2					
			+.2-110U1	M					
Main PLC, SPS, 24V contacts CONTROL VOLTAGE			-AI_04	7	7				&EFS+/103.3
			-XDC2	3					
			-X3	25					
Main PLC, SPS, 24V contacts CONTROL VOLTAGE	GNYE		+CTRL_2.1-240U1	2	PE		-101T1	PE	&EFS+/103.4

previous page: 2011

next page: 2013

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.3-XDC1

Steuerspannung 24VDC (USV) DC1

Function text	-241W9	-112W1	-242W9	Cable name	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name	-243W9	Page / column
	1Z-500	1Z-500	1Z-500	Cable type								1Z-500	
					-XE	PE:1							
					-101T1	-"							
Main PLC, SPS, 24V contacts CONTROL VOLTAGE					+.2-18B1	41	PE	,	+CTRL_2.1-243U1	2		GNYE	&EFS+/103.4
			GNYE		+CTRL_2.1-242U1	2							
		GNYE			+.1-112A1	PE							
	GNYE				+CTRL_2.1-241U1	2							

previous page: 2012

next page: 2014

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_01++CT+CTRL_1.3-XDC1	20241203_V1.22	= UNIT_01 Converter Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets — page: 2013
Date								+ CTRL_1.3 Main mounting plate — total: 500

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.3-XDC2

Steuerspannung 24VDC (USV) DC2

Function text	-241W9 / JZ-500	-242W9 / JZ-500	-243W9 / JZ-500	Cable name / Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
Main PLC, SPS, 24V contacts CONTROL VOLTAGE			1		+CTRL_2.1-243U1	1	1		-103F2	2		&EFS+/103.4
		1			+CTRL_2.1-242U1	1						
					-X3	29						
BSU, SPARE CONTROL VOLTAGE	1				+CTRL_2.1-241U1	1	2					&EFS+/103.5

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next page: 2015

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_01++CT+CTRL_1.3-XDC2	20241203_V1.22	= UNIT_01 Converter Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets — page: 2014
Date								+ CTRL_1.3 Main mounting plate — total: 500

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.3-XDC2

Steuerspannung 24VDC (USV) DC2

Function text	-243W9 / 1Z-500	-242W9 / 1Z-500	-112W1 / 1Z-500	Cable name / Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
			1		+.1-112A1	L+						
BSU, SPARE CONTROL VOLTAGE					-186K1	A2	3		-XDC1	7		&EFS+/103.5
		2			+CTRL_2.1-242U1	3						
	2				+CTRL_2.1-243U1	3						

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Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_01++CT+CTRL_1.3-XDC2	20241203_V1.22	= UNIT_01 Converter Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets — page: 2015
Date								+ CTRL_1.3 Main mounting plate — total: 500

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.3-XDC2

Steuerspannung 24VDC (USV) DC2

Function text		-112W1	-241W9	Cable name	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name	Page / column
		1Z-500	1Z-500	Cable type							Cable type	
BSU, SPARE CONTROL VOLTAGE			2		+CTRL_2.1-241U1	3	4	⌟	-XDC3	3		&EFS+/103.5
					-138K1	A2						
		2			+.1-112A1	M						
								'				
								'				

previous page: 2015

next page: 2017

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_01++CT+CTRL_1.3-XDC2	20241203_V1.22	= UNIT_01 Converter Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets — page: 2016
Date								+ CTRL_1.3 Main mounting plate — total: 500

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.3-XDC3

Steuerspannung 24VDC (USV) DC3

Function text	Cable name	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type	Cable name	Page / column
BSU, SPARE CONTROL VOLTAGE			-111A1	3	1		-103F3	2			&EFS+/103.6
			-173K3	21							
			+.2-114A1	-X80:1							
BSU, SPARE CONTROL VOLTAGE			-X3	31	2		+.4-306K1	11			&EFS+/103.6
			-195K1	83							
			-115A1	V+							
PRECHARGE CONTROL VOLTAGE			-X3	32	3		-XDC2	4			&EFS+/103.7
			-111A1	4							
			+.2-114A1	-X80:2							
PRECHARGE CONTROL VOLTAGE			-195K1	43	4		-XDC4	3			&EFS+/103.7
			+.4-171K1	x2							
			-115A1	V-							

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Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_01++CT+CTRL_1.3-XDC3	20241203_V1.22	=	UNIT_01	Converter Container 1	
Date	05.11.2024							&	EMZ	Terminals	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore				++	CT	Control cabinets	page: 2017
Date							10354_23A2007	+	CTRL_1.3	Main mounting plate	total: 500

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.3-XDC4

Steuerspannung 24VDC (USV) DC4

Function text	Cable name	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type	Cable name	Page / column
PRECHARGE CONTROL VOLTAGE			-195K1	33	1		-103F4	2			&EFS+/103.8
			-195K3	A1							
			-X3.10	12							
PRECHARGE CONTROL VOLTAGE			-X3.11	12	2		-X3.13	12			&EFS+/103.8
			-X3	5							
			-X3.12	12							
DC CONTACTORS, RELAYS, CONTROL VOLTAGE			-139K2	A2	3		-XDC3	4			&EFS+/103.9
			-195K3	A2							
			-195K1	23							
DC CONTACTORS, RELAYS, CONTROL VOLTAGE			-X3	21	4						&EFS+/103.9
			+.4-306K1	A2							

previous page: 2017

next page: 2019

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.3-XDC5.1

Steuerspannung 24VDC (USV) DC5.1

Function text	Cable name	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type	Cable name	Page / column
DC CONTACTORS, RELAYS, CONTROL VOLTAGE			-186K1	1	1	,	-103F5	2			&EFS+/103.9
			-186K1	3							
						,					
						,					

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2018

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2020

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_01++CT+CTRL_1.3-XDC5.1	20241203_V1.22	= UNIT_01 Converter Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets — page: 2019
Date								+ CTRL_1.3 Main mounting plate — total: 500

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.3-XDC5.2

Steuerspannung 24VDC (USV) DC5.2

Function text	Cable name	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type	Cable name	Page / column
DC CONTACTORS, RELAYS, CONTROL VOLTAGE			+.2-110U1	+24V	1	,	-186K1	2			&EFS+/103.9
			-120A1	-X80:1							
			-DI_01	L+							
						,					
						,					

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next page: 2021

Editor	Freqcon_DG	Statron	FREQCON	Klemmenplan =UNIT_01++CT+CTRL_1.3-XDC5.2	20241203_V1.22	= UNIT_01	Converter Container 1
Date	05.11.2024					& EMZ	Terminals
Proved by		Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets page: 2020
Date						+ CTRL_1.3	Main mounting plate total: 500

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.3-XE

Hauptstromversorgung 400V AC

Function text	Cable name	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type	Cable name	Page / column
					1		-84F2	2			&EFS+/84.0
1-6					1						&EFA+++/2a.4
Supply Control Cabinet 3-phase 400V AC					N		-X1	7			&EFS+/84.1
=			-191XT1	4	N		-XT	2			&EFS+/84.1
=			-190F3	N	N		-191XT1	8			&EFS+/84.2
=			-190F2	N	N		-190F1	N			&EFS+/84.2
=					PE						&EFS+/84.2
=			-84F1	PE	PE		-XDC1	PE			&EFS+/84.2
=				PE	PE						&EFS+/84.3
			-101Q1	1	2		-190F2	1			&EFS+/84.0
					3		-84F2	4			&EFS+/84.0
Supply Control Cabinet 3-phase 400V AC			-101Q1	3	4		-190F3	1			&EFS+/84.1
=					5		-84F2	6			&EFS+/84.1
=			-101Q1	5	6		-190F1	1			&EFS+/84.1

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next page: 2022

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_01++CT+CTRL_1.3-XE	20241203_V1.22	= UNIT_01 Converter Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets page: 2021
Date								+ CTRL_1.3 Main mounting plate total: 500

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.3-XT

Transfer Klemmenblock 24VDC/230VAC

Function text	-278W1	++CONV-281W1	++CONV-279W1	Cable name	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name	++CONV-279W1	++CONV-281W1	-278W1								Page / column
	1Z-500	1Z-500	1Z-500	Cable type							Cable type	1Z-500	1Z-500	1Z-500								
CON Fans 1-5 in door			1		++CONV+CON-279M1	L	1		-135K1	14												&EFS+/183.1
CON Fans 1-5 in door			2		++CONV+CON-279M1	N	2		-XE	N:1												&EFS+/183.1
=							PE		++CONV+CON-279M1	PE		GNYE										&EFS+/183.1
=		1			++CONV+CIR-281M1	L	3		-135K3	14												&EFS+/183.3
CIR Fans 1-3 in door		2			++CONV+CIR-281M1	N	4															&EFS+/183.4
=							PE		++CONV+CIR-281M1	PE			GNYE									&EFS+/183.4
FAN 1 CONTROL CABINET	1				+.1-278M1	L	5		-135K2	14												&EFS+/185.1
FAN 1 CONTROL CABINET	2				+.1-278M1	N	6															&EFS+/185.1
=							PE		+.1-278M1	PE			GNYE									&EFS+/185.1

previous page: 2021

next page: 2023

| | | | | | | | | | | | | | | | | | | |

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.3-XT

Transfer Klemmenblock 24VDC/230VAC

Function text	++CONV-80W2	-185W1	Cable name	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name	-185W1	++CONV-80W2	Page / column
	1Z-500	1Z-500	Cable type							Cable type	1Z-500	1Z-500	
HEATING CONTROL CABINET		1		+.2-185R1	1	7		-185B1	2				&EFS+/185.7
HEATING CONTROL CABINET		2		+.2-185R1	2	8							&EFS+/185.7
=						PE		+.2-185R1	PE		GNYE		&EFS+/185.7
230V AC for Circuit Breaker 1	1			++CONV+CIR-80Q1	X5_2	9		-187F1	2				&EFS+/187.1
230V AC for Circuit Breaker 1	2			++CONV+CIR-80Q1	X5_1	10							&EFS+/187.1
=						PE						GNYE	&EFS+/187.1
230V AC for Circuit Breaker Optional						11							&EFS+/187.2
230V AC for Circuit Breaker Optional						12							&EFS+/187.2
=						PE							&EFS+/187.2
24V DC for Circuit Breaker 2 Optional						13		-187F2	2				&EFS+/187.4
24V DC for Circuit Breaker 2 Optional						14		-101T1	-'				&EFS+/187.4
24V DC for Circuit Breaker Optional						15							&EFS+/187.5
24V DC for Circuit Breaker Optional						16							&EFS+/187.5

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next page: 2024

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_01++CT+CTRL_1.3-XT	20241203_V1.22
Date	05.11.2024						
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007
Date							

=	UNIT_01	Converter Container 1		
&	EMZ	Terminals		
++	CT	Control cabinets	page:	2023
+	CTRL_1.3	Main mounting plate	total:	500

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.3-190XT1

230VAC Beleuchtung/Klimaanlage Container/Schrank

Function text			+.5-190H1-W1	Cable name	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type	Cable name	Page / column
				Cable type									
SPARE							1	,	-190F1	2			&EFS+/190.1
								,					
SPARE							2	,	-190F1	N.			&EFS+/190.1
								,					
SPARE							PE	,					&EFS+/190.1
								,					
SPARE							3	,	-190F2	2			&EFS+/190.3
								,					
SPARE							4	,	-190F2	N.			&EFS+/190.3
								,					
SPARE							PE	,					&EFS+/190.3
								,					
SPARE							PE	,					&EFS+/190.3
								,					
Light Control cabinet			BN		+.5-190H1		5	,	-190F3	2			&EFS+/190.5
								,					
Light Control cabinet							PE	,	-190X10	PE			&EFS+/190.5
								,					
Light Control cabinet			LBU		+.5-190H1		6	,	-190F3	N.			&EFS+/190.5
								,					
230V AC for Container light, socket							7	,	-190X10	1			&EFS+/190.7
								,					
230V AC for Container light, socket							8	,	-190X10	2			&EFS+/190.7
								,					
230V AC for Container light, socket							PE	,					&EFS+/190.7
								,					

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Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_01++CT+CTRL_1.3-191XT1					Cable name												Page / column
				Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
400V AC for Container Air Conditioning 1							1	,	-191F1	2												&EFS+/191.1
=							2	,	-191F1	4												&EFS+/191.1
=							3	,	-191F1	6												&EFS+/191.1
=							4	,	-XE	N:2												&EFS+/191.2
=							PE	,														&EFS+/191.2
400V AC for Container Air Conditioning 2							5	,	-191F2	2												&EFS+/191.3
=							6	,	-191F2	4												&EFS+/191.3
=							7	,	-191F2	6												&EFS+/191.3
=							8	,	-XE	N:1												&EFS+/191.4
=							PE	,														&EFS+/191.4

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Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_01++CT+CTRL_1.3-191XT1	20241203_V1.22	= UNIT_01 Converter Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets page: 2025
Date								+ CTRL_1.3 Main mounting plate total: 500

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.3-XV

Suppression TVS Diode

Function text	Cable name	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type	Cable name	Page / column
Suppression TVS Diode bi-directional 47 V					1		-171K3	14			&EFS+/171.8
Suppression TVS Diode bi-directional 47 V					5						&EFS+/151.7
Suppression TVS Diode bi-directional 47 V					6						&EFS+/151.7
Suppression TVS Diode bi-directional 47 V					7						&EFS+/151.7
Suppression TVS Diode bi-directional 47 V					8						&EFS+/151.8
Suppression TVS Diode bi-directional 47 V					9						&EFS+/134.5
Suppression TVS Diode bi-directional 47 V					2		-173K3	14			&EFS+/173.9
Suppression TVS Diode bi-directional 47 V					3						&EFS+/150.7
Suppression TVS Diode bi-directional 47 V					4						&EFS+/150.7

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Editor	Freqcon_DG	Statron	FREQCON	Klemmenplan =UNIT_01++CT+CTRL_1.3-XV	20241203_V1.22	= UNIT_01	Converter Container 1
Date	05.11.2024					& EMZ	Terminals
Proved by		Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets page: 2026
Date						+ CTRL_1.3	Main mounting plate total: 500

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.3-XV

Suppression TVS Diode

Function text				Cable name	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name												Page / column
				Cable type							Cable type												

Terminal-strip overview

F14_001

Terminal strip	Terminal strip definition text	Terminals					Graphical page of terminal diagrams
		first	last	Total PE	Total N	Total number	
-350X1.21	Subsysteme DC Schütz EIN	1	19	0	0	38	=UNIT_01&EMZ++CT+CTRL_1.4/2000
-XE2	Gleichstromversorgung 1000VDC	1	11	0	0	11	=UNIT_01&EMZ++CT+CTRL_1.4/2002
-XV.20		1	12	0	0	48	=UNIT_01&EMZ++CT+CTRL_1.4/2003

previous page:
+.3/2027

next page:
2000

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.4-350X1.21

Subsysteme DC Schütz EIN

Function text		++CONV-237W4 OZ-500	++CONV-227W4 OZ-500	Cable name Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name Cable type	++CONV-227W4 OZ-500	++CONV-237W4 OZ-500	Page / column
SUBSYSTEM 3_1 CONTACTOR DC+ ON			1		++CONV+CIR-227U1-X3.1	1	1	,	-350K1	14				&EFS+/350.2
								,						
								,						
SUBSYSTEM 3_1 CONTACTOR DC+ ON					-350K1	A2	2	,	++CONV+CIR-227U1-X3.1	17		17		&EFS+/350.2
SUBSYSTEM 3_1 CONTACTOR DC-ON			4		++CONV+CIR-227U1-X3.1	4	3	,	-350K2	14				&EFS+/350.4
								,						
								,						
			2		++CONV+CIR-227U1-X3.1	2	4	,	-351K1	14				&EFS+/351.1
					+.3-195K2	43	5	,						&EFS+/351.1
								,						
								,						
								,						
								,						
SUBSYSTEM 3_3 CONTACTOR DC+ ON			5		++CONV+CIR-227U1-X3.1	5	6	,	-351K2	14				&EFS+/351.3
=			3		++CONV+CIR-227U1-X3.1	3	7	,	-351K3	14				&EFS+/351.4
								,						
								,						
SUBSYSTEM 3_3 CONTACTOR DC-ON							8	,						&EFS+/351.5
=			6		++CONV+CIR-227U1-X3.1	6	9	,	-351K4	14				&EFS+/351.6
								,						
								,						
SUBSYSTEM 3_3 CONTACTOR DC-ON							10	,						&EFS+/351.7
SUBSYSTEM 4_3 CONTACTOR DC-ON							10	,						&EFS+/353.6
SUBSYSTEM 4_1 CONTACTOR DC+ ON		1			++CONV+CIR-237U1-X3.1	1	11	,	-352K1	14				&EFS+/352.1
SUBSYSTEM 4_1 CONTACTOR DC-ON					-352K1	A2	12	,	++CONV+CIR-237U1-X3.1	17			17	&EFS+/352.2
=		4			++CONV+CIR-237U1-X3.1	4	13	,	-352K2	14				&EFS+/352.3
								,						
								,						
SUBSYSTEM 4_2 CONTACTOR DC+ ON		2			++CONV+CIR-237U1-X3.1	2	14	,	-353K1	14				&EFS+/353.1
=					-353K1	A2	15	,						&EFS+/353.1
								,						
								,						
SUBSYSTEM 4_3 CONTACTOR DC+ ON		5			++CONV+CIR-237U1-X3.1	5	16	,	-353K2	14				&EFS+/353.3
=		3			++CONV+CIR-237U1-X3.1	3	17	,	-353K3	14				&EFS+/353.4
								,						
								,						
SUBSYSTEM 4_3 CONTACTOR DC+ ON					-353K2	A2	18	,						&EFS+/353.4

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Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.4-350X1.21

Subsysteme DC Schütz EIN

Function text			++CONV-237W4	Cable name	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name	Page / column
			0Z-500	Cable type							Cable type	
SUBSYSTEM 4_3 CONTACTOR DC-ON			6		++CONV+CIR-237U1-X3.1	6	19	,	-353K4	14		&EFS+/353.6
								,				
								,				

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2002

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_01++CT+CTRL_1.4-350X1.21	20241203_V1.22
Date	05.11.2024						
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007
Date							

=	UNIT_01	Converter Container 1	
&	EMZ	Terminals	
++	CT	Control cabinets	page: 2001
+	CTRL_1.4	Right side	total: 500

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.4-XE2

Gleichstromversorgung 1000VDC

Function text	Cable name	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type	Cable name	Page / column
RESISTORS FOR DISCHARGING UDC+			-173R2		1		-173R1				&EFS+/173.2
RESISTORS FOR DISCHARGING UDC-			-173R4		2		-173R3				&EFS+/173.3
=			-173R4		3		+CTRL_2.1-160U1	15			&EFS+/173.3
=			-173R2		4		+CTRL_2.1-160U1	44			&EFS+/173.3
=			+CTRL_2.1-162U1	15	5		+CTRL_2.1-161U1	15			&EFS+/173.3
=			+CTRL_2.1-162U1	44	6		+CTRL_2.1-161U1	44			&EFS+/173.3
=			+CTRL_2.1-163U1	15	7		-189X1	4			&EFS+/173.4
=			+CTRL_2.1-163U1	44	8		+CTRL_2.1-164U1	44			&EFS+/173.4
=			+CTRL_2.1-164U1	15	9		++CONV+CON-N	N			&EFS+/173.4
=					10		+CTRL.4-173R6				&EFS+/173.5
=					11		+CTRL.4-173R8				&EFS+/173.5

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Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_01++CT+CTRL_1.4-XE2	20241203_V1.22	= UNIT_01 Converter Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets — page: 2002
Date								+ CTRL_1.4 Right side — total: 500

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_1.4-XV.20

Function text	Cable name	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type	Cable name	Page / column
Suppression TVS Diode bi-directional 47 V					1						&EFS+/350.7
Suppression TVS Diode bi-directional 47 V					2						&EFS+/350.7
Suppression TVS Diode bi-directional 47 V					3						&EFS+/351.7
Suppression TVS Diode bi-directional 47 V					4						&EFS+/351.7
Suppression TVS Diode bi-directional 47 V					5						&EFS+/351.8
Suppression TVS Diode bi-directional 47 V					6						&EFS+/351.8
Suppression TVS Diode bi-directional 47 V					7						&EFS+/352.7
Suppression TVS Diode bi-directional 47 V					8						&EFS+/352.7
Suppression TVS Diode bi-directional 47 V					9						&EFS+/353.7

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Editor	Freqcon_DG	Statron	FREQCON	Klemmenplan =UNIT_01++CT+CTRL_1.4-XV.20	20241203_V1.22	= UNIT_01	Converter Container 1
Date	05.11.2024					& EMZ	Terminals
Proved by		Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets
Date						+ CTRL_1.4	Right side

page: 2003

total: 500

Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_01++CT+CTRL_1.4-XV.20						Cable name												Page / column
				Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
Suppression TVS Diode bi-directional 47 V							10																&EFS+/353.7
Suppression TVS Diode bi-directional 47 V							11																&EFS+/353.7
Suppression TVS Diode bi-directional 47 V							12																&EFS+/353.8

Terminal-strip overview

F14_001

Terminal strip	Terminal strip definition text	Terminals					Graphical page of terminal diagrams
		first	last	Total PE	Total N	Total number	
-149X1		1	6	0	0	6	=UNIT_01&EMZ++CT+CTRL_2.1/2000

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+CTRL_1.4/2004

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2000

Editor	Freqcon_DG			Statron	FREQCON	Klemmenleistenübersicht : =UNIT_01++CT+CTRL_2.1-149X1 - =UNIT_01++CT+CTRL_2.1-149X1	20241203_V1.22	= UNIT_01	Converter Container 1	
Date	05.11.2024							& EMZ	Terminals	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT	Control cabinets	page: 1000
Date								+ CTRL_2.1	Cabinet door	total: 500

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_01++CT+CTRL_2.1-149X1

Function text				Cable name	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name	Page / column
				Cable type							Cable type	
					-161U1	19	1	,				&EFS+/161.4
					-161U1	23	2	,				&EFS+/161.5
					-161U1	27	3	,				&EFS+/161.5
					-161U1	32	4	,				&EFS+/161.6
					-161U1	36	5	,				&EFS+/161.7
					-161U1	40	6	,				&EFS+/161.8

Terminal-strip overview

F14_001

Terminal strip	Terminal strip definition text	Terminals					Graphical page of terminal diagrams
		first	last	Total PE	Total N	Total number	
-52G1-181X1	400VAC Wassersystem	1	PE	3	1	14	=UNIT_01&EMZ++FAN/2000
-52G1-181X3		1	GND	0	0	10	=UNIT_01&EMZ++FAN/2001

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++CT+CTRL_2.1/2000

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Terminal diagram

Freqcon_F13_001_02

Function text	-52G1-182W1	-52G1-181W5	-52G1-181W2	Cable name	Strip =UNIT_01++FAN+-52G1-181X1 400VAC Wassersystem						Cable name	++CT-181W1											Page / column
	1Z-600	1Z-600	1Z-600	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type	1Z-600											
PUMP			1		-52G1-181M1	U1	1	,	++CT+CTRL_1.3-X1	1		1											&EFS++CT/181.1
=			2		-52G1-181M1	V1	2	,	++CT+CTRL_1.3-X1	2		2											&EFS++CT/181.1
=			3		-52G1-181M1	W1	3	,	++CT+CTRL_1.3-X1	3		3											&EFS++CT/181.1
FUSE FOR PUMP		1			-52G1-181R1	x1	4	,	++CT+CTRL_1.3-X1	4		4											&EFS++CT/181.3
HEATER		2			-52G1-181R1	x3	5	,	++CT+CTRL_1.3-X1	5		5											&EFS++CT/181.4
=		3			-52G1-181R1	x5	6	,	++CT+CTRL_1.3-X1	6		6											&EFS++CT/181.4
=		4			-52G1-181R1	x6	7	,	++CT+CTRL_1.3-X1	7		7											&EFS++CT/181.4
								,															
FAN 1 HEAT EXCHANGER	1				-52G1-182M1	U1	8	,	++CT+CTRL_1.3-X1	8		8											&EFS++CT/182.1
=	2				-52G1-182M1	V1	9	,	++CT+CTRL_1.3-X1	9		9											&EFS++CT/182.1
=	3				-52G1-182M1	W1	10	,	++CT+CTRL_1.3-X1	10		10											&EFS++CT/182.1
PUMP			GNYE		-52G1-181M1	PE	PE	,	++CT+CTRL_1.3-X1	PE		GNYE											&EFS++CT/181.1
HEATER		GNYE			-52G1-181R1	PE	PE	,															&EFS++CT/181.4
FAN 1 HEAT EXCHANGER	GNYE				-52G1-182M1	PE	PE	,															&EFS++CT/182.1

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Terminal diagram

Freqcon_F13_001_02

Function text			++CT-181W3	Cable name	Strip =UNIT_01++FAN+-52G1-181X3					Cable name	++CT-181W3										Page / column
			F-CY-OZ (LIY-CY)	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type	F-CY-OZ (LIY-CY)										
PRESSURE SWITCH			1		++CT+CTRL_1.3-X3	23	1	,	-52G1	1												&EFS++CT/181.7
								,														
								,														
PRESSURE SWITCH					-52G1	2	2	,	++CT+CTRL_1.3-X3	25		3										&EFS++CT/181.7
=					-52G1	3	3	,	++CT+CTRL_1.3-X3	24		2										&EFS++CT/181.7
COOLING WATER TEMPERATURE			4		++CT+CTRL_1.3-X5	23	4	,	-52G1-148B1	+												&EFS++CT/148.1
								,														
								,														
COOLING WATER TEMPERATURE			5		++CT+CTRL_1.3-X5	24	5	,	-52G1-148B1	-												&EFS++CT/148.1
PRESSURE SWITCH					-52G1	SH	GND	,														&EFS++CT/181.7
PRESSURE SWITCH					-52G1	SH	GND	,														&EFS++CT/181.7

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Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_01++FAN+-52G1-181X3	20241203_V1.22	= UNIT_01 Converter Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ FAN FAN page: 2001
Date								+ total: 500

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Customer:	Statron
Project:	Shell Crosswind BESS FQ 1MW 5MWh Offshore
Type:	BESS MSC-1000-620-8
Product	BATTERY CONTAINER 1
Circuit diagram No:	10354_23A2007 20241203_V1.22
Producer (company):	Freqcon GmbH 53406 ASC 53409
Project:	Shell Crosswind BESS FQ 1MW 5MWh Offshore
Type:	BESS MSC-1000-620-8
Project manager:	Freqcon_CP

created on: 17.09.2019
edited on: 03.12.2024 edited by: Freqcon_DG total pages: 500

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	688	AUXILIARY SUPPLY 400V / 230V AC DISTRIBUTION	08.10.2024	Freqcon_DG
	690	CONTAINER COOLING / LIGHTNING	29.10.2024	Freqcon_DG
	691	CONTAINER COOLING / LIGHTNING	05.11.2024	Freqcon_DG
&EPC ++Container		Parts List		
	1	PARTS LIST	05.11.2024	Freqcon_DG
&EPC ++ASC		Parts List auxillary cabinet		
	1	PARTS LIST	05.11.2024	Freqcon_DG
	2	PARTS LIST	05.11.2024	Freqcon_DG
	3	PARTS LIST	05.11.2024	Freqcon_DG
	4	PARTS LIST	05.11.2024	Freqcon_DG
	5	PARTS LIST	05.11.2024	Freqcon_DG
	6	PARTS LIST	05.11.2024	Freqcon_DG
	7	PARTS LIST	05.11.2024	Freqcon_DG
&EPA ++Container		Summarized part list		
	1	SUMMARIZED PARTS LIST	05.11.2024	Freqcon_DG
&EPA ++ASC		Summarized part list auxillary cabinet		
	1	SUMMARIZED PARTS LIST	05.11.2024	Freqcon_DG
	2	SUMMARIZED PARTS LIST	05.11.2024	Freqcon_DG

Editor	Freqcon_DG			Statron		INDEX	20241203_V1.22	= UNIT_02 Battery Container 1
Date	05.11.2024							& EAB Contents
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ page: 3
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&EMB ++Container		Cable list		
	1	CABEL LIST	05.11.2024	Freqcon_DG
	2	CABEL LIST	05.11.2024	Freqcon_DG
	3	CABEL LIST	05.11.2024	Freqcon_DG
	4	CABEL LIST	05.11.2024	Freqcon_DG
	5	CABEL LIST	05.11.2024	Freqcon_DG
	6	CABEL LIST	05.11.2024	Freqcon_DG
	7	CABEL LIST	05.11.2024	Freqcon_DG
	8	CABEL LIST	05.11.2024	Freqcon_DG
	9	CABEL LIST	05.11.2024	Freqcon_DG
&EMB ++ASC		Cable list auxillary cabinet		
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	2	CABEL LIST	05.11.2024	Freqcon_DG
	3	CABEL LIST	05.11.2024	Freqcon_DG
	4	CABEL LIST	05.11.2024	Freqcon_DG
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	9	CABEL LIST	05.11.2024	Freqcon_DG
	10	CABEL LIST	05.11.2024	Freqcon_DG
&EMZ ++ASC		Terminals auxillary cabinet		
	1000	Klemmenleistenübersicht : =UNIT_02++ASC+-X5.1 - =UNIT_02++ASC+-690XT1	05.11.2024	Freqcon_DG
	2000	Klemmenplan =UNIT_02++ASC+-X5.1	05.11.2024	Freqcon_DG
	2001	Klemmenplan =UNIT_02++ASC+-X5.2	05.11.2024	Freqcon_DG

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&EMZ ++ASC		Terminals auxillary cabinet		
	2002	Klemmenplan =UNIT_02++ASC+-X5.3	05.11.2024	Freqcon_DG
	2003	Klemmenplan =UNIT_02++ASC+-X6	05.11.2024	Freqcon_DG
	2004	Klemmenplan =UNIT_02++ASC+-XDC1	05.11.2024	Freqcon_DG
	2005	Klemmenplan =UNIT_02++ASC+-XDC2	05.11.2024	Freqcon_DG
	2006	Klemmenplan =UNIT_02++ASC+-XES	05.11.2024	Freqcon_DG
	2007	Klemmenplan =UNIT_02++ASC+-369XT	05.11.2024	Freqcon_DG
	2008	Klemmenplan =UNIT_02++ASC+-369XT	05.11.2024	Freqcon_DG
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	2011	Klemmenplan =UNIT_02++ASC+-369XT	05.11.2024	Freqcon_DG
	2012	Klemmenplan =UNIT_02++ASC+-369XT	05.11.2024	Freqcon_DG
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	2014	Klemmenplan =UNIT_02++ASC+-369XT	05.11.2024	Freqcon_DG
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	2018	Klemmenplan =UNIT_02++ASC+-369XT	05.11.2024	Freqcon_DG
	2019	Klemmenplan =UNIT_02++ASC+-687XT1	05.11.2024	Freqcon_DG
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	2027	Klemmenplan =UNIT_02++ASC+-687XT1	05.11.2024	Freqcon_DG
	2028	Klemmenplan =UNIT_02++ASC+-687XT1	05.11.2024	Freqcon_DG

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&EMZ ++ASC		Terminals auxillary cabinet		
	2029	Klemmenplan =UNIT_02++ASC+-687XT1	05.11.2024	Freqcon_DG
	2030	Klemmenplan =UNIT_02++ASC+-690XT1	05.11.2024	Freqcon_DG
	2031	Klemmenplan =UNIT_02++ASC+-690XT1	05.11.2024	Freqcon_DG
	2032	Klemmenplan =UNIT_02++ASC+-690XT1	05.11.2024	Freqcon_DG
	2033	Klemmenplan =UNIT_02++ASC+-690XT1	05.11.2024	Freqcon_DG
	2034	Klemmenplan =UNIT_02++ASC+-690XT1	05.11.2024	Freqcon_DG

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SPECIFICATION

TERMINAL STRIP

-XE1	MAIN POWER SUPPLY 600V AC
-XE2	DC POWER SUPPLY 1000V DC
-XE	MAIN POWER SUPPLY 400V AC
-X1	MAIN POWER 400V/230V AC
-X2	LIGHT CABINET 230V AC
-X3	CONTROL VOLTAGE 24V DC
-14X1	CONTROL VOLTAGE 24V DC (TO DC CONTACTORS)
-X5	LOW-VOLTAGE SIGNALS
-XDC0	24V DC POWER SUPPLY
-XDC1-4	CONTROL VOLTAGE 24V DC (UPS)
-XT	TRANSFER TERMINAL BLOCK 24V DC / 230V AC

WIRING COLOR

L1 / L2 / L3	=	BLACK
N	=	LIGHT BLUE (IEC) / GREY (UL)
PE	=	YELLOW-GREEN
EXTERNAL VOLTAGE	=	ORANGE
CONTROL VOLTAGE 24 V DC	=	DARK BLUE
ANALOG SIGNALS	=	WHITE

PLACE

+CTRL	=	Control cabinet
+CON	=	Converter cabinet
+IND	=	Inductor cabinet
+CIR	=	Circuit breaker cabinet
+COSY	=	Cooling System
+FAN	=	External fan

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SPECIFICATION of grounding

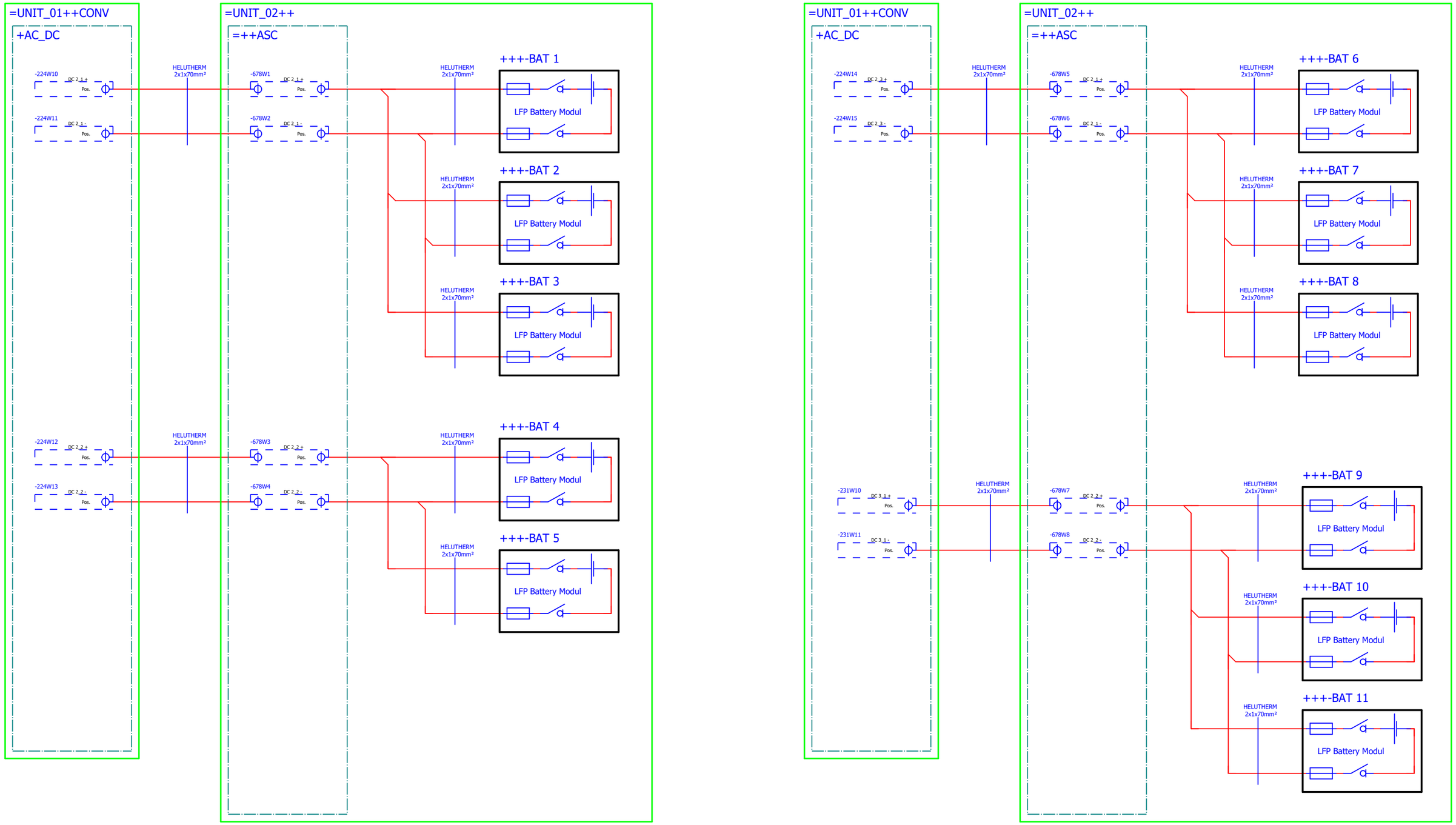
	from frame to			
1	**roof & side walls & doors**	**EVD_1**	**Flachband**	**2x25 mm²**
2	**frame**	**EVD_2**	**Flachband**	**2x25 mm²**
3	**base**	**EVD_3**	**Flachband**	**2x25 mm²**
4	**Mounting plate & partitions**	**EVD_4**	**H07-V-K**	**2x25 mm²**
5	**inductors**	**EVD_5**	**H07-V-k**	**2x25 mm²**
6	**Powerstack**	**EVD_6**	**H07-V-K**	**2x25 mm²**
7	**DC Switch & Fuse**	**EVD_7**	**H07-V-K**	**2x25 mm²**
8	**AC Filter**	**EVD_8**	**H07-V-K**	**2x25 mm²**
9	**circuit-breaker**	**EVD_9**	**H07-V-K**	**2x25 mm²**
10	**Freqcon_Fast_Disconektor**	**EVD_10**	**H07-V-K**	**2x25 mm²**
11	**Freqcon_Rectifier_Modul**	**EVD_11**	**H07-V-K**	**2x25 mm²**
12	**capacitor banks**	**EVD_12**	**H07-V-K**	**2x25 mm²**
13	**water distributor**	**EVD_13**	**H07-V-K**	**2x25 mm²**
14	**SPARE**	**EVD_14**	**H07-V-K**	**2x25 mm²**
15	**SPARE**	**EVD_15**	**H07-V-K**	**2x25 mm²**
16	**SPARE**	**EVD_16**	**H07-V-K**	**2x25 mm²**
17	**SPARE**	**EVD_17**	**H07-V-K**	**2x25 mm²**
18	**SPARE**	**EVD_18**	**H07-V-K**	**2x25 mm²**
	from door to			
19	**PROFINET IRT IGBT Interface**	**EVD_19**	**H07-V-K**	**1,5 mm²**
20	**HMI**	**EVD_20**	**H07-V-K**	**1,5 mm²**
21	**SPARE**	**EVD_21**	**H07-V-K**	**??? mm²**
22	**SPARE**	**EVD_22**	**H07-V-K**	**??? mm²**

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Editor	Freqcon_JD			Statron	FREQCON	Specification Earthing	20241203_V1.22	= UNIT_02	Battery Container 1
Date	14.06.2024	Norm						& EAC	Explanatory documents
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++	page: 6a
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Single line diagram



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Date	18.06.2024	Norm						& EFA	Single line diagram
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0	1	2	3	4	5	6	7	8	9

Single line diagram

Control circuit

++ASC

400V

-XES

-684F3 &EFS++ASC/684.2 C32A

-684F1 &EFS++ASC/684.0 C32A

-684F2 &EFS++ASC/684.5 TYP 1 + 2 SPD

-601F1 &EFS++ASC/601.1 TYP 1 + 2 SPD

-684F4 &EFS++ASC/685.0 C32A

-684F5 &EFS++ASC/685.5 TYP 1 + 2 SPD

-691F1 &EFS++ASC/691.1 C6A

-691F2 &EFS++ASC/691.3 C6A

-691F3 &EFS++ASC/691.4 C6A

-690F1 &EFS++ASC/690.1 16A

-690F3 &EFS++ASC/690.5 C6A

-690F4 &EFS++ASC/690.7 C6A

-690F5 &EFS++ASC/690.8 C6A

-691F4 &EFS++ASC/691.5 C16A

-690F2 &EFS++ASC/690.3 16A

-101Q1

-687F1 &EFS++ASC/687.1 C16A

-687F2 &EFS++ASC/687.3 C16A

-687F3 &EFS++ASC/687.4 C16A

-687F4 &EFS++ASC/687.5 C16A

-687F5 &EFS++ASC/687.7 C16A

-636K1 &EFS++ASC/636.1

-636K2 &EFS++ASC/636.2

-636K3 &EFS++ASC/636.4

M 1~

1/N/PE

1/N/PE

1/N/PE

1/N/PE 1/N/PE

20 A

Battery cabinet 1

Battery cabinet 2

Battery cabinet 3

Battery cabinet 4

Battery cabinet 5

-687F6 &EFS++ASC/687.8 C16A

-688F1 &EFS++ASC/688.1 C16A

-688F2 &EFS++ASC/688.2 C16A

-688F3 &EFS++ASC/688.4 C16A

-688F4 &EFS++ASC/688.5 C16A

-688F5 &EFS++ASC/688.7 C16A

Battery cabinet 6

Battery cabinet 7

Battery cabinet 8

Battery cabinet 9

Battery cabinet 10

Battery cabinet 11

Exhaust Unit / shut-off flap Bat 1-4

Exhaust Unit / shut-off flap Bat 5-8

Exhaust Unit / shut-off flap Bat 9-11

Container Internal Lighting

crane 1

crane 2

crane 3

Cooling Units

Container Sockets

Power Supply

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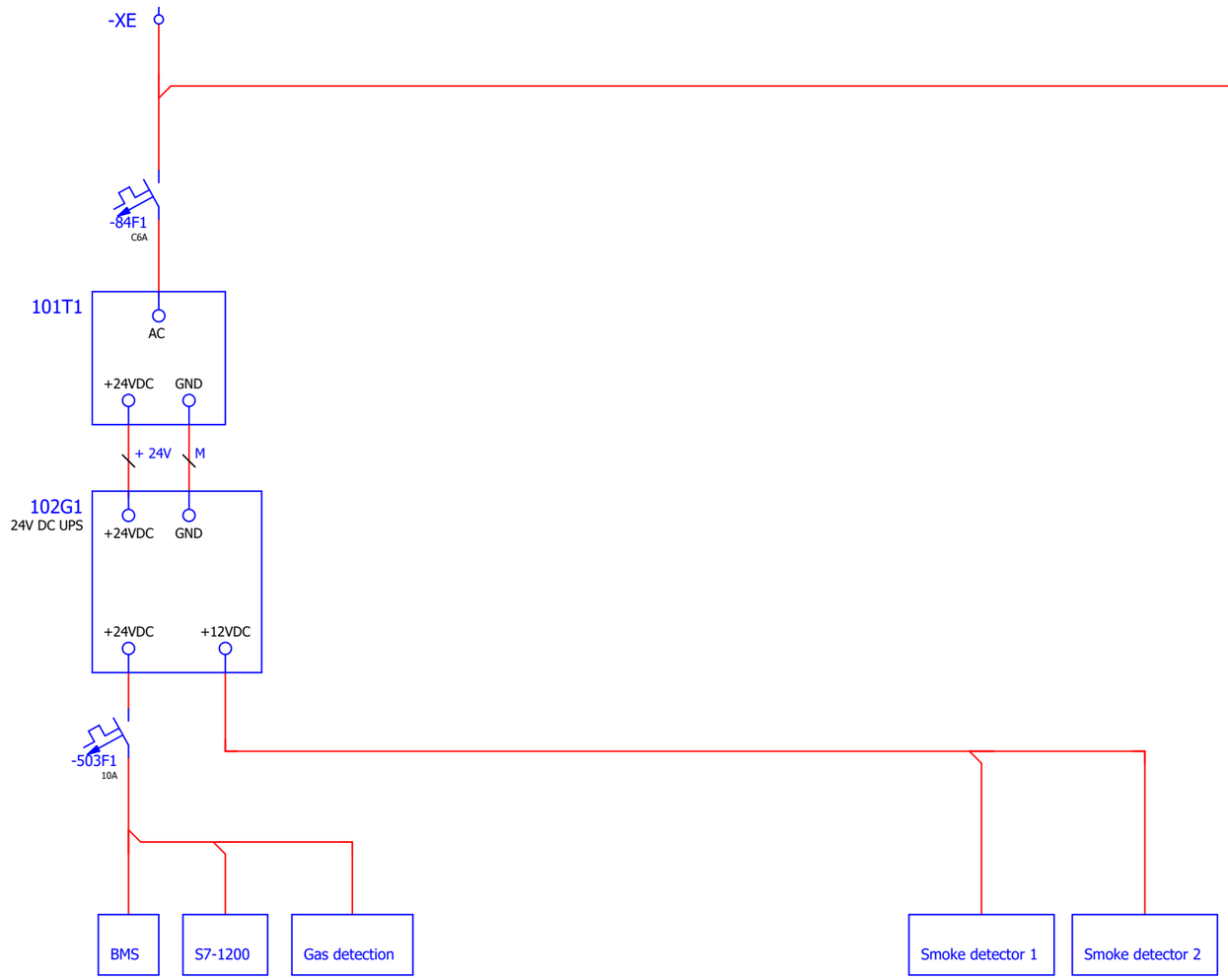
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Single line diagram

Control circuit

Battery Cabinet

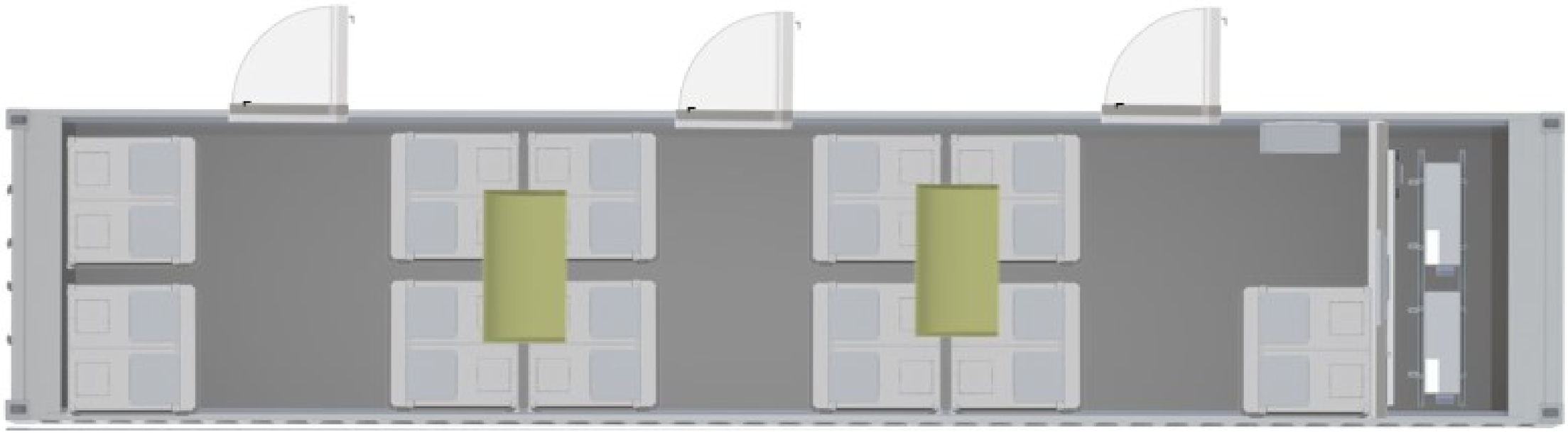


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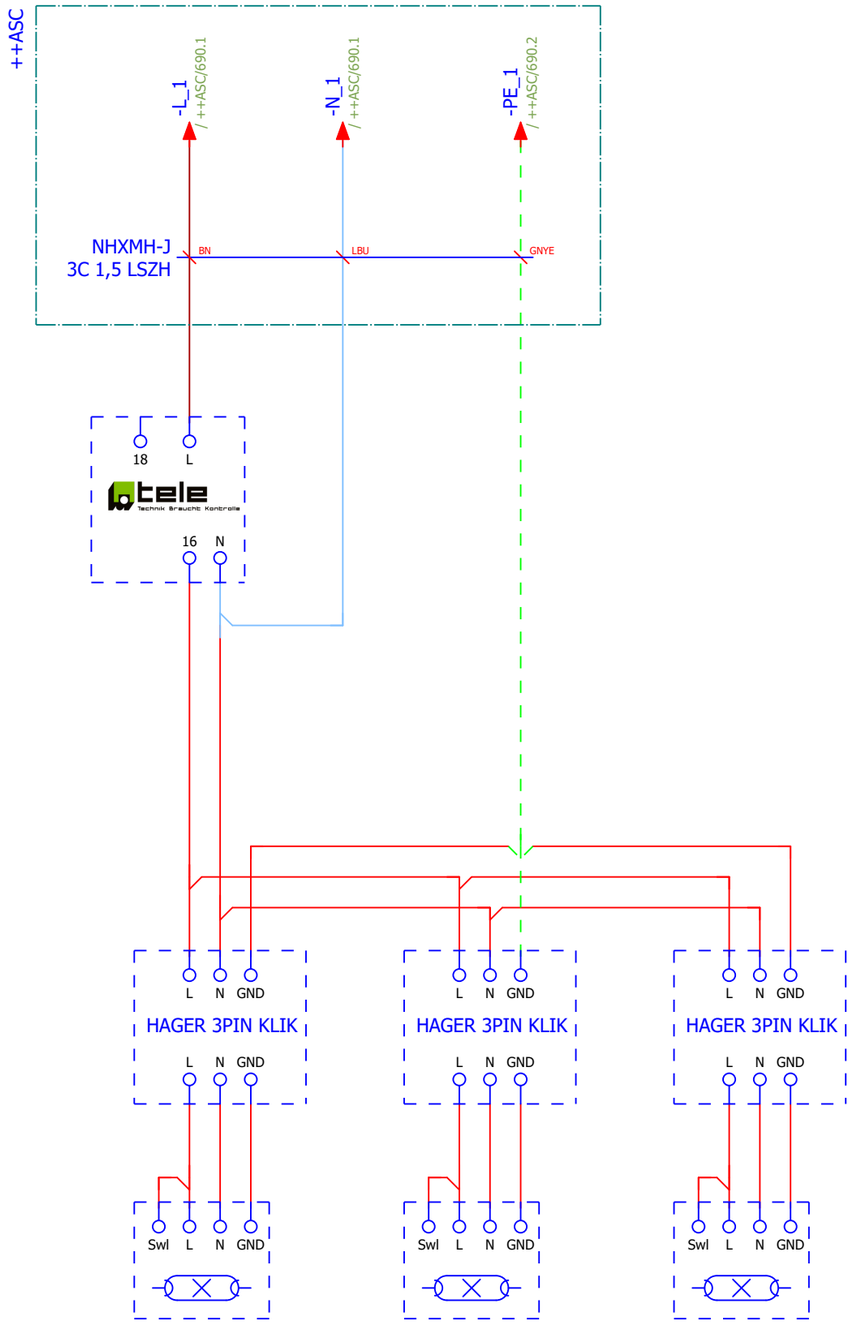
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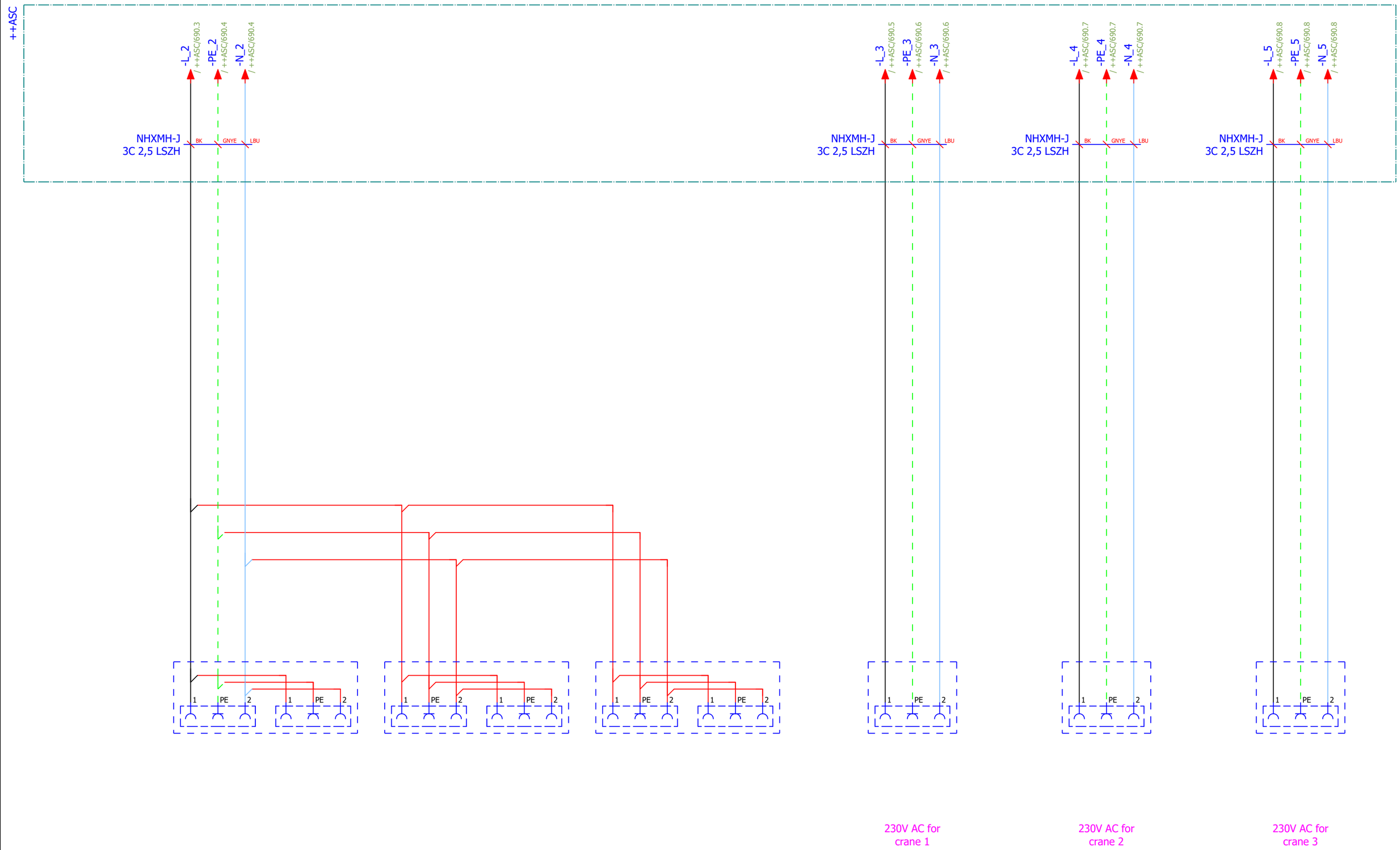
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++ASC

-L_6 / ++ASC/691.1
-N_6 / ++ASC/691.1
-PE_6 / ++ASC/691.2

NHXMH-J
3C 1,5 LSZH
BK LBU GNYE

L N GND
13A fused
Spur K983ALM
L N GND

1 2
M
1~
PE

BELDEN 9842
LSZH
WH BU WH BU

Junction Box
next to fan motor

230V AC for
Exhaust Unit
Battery cabinets 1-4

-L_6 / ++ASC/691.1
-N_6 / ++ASC/691.1
-PE_6 / ++ASC/691.2

L N GND
13A fused
Spur K983ALM
L N GND

1 2
M
1~
PE

230V AC for
shut-off flap
Battery cabinets 1-4

-L_7 / ++ASC/691.3
-N_7 / ++ASC/691.3
-PE_7 / ++ASC/691.3

NHXMH-J
3C 1,5 LSZH
BK LBU GNYE

L N GND
13A fused
Spur K983ALM
L N GND

1 2
M
1~
PE

BELDEN 9842
LSZH
WH BU WH BU

Junction Box
next to fan motor

230V AC for
Exhaust Unit
Battery cabinets 5-8

-L_7 / ++ASC/691.3
-N_7 / ++ASC/691.3
-PE_7 / ++ASC/691.3

L N GND
13A fused
Spur K983ALM
L N GND

1 2
M
1~
PE

230V AC for
shut-off flap
Battery cabinets 5-8

-L_8 / ++ASC/691.4
-N_8 / ++ASC/691.4
-PE_8 / ++ASC/691.4

NHXMH-J
3C 1,5 LSZH
BK LBU GNYE

L N GND
13A fused
Spur K983ALM
L N GND

1 2
M
1~
PE

BELDEN 9842
LSZH
WH BU WH BU

Junction Box
next to fan motor

230V AC for
Exhaust Unit
Battery cabinets 9-11

-L_8 / ++ASC/691.4
-N_8 / ++ASC/691.4
-PE_8 / ++ASC/691.4

L N GND
13A fused
Spur K983ALM
L N GND

1 2
M
1~
PE

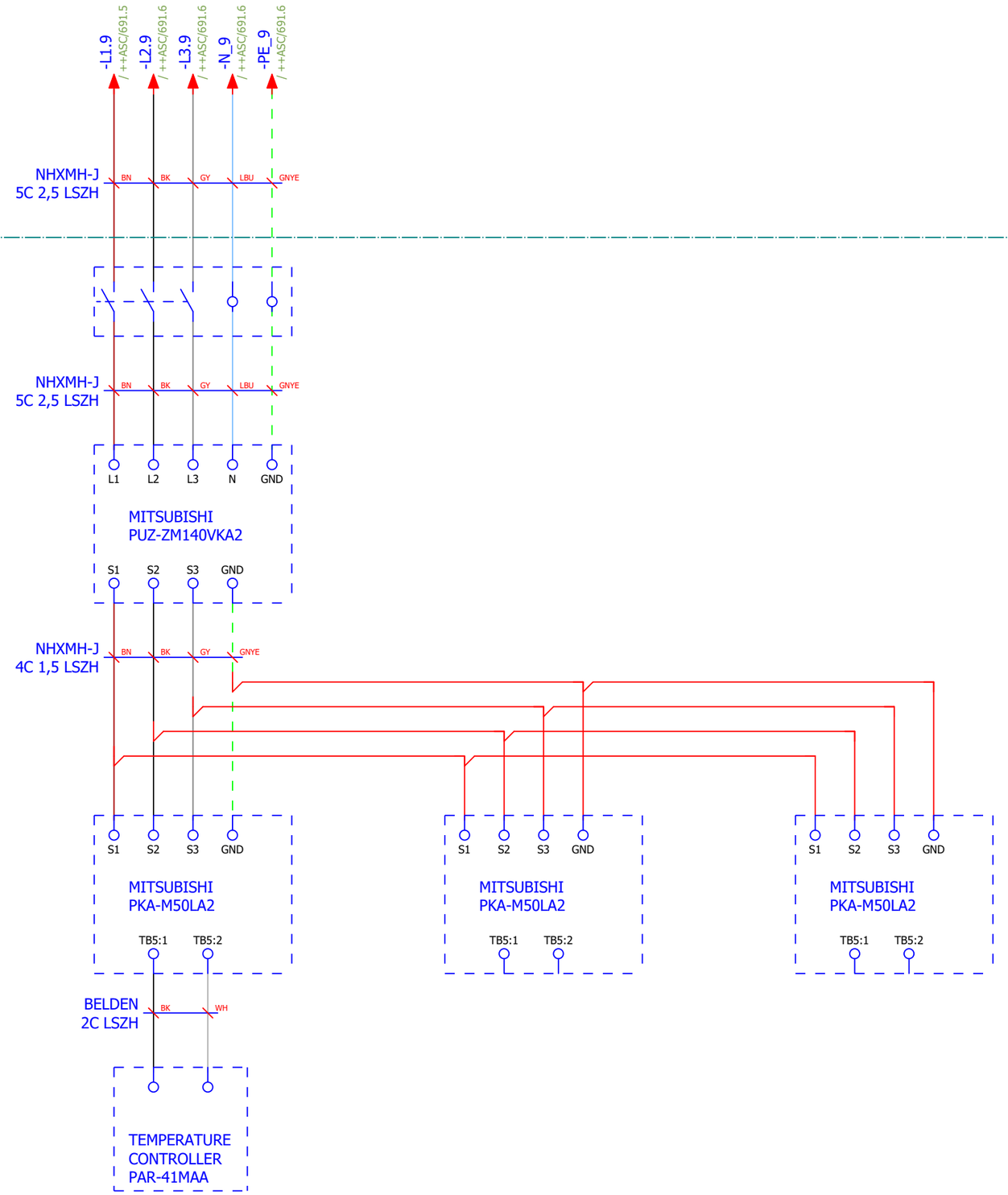
230V AC for
shut-off flap
Battery cabinets 9-11

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++ASC

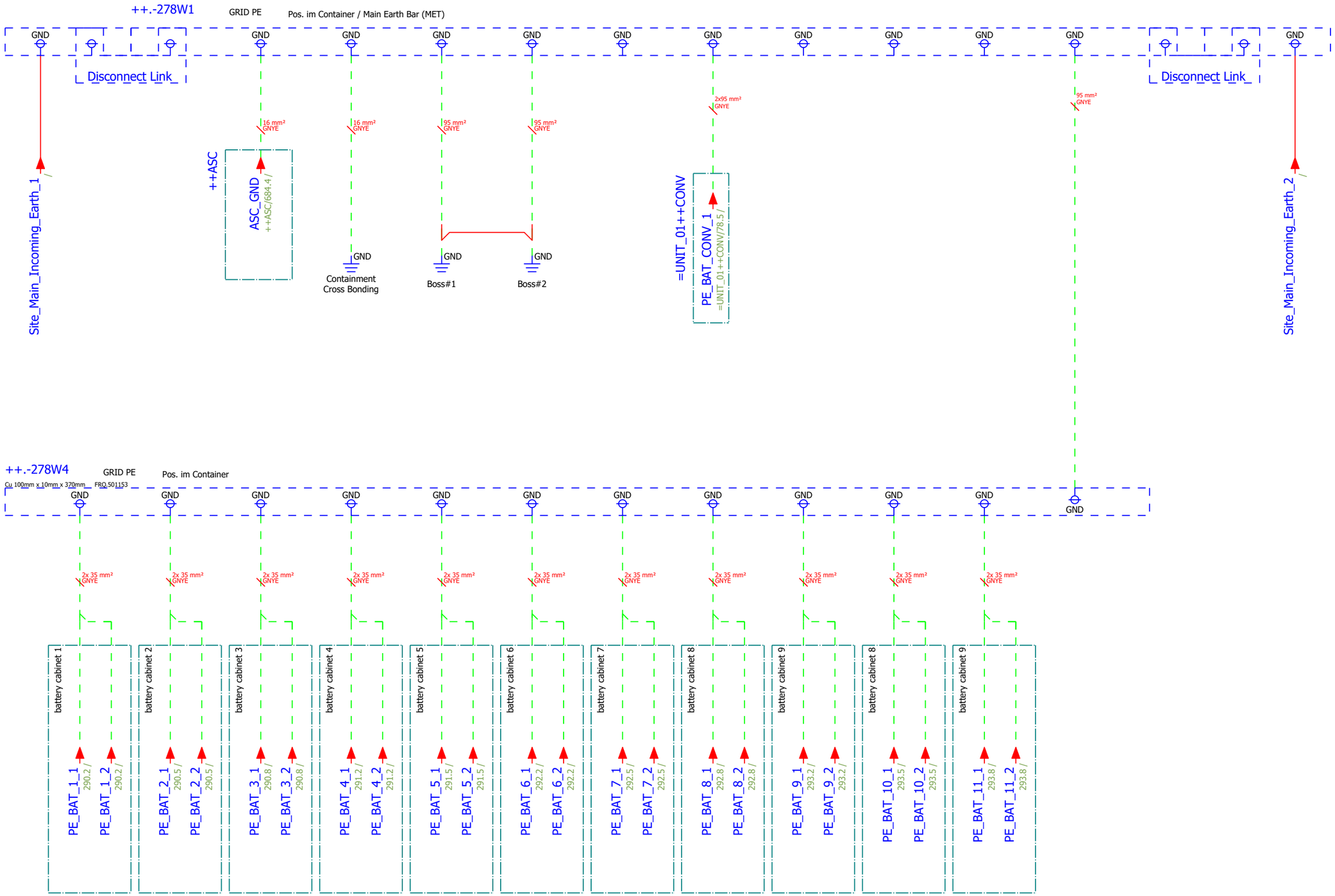


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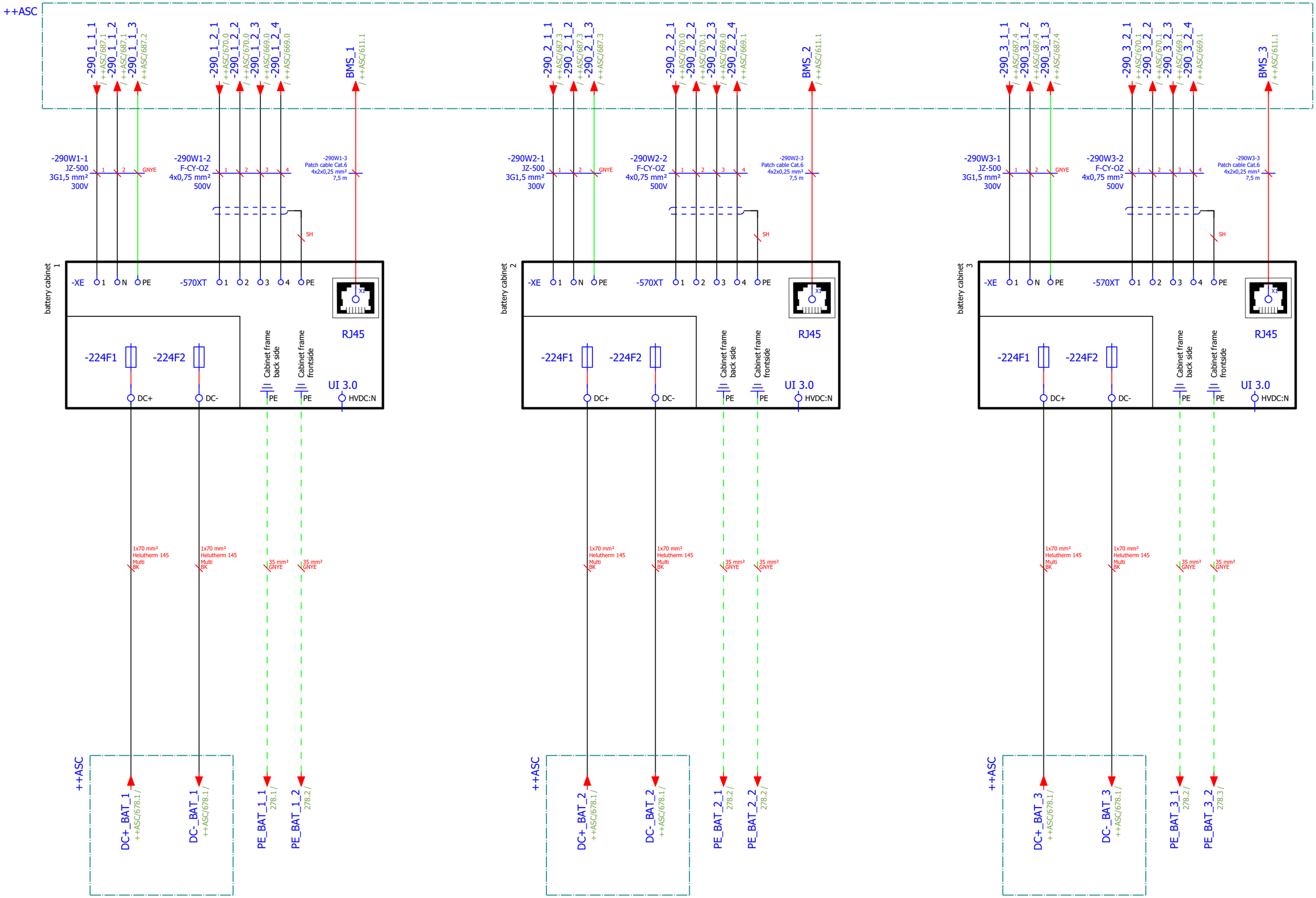
Busbars PE



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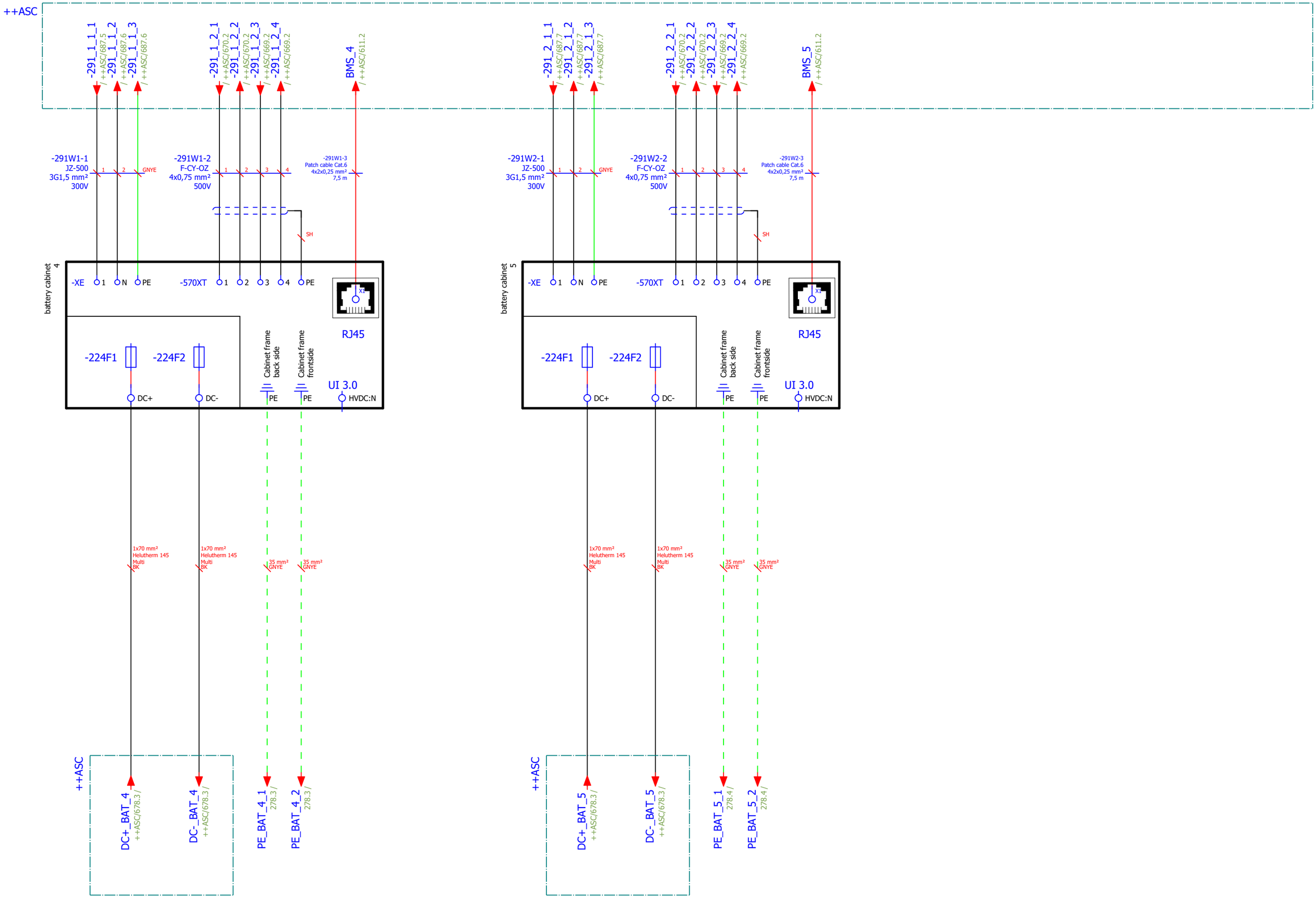
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Date	08.10.2024							& EFS	Circuit diagram
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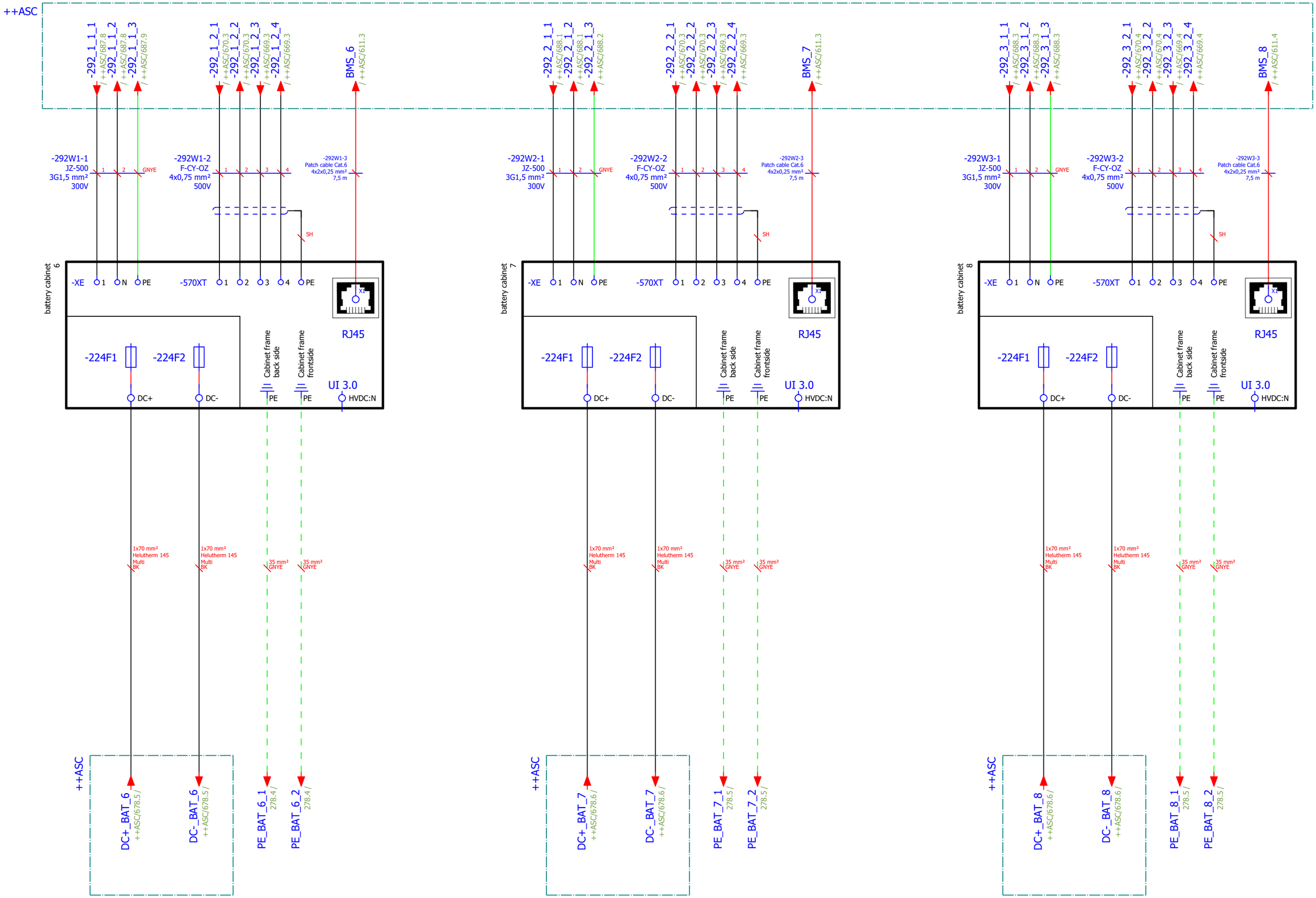
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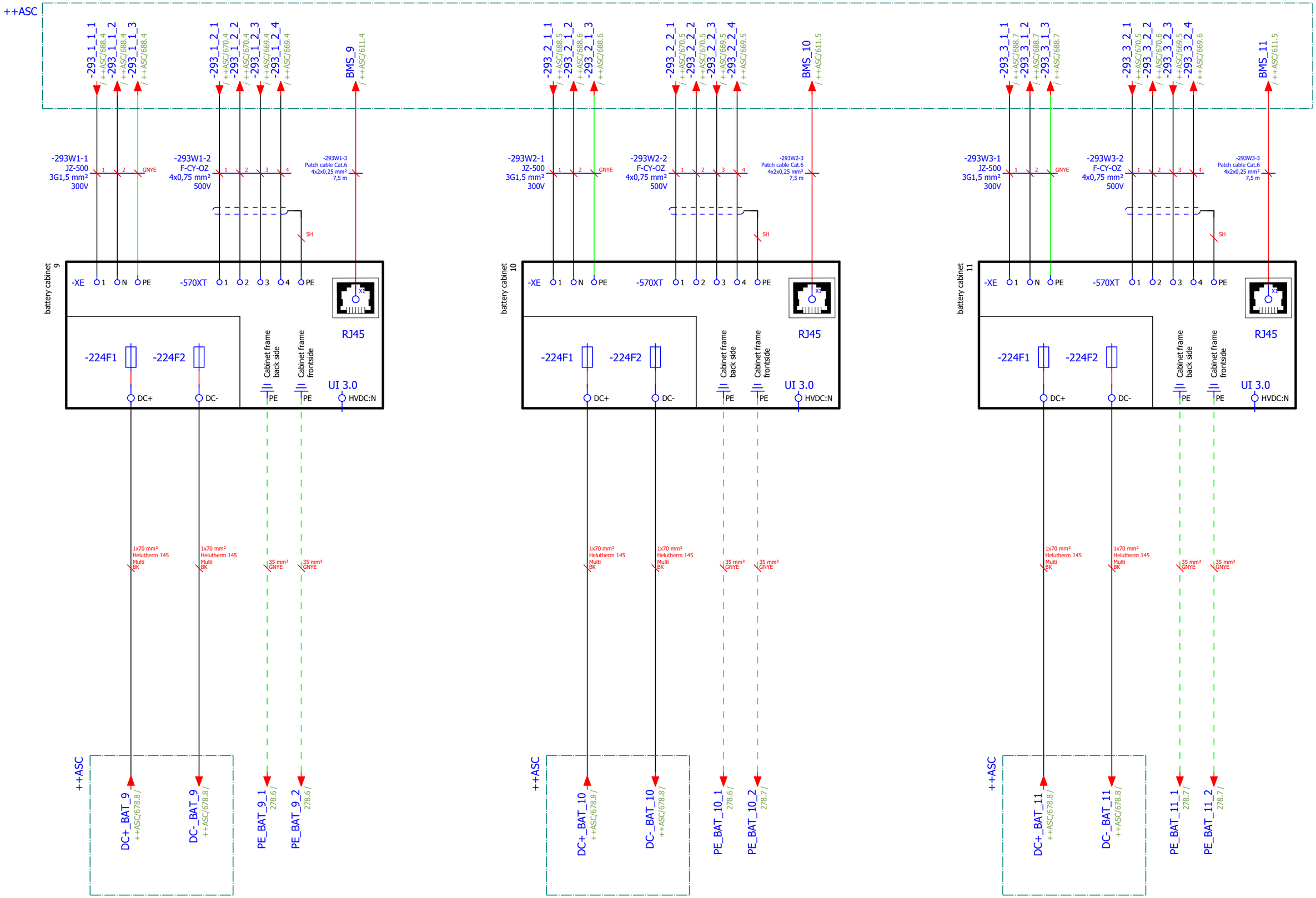
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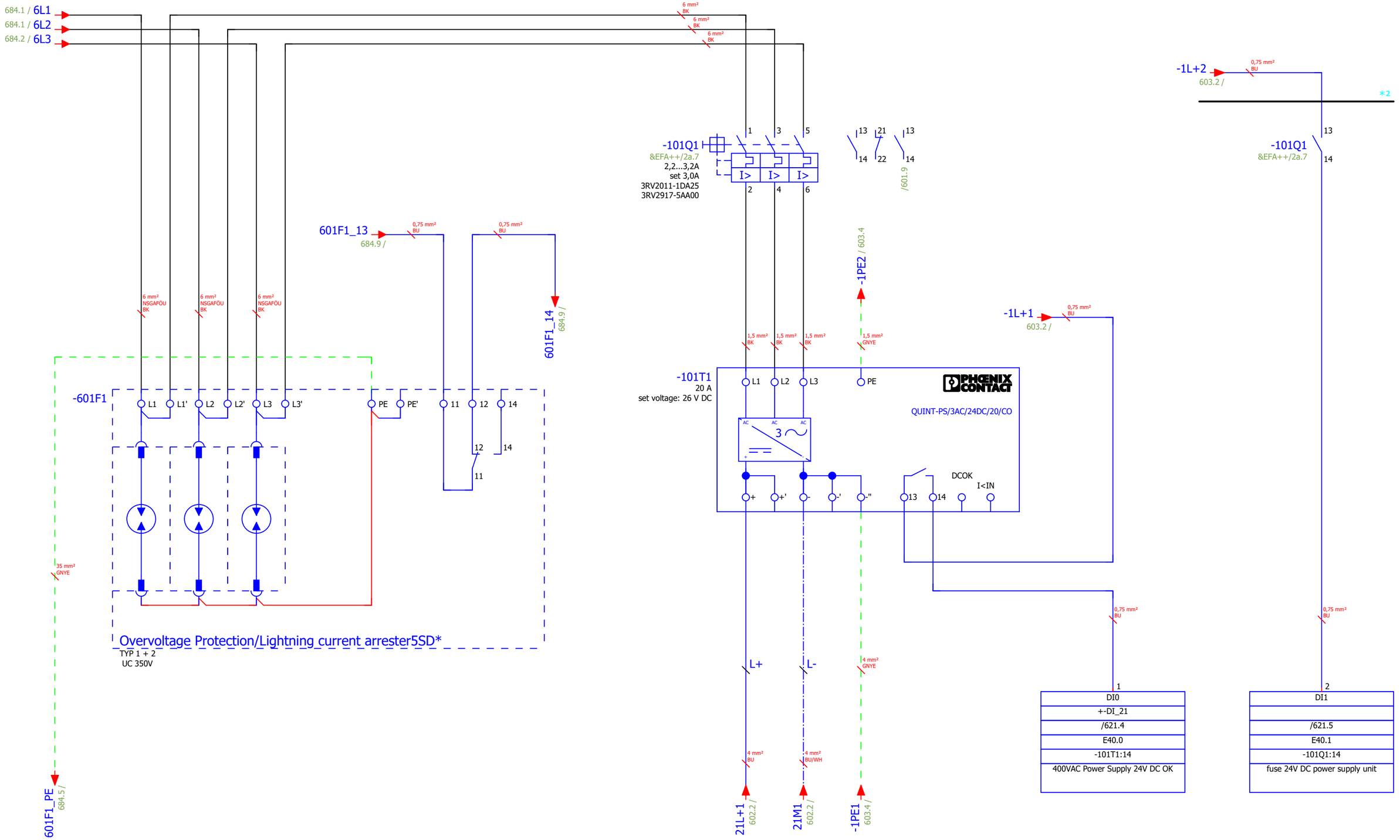
Editor	Freqcon_JD			Statron	FREQCON	BATTERY CABINETS 6-8	20241203_V1.22	= UNIT_02	Battery Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container	page: 292
Date								+	total: 500



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++ASC/601

Editor	Freqcon_JD			Statron	FREQCON	BATTERY CABINETS 9-11	20241203_V1.22	= UNIT_02 Battery Container 1
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container page: 293
Date								+ total: 500



400VAC Power Supply 24V DC OK

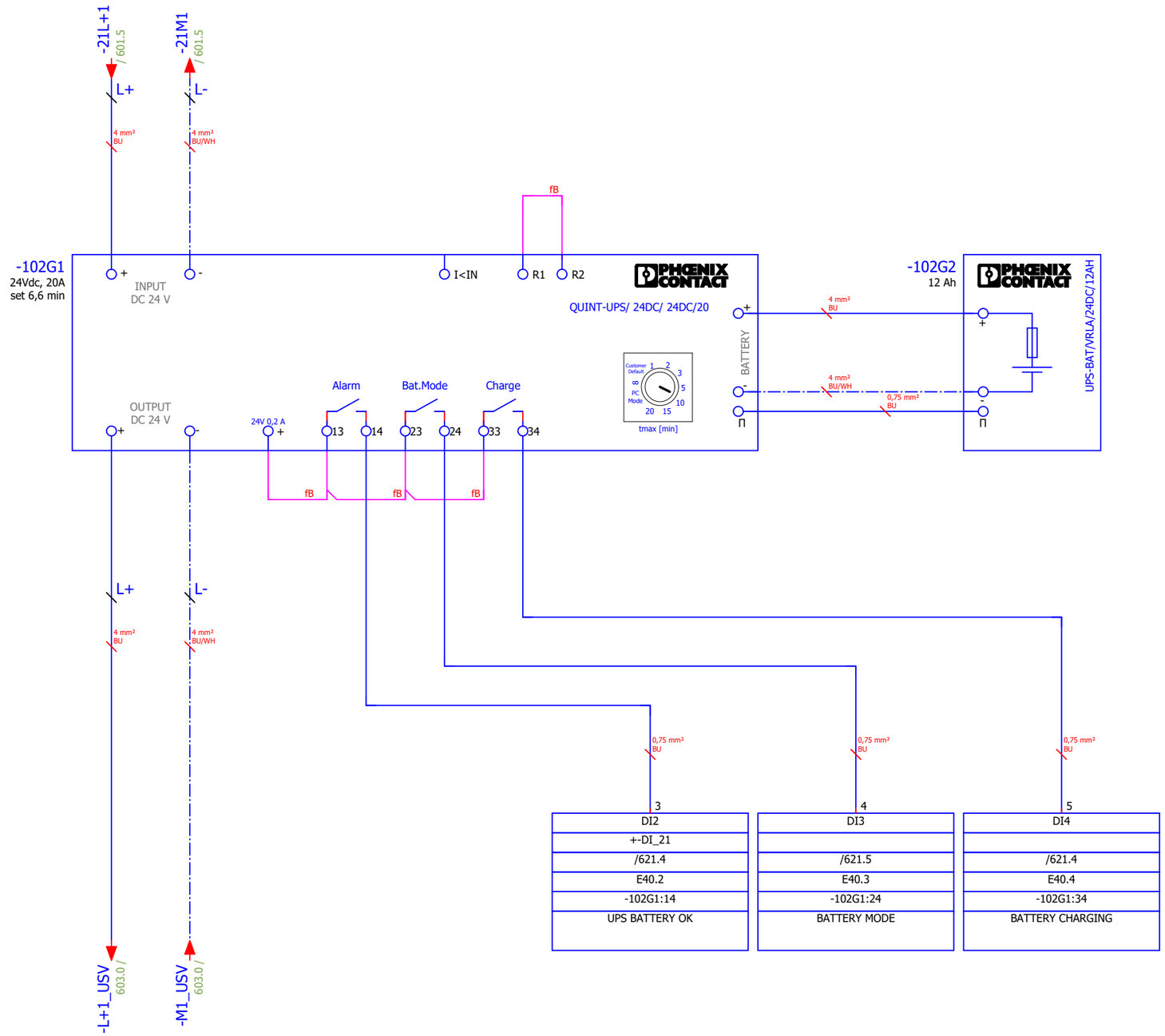
fuse 24V DC power supply unit

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++Container/293

Power supply unit from 400V AC

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602

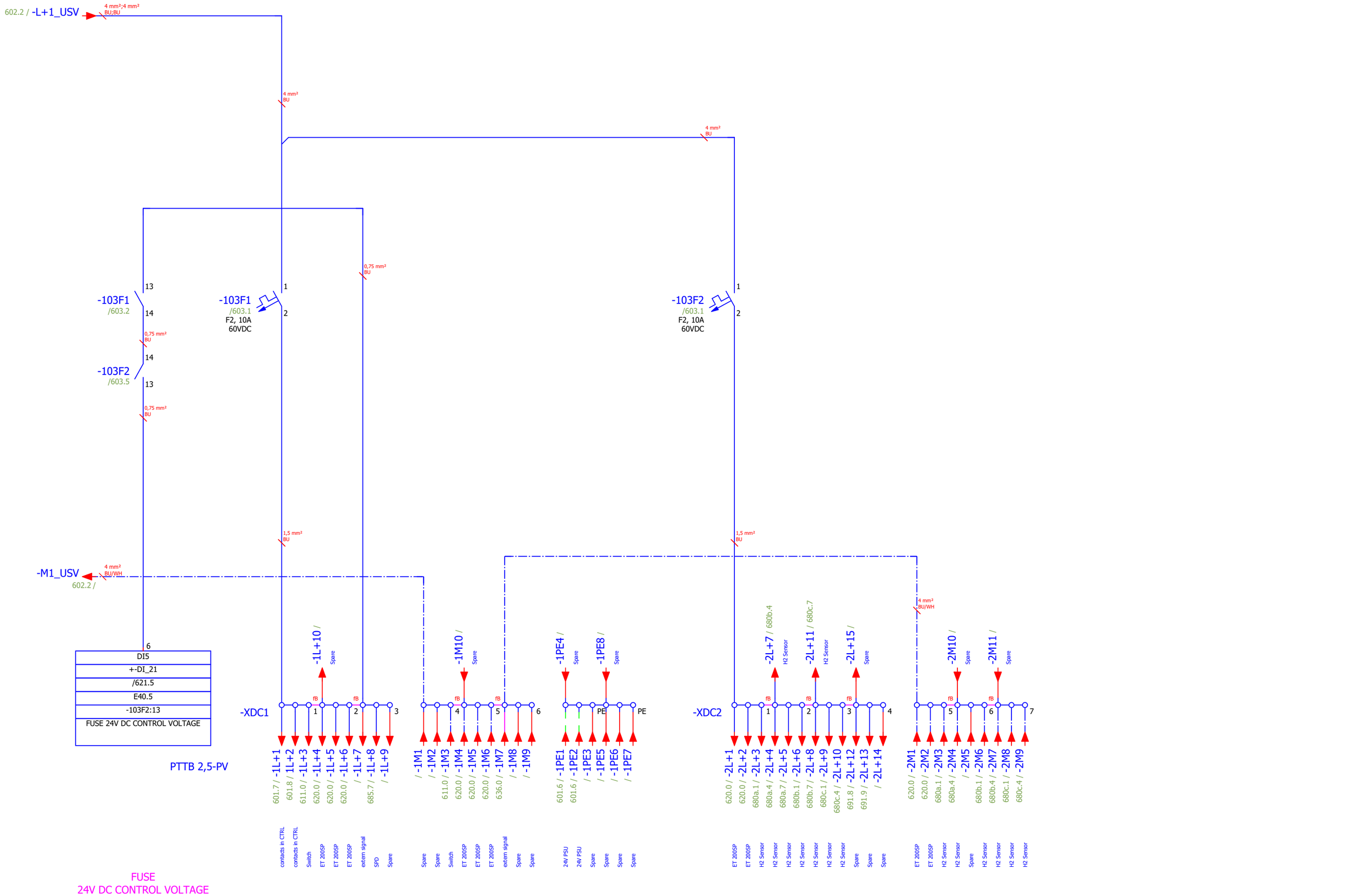
Editor	Freqcon_DG			Statron	FREQCON	CONTROL VOLTAGE POWER SUPPLY UNIT	20241203_V1.22	= UNIT_02 Battery Container 1
Date	05.11.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet page: 601
Date								+ total: 500



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603

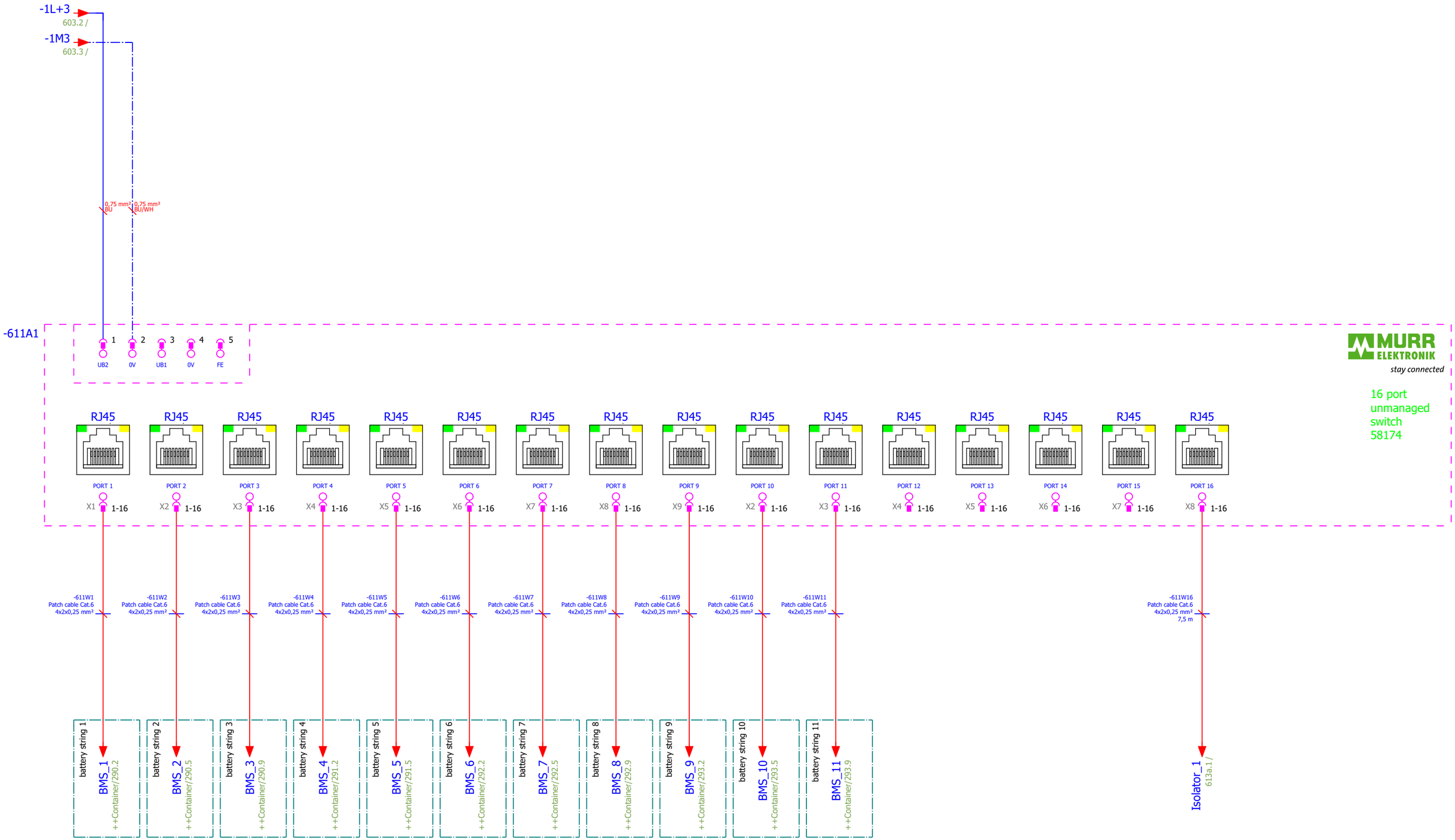
Editor	Freqcon_DG			Statron	FREQCON	CONTROL VOLTAGE UPS	20241203_V1.22	= UNIT_02 Battery Container 1
Date	05.11.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet — page: 602
Date								+ — total: 500



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611

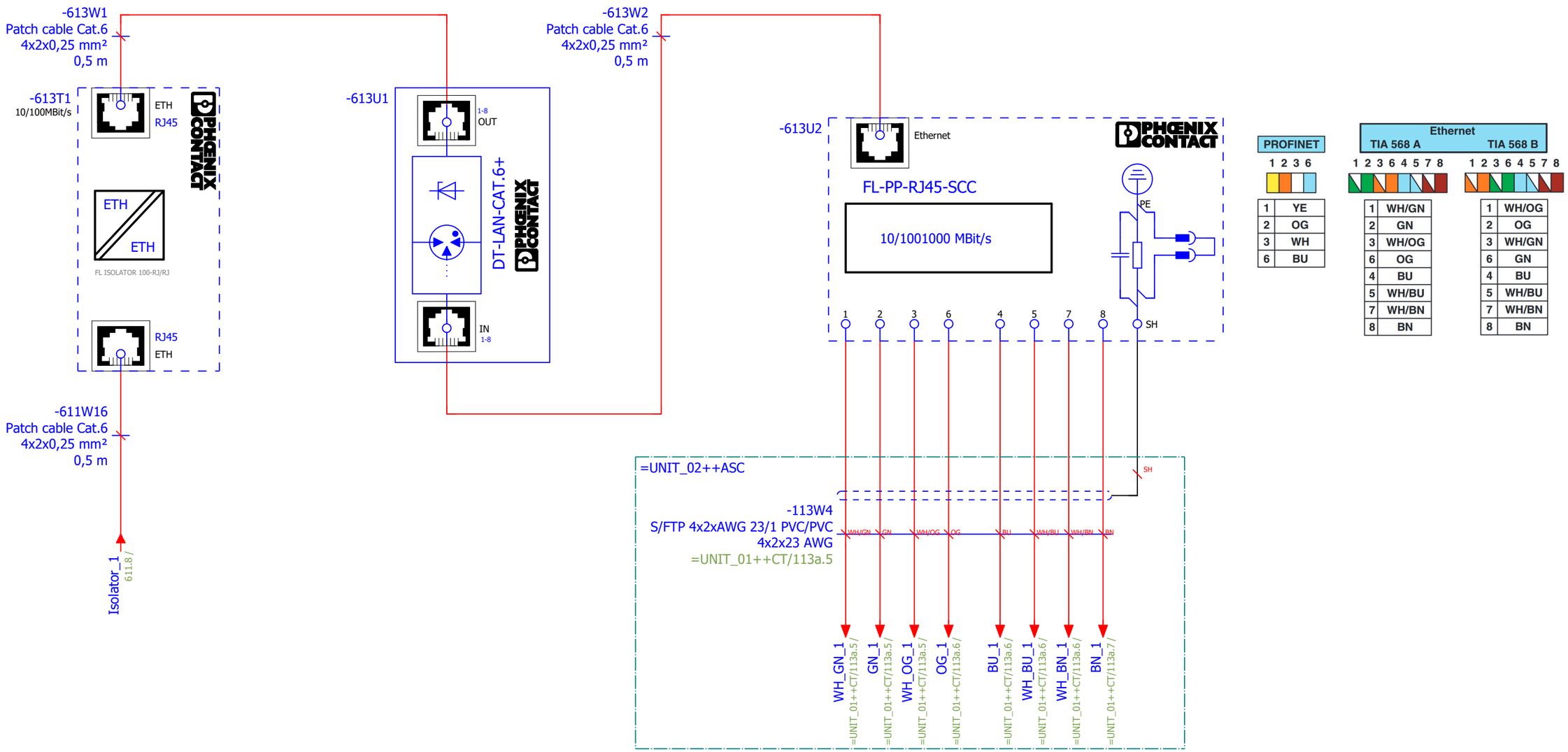
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Date	03.12.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore				++ ASC	auxiliary cabinet	page: 603
Date							10354_23A2007	+		total: 500



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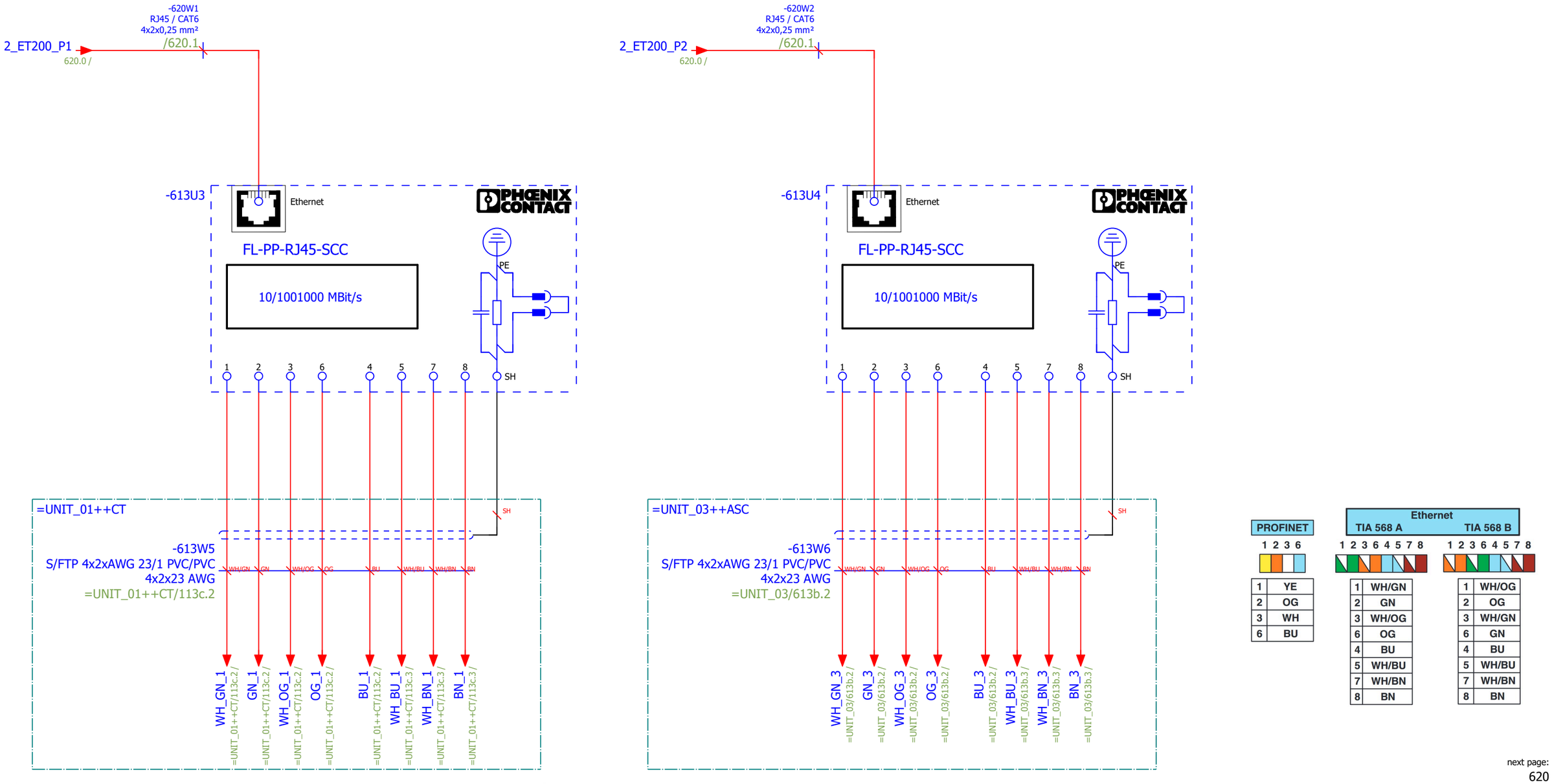
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Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 611
Date								+	total: 500



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613b

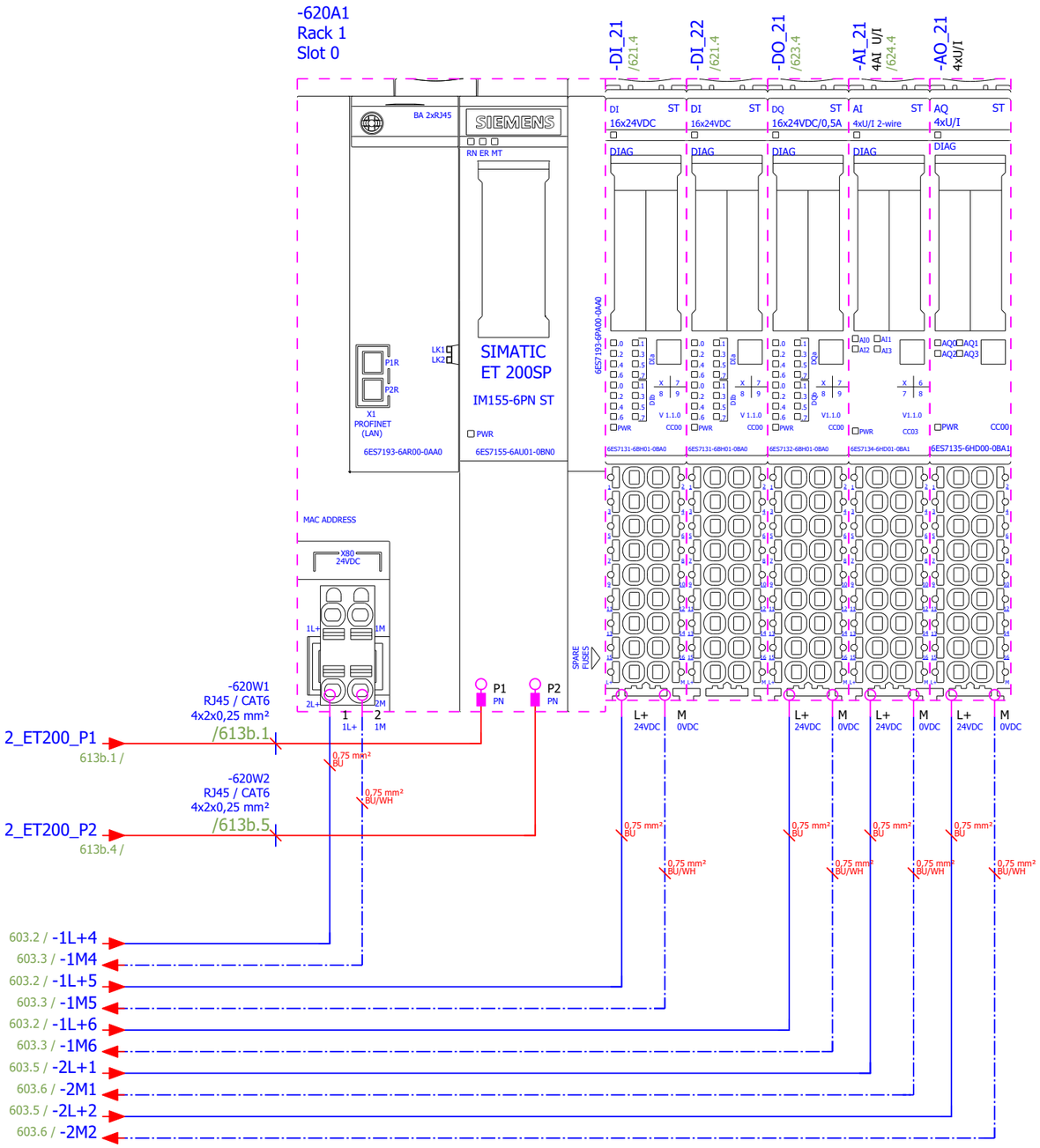
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Date	25.11.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 613a
Date								+	total: 500



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Editor	Freqcon_DG			Statron	FREQCON	PROFINET	20241203_V1.22	= UNIT_02	Battery Container 1	
Date	25.11.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet	page: 613b
Date								+		total: 500



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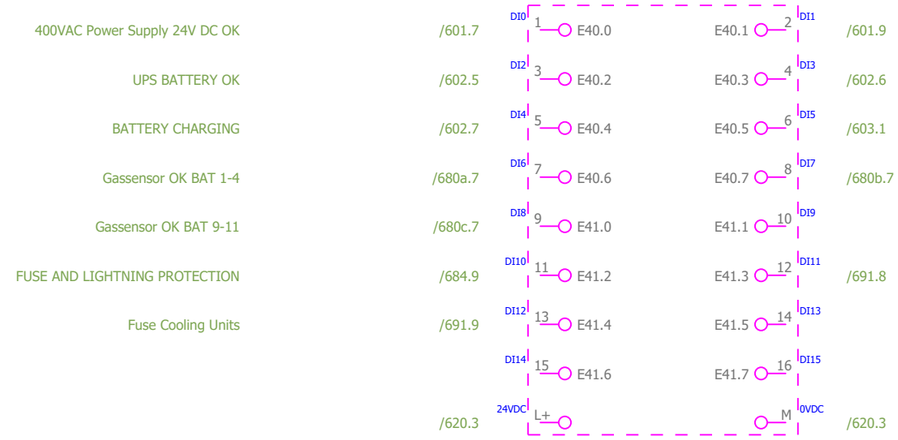
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621

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Date	03.12.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet
Date								+	

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total: 500

-DI_21

/620.3



400VAC Power Supply 24V DC OK	/601.7			/601.9	fuse 24V DC power supply unit
UPS BATTERY OK	/602.5			/602.6	BATTERY MODE
BATTERY CHARGING	/602.7			/603.1	FUSE 24V DC CONTROL VOLTAGE
Gassensor OK BAT 1-4	/680a.7			/680b.7	Gassensor OK BAT 5-8
Gassensor OK BAT 9-11	/680c.7				
FUSE AND LIGHTNING PROTECTION	/684.9			/691.8	Fuse Exhaust Unit
Fuse Cooling Units	/691.9				
	/620.3			/620.3	

-DI_22

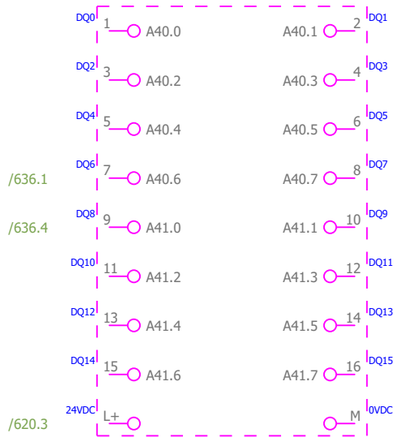
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Editor	Freqcon_DG			Statron	FREQCON	ET200SP DIGITAL INPUTS DI_21 + DI_22	20241203_V1.22	= UNIT_02 Battery Container 1	
Date	03.12.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 621
Date								+	total: 500

0	1	2	3	4	5	6	7	8	9

-DO_21

/620.3



230V AC for Exhaust Unit / shut-off flap Battery cabinets 1-4 /636.1

230V AC for Exhaust Unit / shut-off flap Battery cabinets 9-11 /636.4

/620.3

/636.2 230V AC for Exhaust Unit / shut-off flap Battery cabinets 5-8

/620.4

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Editor	Freqcon_JD			Statron	FREQCON	ET200SP DIGITAL OUTPUTS DO_21	20241203_V1.22	= UNIT_02	Battery Container 1
Date	14.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet
Date								+	

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-AI_21

/620.4



gas concentration BAT 1-4 /680a.2

gas concentration BAT 9-11 /680c.2

gas concentration BAT 1-4 /680a.2

gas concentration BAT 9-11 /680c.2

/620.4

/680b.2 gas concentration BAT 5-8

/680b.2 gas concentration BAT 5-8

/620.4

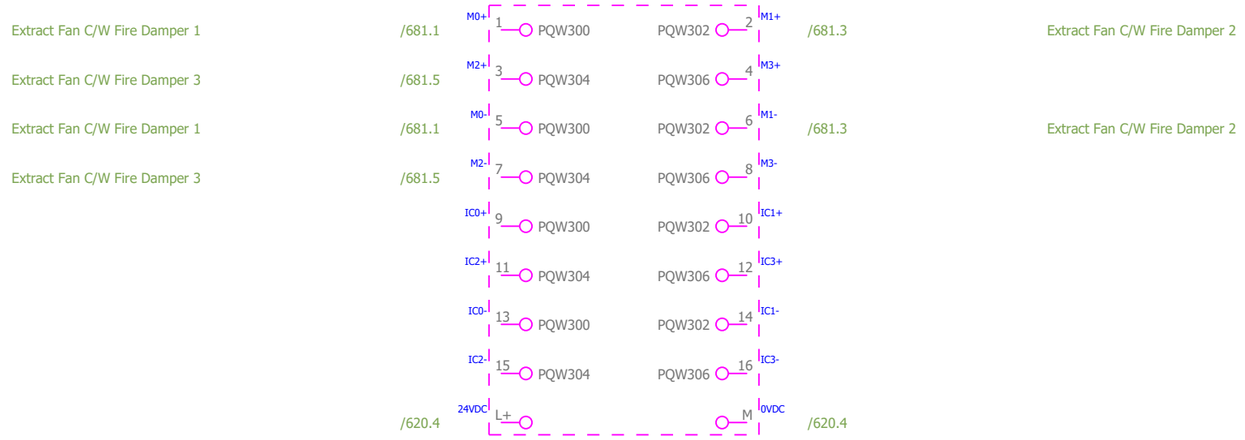
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Editor	Freqcon_JD			Statron	FREQCON	ET200SP ANALOG INPUTS AI_21	20241203_V1.22	= UNIT_02	Battery Container 1	
Date	14.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet	page: 624
Date								+		total: 500

-AO_21

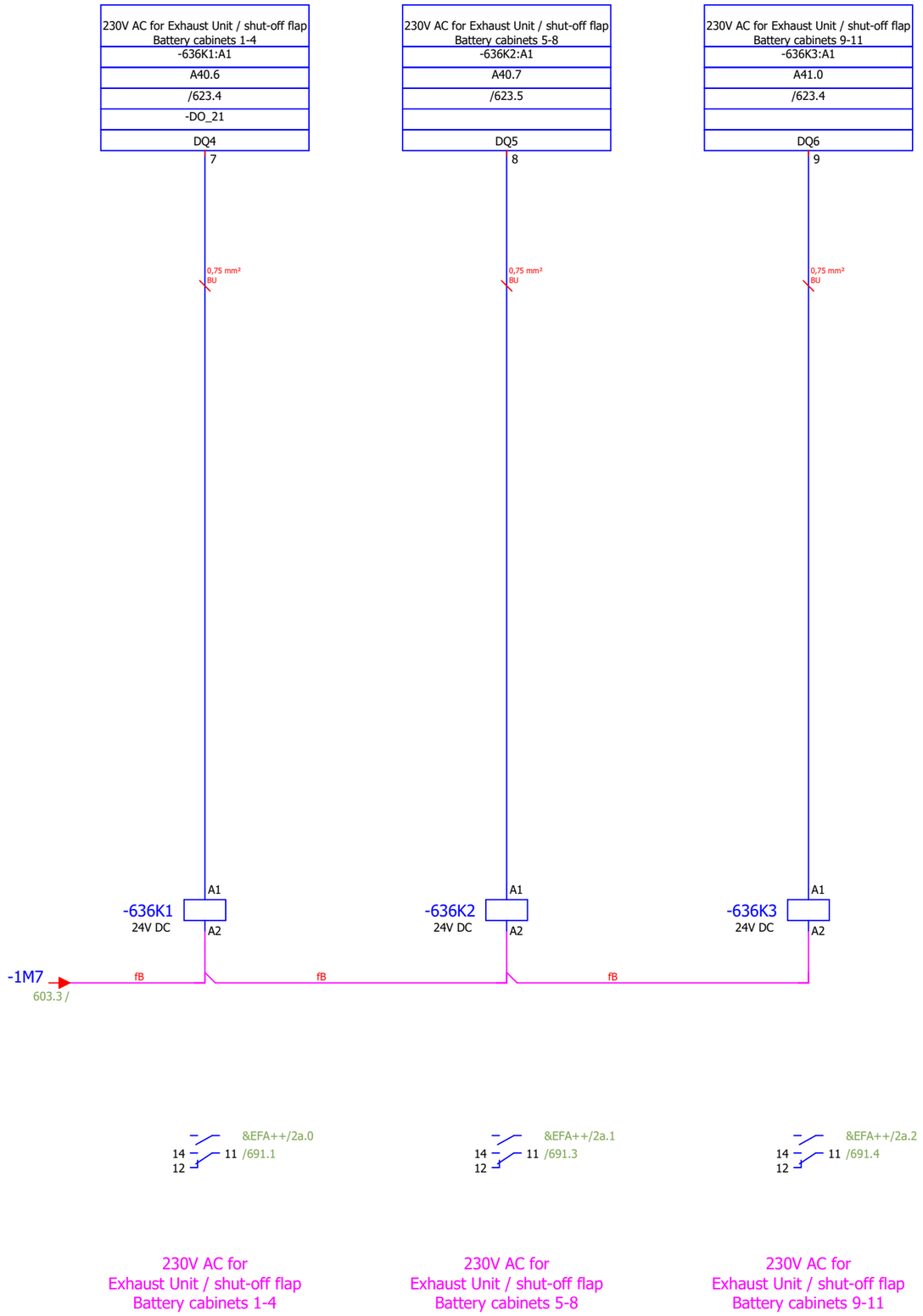
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next page: 636

Editor	Freqcon_JD			Statron	FREQCON	ET200SP ANALOG OUTPUTS AO_21	20241203_V1.22	= UNIT_02 Battery Container 1
Date	14.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet page: 625
Date								+ total: 500

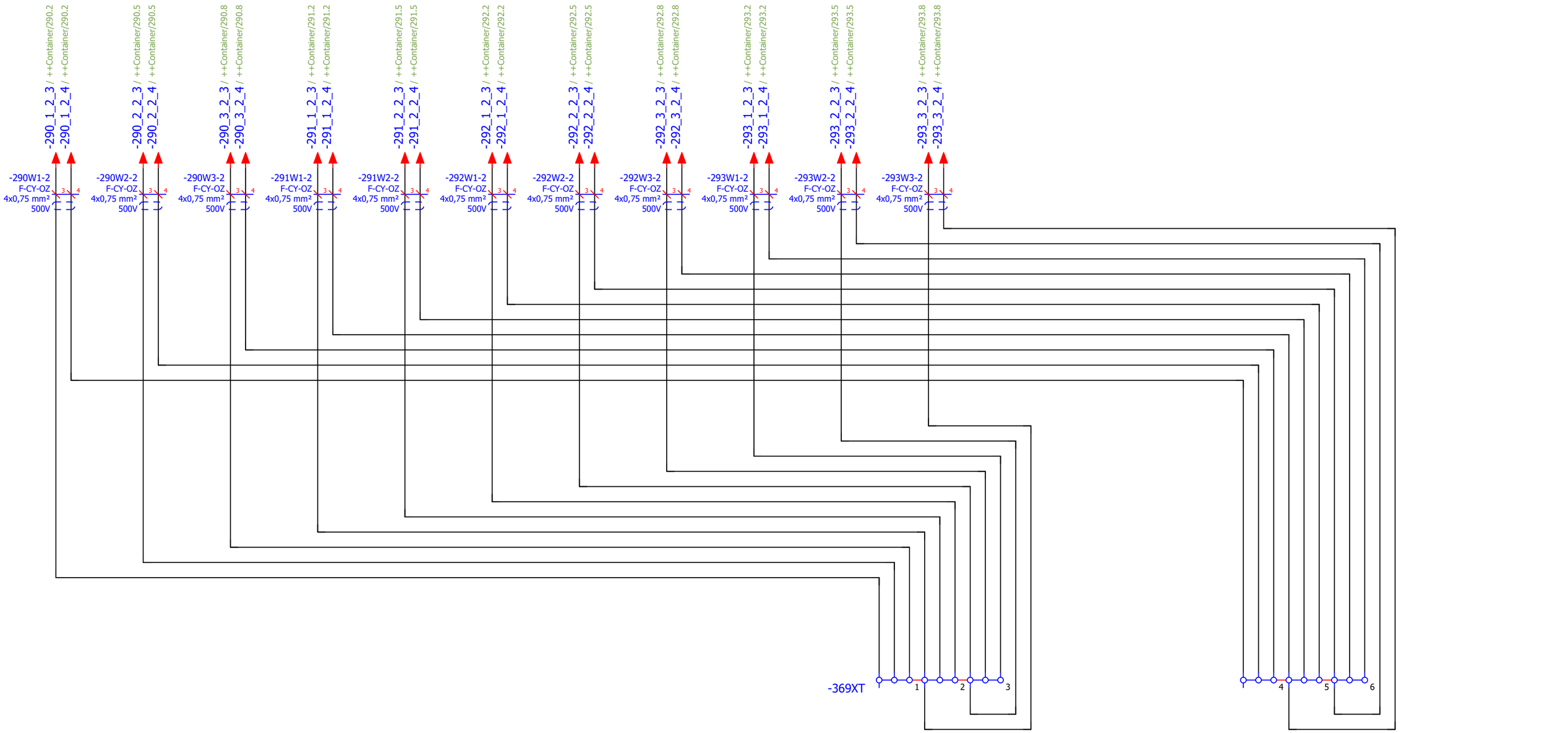


previous page: 625

next page: 669

Editor	Freqcon_JD			Statron	FREQCON	OUTPUTS FIRE DAMPER	20241203_V1.22	= UNIT_02	Battery Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet
Date								+	

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total: 500



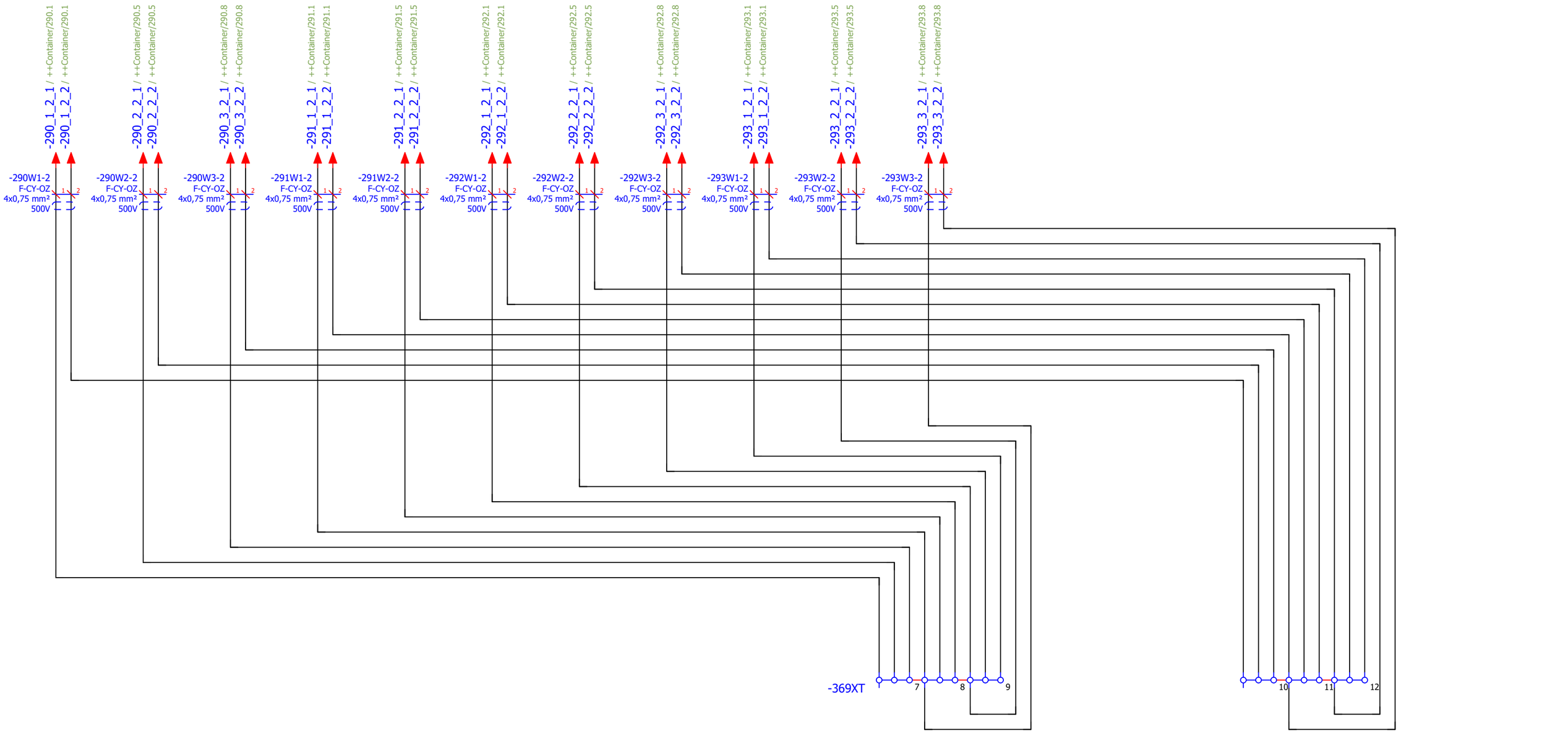
battery cabinet smoke detector
potential-free contacts
customer

battery cabinet smoke detector
potential-free contacts
customer

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Editor	Freqcon_JD			Statron	FREQCON	SMOKE POTENTIAL-FREE CONTACTS	20241203_V1.22	= UNIT_02 Battery Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 669
Date								+	total: 500



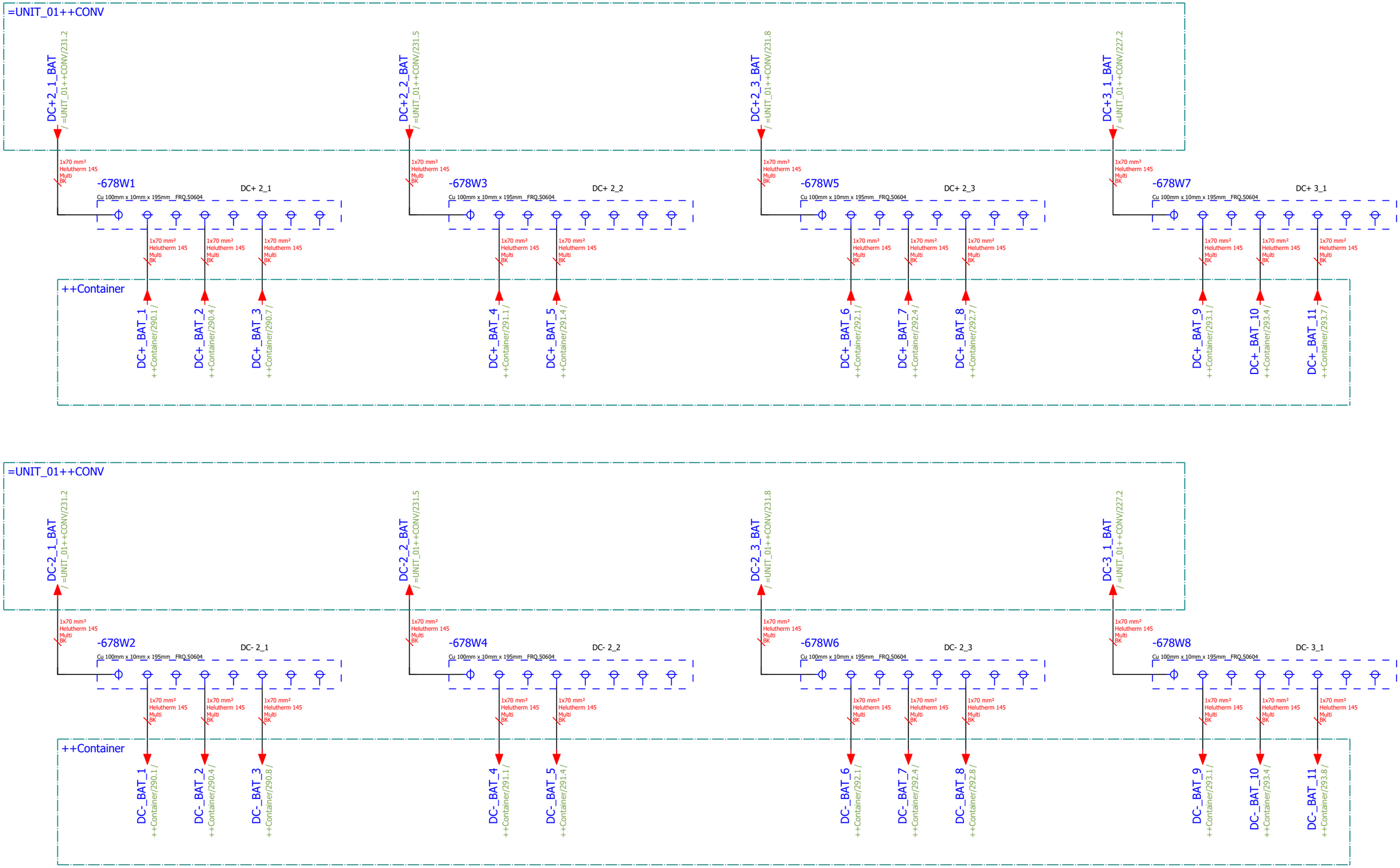
battery cabinet gas
potential-free contacts
customer

battery cabinet gas
potential-free contacts
customer

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Editor	Freqcon_JD			Statron	FREQCON	GAS POTENTIAL-FREE CONTACTS	20241203_V1.22	= UNIT_02 Battery Container 1	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 670
Date								+	total: 500



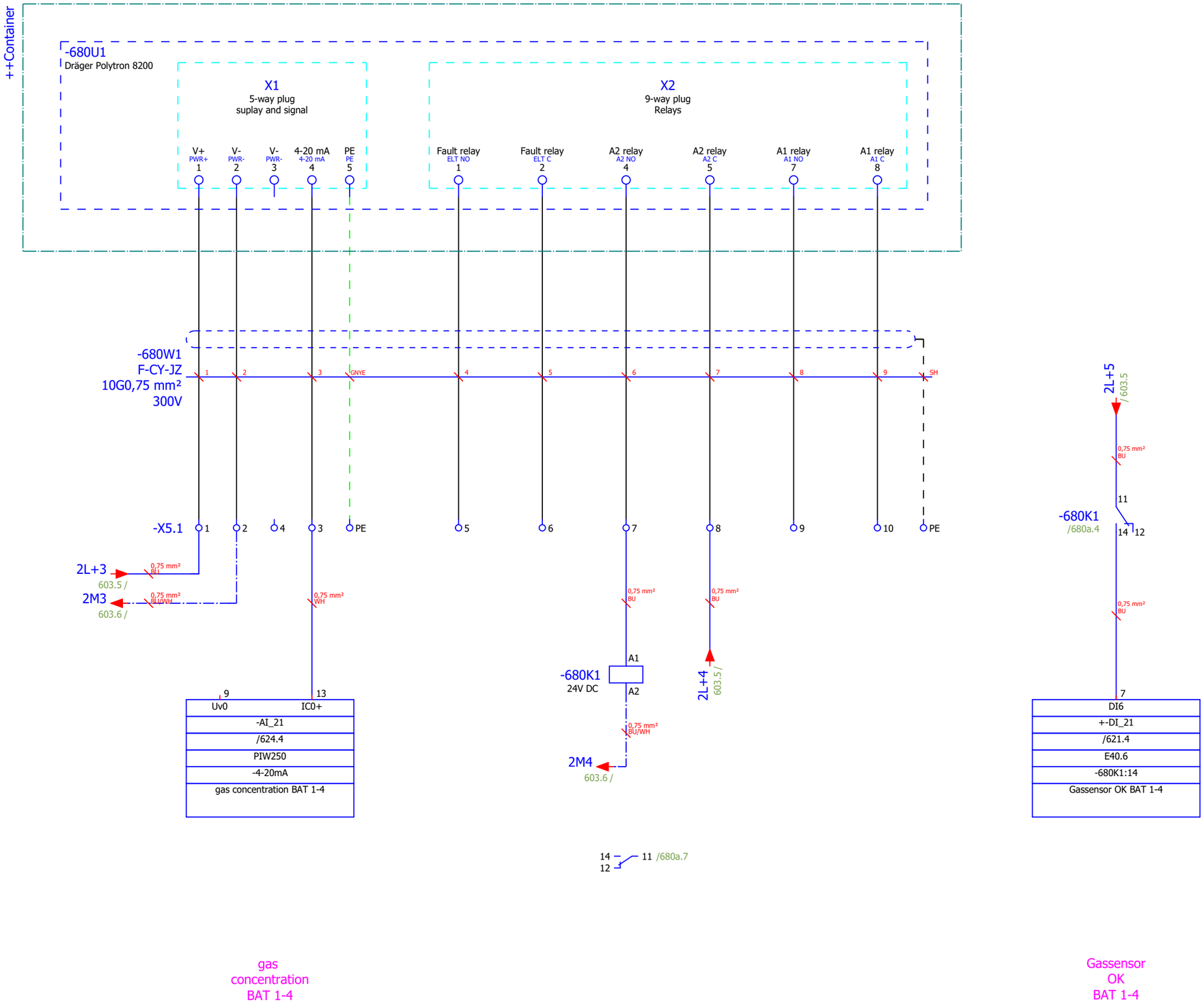
previous page: 670

next page: 680a

Editor	Freqcon_JD			Statron	FREQCON	DC BATTERY CABINETS	20241203_V1.22	= UNIT_02	Battery Container 1
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet
Date								+	

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total: 500



gas concentration BAT 1-4

Gassensor OK BAT 1-4

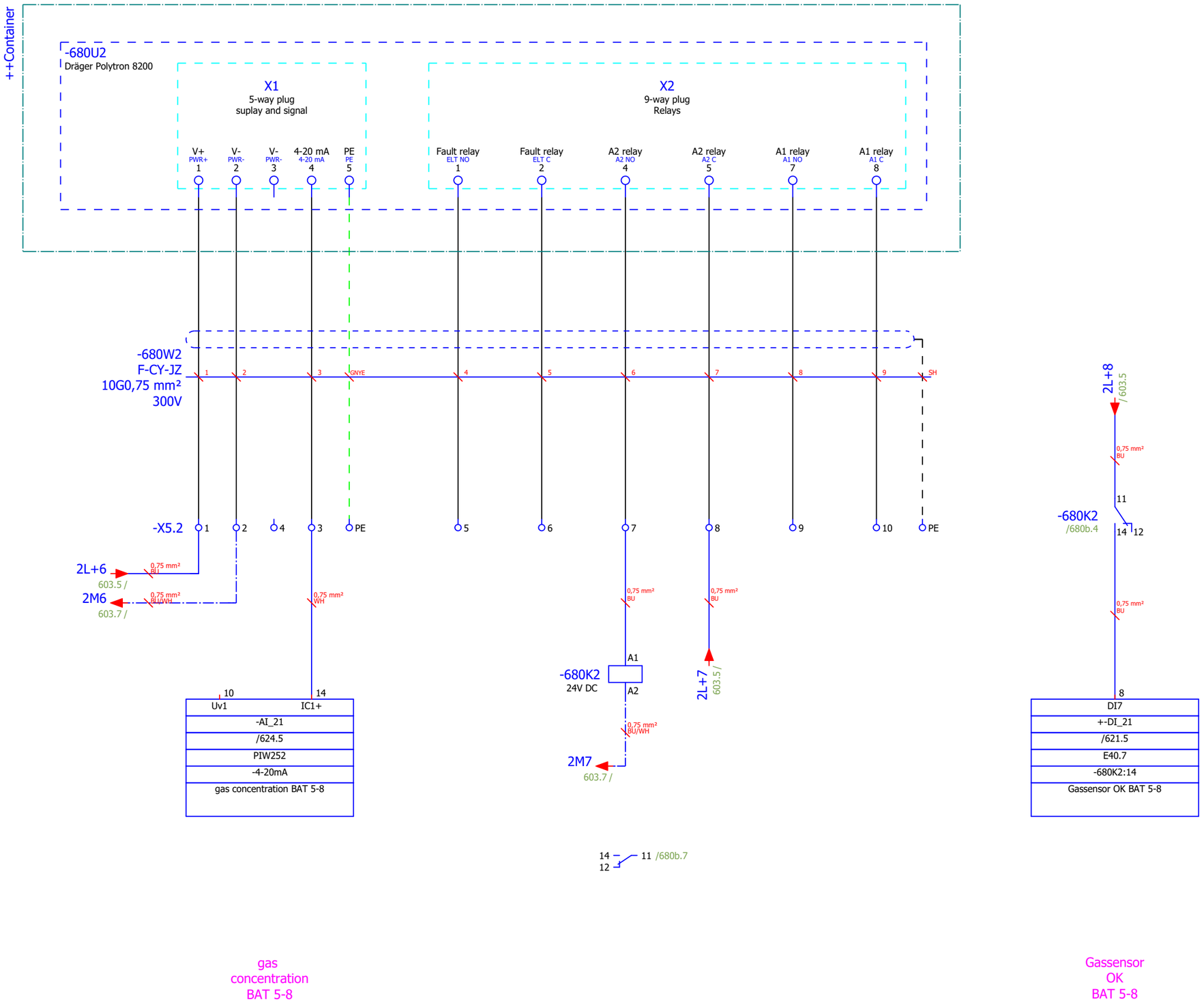
previous page: 678

next page: 680b

Editor	Freqcon_JD			Statron	FREQCON	STATIONARY GAS DETECTOR BAT 1-4	20241203_V1.22	= UNIT_02	Battery Container 1
Date	14.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet
Date								+	

page: 680a

total: 500



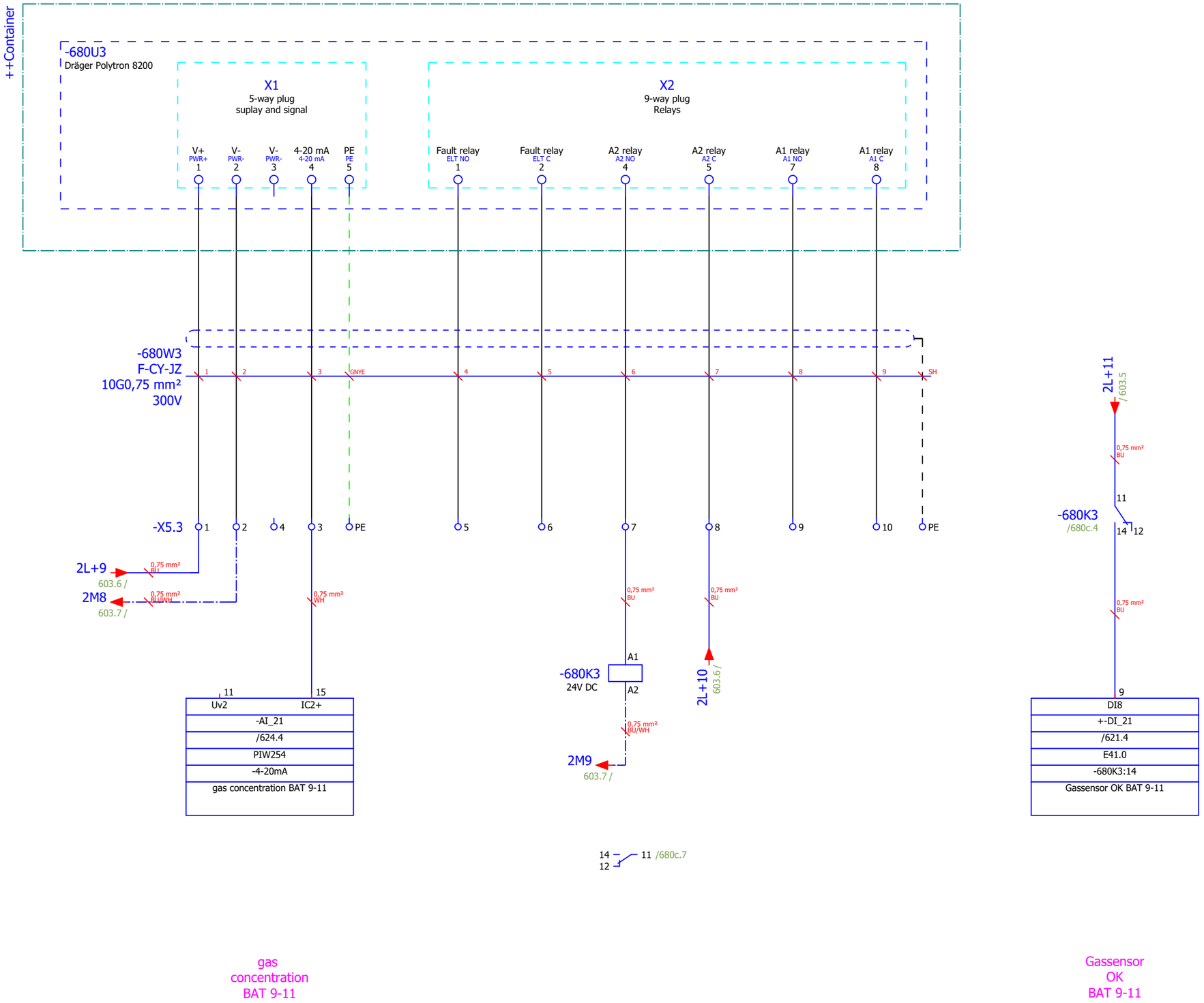
gas concentration BAT 5-8

Gassensor OK BAT 5-8

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next page: 680c

Editor	Freqcon_JD			Statron	FREQCON	STATIONARY GAS DETECTOR BAT 5-8	20241203_V1.22	= UNIT_02 Battery Container 1
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet — page: 680b
Date								+ — total: 500



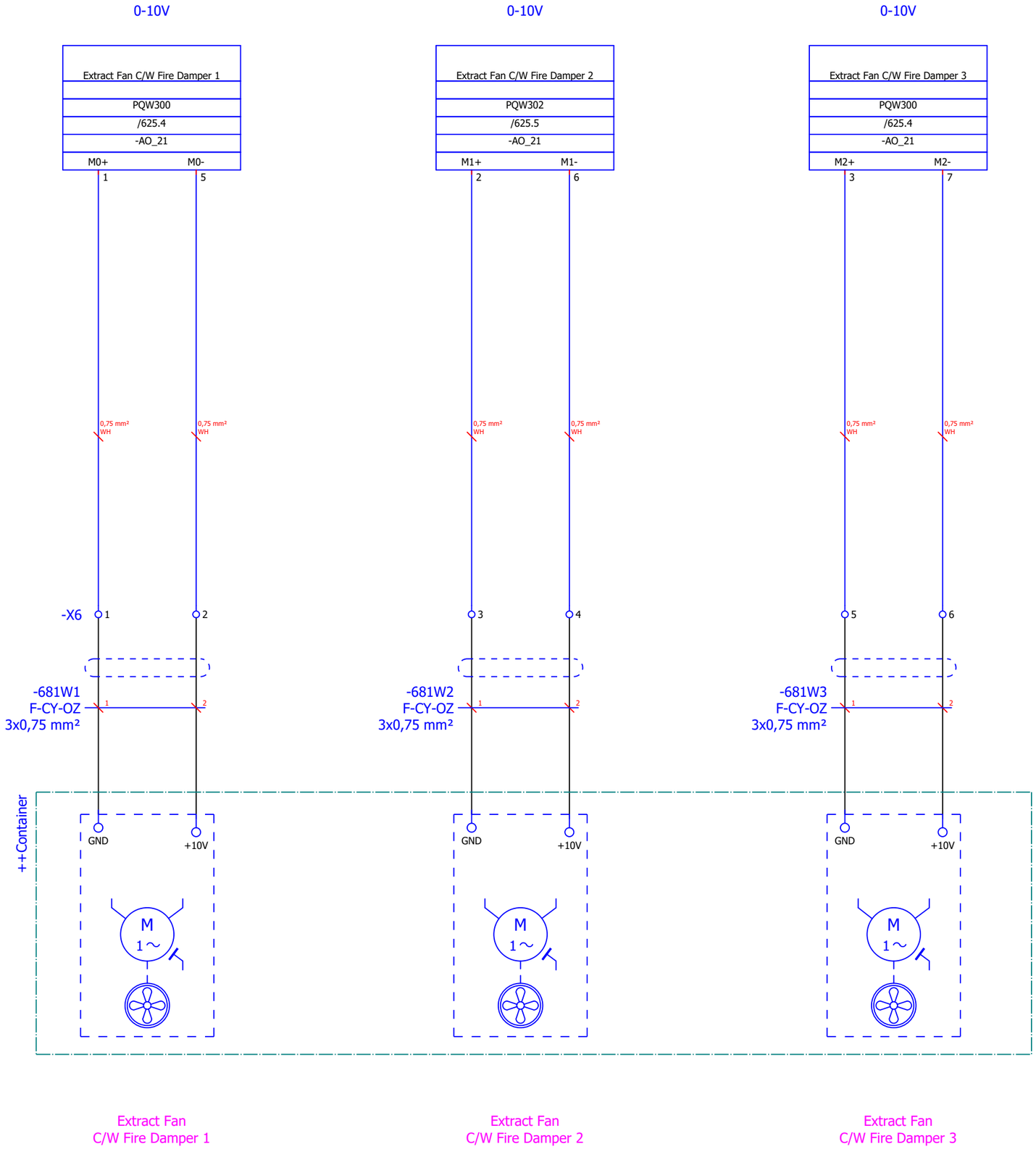
gas concentration BAT 9-11

Gassensor OK BAT 9-11

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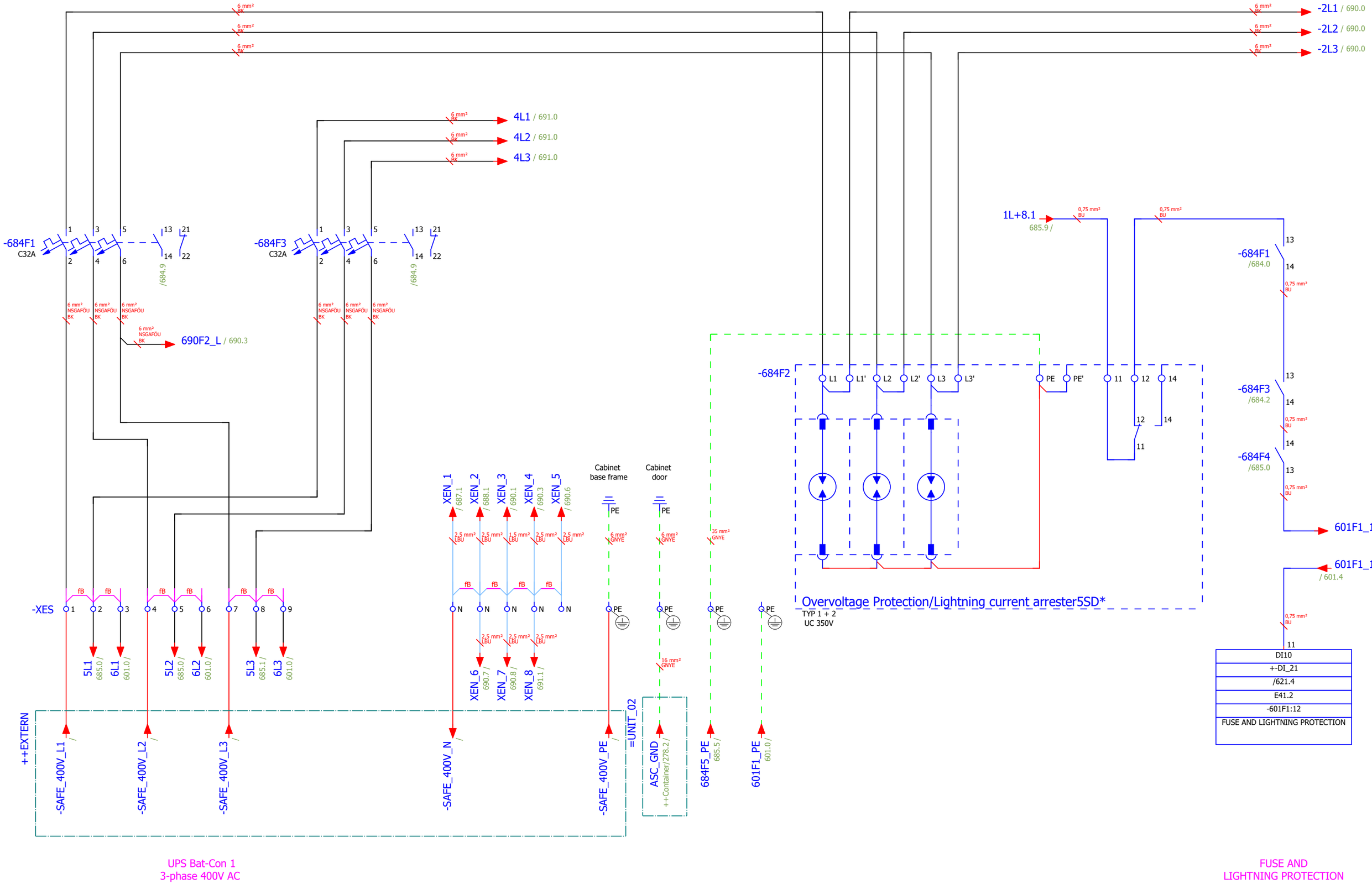
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Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 680c
Date								+	total: 500



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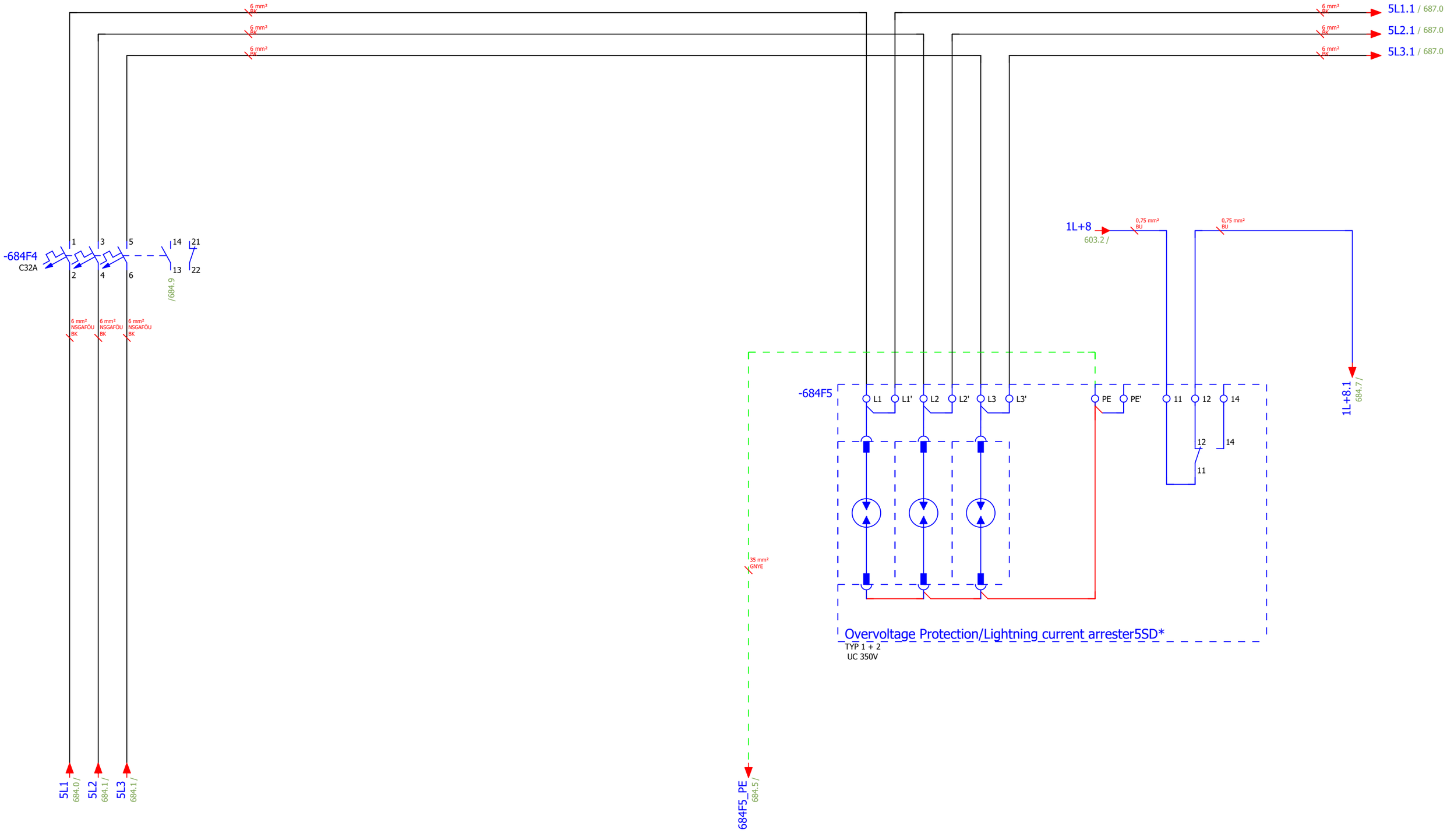
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Date	14.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 681
Date								+	total: 500



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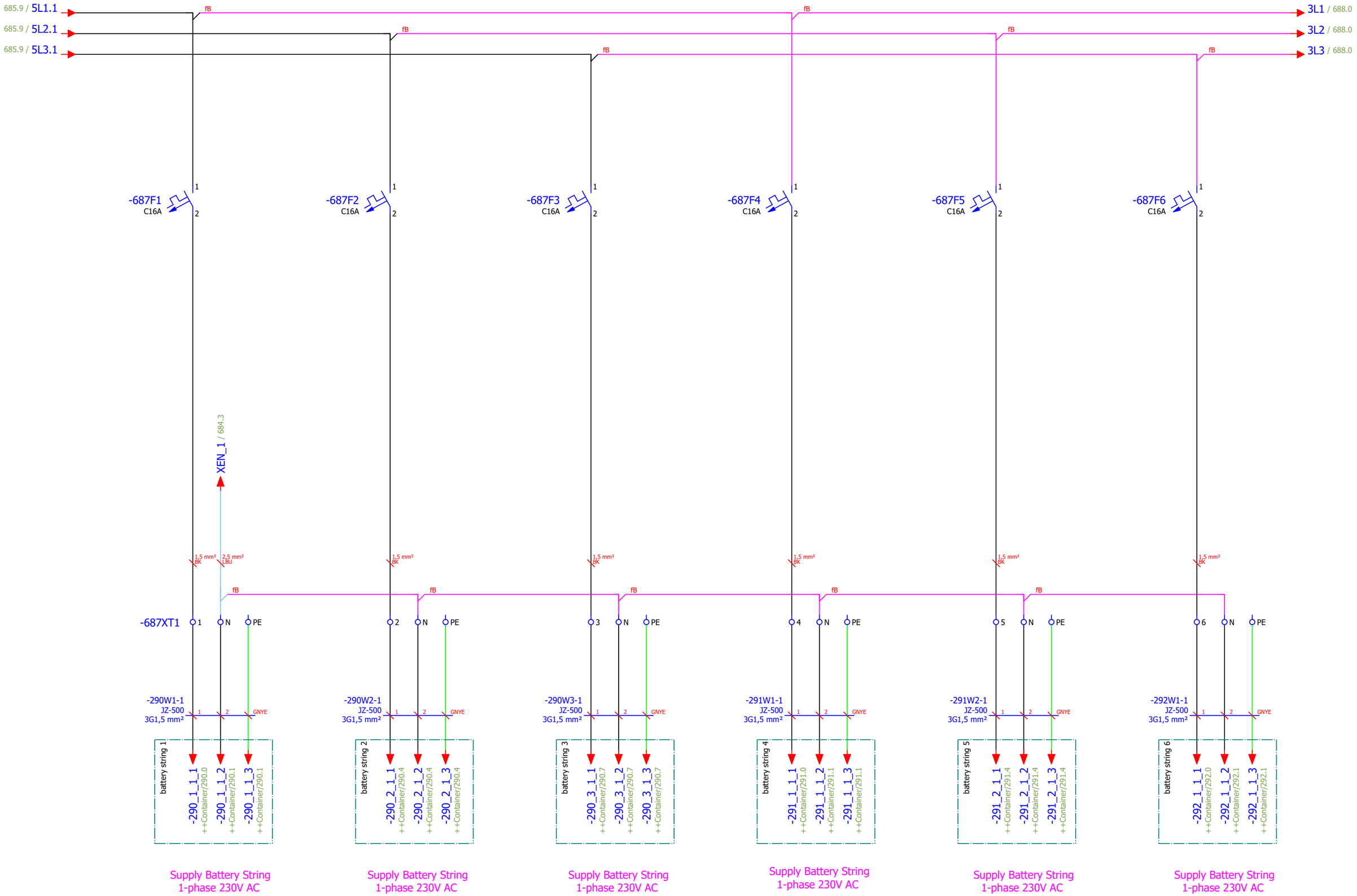
Editor	Freqcon_DG			Statron	FREQCON	AUXILIARY SUPPLY 400V AC	20241203_V1.22	= UNIT_02	Battery Container 1	
Date	22.11.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet	page: 684
Date								+		total: 500



FUSE AND
LIGHTNING PROTECTION

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Editor	Freqcon_DG			Statron	FREQCON	AUXILIARY SUPPLY 400V AC	20241203_V1.22	= UNIT_02 Battery Container 1	
Date	05.11.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 685
Date								+	total: 500



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Editor	Freqcon_DG			Statron		AUXILIARY SUPPLY 400V / 230V AC DISTRIBUTION	20241203_V1.22	= UNIT_02 Battery Container 1	
Date	08.10.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 687
Date								+	total: 500

687.9 / 3L1
687.9 / 3L2
687.9 / 3L3

fB

-688F1 C16A
-688F2 C16A
-688F3 C16A
-688F4 C16A
-688F5 C16A

XEN_2 / 684.3

1,5 mm² BK
2,5 mm² LBU

-687XT1 7 N PE
-687XT1 8 N PE
-687XT1 9 N PE
-687XT1 10 N PE
-687XT1 11 N PE

-292W2-1 JZ-500 3G1,5 mm²
-292W3-1 JZ-500 3G1,5 mm²
-293W1-1 JZ-500 3G1,5 mm²
-293W2-1 JZ-500 3G1,5 mm²
-293W3-1 JZ-500 3G1,5 mm²

1 2 GNYE

battery string 7
-292_2_1_1 ++Container/292.4
-292_2_1_2 ++Container/292.4
-292_2_1_3 ++Container/292.4

battery string 8
-292_3_1_1 ++Container/292.7
-292_3_1_2 ++Container/292.7
-292_3_1_3 ++Container/292.7

battery string 9
-293_1_1_1 ++Container/293.0
-293_1_1_2 ++Container/293.1
-293_1_1_3 ++Container/293.1

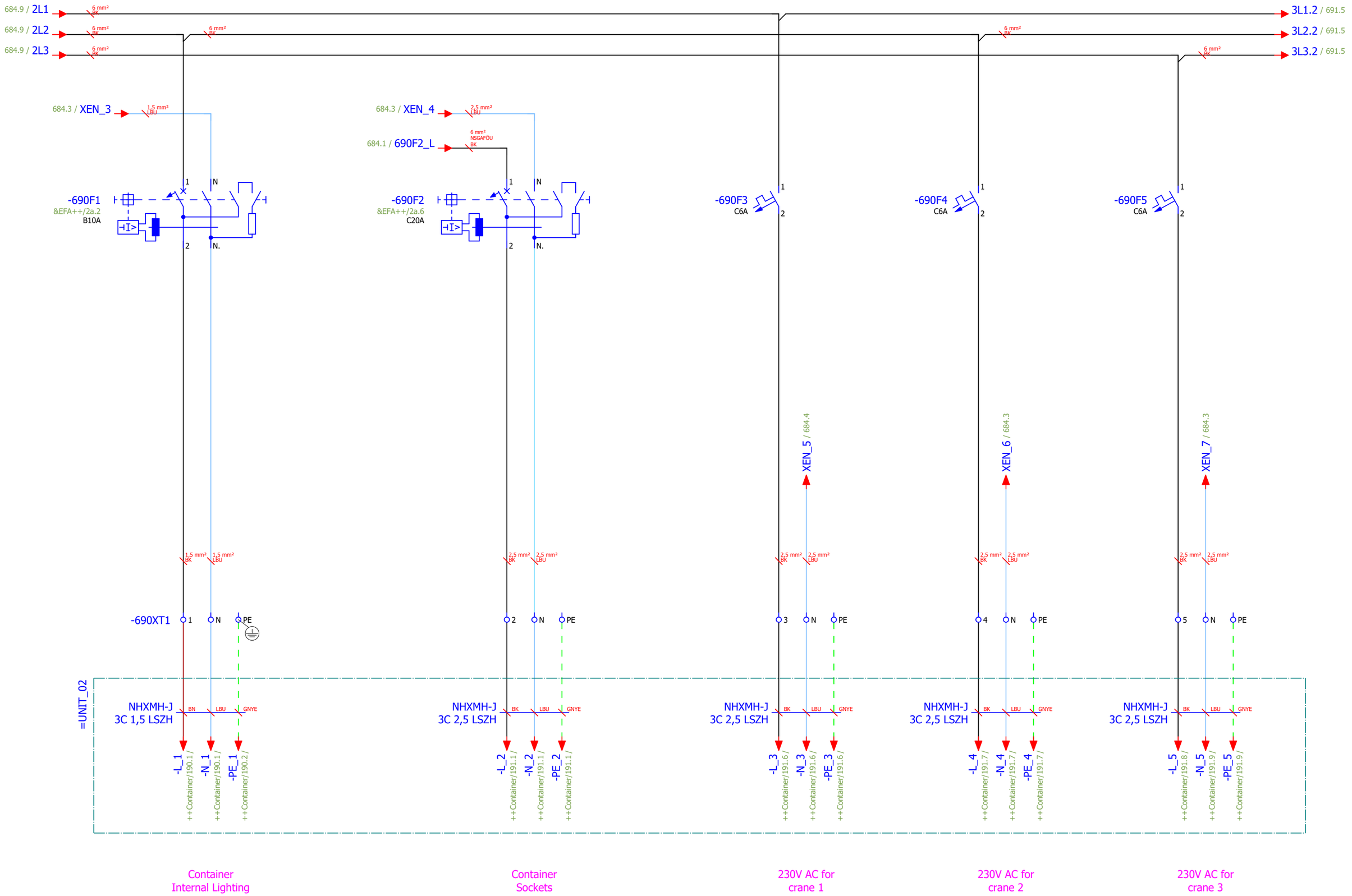
battery string 10
-293_2_1_1 ++Container/293.4
-293_2_1_2 ++Container/293.4
-293_2_1_3 ++Container/293.4

battery string 11
-293_3_1_1 ++Container/293.7
-293_3_1_2 ++Container/293.7
-293_3_1_3 ++Container/293.7

Supply Battery String 1-phase 230V AC
Supply Battery String 1-phase 230V AC
Supply Battery String 1-phase 230V AC
Supply Battery String 1-phase 230V AC
Supply Battery String 1-phase 230V AC

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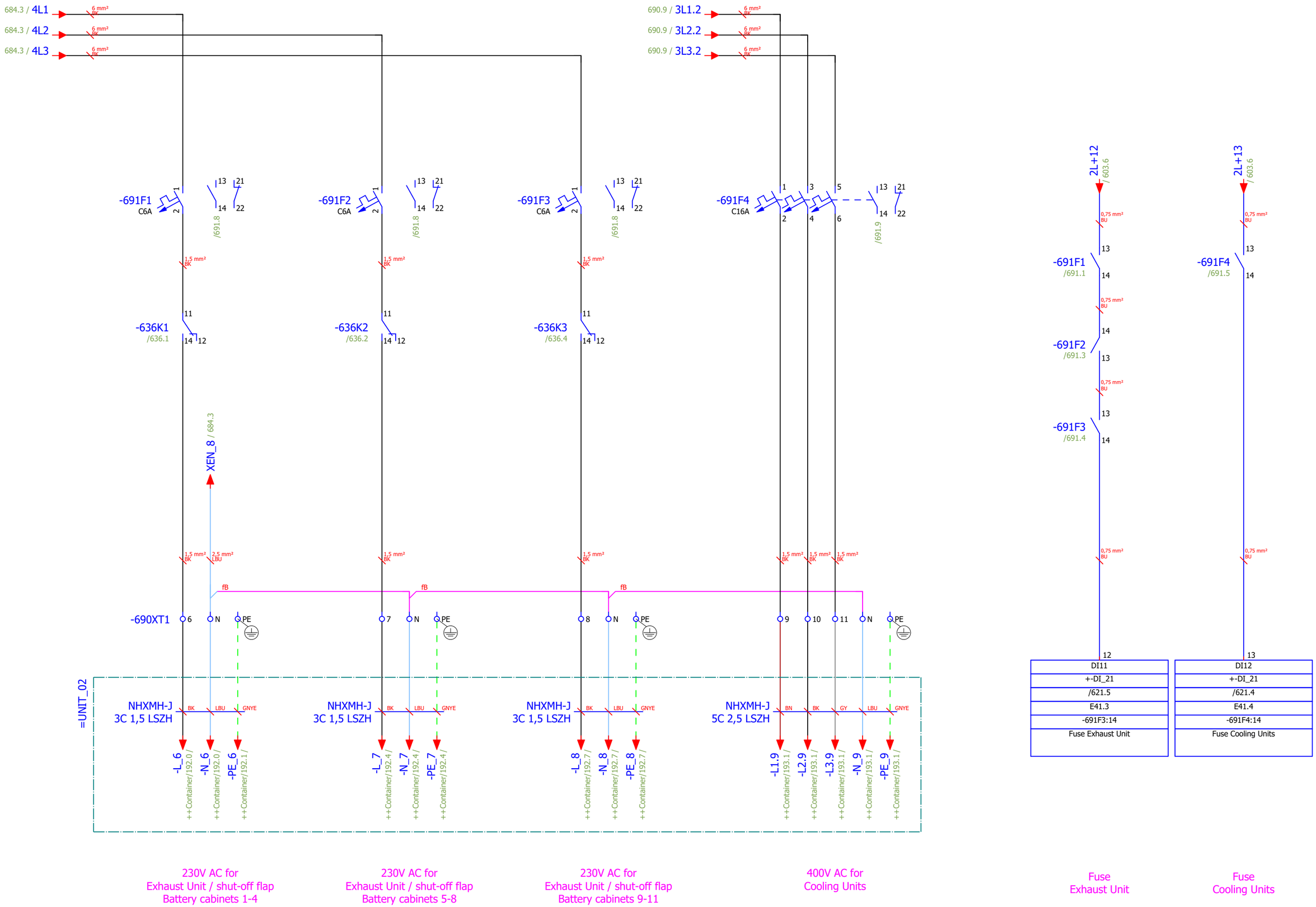
Editor	Freqcon_DG			Statron		AUXILIARY SUPPLY 400V / 230V AC DISTRIBUTION	20241203_V1.22	= UNIT_02	Battery Container 1
Date	08.10.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet
Date								+	page: 688 / total: 500



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Editor	Freqcon_DG			Statron	FREQCON	CONTAINER COOLING / LIGHTNING	20241203_V1.22	= UNIT_02	Battery Container 1	
Date	29.10.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet	page: 690
Date								+		total: 500



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next page: &EPC++Container/1

Editor	Freqcon_DG			Statron	FREQCON	CONTAINER COOLING / LIGHTNING	20241203_V1.22	= UNIT_02	Battery Container 1	
Date	05.11.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet	page: 691
Date								+		total: 500

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-680U1 &EFS++ASC/680a.1	1	Polytron 8000 Series Customized 4-20/HART mit Relais	8344800	Dräger	509321	
-680U2 &EFS++ASC/680b.1	1	Polytron 8000 Series Customized 4-20/HART mit Relais	8344800	Dräger	509321	
-680U3 &EFS++ASC/680c.1	1	Polytron 8000 Series Customized 4-20/HART mit Relais	8344800	Dräger	509321	

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&EFS++ASC/691

next page:
++ASC/1

Editor	Freqcon_DG			Statron	FREQCON	PARTS LIST	20241203_V1.22	= UNIT_02 Battery Container 1
Date	05.11.2024							& EPC Parts List
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container page: 1
Date								+ total: 500

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-101Q1 &EFA++/2a.7;&EFS/601.5	2	CIRCUIT-BREAKER SPRING-L. CONN. 3.2A	3RV2011-1DA25	Siemens	501432	
-101T1 &EFS/601.5	1	Power supply QUINT-PS/3AC/24DC/20/CO, with protective coating	2320924	Phoenix Contact	501573	
-102G1 &EFS/602.2	1	Uninterruptible power supply QUINT-UPS/ 24DC/ 24DC/20	2320238	Phoenix Contact	501598	
-102G2 &EFS/602.6	1	Energy storage UPS-BAT/VRLA/24DC/12AH	2320322	Phoenix Contact	501229	
-103F1 &EFS/603.2	1	Device circuit breaker 230VAC / 60VDC, 3kA, 1-pole, AS, F2, 10A	5SY1710-4	Siemens	10086	
-103F2 &EFS/603.5	1	Device circuit breaker 230VAC / 60VDC, 3kA, 1-pole, AS, F2, 10A	5SY1710-4	Siemens	10086	
-369XT &EFS/669.5...&EFS/669.8;&EFS/670.5...&EFS/670.8	12	Multi-level terminal block	3210583	Phoenix Contact	501385	
-369XT &EFS/669.5;&EFS/669.7;&EFS/670.5;&EFS/670.7	4	Plug-in bridge FBS 10-5	3030213	Phoenix Contact	500547	
-369XT &EFS/669.5	2	End bracket for terminal block	3022276	Phoenix Contact	500588	
-601F1 &EFS/601.1	1	Combination arrester type 1+2, UC 350V AC, 3-pole, FM, for TNC systems	5SD7443-1	Siemens	504070	
-611A1 &EFS/611.0	1	TREE 16 TX Metall 2GE 14 FE - Unmanaged Gigabit Switch - 16 Ports/	58174	Murrelektronik	10286	
-613T1 &EFS/613.1	1	Network isolators - FL ISOLATOR 100-RJ/RJ	2313931	Phoenix Contact	501464	
-613T1 &EFS/613.1	1	0,5m Cat.6 PiMF-Patchcabel, green	PATCH-C6 05 GN	reichelt elektronik GmbH & Co. KG	504395	
-613U1 &EFS/613.3	1	Surge protection device	2881007	Phoenix Contact	504791	
-613U2 &EFS/613.5	1	Patch panel, connection field: one RJ45 socket on 8 spring-cage connection terminals	2901642	Phoenix Contact	10214	
-620A1 &EFS/620.1	1	SIMATIC ET 200SP, PROFINET Interface-Module, IM 155-6 PN ST, bundle of Server module + Busadapter	6ES7155-6AA01-0BN0	Siemens	501554	
-636K1 &EFS/636.1	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-636K1 &EFS/636.1	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-636K2 &EFS/636.2	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-636K2 &EFS/636.2	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-636K3 &EFS/636.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-636K3 &EFS/636.4	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-680K1 &EFS/680a.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-680K2 &EFS/680b.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-680K3 &EFS/680c.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-684F1 &EFS/684.0	1	SENTRON Miniature circuit breaker	5SY4332-7	Siemens	505272	
-684F1 &EFS/684.0	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-684F2 &EFS/684.5	1	Combination arrester type 1+2, UC 350V AC, 3-pole, FM, for TNC systems	5SD7443-1	Siemens	504070	
-684F3 &EFS/684.2	1	SENTRON Miniature circuit breaker	5SY4332-7	Siemens	505272	
-684F3 &EFS/684.2	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-684F4 &EFS/685.0	1	SENTRON Miniature circuit breaker	5SY4332-7	Siemens	505272	
-684F4 &EFS/685.0	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-684F5 &EFS/685.5	1	Combination arrester type 1+2, UC 350V AC, 3-pole, FM, for TNC systems	5SD7443-1	Siemens	504070	
-687F1 &EFS/687.1	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-687F1 &EFS/687.1	1	PIN BUS BAR SHOCKHAZARD SAFETY, 16QMM 3 PHASE+HS	5ST3712	Siemens	10274	
-687F1 &EFS/687.1	2	End cap for pin busbars 2 - 3-phase	5ST3750	Siemens	503570	
-687F2 &EFS/687.3	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-687F3 &EFS/687.4	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-687F4 &EFS/687.5	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-687F5 &EFS/687.7	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-687F6 &EFS/687.8	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-687XT1 &EFS/687.1;&EFS/687.2;...&EFS/687.5;&EFS/687.7;&EFS/687.8;&EFS/688.1;&EFS/688.3;...&EFS/688.5;&EFS/688.7	11	Feed-through terminal block	3209510	Phoenix Contact	500583	
-687XT1 &EFS/687.1	2	End bracket for terminal block	3022276	Phoenix Contact	500588	
-687XT1 &EFS/687.1	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	
-687XT1 &EFS/687.1;&EFS/687.3;&EFS/687.4;&EFS/687A...&EFS/687.8;&EFS/688.1;&EFS/688.3;&EFS/688.4;&EFS/688.6;&EFS/688.7	11	Feed-through terminal block	3209523	Phoenix Contact	500584	
-687XT1 &EFS/687.1	1	Plug-in bridge FBS 10-5	3030213	Phoenix Contact	500547	
-687XT1 &EFS/688.1	1	Plug-in bridge FBS 5-5	3030190	Phoenix Contact	500545	
-687XT1 &EFS/687.2;...&EFS/687.4;&EFS/687.6;&EFS/687.7;&EFS/687.8;&EFS/688.2;...&EFS/688.4;&EFS/688.6;&EFS/688.7	11	Ground terminal block	3209536	Phoenix Contact	500813	
-688F1 &EFS/688.1	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-688F2 &EFS/688.3	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-688F3 &EFS/688.4	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-688F4 &EFS/688.5	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-688F5 &EFS/688.7	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-690F1 &EFS/690.1	1	RCBO elm, 10 kA, 1P+N, type A, 30 mA, B-char, In: 10 A, Un AC: 230 V	5SU1354-6KK10	Siemens	10440	
-690F2 &EFS/690.3	1	RCBO elm, 10 kA, 1P+N, type A, 30 mA, C-char, In: 20 A, Un AC: 230 V	5SU1354-7KK20	Siemens	10441	
-690F3 &EFS/690.5	1	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682	
-690F4 &EFS/690.7	1	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682	

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Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-690F5 &EFS/690.8	1	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682	
-690XT1 &EFS/690.1;&EFS/691.1;&EFS/691.3...&EFS/691.6	35	Feed-through terminal block	3209510	Phoenix Contact	500583	
-690XT1 &EFS/690.1;&EFS/691.1;&EFS/691.3...&EFS/691.6	35	Feed-through terminal block	3209523	Phoenix Contact	500584	
-690XT1 &EFS/690.1;&EFS/691.1;&EFS/691.3...&EFS/691.6	35	Ground terminal block	3209536	Phoenix Contact	500813	
-690XT1 &EFS/690.1;&EFS/691.1;&EFS/691.3...&EFS/691.6	7	End and partition plate for terminal block	3030417	Phoenix Contact	500506	
-690XT1 &EFS/690.1;&EFS/691.1;&EFS/691.3...&EFS/691.6	14	End bracket for terminal block	3022276	Phoenix Contact	500588	
-691F1 &EFS/691.1	1	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682	
-691F1 &EFS/691.1	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-691F2 &EFS/691.3	1	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682	
-691F2 &EFS/691.3	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-691F3 &EFS/691.4	1	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682	
-691F3 &EFS/691.4	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-691F4 &EFS/691.5	1	CIRCUIT BREAKER 10KA 3POL C16	5SY4316-7	Siemens	503340	X
-691F4 &EFS/691.5	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-AI_21 &EFS/620.3	1	ET 200SP, AI 4XU/I 2-WIRE ST, PU 1	6ES7134-6HD01-0BA1	Siemens	505054	
-AI_21 &EFS/620.3	1	BASEUNIT TYPE A0, BU15-P16+A0+2D	6ES7193-6BP00-0DA0	Siemens	500786	
-AO_21 &EFS/620.4	1	AQ 4XU/I ST	6ES7135-6HD00-0BA1	Siemens	504291	
-AO_21 &EFS/620.4	1	BASEUNIT TYPE A0, BU15-P16+A0+2D	6ES7193-6BP00-0DA0	Siemens	500786	
-DI_21 &EFS/620.3	1	SIMATIC ET 200SP DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	Siemens	500788	

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-DI_21 &EFS/620.3	1	BASEUNIT TYPE A0, BU15-P16+A0+2D	6ES7193-6BP00-0DA0	Siemens	500786	
-DO_21 &EFS/620.3	1	ET 200SP, DQ 16x 24V DC/0,5A ST, PU 1	6ES7132-6BH01-0BA0	Siemens	504397	
-DO_21 &EFS/620.3	1	BASEUNIT TYPE A0, BU15-P16+A0+2D	6ES7193-6BP00-0DA0	Siemens	500786	
-X5.1 &EFS/680a.2...&EFS/680a.5	10	Feed-through terminal block	3209510	Phoenix Contact	500583	
-X5.1 &EFS/680a.2	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	
-X5.1 &EFS/680a.2	2	End bracket for terminal block	3022276	Phoenix Contact	500588	
-X5.1 &EFS/680a.2	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	
-X5.1 &EFS/680a.2;&EFS/680a.6	2	Ground terminal block	3209536	Phoenix Contact	500813	
-X5.2 &EFS/680b.2...&EFS/680b.5	10	Feed-through terminal block	3209510	Phoenix Contact	500583	
-X5.2 &EFS/680b.2	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	
-X5.2 &EFS/680b.2	1	End bracket for terminal block	3022276	Phoenix Contact	500588	
-X5.2 &EFS/680b.2	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	
-X5.2 &EFS/680b.2;&EFS/680b.6	2	Ground terminal block	3209536	Phoenix Contact	500813	
-X5.3 &EFS/680c.2...&EFS/680c.5	10	Feed-through terminal block	3209510	Phoenix Contact	500583	
-X5.3 &EFS/680c.2	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	
-X5.3 &EFS/680c.2	1	End bracket for terminal block	3022276	Phoenix Contact	500588	
-X5.3 &EFS/680c.2	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	
-X5.3 &EFS/680c.2;&EFS/680c.6	2	Ground terminal block	3209536	Phoenix Contact	500813	
-X6 &EFS/681.1;&EFS/681.3;&EFS/681.5	6	Feed-through terminal block	3209510	Phoenix Contact	500583	

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Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-X6 &EFS/681.1	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	
-X6 &EFS/681.1	1	End bracket for terminal block	3022276	Phoenix Contact	500588	
-X6 &EFS/681.1	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	
-XDC1 &EFS/603.2;&EFS/603.3	6	Multi-level terminal block	3210583	Phoenix Contact	501385	
-XDC1 &EFS/603.2;&EFS/603.3	2	Plug-in bridge FBS 3-5	3030174	Phoenix Contact	503103	
-XDC1 &EFS/603.2	2	End bracket for terminal block	3022276	Phoenix Contact	500588	
-XDC1 &EFS/603.2	1	End and partition plate for terminal block	3211634	Phoenix Contact	500505	
-XDC1 &EFS/603.4	2	Protective conductor double-level terminal block Push-in PTTB 2,5-PE	3210596	Phoenix Contact	501389	
-XDC2 &EFS/603.5...&EFS/603.7	7	Multi-level terminal block	3210583	Phoenix Contact	501385	
-XDC2 &EFS/603.5	1	Plug-in bridge FBS 4-5	3030187	Phoenix Contact	500801	
-XDC2 &EFS/603.5	1	End bracket for terminal block	3022276	Phoenix Contact	500588	
-XDC2 &EFS/603.5	1	End and partition plate for terminal block	3211634	Phoenix Contact	500505	
-XDC2 &EFS/603.6	1	Plug-in bridge FBS 2-5	3030161	Phoenix Contact	505211	
-XDC2 &EFS/603.6	1	Plug-in bridge FBS 3-5	3030174	Phoenix Contact	503103	
-XES &EFS/684.0...&EFS/684.2	9	Feed-through terminal block Push-in PT 6	3211813	Phoenix Contact	501388	
-XES &EFS/684.0;&EFS/684.1	4	Plug-in bridge FBS 2-8	3030284	Phoenix Contact	502068	
-XES &EFS/684.0	2	End bracket for terminal block	3022276	Phoenix Contact	500588	
-XES &EFS/684.0	1	End and partition plate for terminal block	3212044	Phoenix Contact	500503	
-XES &EFS/684.3;&EFS/684.4	5	Feed-through terminal block Push-in PT 6 BU	3211819	Phoenix Contact	500585	

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Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-XES &EFS/684.3	1	Plug-in bridge FBS 5-8	3030310	Phoenix Contact	504375	
-XES &EFS/684.4;&EFS/684.5	4	Ground modular terminal block Push-in PT 6-PE	3211822	Phoenix Contact	500725	

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&EPA++Container/1

Editor	Freqcon_DG			Statron	FREQCON	PARTS LIST	20241203_V1.22	= UNIT_02 Battery Container 1
Date	05.11.2024							& EPC Parts List
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet page: 7
Date								+ total: 500

0	1	2	3	4	5	6	7	8	9

Summarized parts list

Freqcon_ABAS_de_en

Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.
3	Polytron 8000 Series Customized 4-20/HART mit Relais	8344800	Dräger	509321

Editor	Freqcon_DG			Statron		SUMMARIZED PARTS LIST	20241203_V1.22	= UNIT_02 Battery Container 1	
Date	05.11.2024							& EPA Summarized part list	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container	page: 1
Date								+	total: 500

Summarized parts list

Freqcon_ABAS_de_en

Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.
1	TREE 16 TX Metall 2GE 14 FE - Unmanaged Gigabit Switch - 16 Ports/	58174	Murrelektronik	10286
1	Network isolators - FL ISOLATOR 100-RJ/RJ	2313931	Phoenix Contact	501464
1	Uninterruptible power supply QUINT-UPS/ 24DC/ 24DC/20	2320238	Phoenix Contact	501598
1	Energy storage UPS-BAT/VRLA/24DC/12AH	2320322	Phoenix Contact	501229
1	Power supply QUINT-PS/3AC/24DC/20/CO, with protective coating	2320924	Phoenix Contact	501573
1	Surge protection device	2881007	Phoenix Contact	504791
1	Patch panel, connection field: one RJ45 socket on 8 spring-cage connection terminals	2901642	Phoenix Contact	10214
6	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726
3	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803
1	0,5m Cat.6 PiMF-Patchcabel, green	PATCH-C6 05 GN	reichelt elektronik GmbH & Co. KG	504395
2	CIRCUIT-BREAKER SPRING-L. CONN. 3.2A	3RV2011-1DA25	Siemens	501432
3	Combination arrester type 1+2, UC 350V AC, 3-pole, FM, for TNC systems	5SD7443-1	Siemens	504070
7	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737
1	PIN BUS BAR SHOCKHAZARD SAFETY, 16QMM 3 PHASE+HS	5ST3712	Siemens	10274
2	End cap for pin busbars 2 - 3-phase	5ST3750	Siemens	503570
1	RCBO elm, 10 kA, 1P+N, type A, 30 mA, B-char, In: 10 A, Un AC: 230 V	5SU1354-6KK10	Siemens	10440
1	RCBO elm, 10 kA, 1P+N, type A, 30 mA, C-char, In: 20 A, Un AC: 230 V	5SU1354-7KK20	Siemens	10441
2	Device circuit breaker 230VAC / 60VDC, 3kA, 1-pole, AS, F2, 10A	5SY1710-4	Siemens	10086

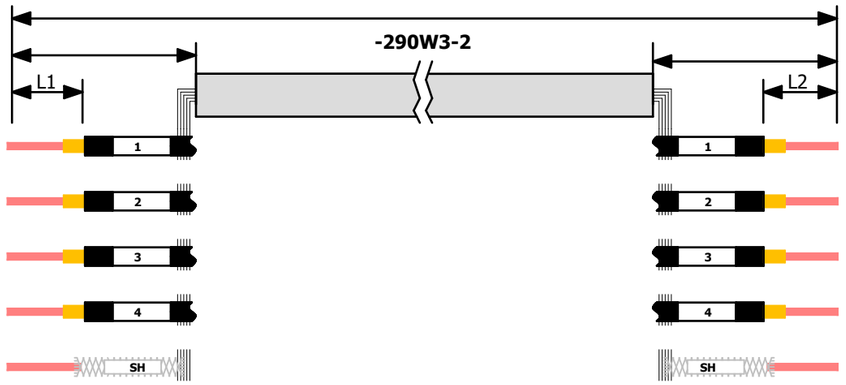
Summarized parts list

Freqcon_ABAS_de_en

Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.
6	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682
11	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569
3	SENTRON Miniature circuit breaker	5SY4332-7	Siemens	505272
1	SIMATIC ET 200SP DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	Siemens	500788
1	ET 200SP, DQ 16x 24V DC/0,5A ST, PU 1	6ES7132-6BH01-0BA0	Siemens	504397
1	ET 200SP, AI 4XU/I 2-WIRE ST, PU 1	6ES7134-6HD01-0BA1	Siemens	505054
1	AQ 4XU/I ST	6ES7135-6HD00-0BA1	Siemens	504291
1	SIMATIC ET 200SP, PROFINET Interface-Module, IM 155-6 PN ST, bundle of Server module + Busadapter	6ES7155-6AA01-0BN0	Siemens	501554
4	BASEUNIT TYPE A0, BU15-P16+A0+2D	6ES7193-6BP00-0DA0	Siemens	500786

Cable name =UNIT_02++Container+-290W3-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors

Cable parts HELU.16560
Order number 16560

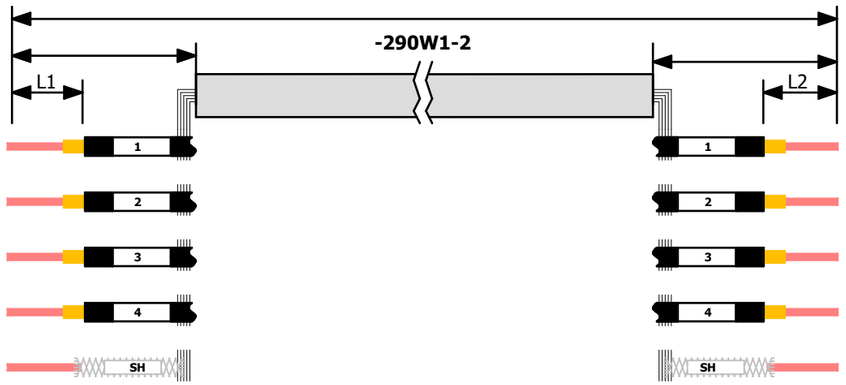


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-570XT:1			
	-570XT:2			
	-570XT:3			
	-570XT:4			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-369XT:7	
			++ASC-369XT:10	
			++ASC-369XT:1	
			++ASC-369XT:4	

Cable name =UNIT_02++Container+-290W1-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors

Cable parts HELU.16560
Order number 16560

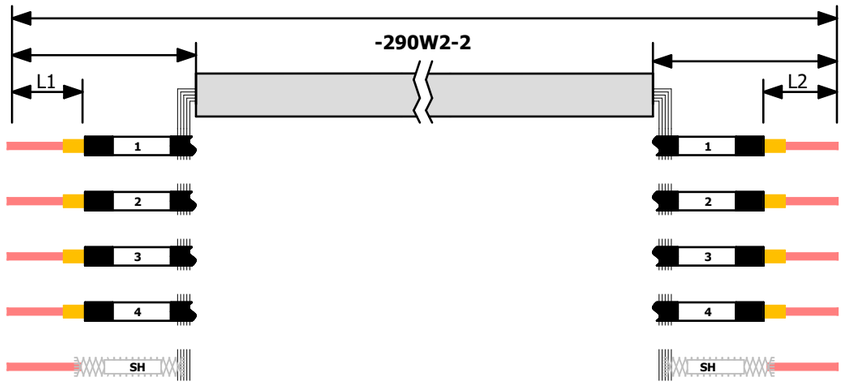


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-570XT:1			
	-570XT:2			
	-570XT:3			
	-570XT:4			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-369XT:7	
			++ASC-369XT:10	
			++ASC-369XT:1	
			++ASC-369XT:4	

Cable name =UNIT_02++Container+-290W2-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors

Cable parts HELU.16560
Order number 16560



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-570XT:1			
	-570XT:2			
	-570XT:3			
	-570XT:4			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-369XT:7	
			++ASC-369XT:10	
			++ASC-369XT:1	
			++ASC-369XT:4	

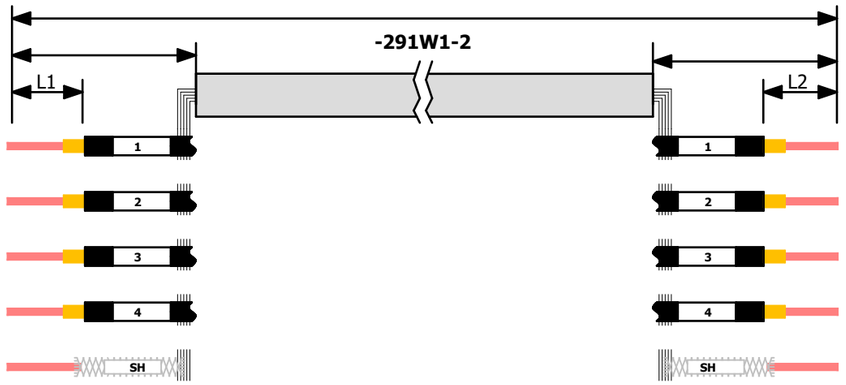
previous page:
&EPA++ASC/2

next page:
2

FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_02++Container+-291W1-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors

Cable parts HELU.16560
Order number 16560

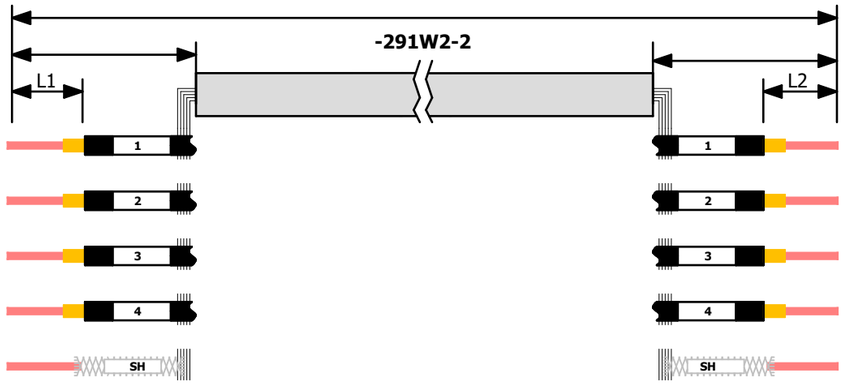


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-570XT:1			
	-570XT:2			
	-570XT:3			
	-570XT:4			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-369XT:8	
			++ASC-369XT:11	
			++ASC-369XT:2	
			++ASC-369XT:5	

Cable name =UNIT_02++Container+-291W2-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors

Cable parts HELU.16560
Order number 16560

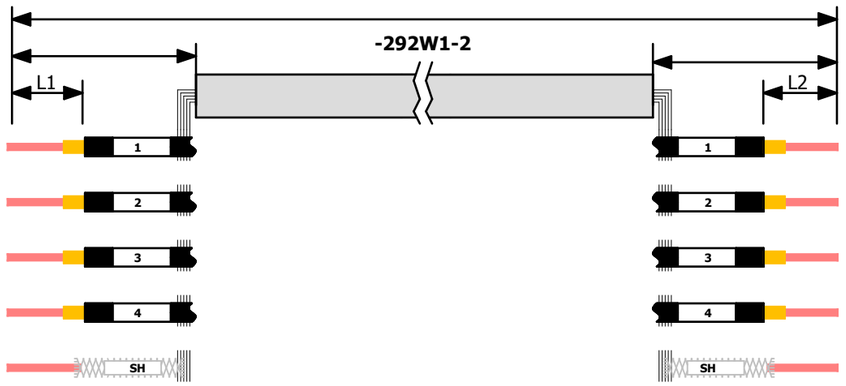


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-570XT:1			
	-570XT:2			
	-570XT:3			
	-570XT:4			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-369XT:8	
			++ASC-369XT:11	
			++ASC-369XT:2	
			++ASC-369XT:5	

Cable name =UNIT_02++Container+-292W1-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors

Cable parts HELU.16560
Order number 16560



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-570XT:1			
	-570XT:2			
	-570XT:3			
	-570XT:4			

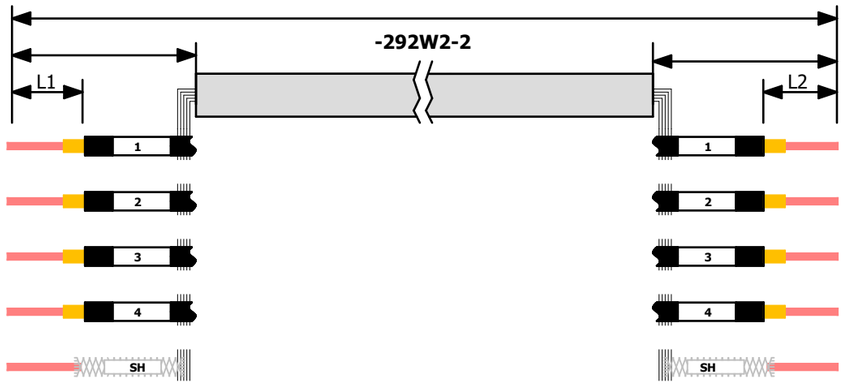
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-369XT:8	
			++ASC-369XT:11	
			++ASC-369XT:2	
			++ASC-369XT:5	

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FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_02++Container+-292W2-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors

Cable parts HELU.16560
Order number 16560

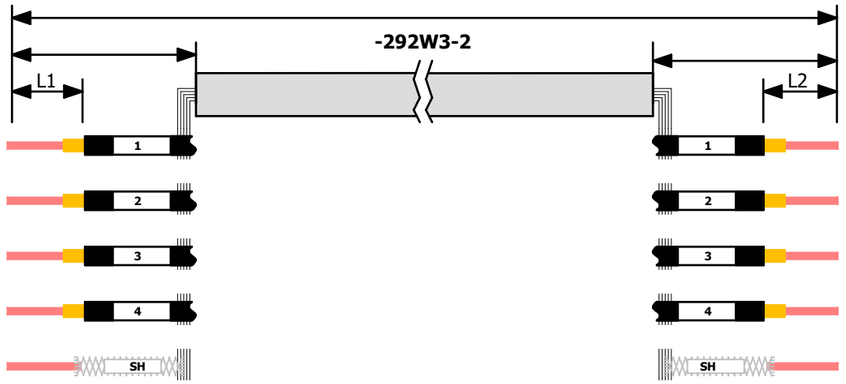


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-570XT:1			
	-570XT:2			
	-570XT:3			
	-570XT:4			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-369XT:9	
			++ASC-369XT:12	
			++ASC-369XT:3	
			++ASC-369XT:6	

Cable name =UNIT_02++Container+-292W3-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors

Cable parts HELU.16560
Order number 16560

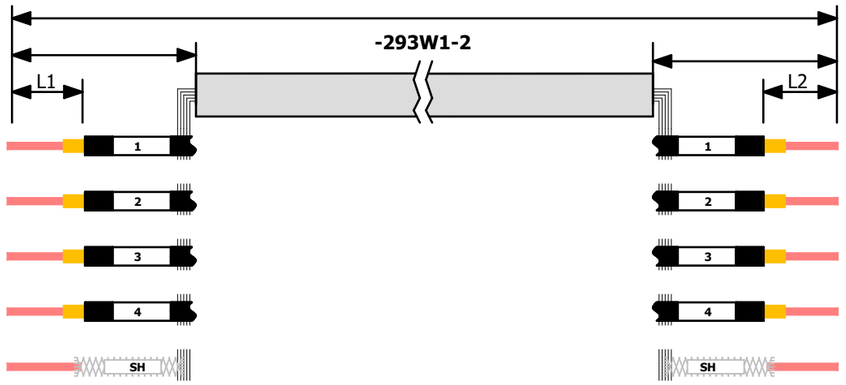


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-570XT:1			
	-570XT:2			
	-570XT:3			
	-570XT:4			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-369XT:9	
			++ASC-369XT:12	
			++ASC-369XT:3	
			++ASC-369XT:6	

Cable name =UNIT_02++Container+-293W1-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors

Cable parts HELU.16560
Order number 16560



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-570XT:1			
	-570XT:2			
	-570XT:3			
	-570XT:4			

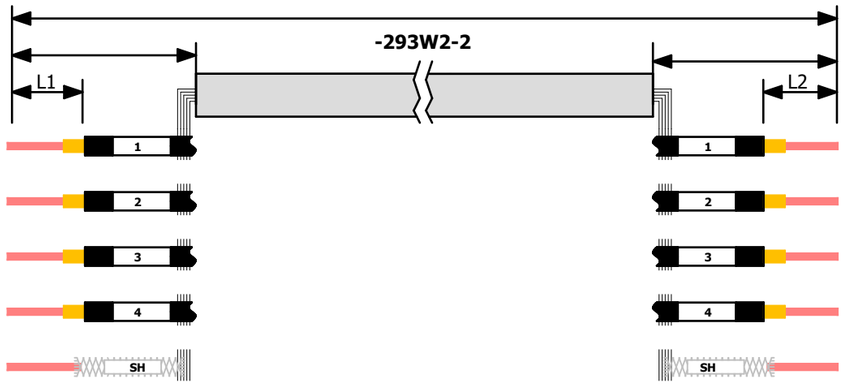
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-369XT:9	
			++ASC-369XT:12	
			++ASC-369XT:3	
			++ASC-369XT:6	

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FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_02++Container+-293W2-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors

Cable parts HELU.16560
Order number 16560

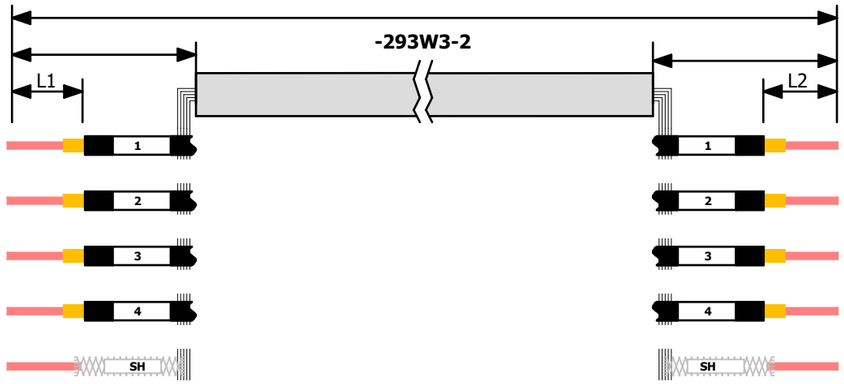


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-570XT:1			
	-570XT:2			
	-570XT:3			
	-570XT:4			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-369XT:9	
			++ASC-369XT:12	
			++ASC-369XT:3	
			++ASC-369XT:6	

Cable name =UNIT_02++Container+-293W3-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors

Cable parts HELU.16560
Order number 16560



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-570XT:1			
	-570XT:2			
	-570XT:3			
	-570XT:4			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-369XT:8	
			++ASC-369XT:11	
			++ASC-369XT:2	
			++ASC-369XT:5	

Cable name =UNIT_02++Container+-290W1-1
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts
Order number



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-XE:1			
	-XE:N			
	-XE:PE			

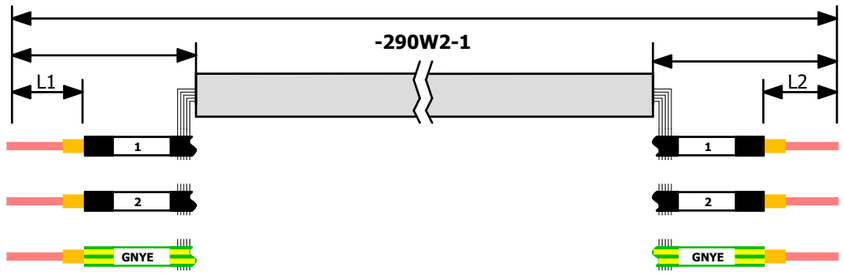
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-687XT1:1	
			++ASC-687XT1:N	
			++ASC-687XT1:PE	

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FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_02++Container+-290W2-1
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts
Order number



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-XE:1			
	-XE:N			
	-XE:PE			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-687XT1:2	
			++ASC-687XT1:N	
			++ASC-687XT1:PE	

Cable name =UNIT_02++Container+-290W3-1
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts
Order number

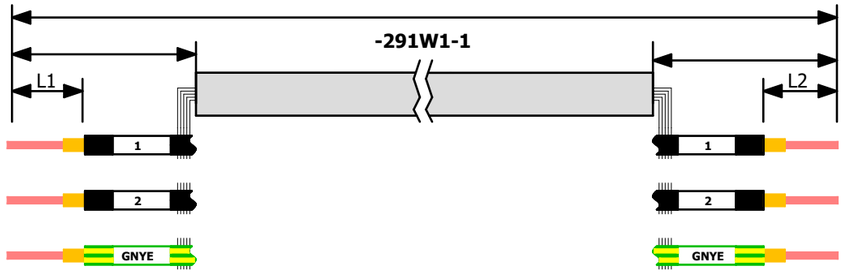


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-XE:1			
	-XE:N			
	-XE:PE			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-687XT1:3	
			++ASC-687XT1:N	
			++ASC-687XT1:PE	

Cable name =UNIT_02++Container+-291W1-1
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts
Order number

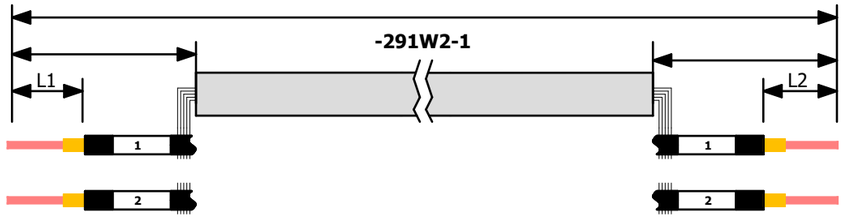


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-XE:1			
	-XE:N			
	-XE:PE			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-687XT1:4	
			++ASC-687XT1:N	
			++ASC-687XT1:PE	

Cable name =UNIT_02++Container+-291W2-1
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts
Order number



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-XE:1			
	-XE:N			

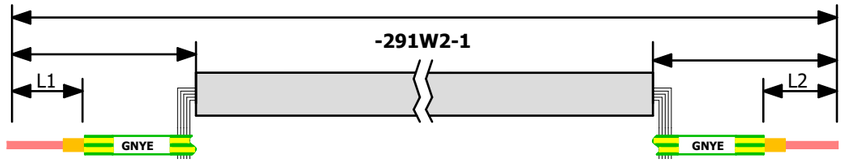
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-687XT1:5	
			++ASC-687XT1:N	

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FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_02++Container+-291W2-1
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts
Order number

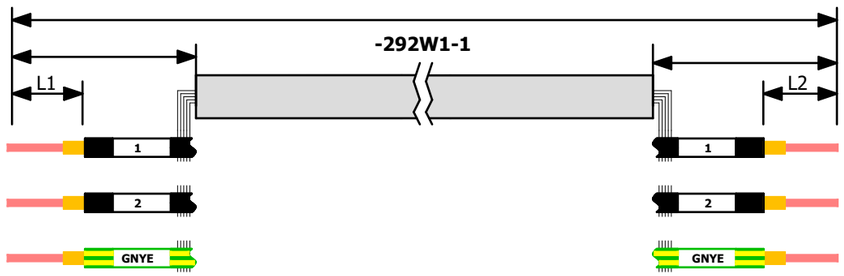


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-XE:PE			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-687XT1:PE	

Cable name =UNIT_02++Container+-292W1-1
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts
Order number

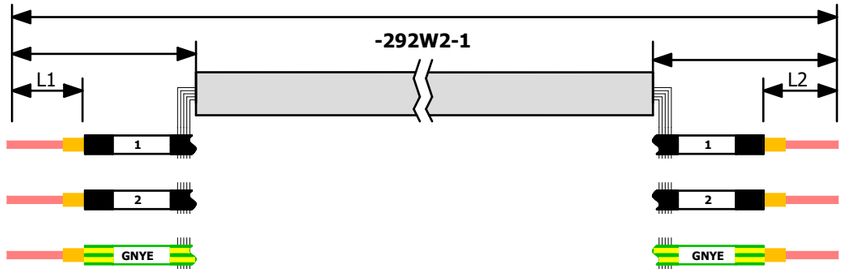


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-XE:1			
	-XE:N			
	-XE:PE			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-687XT1:6	
			++ASC-687XT1:N	
			++ASC-687XT1:PE	

Cable name =UNIT_02++Container+-292W2-1
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts
Order number

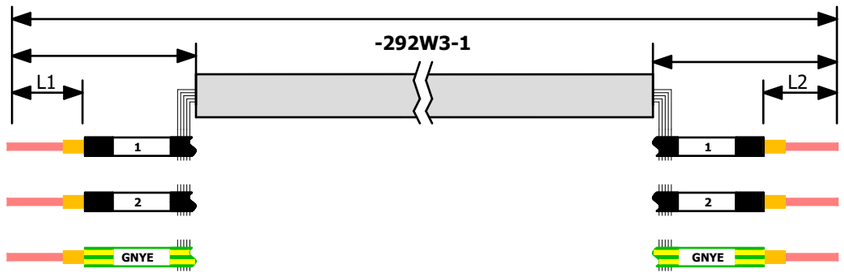


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-XE:1			
	-XE:N			
	-XE:PE			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-687XT1:7	
			++ASC-687XT1:N	
			++ASC-687XT1:PE	

Cable name =UNIT_02++Container+-292W3-1
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts
Order number



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-XE:1			
	-XE:N			
	-XE:PE			

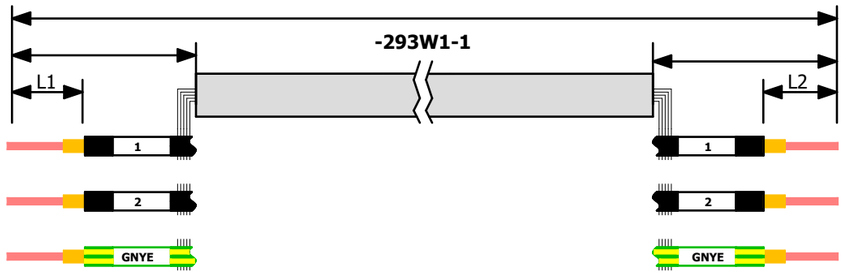
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-687XT1:8	
			++ASC-687XT1:N	
			++ASC-687XT1:PE	

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FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_02++Container+-293W1-1
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts
Order number



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-XE:1			
	-XE:N			
	-XE:PE			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-687XT1:9	
			++ASC-687XT1:N	
			++ASC-687XT1:PE	

Cable name =UNIT_02++Container+-293W2-1
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts
Order number

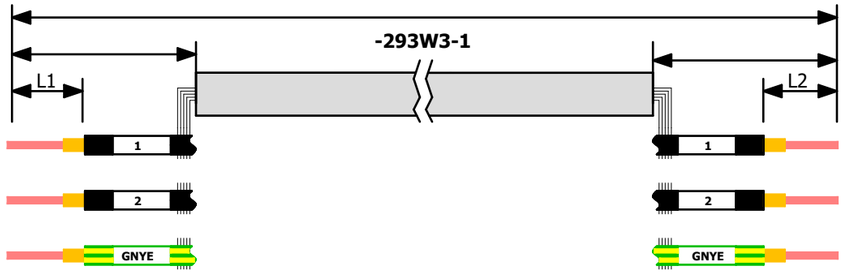


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-XE:1			
	-XE:N			
	-XE:PE			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-687XT1:10	
			++ASC-687XT1:N	
			++ASC-687XT1:PE	

Cable name =UNIT_02++Container+-293W3-1
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts
Order number

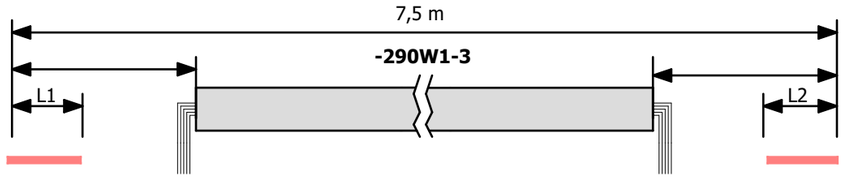


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-XE:1			
	-XE:N			
	-XE:PE			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-687XT1:11	
			++ASC-687XT1:N	
			++ASC-687XT1:PE	

Cable name =UNIT_02++Container+-290W1-3
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors

Cable parts REI.PATCH-C6 7,5 GN
Order number PATCH-C6 7,5 GN



Mounting location:	Source	Function text source	wire end handling	L1 [mm]

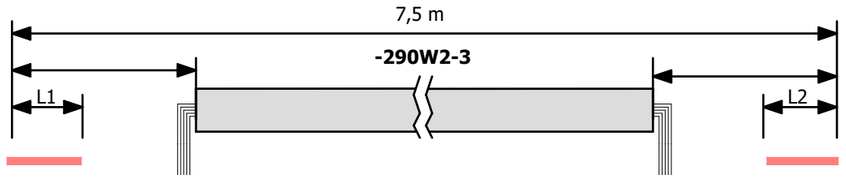
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-611A1:X1:1-16	

Editor	Freqcon_DG			Statron	FREQCON	CABEL LIST	20241203_V1.22	= UNIT_02 Battery Container 1
Date	05.11.2024							& EMB Cable list
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container page: 7
Date								+ total: 500

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Cable name =UNIT_02++Container+-290W2-3
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors

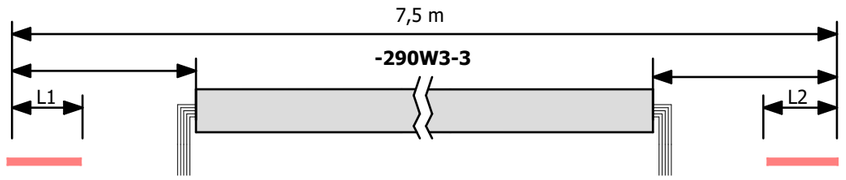
Cable parts REI.PATCH-C6 7,5 GN
Order number PATCH-C6 7,5 GN



Mounting location:	Source	Function text source	wire end handling	L1 [mm]	L2 [mm]	wire end handling	Function text target	Target	Mounting location:
								++ASC-611A1:X2:1-16	

Cable name =UNIT_02++Container+-290W3-3
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors

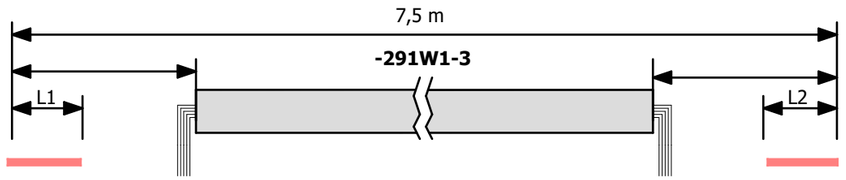
Cable parts REI.PATCH-C6 7,5 GN
Order number PATCH-C6 7,5 GN



Mounting location:	Source	Function text source	wire end handling	L1 [mm]	L2 [mm]	wire end handling	Function text target	Target	Mounting location:
								++ASC-611A1:X3:1-16	

Cable name =UNIT_02++Container+-291W1-3
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors

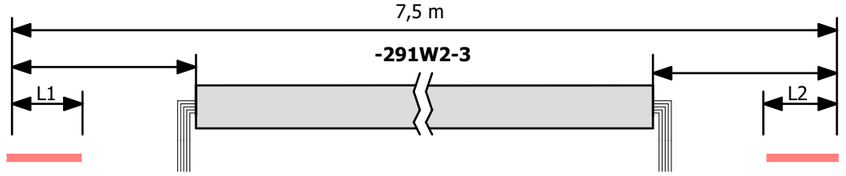
Cable parts REI.PATCH-C6 7,5 GN
Order number PATCH-C6 7,5 GN



Mounting location:	Source	Function text source	wire end handling	L1 [mm]	L2 [mm]	wire end handling	Function text target	Target	Mounting location:
								++ASC-611A1:X4:1-16	

Cable name =UNIT_02++Container+-291W2-3
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors

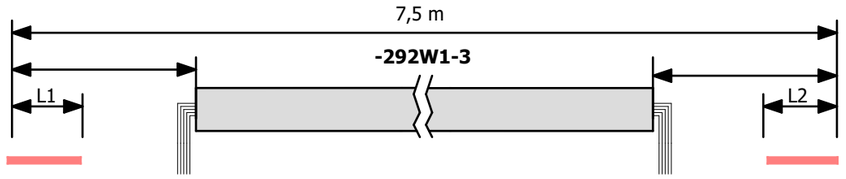
Cable parts REI.PATCH-C6 7,5 GN
Order number PATCH-C6 7,5 GN



Mounting location:	Source	Function text source	wire end handling	L1 [mm]	L2 [mm]	wire end handling	Function text target	Target	Mounting location:
								++ASC-611A1:X5:1-16	

Cable name =UNIT_02++Container+-292W1-3
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors

Cable parts REI.PATCH-C6 7,5 GN
Order number PATCH-C6 7,5 GN



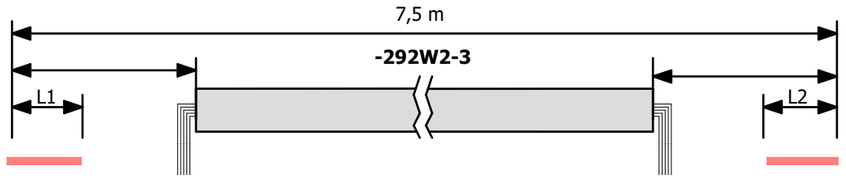
Mounting location:	Source	Function text source	wire end handling	L1 [mm]	L2 [mm]	wire end handling	Function text target	Target	Mounting location:
								++ASC-611A1:X6:1-16	

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Cable name =UNIT_02++Container+-292W2-3
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors

Cable parts REI.PATCH-C6 7,5 GN
Order number PATCH-C6 7,5 GN

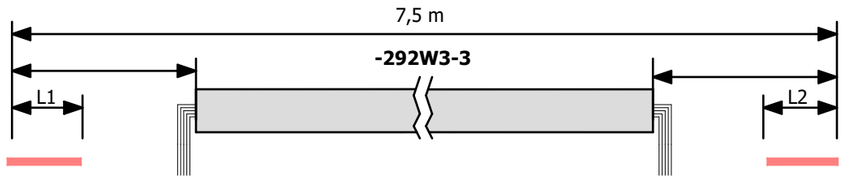


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-611A1:X7:1-16	

Cable name =UNIT_02++Container+-292W3-3
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors

Cable parts REI.PATCH-C6 7,5 GN
Order number PATCH-C6 7,5 GN

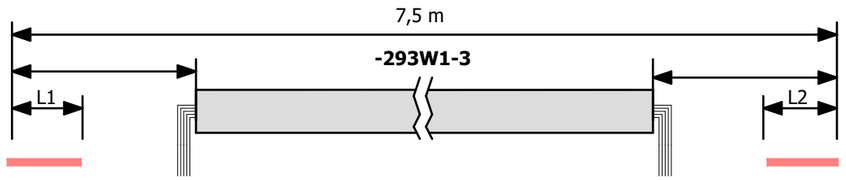


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-611A1:X8:1-16	

Cable name =UNIT_02++Container+-293W1-3
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors

Cable parts REI.PATCH-C6 7,5 GN
Order number PATCH-C6 7,5 GN

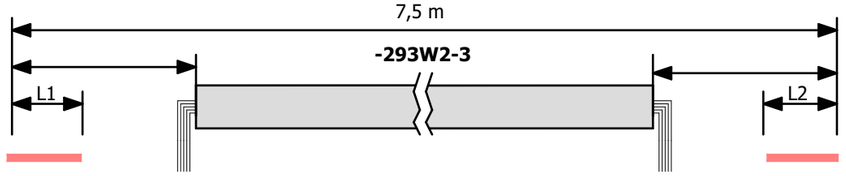


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-611A1:X9:1-16	

Cable name =UNIT_02++Container+-293W2-3
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors

Cable parts REI.PATCH-C6 7,5 GN
Order number PATCH-C6 7,5 GN

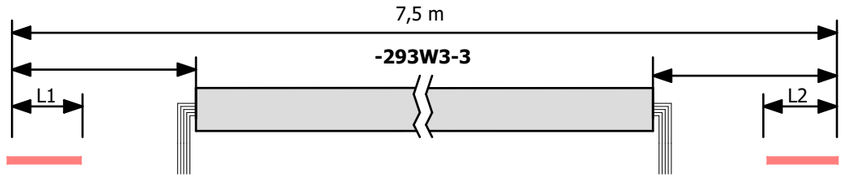


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-611A1:X2:1-16	

Cable name =UNIT_02++Container+-293W3-3
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors

Cable parts REI.PATCH-C6 7,5 GN
Order number PATCH-C6 7,5 GN



Mounting location:	Source	Function text source	wire end handling	L1 [mm]

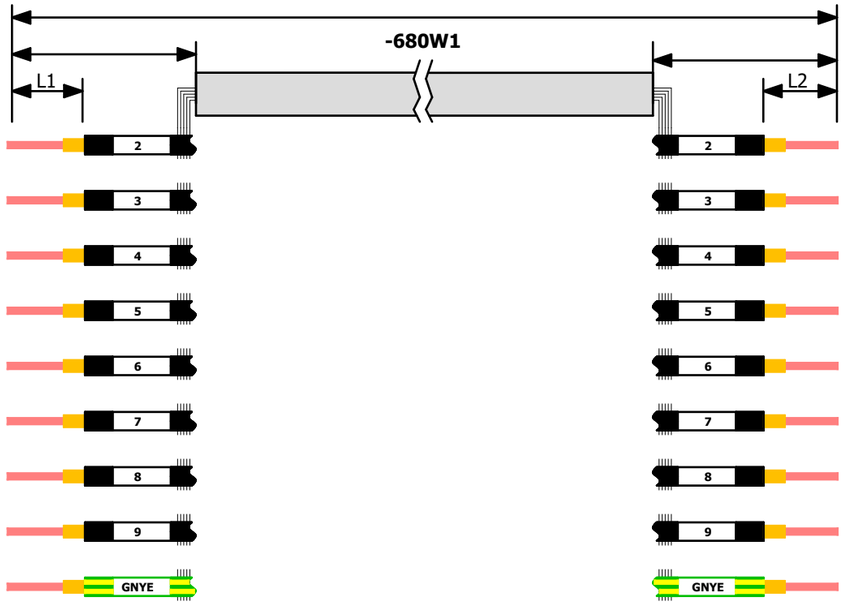
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-611A1:X3:1-16	

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next page: ++ASC/1

FRQ_Kabelplan_04_gro8_de_en

Cable name =UNIT_02++ASC+-680W1
Cable type F-CY-JZ 10G0,75 mm²
Free conductors

Cable parts
Order number

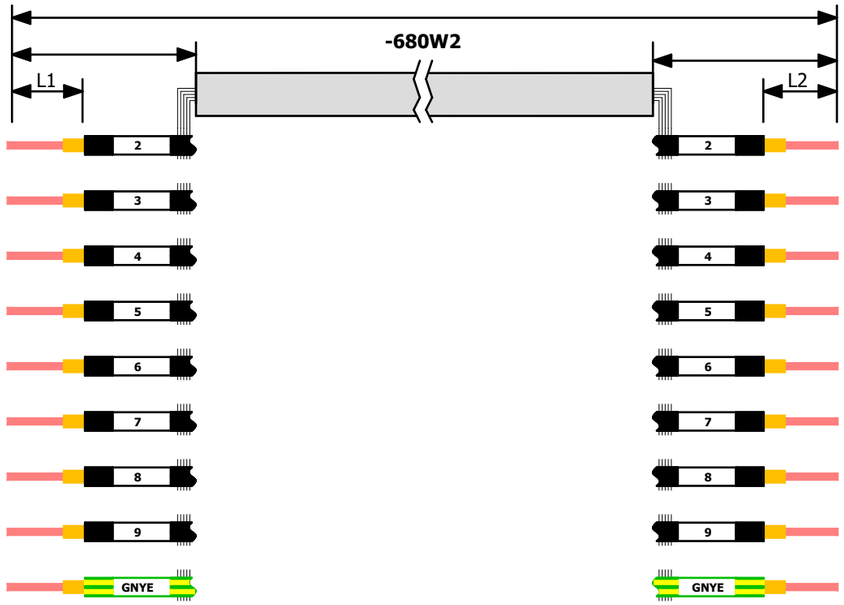


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-X5.1:2	gas concentration BAT 1-4		
	-X5.1:3	=		
	-X5.1:5	=		
	-X5.1:6	=		
	-X5.1:7	=		
	-X5.1:8	=		
	-X5.1:9	=		
	-X5.1:10	=		
	-X5.1:PE	=		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		gas concentration	++Container-680U1-X1:2	
		=	++Container-680U1-X1:4	
		=	++Container-680U1-X2:1	
		=	++Container-680U1-X2:2	
		=	++Container-680U1-X2:4	
		=	++Container-680U1-X2:5	
		=	++Container-680U1-X2:7	
		=	++Container-680U1-X2:8	
		=	++Container-680U1-X1:5	

Cable name =UNIT_02++ASC+-680W2
Cable type F-CY-JZ 10G0,75 mm²
Free conductors

Cable parts
Order number



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-X5.2:2	gas concentration BAT 5-8		
	-X5.2:3	=		
	-X5.2:5	=		
	-X5.2:6	=		
	-X5.2:7	=		
	-X5.2:8	=		
	-X5.2:9	=		
	-X5.2:10	=		
	-X5.2:PE	=		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		gas concentration	++Container-680U2-X1:2	
		=	++Container-680U2-X1:4	
		=	++Container-680U2-X2:1	
		=	++Container-680U2-X2:2	
		=	++Container-680U2-X2:4	
		=	++Container-680U2-X2:5	
		=	++Container-680U2-X2:7	
		=	++Container-680U2-X2:8	
		=	++Container-680U2-X1:5	

FRQ_Kabelplan_04_gro8_de_en

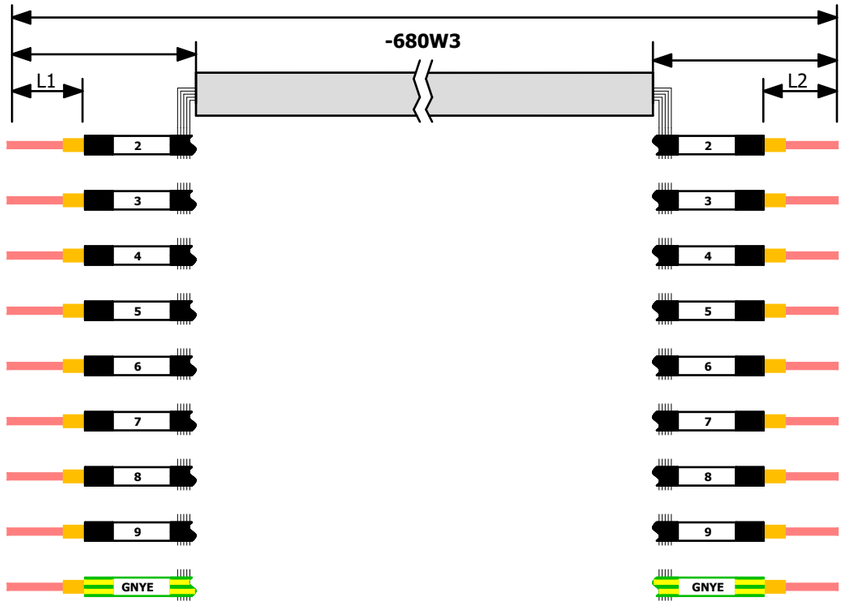
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++Container/9

next page:
2

Cable name =UNIT_02++ASC+-680W3
Cable type F-CY-JZ 10G0,75 mm²
Free conductors 9

Cable parts
Order number

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-X5.3:2	gas concentration BAT 9-11		
	-X5.3:3	=		
	-X5.3:5	=		
	-X5.3:6	=		
	-X5.3:7	=		
	-X5.3:8	=		
	-X5.3:9	=		
	-X5.3:10	=		
	-X5.3:PE	=		

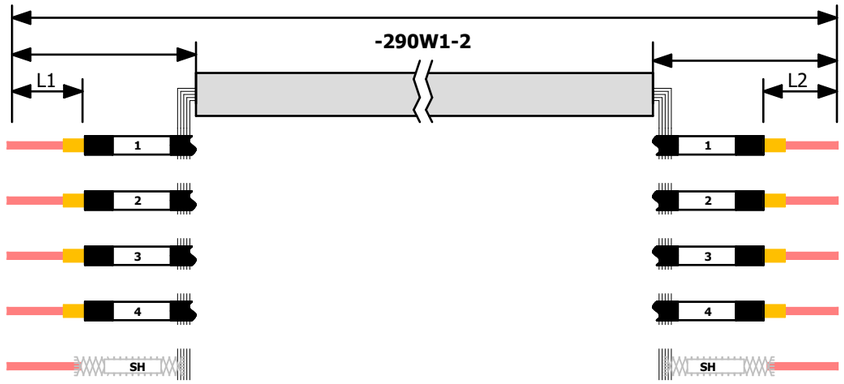


L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		gas concentration	++Container-680U3-X1:2	
		=	++Container-680U3-X1:4	
		=	++Container-680U3-X2:1	
		=	++Container-680U3-X2:2	
		=	++Container-680U3-X2:4	
		=	++Container-680U3-X2:5	
		=	++Container-680U3-X2:7	
		=	++Container-680U3-X2:8	
		=	++Container-680U3-X1:5	

Cable name =UNIT_02++ASC+-290W1-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors 4

Cable parts HELU.16560
Order number 16560

Mounting location:	Source	Function text source	wire end handling	L1 [mm]

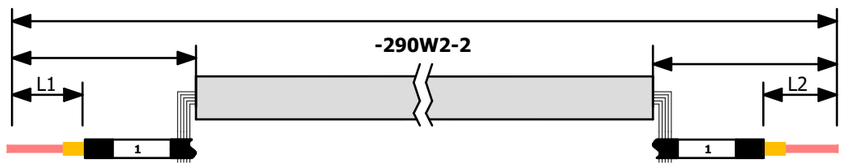


L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_02++ASC+-290W2-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors 4

Cable parts HELU.16560
Order number 16560

Mounting location:	Source	Function text source	wire end handling	L1 [mm]



L2 [mm]	wire end handling	Function text target	Target	Mounting location:

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FRQ_Kabelplan_04_gro8_de_en

Cable name =UNIT_02++ASC+-290W2-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors 4

Cable parts HELU.16560
Order number 16560

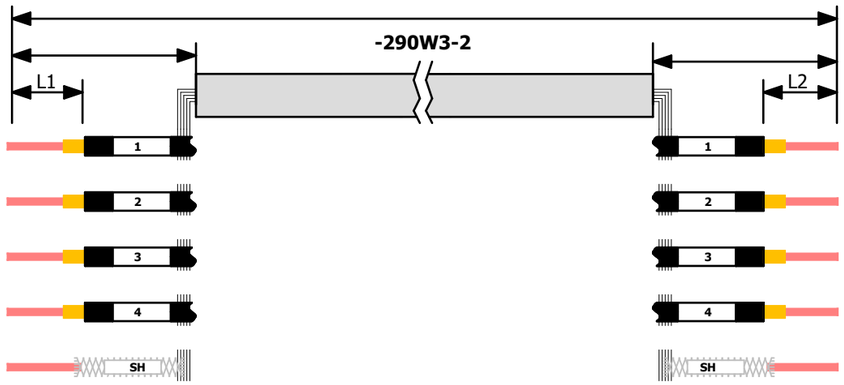


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_02++ASC+-290W3-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors 4

Cable parts HELU.16560
Order number 16560

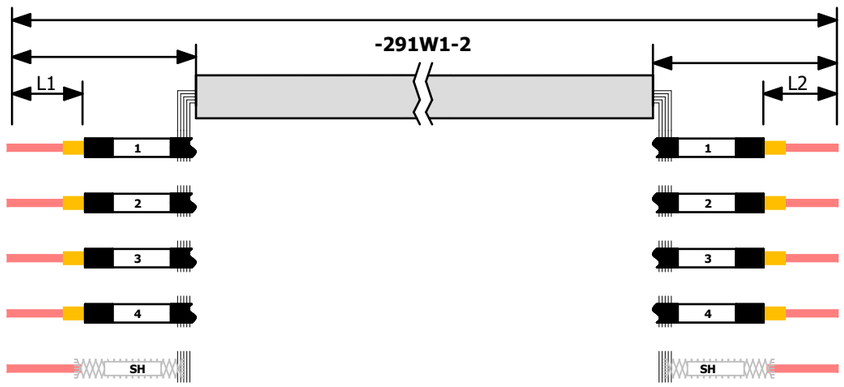


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_02++ASC+-291W1-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors 4

Cable parts HELU.16560
Order number 16560



Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

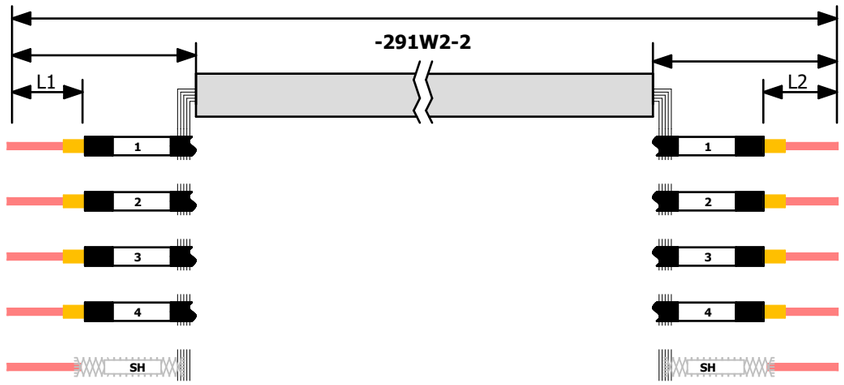
previous page: 2

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FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_02++ASC+-291W2-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors 4

Cable parts HELU.16560
Order number 16560

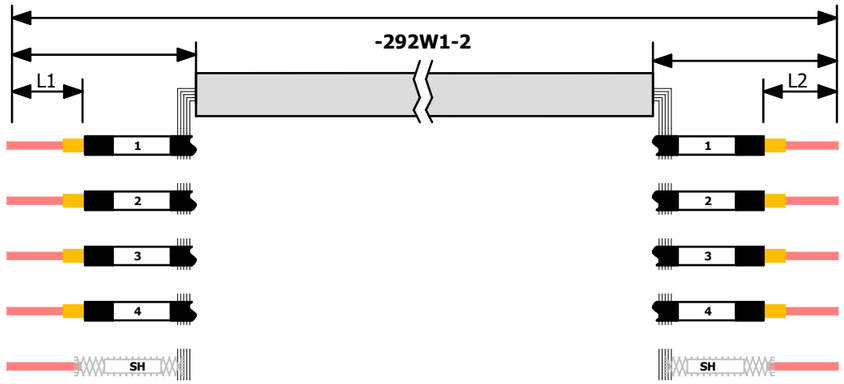


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_02++ASC+-292W1-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors 4

Cable parts HELU.16560
Order number 16560

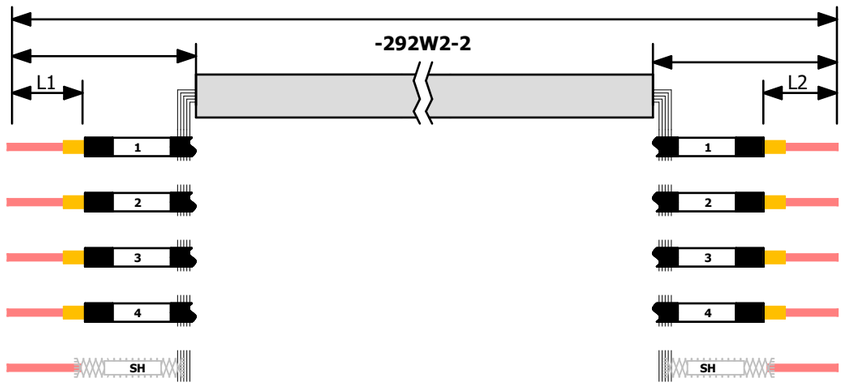


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_02++ASC+-292W2-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors 4

Cable parts HELU.16560
Order number 16560



Mounting location:	Source	Function text source	wire end handling	L1 [mm]

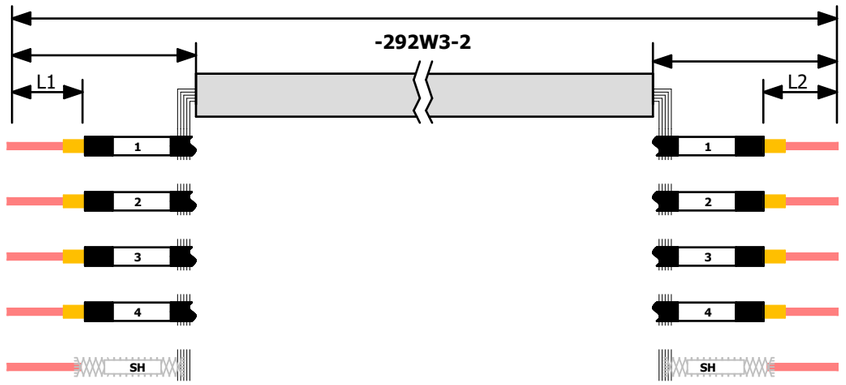
L2 [mm]	wire end handling	Function text target	Target	Mounting location:

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FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_02++ASC+-292W3-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors 4

Cable parts HELU.16560
Order number 16560

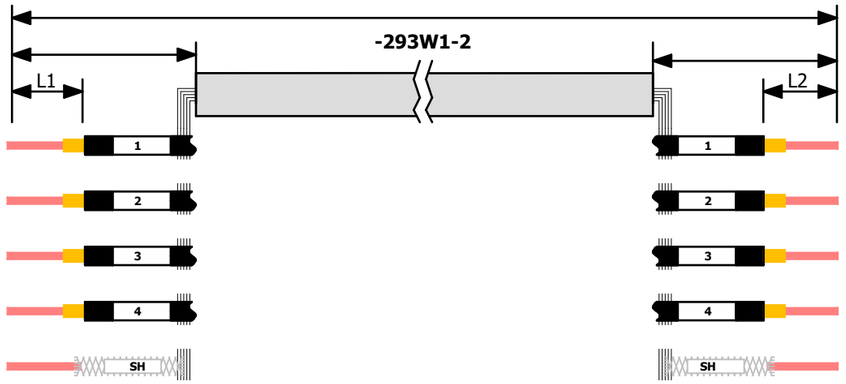


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_02++ASC+-293W1-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors 4

Cable parts HELU.16560
Order number 16560

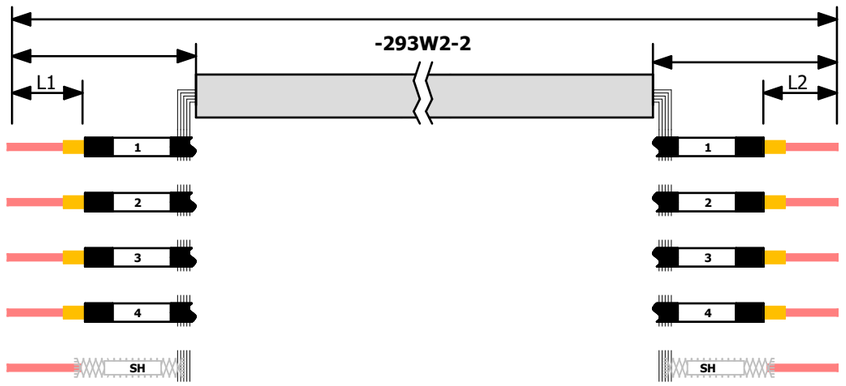


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_02++ASC+-293W2-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors 4

Cable parts HELU.16560
Order number 16560



Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

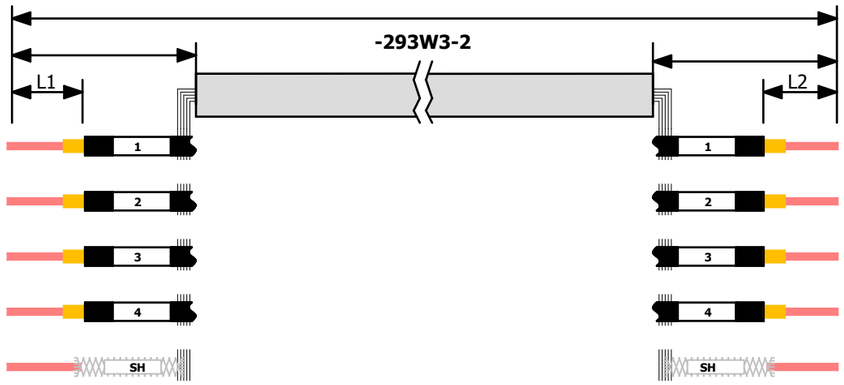
previous page: 4
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FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_02++ASC+-293W3-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors 4

Cable parts HELU.16560
Order number 16560

Mounting location:	Source	Function text source	wire end handling	L1 [mm]

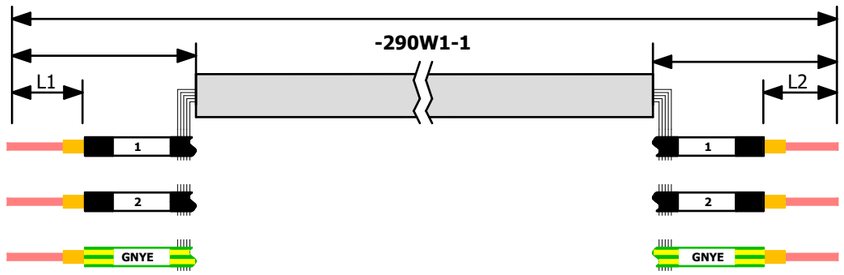


L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_02++ASC+-290W1-1
Cable type JZ-500 3G1,5 mm²
Free conductors 3

Cable parts HELU.10091
Order number 10091

Mounting location:	Source	Function text source	wire end handling	L1 [mm]

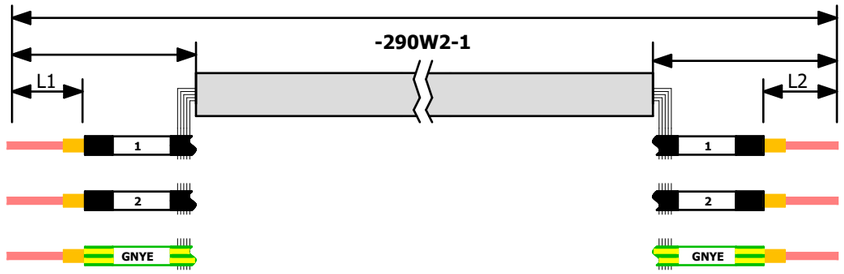


L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_02++ASC+-290W2-1
Cable type JZ-500 3G1,5 mm²
Free conductors 3

Cable parts HELU.10091
Order number 10091

Mounting location:	Source	Function text source	wire end handling	L1 [mm]



L2 [mm]	wire end handling	Function text target	Target	Mounting location:

previous page: 5

next page: 7

Editor	Freqcon_DG			Statron	FREQCON	CABEL LIST	20241203_V1.22	= UNIT_02	Battery Container 1
Date	05.11.2024							& EMB	Cable list
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet
Date								+	

FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_02++ASC+-290W3-1
Cable type JZ-500 3G1,5 mm²
Free conductors 3

Cable parts HELU.10091
Order number 10091

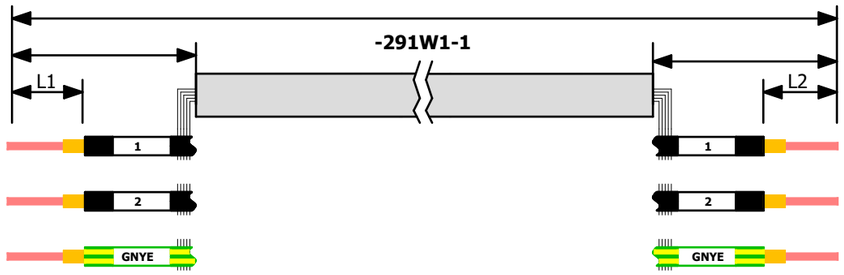


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_02++ASC+-291W1-1
Cable type JZ-500 3G1,5 mm²
Free conductors 3

Cable parts HELU.10091
Order number 10091

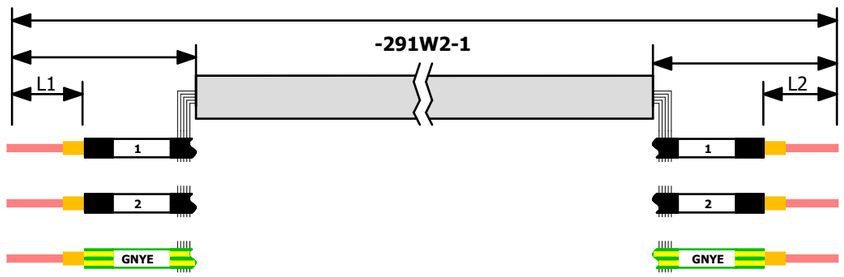


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_02++ASC+-291W2-1
Cable type JZ-500 3G1,5 mm²
Free conductors 3

Cable parts HELU.10091
Order number 10091

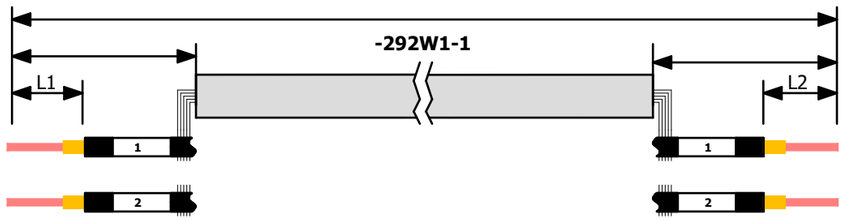


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_02++ASC+-292W1-1
Cable type JZ-500 3G1,5 mm²
Free conductors 3

Cable parts HELU.10091
Order number 10091



Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

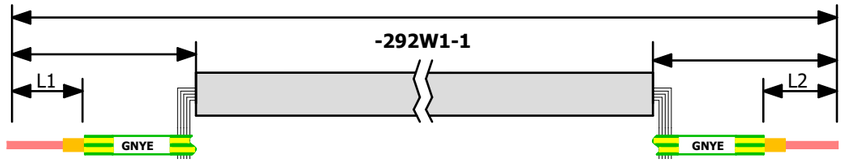
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FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_02++ASC+-292W1-1
Cable type JZ-500 3G1,5 mm²
Free conductors 2

Cable parts HELU.10091
Order number 10091

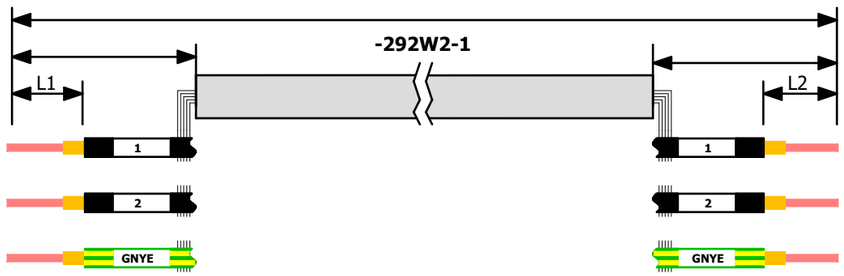


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_02++ASC+-292W2-1
Cable type JZ-500 3G1,5 mm²
Free conductors 2

Cable parts HELU.10091
Order number 10091

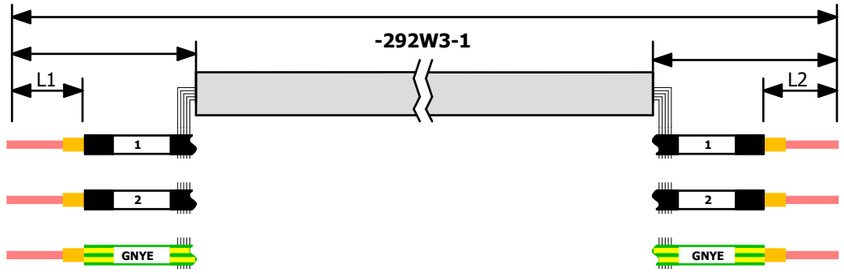


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_02++ASC+-292W3-1
Cable type JZ-500 3G1,5 mm²
Free conductors 2

Cable parts HELU.10091
Order number 10091

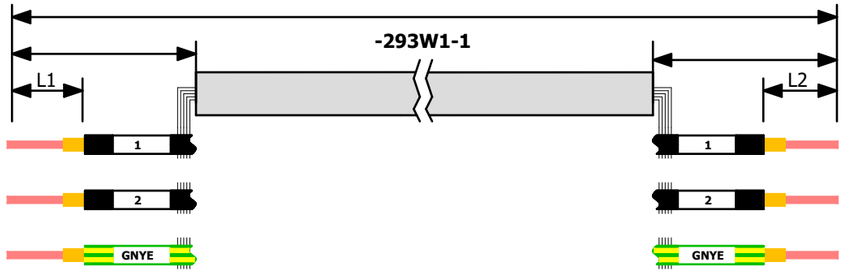


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_02++ASC+-293W1-1
Cable type JZ-500 3G1,5 mm²
Free conductors 2

Cable parts HELU.10091
Order number 10091



Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

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FRQ_Kabelplan_04_gro8_de_en

Cable name =UNIT_02++ASC+-293W2-1
Cable type JZ-500 3G1,5 mm²
Free conductors 3

Cable parts HELU.10091
Order number 10091

Mounting location:	Source	Function text source	wire end handling	L1 [mm]



L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_02++ASC+-293W3-1
Cable type JZ-500 3G1,5 mm²
Free conductors 3

Cable parts HELU.10091
Order number 10091

Mounting location:	Source	Function text source	wire end handling	L1 [mm]

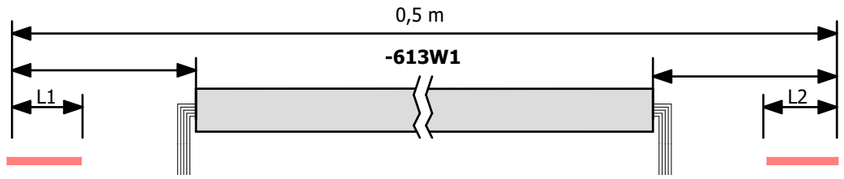


L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_02++ASC+-613W1
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors 8

Cable parts REI.PATCH-C6 05 GN
Order number PATCH-C6 05 GN

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-613T1:7			

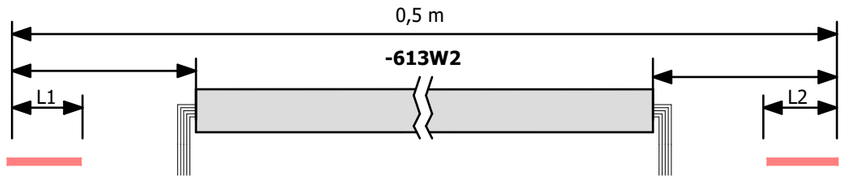


L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			-613U1:OUT	

Cable name =UNIT_02++ASC+-613W2
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors 8

Cable parts REI.PATCH-C6 05 GN
Order number PATCH-C6 05 GN

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-613U1:IN			



L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			-613U2:8	

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FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_02++ASC+-620W3
Cable type RJ45 / CAT6 4x2x0,25 mm²
Free conductors

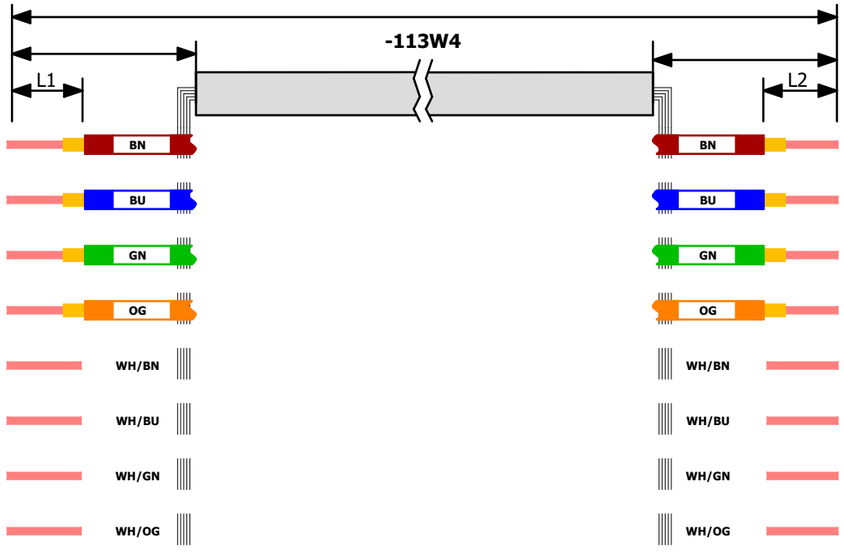
Cable parts
Order number



Mounting location:	Source	Function text source	wire end handling	L1 [mm]	L2 [mm]	wire end handling	Function text target	Target	Mounting location:
	-620A1:-X1:P2							=UNIT_03-620A1:-X1:P1	

Cable name =UNIT_02++ASC+-113W4
Cable type S/FTP 4x2xAWG 23/1 PVC/PVC 4x2x23 AWG
Free conductors

Cable parts
Order number



Mounting location:	Source	Function text source	wire end handling	L1 [mm]	L2 [mm]	wire end handling	Function text target	Target	Mounting location:
Control cabinet 1	=UNIT_01++CT+CTRL_1.3-113U2:8							-613U2:8	
Control cabinet 1	=UNIT_01++CT+CTRL_1.3-113U2:4							-613U2:4	
Control cabinet 1	=UNIT_01++CT+CTRL_1.3-113U2:2							-613U2:2	
Control cabinet 1	=UNIT_01++CT+CTRL_1.3-113U2:6							-613U2:6	
Control cabinet 1	=UNIT_01++CT+CTRL_1.3-113U2:7							-613U2:7	
Control cabinet 1	=UNIT_01++CT+CTRL_1.3-113U2:5							-613U2:5	
Control cabinet 1	=UNIT_01++CT+CTRL_1.3-113U2:1							-613U2:1	
Control cabinet 1	=UNIT_01++CT+CTRL_1.3-113U2:3							-613U2:3	

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FRQ_Kabelplan_04_groß_de_en

Terminal-strip overview

F14_001

Terminal strip	Terminal strip definition text	Terminals					Graphical page of terminal diagrams
		first	last	Total PE	Total N	Total number	
-X5.1		1	PE	4	0	24	=UNIT_02&EMZ++ASC/2000
-X5.2		1	PE	4	0	24	=UNIT_02&EMZ++ASC/2001
-X5.3		1	PE	4	0	24	=UNIT_02&EMZ++ASC/2002
-X6		1	6	0	0	12	=UNIT_02&EMZ++ASC/2003
-XDC1		1	PE	2	0	20	=UNIT_02&EMZ++ASC/2004
-XDC2		1	7	0	0	21	=UNIT_02&EMZ++ASC/2005
-XES		1	9	4	5	18	=UNIT_02&EMZ++ASC/2006
-369XT		1	12	0	0	36	=UNIT_02&EMZ++ASC/2007
-687XT1		1	PE	22	11	66	=UNIT_02&EMZ++ASC/2019
-690XT1		1	PE	44	4	134	=UNIT_02&EMZ++ASC/2030

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&EMB/10

next page:
2000

Editor	Freqcon_DG			Statron	FREQCON	Klemmenleistenübersicht : =UNIT_02++ASC+-X5.1 - =UNIT_02++ASC+-690XT1	20241203_V1.22	= UNIT_02	Battery Container 1
Date	05.11.2024							& EMZ	Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet
Date								+	page: 1000 / total: 500

Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_02++ASC+-X5.1 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type	Cable name -680W1										Page / column
				Cable type								F-CY-JZ										
gas concentration BAT 1-4					-XDC2	1	1	,	++Container-680U1-X1	1												&EFS/680a.2
								,														
gas concentration BAT 1-4					-XDC2	5	2	,	++Container-680U1-X1	2		2										&EFS/680a.2
								,														
gas concentration BAT 1-4					-AI_21	13	3	,	++Container-680U1-X1	4		3										&EFS/680a.2
								,														
gas concentration BAT 1-4							4	,														&EFS/680a.2
								,														
gas concentration BAT 1-4							5	,	++Container-680U1-X2	1		4										&EFS/680a.3
								,														
gas concentration BAT 1-4							6	,	++Container-680U1-X2	2		5										&EFS/680a.3
								,														
gas concentration BAT 1-4					-680K1	A1	7	,	++Container-680U1-X2	4		6										&EFS/680a.4
								,														
gas concentration BAT 1-4					-XDC2	2	8	,	++Container-680U1-X2	5		7										&EFS/680a.4
								,														
gas concentration BAT 1-4							9	,	++Container-680U1-X2	7		8										&EFS/680a.5
								,														
gas concentration BAT 1-4							10	,	++Container-680U1-X2	8		9										&EFS/680a.5
								,														
gas concentration BAT 1-4							PE	,	++Container-680U1-X1	5		GNYE										&EFS/680a.2
								,														
gas concentration BAT 1-4							PE	,	-480W1													&EFS/680a.6
								,														

Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_02++ASC+-X5.2 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name	-680W2											Page / column
				Cable type							Cable type	F-CY-1Z											
gas concentration BAT 5-8					-XDC2	2	1	,	++Container-680U2-X1	1													&EFS/680b.2
								,															
gas concentration BAT 5-8					-XDC2	6	2	,	++Container-680U2-X1	2		2											&EFS/680b.2
								,															
gas concentration BAT 5-8					-AI_21	14	3	,	++Container-680U2-X1	4		3											&EFS/680b.2
								,															
gas concentration BAT 5-8							4	,															&EFS/680b.2
								,															
gas concentration BAT 5-8							5	,	++Container-680U2-X2	1		4											&EFS/680b.3
								,															
gas concentration BAT 5-8							6	,	++Container-680U2-X2	2		5											&EFS/680b.3
								,															
gas concentration BAT 5-8					-680K2	A1	7	,	++Container-680U2-X2	4		6											&EFS/680b.4
								,															
gas concentration BAT 5-8					-XDC2	2	8	,	++Container-680U2-X2	5		7											&EFS/680b.4
								,															
gas concentration BAT 5-8							9	,	++Container-680U2-X2	7		8											&EFS/680b.5
								,															
gas concentration BAT 5-8							10	,	++Container-680U2-X2	8		9											&EFS/680b.5
								,															
gas concentration BAT 5-8							PE	,	++Container-680U2-X1	5		GNYE											&EFS/680b.2
								,															
gas concentration BAT 5-8							PE	,	-480W1														&EFS/680b.6
								,															

Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_02++ASC+-X5.3 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name	-680W3											Page / column
				Cable type							Cable type	F-CY-JZ											
gas concentration BAT 9-11					-XDC2	3	1	,	++Container-680U3-X1	1													&EFS/680c.2
								,															
gas concentration BAT 9-11					-XDC2	7	2	,	++Container-680U3-X1	2		2											&EFS/680c.2
								,															
gas concentration BAT 9-11					-AI_21	15	3	,	++Container-680U3-X1	4		3											&EFS/680c.2
								,															
gas concentration BAT 9-11							4	,															&EFS/680c.2
								,															
gas concentration BAT 9-11							5	,	++Container-680U3-X2	1		4											&EFS/680c.3
								,															
gas concentration BAT 9-11							6	,	++Container-680U3-X2	2		5											&EFS/680c.3
								,															
gas concentration BAT 9-11					-680K3	A1	7	,	++Container-680U3-X2	4		6											&EFS/680c.4
								,															
gas concentration BAT 9-11					-XDC2	3	8	,	++Container-680U3-X2	5		7											&EFS/680c.4
								,															
gas concentration BAT 9-11							9	,	++Container-680U3-X2	7		8											&EFS/680c.5
								,															
gas concentration BAT 9-11							10	,	++Container-680U3-X2	8		9											&EFS/680c.5
								,															
gas concentration BAT 9-11							PE	,	++Container-680U3-X1	5		GNYE											&EFS/680c.2
								,															
gas concentration BAT 9-11							PE	,	-480W1														&EFS/680c.6
								,															

Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_02++ASC+-X6					Cable name												Page / column
				Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
Extract Fan C/W Fire Damper 1						GND	1	,	-AO_21	1													&EFS/681.1
								,															
Extract Fan C/W Fire Damper 1						+10V	2	,	-AO_21	5													&EFS/681.1
								,															
Extract Fan C/W Fire Damper 2						GND	3	,	-AO_21	2													&EFS/681.3
								,															
Extract Fan C/W Fire Damper 2						+10V	4	,	-AO_21	6													&EFS/681.3
								,															
Extract Fan C/W Fire Damper 3						GND	5	,	-AO_21	3													&EFS/681.5
								,															
Extract Fan C/W Fire Damper 3						+10V	6	,	-AO_21	7													&EFS/681.5
								,															
Extract Fan C/W Fire Damper 3						+10V	6	,	-AO_21	7													&EFS/681.5
								,															

Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_02++ASC+-XDC1						Cable name												Page / column
				Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
FUSE 24V DC CONTROL VOLTAGE					-101T1	13	1		-103F1	2													&EFS/603.2
					-101Q1	13																	
					-611A1	1																	
FUSE 24V DC CONTROL VOLTAGE					-620A1	-X80:1	2																&EFS/603.2
					-DI_21	L+																	
					-DO_21	L+																	
FUSE 24V DC CONTROL VOLTAGE					-684F5	11	3		-103F1	13													&EFS/603.2
FUSE 24V DC CONTROL VOLTAGE					-611A1	2	4		-102G1	OUTPUT DC 24 V:-													&EFS/603.3
FUSE 24V DC CONTROL VOLTAGE					-620A1	-X80:2	5																&EFS/603.3
					-DI_21	M																	
					-DO_21	M																	
FUSE 24V DC CONTROL VOLTAGE					-636K1	A2	6		-XDC2	5													&EFS/603.3
FUSE 24V DC CONTROL VOLTAGE					-101T1	-"	PE																&EFS/603.4
					-101T1	PE																	
FUSE 24V DC CONTROL VOLTAGE							PE																&EFS/603.4

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Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_02++ASC+-XDC2					Cable name												Page / column
				Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
FUSE 24V DC CONTROL VOLTAGE					-AI_21	L+	1		-103F2	2												&EFS/603.5
					-AO_21	L+																
					-X5.1	1																
FUSE 24V DC CONTROL VOLTAGE					-X5.1	8	2		-X5.2	8												&EFS/603.5
					-680K1	11																
					-X5.2	1																
FUSE 24V DC CONTROL VOLTAGE					-680K2	11	3		-680K3	11												&EFS/603.5
					-X5.3	1																
					-X5.3	8																
FUSE 24V DC CONTROL VOLTAGE					-691F1	13	4															&EFS/603.6
					-691F4	13																
FUSE 24V DC CONTROL VOLTAGE					-AI_21	M	5		-XDC1	6												&EFS/603.6
					-AO_21	M																
					-X5.1	2																
FUSE 24V DC CONTROL VOLTAGE					-680K1	A2	6															&EFS/603.6
					-X5.2	2																
FUSE 24V DC CONTROL VOLTAGE					-680K2	A2	7															&EFS/603.7
					-X5.3	2																
					-680K3	A2																

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Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_02++ASC+-XDC2	20241203_V1.22	= UNIT_02 Battery Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet page: 2005
Date								+ total: 500

Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_02++ASC+-XES						Cable name												Page / column
				Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
							1		-684F1	2													&EFS/684.0
UPS Bat-Con 1 3-phase 400V AC							N		-687XT1	N													&EFS/684.3
=					-690XT1	N	N		-687XT1	N													&EFS/684.3
=					-690XT1	N	N		-690F1	N													&EFS/684.3
=					-690XT1	N	N		-690F2	N													&EFS/684.3
=							N		-690XT1	N													&EFS/684.4
=							PE			PE													&EFS/684.4
=					++Container-278W1	GND	PE			PE													&EFS/684.4
=					-684F5	PE	PE		-684F2	PE													&EFS/684.5
=					-601F1	PE	PE																&EFS/684.5
					-684F4	2	2		-684F3	2													&EFS/684.0
UPS Bat-Con 1 3-phase 400V AC					-601F1	L1	3																&EFS/684.1
=							4		-684F1	4													&EFS/684.1
=					-684F4	4	5		-684F3	4													&EFS/684.1
=					-601F1	L2	6																&EFS/684.1
=							7		-684F1	6													&EFS/684.1
=					-684F4	6	8		-684F3	6													&EFS/684.1
=					-601F1	L3	9																&EFS/684.2

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-290W3-2 F-CY-0Z	++Container-290W2-2 F-CY-0Z	++Container-290W1-2 F-CY-0Z	Cable name / Cable type	Strip =UNIT_02++ASC+-369XT: Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
battery cabinet smoke detector potential-free contacts customer			3		++Container-570XT	3	1					&EFS/669.5
		3			++Container-570XT	3						
	3				++Container-570XT	3						

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next page: 2008

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_02++ASC+-369XT	20241203_V1.22	= UNIT_02 Battery Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet
Date								+

page: 2007

total: 500

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-292W1-2 F-CY-0Z	++Container-291W2-2 F-CY-0Z	++Container-291W1-2 F-CY-0Z	Cable name / Cable type	Strip =UNIT_02++ASC+-369XT: Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	++Container-293W3-2 F-CY-0Z	Page / column
battery cabinet smoke detector potential-free contacts customer			3		++Container-570XT	3	2		++Container-570XT	3		3	&EFS/669.5
		3			++Container-570XT	3							
	3				++Container-570XT	3							

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next page: 2009

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_02++ASC+-369XT	20241203_V1.22	= UNIT_02 Battery Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet
Date								+

page: 2008

total: 500

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-293W1-2 F-CY-OZ	++Container-292W3-2 F-CY-OZ	++Container-292W2-2 F-CY-OZ	Cable name / Cable type	Strip =UNIT_02++ASC+-369XT: Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	++Container-293W2-2 F-CY-OZ	Page / column
battery cabinet smoke detector potential-free contacts customer			3		++Container-570XT	3	3		++Container-570XT	3		3	&EFS/669.6
		3			++Container-570XT	3							
	3				++Container-570XT	3							

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Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_02++ASC+-369XT	20241203_V1.22	= UNIT_02 Battery Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet
Date								+

page: 2009

total: 500

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-290W3-2 F-CY-0Z	++Container-290W2-2 F-CY-0Z	++Container-290W1-2 F-CY-0Z	Cable name / Cable type	Strip =UNIT_02++ASC+-369XT: Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
battery cabinet smoke detector potential-free contacts customer			4		++Container-570XT	4	4					&EFS/669.7
		4			++Container-570XT	4						
	4				++Container-570XT	4						

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-292W1-2 F-CY-OZ	++Container-291W2-2 F-CY-OZ	++Container-291W1-2 F-CY-OZ	Cable name / Cable type	Strip =UNIT_02++ASC+-369XT: Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	++Container-293W3-2 F-CY-OZ	Page / column
battery cabinet smoke detector potential-free contacts customer			4		++Container-570XT	4	5		++Container-570XT	4		4	&EFS/669.8
		4			++Container-570XT	4							
	4				++Container-570XT	4							

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-293W1-2 F-CY-OZ	++Container-292W3-2 F-CY-OZ	++Container-292W2-2 F-CY-OZ	Cable name / Cable type	Strip =UNIT_02++ASC+-369XT: Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	++Container-293W2-2 F-CY-OZ	Page / column
battery cabinet smoke detector potential-free contacts customer			4		++Container-570XT	4	6		++Container-570XT	4		4	&EFS/669.8
		4			++Container-570XT	4							
	4				++Container-570XT	4							

previous page: 2011

next page: 2013

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_02++ASC+-369XT	20241203_V1.22	= UNIT_02 Battery Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet
Date								+

page: 2012

total: 500

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-290W3-2 F-CY-0Z	++Container-290W2-2 F-CY-0Z	++Container-290W1-2 F-CY-0Z	Cable name / Cable type	Strip =UNIT_02++ASC+-369XT: Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
battery cabinet gas potential-free contacts customer			1		++Container-570XT	1	7					&EFS/670.5
		1			++Container-570XT	1						
	1				++Container-570XT	1						

previous page: 2012

next page: 2014

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_02++ASC+-369XT	20241203_V1.22	= UNIT_02 Battery Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet
Date								+

page: 2013

total: 500

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-292W1-2 F-CY-0Z	++Container-291W2-2 F-CY-0Z	++Container-291W1-2 F-CY-0Z	Cable name / Cable type	Strip =UNIT_02++ASC+-369XT: Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	++Container-293W3-2 F-CY-0Z	Page / column
battery cabinet gas potential-free contacts customer			1		++Container-570XT	1	8		++Container-570XT	1		1	&EFS/670.5
		1			++Container-570XT	1							
	1				++Container-570XT	1							

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-293W1-2 F-CY-OZ	++Container-292W3-2 F-CY-OZ	++Container-292W2-2 F-CY-OZ	Cable name / Cable type	Strip =UNIT_02++ASC+-369XT: Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	++Container-293W2-2 F-CY-OZ	Page / column
battery cabinet gas potential-free contacts customer			1		++Container-570XT	1	9		++Container-570XT	1		1	&EFS/670.6
		1			++Container-570XT	1							
	1				++Container-570XT	1							

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_02++ASC+-369XT

Function text	++Container-290W3-2 F-CY-0Z	++Container-290W2-2 F-CY-0Z	++Container-290W1-2 F-CY-0Z	Cable name / Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
battery cabinet gas potential-free contacts customer			2		++Container-570XT	2	10					&EFS/670.7
		2			++Container-570XT	2						
	2				++Container-570XT	2						

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Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_02++ASC+-369XT	20241203_V1.22	= UNIT_02 Battery Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet
Date								+

page: 2016

total: 500

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-292W1-2 F-CY-0Z	++Container-291W2-2 F-CY-0Z	++Container-291W1-2 F-CY-0Z	Cable name / Cable type	Strip =UNIT_02++ASC+-369XT: Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	++Container-293W3-2 F-CY-0Z	Page / column
battery cabinet gas potential-free contacts customer			2		++Container-570XT	2	11		++Container-570XT	2		2	&EFS/670.8
		2			++Container-570XT	2							
	2				++Container-570XT	2							

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next page: 2018

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_02++ASC+-369XT	20241203_V1.22	= UNIT_02 Battery Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet
Date								+

page: 2017

total: 500

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-293W1-2 F-CY-0Z	++Container-292W3-2 F-CY-0Z	++Container-292W2-2 F-CY-0Z	Cable name / Cable type	Strip =UNIT_02++ASC+-369XT: Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	++Container-293W2-2 F-CY-0Z	Page / column
battery cabinet gas potential-free contacts customer			2		++Container-570XT	2	12		++Container-570XT	2		2	&EFS/670.8
		2			++Container-570XT	2							
	2				++Container-570XT	2							

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next page: 2019

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_02++ASC+-369XT	20241203_V1.22	= UNIT_02 Battery Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet
Date								+

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Terminal diagram

Freqcon_F13_001_02

Function text	++Container-290W3-1 JZ-500	++Container-290W2-1 JZ-500	++Container-290W1-1 JZ-500	Cable name / Cable type	Strip =UNIT_02++ASC+-687XT1 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
Supply Battery String 1-phase 230V AC			1		++Container-XE	1	1	,	-687F1	2		&EFS/687.1
								,				
Supply Battery String 1-phase 230V AC		1			++Container-XE	1	2	,	-687F2	2		&EFS/687.3
								,				
Supply Battery String 1-phase 230V AC	1				++Container-XE	1	3	,	-687F3	2		&EFS/687.4
								,				

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-292W1-1 JZ-500	++Container-291W2-1 JZ-500	++Container-291W1-1 JZ-500	Cable name / Cable type	Strip =UNIT_02++ASC+-687XT1 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
Supply Battery String 1-phase 230V AC			1		++Container-XE	1	4	,	-687F4	2		&EFS/687.5
								,				
Supply Battery String 1-phase 230V AC		1			++Container-XE	1	5	,	-687F5	2		&EFS/687.7
								,				
Supply Battery String 1-phase 230V AC	1				++Container-XE	1	6	,	-687F6	2		&EFS/687.8
								,				

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-293W1-1 JZ-500	++Container-292W3-1 JZ-500	++Container-292W2-1 JZ-500	Cable name / Cable type	Strip =UNIT_02++ASC+-687XT1 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
Supply Battery String 1-phase 230V AC			1		++Container-XE	1	7	,	-688F1	2		&EFS/688.1
								,				
Supply Battery String 1-phase 230V AC		1			++Container-XE	1	8	,	-688F2	2		&EFS/688.3
								,				
Supply Battery String 1-phase 230V AC	1				++Container-XE	1	9	,	-688F3	2		&EFS/688.4
								,				

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-290W1-1 JZ-500	++Container-293W3-1 JZ-500	++Container-293W2-1 JZ-500	Cable name / Cable type	Strip =UNIT_02++ASC+-687XT1 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
Supply Battery String 1-phase 230V AC			1		++Container-XE	1	10		-688F4	2		&EFS/688.5
Supply Battery String 1-phase 230V AC		1			++Container-XE	1	11		-688F5	2		&EFS/688.7
Supply Battery String 1-phase 230V AC	2				++Container-XE	N	N		-XES	N		&EFS/687.1

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Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_02++ASC+-687XT1	20241203_V1.22	= UNIT_02 Battery Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet
Date								+

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Terminal diagram

Freqcon_F13_001_02

Function text	++Container-291W1-1 JZ-500	++Container-290W3-1 JZ-500	++Container-290W2-1 JZ-500	Cable name / Cable type	Strip =UNIT_02++ASC+-687XT1 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
Supply Battery String 1-phase 230V AC			2		++Container-XE	N	N					&EFS/687.3
Supply Battery String 1-phase 230V AC		2			++Container-XE	N	N					&EFS/687.4
Supply Battery String 1-phase 230V AC	2				++Container-XE	N	N					&EFS/687.6

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Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_02++ASC+-687XT1	20241203_V1.22	= UNIT_02 Battery Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet
Date								+

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-292W2-1 -XZ-500	++Container-292W1-1 -XZ-500	++Container-291W2-1 -XZ-500	Cable name / Cable type	Strip =UNIT_02++ASC+-687XT1 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
Supply Battery String 1-phase 230V AC			2		++Container-XE	N	N					&EFS/687.7
Supply Battery String 1-phase 230V AC		2			++Container-XE	N	N					&EFS/687.8
Supply Battery String 1-phase 230V AC	2				++Container-XE	N	N		-XES	N		&EFS/688.1

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-293W2-1 -1Z-500	++Container-293W1-1 -1Z-500	++Container-292W3-1 -1Z-500	Cable name / Cable type	Strip =UNIT_02++ASC+-687XT1 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
Supply Battery String 1-phase 230V AC			2		++Container-XE	N	N					&EFS/688.3
Supply Battery String 1-phase 230V AC		2			++Container-XE	N	N					&EFS/688.4
Supply Battery String 1-phase 230V AC	2				++Container-XE	N	N					&EFS/688.6

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Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_02++ASC+-687XT1	20241203_V1.22	= UNIT_02 Battery Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet
Date								+

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-290W2-1 -1Z-500	++Container-290W1-1 -1Z-500	++Container-293W3-1 -1Z-500	Cable name / Cable type	Strip =UNIT_02++ASC+-687XT1 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
Supply Battery String 1-phase 230V AC			2		++Container-XE	N	N	⌟				&EFS/688.7
								,				
Supply Battery String 1-phase 230V AC		GNYE			++Container-XE	PE	PE	,				&EFS/687.2
								,				
Supply Battery String 1-phase 230V AC	GNYE				++Container-XE	PE	PE	,				&EFS/687.3
								,				

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-291W2-1 JZ-500	++Container-291W1-1 JZ-500	++Container-290W3-1 JZ-500	Cable name Cable type	Strip =UNIT_02++ASC+-687XT1 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name Cable type	Page / column
Supply Battery String 1-phase 230V AC			GNYE		++Container-XE	PE	PE	,				&EFS/687.4
								,				
Supply Battery String 1-phase 230V AC		GNYE			++Container-XE	PE	PE	,				&EFS/687.6
								,				
Supply Battery String 1-phase 230V AC	GNYE				++Container-XE	PE	PE	,				&EFS/687.7
								,				

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-292W3-1 JZ-500	++Container-292W2-1 JZ-500	++Container-292W1-1 JZ-500	Cable name / Cable type	Strip =UNIT_02++ASC+-687XT1 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
Supply Battery String 1-phase 230V AC			GNYE		++Container-XE	PE	PE	,				&EFS/687.9
								,				
Supply Battery String 1-phase 230V AC		GNYE			++Container-XE	PE	PE	,				&EFS/688.2
								,				
Supply Battery String 1-phase 230V AC	GNYE				++Container-XE	PE	PE	,				&EFS/688.3
								,				

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Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_02++ASC+-687XT1	20241203_V1.22	= UNIT_02 Battery Container 1
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet
Date								+

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-293W3-1	++Container-293W2-1	++Container-293W1-1	Cable name	Strip =UNIT_02++ASC+-687XT1						Cable name												Page / column
	1Z-500	1Z-500	1Z-500	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
Supply Battery String 1-phase 230V AC			GNYE		++Container-XE	PE	PE	,															&EFS/688.4
								,															
Supply Battery String 1-phase 230V AC		GNYE			++Container-XE	PE	PE	,															&EFS/688.6
								,															
Supply Battery String 1-phase 230V AC	GNYE				++Container-XE	PE	PE	,															&EFS/688.7
								,															

Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_02++ASC+-690XT1						Cable name												Page / column
				Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
Container Internal Lighting						L	1	,	-690F1	2													&EFS/690.1
								,															
								,															
								,														

Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_02++ASC+-690XT1 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name	Page / column
				Cable type							Cable type	
								,				
								,				
230V AC for Exhaust Unit / shut-off flap Battery cabinets 5-8						L	7	,	-636K2	14		&EFS/691.3
						L						
								,				
								,				
								,				
								,				
								,				
								,				
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								,				
								,				
230V AC for Exhaust Unit / shut-off flap Battery cabinets 9-11						L	8	,	-636K3	14		&EFS/691.4
						L						
								,				
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								,				
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Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_02++ASC+-690XT1	20241203_V1.22
Date	05.11.2024						
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007
Date							

=	UNIT_02	Battery Container 1	
&	EMZ	Terminals	
++	ASC	auxillary cabinet	page: 2031
+			total: 500

Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_02++ASC+-690XT1						Cable name												Page / column
				Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
								,															
230V AC for Exhaust Unit / shut-off flap Battery cabinets 9-11							9	,	-691F4	2													&EFS/691.5
								,															
								,															
								,														

Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_02++ASC+-690XT1						Cable name												Page / column
				Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												

Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_02++ASC+-690XT1						Cable name												Page / column
				Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
						GND																	
400V AC for Cooling Units							N																&EFS/691.6
=							PE																&EFS/691.6

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Customer:	Statron
Project:	Shell Crosswind BESS FQ 1MW 5MWh Offshore
Type:	BESS MSC-1000-620-8
Product	BATTERY CONTAINER 2
Circuit diagram No:	10354_23A2007 20241203_V1.22
Producer (company):	Freqcon GmbH 53412 ASC 53409
Project:	Shell Crosswind BESS FQ 1MW 5MWh Offshore
Type:	BESS MSC-1000-620-8
Project manager:	Freqcon_CP

created on: 17.09.2019
edited on: 03.12.2024 edited by: Freqcon_DG total pages: 500

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	3	PARTS LIST	05.11.2024	Freqcon_DG
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	5	PARTS LIST	05.11.2024	Freqcon_DG
	6	PARTS LIST	05.11.2024	Freqcon_DG
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	2008	Klemmenplan =UNIT_03++ASC+-369XT	05.11.2024	Freqcon_DG
	2009	Klemmenplan =UNIT_03++ASC+-369XT	05.11.2024	Freqcon_DG
	2010	Klemmenplan =UNIT_03++ASC+-369XT	05.11.2024	Freqcon_DG
	2011	Klemmenplan =UNIT_03++ASC+-369XT	05.11.2024	Freqcon_DG
	2012	Klemmenplan =UNIT_03++ASC+-369XT	05.11.2024	Freqcon_DG
	2013	Klemmenplan =UNIT_03++ASC+-369XT	05.11.2024	Freqcon_DG
	2014	Klemmenplan =UNIT_03++ASC+-369XT	05.11.2024	Freqcon_DG
	2015	Klemmenplan =UNIT_03++ASC+-369XT	05.11.2024	Freqcon_DG
	2016	Klemmenplan =UNIT_03++ASC+-369XT	05.11.2024	Freqcon_DG
	2017	Klemmenplan =UNIT_03++ASC+-369XT	05.11.2024	Freqcon_DG
	2018	Klemmenplan =UNIT_03++ASC+-369XT	05.11.2024	Freqcon_DG
	2019	Klemmenplan =UNIT_03++ASC+-369XT	05.11.2024	Freqcon_DG
	2020	Klemmenplan =UNIT_03++ASC+-687XT1	05.11.2024	Freqcon_DG
	2021	Klemmenplan =UNIT_03++ASC+-687XT1	05.11.2024	Freqcon_DG
	2022	Klemmenplan =UNIT_03++ASC+-687XT1	05.11.2024	Freqcon_DG
	2023	Klemmenplan =UNIT_03++ASC+-687XT1	05.11.2024	Freqcon_DG
	2024	Klemmenplan =UNIT_03++ASC+-687XT1	05.11.2024	Freqcon_DG
	2025	Klemmenplan =UNIT_03++ASC+-687XT1	05.11.2024	Freqcon_DG

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FREQCON_INHALT_04_de_en

Assignment	Page	Page description	Date	Edited by
&EMZ ++ASC		Terminals auxillary cabinet		
	2026	Klemmenplan =UNIT_03++ASC+-687XT1	05.11.2024	Freqcon_DG
	2027	Klemmenplan =UNIT_03++ASC+-687XT1	05.11.2024	Freqcon_DG
	2028	Klemmenplan =UNIT_03++ASC+-687XT1	05.11.2024	Freqcon_DG
	2029	Klemmenplan =UNIT_03++ASC+-687XT1	05.11.2024	Freqcon_DG
	2030	Klemmenplan =UNIT_03++ASC+-687XT1	05.11.2024	Freqcon_DG
	2031	Klemmenplan =UNIT_03++ASC+-690XT1	05.11.2024	Freqcon_DG
	2032	Klemmenplan =UNIT_03++ASC+-690XT1	05.11.2024	Freqcon_DG
	2033	Klemmenplan =UNIT_03++ASC+-690XT1	05.11.2024	Freqcon_DG
	2034	Klemmenplan =UNIT_03++ASC+-690XT1	05.11.2024	Freqcon_DG
	2035	Klemmenplan =UNIT_03++ASC+-690XT1	05.11.2024	Freqcon_DG

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&EAC/1a

SPECIFICATION

TERMINAL STRIP

-XE1	MAIN POWER SUPPLY 600V AC
-XE2	DC POWER SUPPLY 1000V DC
-XE	MAIN POWER SUPPLY 400V AC
-X1	MAIN POWER 400V/230V AC
-X2	LIGHT CABINET 230V AC
-X3	CONTROL VOLTAGE 24V DC
-14X1	CONTROL VOLTAGE 24V DC (TO DC CONTACTORS)
-X5	LOW-VOLTAGE SIGNALS
-XDC0	24V DC POWER SUPPLY
-XDC1-4	CONTROL VOLTAGE 24V DC (UPS)
-XT	TRANSFER TERMINAL BLOCK 24V DC / 230V AC

WIRING COLOR

L1 / L2 / L3	=	BLACK
N	=	LIGHT BLUE (IEC) / GREY (UL)
PE	=	YELLOW-GREEN
EXTERNAL VOLTAGE	=	ORANGE
CONTROL VOLTAGE 24 V DC	=	DARK BLUE
ANALOG SIGNALS	=	WHITE

PLACE

+CTRL	=	Control cabinet
+CON	=	Converter cabinet
+IND	=	Inductor cabinet
+CIR	=	Circuit breaker cabinet
+COSY	=	Cooling System
+FAN	=	External fan

previous page: &EAB/6

next page: 6a

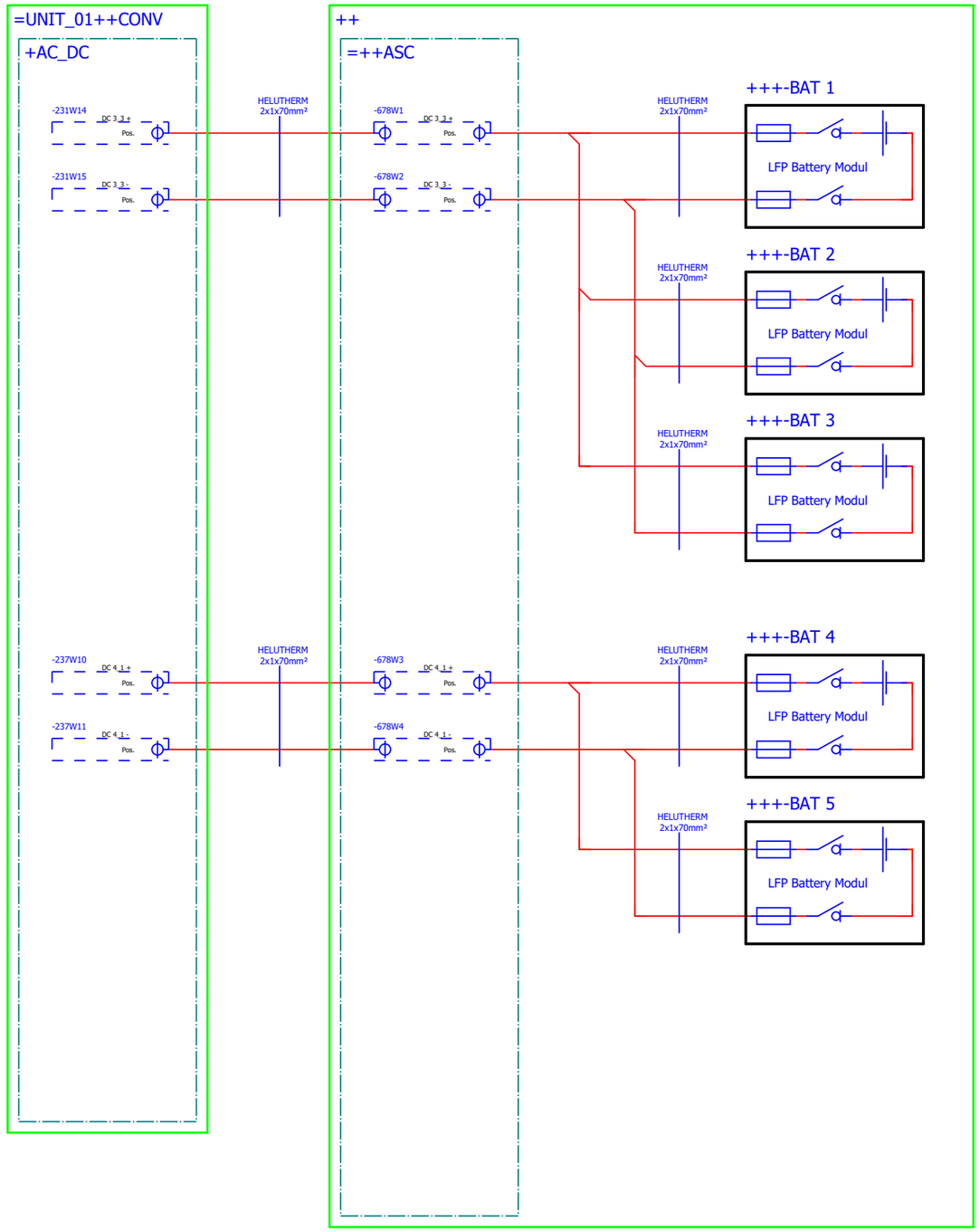
SPECIFICATION of grounding

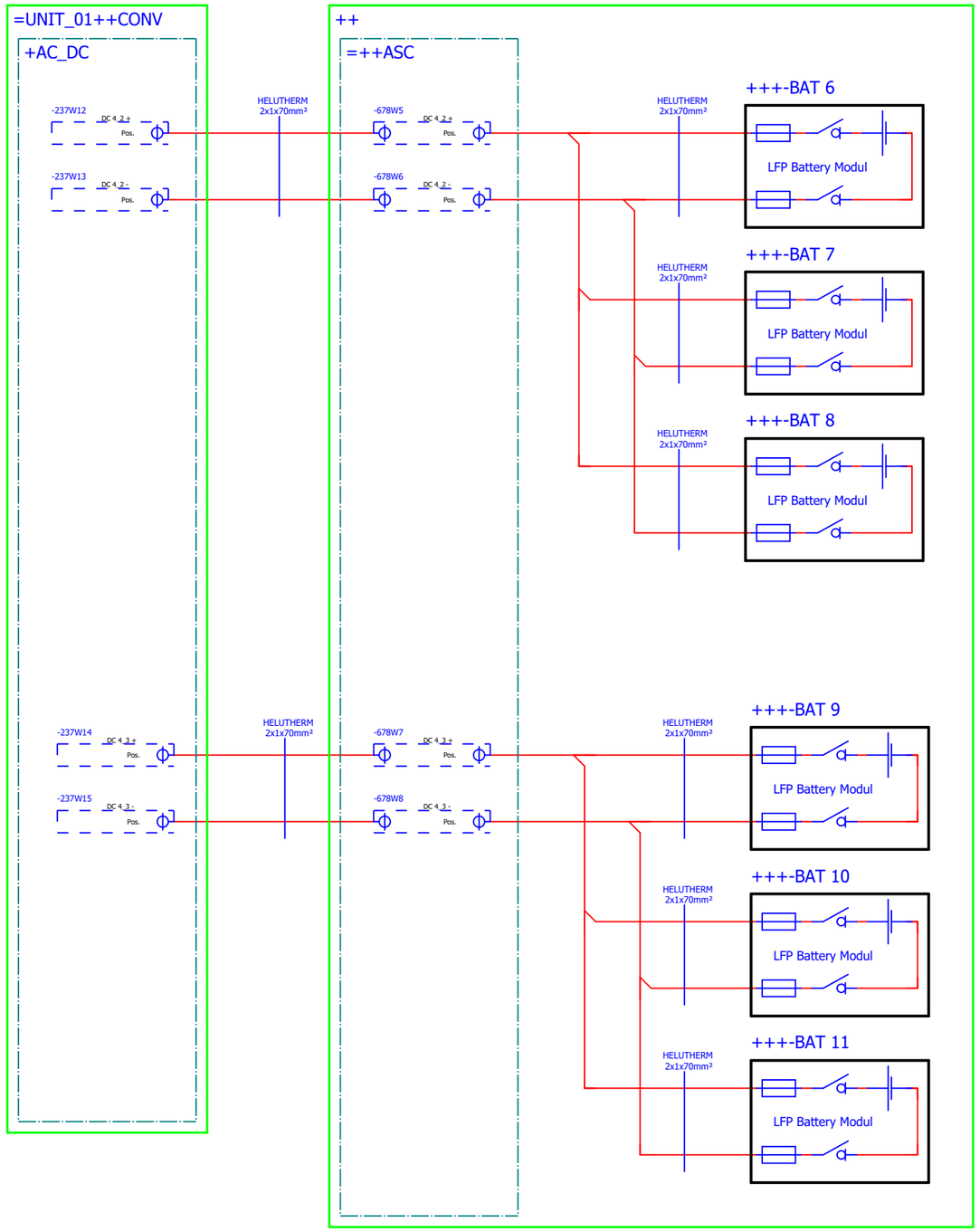
	from frame to			
1	**roof & side walls & doors**	**EVD_1**	**Flachband**	**2x25 mm²**
2	**frame**	**EVD_2**	**Flachband**	**2x25 mm²**
3	**base**	**EVD_3**	**Flachband**	**2x25 mm²**
4	**Mounting plate & partitions**	**EVD_4**	**H07-V-K**	**2x25 mm²**
5	**inductors**	**EVD_5**	**H07-V-k**	**2x25 mm²**
6	**Powerstack**	**EVD_6**	**H07-V-K**	**2x25 mm²**
7	**DC Switch & Fuse**	**EVD_7**	**H07-V-K**	**2x25 mm²**
8	**AC Filter**	**EVD_8**	**H07-V-K**	**2x25 mm²**
9	**circuit-breaker**	**EVD_9**	**H07-V-K**	**2x25 mm²**
10	**Freqcon_Fast_Disconektor**	**EVD_10**	**H07-V-K**	**2x25 mm²**
11	**Freqcon_Rectifier_Modul**	**EVD_11**	**H07-V-K**	**2x25 mm²**
12	**capacitor banks**	**EVD_12**	**H07-V-K**	**2x25 mm²**
13	**water distributor**	**EVD_13**	**H07-V-K**	**2x25 mm²**
14	**SPARE**	**EVD_14**	**H07-V-K**	**2x25 mm²**
15	**SPARE**	**EVD_15**	**H07-V-K**	**2x25 mm²**
16	**SPARE**	**EVD_16**	**H07-V-K**	**2x25 mm²**
17	**SPARE**	**EVD_17**	**H07-V-K**	**2x25 mm²**
18	**SPARE**	**EVD_18**	**H07-V-K**	**2x25 mm²**
	from door to			
19	**PROFINET IRT IGBT Interface**	**EVD_19**	**H07-V-K**	**1,5 mm²**
20	**HMI**	**EVD_20**	**H07-V-K**	**1,5 mm²**
21	**SPARE**	**EVD_21**	**H07-V-K**	**??? mm²**
22	**SPARE**	**EVD_22**	**H07-V-K**	**??? mm²**

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Single line diagram





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Date	18.06.2024	Norm						& EFA Single line diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ page: 1a
Date								+ total: 500

Single line diagram

Control circuit

++ASC

400V

-XES

-684F3 &EFS++ASC/684.2 C32A

-684F1 &EFS++ASC/684.0 C32A

-684F2 &EFS++ASC/684.5 TYP 1 + 2 SPD

-601F1 &EFS++ASC/601.1 TYP 1 + 2 SPD

-684F4 &EFS++ASC/685.0 C32A

-684F5 &EFS++ASC/685.5 TYP 1 + 2 SPD

-691F1 &EFS++ASC/691.1 C6A

-691F2 &EFS++ASC/691.3 C6A

-691F3 &EFS++ASC/691.4 C6A

-690F1 &EFS++ASC/690.1 16A

-690F3 &EFS++ASC/690.5 C6A

-690F4 &EFS++ASC/690.7 C6A

-690F5 &EFS++ASC/690.8 C6A

-691F4 &EFS++ASC/691.5 C16A

-690F2 &EFS++ASC/690.3 16A

-101Q1

-687F1 &EFS++ASC/687.1 C16A

-687F2 &EFS++ASC/687.3 C16A

-687F3 &EFS++ASC/687.4 C16A

-687F4 &EFS++ASC/687.5 C16A

-687F5 &EFS++ASC/687.7 C16A

-636K1 &EFS++ASC/636.1

-636K2 &EFS++ASC/636.2

-636K3 &EFS++ASC/636.4

M 1~

1/N/PE

20 A

Exhaust Unit / shut-off flap Bat 1-4

Exhaust Unit / shut-off flap Bat 5-8

Exhaust Unit / shut-off flap Bat 9-11

Container Internal Lighting

crane 1

crane 2

crane 3

Cooling Units

Container Sockets

Power Supply

Battery cabinet 1

Battery cabinet 2

Battery cabinet 3

Battery cabinet 4

Battery cabinet 5

-687F6 &EFS++ASC/687.8 C16A

-688F1 &EFS++ASC/688.1 C16A

-688F2 &EFS++ASC/688.2 C16A

-688F3 &EFS++ASC/688.4 C16A

-688F4 &EFS++ASC/688.5 C16A

-688F5 &EFS++ASC/688.7 C16A

Battery cabinet 6

Battery cabinet 7

Battery cabinet 8

Battery cabinet 9

Battery cabinet 10

Battery cabinet 11

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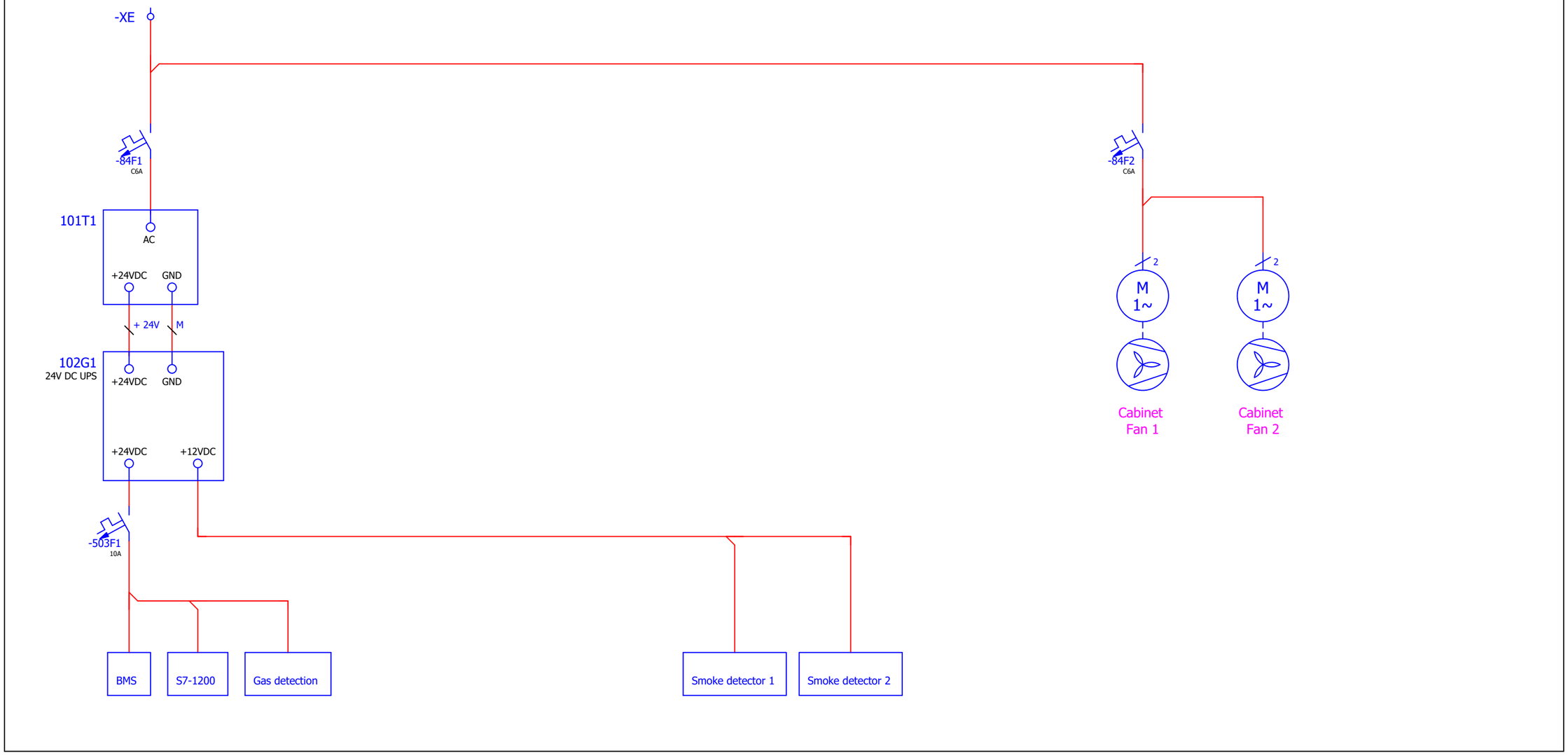
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Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ page: 2a
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Single line diagram

Control circuit

Battery Cabinet

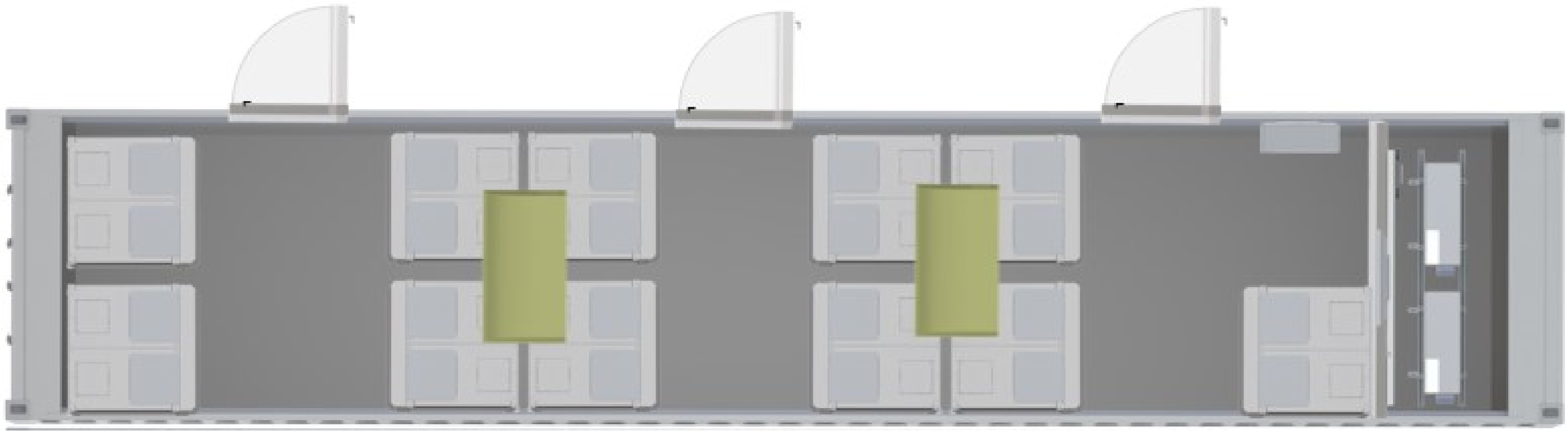


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&ELU/5a

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Date	18.06.2024	Norm						& EFA	Single line diagram
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Date								+	total: 500

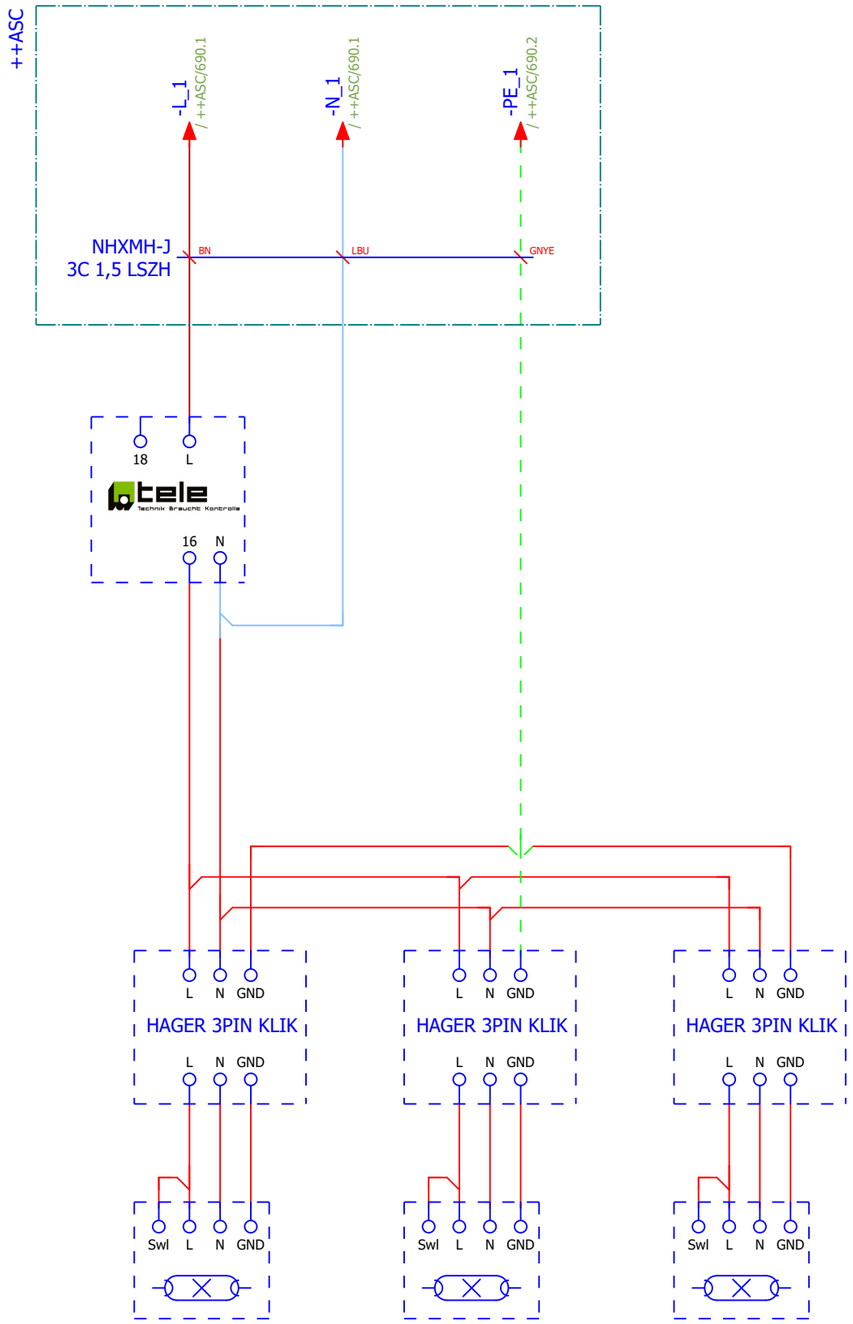
0	1	2	3	4	5	6	7	8	9



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&EFA/3a

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&EFS++Container/190

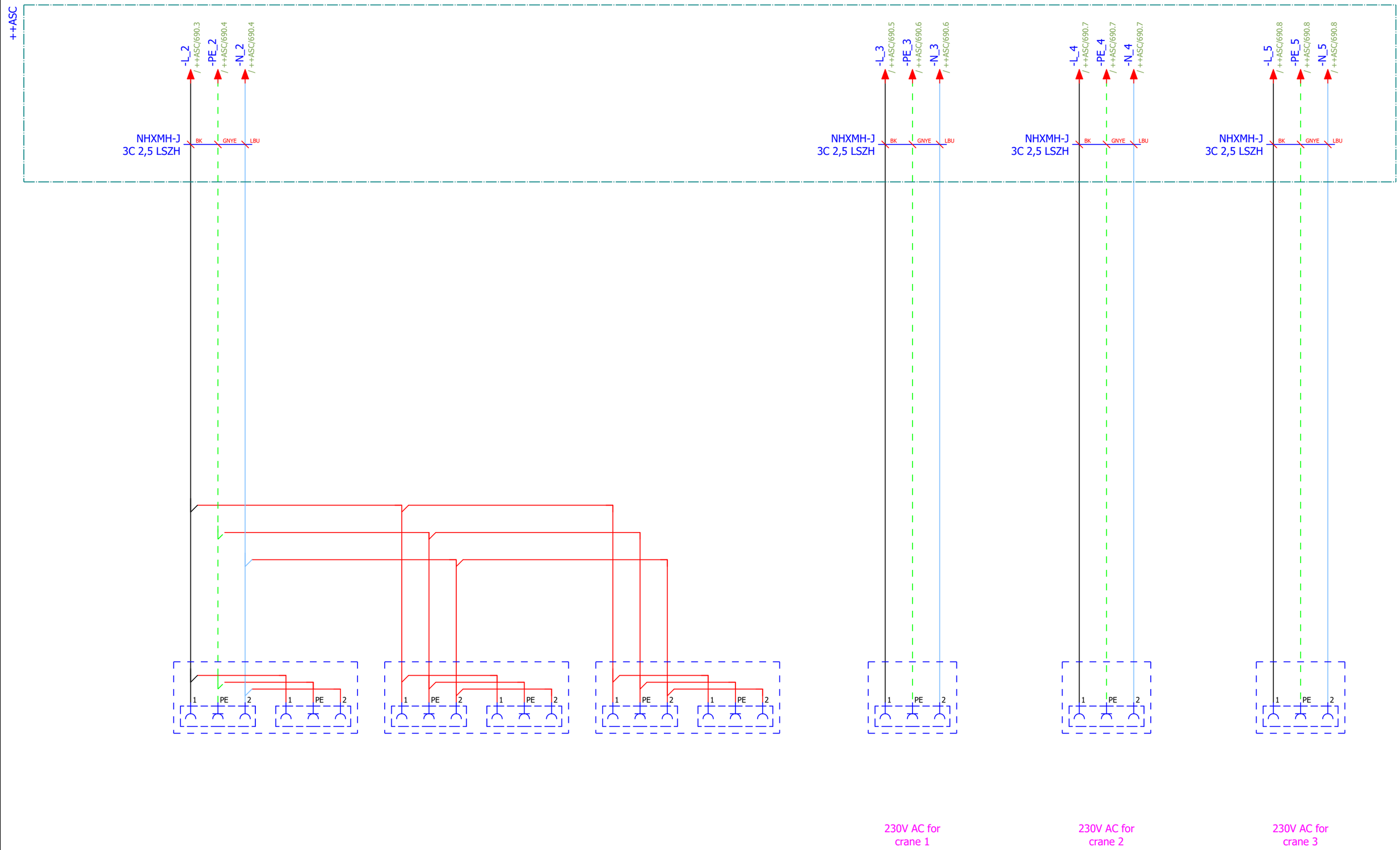
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Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++	page: 5a
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Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container	page: 190
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Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container	page: 191
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++ASC

-L_6 / ++ASC/691.1
-N_6 / ++ASC/691.1
-PE_6 / ++ASC/691.2

NHXMH-J
3C 1,5 LSZH
BK LBU GNYE

L N GND
13A fused
Spur K983ALM
L N GND

1 2
M
1~
PE

BELDEN 9842
LSZH
WH BU WH BU

Junction Box
next to fan motor

230V AC for
Exhaust Unit
Battery cabinets 1-4

-L_6 / ++ASC/691.1
-N_6 / ++ASC/691.1
-PE_6 / ++ASC/691.2

L N GND
13A fused
Spur K983ALM
L N GND

1 2
M
1~
PE

230V AC for
shut-off flap
Battery cabinets 1-4

-L_7 / ++ASC/691.3
-N_7 / ++ASC/691.3
-PE_7 / ++ASC/691.3

NHXMH-J
3C 1,5 LSZH
BK LBU GNYE

L N GND
13A fused
Spur K983ALM
L N GND

1 2
M
1~
PE

BELDEN 9842
LSZH
WH BU WH BU

Junction Box
next to fan motor

230V AC for
Exhaust Unit
Battery cabinets 5-8

-L_7 / ++ASC/691.3
-N_7 / ++ASC/691.3
-PE_7 / ++ASC/691.3

L N GND
13A fused
Spur K983ALM
L N GND

1 2
M
1~
PE

230V AC for
shut-off flap
Battery cabinets 5-8

-L_8 / ++ASC/691.4
-N_8 / ++ASC/691.4
-PE_8 / ++ASC/691.4

NHXMH-J
3C 1,5 LSZH
BK LBU GNYE

L N GND
13A fused
Spur K983ALM
L N GND

1 2
M
1~
PE

BELDEN 9842
LSZH
WH BU WH BU

Junction Box
next to fan motor

230V AC for
Exhaust Unit
Battery cabinets 9-11

-L_8 / ++ASC/691.4
-N_8 / ++ASC/691.4
-PE_8 / ++ASC/691.4

L N GND
13A fused
Spur K983ALM
L N GND

1 2
M
1~
PE

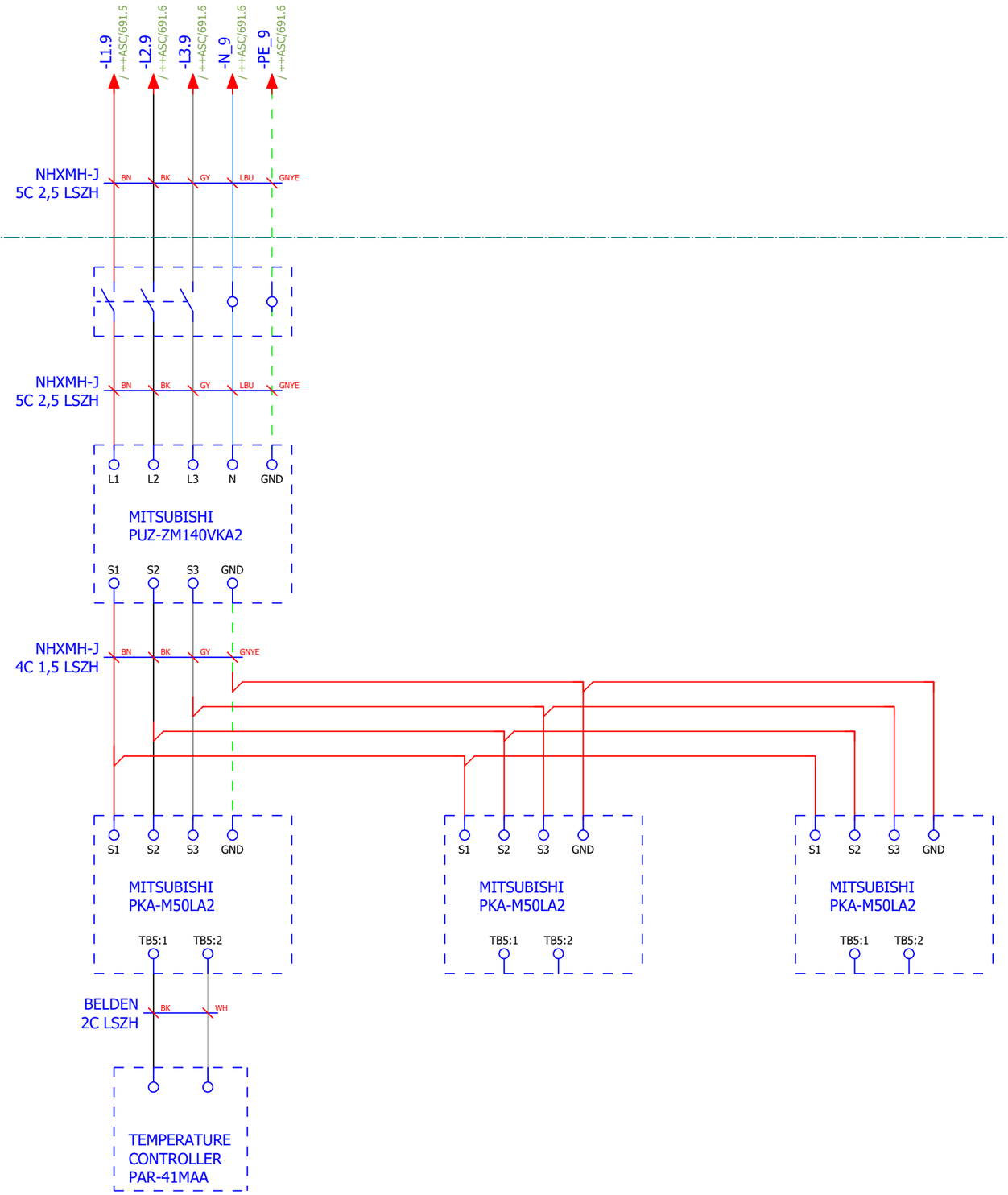
230V AC for
shut-off flap
Battery cabinets 9-11

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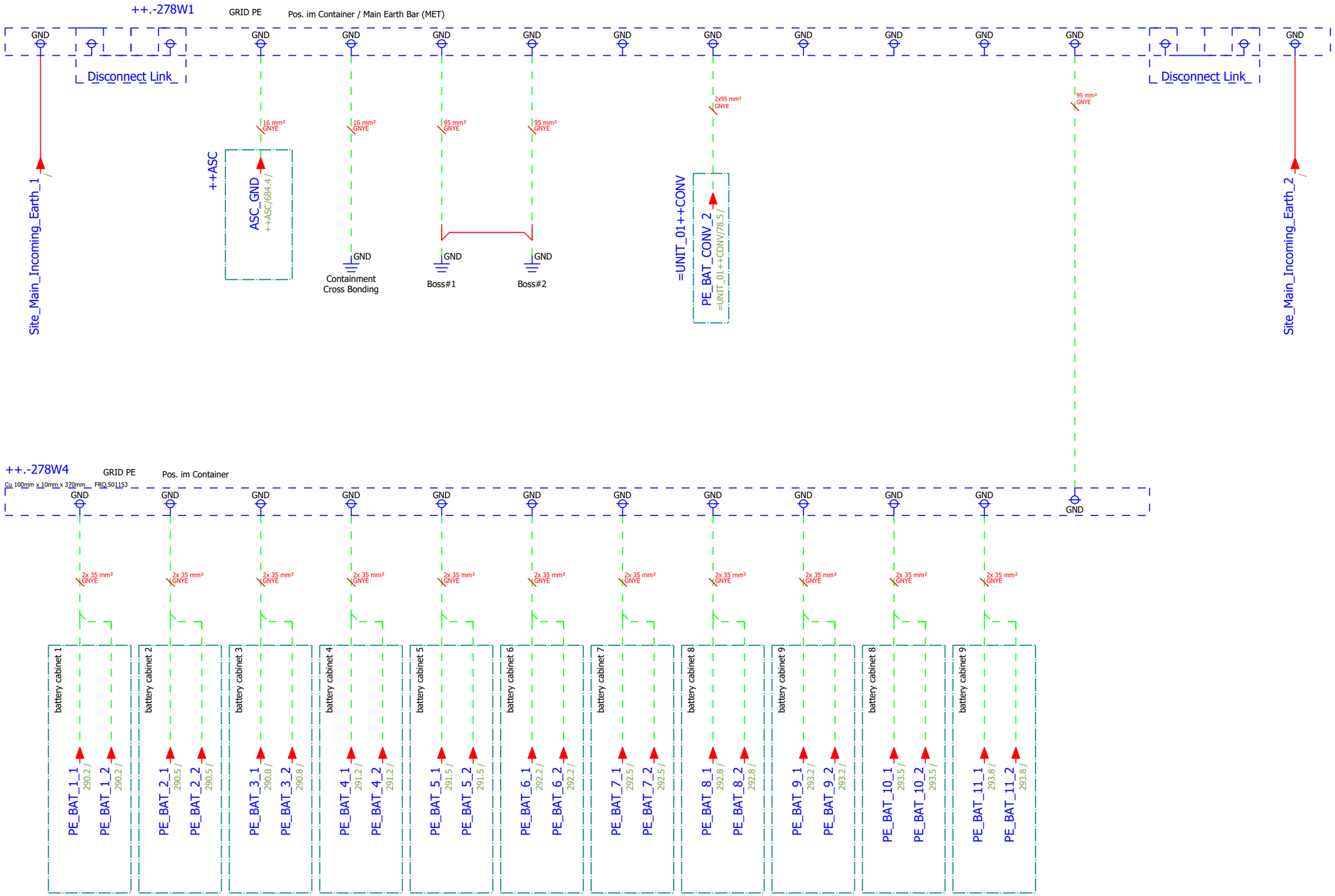
++ASC



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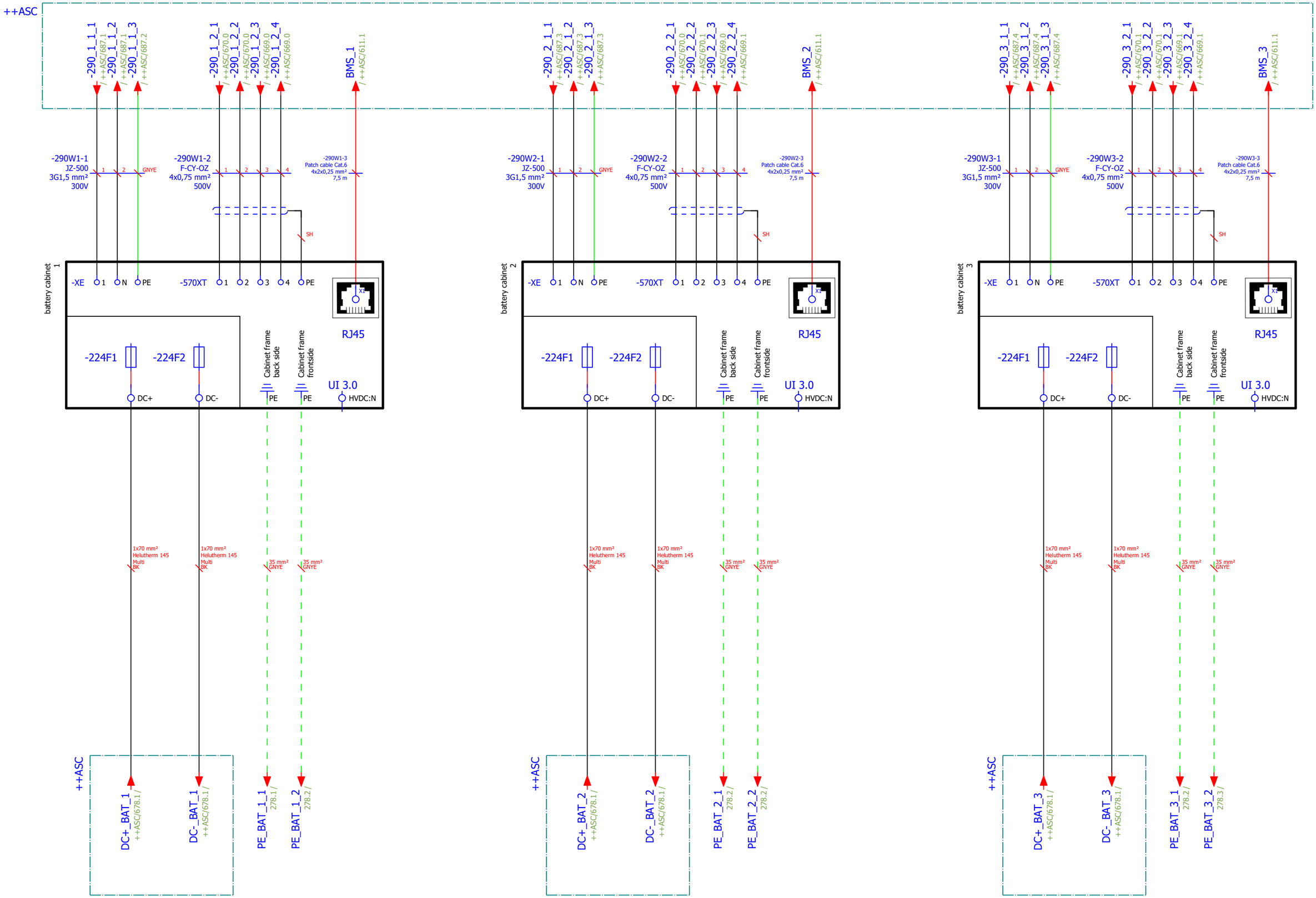
Busbars PE



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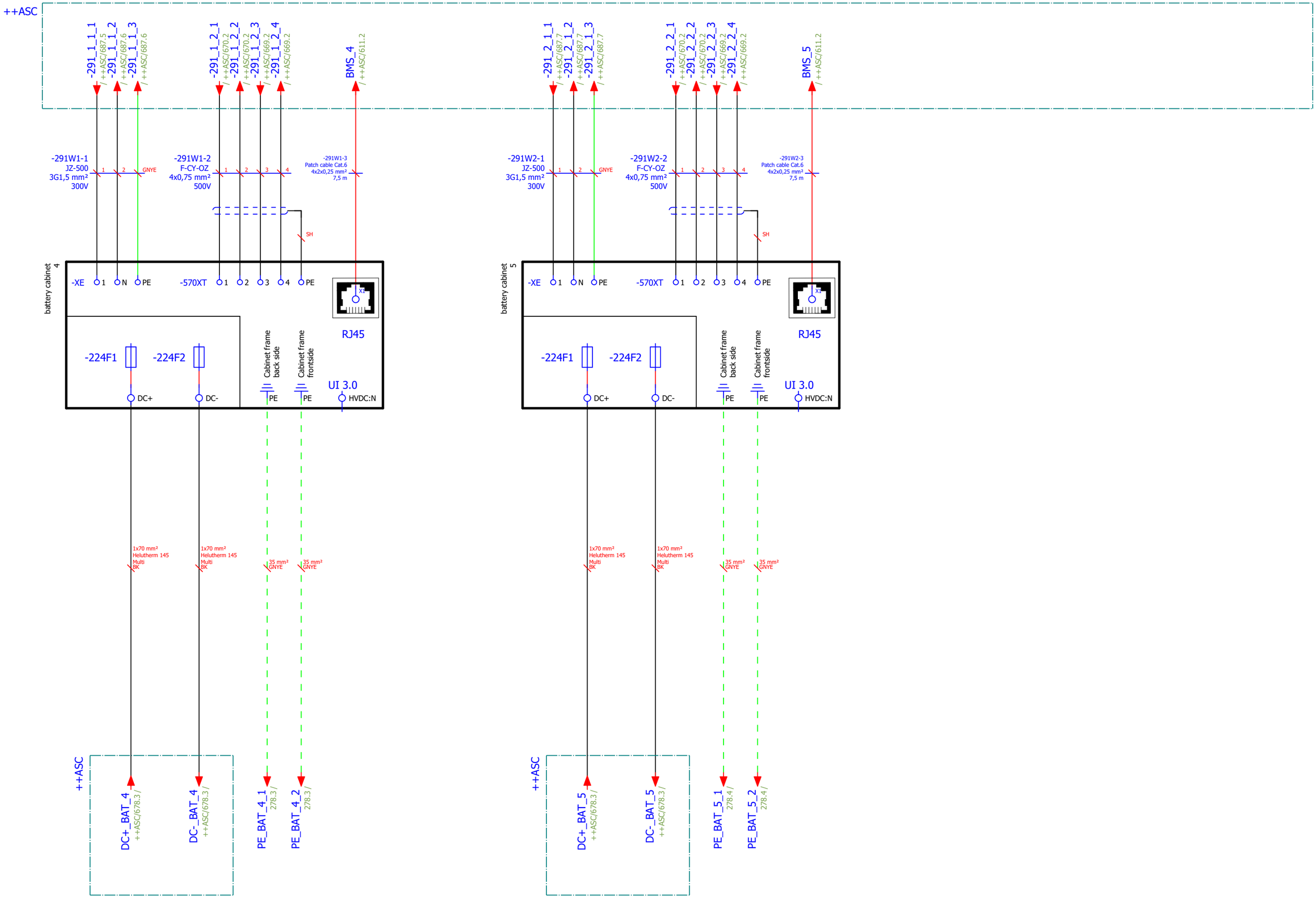
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Date	18.06.2024							& EFS	Circuit diagram
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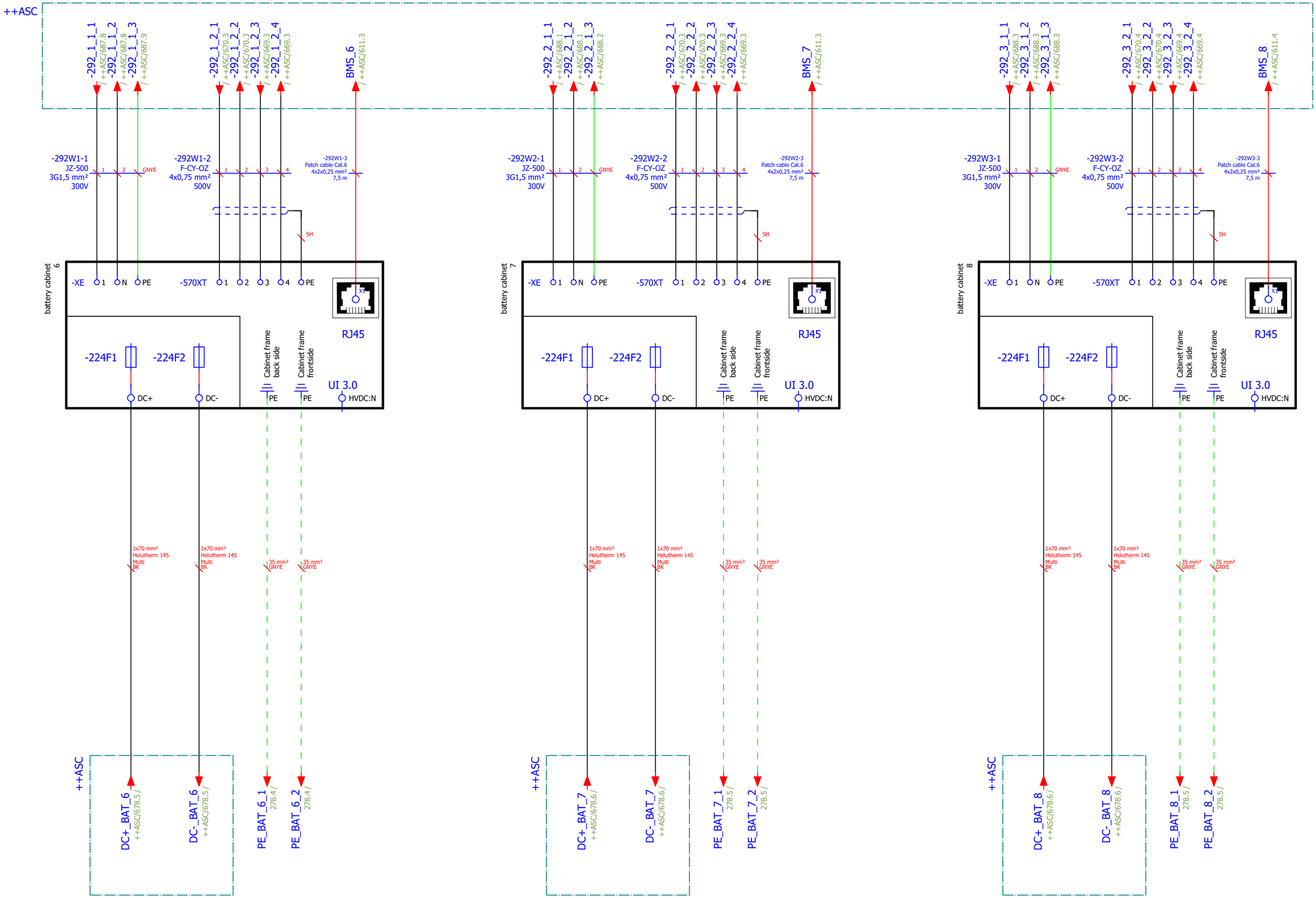
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Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container	page: 290
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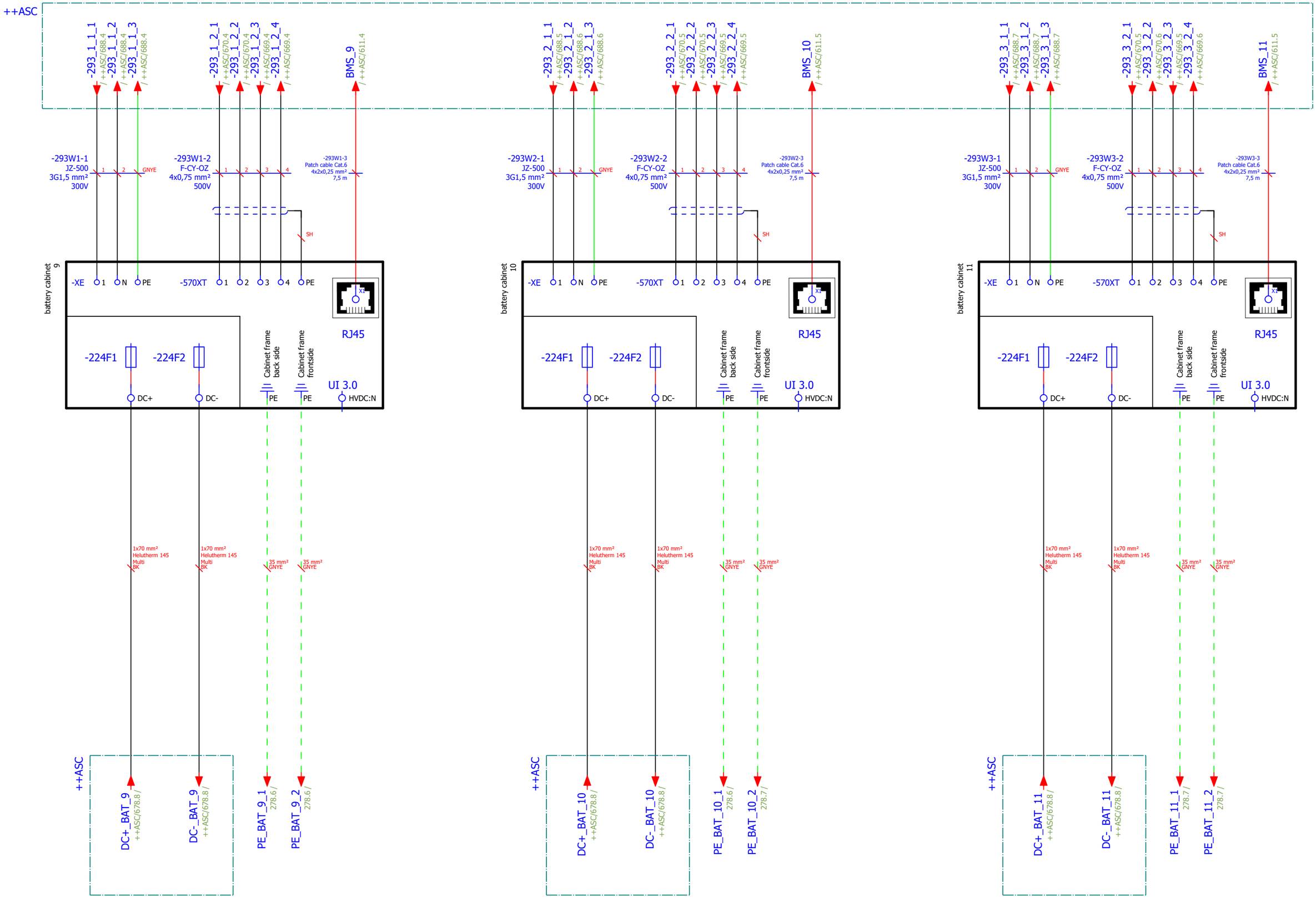
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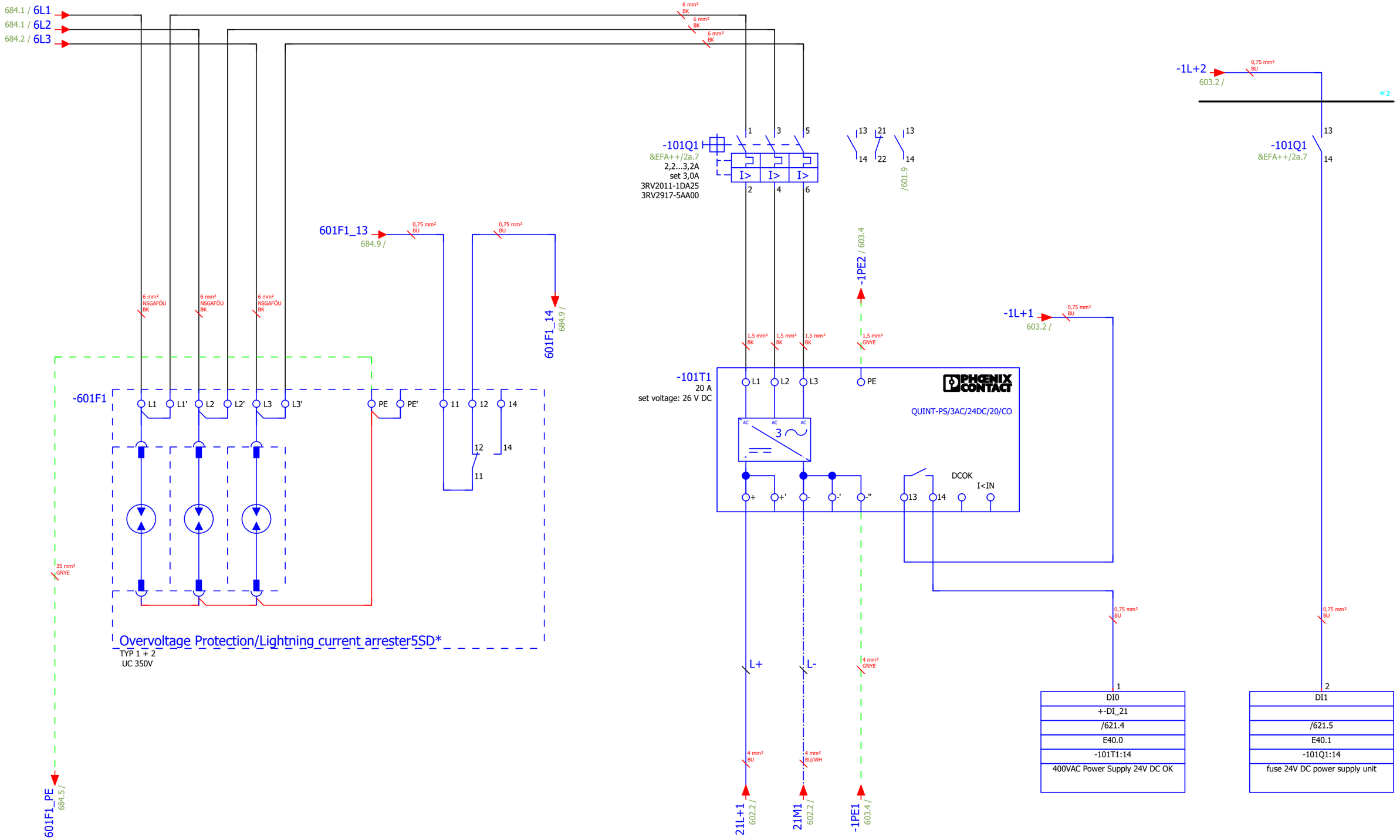
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400VAC
Power Supply
24V DC OK

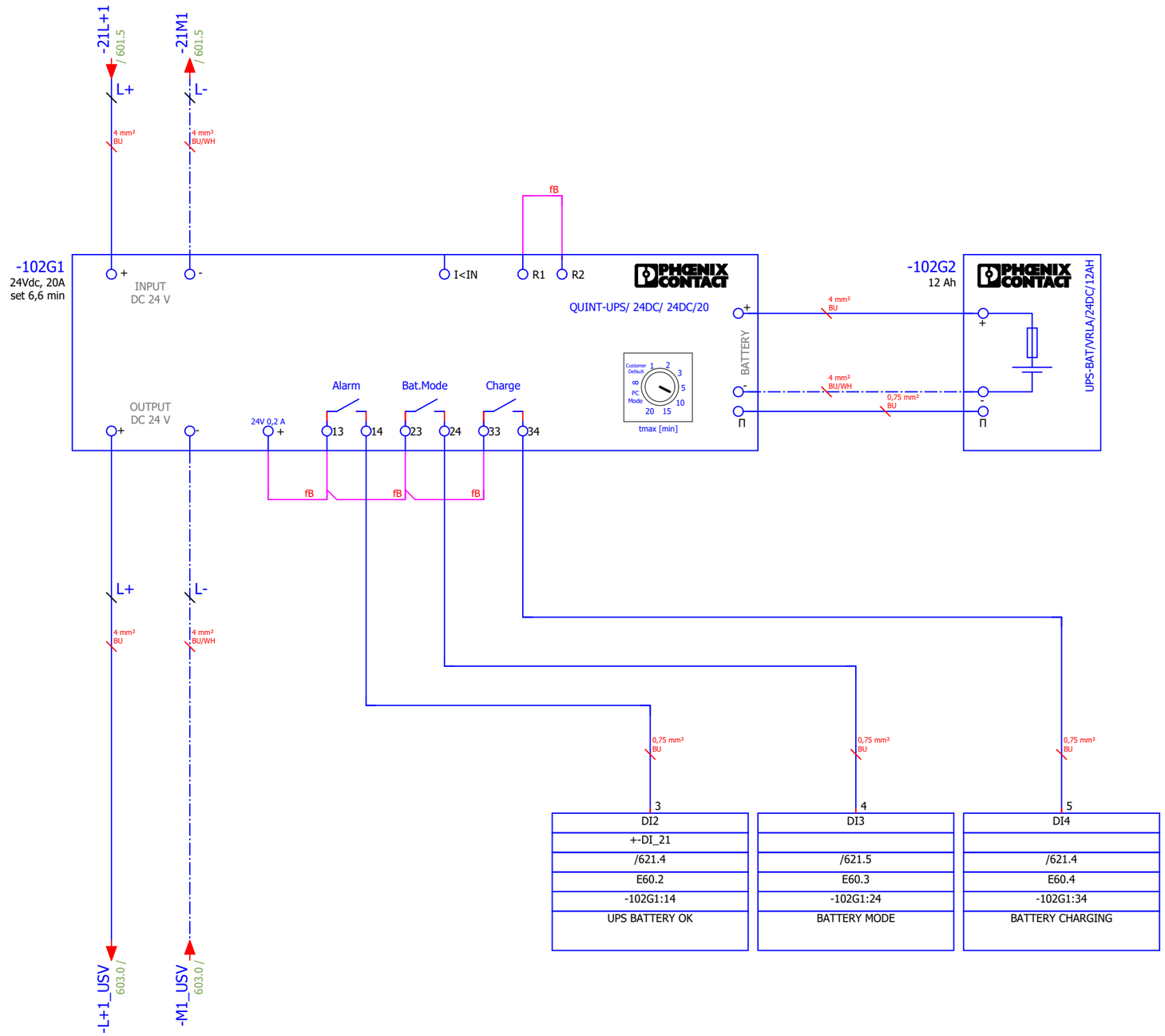
fuse
24V DC power supply unit

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Power supply unit from 400V AC

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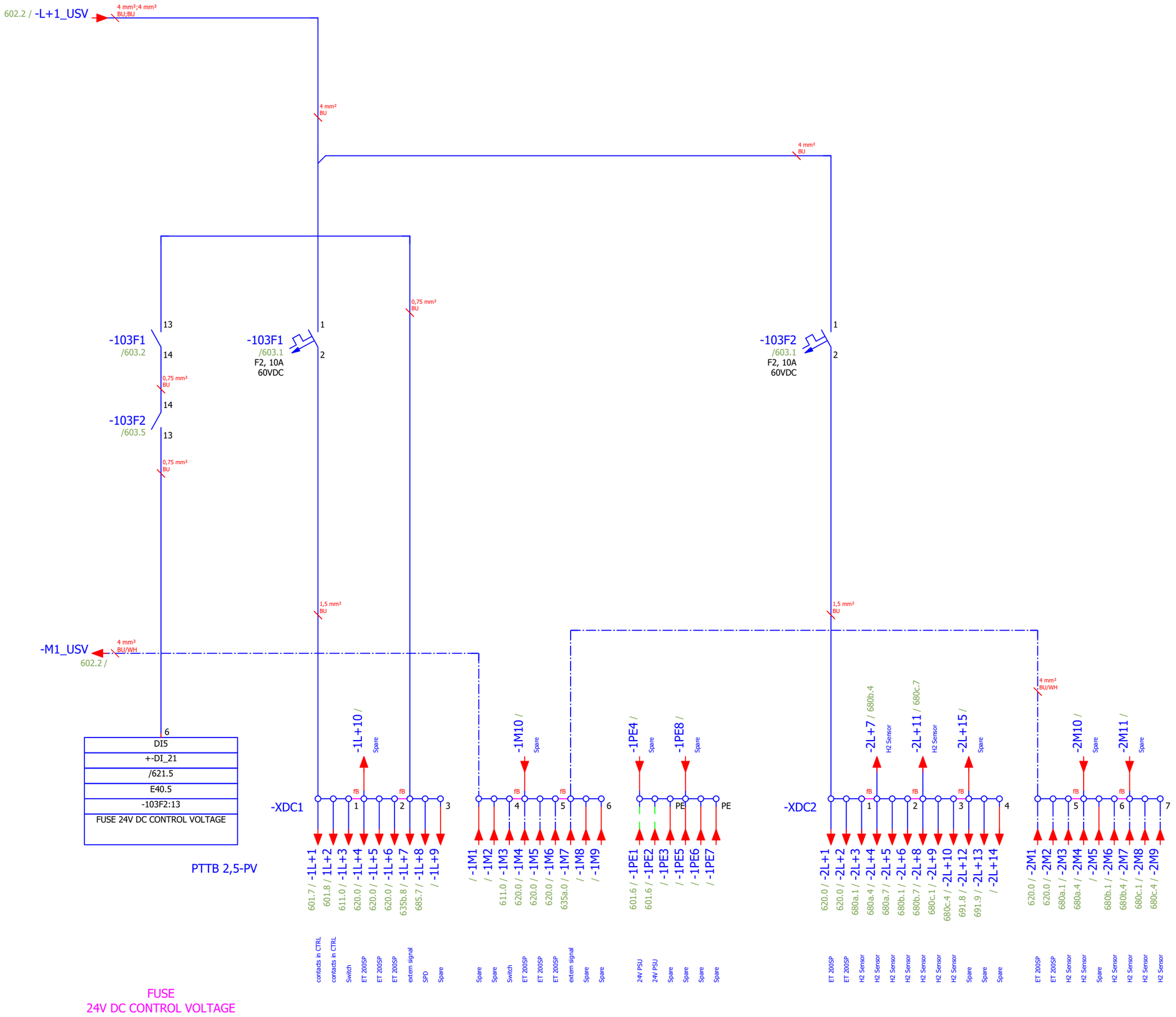
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Date	05.11.2024							& EFS Circuit diagram
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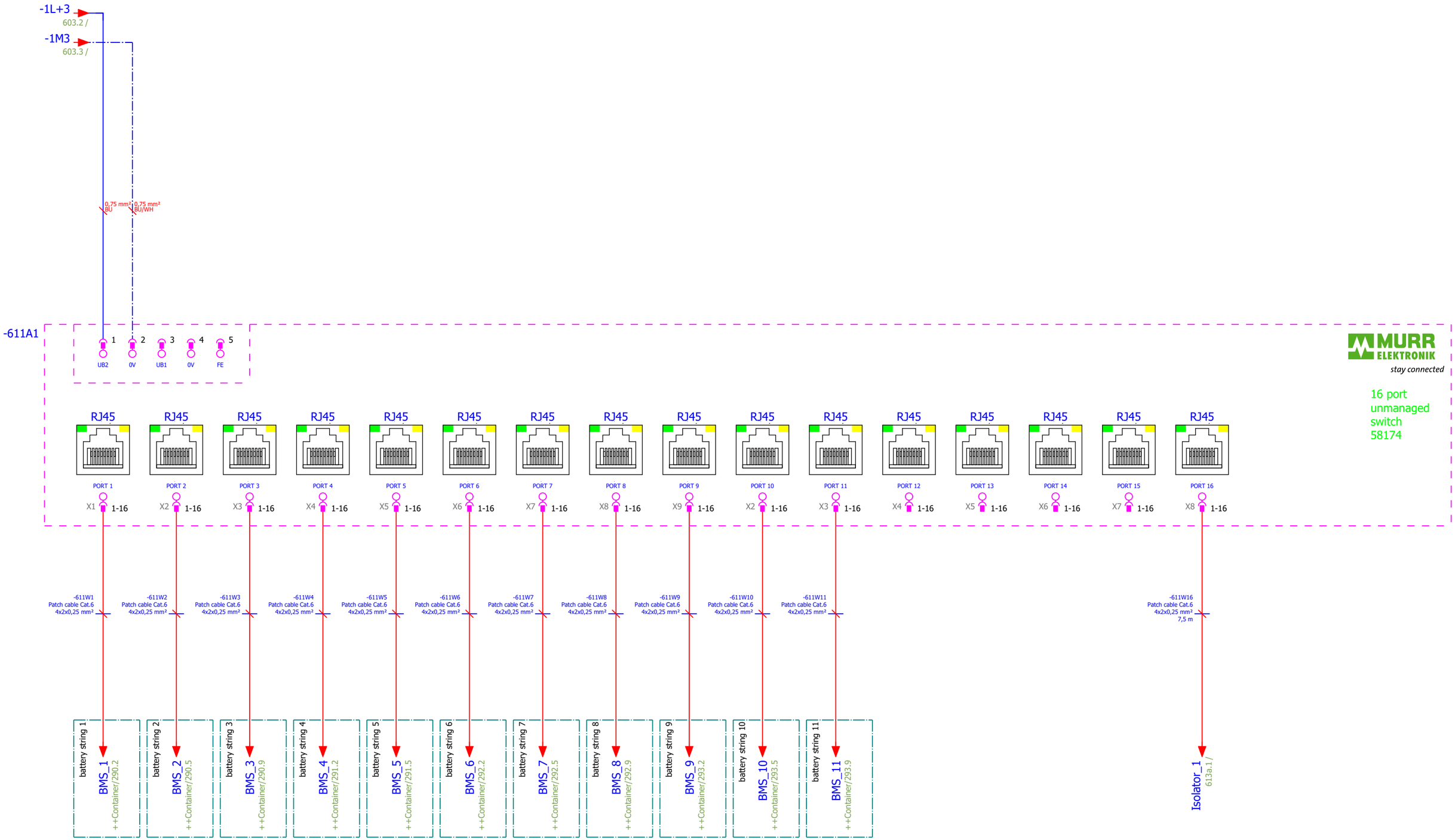
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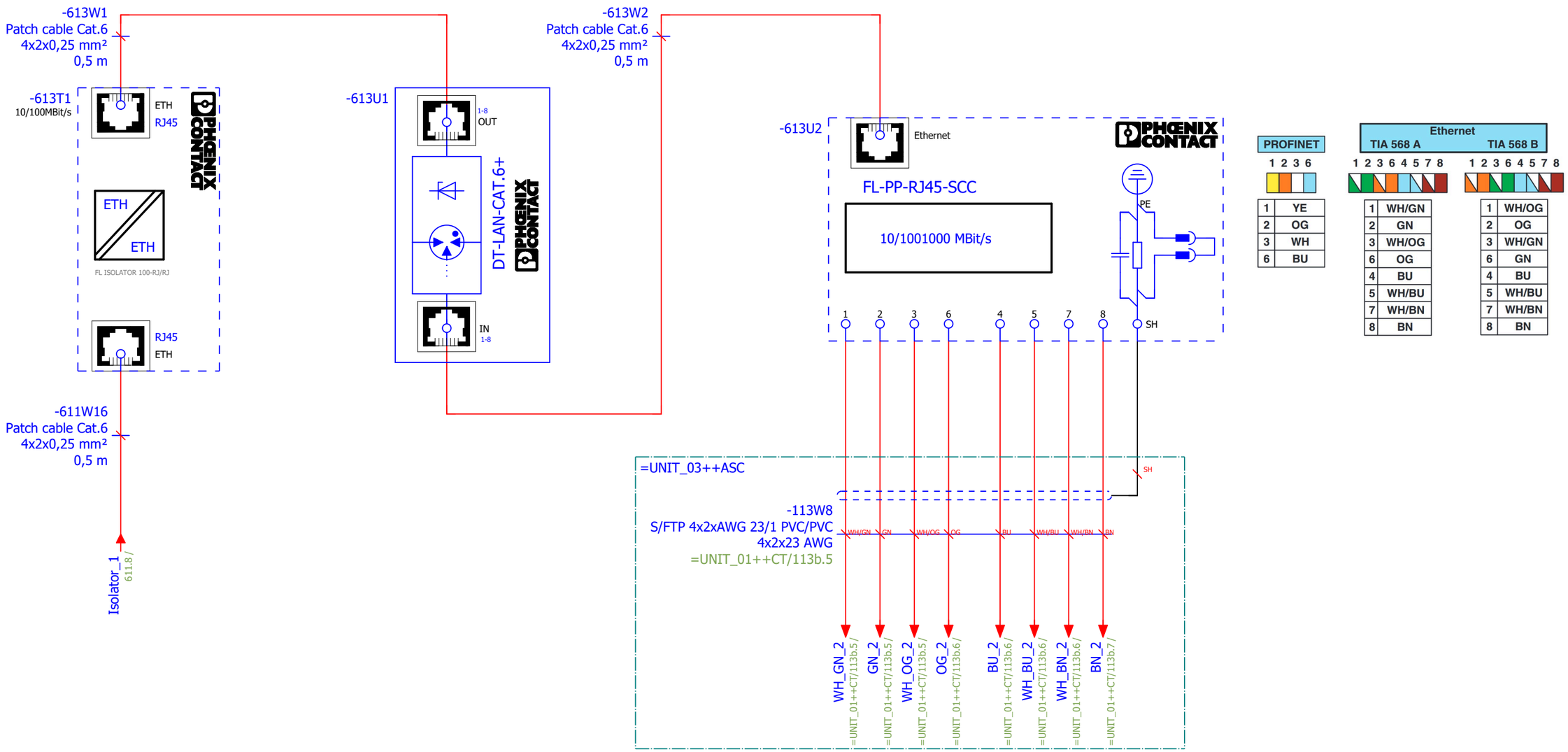
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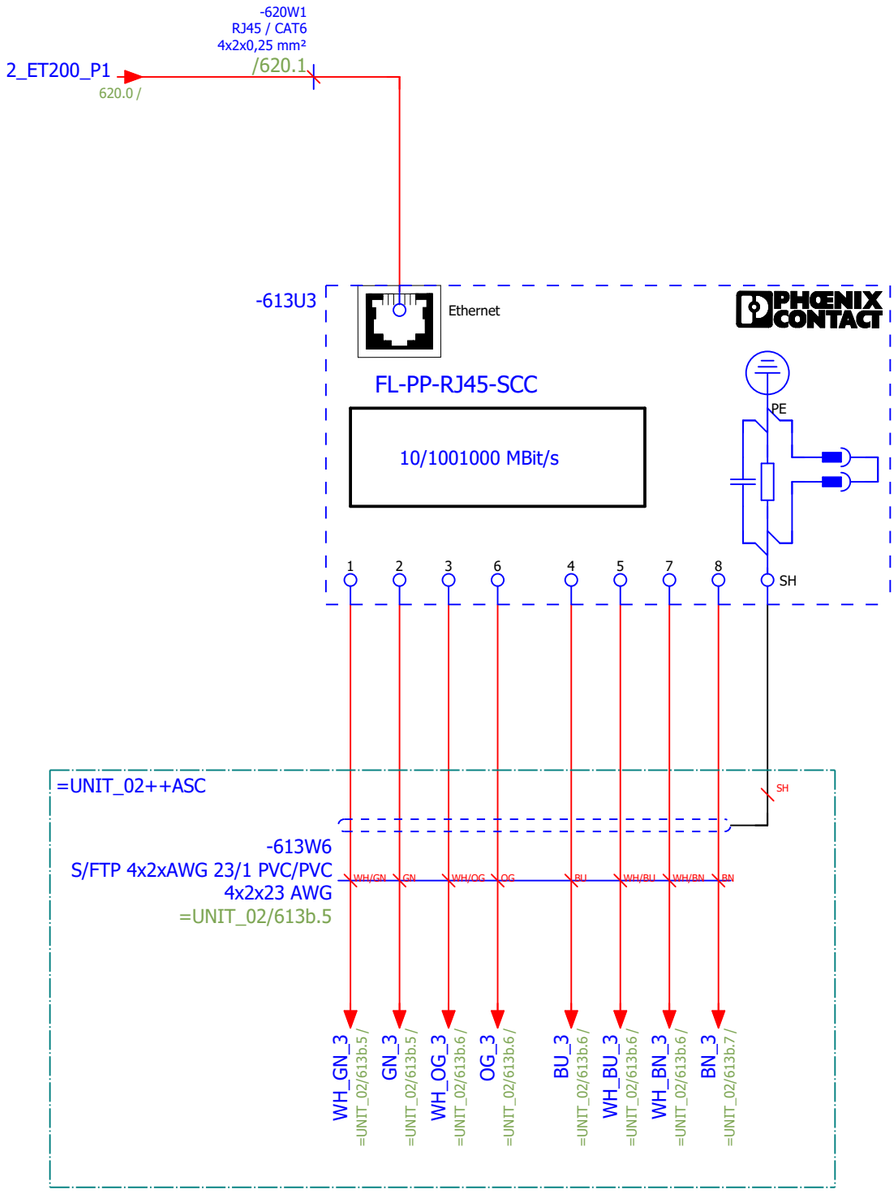
Editor	Freqcon_JD			Statron	FREQCON	ETHERNET SWITCH	20241203_V1.22	= UNIT_03 Battery Container 2	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 611
Date								+	total: 500



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Editor	Freqcon_DG			Statron	FREQCON	ETHERNET / PROFINET ISOLATOR	20241203_V1.22	= UNIT_03 Battery Container 2	
Date	25.11.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 613a
Date								+	total: 500



PROFINET

1 2 3 6	
1	YE
2	OG
3	WH
6	BU

Ethernet

TIA 568 A

1 2 3 6 4 5 7 8	
1	WH/GN
2	GN
3	WH/OG
6	OG
4	BU
5	WH/BU
7	WH/BN
8	BN

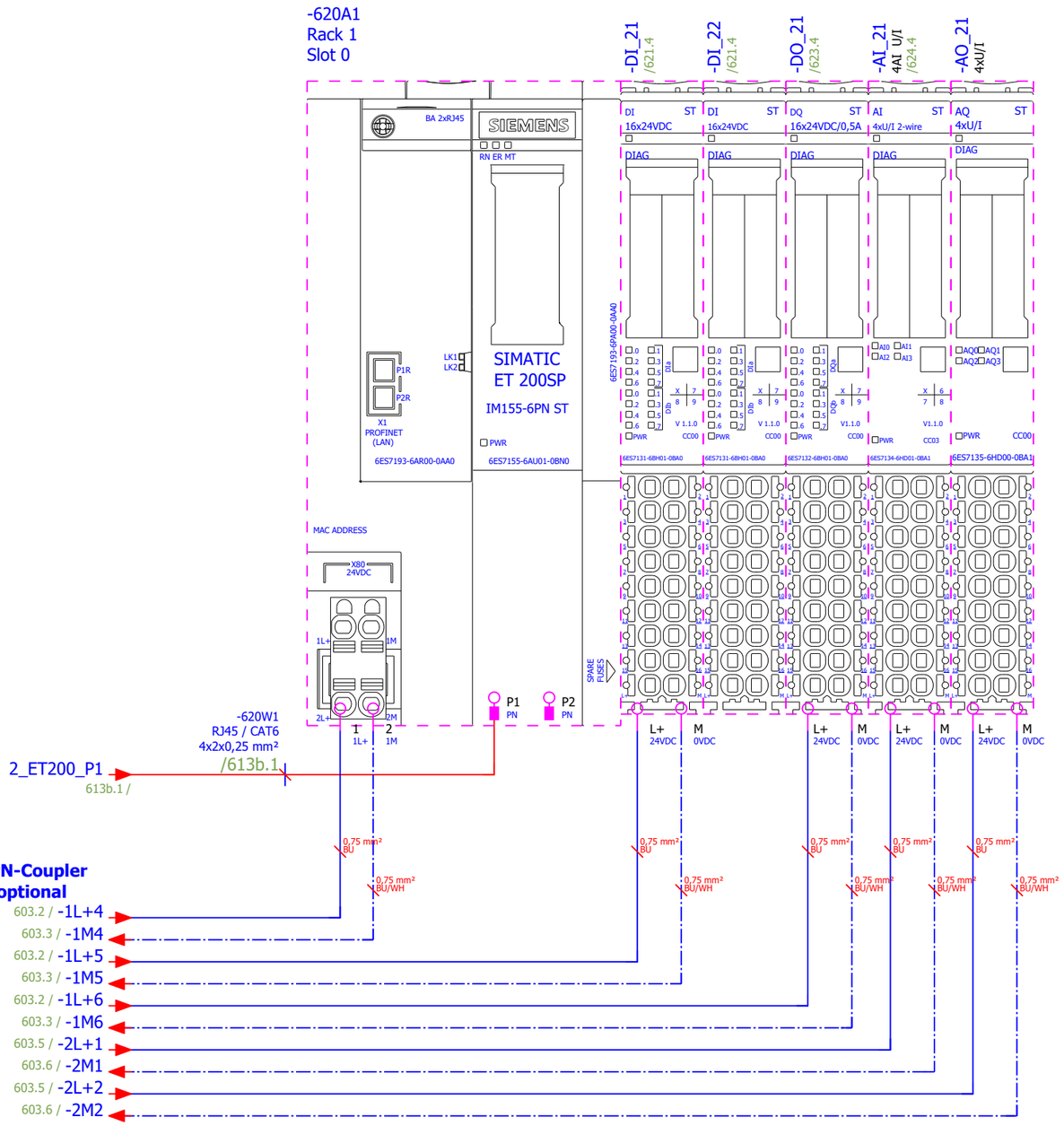
TIA 568 B

1 2 3 6 4 5 7 8	
1	WH/OG
2	OG
3	WH/GN
6	GN
4	BU
5	WH/BU
7	WH/BN
8	BN

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Editor	Freqcon_DG			Statron		PROFINET	20241203_V1.22	= UNIT_03	Battery Container 2	
Date	25.11.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet	page: 613b
Date								+		total: 500



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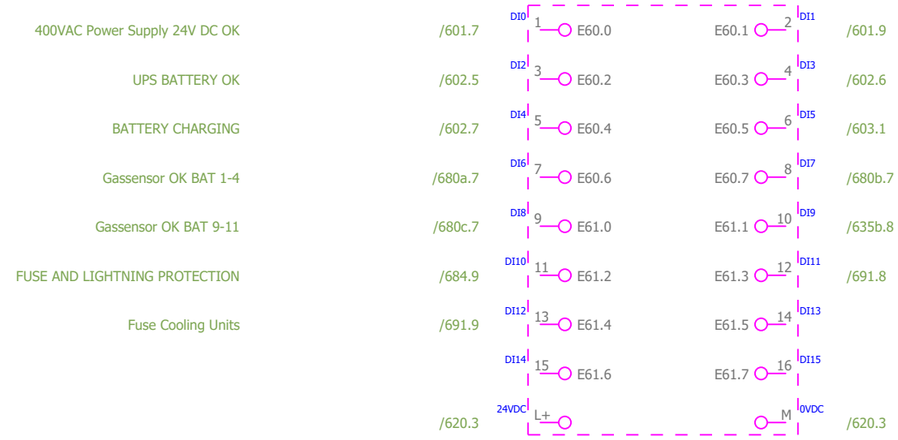
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621

Editor	Freqcon_DG			Statron	FREQCON	ET200 24V DC ASC	20241203_V1.22	= UNIT_03	Battery Container 2
Date	25.11.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet
Date								+	

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total: 500

-DI_21

/620.3



-DI_22

/620.3

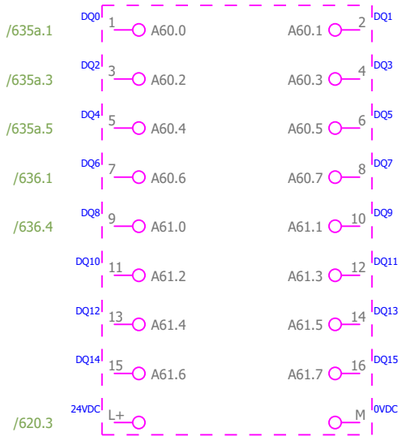
previous page: 620

next page: 623

Editor	Freqcon_DG			Statron	FREQCON	ET200SP DIGITAL INPUTS DI_21 + DI_22	20241203_V1.22	= UNIT_03 Battery Container 2	
Date	03.12.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 621
Date								+	total: 500

-DO_21

/620.3



Gas confirmed	/635a.1	DQ0	1	A60.0	
				A60.1	2 DQ1 /635a.2 Smoke confirmed
PLC fault status	/635a.3	DQ2	3	A60.2	
				A60.3	4 DQ3 /635a.4 Thermal runaway
Spare	/635a.5	DQ4	5	A60.4	
				A60.5	6 DQ5 /635a.6 Spare
230V AC for Exhaust Unit / shut-off flap Battery cabinets 1-4	/636.1	DQ6	7	A60.6	
				A60.7	8 DQ7 /636.2 230V AC for Exhaust Unit / shut-off flap Battery cabinets 5-8
230V AC for Exhaust Unit / shut-off flap Battery cabinets 9-11	/636.4	DQ8	9	A61.0	
				A61.1	10 DQ9
		DQ10	11	A61.2	
				A61.3	12 DQ11
		DQ12	13	A61.4	
				A61.5	14 DQ13
		DQ14	15	A61.6	
				A61.7	16 DQ15
	/620.3	24VDC	L+		
				M	0VDC /620.4

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Editor	Freqcon_JD			Statron	FREQCON	ET200SP DIGITAL OUTPUTS DO_21	20241203_V1.22	= UNIT_03 Battery Container 2
Date	14.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet page: 623
Date								+ total: 500

-AI_21

/620.4



gas concentration BAT 1-4 /680a.2

gas concentration BAT 9-11 /680c.2

gas concentration BAT 1-4 /680a.2

gas concentration BAT 9-11 /680c.2

/620.4

/680b.2 gas concentration BAT 5-8

/680b.2 gas concentration BAT 5-8

/620.4

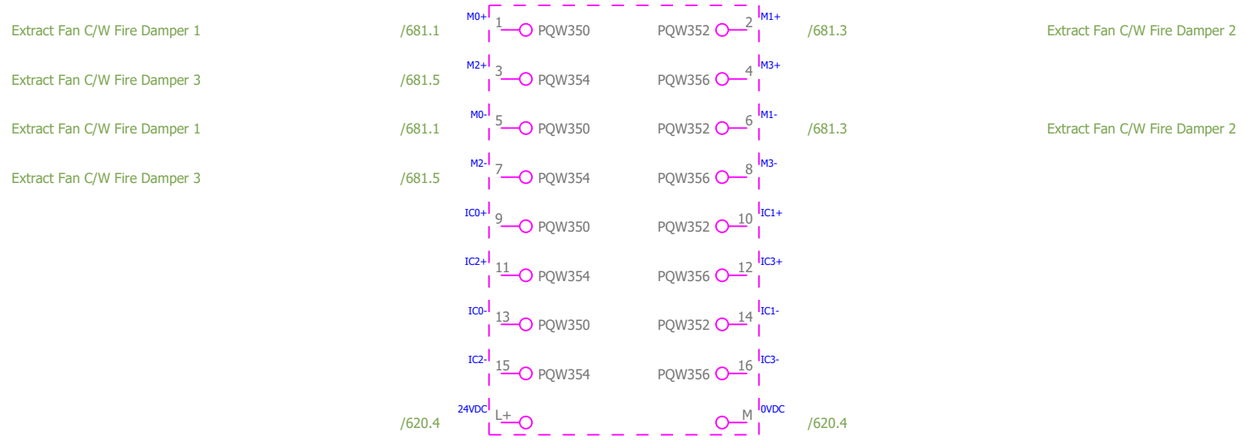
previous page: 623

next page: 625

Editor	Freqcon_JD			Statron	FREQCON	ET200SP ANALOG INPUTS AI_21	20241203_V1.22	= UNIT_03 Battery Container 2
Date	14.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet page: 624
Date								+ total: 500

-AO_21

/620.4



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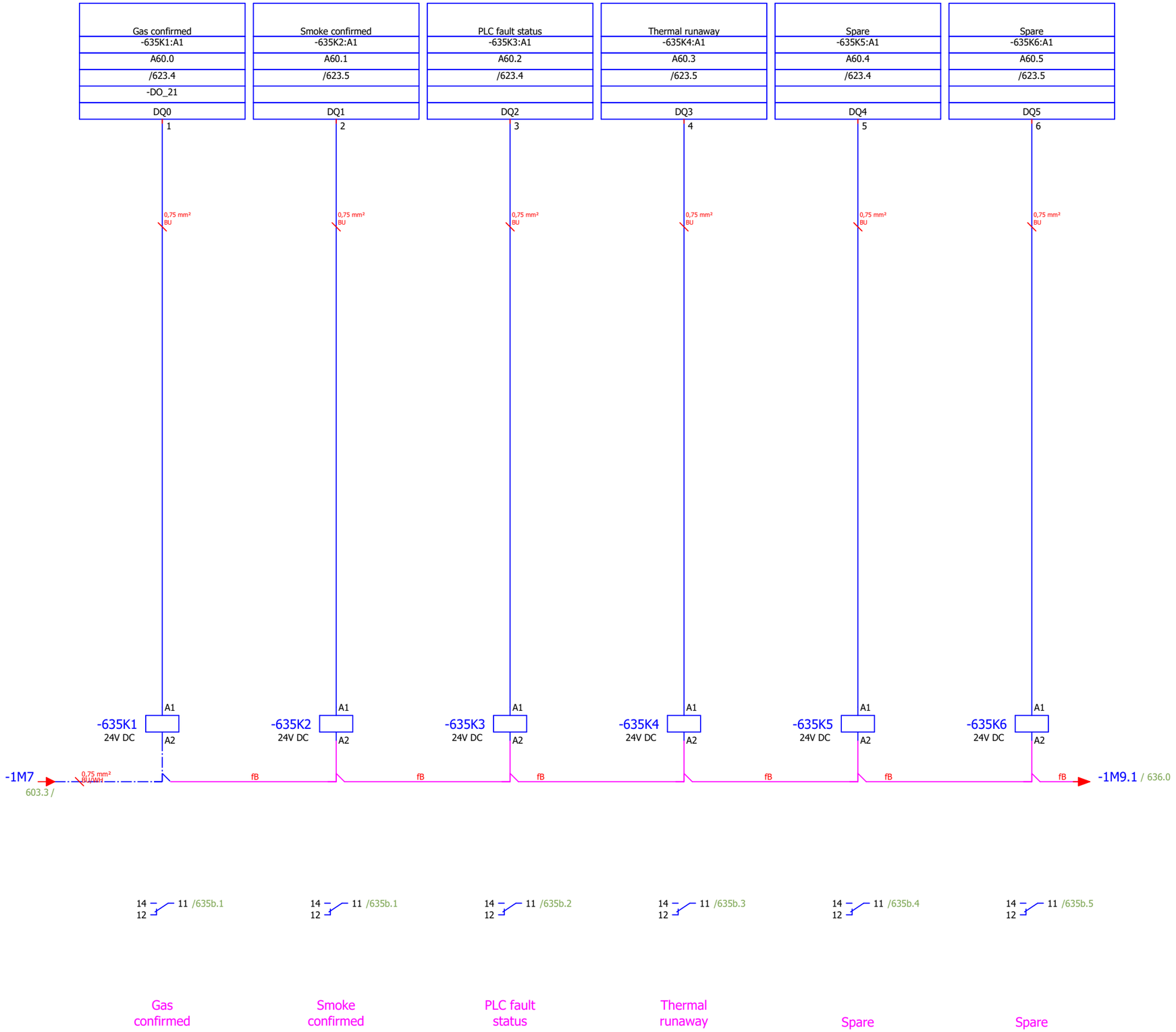
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Editor	Freqcon_JD			Statron	FREQCON	ET200SP ANALOG OUTPUTS AO_21	20241203_V1.22	= UNIT_03	Battery Container 2
Date	14.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet
Date								+	

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total: 500

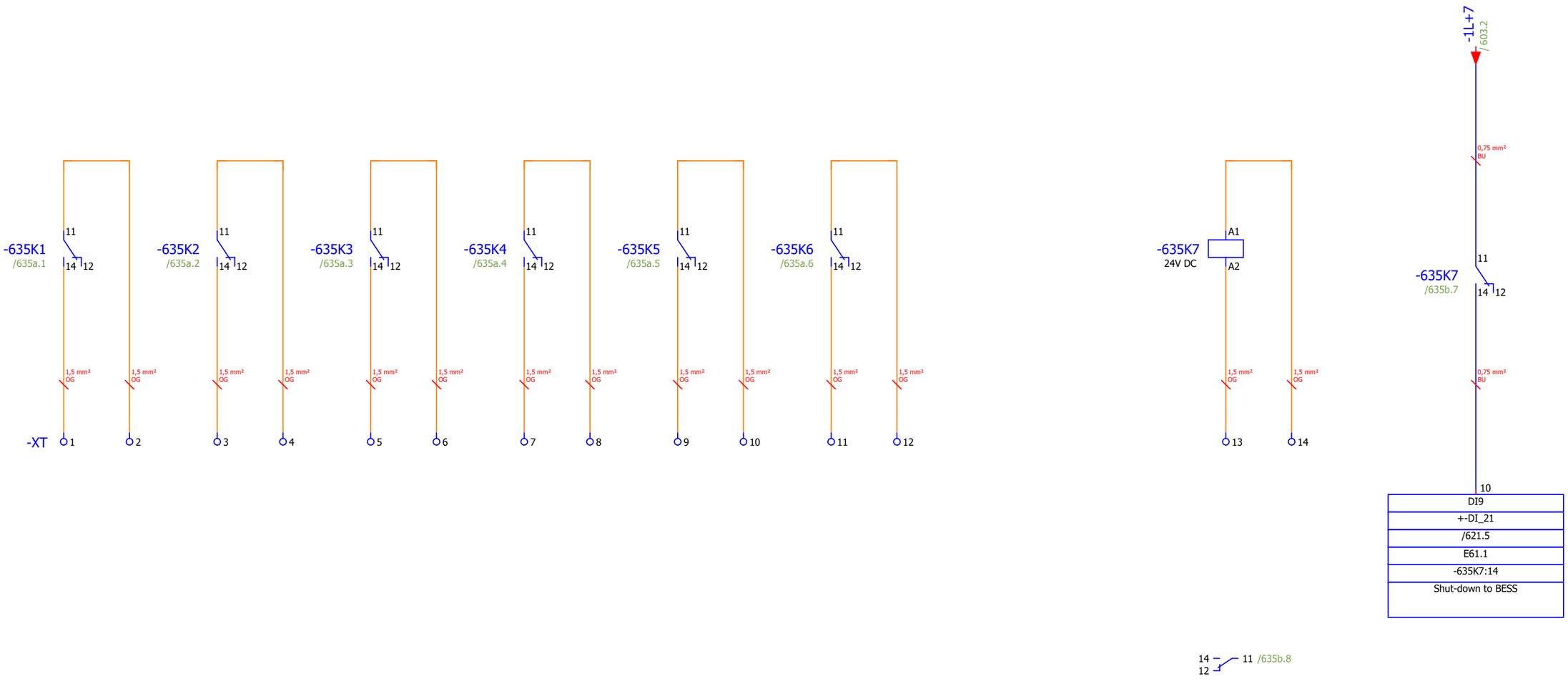
0	1	2	3	4	5	6	7	8	9



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Editor	Freqcon_JD			Statron	FREQCON	OUTPUTS COMMUNICATION	20241203_V1.22	= UNIT_03 Battery Container 2	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 635a
Date								+	total: 500



Gas confirmed FGS

Smoke confirmed FGS

PLC fault status SIS

Thermal runaway SIS

Spare

Spare

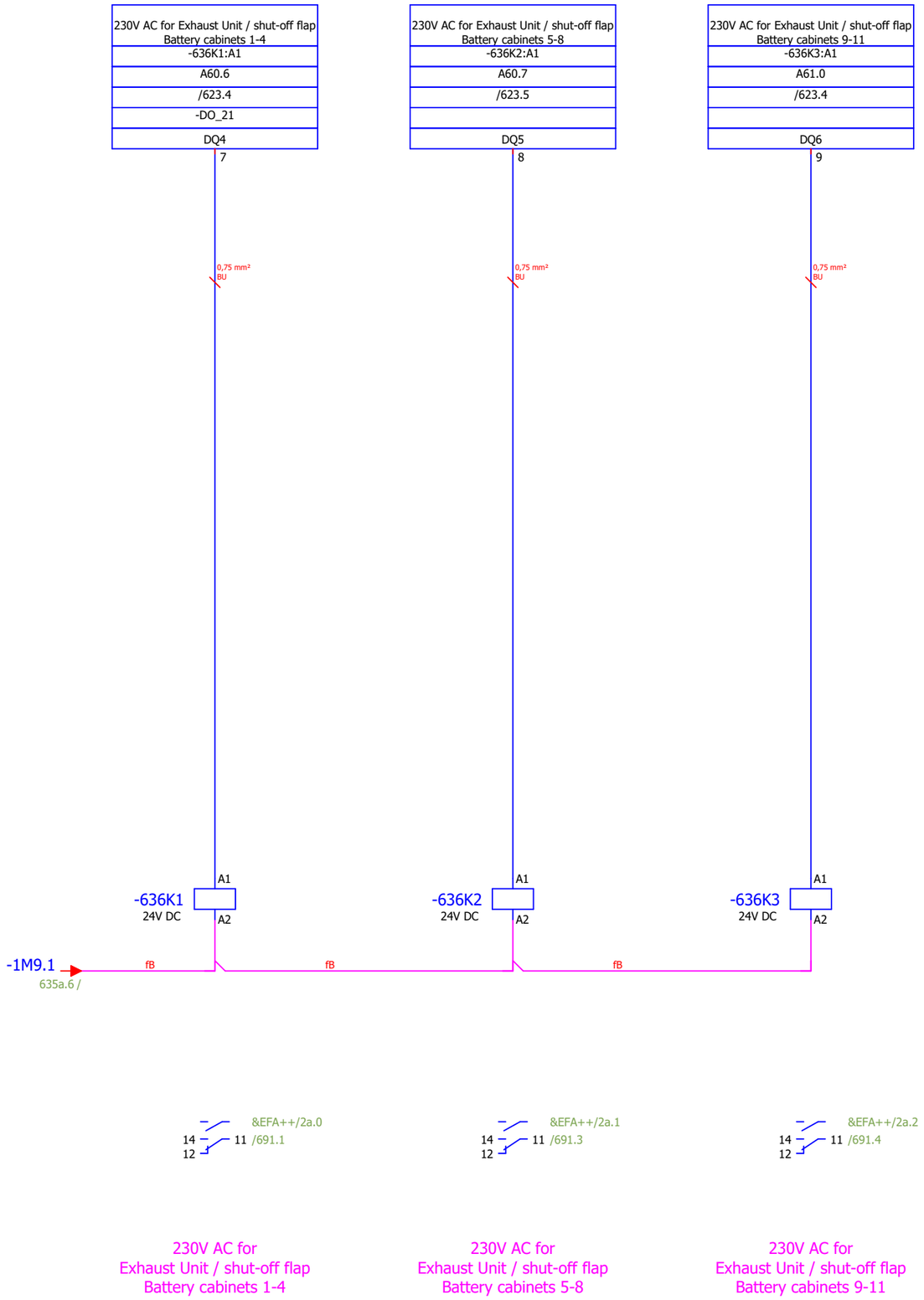
Shut-down to BESS

Shut-down to BESS

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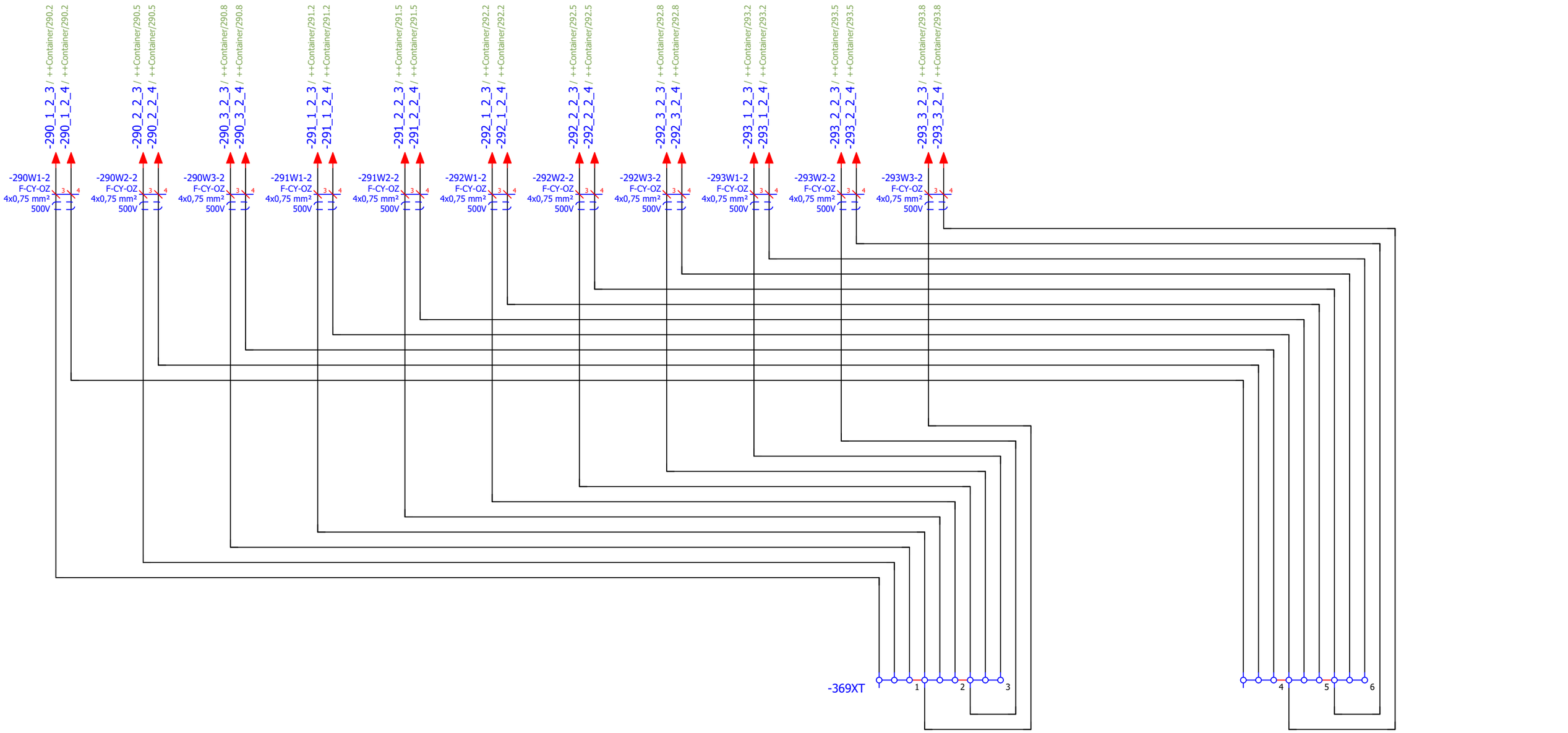
Editor	Freqcon_JD			Statron	FREQCON	OUTPUTS COMMUNICATION	20241203_V1.22	= UNIT_03	Battery Container 2	
Date	18.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet	page: 635b
Date								+		total: 500



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Editor	Freqcon_JD			Statron	FREQCON	OUTPUTS FIRE DAMPER	20241203_V1.22	= UNIT_03 Battery Container 2	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 636
Date								+	total: 500



battery cabinet smoke detector
potential-free contacts
customer

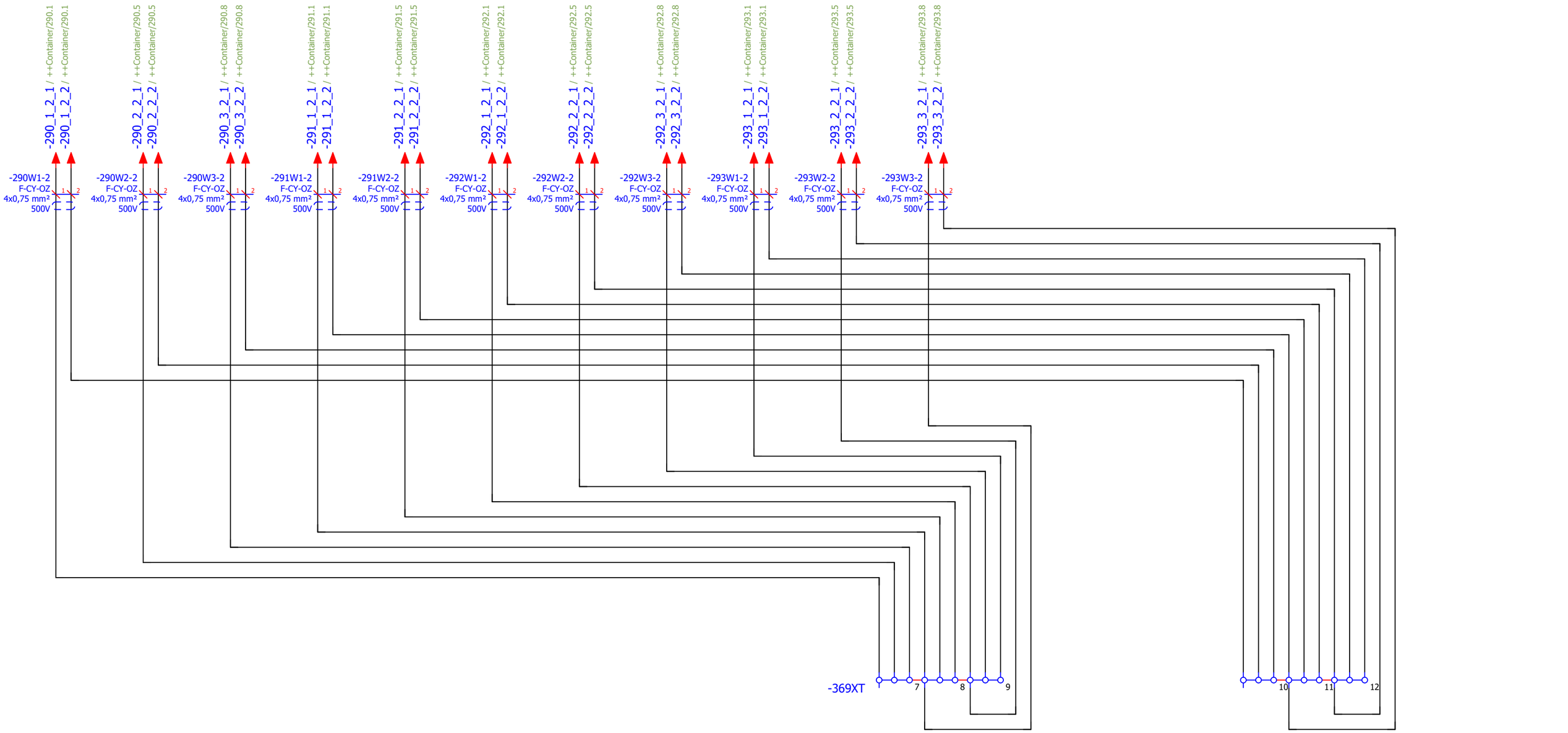
battery cabinet smoke detector
potential-free contacts
customer

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Editor	Freqcon_JD			Statron	FREQCON	SMOKE POTENTIAL-FREE CONTACTS	20241203_V1.22	= UNIT_03	Battery Container 2
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet
Date								+	

page: 669
total: 500



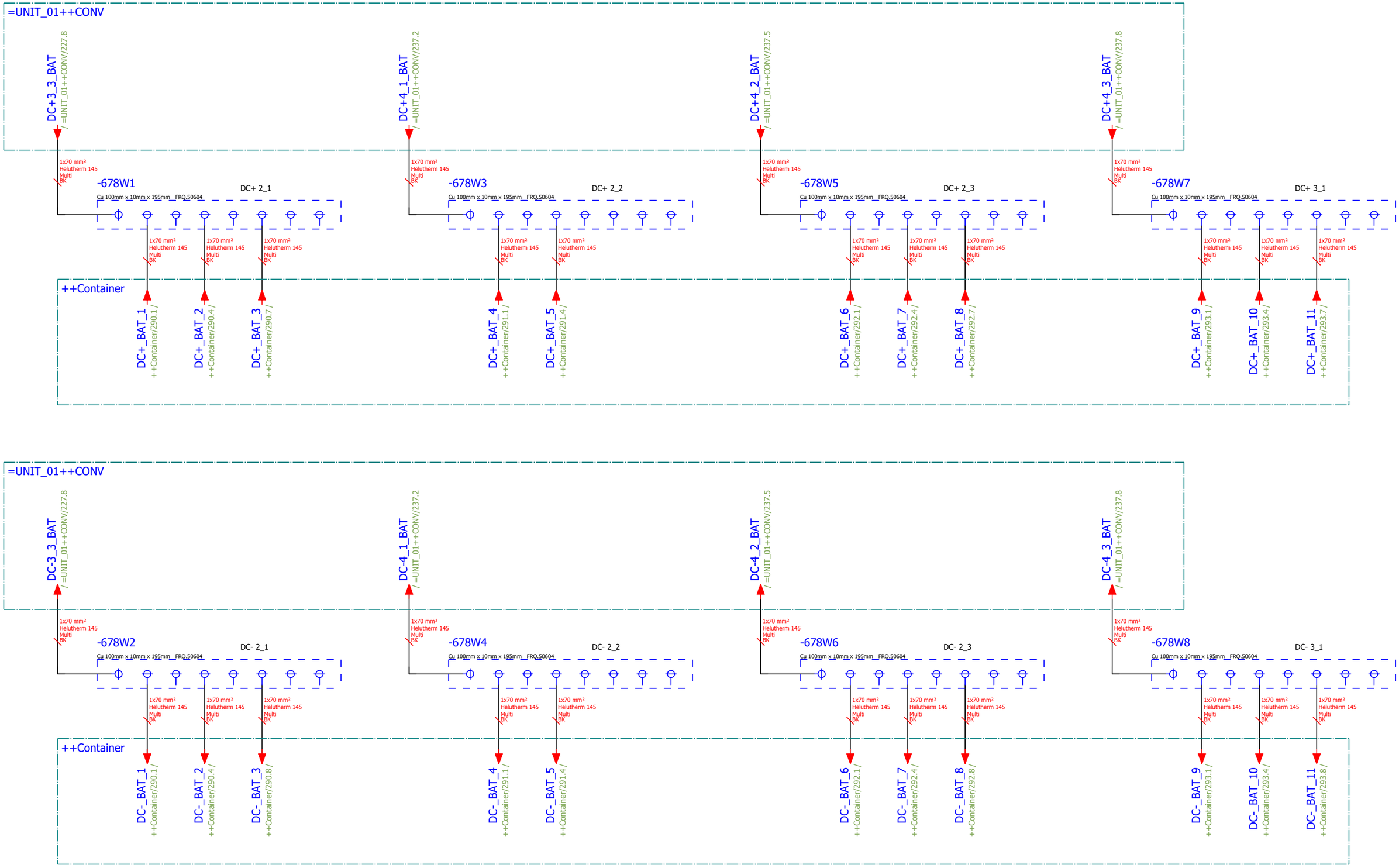
battery cabinet gas
potential-free contacts
customer

battery cabinet gas
potential-free contacts
customer

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678

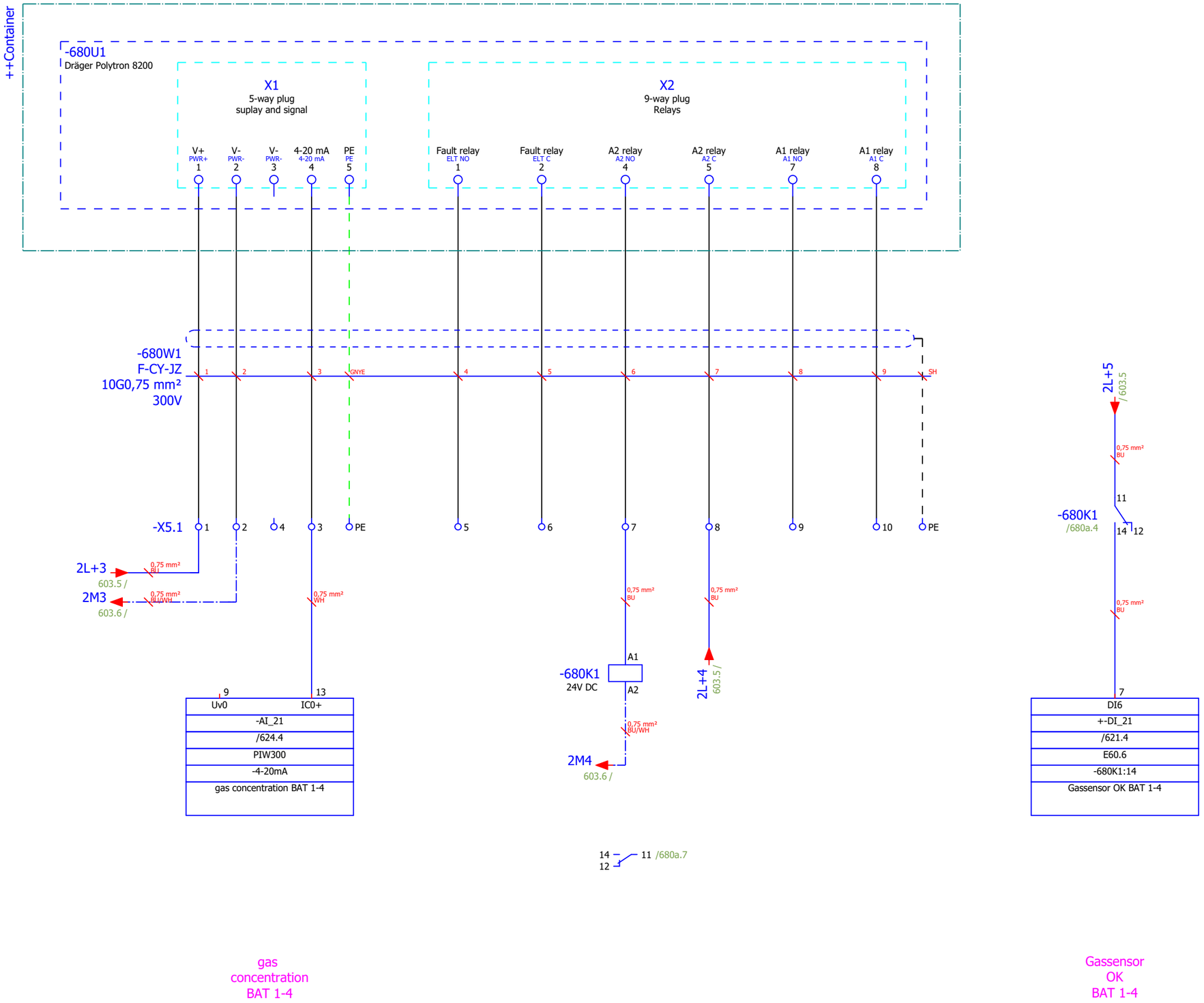
Editor	Freqcon_JD			Statron	FREQCON	GAS POTENTIAL-FREE CONTACTS	20241203_V1.22	= UNIT_03 Battery Container 2	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 670
Date								+	total: 500



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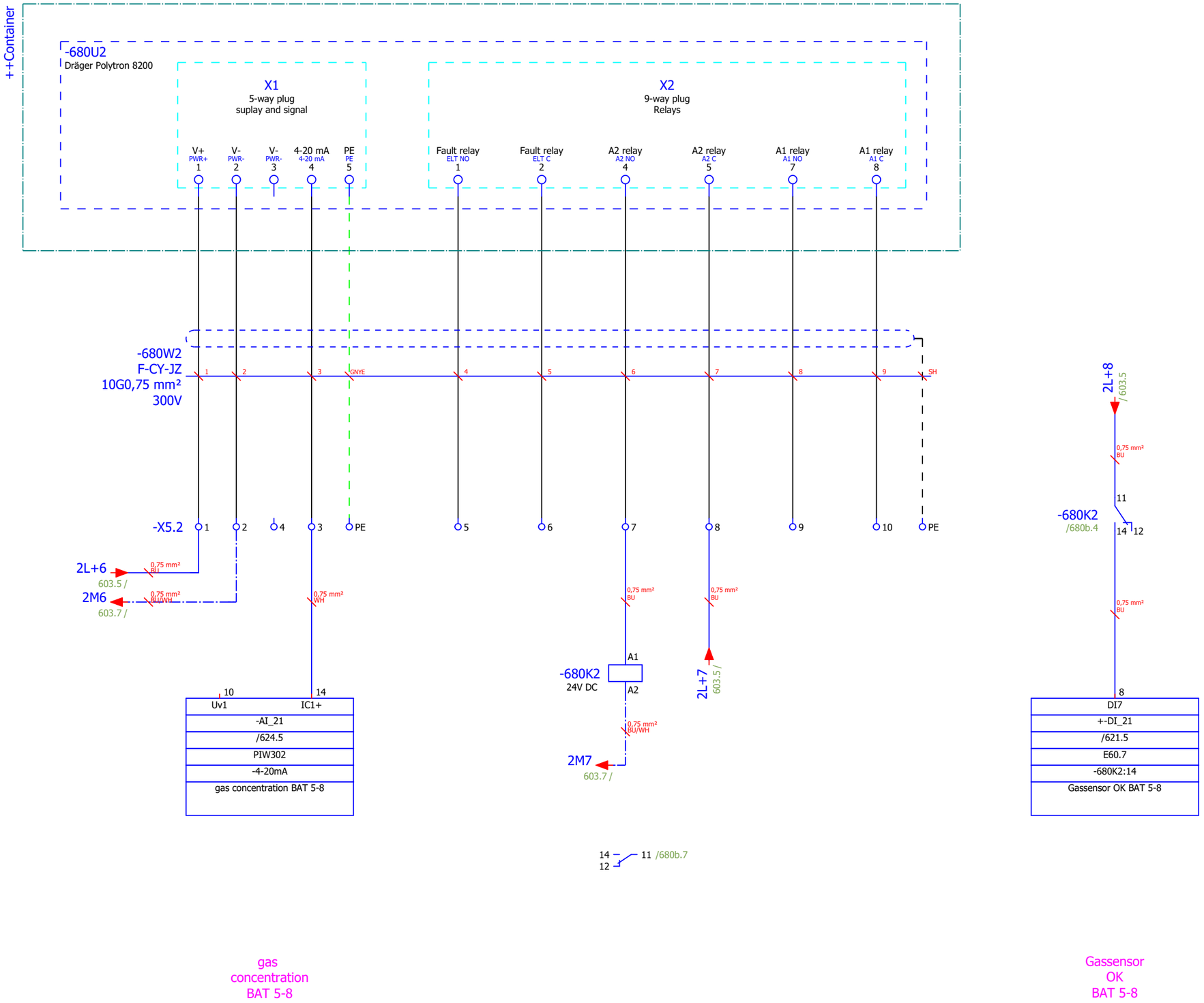
Editor	Freqcon_JD			Statron	FREQCON	DC BATTERY CABINETS	20241203_V1.22	= UNIT_03	Battery Container 2	
Date	18.06.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet	page: 678
Date								+		total: 500



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Editor	Freqcon_JD			Statron	FREQCON	STATIONARY GAS DETECTOR BAT 1-4	20241203_V1.22	= UNIT_03 Battery Container 2	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 680a
Date								+	total: 500

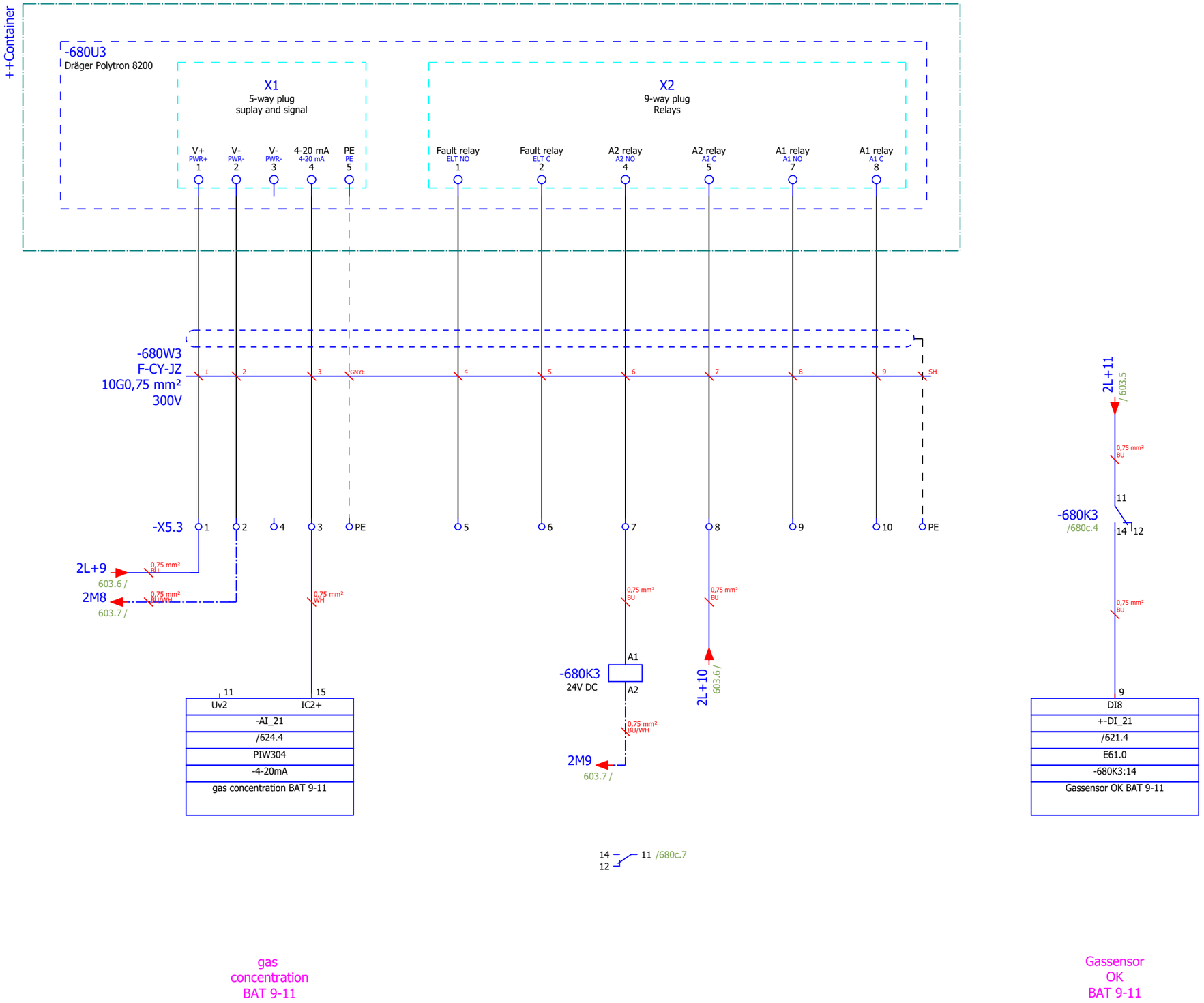


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Editor	Freqcon_JD			Statron	FREQCON	STATIONARY GAS DETECTOR BAT 5-8	20241203_V1.22	= UNIT_03	Battery Container 2
Date	18.06.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet
Date								+	

page: 680b
total: 500



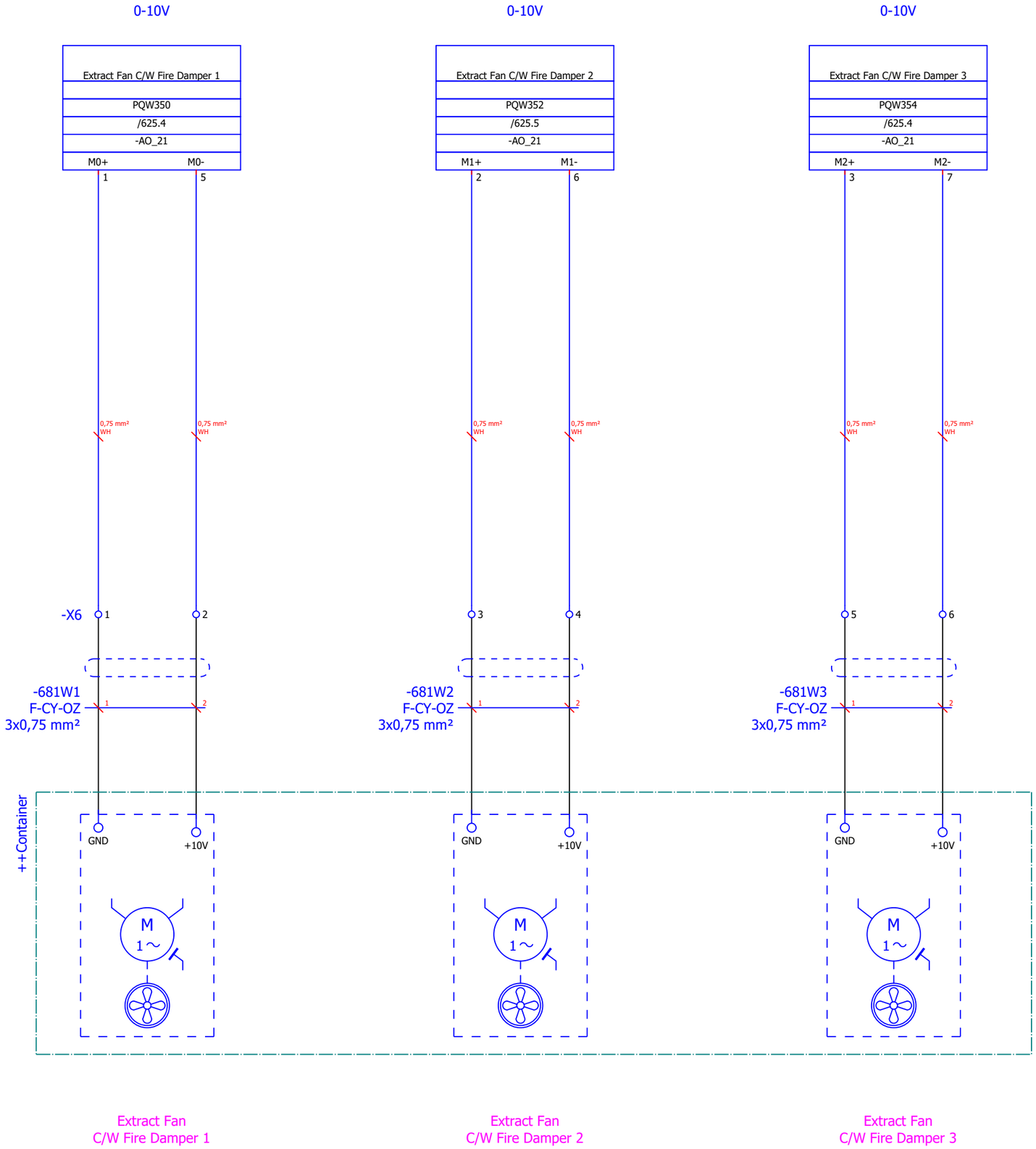
gas concentration BAT 9-11

Gassensor OK BAT 9-11

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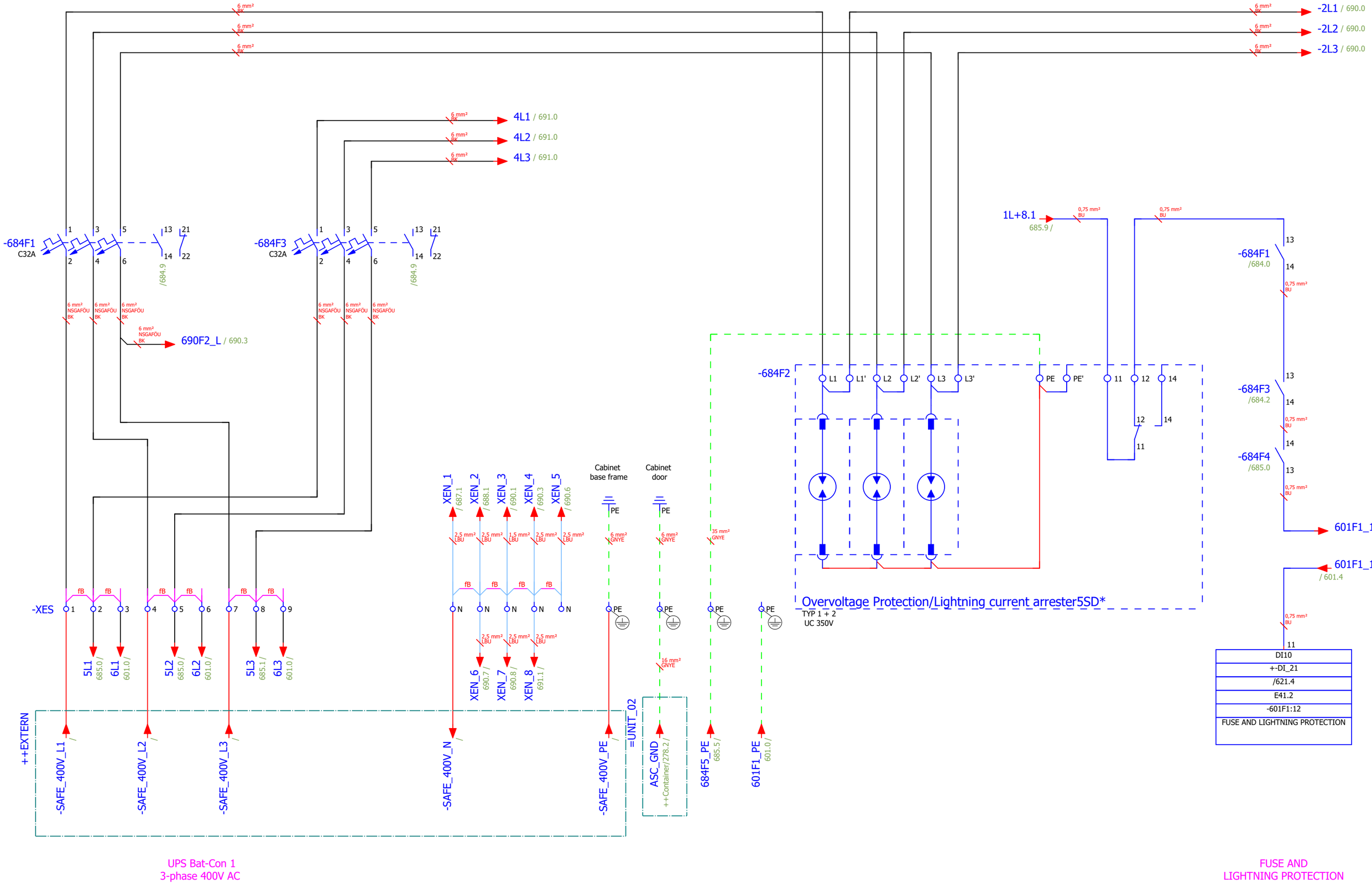
Editor	Freqcon_JD			Statron	FREQCON	STATIONARY GAS DETECTOR BAT 9-11	20241203_V1.22	= UNIT_03 Battery Container 2
Date	18.06.2024							& EFS Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet — page: 680c
Date								+ — total: 500



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Editor	Freqcon_JD			Statron	FREQCON	EXTRACT FAN FIRE DAMPER	20241203_V1.22	= UNIT_03 Battery Container 2	
Date	18.06.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 681
Date								+	total: 500

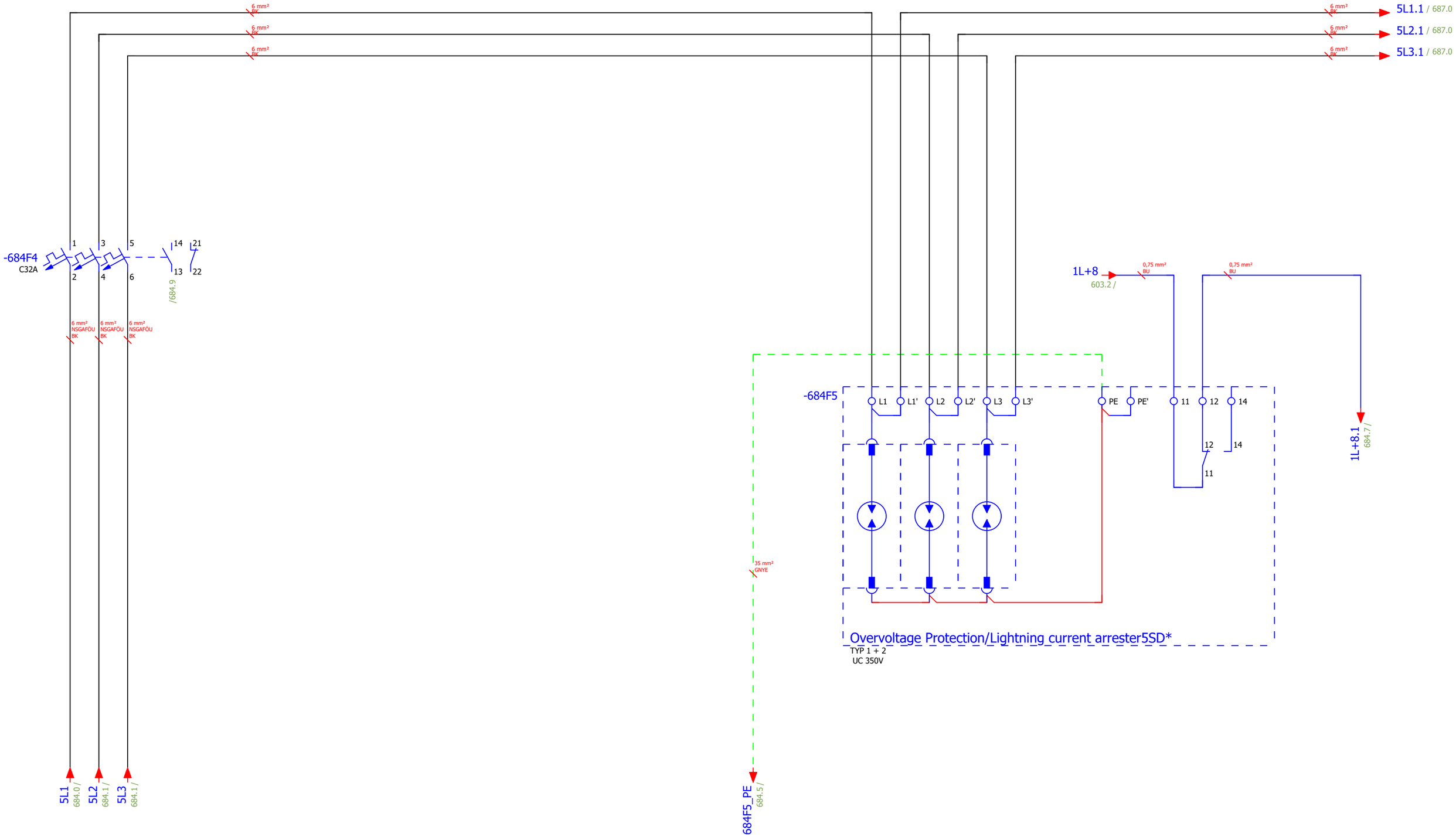


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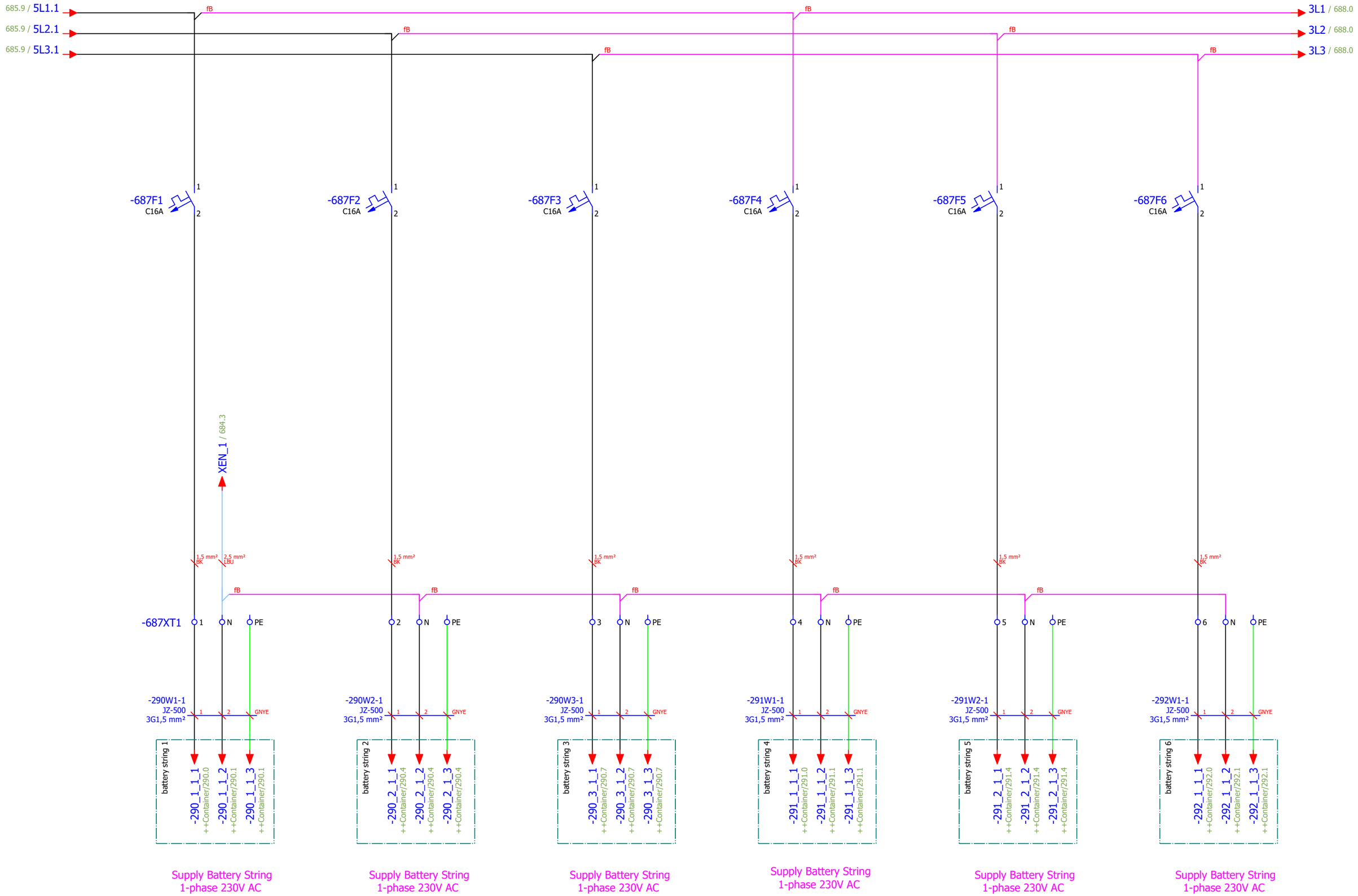
Editor	Freqcon_DG			Statron	FREQCON	AUXILIARY SUPPLY 400V AC	20241203_V1.22	= UNIT_03	Battery Container 2
Date	22.11.2024							& EFS	Circuit diagram
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet
Date								+	

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FUSE AND
LIGHTNING PROTECTION

Editor	Freqcon_DG			Statron	FREQCON	AUXILIARY SUPPLY 400V AC	20241203_V1.22	= UNIT_03 Battery Container 2	
Date	08.10.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 685
Date								+	total: 500



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Editor	Freqcon_DG			Statron		AUXILIARY SUPPLY 400V / 230V AC DISTRIBUTION	20241203_V1.22	= UNIT_03 Battery Container 2	
Date	08.10.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 687
Date								+	total: 500

687.9 / 3L1
687.9 / 3L2
687.9 / 3L3

fB

-688F1 C16A
-688F2 C16A
-688F3 C16A
-688F4 C16A
-688F5 C16A

XEN_2 / 684.3

1,5 mm² BK
2,5 mm² LBU

-687XT1 7 N PE
-687XT1 8 N PE
-687XT1 9 N PE
-687XT1 10 N PE
-687XT1 11 N PE

-292W2-1 JZ-500 3G1,5 mm²
-292W3-1 JZ-500 3G1,5 mm²
-293W1-1 JZ-500 3G1,5 mm²
-293W2-1 JZ-500 3G1,5 mm²
-293W3-1 JZ-500 3G1,5 mm²

1 2 GNYE

battery string 7
-292_2_1_1 ++Container/292.4
-292_2_1_2 ++Container/292.4
-292_2_1_3 ++Container/292.4

battery string 8
-292_3_1_1 ++Container/292.7
-292_3_1_2 ++Container/292.7
-292_3_1_3 ++Container/292.7

battery string 9
-293_1_1_1 ++Container/293.0
-293_1_1_2 ++Container/293.1
-293_1_1_3 ++Container/293.1

battery string 10
-293_2_1_1 ++Container/293.4
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-293_2_1_3 ++Container/293.4

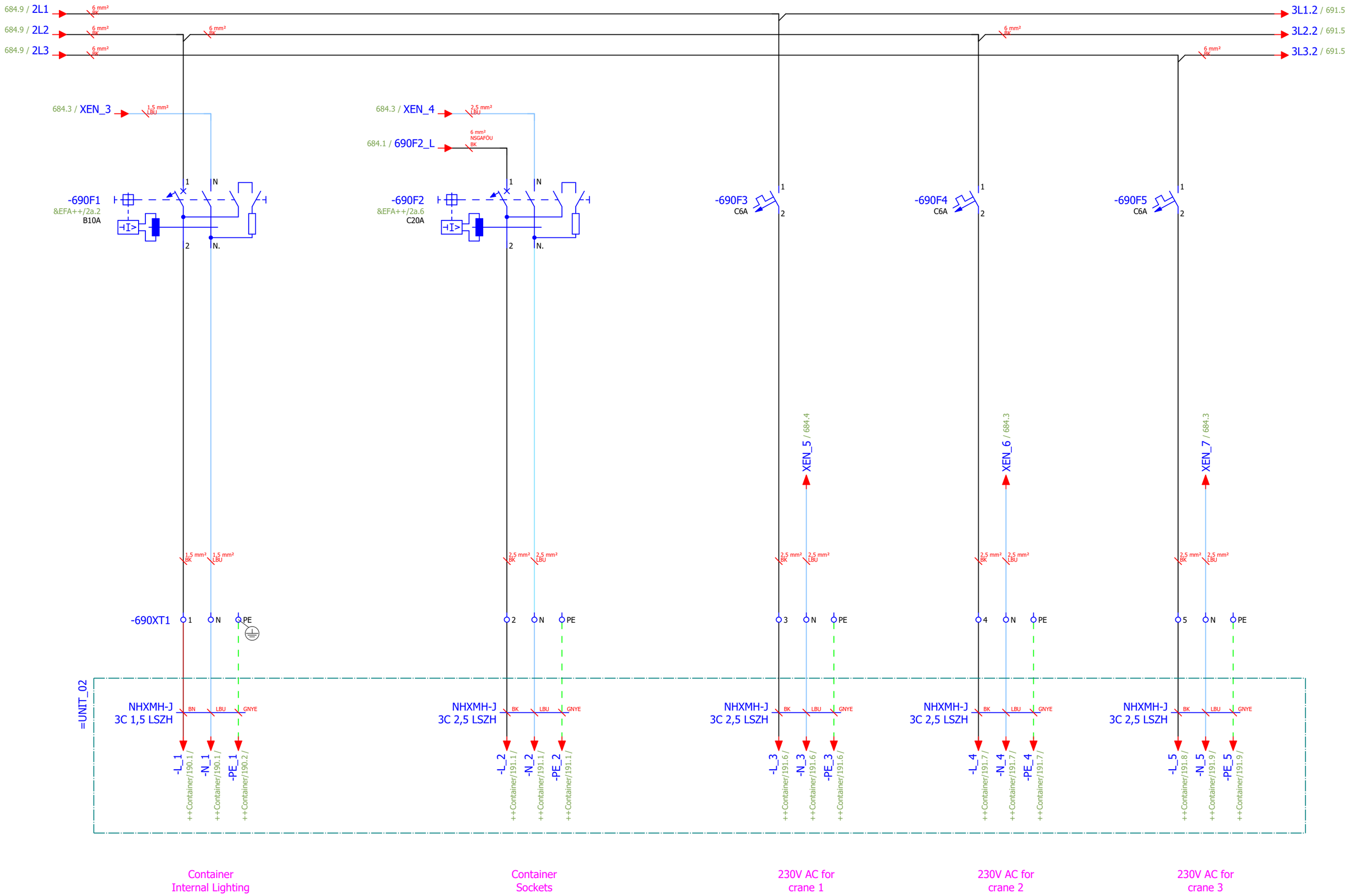
battery string 11
-293_3_1_1 ++Container/293.7
-293_3_1_2 ++Container/293.7
-293_3_1_3 ++Container/293.7

Supply Battery String 1-phase 230V AC

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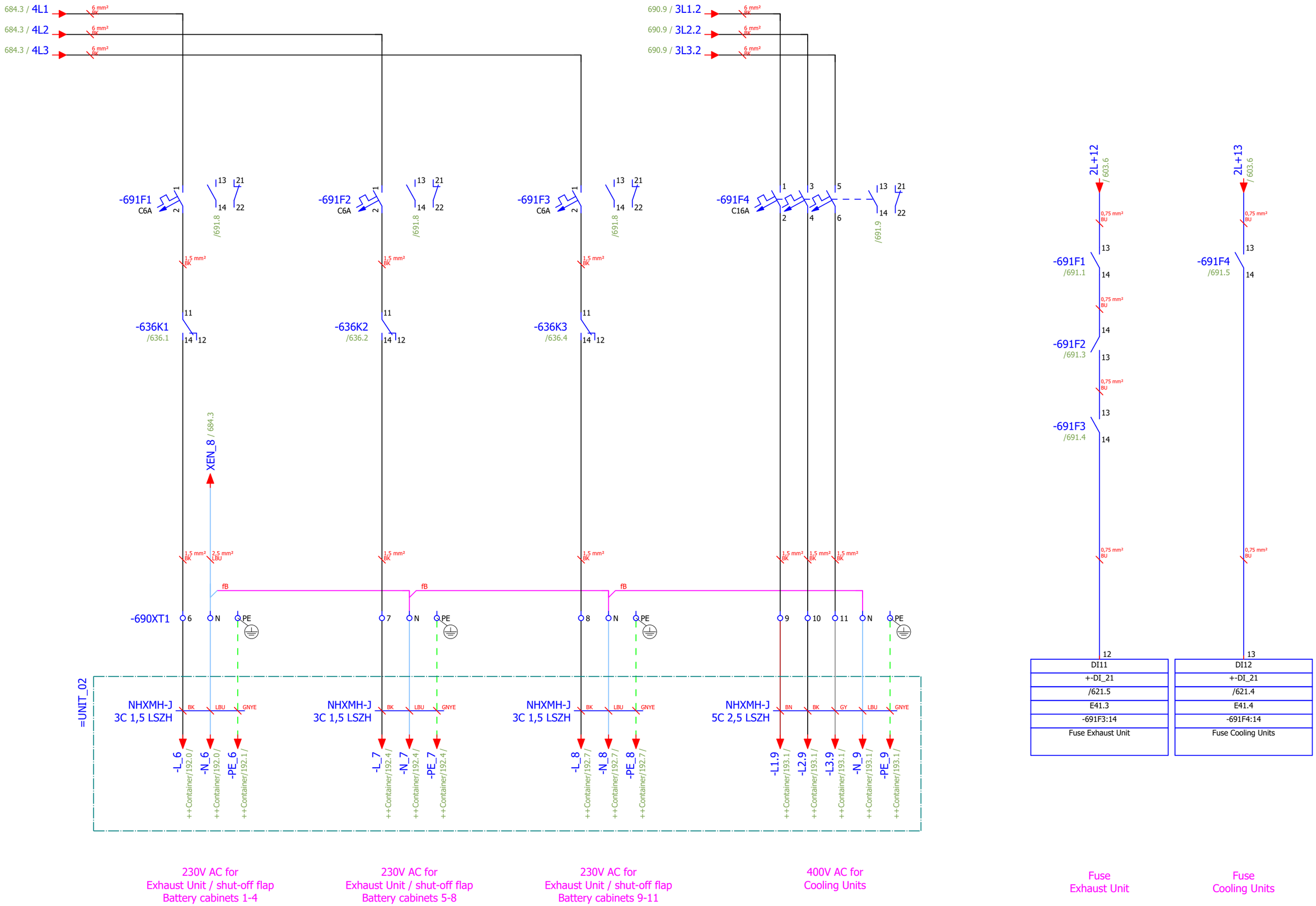
Editor	Freqcon_DG			Statron	FREQCON	AUXILIARY SUPPLY 400V / 230V AC DISTRIBUTION	20241203_V1.22	= UNIT_03 Battery Container 2	
Date	08.10.2024							& EFS Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 688
Date								+	total: 500



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Editor	Freqcon_DG			Statron	FREQCON	CONTAINER COOLING / LIGHTNING	20241203_V1.22	= UNIT_03	Battery Container 2	
Date	29.10.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet	page: 690
Date								+		total: 500



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&EPC++Container/1

Editor	Freqcon_DG			Statron	FREQCON	CONTAINER COOLING / LIGHTNING	20241203_V1.22	= UNIT_03	Battery Container 2	
Date	05.11.2024							& EFS	Circuit diagram	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC	auxillary cabinet	page: 691
Date								+		total: 500

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-680U1 &EFS++ASC/680a.1	1	Polytron 8000 Series Customized 4-20/HART mit Relais	8344800	Dräger	509321	
-680U2 &EFS++ASC/680b.1	1	Polytron 8000 Series Customized 4-20/HART mit Relais	8344800	Dräger	509321	
-680U3 &EFS++ASC/680c.1	1	Polytron 8000 Series Customized 4-20/HART mit Relais	8344800	Dräger	509321	

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&EFS++ASC/691

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++ASC/1

Editor	Freqcon_DG			Statron	FREQCON	PARTS LIST	20241203_V1.22	= UNIT_03 Battery Container 2
Date	05.11.2024							& EPC Parts List
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container page: 1
Date								+ total: 500

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-101Q1 &EFA++/2a.7;&EFS/601.5	2	CIRCUIT-BREAKER SPRING-L. CONN. 3.2A	3RV2011-1DA25	Siemens	501432	
-101T1 &EFS/601.5	1	Power supply QUINT-PS/3AC/24DC/20/CO, with protective coating	2320924	Phoenix Contact	501573	
-102G1 &EFS/602.2	1	Uninterruptible power supply QUINT-UPS/ 24DC/ 24DC/20	2320238	Phoenix Contact	501598	
-102G2 &EFS/602.6	1	Energy storage UPS-BAT/VRLA/24DC/12AH	2320322	Phoenix Contact	501229	
-103F1 &EFS/603.2	1	Device circuit breaker 230VAC / 60VDC, 3kA, 1-pole, AS, F2, 10A	5SY1710-4	Siemens	10086	
-103F2 &EFS/603.5	1	Device circuit breaker 230VAC / 60VDC, 3kA, 1-pole, AS, F2, 10A	5SY1710-4	Siemens	10086	
-369XT &EFS/669.5...&EFS/669.8;&EFS/670.5...&EFS/670.8	12	Multi-level terminal block	3210583	Phoenix Contact	501385	
-369XT &EFS/669.5;&EFS/669.7;&EFS/670.5;&EFS/670.7	4	Plug-in bridge FBS 10-5	3030213	Phoenix Contact	500547	
-369XT &EFS/669.5	2	End bracket for terminal block	3022276	Phoenix Contact	500588	
-601F1 &EFS/601.1	1	Combination arrester type 1+2, UC 350V AC, 3-pole, FM, for TNC systems	5SD7443-1	Siemens	504070	
-611A1 &EFS/611.0	1	TREE 16 TX Metall 2GE 14 FE - Unmanaged Gigabit Switch - 16 Ports/	58174	Murrelektronik	10286	
-613T1 &EFS/613.1	1	Network isolators - FL ISOLATOR 100-RJ/RJ	2313931	Phoenix Contact	501464	
-613T1 &EFS/613.1	1	0,5m Cat.6 PiMF-Patchcabel, green	PATCH-C6 05 GN	reichelt elektronik GmbH & Co. KG	504395	
-613U1 &EFS/613.3	1	Surge protection device	2881007	Phoenix Contact	504791	
-613U2 &EFS/613.5	1	Patch panel, connection field: one RJ45 socket on 8 spring-cage connection terminals	2901642	Phoenix Contact	10214	
-620A1 &EFS/620.1	1	SIMATIC ET 200SP, PROFINET Interface-Module, IM 155-6 PN ST, bundle of Server module + Busadapter	6ES7155-6AA01-0BN0	Siemens	501554	
-635K1 &EFS/635a.1	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-635K1 &EFS/635a.1	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-635K2 &EFS/635a.2	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-635K2 &EFS/635a.2	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-635K3 &EFS/635a.3	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-635K3 &EFS/635a.3	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-635K4 &EFS/635a.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-635K4 &EFS/635a.4	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-635K5 &EFS/635a.5	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-635K5 &EFS/635a.5	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-635K6 &EFS/635a.6	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-635K6 &EFS/635a.6	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-635K7 &EFS/635b.7	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-636K1 &EFS/636.1	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-636K1 &EFS/636.1	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-636K2 &EFS/636.2	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-636K2 &EFS/636.2	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-636K3 &EFS/636.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-636K3 &EFS/636.4	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-680K1 &EFS/680a.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-680K2 &EFS/680b.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-680K3 &EFS/680c.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-684F1 &EFS/684.0	1	SENTRON Miniature circuit breaker	5SY4332-7	Siemens	505272	
-684F1 &EFS/684.0	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-684F2 &EFS/684.5	1	Combination arrester type 1+2, UC 350V AC, 3-pole, FM, for TNC systems	5SD7443-1	Siemens	504070	
-684F3 &EFS/684.2	1	SENTRON Miniature circuit breaker	5SY4332-7	Siemens	505272	
-684F3 &EFS/684.2	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-684F4 &EFS/685.0	1	SENTRON Miniature circuit breaker	5SY4332-7	Siemens	505272	
-684F4 &EFS/685.0	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-684F5 &EFS/685.5	1	Combination arrester type 1+2, UC 350V AC, 3-pole, FM, for TNC systems	5SD7443-1	Siemens	504070	
-687F1 &EFS/687.1	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-687F1 &EFS/687.1	1	PIN BUS BAR SHOCKHAZARD SAFETY, 16QMM 3 PHASE+HS	5ST3712	Siemens	10274	
-687F1 &EFS/687.1	2	End cap for pin busbars 2 - 3-phase	5ST3750	Siemens	503570	
-687F2 &EFS/687.3	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-687F3 &EFS/687.4	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-687F4 &EFS/687.5	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-687F5 &EFS/687.7	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-687F6 &EFS/687.8	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-687XT1 &EFS/687.1;&EFS/687.3...&EFS/687.5;&EFS/687.7;&EFS/687.8;&EFS/688.1;&EFS/688.3...&EFS/688.5;&EFS/688.7	11	Feed-through terminal block	3209510	Phoenix Contact	500583	
-687XT1 &EFS/687.1	2	End bracket for terminal block	3022276	Phoenix Contact	500588	
-687XT1 &EFS/687.1	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	

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Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-687XT1 &EFS/687.1;&EFS/687.2;&EFS/687.4;&EFS/687.6;&EFS/687.7;&EFS/687.8;&EFS/688.1;&EFS/688.2;&EFS/688.3;&EFS/688.4;&EFS/688.6;&EFS/688.7	11	Feed-through terminal block	3209523	Phoenix Contact	500584	
-687XT1 &EFS/687.1	1	Plug-in bridge FBS 10-5	3030213	Phoenix Contact	500547	
-687XT1 &EFS/688.1	1	Plug-in bridge FBS 5-5	3030190	Phoenix Contact	500545	
-687XT1 &EFS/687.2...&EFS/687.4;&EFS/687.6;&EFS/687.7;&EFS/687.8;&EFS/688.2...&EFS/688.4;&EFS/688.6;&EFS/688.7	11	Ground terminal block	3209536	Phoenix Contact	500813	
-688F1 &EFS/688.1	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-688F2 &EFS/688.3	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-688F3 &EFS/688.4	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-688F4 &EFS/688.5	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-688F5 &EFS/688.7	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-690F1 &EFS/690.1	1	RCBO elm, 10 kA, 1P+N, type A, 30 mA, B-char, In: 10 A, Un AC: 230 V	5SU1354-6KK10	Siemens	10440	
-690F2 &EFS/690.3	1	RCBO elm, 10 kA, 1P+N, type A, 30 mA, C-char, In: 20 A, Un AC: 230 V	5SU1354-7KK20	Siemens	10441	
-690F3 &EFS/690.5	1	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682	
-690F4 &EFS/690.7	1	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682	
-690F5 &EFS/690.8	1	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682	
-690XT1 &EFS/690.1;&EFS/691.1;&EFS/691.3...&EFS/691.6	35	Feed-through terminal block	3209510	Phoenix Contact	500583	
-690XT1 &EFS/690.1;&EFS/691.1;&EFS/691.3...&EFS/691.6	35	Feed-through terminal block	3209523	Phoenix Contact	500584	
-690XT1 &EFS/690.1;&EFS/691.1;&EFS/691.3...&EFS/691.6	35	Ground terminal block	3209536	Phoenix Contact	500813	
-690XT1 &EFS/690.1;&EFS/691.1;&EFS/691.3...&EFS/691.6	7	End and partition plate for terminal block	3030417	Phoenix Contact	500506	
-690XT1 &EFS/690.1;&EFS/691.1;&EFS/691.3...&EFS/691.6	14	End bracket for terminal block	3022276	Phoenix Contact	500588	

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Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-691F1 &EFS/691.1	1	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682	
-691F1 &EFS/691.1	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-691F2 &EFS/691.3	1	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682	
-691F2 &EFS/691.3	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-691F3 &EFS/691.4	1	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682	
-691F3 &EFS/691.4	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-691F4 &EFS/691.5	1	CIRCUIT BREAKER 10KA 3POL C16	5SY4316-7	Siemens	503340	X
-691F4 &EFS/691.5	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-AI_21 &EFS/620.4	1	ET 200SP, AI 4XU/I 2-WIRE ST, PU 1	6ES7134-6HD01-0BA1	Siemens	505054	
-AI_21 &EFS/620.4	1	BASEUNIT TYPE A0, BU15-P16+A0+2D	6ES7193-6BP00-0DA0	Siemens	500786	
-AO_21 &EFS/620.4	1	AQ 4XU/I ST	6ES7135-6HD00-0BA1	Siemens	504291	
-AO_21 &EFS/620.4	1	BASEUNIT TYPE A0, BU15-P16+A0+2D	6ES7193-6BP00-0DA0	Siemens	500786	
-DI_21 &EFS/620.3	1	SIMATIC ET 200SP DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	Siemens	500788	
-DI_21 &EFS/620.3	1	BASEUNIT TYPE A0, BU15-P16+A0+2D	6ES7193-6BP00-0DA0	Siemens	500786	
-DI_22 &EFS/620.3	1	SIMATIC ET 200SP DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	Siemens	500788	
-DI_22 &EFS/620.3	1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787	
-DO_21 &EFS/620.3	1	ET 200SP, DQ 16x 24V DC/0,5A ST, PU 1	6ES7132-6BH01-0BA0	Siemens	504397	
-DO_21 &EFS/620.3	1	BASEUNIT TYPE A0, BU15-P16+A0+2D	6ES7193-6BP00-0DA0	Siemens	500786	
-X5.1 &EFS/680a.2...&EFS/680a.5	10	Feed-through terminal block	3209510	Phoenix Contact	500583	

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-X5.1 &EFS/680a.2	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	
-X5.1 &EFS/680a.2	2	End bracket for terminal block	3022276	Phoenix Contact	500588	
-X5.1 &EFS/680a.2	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	
-X5.1 &EFS/680a.2;&EFS/680a.6	2	Ground terminal block	3209536	Phoenix Contact	500813	
-X5.2 &EFS/680b.2...&EFS/680b.5	10	Feed-through terminal block	3209510	Phoenix Contact	500583	
-X5.2 &EFS/680b.2	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	
-X5.2 &EFS/680b.2	1	End bracket for terminal block	3022276	Phoenix Contact	500588	
-X5.2 &EFS/680b.2	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	
-X5.2 &EFS/680b.2;&EFS/680b.6	2	Ground terminal block	3209536	Phoenix Contact	500813	
-X5.3 &EFS/680c.2...&EFS/680c.5	10	Feed-through terminal block	3209510	Phoenix Contact	500583	
-X5.3 &EFS/680c.2	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	
-X5.3 &EFS/680c.2	1	End bracket for terminal block	3022276	Phoenix Contact	500588	
-X5.3 &EFS/680c.2	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	
-X5.3 &EFS/680c.2;&EFS/680c.6	2	Ground terminal block	3209536	Phoenix Contact	500813	
-X6 &EFS/681.1;&EFS/681.3;&EFS/681.5	6	Feed-through terminal block	3209510	Phoenix Contact	500583	
-X6 &EFS/681.1	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	
-X6 &EFS/681.1	1	End bracket for terminal block	3022276	Phoenix Contact	500588	
-X6 &EFS/681.1	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	
-XDC1 &EFS/603.2;&EFS/603.3	6	Multi-level terminal block	3210583	Phoenix Contact	501385	

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-XDC1 &EFS/603.2;&EFS/603.3	2	Plug-in bridge FBS 3-5	3030174	Phoenix Contact	503103	
-XDC1 &EFS/603.2	2	End bracket for terminal block	3022276	Phoenix Contact	500588	
-XDC1 &EFS/603.2	1	End and partition plate for terminal block	3211634	Phoenix Contact	500505	
-XDC1 &EFS/603.4	2	Protective conductor double-level terminal block Push-in PTTB 2,5-PE	3210596	Phoenix Contact	501389	
-XDC2 &EFS/603.5...&EFS/603.7	7	Multi-level terminal block	3210583	Phoenix Contact	501385	
-XDC2 &EFS/603.5	1	Plug-in bridge FBS 4-5	3030187	Phoenix Contact	500801	
-XDC2 &EFS/603.5	1	End bracket for terminal block	3022276	Phoenix Contact	500588	
-XDC2 &EFS/603.5	1	End and partition plate for terminal block	3211634	Phoenix Contact	500505	
-XDC2 &EFS/603.6	1	Plug-in bridge FBS 2-5	3030161	Phoenix Contact	505211	
-XDC2 &EFS/603.6	1	Plug-in bridge FBS 3-5	3030174	Phoenix Contact	503103	
-XES &EFS/684.0...&EFS/684.2	9	Feed-through terminal block Push-in PT 6	3211813	Phoenix Contact	501388	
-XES &EFS/684.0;&EFS/684.1	4	Plug-in bridge FBS 2-8	3030284	Phoenix Contact	502068	
-XES &EFS/684.0	2	End bracket for terminal block	3022276	Phoenix Contact	500588	
-XES &EFS/684.0	1	End and partition plate for terminal block	3212044	Phoenix Contact	500503	
-XES &EFS/684.3;&EFS/684.4	5	Feed-through terminal block Push-in PT 6 BU	3211819	Phoenix Contact	500585	
-XES &EFS/684.3	1	Plug-in bridge FBS 5-8	3030310	Phoenix Contact	504375	
-XES &EFS/684.4;&EFS/684.5	4	Ground modular terminal block Push-in PT 6-PE	3211822	Phoenix Contact	500725	
-XT &EFS/635b.1...&EFS/635b.5;&EFS/635b.7	14	Feed-through terminal block	3209510	Phoenix Contact	500583	
-XT &EFS/635b.1	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-XT &EFS/635b.1	2	End bracket for terminal block	3022276	Phoenix Contact	500588	
-XT &EFS/635b.1	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	

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&EPA++Container/1

Editor	Freqcon_DG			Statron	FREQCON	PARTS LIST	20241203_V1.22	= UNIT_03 Battery Container 2	
Date	05.11.2024							& EPC Parts List	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 8
Date								+	total: 500

Summarized parts list

Freqcon_ABAS_de_en

Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.
3	Polytron 8000 Series Customized 4-20/HART mit Relais	8344800	Dräger	509321

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&EPC++ASC/8

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Summarized parts list

Freqcon_ABAS_de_en

Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.
1	TREE 16 TX Metall 2GE 14 FE - Unmanaged Gigabit Switch - 16 Ports/	58174	Murrelektronik	10286
1	Network isolators - FL ISOLATOR 100-RJ/RJ	2313931	Phoenix Contact	501464
1	Uninterruptible power supply QUINT-UPS/ 24DC/ 24DC/20	2320238	Phoenix Contact	501598
1	Energy storage UPS-BAT/VRLA/24DC/12AH	2320322	Phoenix Contact	501229
1	Power supply QUINT-PS/3AC/24DC/20/CO, with protective coating	2320924	Phoenix Contact	501573
1	Surge protection device	2881007	Phoenix Contact	504791
1	Patch panel, connection field: one RJ45 socket on 8 spring-cage connection terminals	2901642	Phoenix Contact	10214
13	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726
9	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803
1	0,5m Cat.6 PiMF-Patchcabel, green	PATCH-C6 05 GN	reichelt elektronik GmbH & Co. KG	504395
2	CIRCUIT-BREAKER SPRING-L. CONN. 3.2A	3RV2011-1DA25	Siemens	501432
3	Combination arrester type 1+2, UC 350V AC, 3-pole, FM, for TNC systems	5SD7443-1	Siemens	504070
7	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737
1	PIN BUS BAR SHOCKHAZARD SAFETY, 16QMM 3 PHASE+HS	5ST3712	Siemens	10274
2	End cap for pin busbars 2 - 3-phase	5ST3750	Siemens	503570
1	RCBO elm, 10 kA, 1P+N, type A, 30 mA, B-char, In: 10 A, Un AC: 230 V	5SU1354-6KK10	Siemens	10440
1	RCBO elm, 10 kA, 1P+N, type A, 30 mA, C-char, In: 20 A, Un AC: 230 V	5SU1354-7KK20	Siemens	10441
2	Device circuit breaker 230VAC / 60VDC, 3kA, 1-pole, AS, F2, 10A	5SY1710-4	Siemens	10086

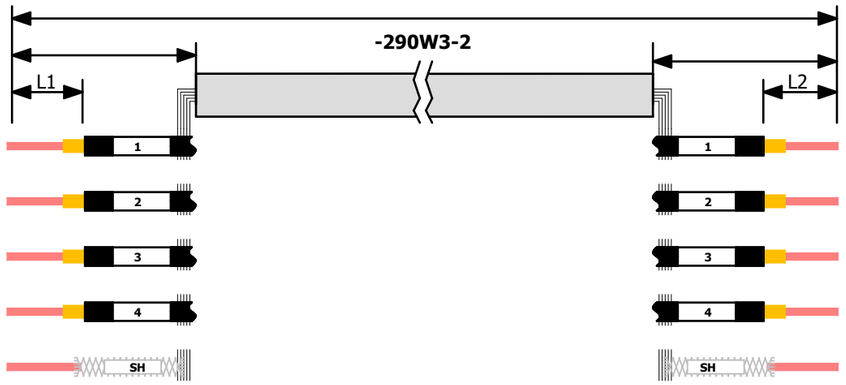
Summarized parts list

Freqcon_ABAS_de_en

Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.
6	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682
11	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569
3	SENTRON Miniature circuit breaker	5SY4332-7	Siemens	505272
2	SIMATIC ET 200SP DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	Siemens	500788
1	ET 200SP, DQ 16x 24V DC/0,5A ST, PU 1	6ES7132-6BH01-0BA0	Siemens	504397
1	ET 200SP, AI 4XU/I 2-WIRE ST, PU 1	6ES7134-6HD01-0BA1	Siemens	505054
1	AQ 4XU/I ST	6ES7135-6HD00-0BA1	Siemens	504291
1	SIMATIC ET 200SP, PROFINET Interface-Module, IM 155-6 PN ST, bundle of Server module + Busadapter	6ES7155-6AA01-0BN0	Siemens	501554
1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787
4	BASEUNIT TYPE A0, BU15-P16+A0+2D	6ES7193-6BP00-0DA0	Siemens	500786

Cable name =UNIT_03++Container+-290W3-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors

Cable parts HELU.16560
Order number 16560

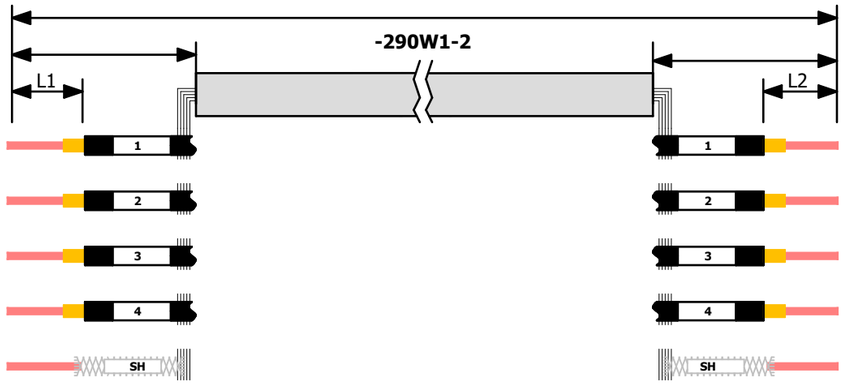


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-570XT:1			
	-570XT:2			
	-570XT:3			
	-570XT:4			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-369XT:7	
			++ASC-369XT:10	
			++ASC-369XT:1	
			++ASC-369XT:4	

Cable name =UNIT_03++Container+-290W1-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors

Cable parts HELU.16560
Order number 16560

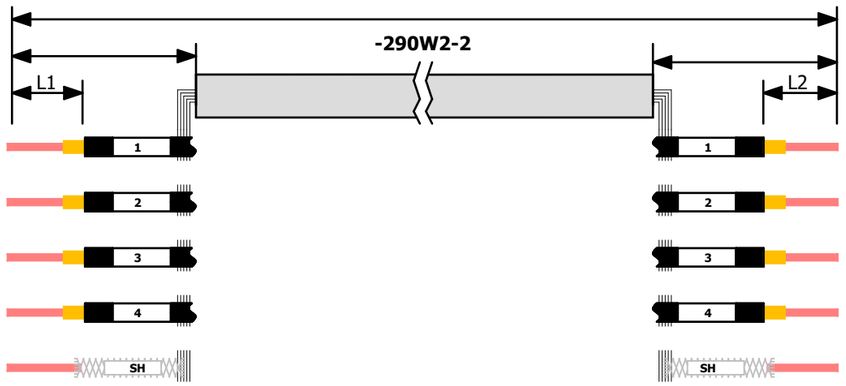


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-570XT:1			
	-570XT:2			
	-570XT:3			
	-570XT:4			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-369XT:7	
			++ASC-369XT:10	
			++ASC-369XT:1	
			++ASC-369XT:4	

Cable name =UNIT_03++Container+-290W2-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors

Cable parts HELU.16560
Order number 16560



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-570XT:1			
	-570XT:2			
	-570XT:3			
	-570XT:4			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-369XT:7	
			++ASC-369XT:10	
			++ASC-369XT:1	
			++ASC-369XT:4	

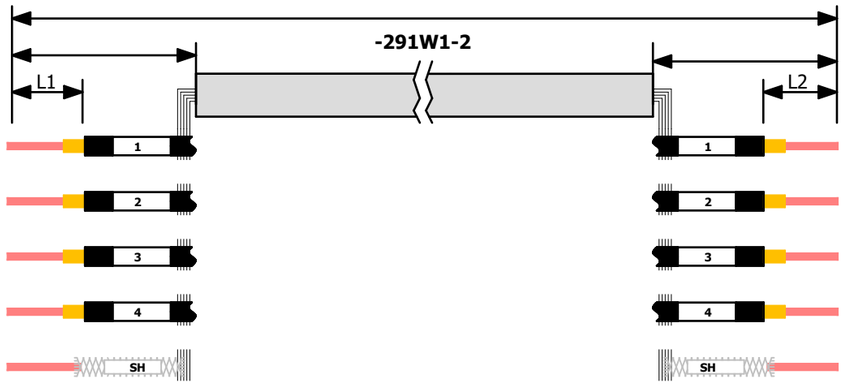
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FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_03++Container+-291W1-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors

Cable parts HELU.16560
Order number 16560

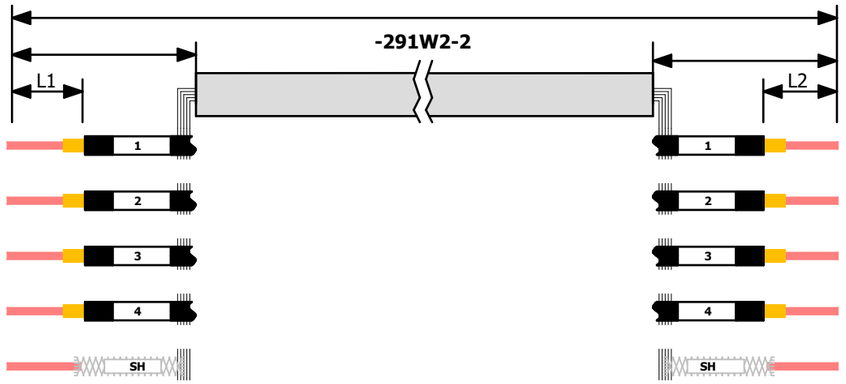


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-570XT:1			
	-570XT:2			
	-570XT:3			
	-570XT:4			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-369XT:8	
			++ASC-369XT:11	
			++ASC-369XT:2	
			++ASC-369XT:5	

Cable name =UNIT_03++Container+-291W2-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors

Cable parts HELU.16560
Order number 16560

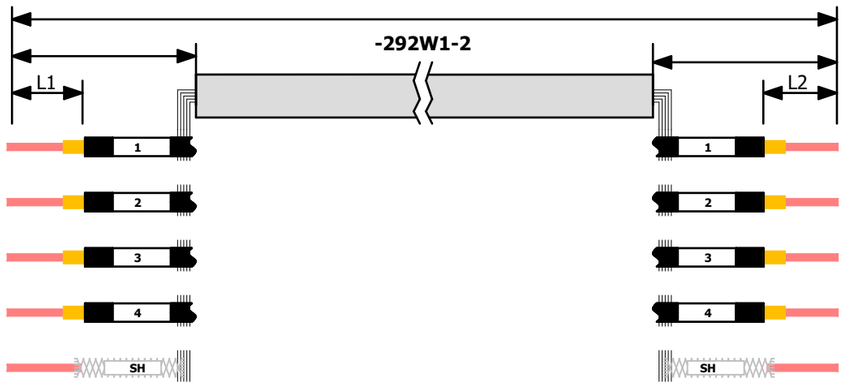


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-570XT:1			
	-570XT:2			
	-570XT:3			
	-570XT:4			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-369XT:8	
			++ASC-369XT:11	
			++ASC-369XT:2	
			++ASC-369XT:5	

Cable name =UNIT_03++Container+-292W1-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors

Cable parts HELU.16560
Order number 16560



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-570XT:1			
	-570XT:2			
	-570XT:3			
	-570XT:4			

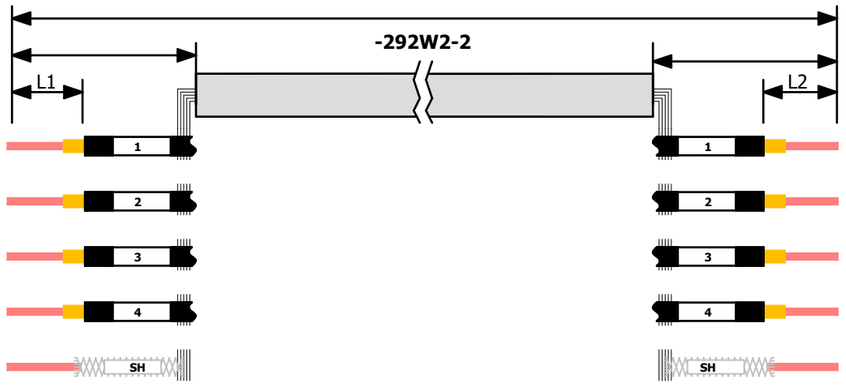
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-369XT:8	
			++ASC-369XT:11	
			++ASC-369XT:2	
			++ASC-369XT:5	

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FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_03++Container+-292W2-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors

Cable parts HELU.16560
Order number 16560

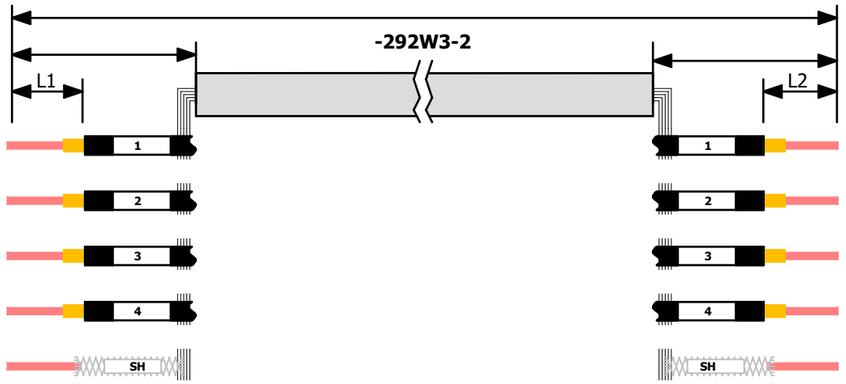


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-570XT:1			
	-570XT:2			
	-570XT:3			
	-570XT:4			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-369XT:9	
			++ASC-369XT:12	
			++ASC-369XT:3	
			++ASC-369XT:6	

Cable name =UNIT_03++Container+-292W3-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors

Cable parts HELU.16560
Order number 16560

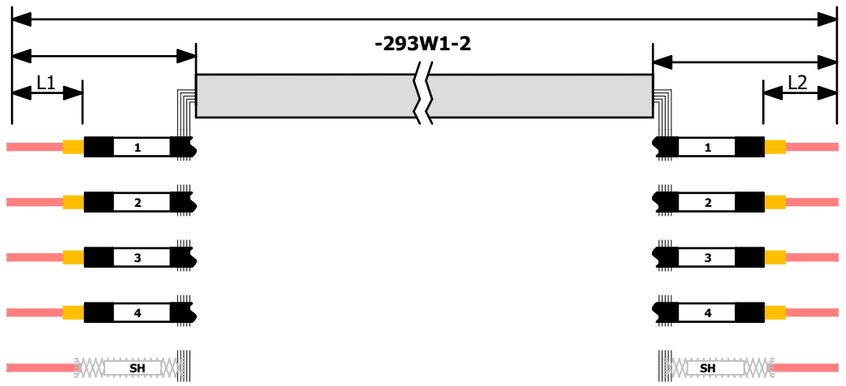


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-570XT:1			
	-570XT:2			
	-570XT:3			
	-570XT:4			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-369XT:9	
			++ASC-369XT:12	
			++ASC-369XT:3	
			++ASC-369XT:6	

Cable name =UNIT_03++Container+-293W1-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors

Cable parts HELU.16560
Order number 16560



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-570XT:1			
	-570XT:2			
	-570XT:3			
	-570XT:4			

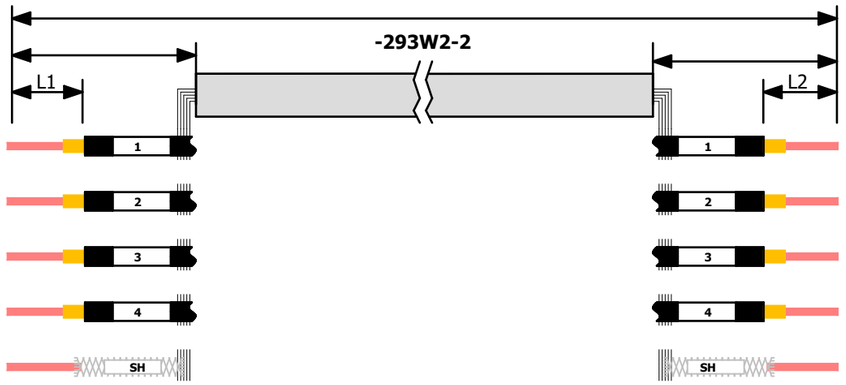
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-369XT:9	
			++ASC-369XT:12	
			++ASC-369XT:3	
			++ASC-369XT:6	

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FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_03++Container+-293W2-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors

Cable parts HELU.16560
Order number 16560

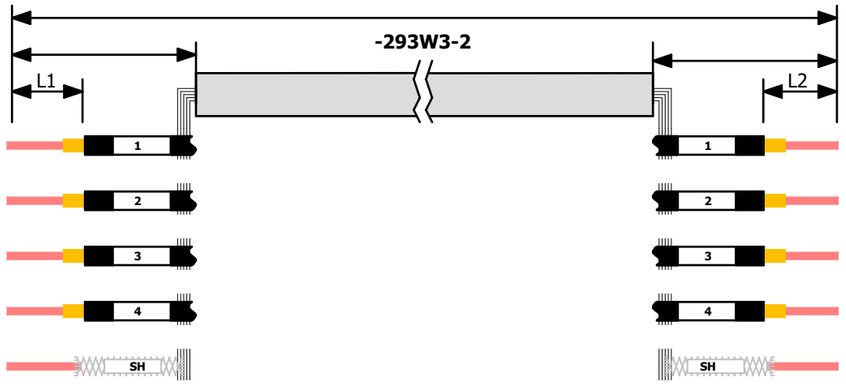


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-570XT:1			
	-570XT:2			
	-570XT:3			
	-570XT:4			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-369XT:9	
			++ASC-369XT:12	
			++ASC-369XT:3	
			++ASC-369XT:6	

Cable name =UNIT_03++Container+-293W3-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors

Cable parts HELU.16560
Order number 16560



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-570XT:1			
	-570XT:2			
	-570XT:3			
	-570XT:4			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-369XT:8	
			++ASC-369XT:11	
			++ASC-369XT:2	
			++ASC-369XT:5	

Cable name =UNIT_03++Container+-290W1-1
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts
Order number



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-XE:1			
	-XE:N			
	-XE:PE			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-687XT1:1	
			++ASC-687XT1:N	
			++ASC-687XT1:PE	

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FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_03++Container+-290W2-1
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts
Order number



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-XE:1			
	-XE:N			
	-XE:PE			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-687XT1:2	
			++ASC-687XT1:N	
			++ASC-687XT1:PE	

Cable name =UNIT_03++Container+-290W3-1
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts
Order number

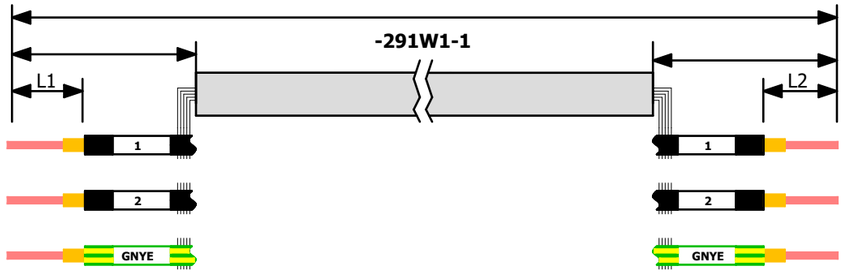


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-XE:1			
	-XE:N			
	-XE:PE			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-687XT1:3	
			++ASC-687XT1:N	
			++ASC-687XT1:PE	

Cable name =UNIT_03++Container+-291W1-1
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts
Order number

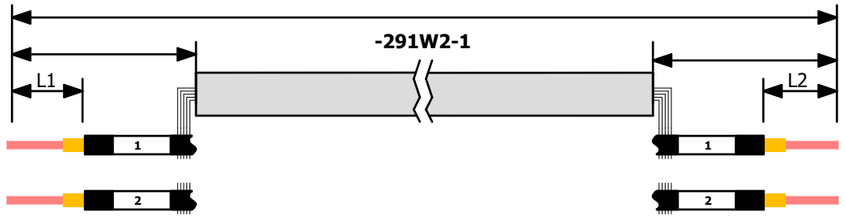


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-XE:1			
	-XE:N			
	-XE:PE			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-687XT1:4	
			++ASC-687XT1:N	
			++ASC-687XT1:PE	

Cable name =UNIT_03++Container+-291W2-1
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts
Order number



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-XE:1			
	-XE:N			

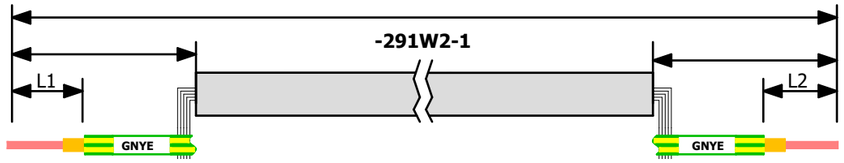
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-687XT1:5	
			++ASC-687XT1:N	

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FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_03++Container+-291W2-1
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts
Order number

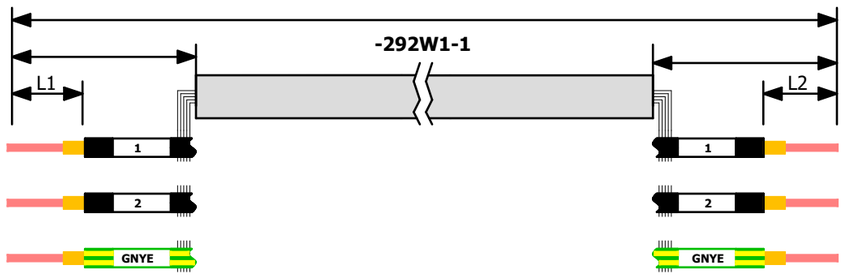


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-XE:PE			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-687XT1:PE	

Cable name =UNIT_03++Container+-292W1-1
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts
Order number

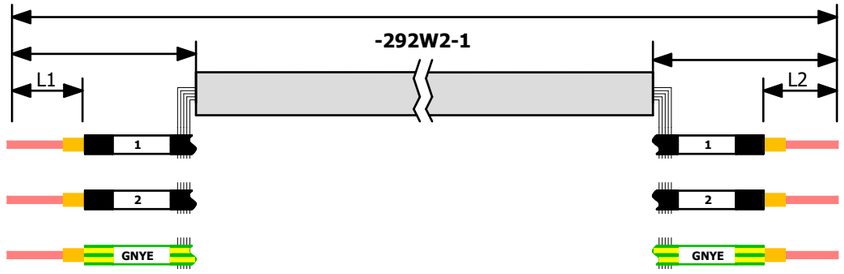


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-XE:1			
	-XE:N			
	-XE:PE			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-687XT1:6	
			++ASC-687XT1:N	
			++ASC-687XT1:PE	

Cable name =UNIT_03++Container+-292W2-1
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts
Order number

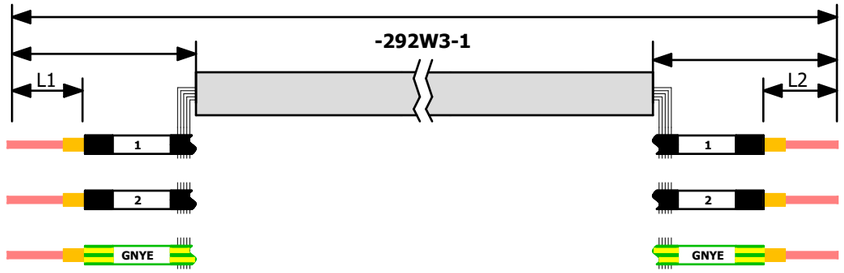


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-XE:1			
	-XE:N			
	-XE:PE			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-687XT1:7	
			++ASC-687XT1:N	
			++ASC-687XT1:PE	

Cable name =UNIT_03++Container+-292W3-1
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts
Order number



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-XE:1			
	-XE:N			
	-XE:PE			

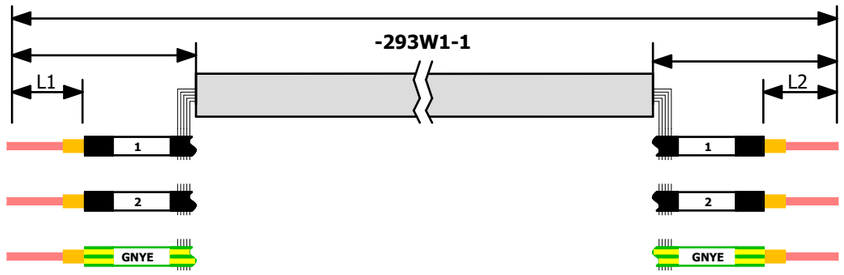
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-687XT1:8	
			++ASC-687XT1:N	
			++ASC-687XT1:PE	

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Cable name =UNIT_03++Container+-293W1-1
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts
Order number



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-XE:1			
	-XE:N			
	-XE:PE			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-687XT1:9	
			++ASC-687XT1:N	
			++ASC-687XT1:PE	

Cable name =UNIT_03++Container+-293W2-1
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts
Order number

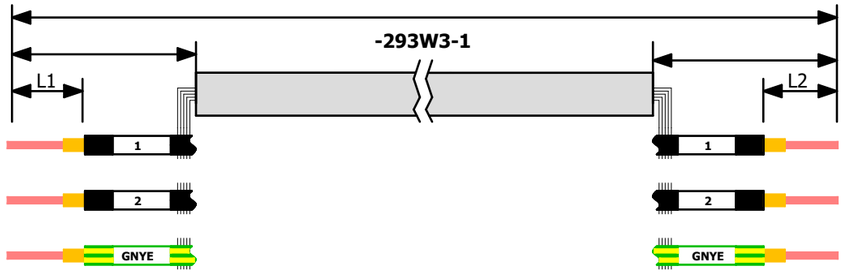


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-XE:1			
	-XE:N			
	-XE:PE			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-687XT1:10	
			++ASC-687XT1:N	
			++ASC-687XT1:PE	

Cable name =UNIT_03++Container+-293W3-1
Cable type JZ-500 3G1,5 mm²
Free conductors

Cable parts
Order number

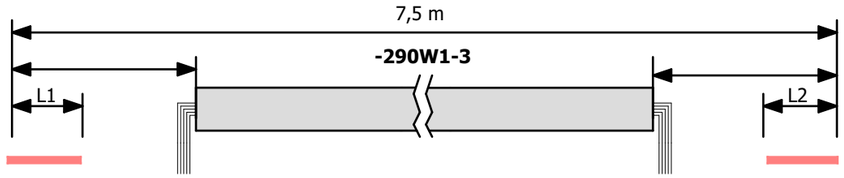


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-XE:1			
	-XE:N			
	-XE:PE			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-687XT1:11	
			++ASC-687XT1:N	
			++ASC-687XT1:PE	

Cable name =UNIT_03++Container+-290W1-3
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors

Cable parts REI.PATCH-C6 7,5 GN
Order number PATCH-C6 7,5 GN



Mounting location:	Source	Function text source	wire end handling	L1 [mm]

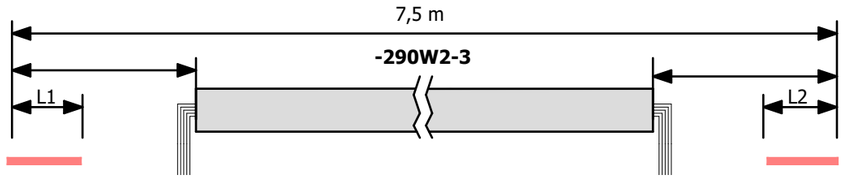
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-611A1:X1:1-16	

Editor	Freqcon_DG			Statron	FREQCON	CABEL LIST	20241203_V1.22	= UNIT_03 Battery Container 2
Date	05.11.2024							& EMB Cable list
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container page: 7
Date								+ total: 500

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Cable name =UNIT_03++Container+-290W2-3
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors

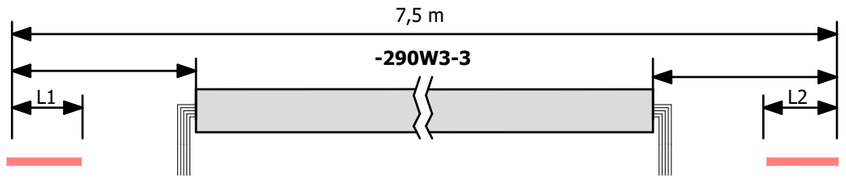
Cable parts REI.PATCH-C6 7,5 GN
Order number PATCH-C6 7,5 GN



Mounting location:	Source	Function text source	wire end handling	L1 [mm]	L2 [mm]	wire end handling	Function text target	Target	Mounting location:
								++ASC-611A1:X2:1-16	

Cable name =UNIT_03++Container+-290W3-3
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors

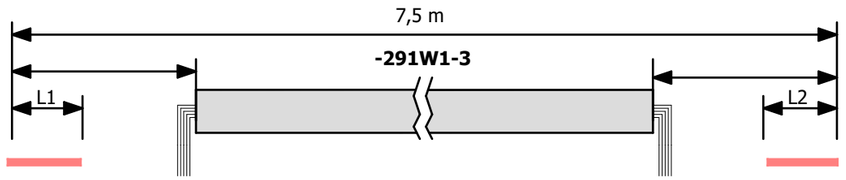
Cable parts REI.PATCH-C6 7,5 GN
Order number PATCH-C6 7,5 GN



Mounting location:	Source	Function text source	wire end handling	L1 [mm]	L2 [mm]	wire end handling	Function text target	Target	Mounting location:
								++ASC-611A1:X3:1-16	

Cable name =UNIT_03++Container+-291W1-3
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors

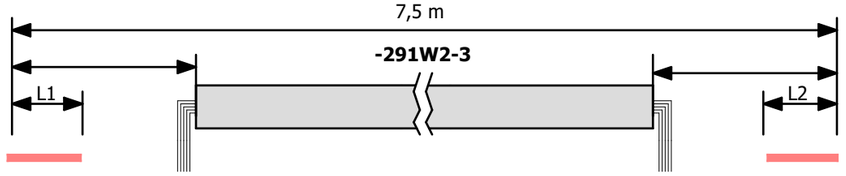
Cable parts REI.PATCH-C6 7,5 GN
Order number PATCH-C6 7,5 GN



Mounting location:	Source	Function text source	wire end handling	L1 [mm]	L2 [mm]	wire end handling	Function text target	Target	Mounting location:
								++ASC-611A1:X4:1-16	

Cable name =UNIT_03++Container+-291W2-3
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors

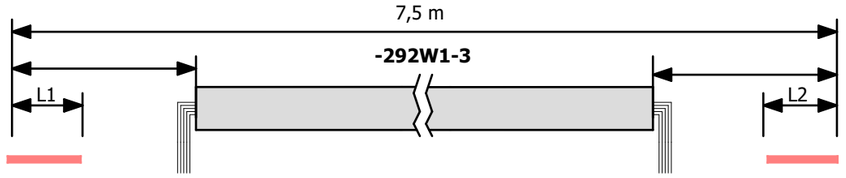
Cable parts REI.PATCH-C6 7,5 GN
Order number PATCH-C6 7,5 GN



Mounting location:	Source	Function text source	wire end handling	L1 [mm]	L2 [mm]	wire end handling	Function text target	Target	Mounting location:
								++ASC-611A1:X5:1-16	

Cable name =UNIT_03++Container+-292W1-3
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors

Cable parts REI.PATCH-C6 7,5 GN
Order number PATCH-C6 7,5 GN



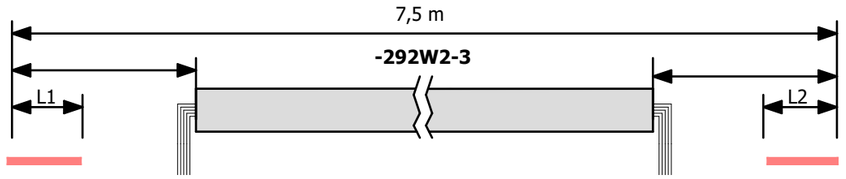
Mounting location:	Source	Function text source	wire end handling	L1 [mm]	L2 [mm]	wire end handling	Function text target	Target	Mounting location:
								++ASC-611A1:X6:1-16	

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Cable name =UNIT_03++Container+-292W2-3
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors

Cable parts REI.PATCH-C6 7,5 GN
Order number PATCH-C6 7,5 GN

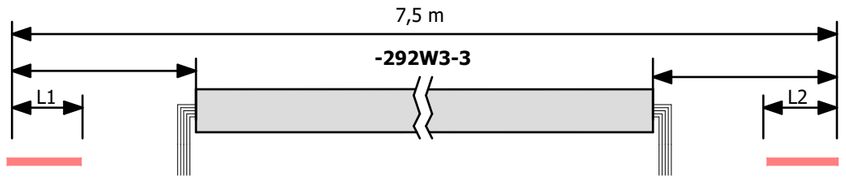


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-611A1:X7:1-16	

Cable name =UNIT_03++Container+-292W3-3
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors

Cable parts REI.PATCH-C6 7,5 GN
Order number PATCH-C6 7,5 GN

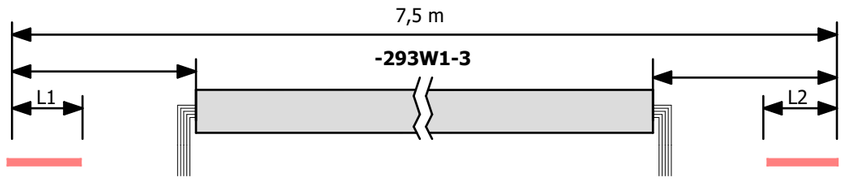


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-611A1:X8:1-16	

Cable name =UNIT_03++Container+-293W1-3
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors

Cable parts REI.PATCH-C6 7,5 GN
Order number PATCH-C6 7,5 GN

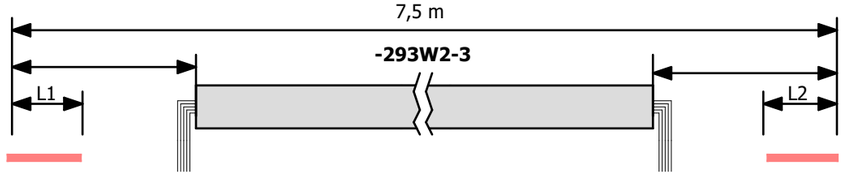


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-611A1:X9:1-16	

Cable name =UNIT_03++Container+-293W2-3
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors

Cable parts REI.PATCH-C6 7,5 GN
Order number PATCH-C6 7,5 GN

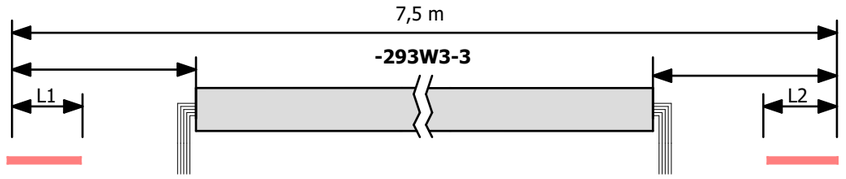


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-611A1:X2:1-16	

Cable name =UNIT_03++Container+-293W3-3
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors

Cable parts REI.PATCH-C6 7,5 GN
Order number PATCH-C6 7,5 GN



Mounting location:	Source	Function text source	wire end handling	L1 [mm]

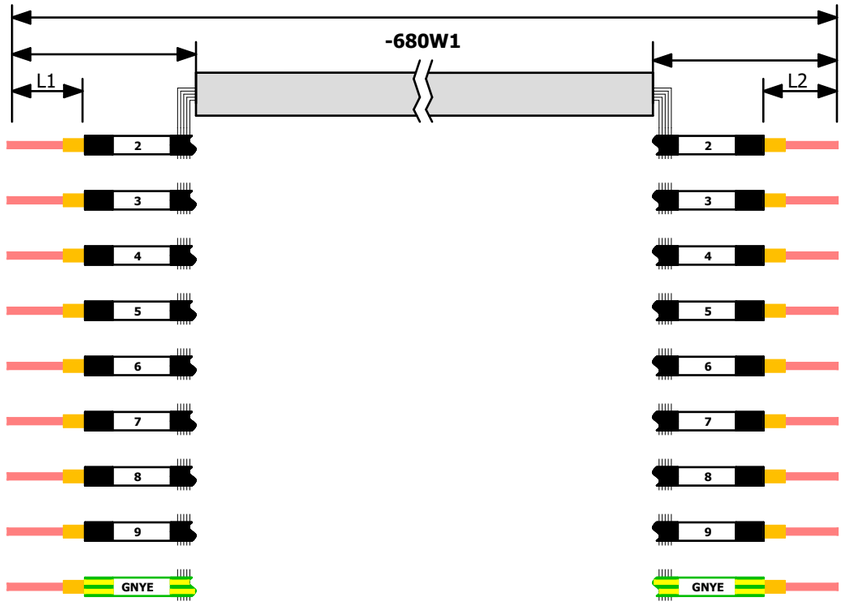
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			++ASC-611A1:X3:1-16	

previous page: 8
next page: ++ASC/1

FRQ_Kabelplan_04_gro8_de_en

Cable name =UNIT_03++ASC+-680W1
Cable type F-CY-JZ 10G0,75 mm²
Free conductors

Cable parts
Order number

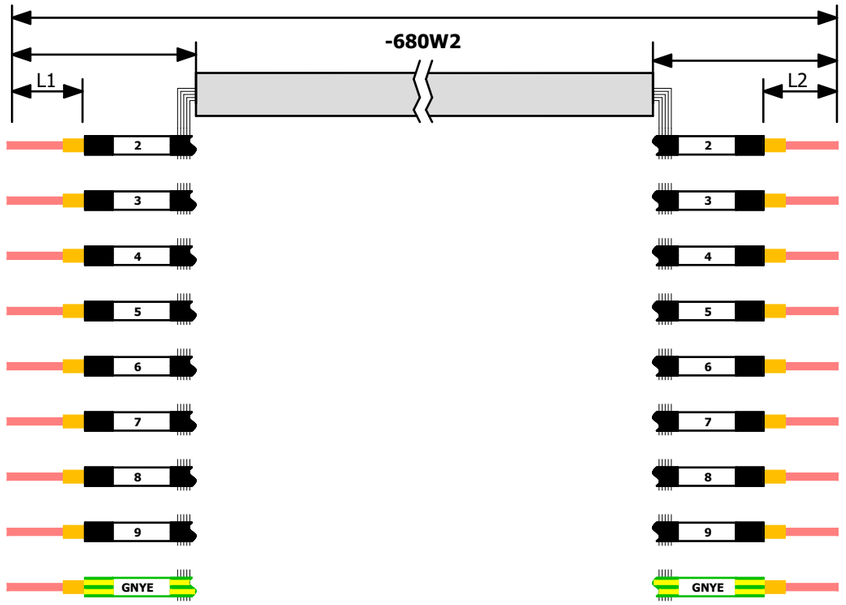


Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-X5.1:2	gas concentration BAT 1-4		
	-X5.1:3	=		
	-X5.1:5	=		
	-X5.1:6	=		
	-X5.1:7	=		
	-X5.1:8	=		
	-X5.1:9	=		
	-X5.1:10	=		
	-X5.1:PE	=		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		gas concentration	++Container-680U1-X1:2	
		=	++Container-680U1-X1:4	
		=	++Container-680U1-X2:1	
		=	++Container-680U1-X2:2	
		=	++Container-680U1-X2:4	
		=	++Container-680U1-X2:5	
		=	++Container-680U1-X2:7	
		=	++Container-680U1-X2:8	
		=	++Container-680U1-X1:5	

Cable name =UNIT_03++ASC+-680W2
Cable type F-CY-JZ 10G0,75 mm²
Free conductors

Cable parts
Order number



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-X5.2:2	gas concentration BAT 5-8		
	-X5.2:3	=		
	-X5.2:5	=		
	-X5.2:6	=		
	-X5.2:7	=		
	-X5.2:8	=		
	-X5.2:9	=		
	-X5.2:10	=		
	-X5.2:PE	=		

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		gas concentration	++Container-680U2-X1:2	
		=	++Container-680U2-X1:4	
		=	++Container-680U2-X2:1	
		=	++Container-680U2-X2:2	
		=	++Container-680U2-X2:4	
		=	++Container-680U2-X2:5	
		=	++Container-680U2-X2:7	
		=	++Container-680U2-X2:8	
		=	++Container-680U2-X1:5	

previous page:
++Container/9

next page:
2

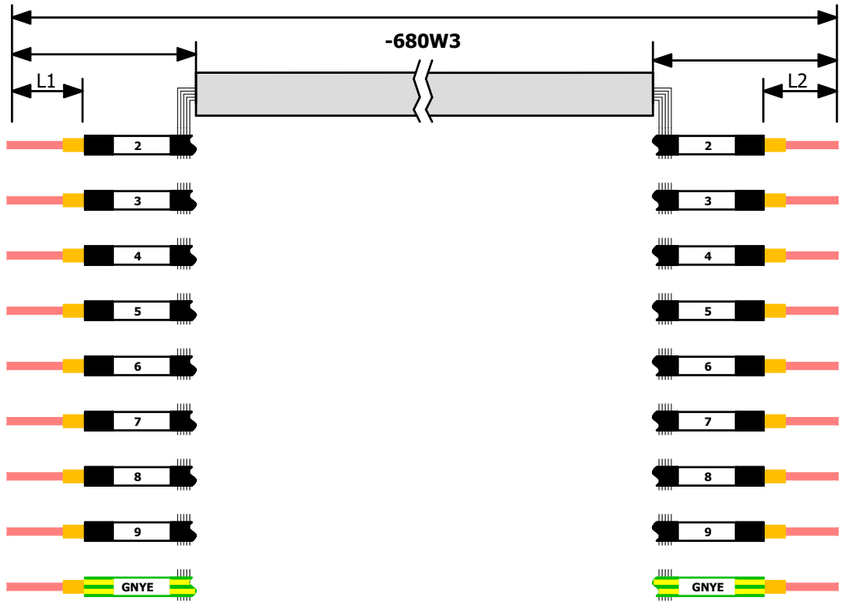
Editor	Freqcon_DG			Statron	FREQCON	CABEL LIST	20241203_V1.22	= UNIT_03 Battery Container 2
Date	05.11.2024							& EMB Cable list
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet page: 1
Date								+ total: 500

FRQ_Kabelplan_04_gro8_de_en

Cable name =UNIT_03++ASC+-680W3
Cable type F-CY-JZ 10G0,75 mm²
Free conductors 9

Cable parts
Order number

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-X5.3:2	gas concentration BAT 9-11		
	-X5.3:3	=		
	-X5.3:5	=		
	-X5.3:6	=		
	-X5.3:7	=		
	-X5.3:8	=		
	-X5.3:9	=		
	-X5.3:10	=		
	-X5.3:PE	=		

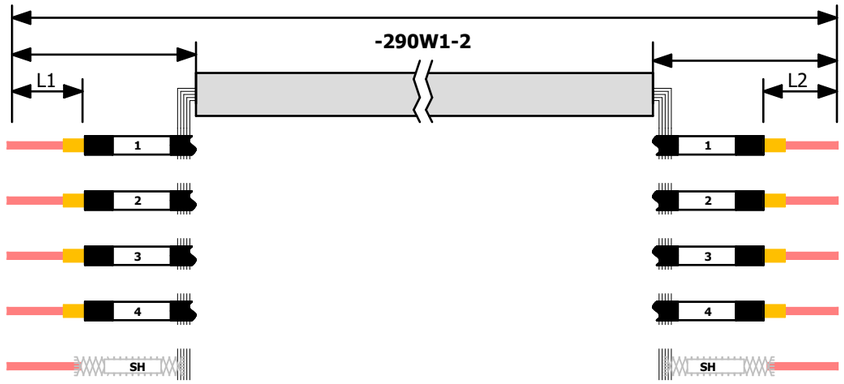


L2 [mm]	wire end handling	Function text target	Target	Mounting location:
		gas concentration	++Container-680U3-X1:2	
		=	++Container-680U3-X1:4	
		=	++Container-680U3-X2:1	
		=	++Container-680U3-X2:2	
		=	++Container-680U3-X2:4	
		=	++Container-680U3-X2:5	
		=	++Container-680U3-X2:7	
		=	++Container-680U3-X2:8	
		=	++Container-680U3-X1:5	

Cable name =UNIT_03++ASC+-290W1-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors 4

Cable parts HELU.16560
Order number 16560

Mounting location:	Source	Function text source	wire end handling	L1 [mm]

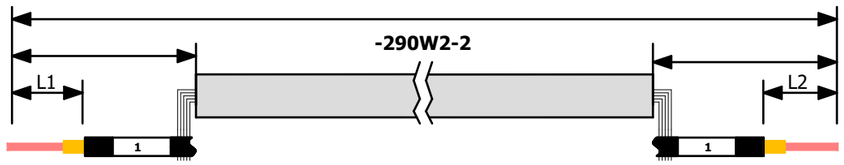


L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_03++ASC+-290W2-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors 4

Cable parts HELU.16560
Order number 16560

Mounting location:	Source	Function text source	wire end handling	L1 [mm]



L2 [mm]	wire end handling	Function text target	Target	Mounting location:

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FRQ_Kabelplan_04_gro8_de_en

Cable name =UNIT_03++ASC+-290W2-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors 4

Cable parts HELU.16560
Order number 16560

Mounting location:	Source	Function text source	wire end handling	L1 [mm]

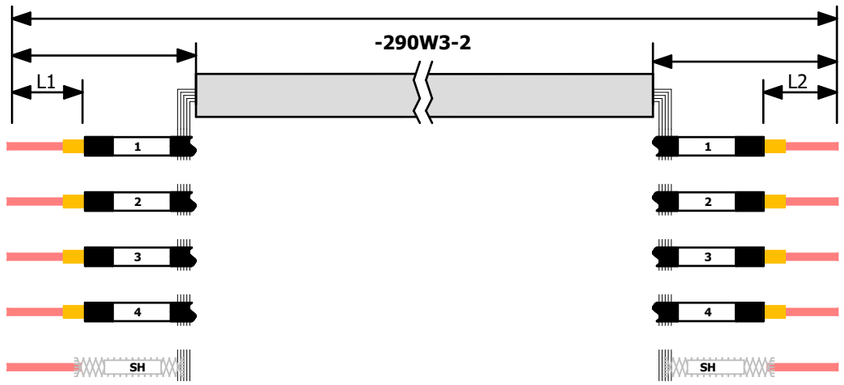


L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_03++ASC+-290W3-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors 4

Cable parts HELU.16560
Order number 16560

Mounting location:	Source	Function text source	wire end handling	L1 [mm]

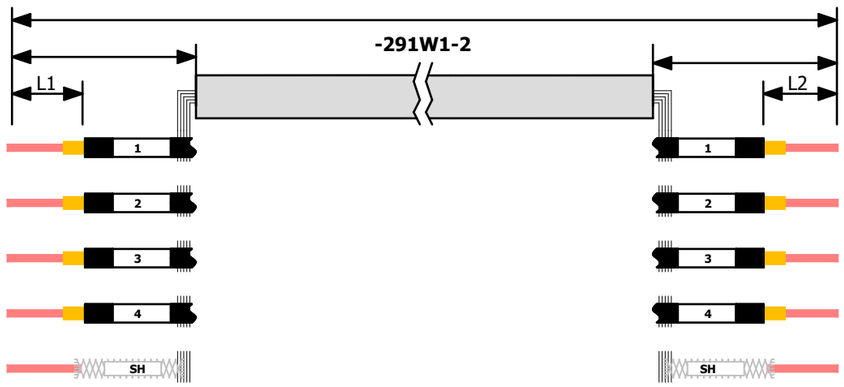


L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_03++ASC+-291W1-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors 4

Cable parts HELU.16560
Order number 16560

Mounting location:	Source	Function text source	wire end handling	L1 [mm]



L2 [mm]	wire end handling	Function text target	Target	Mounting location:

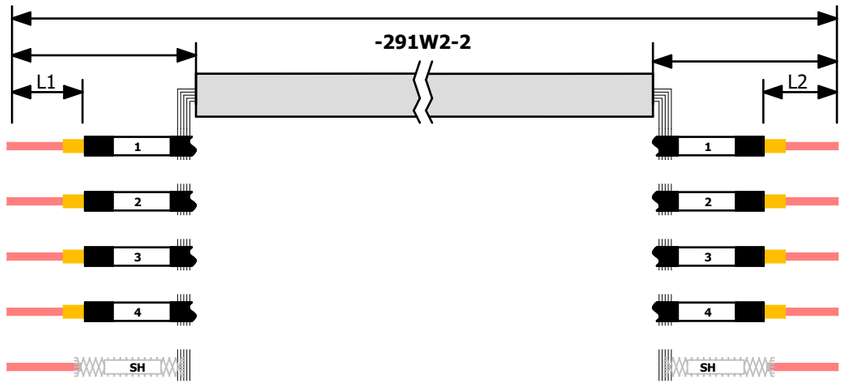
previous page: 2

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FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_03++ASC+-291W2-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors 4

Cable parts HELU.16560
Order number 16560

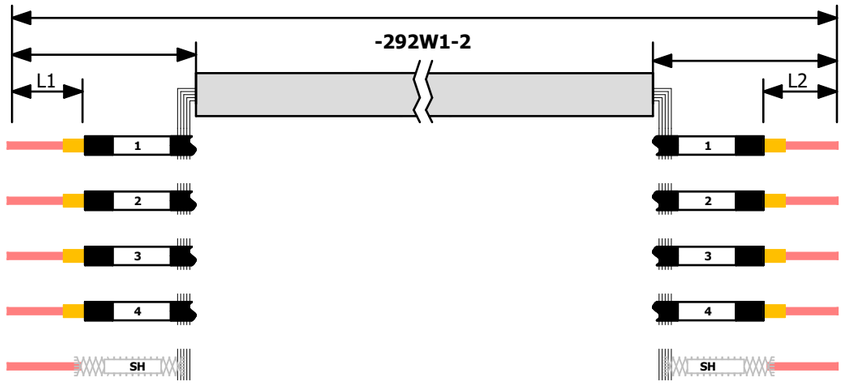


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_03++ASC+-292W1-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors 4

Cable parts HELU.16560
Order number 16560

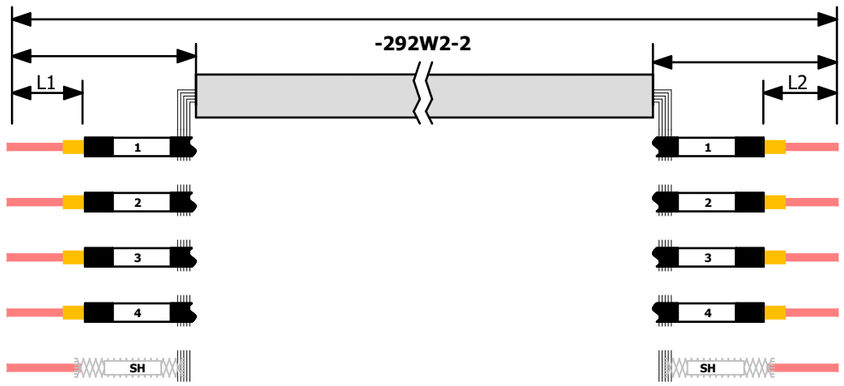


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_03++ASC+-292W2-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors 4

Cable parts HELU.16560
Order number 16560



Mounting location:	Source	Function text source	wire end handling	L1 [mm]

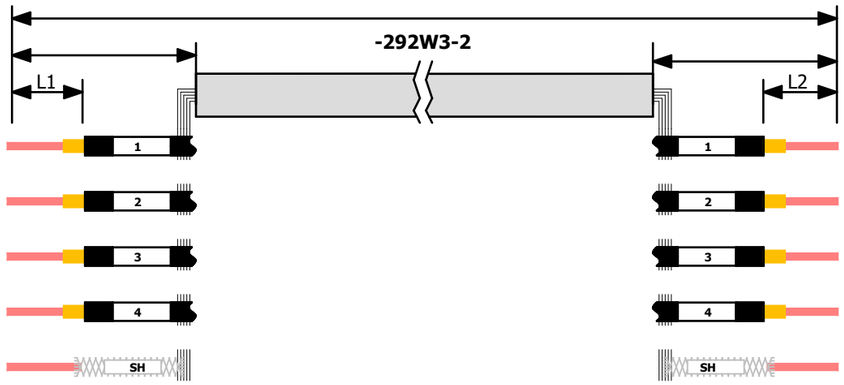
L2 [mm]	wire end handling	Function text target	Target	Mounting location:

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Cable name =UNIT_03++ASC+-292W3-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors 4

Cable parts HELU.16560
Order number 16560

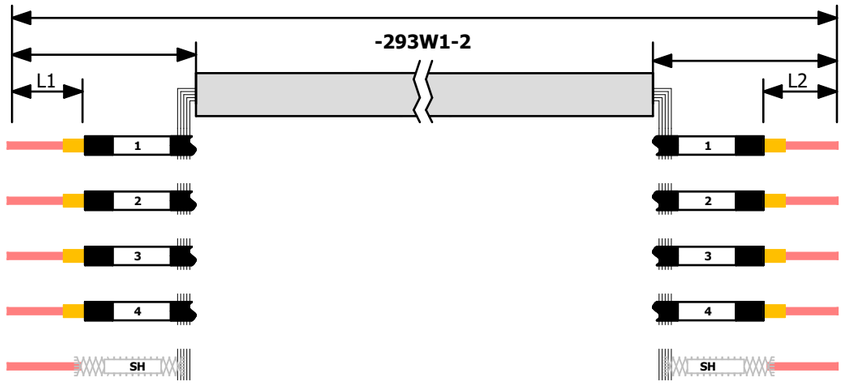


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_03++ASC+-293W1-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors 4

Cable parts HELU.16560
Order number 16560

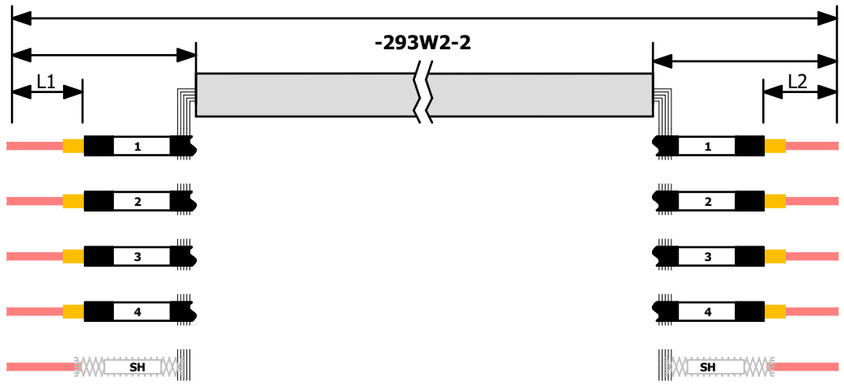


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_03++ASC+-293W2-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors 4

Cable parts HELU.16560
Order number 16560



Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

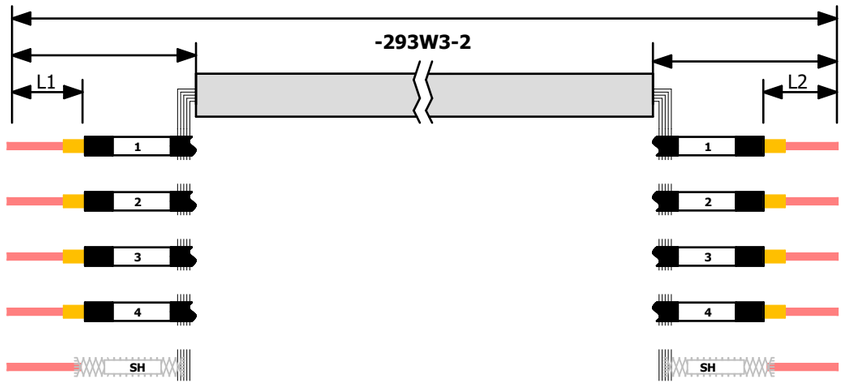
previous page: 4
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Cable name =UNIT_03++ASC+-293W3-2
Cable type F-CY-OZ 4x0,75 mm²
Free conductors 4

Cable parts HELU.16560
Order number 16560

Mounting location:	Source	Function text source	wire end handling	L1 [mm]

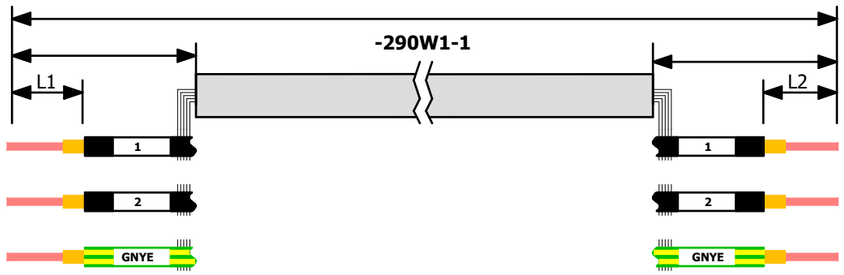


L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_03++ASC+-290W1-1
Cable type JZ-500 3G1,5 mm²
Free conductors 3

Cable parts HELU.10091
Order number 10091

Mounting location:	Source	Function text source	wire end handling	L1 [mm]

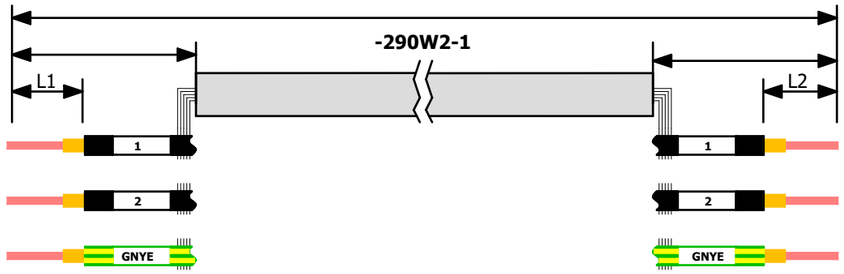


L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_03++ASC+-290W2-1
Cable type JZ-500 3G1,5 mm²
Free conductors 3

Cable parts HELU.10091
Order number 10091

Mounting location:	Source	Function text source	wire end handling	L1 [mm]



L2 [mm]	wire end handling	Function text target	Target	Mounting location:

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Cable name =UNIT_03++ASC+-290W3-1
Cable type JZ-500 3G1,5 mm²
Free conductors 3

Cable parts HELU.10091
Order number 10091

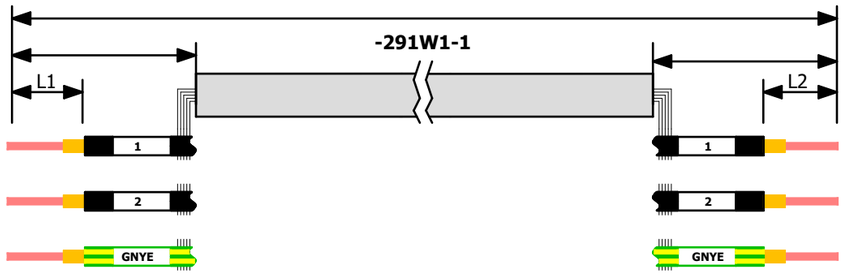


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_03++ASC+-291W1-1
Cable type JZ-500 3G1,5 mm²
Free conductors 3

Cable parts HELU.10091
Order number 10091

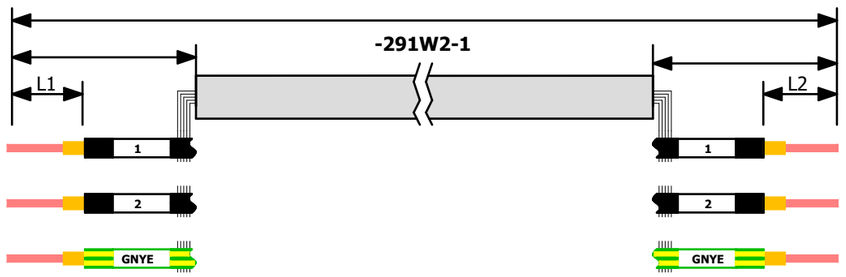


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_03++ASC+-291W2-1
Cable type JZ-500 3G1,5 mm²
Free conductors 3

Cable parts HELU.10091
Order number 10091

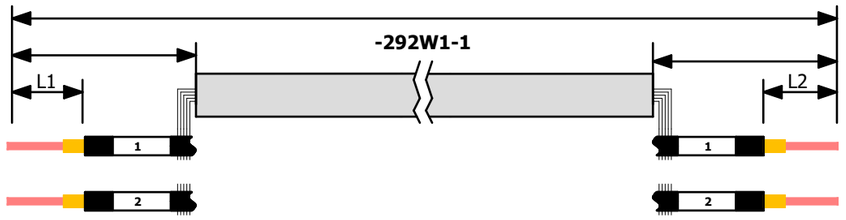


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_03++ASC+-292W1-1
Cable type JZ-500 3G1,5 mm²
Free conductors 3

Cable parts HELU.10091
Order number 10091



Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

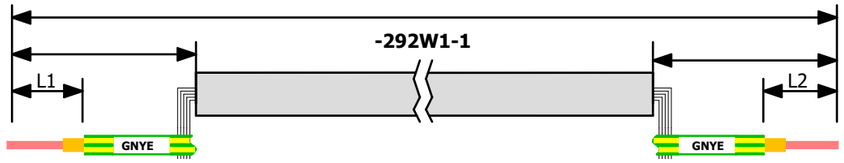
previous page: 6

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FRQ_Kabelplan_04_groß_de_en

Cable name =UNIT_03++ASC+-292W1-1
Cable type JZ-500 3G1,5 mm²
Free conductors 2

Cable parts HELU.10091
Order number 10091

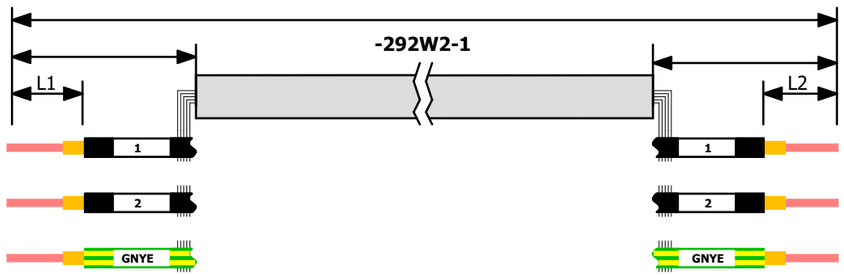


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_03++ASC+-292W2-1
Cable type JZ-500 3G1,5 mm²
Free conductors 2

Cable parts HELU.10091
Order number 10091

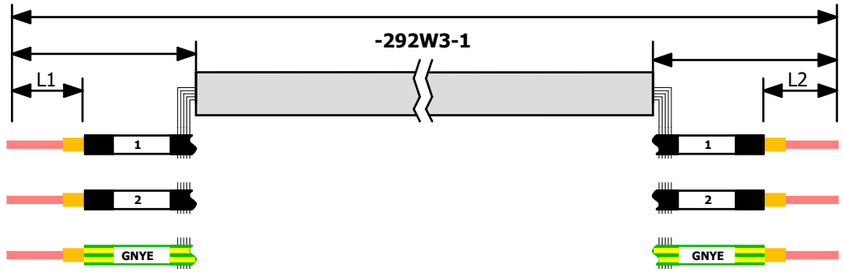


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_03++ASC+-292W3-1
Cable type JZ-500 3G1,5 mm²
Free conductors 2

Cable parts HELU.10091
Order number 10091

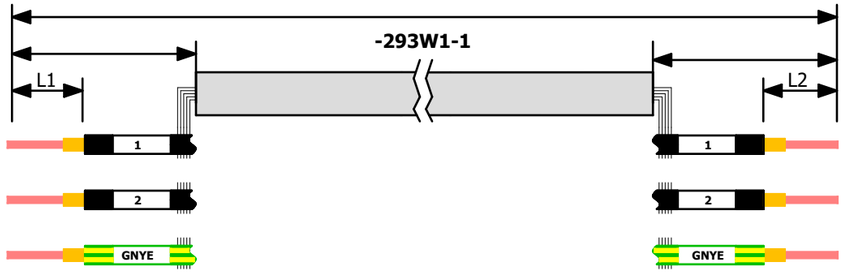


Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_03++ASC+-293W1-1
Cable type JZ-500 3G1,5 mm²
Free conductors 2

Cable parts HELU.10091
Order number 10091



Mounting location:	Source	Function text source	wire end handling	L1 [mm]

L2 [mm]	wire end handling	Function text target	Target	Mounting location:

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Cable name =UNIT_03++ASC+-293W2-1
Cable type JZ-500 3G1,5 mm²
Free conductors 3

Cable parts HELU.10091
Order number 10091

Mounting location:	Source	Function text source	wire end handling	L1 [mm]



L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_03++ASC+-293W3-1
Cable type JZ-500 3G1,5 mm²
Free conductors 3

Cable parts HELU.10091
Order number 10091

Mounting location:	Source	Function text source	wire end handling	L1 [mm]

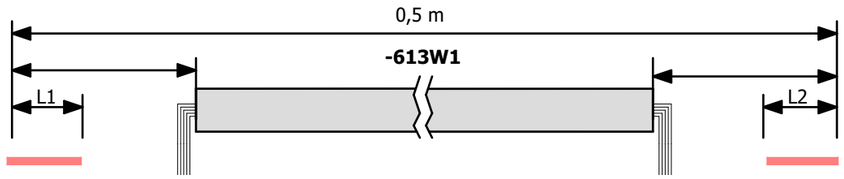


L2 [mm]	wire end handling	Function text target	Target	Mounting location:

Cable name =UNIT_03++ASC+-613W1
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors 8

Cable parts REI.PATCH-C6 05 GN
Order number PATCH-C6 05 GN

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-613T1:7			

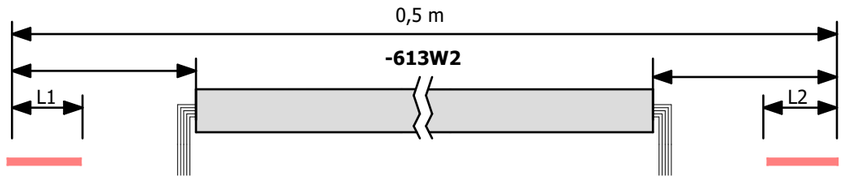


L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			-613U1:OUT	

Cable name =UNIT_03++ASC+-613W2
Cable type Patch cable Cat.6 4x2x0,25 mm²
Free conductors 8

Cable parts REI.PATCH-C6 05 GN
Order number PATCH-C6 05 GN

Mounting location:	Source	Function text source	wire end handling	L1 [mm]
	-613U1:IN			



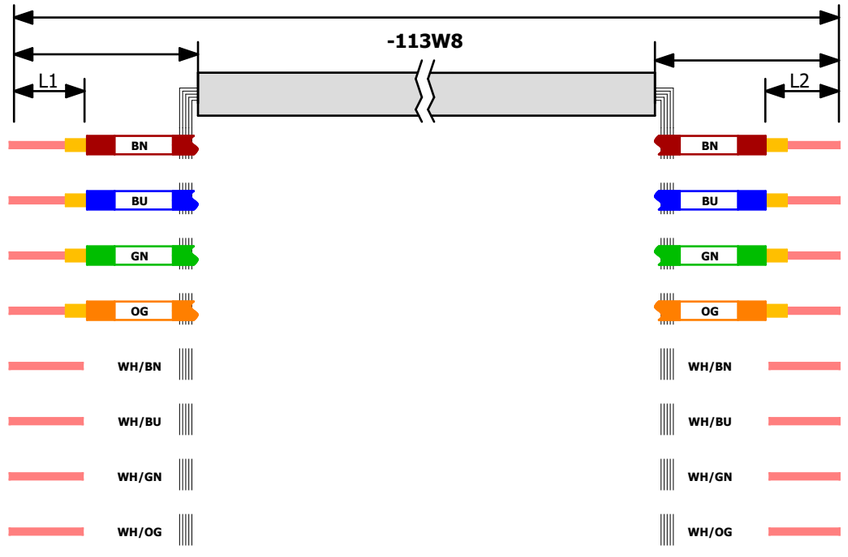
L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			-613U2:8	

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FRQ_Kabelplan_04_gro8_de_en

Cable name =UNIT_03++ASC+-113W8
Cable type S/FTP 4x2xAWG 23/1 PVC/PVC 4x2x23 AWG
Free conductors

Cable parts
Order number



Mounting location:	Source	Function text source	wire end handling	L1 [mm]
Control cabinet 1	=UNIT_01++CT+CTRL_1.3-113U4:8			
Control cabinet 1	=UNIT_01++CT+CTRL_1.3-113U4:4			
Control cabinet 1	=UNIT_01++CT+CTRL_1.3-113U4:2			
Control cabinet 1	=UNIT_01++CT+CTRL_1.3-113U4:6			
Control cabinet 1	=UNIT_01++CT+CTRL_1.3-113U4:7			
Control cabinet 1	=UNIT_01++CT+CTRL_1.3-113U4:5			
Control cabinet 1	=UNIT_01++CT+CTRL_1.3-113U4:1			
Control cabinet 1	=UNIT_01++CT+CTRL_1.3-113U4:3			

L2 [mm]	wire end handling	Function text target	Target	Mounting location:
			-613U2:8	
			-613U2:4	
			-613U2:2	
			-613U2:6	
			-613U2:7	
			-613U2:5	
			-613U2:1	
			-613U2:3	

FRQ_Kabelplan_04_gro8_de_en

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Terminal-strip overview

F14_001

Terminal strip	Terminal strip definition text	Terminals					Graphical page of terminal diagrams
		first	last	Total PE	Total N	Total number	
-X5.1		1	PE	4	0	24	=UNIT_03&EMZ++ASC/2000
-X5.2		1	PE	4	0	24	=UNIT_03&EMZ++ASC/2001
-X5.3		1	PE	4	0	24	=UNIT_03&EMZ++ASC/2002
-X6		1	6	0	0	12	=UNIT_03&EMZ++ASC/2003
-XDC1		1	PE	2	0	20	=UNIT_03&EMZ++ASC/2004
-XDC2		1	7	0	0	21	=UNIT_03&EMZ++ASC/2005
-XES		1	9	4	5	18	=UNIT_03&EMZ++ASC/2006
-XT		1	14	0	0	28	=UNIT_03&EMZ++ASC/2007
-369XT		1	12	0	0	36	=UNIT_03&EMZ++ASC/2008
-687XT1		1	PE	22	11	66	=UNIT_03&EMZ++ASC/2020
-690XT1		1	PE	44	4	134	=UNIT_03&EMZ++ASC/2031

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2000

Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_03++ASC+-X5.1						Cable name	-680W1										Page / column
				Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type	F-CY-JZ											
gas concentration BAT 1-4					-XDC2	1	1	,	++Container-680U1-X1	1													&EFS/680a.2
								,															
gas concentration BAT 1-4					-XDC2	5	2	,	++Container-680U1-X1	2		2											&EFS/680a.2
								,															
gas concentration BAT 1-4					-AI_21	13	3	,	++Container-680U1-X1	4		3											&EFS/680a.2
								,															
gas concentration BAT 1-4							4	,															&EFS/680a.2
								,															
gas concentration BAT 1-4							5	,	++Container-680U1-X2	1		4											&EFS/680a.3
								,															
gas concentration BAT 1-4							6	,	++Container-680U1-X2	2		5											&EFS/680a.3
								,															
gas concentration BAT 1-4					-680K1	A1	7	,	++Container-680U1-X2	4		6											&EFS/680a.4
								,															
gas concentration BAT 1-4					-XDC2	2	8	,	++Container-680U1-X2	5		7											&EFS/680a.4
								,															
gas concentration BAT 1-4							9	,	++Container-680U1-X2	7		8											&EFS/680a.5
								,															
gas concentration BAT 1-4							10	,	++Container-680U1-X2	8		9											&EFS/680a.5
								,															
gas concentration BAT 1-4							PE	,	++Container-680U1-X1	5		GNYE											&EFS/680a.2
								,															
gas concentration BAT 1-4							PE	,	-480W1														&EFS/680a.6
								,															

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_03++ASC+-X5.2

Function text	Cable name	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type	Cable name	Page / column
										-680W2	
										F-CY-JZ	
gas concentration BAT 5-8			-XDC2	2	1	,	++Container-680U2-X1	1			&EFS/680b.2
						,					
gas concentration BAT 5-8			-XDC2	6	2	,	++Container-680U2-X1	2		2	&EFS/680b.2
						,					
gas concentration BAT 5-8			-AI_21	14	3	,	++Container-680U2-X1	4		3	&EFS/680b.2
						,					
gas concentration BAT 5-8					4	,					&EFS/680b.2
						,					
gas concentration BAT 5-8					5	,	++Container-680U2-X2	1		4	&EFS/680b.3
						,					
gas concentration BAT 5-8					6	,	++Container-680U2-X2	2		5	&EFS/680b.3
						,					
gas concentration BAT 5-8			-680K2	A1	7	,	++Container-680U2-X2	4		6	&EFS/680b.4
						,					
gas concentration BAT 5-8			-XDC2	2	8	,	++Container-680U2-X2	5		7	&EFS/680b.4
						,					
gas concentration BAT 5-8					9	,	++Container-680U2-X2	7		8	&EFS/680b.5
						,					
gas concentration BAT 5-8					10	,	++Container-680U2-X2	8		9	&EFS/680b.5
						,					
gas concentration BAT 5-8					PE	,	++Container-680U2-X1	5		GNYE	&EFS/680b.2
						,					
gas concentration BAT 5-8					PE	,	-480W1				&EFS/680b.6
						,					

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Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_03++ASC+-X5.3						Cable name	-680W3										Page / column
				Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type	F-CY-JZ											
gas concentration BAT 9-11					-XDC2	3	1	,	++Container-680U3-X1	1													&EFS/680c.2
								,															
gas concentration BAT 9-11					-XDC2	7	2	,	++Container-680U3-X1	2		2											&EFS/680c.2
								,															
gas concentration BAT 9-11					-AI_21	15	3	,	++Container-680U3-X1	4		3											&EFS/680c.2
								,															
gas concentration BAT 9-11							4	,															&EFS/680c.2
								,															
gas concentration BAT 9-11							5	,	++Container-680U3-X2	1		4											&EFS/680c.3
								,															
gas concentration BAT 9-11							6	,	++Container-680U3-X2	2		5											&EFS/680c.3
								,															
gas concentration BAT 9-11					-680K3	A1	7	,	++Container-680U3-X2	4		6											&EFS/680c.4
								,															
gas concentration BAT 9-11					-XDC2	3	8	,	++Container-680U3-X2	5		7											&EFS/680c.4
								,															
gas concentration BAT 9-11							9	,	++Container-680U3-X2	7		8											&EFS/680c.5
								,															
gas concentration BAT 9-11							10	,	++Container-680U3-X2	8		9											&EFS/680c.5
								,															
gas concentration BAT 9-11							PE	,	++Container-680U3-X1	5		GNYE											&EFS/680c.2
								,															
gas concentration BAT 9-11							PE	,	-480W1														&EFS/680c.6
								,															

Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_03++ASC+-X6					Cable name												Page / column
				Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
Extract Fan C/W Fire Damper 1						GND	1	,	-AO_21	1													&EFS/681.1
								,															
Extract Fan C/W Fire Damper 1						+10V	2	,	-AO_21	5													&EFS/681.1
								,															
Extract Fan C/W Fire Damper 2						GND	3	,	-AO_21	2													&EFS/681.3
								,															
Extract Fan C/W Fire Damper 2						+10V	4	,	-AO_21	6													&EFS/681.3
								,															
Extract Fan C/W Fire Damper 3						GND	5	,	-AO_21	3													&EFS/681.5
								,															
Extract Fan C/W Fire Damper 3						+10V	6	,	-AO_21	7													&EFS/681.5
								,															
Extract Fan C/W Fire Damper 3						+10V	6	,	-AO_21	7													&EFS/681.5
								,															

Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_03++ASC+-XDC1						Cable name												Page / column
				Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
FUSE 24V DC CONTROL VOLTAGE					-101T1	13	1		-103F1	2													&EFS/603.2
					-101Q1	13																	
					-611A1	1																	
FUSE 24V DC CONTROL VOLTAGE					-620A1	-X80:1	2																&EFS/603.2
					-DI_21	L+																	
					-DO_21	L+																	
FUSE 24V DC CONTROL VOLTAGE					-635K7	11	3		-103F1	13													&EFS/603.2
					-684F5	11																	
FUSE 24V DC CONTROL VOLTAGE					-611A1	2	4		-102G1	OUTPUT DC 24 V:-													&EFS/603.3
FUSE 24V DC CONTROL VOLTAGE					-620A1	-X80:2	5																&EFS/603.3
					-DI_21	M																	
					-DO_21	M																	
FUSE 24V DC CONTROL VOLTAGE					-635K1	A2	6		-XDC2	5													&EFS/603.3
FUSE 24V DC CONTROL VOLTAGE					-101T1	-''	PE																&EFS/603.4
					-101T1	PE																	
FUSE 24V DC CONTROL VOLTAGE							PE																&EFS/603.4

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Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_03++ASC+-XDC2					Cable name												Page / column
				Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
FUSE 24V DC CONTROL VOLTAGE					-AI_21	L+	1		-103F2	2													&EFS/603.5
					-AO_21	L+																	
					-X5.1	1																	
FUSE 24V DC CONTROL VOLTAGE					-X5.1	8	2		-X5.2	8													&EFS/603.5
					-680K1	11																	
					-X5.2	1																	
FUSE 24V DC CONTROL VOLTAGE					-680K2	11	3		-680K3	11													&EFS/603.5
					-X5.3	1																	
					-X5.3	8																	
FUSE 24V DC CONTROL VOLTAGE					-691F1	13	4																&EFS/603.6
					-691F4	13																	
FUSE 24V DC CONTROL VOLTAGE					-AI_21	M	5		-XDC1	6													&EFS/603.6
					-AO_21	M																	
					-X5.1	2																	
FUSE 24V DC CONTROL VOLTAGE					-680K1	A2	6																&EFS/603.6
					-X5.2	2																	
FUSE 24V DC CONTROL VOLTAGE					-680K2	A2	7																&EFS/603.7
					-X5.3	2																	
					-680K3	A2																	

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Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_03++ASC+-XES

Function text	Cable name	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type	Cable name	Page / column
					1		-684F1	2			&EFS/684.0
UPS Bat-Con 1 3-phase 400V AC					N		-687XT1	N			&EFS/684.3
=			-690XT1	N	N		-687XT1	N			&EFS/684.3
=			-690XT1	N	N		-690F1	N			&EFS/684.3
=			-690XT1	N	N		-690F2	N			&EFS/684.3
=					N		-690XT1	N			&EFS/684.4
=					PE			PE			&EFS/684.4
=			++Container-278W1	GND	PE			PE			&EFS/684.4
=			-684F5	PE	PE		-684F2	PE			&EFS/684.5
=			-601F1	PE	PE						&EFS/684.5
			-684F4	2	2		-684F3	2			&EFS/684.0
UPS Bat-Con 1 3-phase 400V AC			-601F1	L1	3						&EFS/684.1
=					4		-684F1	4			&EFS/684.1
=			-684F4	4	5		-684F3	4			&EFS/684.1
=			-601F1	L2	6						&EFS/684.1
=					7		-684F1	6			&EFS/684.1
=			-684F4	6	8		-684F3	6			&EFS/684.1
=			-601F1	L3	9						&EFS/684.2

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2005

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2007

Editor	Freqcon_DG	Statron	FREQCON	Klemmenplan =UNIT_03++ASC+-XES	20241203_V1.22	= UNIT_03 Battery Container 2
Date	05.11.2024					& EMZ Terminals
Proved by		Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet page: 2006
Date						+ total: 500

Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_03++ASC+-XT Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name												Page / column
				Cable type							Cable type												
Gas confirmed FGS							1	,	-635K1	14													&EFS/635b.1
								,															
Gas confirmed FGS							2	,	-635K1	11													&EFS/635b.1
								,															
Gas confirmed FGS							3	,	-635K2	14													&EFS/635b.1
								,															
Smoke confirmed FGS							4	,	-635K2	11													&EFS/635b.2
								,															
Smoke confirmed FGS							5	,	-635K3	14													&EFS/635b.2
								,															
Thermal runaway SIS							6	,	-635K3	11													&EFS/635b.3
								,															
Thermal runaway SIS							7	,	-635K4	14													&EFS/635b.3
								,															
Thermal runaway SIS							8	,	-635K4	11													&EFS/635b.3
								,															
Spare							9	,	-635K5	14													&EFS/635b.4
								,															
Spare							10	,	-635K5	11													&EFS/635b.4
								,															
Spare							11	,	-635K6	14													&EFS/635b.5
								,															
Spare							12	,	-635K6	11													&EFS/635b.5
								,															
Shut-down to BESS							13	,	-635K7	A2													&EFS/635b.7
								,															
Shut-down to BESS							14	,	-635K7	A1													&EFS/635b.7
								,															

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Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_03++ASC+-XT	20241203_V1.22	= UNIT_03 Battery Container 2
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet
Date								+

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_03++ASC+-369XT

Function text	++Container-290W3-2 F-CY-0Z	++Container-290W2-2 F-CY-0Z	++Container-290W1-2 F-CY-0Z	Cable name / Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
battery cabinet smoke detector potential-free contacts customer			3		++Container-570XT	3	1					&EFS/669.5
		3			++Container-570XT	3						
	3				++Container-570XT	3						

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Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_03++ASC+-369XT	20241203_V1.22	= UNIT_03 Battery Container 2
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet
Date								+

page: 2008

total: 500

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-292W1-2 F-CY-OZ	++Container-291W2-2 F-CY-OZ	++Container-291W1-2 F-CY-OZ	Cable name / Cable type	Strip =UNIT_03++ASC+-369XT: Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	++Container-293W3-2 F-CY-OZ	Page / column
battery cabinet smoke detector potential-free contacts customer			3		++Container-570XT	3	2		++Container-570XT	3		3	&EFS/669.5
		3			++Container-570XT	3							
	3				++Container-570XT	3							

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-293W1-2 F-CY-OZ	++Container-292W3-2 F-CY-OZ	++Container-292W2-2 F-CY-OZ	Cable name / Cable type	Strip =UNIT_03++ASC+-369XT: Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	++Container-293W2-2 F-CY-OZ	Page / column
battery cabinet smoke detector potential-free contacts customer			3		++Container-570XT	3	3		++Container-570XT	3		3	&EFS/669.6
		3			++Container-570XT	3							
	3				++Container-570XT	3							

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Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_03++ASC+-369XT	20241203_V1.22	= UNIT_03 Battery Container 2
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet
Date								+

page: 2010

total: 500

Terminal diagram

Freqcon_F13_001_02

Strip

=UNIT_03++ASC+-369XT

Function text	++Container-290W3-2 F-CY-0Z	++Container-290W2-2 F-CY-0Z	++Container-290W1-2 F-CY-0Z	Cable name / Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
battery cabinet smoke detector potential-free contacts customer			4		++Container-570XT	4	4					&EFS/669.7
		4			++Container-570XT	4						
	4				++Container-570XT	4						

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2010

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2012

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_03++ASC+-369XT	20241203_V1.22	= UNIT_03 Battery Container 2
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet
Date								+

page: 2011
total: 500

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-292W1-2 F-CY-OZ	++Container-291W2-2 F-CY-OZ	++Container-291W1-2 F-CY-OZ	Cable name / Cable type	Strip =UNIT_03++ASC+-369XT: Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	++Container-293W3-2 F-CY-OZ	Page / column
battery cabinet smoke detector potential-free contacts customer			4		++Container-570XT	4	5		++Container-570XT	4		4	&EFS/669.8
		4			++Container-570XT	4							
	4				++Container-570XT	4							

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-293W1-2 F-CY-OZ	++Container-292W3-2 F-CY-OZ	++Container-292W2-2 F-CY-OZ	Cable name / Cable type	Strip =UNIT_03++ASC+-369XT: Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	++Container-293W2-2 F-CY-OZ	Page / column
battery cabinet smoke detector potential-free contacts customer			4		++Container-570XT	4	6		++Container-570XT	4		4	&EFS/669.8
		4			++Container-570XT	4							
	4				++Container-570XT	4							

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2012

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2014

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_03++ASC+-369XT	20241203_V1.22
Date	05.11.2024						
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007
Date							

=	UNIT_03	Battery Container 2	
&	EMZ	Terminals	
++	ASC	auxillary cabinet	page: 2013
+			total: 500

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-290W3-2 F-CY-0Z	++Container-290W2-2 F-CY-0Z	++Container-290W1-2 F-CY-0Z	Cable name / Cable type	Strip =UNIT_03++ASC+-369XT: Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
battery cabinet gas potential-free contacts customer			1		++Container-570XT	1	7					&EFS/670.5
		1			++Container-570XT	1						
	1				++Container-570XT	1						

previous page: 2013

next page: 2015

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_03++ASC+-369XT	20241203_V1.22	= UNIT_03 Battery Container 2
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet
Date								+

page: 2014

total: 500

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-292W1-2 F-CY-0Z	++Container-291W2-2 F-CY-0Z	++Container-291W1-2 F-CY-0Z	Cable name / Cable type	Strip =UNIT_03++ASC+-369XT: Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	++Container-293W3-2 F-CY-0Z	Page / column
battery cabinet gas potential-free contacts customer			1		++Container-570XT	1	8		++Container-570XT	1		1	&EFS/670.5
		1			++Container-570XT	1							
	1				++Container-570XT	1							

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-293W1-2 F-CY-0Z	++Container-292W3-2 F-CY-0Z	++Container-292W2-2 F-CY-0Z	Cable name / Cable type	Strip =UNIT_03++ASC+-369XT: Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	++Container-293W2-2 F-CY-0Z	Page / column
battery cabinet gas potential-free contacts customer			1		++Container-570XT	1	9		++Container-570XT	1		1	&EFS/670.6
		1			++Container-570XT	1							
	1				++Container-570XT	1							

previous page:
2015

next page:
2017

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_03++ASC+-369XT	20241203_V1.22	= UNIT_03 Battery Container 2
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet
Date								+

page: 2016
total: 500

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-290W3-2 F-CY-0Z	++Container-290W2-2 F-CY-0Z	++Container-290W1-2 F-CY-0Z	Cable name / Cable type	Strip =UNIT_03++ASC+-369XT: Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
battery cabinet gas potential-free contacts customer			2		++Container-570XT	2	10					&EFS/670.7
		2			++Container-570XT	2						
	2				++Container-570XT	2						

previous page: 2016

next page: 2018

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_03++ASC+-369XT	20241203_V1.22	= UNIT_03 Battery Container 2
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet
Date								+

page: 2017

total: 500

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-292W1-2 F-CY-0Z	++Container-291W2-2 F-CY-0Z	++Container-291W1-2 F-CY-0Z	Cable name / Cable type	Strip =UNIT_03++ASC+-369XT: Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	++Container-293W3-2 F-CY-0Z	Page / column
battery cabinet gas potential-free contacts customer			2		++Container-570XT	2	11		++Container-570XT	2		2	&EFS/670.8
		2			++Container-570XT	2							
	2				++Container-570XT	2							

previous page: 2017

next page: 2019

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_03++ASC+-369XT	20241203_V1.22	= UNIT_03 Battery Container 2
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet
Date								+

page: 2018

total: 500

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-293W1-2 F-CY-0Z	++Container-292W3-2 F-CY-0Z	++Container-292W2-2 F-CY-0Z	Cable name / Cable type	Strip =UNIT_03++ASC+-369XT: Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	++Container-293W2-2 F-CY-0Z	Page / column
battery cabinet gas potential-free contacts customer			2		++Container-570XT	2	12		++Container-570XT	2		2	&EFS/670.8
		2			++Container-570XT	2							
	2				++Container-570XT	2							

previous page: 2018

next page: 2020

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_03++ASC+-369XT	20241203_V1.22	= UNIT_03 Battery Container 2
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet
Date								+

page: 2019

total: 500

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-290W3-1 JZ-500	++Container-290W2-1 JZ-500	++Container-290W1-1 JZ-500	Cable name / Cable type	Strip =UNIT_03++ASC+-687XT1 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
Supply Battery String 1-phase 230V AC			1		++Container-XE	1	1	,	-687F1	2		&EFS/687.1
								,				
Supply Battery String 1-phase 230V AC		1			++Container-XE	1	2	,	-687F2	2		&EFS/687.3
								,				
Supply Battery String 1-phase 230V AC	1				++Container-XE	1	3	,	-687F3	2		&EFS/687.4
								,				

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-292W1-1 JZ-500	++Container-291W2-1 JZ-500	++Container-291W1-1 JZ-500	Cable name / Cable type	Strip =UNIT_03++ASC+-687XT1 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
Supply Battery String 1-phase 230V AC			1		++Container-XE	1	4	,	-687F4	2		&EFS/687.5
								,				
Supply Battery String 1-phase 230V AC		1			++Container-XE	1	5	,	-687F5	2		&EFS/687.7
								,				
Supply Battery String 1-phase 230V AC	1				++Container-XE	1	6	,	-687F6	2		&EFS/687.8
								,				

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-293W1-1 JZ-500	++Container-292W3-1 JZ-500	++Container-292W2-1 JZ-500	Cable name / Cable type	Strip =UNIT_03++ASC+-687XT1 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
Supply Battery String 1-phase 230V AC			1		++Container-XE	1	7	,	-688F1	2		&EFS/688.1
								,				
Supply Battery String 1-phase 230V AC		1			++Container-XE	1	8	,	-688F2	2		&EFS/688.3
								,				
Supply Battery String 1-phase 230V AC	1				++Container-XE	1	9	,	-688F3	2		&EFS/688.4
								,				

previous page: 2021

next page: 2023

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_03++ASC+-687XT1	20241203_V1.22	= UNIT_03 Battery Container 2
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet / page: 2022
Date								+ / total: 500

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-290W1-1 JZ-500	++Container-293W3-1 JZ-500	++Container-293W2-1 JZ-500	Cable name / Cable type	Strip =UNIT_03++ASC+-687XT1 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
Supply Battery String 1-phase 230V AC			1		++Container-XE	1	10		-688F4	2		&EFS/688.5
Supply Battery String 1-phase 230V AC		1			++Container-XE	1	11		-688F5	2		&EFS/688.7
Supply Battery String 1-phase 230V AC	2				++Container-XE	N	N		-XES	N		&EFS/687.1

previous page: 2022

next page: 2024

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_03++ASC+-687XT1	20241203_V1.22	= UNIT_03 Battery Container 2
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet
Date								+

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-291W1-1 JZ-500	++Container-290W3-1 JZ-500	++Container-290W2-1 JZ-500	Cable name / Cable type	Strip =UNIT_03++ASC+-687XT1 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
Supply Battery String 1-phase 230V AC			2		++Container-XE	N	N					&EFS/687.3
Supply Battery String 1-phase 230V AC		2			++Container-XE	N	N					&EFS/687.4
Supply Battery String 1-phase 230V AC	2				++Container-XE	N	N					&EFS/687.6

previous page: 2023

next page: 2025

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_03++ASC+-687XT1	20241203_V1.22	= UNIT_03 Battery Container 2
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet
Date								+

page: 2024 / total: 500

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-292W2-1 -XZ-500	++Container-292W1-1 -XZ-500	++Container-291W2-1 -XZ-500	Cable name / Cable type	Strip =UNIT_03++ASC+-687XT1 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
Supply Battery String 1-phase 230V AC			2		++Container-XE	N	N					&EFS/687.7
Supply Battery String 1-phase 230V AC		2			++Container-XE	N	N					&EFS/687.8
Supply Battery String 1-phase 230V AC	2				++Container-XE	N	N		-XES	N		&EFS/688.1

previous page: 2024

next page: 2026

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_03++ASC+-687XT1	20241203_V1.22	= UNIT_03 Battery Container 2
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet
Date								+

page: 2025

total: 500

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-293W2-1 -JZ-500	++Container-293W1-1 -JZ-500	++Container-292W3-1 -JZ-500	Cable name / Cable type	Strip =UNIT_03++ASC+-687XT1 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
Supply Battery String 1-phase 230V AC			2		++Container-XE	N	N					&EFS/688.3
Supply Battery String 1-phase 230V AC		2			++Container-XE	N	N					&EFS/688.4
Supply Battery String 1-phase 230V AC	2				++Container-XE	N	N					&EFS/688.6

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-290W2-1 JZ-500	++Container-290W1-1 JZ-500	++Container-293W3-1 JZ-500	Cable name / Cable type	Strip =UNIT_03++ASC+-687XT1 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
Supply Battery String 1-phase 230V AC			2		++Container-XE	N	N	⌟				&EFS/688.7
								,				
Supply Battery String 1-phase 230V AC		GNYE			++Container-XE	PE	PE	,				&EFS/687.2
								,				
Supply Battery String 1-phase 230V AC	GNYE				++Container-XE	PE	PE	,				&EFS/687.3
								,				

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-291W2-1 / JZ-500	++Container-291W1-1 / JZ-500	++Container-290W3-1 / JZ-500	Cable name / Cable type	Strip =UNIT_03++ASC+-687XT1 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name / Cable type	Page / column
Supply Battery String 1-phase 230V AC			GNYE		++Container-XE	PE	PE	,				&EFS/687.4
								,				
Supply Battery String 1-phase 230V AC		GNYE			++Container-XE	PE	PE	,				&EFS/687.6
								,				
Supply Battery String 1-phase 230V AC	GNYE				++Container-XE	PE	PE	,				&EFS/687.7
								,				

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-292W3-1	++Container-292W2-1	++Container-292W1-1	Cable name	Strip =UNIT_03++ASC+-687XT1						Cable name												Page / column
	1Z-500	1Z-500	1Z-500	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
Supply Battery String 1-phase 230V AC			GNYE		++Container-XE	PE	PE	,															&EFS/687.9
								,															
Supply Battery String 1-phase 230V AC		GNYE			++Container-XE	PE	PE	,															&EFS/688.2
								,															
Supply Battery String 1-phase 230V AC	GNYE				++Container-XE	PE	PE	,															&EFS/688.3
								,															

Terminal diagram

Freqcon_F13_001_02

Function text	++Container-293W3-1	++Container-293W2-1	++Container-293W1-1	Cable name	Strip =UNIT_03++ASC+-687XT1						Cable name												Page / column
	JZ-500	JZ-500	JZ-500	Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
Supply Battery String 1-phase 230V AC			GNYE		++Container-XE	PE	PE	,															&EFS/688.4
								,															
Supply Battery String 1-phase 230V AC		GNYE			++Container-XE	PE	PE	,															&EFS/688.6
								,															
Supply Battery String 1-phase 230V AC	GNYE				++Container-XE	PE	PE	,															&EFS/688.7
								,															

Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_03++ASC+-690XT1 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name	Cable type	Page / column
Container Internal Lighting						L	1	,	-690F1	2			&EFS/690.1
								,					
								,					
								,				

Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_03++ASC+-690XT1						Cable name												Page / column
				Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
								,															
								,															
230V AC for Exhaust Unit / shut-off flap Battery cabinets 5-8						L	7	,	-636K2	14													&EFS/691.3
						L																	
								,															
								,															
								,															
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230V AC for Exhaust Unit / shut-off flap Battery cabinets 9-11						L	8	,	-636K3	14													&EFS/691.4
						L																	
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previous page: 2031

next page: 2033

Editor	Freqcon_DG			Statron	FREQCON	Klemmenplan =UNIT_03++ASC+-690XT1	20241203_V1.22	= UNIT_03 Battery Container 2
Date	05.11.2024							& EMZ Terminals
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet
Date								+

page: 2032

total: 500

Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_03++ASC+-690XT1						Cable name												Page / column
				Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
								,															
230V AC for Exhaust Unit / shut-off flap Battery cabinets 9-11							9	,	-691F4	2													&EFS/691.5
								,															
								,															
								,														

Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_03++ASC+-690XT1 Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable name												Page / column
				Cable type							Cable type												

Terminal diagram

Freqcon_F13_001_02

Function text				Cable name	Strip =UNIT_03++ASC+-690XT1						Cable name												Page / column
				Cable type	Target designation	Connection point	Terminal	Jumper	Target designation	Connection point	Cable type												
						GND																	
400V AC for Cooling Units							N																&EFS/691.6
=							PE																&EFS/691.6

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-680U1 &EFS++ASC/680a.1	1	Polytron 8000 Series Customized 4-20/HART mit Relais	8344800	Dräger	509321	
-680U2 &EFS++ASC/680b.1	1	Polytron 8000 Series Customized 4-20/HART mit Relais	8344800	Dräger	509321	
-680U3 &EFS++ASC/680c.1	1	Polytron 8000 Series Customized 4-20/HART mit Relais	8344800	Dräger	509321	

previous page:
&EFS++ASC/691

next page:
++ASC/1

Editor	Freqcon_DG			Statron	FREQCON	PARTS LIST	20250123_V1.3	= UNIT_02 Battery Container 1
Date	05.11.2024							& EPC Parts List
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container page: 1
Date								+ total: 492

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-101Q1 &EFA++/2a.7;&EFS/601.5	2	CIRCUIT-BREAKER SPRING-L. CONN. 3.2A	3RV2011-1DA25	Siemens	501432	
-101T1 &EFS/601.5	1	Power supply QUINT-PS/3AC/24DC/20/CO, with protective coating	2320924	Phoenix Contact	501573	
-102G1 &EFS/602.2	1	Uninterruptible power supply QUINT-UPS/ 24DC/ 24DC/20	2320238	Phoenix Contact	501598	
-102G2 &EFS/602.6	1	Energy storage UPS-BAT/VRLA/24DC/12AH	2320322	Phoenix Contact	501229	
-103F1 &EFS/603.2	1	Device circuit breaker 230VAC / 60VDC, 3kA, 1-pole, AS, F2, 10A	5SY1710-4	Siemens	10086	
-103F2 &EFS/603.5	1	Device circuit breaker 230VAC / 60VDC, 3kA, 1-pole, AS, F2, 10A	5SY1710-4	Siemens	10086	
-369XT &EFS/669.5...&EFS/669.8;&EFS/670.5...&EFS/670.8	12	Multi-level terminal block	3210583	Phoenix Contact	501385	
-369XT &EFS/669.5;&EFS/669.7;&EFS/670.5;&EFS/670.7	4	Plug-in bridge FBS 10-5	3030213	Phoenix Contact	500547	
-369XT &EFS/669.5	2	End bracket for terminal block	3022276	Phoenix Contact	500588	
-601F1 &EFS/601.1	1	Combination arrester type 1+2, UC 350V AC, 3-pole, FM, for TNC systems	5SD7443-1	Siemens	504070	
-611A1 &EFS/611.0	1	TREE 16 TX Metall 2GE 14 FE - Unmanaged Gigabit Switch - 16 Ports/	58174	Murrelektronik	10286	
-613T1 &EFS/613a.1	1	Network isolators - FL ISOLATOR 100-RJ/RJ	2313931	Phoenix Contact	501464	
-613T1 &EFS/613a.1	1	0,5m Cat.6 PiMF-Patchcabel, green	PATCH-C6 05 GN	reichelt elektronik GmbH & Co. KG	504395	
-613U1 &EFS/613a.3	1	Surge protection device	2881007	Phoenix Contact	504791	
-613U2 &EFS/613a.5	1	Patch panel, connection field: one RJ45 socket on 8 spring-cage connection terminals	2901642	Phoenix Contact	10214	
-613U3 &EFS/613b.1	1	Patch panel, connection field: one RJ45 socket on 8 spring-cage connection terminals	2901642	Phoenix Contact	10214	
-613U4 &EFS/613b.5	1	Patch panel, connection field: one RJ45 socket on 8 spring-cage connection terminals	2901642	Phoenix Contact	10214	
-620A1 &EFS/620.1	1	SIMATIC ET 200SP, PROFINET Interface-Module, IM 155-6 PN ST, bundle of Server module + Busadapter	6ES7155-6AA01-0BN0	Siemens	501554	
-636K1 &EFS/636.1	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-636K1 &EFS/636.1	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-636K2 &EFS/636.2	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-636K2 &EFS/636.2	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-636K3 &EFS/636.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-636K3 &EFS/636.4	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-680K1 &EFS/680a.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-680K2 &EFS/680b.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-680K3 &EFS/680c.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-684F1 &EFS/684.0	1	SENTRON Miniature circuit breaker	5SY4332-7	Siemens	505272	
-684F1 &EFS/684.0	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-684F2 &EFS/684.5	1	Combination arrester type 1+2, UC 350V AC, 3-pole, FM, for TNC systems	5SD7443-1	Siemens	504070	
-684F3 &EFS/684.2	1	SENTRON Miniature circuit breaker	5SY4332-7	Siemens	505272	
-684F3 &EFS/684.2	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-684F4 &EFS/685.0	1	SENTRON Miniature circuit breaker	5SY4332-7	Siemens	505272	
-684F4 &EFS/685.0	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-684F5 &EFS/685.5	1	Combination arrester type 1+2, UC 350V AC, 3-pole, FM, for TNC systems	5SD7443-1	Siemens	504070	
-687F1 &EFS/687.1	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-687F1 &EFS/687.1	1	PIN BUS BAR SHOCKHAZARD SAFETY, 16QMM 3 PHASE+HS	5ST3712	Siemens	10274	
-687F1 &EFS/687.1	2	End cap for pin busbars 2 - 3-phase	5ST3750	Siemens	503570	

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-687F2 &EFS/687.3	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-687F3 &EFS/687.4	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-687F4 &EFS/687.5	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-687F5 &EFS/687.7	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-687F6 &EFS/687.8	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-687XT1 &EFS/687.1;&EFS/687.3...&EFS/687.5;&EFS/687.7;&EFS/687.8;&EFS/688.1;&EFS/688.3...&EFS/688.5;&EFS/688.7	11	Feed-through terminal block	3209510	Phoenix Contact	500583	
-687XT1 &EFS/687.1	2	End bracket for terminal block	3022276	Phoenix Contact	500588	
-687XT1 &EFS/687.1	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	
-687XT1 &EFS/687.1;&EFS/687.3;&EFS/687.4;&EFS/687.6...&EFS/687.8;&EFS/688.1;&EFS/688.3;&EFS/688.4;&EFS/688.6;&EFS/688.7	11	Feed-through terminal block	3209523	Phoenix Contact	500584	
-687XT1 &EFS/687.1	1	Plug-in bridge FBS 10-5	3030213	Phoenix Contact	500547	
-687XT1 &EFS/688.1	1	Plug-in bridge FBS 5-5	3030190	Phoenix Contact	500545	
-687XT1 &EFS/687.2...&EFS/687.4;&EFS/687.6;&EFS/687.7;&EFS/687.9;&EFS/688.2...&EFS/688.4;&EFS/688.6;&EFS/688.7	11	Ground terminal block	3209536	Phoenix Contact	500813	
-688F1 &EFS/688.1	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-688F2 &EFS/688.3	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-688F3 &EFS/688.4	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-688F4 &EFS/688.5	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-688F5 &EFS/688.7	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-690F1 &EFS/690.1	1	RCBO elm, 10 kA, 1P+N, type A, 30 mA, B-char, In: 10 A, Un AC: 230 V	5SU1354-6KK10	Siemens	10440	
-690F2 &EFS/690.3	1	RCBO elm, 10 kA, 1P+N, type A, 30 mA, C-char, In: 20 A, Un AC: 230 V	5SU1354-7KK20	Siemens	10441	

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-690F3 &EFS/690.5	1	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682	
-690F4 &EFS/690.7	1	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682	
-690F5 &EFS/690.8	1	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682	
-690XT1 &EFS/690.1;&EFS/691.1;&EFS/691.3...&EFS/691.6	35	Feed-through terminal block	3209510	Phoenix Contact	500583	
-690XT1 &EFS/690.1;&EFS/691.1;&EFS/691.3...&EFS/691.6	35	Feed-through terminal block	3209523	Phoenix Contact	500584	
-690XT1 &EFS/690.1;&EFS/691.1;&EFS/691.3...&EFS/691.6	35	Ground terminal block	3209536	Phoenix Contact	500813	
-690XT1 &EFS/690.1;&EFS/691.1;&EFS/691.3...&EFS/691.6	7	End and partition plate for terminal block	3030417	Phoenix Contact	500506	
-690XT1 &EFS/690.1;&EFS/691.1;&EFS/691.3...&EFS/691.6	14	End bracket for terminal block	3022276	Phoenix Contact	500588	
-691F1 &EFS/691.1	1	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682	
-691F1 &EFS/691.1	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-691F2 &EFS/691.3	1	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682	
-691F2 &EFS/691.3	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-691F3 &EFS/691.4	1	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682	
-691F3 &EFS/691.4	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-691F4 &EFS/691.5	1	CIRCUIT BREAKER 10KA 3POL C16	5SY4316-7	Siemens	503340	X
-691F4 &EFS/691.5	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-AI_21 &EFS/620.4	1	SIMATIC ET 200SP AI 4x U/I 2-wire	6ES7134-6HD01-0BA1	Siemens	505054	
-AI_21 &EFS/620.4	1	BASEUNIT TYPE A0, BU15-P16+A0+2D	6ES7193-6BP00-0DA0	Siemens	500786	
-AO_21 &EFS/620.4	1	AQ 4XU/I ST	6ES7135-6HD00-0BA1	Siemens	504291	

Parts list

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-AO_21 &EFS/620.4	1	BASEUNIT TYPE A0, BU15-P16+A0+2D	6ES7193-6BP00-0DA0	Siemens	500786	
-DI_21 &EFS/620.3	1	SIMATIC ET 200SP DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	Siemens	500788	
-DI_21 &EFS/620.3	1	BASEUNIT TYPE A0, BU15-P16+A0+2D	6ES7193-6BP00-0DA0	Siemens	500786	
-DI_22 &EFS/620.3	1	SIMATIC ET 200SP DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	Siemens	500788	
-DI_22 &EFS/620.3	1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787	
-DO_21 &EFS/620.3	1	SIMATIC ET 200SP DQ 16x24 VDC/0.5 A ST	6ES7132-6BH01-0BA0	Siemens	504397	
-DO_21 &EFS/620.3	1	BASEUNIT TYPE A0, BU15-P16+A0+2D	6ES7193-6BP00-0DA0	Siemens	500786	
-X5.1 &EFS/680a.2...&EFS/680a.5	10	Feed-through terminal block	3209510	Phoenix Contact	500583	
-X5.1 &EFS/680a.2	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	
-X5.1 &EFS/680a.2	2	End bracket for terminal block	3022276	Phoenix Contact	500588	
-X5.1 &EFS/680a.2	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	
-X5.1 &EFS/680a.2;&EFS/680a.6	2	Ground terminal block	3209536	Phoenix Contact	500813	
-X5.2 &EFS/680b.2...&EFS/680b.5	10	Feed-through terminal block	3209510	Phoenix Contact	500583	
-X5.2 &EFS/680b.2	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	
-X5.2 &EFS/680b.2	1	End bracket for terminal block	3022276	Phoenix Contact	500588	
-X5.2 &EFS/680b.2	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	
-X5.2 &EFS/680b.2;&EFS/680b.6	2	Ground terminal block	3209536	Phoenix Contact	500813	
-X5.3 &EFS/680c.2...&EFS/680c.5	10	Feed-through terminal block	3209510	Phoenix Contact	500583	
-X5.3 &EFS/680c.2	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-X5.3 &EFS/680c.2	1	End bracket for terminal block	3022276	Phoenix Contact	500588	
-X5.3 &EFS/680c.2	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	
-X5.3 &EFS/680c.2;&EFS/680c.6	2	Ground terminal block	3209536	Phoenix Contact	500813	
-X6 &EFS/681.1;&EFS/681.3;&EFS/681.5	6	Feed-through terminal block	3209510	Phoenix Contact	500583	
-X6 &EFS/681.1	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	
-X6 &EFS/681.1	1	End bracket for terminal block	3022276	Phoenix Contact	500588	
-X6 &EFS/681.1	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	
-XDC1 &EFS/603.2;&EFS/603.3	6	Multi-level terminal block	3210583	Phoenix Contact	501385	
-XDC1 &EFS/603.2;&EFS/603.3	2	Plug-in bridge FBS 3-5	3030174	Phoenix Contact	503103	
-XDC1 &EFS/603.2	2	End bracket for terminal block	3022276	Phoenix Contact	500588	
-XDC1 &EFS/603.2	1	End and partition plate for terminal block	3211634	Phoenix Contact	500505	
-XDC1 &EFS/603.4	2	Protective conductor double-level terminal block Push-in PTTB 2,5-PE	3210596	Phoenix Contact	501389	
-XDC2 &EFS/603.5...&EFS/603.7	7	Multi-level terminal block	3210583	Phoenix Contact	501385	
-XDC2 &EFS/603.5	1	Plug-in bridge FBS 4-5	3030187	Phoenix Contact	500801	
-XDC2 &EFS/603.5	1	End bracket for terminal block	3022276	Phoenix Contact	500588	
-XDC2 &EFS/603.5	1	End and partition plate for terminal block	3211634	Phoenix Contact	500505	
-XDC2 &EFS/603.6	1	Plug-in bridge FBS 2-5	3030161	Phoenix Contact	505211	
-XDC2 &EFS/603.6	1	Plug-in bridge FBS 3-5	3030174	Phoenix Contact	503103	
-XES &EFS/684.0...&EFS/684.2	9	Feed-through terminal block Push-in PT 6	3211813	Phoenix Contact	501388	

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Parts list

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-XES &EFS/684.0;&EFS/684.1	4	Plug-in bridge FBS 2-8	3030284	Phoenix Contact	502068	
-XES &EFS/684.0	2	End bracket for terminal block	3022276	Phoenix Contact	500588	
-XES &EFS/684.0	1	End and partition plate for terminal block PT 6	3212044	Phoenix Contact	500503	
-XES &EFS/684.3;&EFS/684.4	5	Feed-through terminal block Push-in PT 6 BU	3211819	Phoenix Contact	500585	
-XES &EFS/684.3	1	Plug-in bridge FBS 5-8	3030310	Phoenix Contact	504375	
-XES &EFS/684.4;&EFS/684.5	4	Ground modular terminal block Push-in PT 6-PE	3211822	Phoenix Contact	500725	

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Editor	Freqcon_DG			Statron	FREQCON	PARTS LIST	20250123_V1.3	= UNIT_02 Battery Container 1
Date	21.01.2025							& EPC Parts List
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet page: 7
Date								+ total: 492

Summarized parts list

Freqcon_ABAS_de_en

Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.
3	Polytron 8000 Series Customized 4-20/HART mit Relais	8344800	Dräger	509321

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Summarized parts list

Freqcon_ABAS_de_en

Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.
1	TREE 16 TX Metall 2GE 14 FE - Unmanaged Gigabit Switch - 16 Ports/	58174	Murrelektronik	10286
1	Network isolators - FL ISOLATOR 100-RJ/RJ	2313931	Phoenix Contact	501464
1	Uninterruptible power supply QUINT-UPS/ 24DC/ 24DC/20	2320238	Phoenix Contact	501598
1	Energy storage UPS-BAT/VRLA/24DC/12AH	2320322	Phoenix Contact	501229
1	Power supply QUINT-PS/3AC/24DC/20/CO, with protective coating	2320924	Phoenix Contact	501573
1	Surge protection device	2881007	Phoenix Contact	504791
3	Patch panel, connection field: one RJ45 socket on 8 spring-cage connection terminals	2901642	Phoenix Contact	10214
6	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726
3	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803
1	0,5m Cat.6 PiMF-Patchcabel, green	PATCH-C6 05 GN	reichelt elektronik GmbH & Co. KG	504395
2	CIRCUIT-BREAKER SPRING-L. CONN. 3.2A	3RV2011-1DA25	Siemens	501432
3	Combination arrester type 1+2, UC 350V AC, 3-pole, FM, for TNC systems	5SD7443-1	Siemens	504070
7	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737
1	PIN BUS BAR SHOCKHAZARD SAFETY, 16QMM 3 PHASE+HS	5ST3712	Siemens	10274
2	End cap for pin busbars 2 - 3-phase	5ST3750	Siemens	503570
1	RCBO elm, 10 kA, 1P+N, type A, 30 mA, B-char, In: 10 A, Un AC: 230 V	5SU1354-6KK10	Siemens	10440
1	RCBO elm, 10 kA, 1P+N, type A, 30 mA, C-char, In: 20 A, Un AC: 230 V	5SU1354-7KK20	Siemens	10441
2	Device circuit breaker 230VAC / 60VDC, 3kA, 1-pole, AS, F2, 10A	5SY1710-4	Siemens	10086

Summarized parts list

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Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.
6	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682
11	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569
3	SENTRON Miniature circuit breaker	5SY4332-7	Siemens	505272
2	SIMATIC ET 200SP DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	Siemens	500788
1	SIMATIC ET 200SP DQ 16x24 VDC/0.5 A ST	6ES7132-6BH01-0BA0	Siemens	504397
1	SIMATIC ET 200SP AI 4x U/I 2-wire	6ES7134-6HD01-0BA1	Siemens	505054
1	AQ 4XU/I ST	6ES7135-6HD00-0BA1	Siemens	504291
1	SIMATIC ET 200SP, PROFINET Interface-Module, IM 155-6 PN ST, bundle of Server module + Busadapter	6ES7155-6AA01-0BN0	Siemens	501554
1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787
4	BASEUNIT TYPE A0, BU15-P16+A0+2D	6ES7193-6BP00-0DA0	Siemens	500786

Parts list

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-680U1 &EFS++ASC/680a.1	1	Polytron 8000 Series Customized 4-20/HART mit Relais	8344800	Dräger	509321	
-680U2 &EFS++ASC/680b.1	1	Polytron 8000 Series Customized 4-20/HART mit Relais	8344800	Dräger	509321	
-680U3 &EFS++ASC/680c.1	1	Polytron 8000 Series Customized 4-20/HART mit Relais	8344800	Dräger	509321	

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Editor	Freqcon_DG			Statron	FREQCON	PARTS LIST	20250123_V1.3	= UNIT_03 Battery Container 2
Date	05.11.2024							& EPC Parts List
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ Container page: 1
Date								+ total: 492

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-101Q1 &EFA++/2a.7;&EFS/601.5	2	CIRCUIT-BREAKER SPRING-L. CONN. 3.2A	3RV2011-1DA25	Siemens	501432	
-101T1 &EFS/601.5	1	Power supply QUINT-PS/3AC/24DC/20/CO, with protective coating	2320924	Phoenix Contact	501573	
-102G1 &EFS/602.2	1	Uninterruptible power supply QUINT-UPS/ 24DC/ 24DC/20	2320238	Phoenix Contact	501598	
-102G2 &EFS/602.6	1	Energy storage UPS-BAT/VRLA/24DC/12AH	2320322	Phoenix Contact	501229	
-103F1 &EFS/603.2	1	Device circuit breaker 230VAC / 60VDC, 3kA, 1-pole, AS, F2, 10A	5SY1710-4	Siemens	10086	
-103F2 &EFS/603.5	1	Device circuit breaker 230VAC / 60VDC, 3kA, 1-pole, AS, F2, 10A	5SY1710-4	Siemens	10086	
-369XT &EFS/669.5...&EFS/669.8;&EFS/670.5...&EFS/670.8	12	Multi-level terminal block	3210583	Phoenix Contact	501385	
-369XT &EFS/669.5;&EFS/669.7;&EFS/670.5;&EFS/670.7	4	Plug-in bridge FBS 10-5	3030213	Phoenix Contact	500547	
-369XT &EFS/669.5	2	End bracket for terminal block	3022276	Phoenix Contact	500588	
-601F1 &EFS/601.1	1	Combination arrester type 1+2, UC 350V AC, 3-pole, FM, for TNC systems	5SD7443-1	Siemens	504070	
-611A1 &EFS/611.0	1	TREE 16 TX Metall 2GE 14 FE - Unmanaged Gigabit Switch - 16 Ports/	58174	Murrelektronik	10286	
-613T1 &EFS/613a.1	1	Network isolators - FL ISOLATOR 100-RJ/RJ	2313931	Phoenix Contact	501464	
-613T1 &EFS/613a.1	1	0,5m Cat.6 PiMF-Patchcabel, green	PATCH-C6 05 GN	reichelt elektronik GmbH & Co. KG	504395	
-613U1 &EFS/613a.3	1	Surge protection device	2881007	Phoenix Contact	504791	
-613U2 &EFS/613a.5	1	Patch panel, connection field: one RJ45 socket on 8 spring-cage connection terminals	2901642	Phoenix Contact	10214	
-613U3 &EFS/613b.1	1	Patch panel, connection field: one RJ45 socket on 8 spring-cage connection terminals	2901642	Phoenix Contact	10214	
-620A1 &EFS/620.1	1	SIMATIC ET 200SP, PROFINET Interface-Module, IM 155-6 PN ST, bundle of Server module + Busadapter	6ES7155-6AA01-0BN0	Siemens	501554	
-635K1 &EFS/635a.1	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-635K1 &EFS/635a.1	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	

Parts list

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-635K2 &EFS/635a.2	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-635K2 &EFS/635a.2	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-635K3 &EFS/635a.3	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-635K3 &EFS/635a.3	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-635K4 &EFS/635a.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-635K4 &EFS/635a.4	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-635K5 &EFS/635a.5	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-635K5 &EFS/635a.5	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-635K6 &EFS/635a.6	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-635K6 &EFS/635a.6	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-635K7 &EFS/635b.7	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-636K1 &EFS/636.1	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-636K1 &EFS/636.1	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-636K2 &EFS/636.2	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-636K2 &EFS/636.2	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-636K3 &EFS/636.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-636K3 &EFS/636.4	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-680K1 &EFS/680a.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-680K2 &EFS/680b.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	

Parts list

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-680K3 &EFS/680c.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-684F1 &EFS/684.0	1	SENTRON Miniature circuit breaker	5SY4332-7	Siemens	505272	
-684F1 &EFS/684.0	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-684F2 &EFS/684.5	1	Combination arrester type 1+2, UC 350V AC, 3-pole, FM, for TNC systems	5SD7443-1	Siemens	504070	
-684F3 &EFS/684.2	1	SENTRON Miniature circuit breaker	5SY4332-7	Siemens	505272	
-684F3 &EFS/684.2	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-684F4 &EFS/685.0	1	SENTRON Miniature circuit breaker	5SY4332-7	Siemens	505272	
-684F4 &EFS/685.0	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-684F5 &EFS/685.5	1	Combination arrester type 1+2, UC 350V AC, 3-pole, FM, for TNC systems	5SD7443-1	Siemens	504070	
-687F1 &EFS/687.1	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-687F1 &EFS/687.1	1	PIN BUS BAR SHOCKHAZARD SAFETY, 16QMM 3 PHASE+HS	5ST3712	Siemens	10274	
-687F1 &EFS/687.1	2	End cap for pin busbars 2 - 3-phase	5ST3750	Siemens	503570	
-687F2 &EFS/687.3	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-687F3 &EFS/687.4	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-687F4 &EFS/687.5	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-687F5 &EFS/687.7	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-687F6 &EFS/687.8	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-687XT1 &EFS/687.1;&EFS/687.2...&EFS/687.5;&EFS/687.7;&EFS/687.8;&EFS/688.1;&EFS/688.2...&EFS/688.5;&EFS/688.7	11	Feed-through terminal block	3209510	Phoenix Contact	500583	
-687XT1 &EFS/687.1	2	End bracket for terminal block	3022276	Phoenix Contact	500588	

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-687XT1 &EFS/687.1	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	
-687XT1 &EFS/687.1;&EFS/687.2;&EFS/687.4;&EFS/687.6...&EFS/687.8;&EFS/688.1;&EFS/688.3;&EFS/688.4;&EFS/688.6;&EFS/688.7	11	Feed-through terminal block	3209523	Phoenix Contact	500584	
-687XT1 &EFS/687.1	1	Plug-in bridge FBS 10-5	3030213	Phoenix Contact	500547	
-687XT1 &EFS/688.1	1	Plug-in bridge FBS 5-5	3030190	Phoenix Contact	500545	
-687XT1 &EFS/687.2...&EFS/687.4;&EFS/687.6;&EFS/687.7;&EFS/687.8;&EFS/688.2...&EFS/688.4;&EFS/688.6;&EFS/688.7	11	Ground terminal block	3209536	Phoenix Contact	500813	
-688F1 &EFS/688.1	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-688F2 &EFS/688.3	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-688F3 &EFS/688.4	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-688F4 &EFS/688.5	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-688F5 &EFS/688.7	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	
-690F1 &EFS/690.1	1	RCBO elm, 10 kA, 1P+N, type A, 30 mA, B-char, In: 10 A, Un AC: 230 V	5SU1354-6KK10	Siemens	10440	
-690F2 &EFS/690.3	1	RCBO elm, 10 kA, 1P+N, type A, 30 mA, C-char, In: 20 A, Un AC: 230 V	5SU1354-7KK20	Siemens	10441	
-690F3 &EFS/690.5	1	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682	
-690F4 &EFS/690.7	1	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682	
-690F5 &EFS/690.8	1	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682	
-690XT1 &EFS/690.1;&EFS/691.1;&EFS/691.3...&EFS/691.6	35	Feed-through terminal block	3209510	Phoenix Contact	500583	
-690XT1 &EFS/690.1;&EFS/691.1;&EFS/691.3...&EFS/691.6	35	Feed-through terminal block	3209523	Phoenix Contact	500584	
-690XT1 &EFS/690.1;&EFS/691.1;&EFS/691.3...&EFS/691.6	35	Ground terminal block	3209536	Phoenix Contact	500813	
-690XT1 &EFS/690.1;&EFS/691.1;&EFS/691.3...&EFS/691.6	7	End and partition plate for terminal block	3030417	Phoenix Contact	500506	

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-690XT1 &EFS/690.1;&EFS/691.1;&EFS/691.3...&EFS/691.6	14	End bracket for terminal block	3022276	Phoenix Contact	500588	
-691F1 &EFS/691.1	1	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682	
-691F1 &EFS/691.1	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-691F2 &EFS/691.3	1	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682	
-691F2 &EFS/691.3	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-691F3 &EFS/691.4	1	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682	
-691F3 &EFS/691.4	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-691F4 &EFS/691.5	1	CIRCUIT BREAKER 10KA 3POL C16	5SY4316-7	Siemens	503340	X
-691F4 &EFS/691.5	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	
-AI_21 &EFS/620.4	1	SIMATIC ET 200SP AI 4x U/I 2-wire	6ES7134-6HD01-0BA1	Siemens	505054	
-AI_21 &EFS/620.4	1	BASEUNIT TYPE A0, BU15-P16+A0+2D	6ES7193-6BP00-0DA0	Siemens	500786	
-AO_21 &EFS/620.4	1	AQ 4XU/I ST	6ES7135-6HD00-0BA1	Siemens	504291	
-AO_21 &EFS/620.4	1	BASEUNIT TYPE A0, BU15-P16+A0+2D	6ES7193-6BP00-0DA0	Siemens	500786	
-DI_21 &EFS/620.3	1	SIMATIC ET 200SP DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	Siemens	500788	
-DI_21 &EFS/620.3	1	BASEUNIT TYPE A0, BU15-P16+A0+2D	6ES7193-6BP00-0DA0	Siemens	500786	
-DI_22 &EFS/620.3	1	SIMATIC ET 200SP DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	Siemens	500788	
-DI_22 &EFS/620.3	1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787	
-DO_21 &EFS/620.3	1	SIMATIC ET 200SP DQ 16x24 VDC/0.5 A ST	6ES7132-6BH01-0BA0	Siemens	504397	
-DO_21 &EFS/620.3	1	BASEUNIT TYPE A0, BU15-P16+A0+2D	6ES7193-6BP00-0DA0	Siemens	500786	

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-X5.1 &EFS/680a.2...&EFS/680a.5	10	Feed-through terminal block	3209510	Phoenix Contact	500583	
-X5.1 &EFS/680a.2	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	
-X5.1 &EFS/680a.2	2	End bracket for terminal block	3022276	Phoenix Contact	500588	
-X5.1 &EFS/680a.2	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	
-X5.1 &EFS/680a.2;&EFS/680a.6	2	Ground terminal block	3209536	Phoenix Contact	500813	
-X5.2 &EFS/680b.2...&EFS/680b.5	10	Feed-through terminal block	3209510	Phoenix Contact	500583	
-X5.2 &EFS/680b.2	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	
-X5.2 &EFS/680b.2	1	End bracket for terminal block	3022276	Phoenix Contact	500588	
-X5.2 &EFS/680b.2	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	
-X5.2 &EFS/680b.2;&EFS/680b.6	2	Ground terminal block	3209536	Phoenix Contact	500813	
-X5.3 &EFS/680c.2...&EFS/680c.5	10	Feed-through terminal block	3209510	Phoenix Contact	500583	
-X5.3 &EFS/680c.2	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	
-X5.3 &EFS/680c.2	1	End bracket for terminal block	3022276	Phoenix Contact	500588	
-X5.3 &EFS/680c.2	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	
-X5.3 &EFS/680c.2;&EFS/680c.6	2	Ground terminal block	3209536	Phoenix Contact	500813	
-X6 &EFS/681.1;&EFS/681.3;&EFS/681.5	6	Feed-through terminal block	3209510	Phoenix Contact	500583	
-X6 &EFS/681.1	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	
-X6 &EFS/681.1	1	End bracket for terminal block	3022276	Phoenix Contact	500588	
-X6 &EFS/681.1	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-XDC1 &EFS/603.2;&EFS/603.3	6	Multi-level terminal block	3210583	Phoenix Contact	501385	
-XDC1 &EFS/603.2;&EFS/603.3	2	Plug-in bridge FBS 3-5	3030174	Phoenix Contact	503103	
-XDC1 &EFS/603.2	2	End bracket for terminal block	3022276	Phoenix Contact	500588	
-XDC1 &EFS/603.2	1	End and partition plate for terminal block	3211634	Phoenix Contact	500505	
-XDC1 &EFS/603.4	2	Protective conductor double-level terminal block Push-in PTTB 2,5-PE	3210596	Phoenix Contact	501389	
-XDC2 &EFS/603.5...&EFS/603.7	7	Multi-level terminal block	3210583	Phoenix Contact	501385	
-XDC2 &EFS/603.5	1	Plug-in bridge FBS 4-5	3030187	Phoenix Contact	500801	
-XDC2 &EFS/603.5	1	End bracket for terminal block	3022276	Phoenix Contact	500588	
-XDC2 &EFS/603.5	1	End and partition plate for terminal block	3211634	Phoenix Contact	500505	
-XDC2 &EFS/603.6	1	Plug-in bridge FBS 2-5	3030161	Phoenix Contact	505211	
-XDC2 &EFS/603.6	1	Plug-in bridge FBS 3-5	3030174	Phoenix Contact	503103	
-XES &EFS/684.0...&EFS/684.2	9	Feed-through terminal block Push-in PT 6	3211813	Phoenix Contact	501388	
-XES &EFS/684.0;&EFS/684.1	4	Plug-in bridge FBS 2-8	3030284	Phoenix Contact	502068	
-XES &EFS/684.0	2	End bracket for terminal block	3022276	Phoenix Contact	500588	
-XES &EFS/684.0	1	End and partition plate for terminal block PT 6	3212044	Phoenix Contact	500503	
-XES &EFS/684.3;&EFS/684.4	5	Feed-through terminal block Push-in PT 6 BU	3211819	Phoenix Contact	500585	
-XES &EFS/684.3	1	Plug-in bridge FBS 5-8	3030310	Phoenix Contact	504375	
-XES &EFS/684.4;&EFS/684.5	4	Ground modular terminal block Push-in PT 6-PE	3211822	Phoenix Contact	500725	
-XT &EFS/635b.1...&EFS/635b.5;&EFS/635b.7	14	Feed-through terminal block	3209510	Phoenix Contact	500583	

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-XT &EFS/635b.1	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	
-XT &EFS/635b.1	2	End bracket for terminal block	3022276	Phoenix Contact	500588	
-XT &EFS/635b.1	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	

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Editor	Freqcon_DG			Statron	FREQCON	PARTS LIST	20250123_V1.3	= UNIT_03 Battery Container 2	
Date	21.01.2025							& EPC Parts List	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ ASC auxillary cabinet	page: 8
Date								+	total: 492

Summarized parts list

Freqcon_ABAS_de_en

Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.
3	Polytron 8000 Series Customized 4-20/HART mit Relais	8344800	Dräger	509321

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Summarized parts list

Freqcon_ABAS_de_en

Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.
1	TREE 16 TX Metall 2GE 14 FE - Unmanaged Gigabit Switch - 16 Ports/	58174	Murrelektronik	10286
1	Network isolators - FL ISOLATOR 100-RJ/RJ	2313931	Phoenix Contact	501464
1	Uninterruptible power supply QUINT-UPS/ 24DC/ 24DC/20	2320238	Phoenix Contact	501598
1	Energy storage UPS-BAT/VRLA/24DC/12AH	2320322	Phoenix Contact	501229
1	Power supply QUINT-PS/3AC/24DC/20/CO, with protective coating	2320924	Phoenix Contact	501573
1	Surge protection device	2881007	Phoenix Contact	504791
2	Patch panel, connection field: one RJ45 socket on 8 spring-cage connection terminals	2901642	Phoenix Contact	10214
13	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726
9	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803
1	0,5m Cat.6 PiMF-Patchcabel, green	PATCH-C6 05 GN	reichelt elektronik GmbH & Co. KG	504395
2	CIRCUIT-BREAKER SPRING-L. CONN. 3.2A	3RV2011-1DA25	Siemens	501432
3	Combination arrester type 1+2, UC 350V AC, 3-pole, FM, for TNC systems	5SD7443-1	Siemens	504070
7	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737
1	PIN BUS BAR SHOCKHAZARD SAFETY, 16QMM 3 PHASE+HS	5ST3712	Siemens	10274
2	End cap for pin busbars 2 - 3-phase	5ST3750	Siemens	503570
1	RCBO elm, 10 kA, 1P+N, type A, 30 mA, B-char, In: 10 A, Un AC: 230 V	5SU1354-6KK10	Siemens	10440
1	RCBO elm, 10 kA, 1P+N, type A, 30 mA, C-char, In: 20 A, Un AC: 230 V	5SU1354-7KK20	Siemens	10441
2	Device circuit breaker 230VAC / 60VDC, 3kA, 1-pole, AS, F2, 10A	5SY1710-4	Siemens	10086

Summarized parts list

Freqcon_ABAS_de_en

Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.
6	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682
11	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569
3	SENTRON Miniature circuit breaker	5SY4332-7	Siemens	505272
2	SIMATIC ET 200SP DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	Siemens	500788
1	SIMATIC ET 200SP DQ 16x24 VDC/0.5 A ST	6ES7132-6BH01-0BA0	Siemens	504397
1	SIMATIC ET 200SP AI 4x U/I 2-wire	6ES7134-6HD01-0BA1	Siemens	505054
1	AQ 4XU/I ST	6ES7135-6HD00-0BA1	Siemens	504291
1	SIMATIC ET 200SP, PROFINET Interface-Module, IM 155-6 PN ST, bundle of Server module + Busadapter	6ES7155-6AA01-0BN0	Siemens	501554
1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787
4	BASEUNIT TYPE A0, BU15-P16+A0+2D	6ES7193-6BP00-0DA0	Siemens	500786

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-18T1 &EFS/18.2	1	TMC Transformer 3150kVA-6300V/620V-50Hz-AL-IP00		TMC Transformers	508555	
-18W5 &EFS/18.3	1	Anschlussschiene;100x370mm;Zeichnung 501153B	501153	Freqcon GmbH	501153	

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Editor	Freqcon_DG			Statron	FREQCON	PARTS LIST	20250123_V1.3	= UNIT_01 Converter Container 1
Date	05.11.2024							& EPC Parts List
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ TRA medium voltage transformer page: 1
Date								+ total: 492

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-18Q1 &EFS++TRA/18.7	1	Switch-disconnector S6000, AC 600A at 690V AC (AC21B), size 2, 4-pole, to attach to the mounting plate	S6-08003NDO	Pronutec GmbH	10172	
-18Q1 &EFS++TRA/18.7	1	Auxiliary contacts S6000 SIZE 2	D5LAU01	Pronutec GmbH	503044	
-18Q1 &EFS++TRA/18.7	1	Direct handle S6000 SIZE 2	DS-LI21	Pronutec GmbH	503039	

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Editor	Freqcon_DG			Statron	FREQCON	PARTS LIST	20250123_V1.3	= UNIT_01 Converter Container 1	
Date	05.11.2024							& EPC Parts List	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CONV Converter	page: 1
Date								+	total: 492

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-147B2 &EFS++CT+/147.7	1	Temperature sensor PT100, cable 3m Silicon	H2-012030-SDS	Fühler Direkt	500648	
-201Q1 &EFS+/201.3	1	*** VX BG PowerStack 1*1000A*** with SkiiP 2414 GB12E4-4DUW	52872	Freqcon GmbH	52872	
-201Q1 &EFS+/201.3	1	D SUB ADAPTER, PLUG-RECEPTACLE, 25-POL, L-COM DG9025MF1	506157	Freqcon GmbH	506157	
-201Q1 &EFS+/201.3	1	SKiiP 2414 GB17E4-4DUW, 1*1000 A	20603236	Semikron	501558	X
-201Q1 &EFS+/201.3	2	Mini feed-through terminal block, Push in, MPT 1,5/S	3248100	Phoenix Contact	501024	X
-201Q1 &EFS+/201.3	2	End clamp CLIPFIX 15	3022263	Phoenix Contact	500935	X
-201Q1 &EFS+/201.3	1	End cover D-MPT 1,5/S	3248120	Phoenix Contact	500899	X
-201Q1-C &EFS+/201.5	4	Snubber capacitor 470nF 5% 1500V Version for SkiiP module (SL)	KPF-271 REV-01	Alcon Electronics Pvt. Ltd.	501406	X
-201Q1-C &EFS+/201.6	1	Film Capacitor 1500µF 700VDC, with PT100 temperature sensor	1025314-54097	FTCap GmbH	504740	X
-201Q1-C &EFS+/201.6;&EFS+/201.7	3	Film Capacitor 1500µF 700VDC	1025173-54097	FTCap GmbH	500662	X
-201Q1-C &EFS+/201.6;&EFS+/201.7	2	Film Capacitor 1500µF 700VDC EC1500µ700d116165KF6_1	1025170-54097	FTCap GmbH	500661	X
-202Q1 &EFS+/202.3	1	*** VX BG PowerStack 1*1000A*** with SkiiP 2414 GB12E4-4DUW	52872	Freqcon GmbH	52872	
-202Q1 &EFS+/202.3	1	D SUB ADAPTER, PLUG-RECEPTACLE, 25-POL, L-COM DG9025MF1	506157	Freqcon GmbH	506157	
-202Q1 &EFS+/202.3	1	SKiiP 2414 GB17E4-4DUW, 1*1000 A	20603236	Semikron	501558	X
-202Q1 &EFS+/202.3	2	Mini feed-through terminal block, Push in, MPT 1,5/S	3248100	Phoenix Contact	501024	X
-202Q1 &EFS+/202.3	2	End clamp CLIPFIX 15	3022263	Phoenix Contact	500935	X
-202Q1 &EFS+/202.3	1	End cover D-MPT 1,5/S	3248120	Phoenix Contact	500899	X
-202Q1-C &EFS+/202.5	4	Snubber capacitor 470nF 5% 1500V Version for SkiiP module (SL)	KPF-271 REV-01	Alcon Electronics Pvt. Ltd.	501406	X
-202Q1-C &EFS+/202.6	1	Film Capacitor 1500µF 700VDC, with PT100 temperature sensor	1025314-54097	FTCap GmbH	504740	X

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Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-202Q1-C &EFS+/202.6;&EFS+/202.7	3	Film Capacitor 1500µF 700VDC	1025173-54097	FTCap GmbH	500662	X
-202Q1-C &EFS+/202.6;&EFS+/202.7	2	Film Capacitor 1500µF 700VDC EC1500µ700d116165KF6_1	1025170-54097	FTCap GmbH	500661	X
-203Q1 &EFS+/203.3	1	*** VX BG PowerStack 1*1000A*** with SkiiP 2414 GB12E4-4DUW	52872	Freqcon GmbH	52872	
-203Q1 &EFS+/203.3	1	D SUB ADAPTER, PLUG-RECEPTACLE, 25-POL, L-COM DG9025MF1	506157	Freqcon GmbH	506157	
-203Q1 &EFS+/203.3	1	SKiiP 2414 GB17E4-4DUW, 1*1000 A	20603236	Semikron	501558	X
-203Q1 &EFS+/203.3	2	Mini feed-through terminal block, Push in, MPT 1,5/S	3248100	Phoenix Contact	501024	X
-203Q1 &EFS+/203.3	2	End clamp CLIPFIX 15	3022263	Phoenix Contact	500935	X
-203Q1 &EFS+/203.3	1	End cover D-MPT 1,5/S	3248120	Phoenix Contact	500899	X
-203Q1-C &EFS+/203.5	4	Snubber capacitor 470nF 5% 1500V Version for SkiiP module (SL)	KPF-271 REV-01	Alcon Electronics Pvt. Ltd.	501406	X
-203Q1-C &EFS+/203.6	1	Film Capacitor 1500µF 700VDC, with PT100 temperature sensor	1025314-54097	FTCap GmbH	504740	X
-203Q1-C &EFS+/203.6;&EFS+/203.7	3	Film Capacitor 1500µF 700VDC	1025173-54097	FTCap GmbH	500662	X
-203Q1-C &EFS+/203.6;&EFS+/203.7	2	Film Capacitor 1500µF 700VDC EC1500µ700d116165KF6_1	1025170-54097	FTCap GmbH	500661	X
-207Q1 &EFS+/207.3	1	*** VX BG PowerStack 3*250A***	52867	Freqcon GmbH	52867	
-207Q1 &EFS+/207.3	1	SKiiP 603 GD172-3DK1470	20452470	Semikron	501559	X
-207Q1 &EFS+/207.3	2	Mini feed-through terminal block, Push in, MPT 1,5/S	3248100	Phoenix Contact	501024	X
-207Q1 &EFS+/207.3	2	End clamp CLIPFIX 15	3022263	Phoenix Contact	500935	X
-207Q1 &EFS+/207.3	1	End cover D-MPT 1,5/S	3248120	Phoenix Contact	500899	X
-207Q1-C &EFS+/207.5	3	Snubber capacitor 470nF 5% 1500V Version for SkiiP module (SL)	KPF-271 REV-01	Alcon Electronics Pvt. Ltd.	501406	X
-207Q1-C &EFS+/207.6	1	Film Capacitor 1500µF 700VDC, with PT100 temperature sensor	1025314-54097	FTCap GmbH	504740	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-207Q1-C &EFS+/207.6;&EFS+/207.7	2	Film Capacitor 1500µF 700VDC	1025173-54097	FTCap GmbH	500662	X
-207Q1-C &EFS+/207.7	1	Film Capacitor 1500µF 700VDC EC1500µ700d116165KF6_1	1025170-54097	FTCap GmbH	500661	X
-207Q1-U1 &EFS+/207.3	1	SKiiP 3 I Adapter	FRQ-M00080-1	Freqcon GmbH	500426	
-211Q1 &EFS+/211.3	1	*** VX BG PowerStack 3*250A***	52867	Freqcon GmbH	52867	
-211Q1 &EFS+/211.3	1	SKiiP 603 GD172-3DK1470	20452470	Semikron	501559	X
-211Q1 &EFS+/211.3	2	Mini feed-through terminal block, Push in, MPT 1,5/S	3248100	Phoenix Contact	501024	X
-211Q1 &EFS+/211.3	2	End clamp CLIPFIX 15	3022263	Phoenix Contact	500935	X
-211Q1 &EFS+/211.3	1	End cover D-MPT 1,5/S	3248120	Phoenix Contact	500899	X
-211Q1-C &EFS+/211.5	3	Snubber capacitor 470nF 5% 1500V Version for SkiiP module (SL)	KPF-271 REV-01	Alcon Electronics Pvt. Ltd.	501406	X
-211Q1-C &EFS+/211.6	1	Film Capacitor 1500µF 700VDC, with PT100 temperature sensor	1025314-54097	FTCap GmbH	504740	X
-211Q1-C &EFS+/211.6;&EFS+/211.7	2	Film Capacitor 1500µF 700VDC	1025173-54097	FTCap GmbH	500662	X
-211Q1-C &EFS+/211.7	1	Film Capacitor 1500µF 700VDC EC1500µ700d116165KF6_1	1025170-54097	FTCap GmbH	500661	X
-211Q1-U1 &EFS+/211.3	1	SKiiP 3 I Adapter	FRQ-M00080-1	Freqcon GmbH	500426	
-217Q1 &EFS+/217.3	1	*** VX BG PowerStack 3*250A***	52867	Freqcon GmbH	52867	
-217Q1 &EFS+/217.3	1	SKiiP 603 GD172-3DK1470	20452470	Semikron	501559	X
-217Q1 &EFS+/217.3	1	DC Adapter 3.3535 (EN-AW 5754) Alu	51524	Freqcon GmbH	51524	
-217Q1 &EFS+/217.3	2	Mini feed-through terminal block, Push in, MPT 1,5/S	3248100	Phoenix Contact	501024	X
-217Q1 &EFS+/217.3	2	End clamp CLIPFIX 15	3022263	Phoenix Contact	500935	X
-217Q1 &EFS+/217.3	1	End cover D-MPT 1,5/S	3248120	Phoenix Contact	500899	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-217Q1-C &EFS+/217.5	3	Snubber capacitor 470nF 5% 1500V Version for SkiiP module (SL)	KPF-271 REV-01	Alcon Electronics Pvt. Ltd.	501406	X
-217Q1-C &EFS+/217.6	1	Film Capacitor 1500µF 700VDC, with PT100 temperature sensor	1025314-54097	FTCap GmbH	504740	X
-217Q1-C &EFS+/217.6;&EFS+/217.7	2	Film Capacitor 1500µF 700VDC	1025173-54097	FTCap GmbH	500662	X
-217Q1-C &EFS+/217.7	1	Film Capacitor 1500µF 700VDC EC1500µ700d116165KF6_1	1025170-54097	FTCap GmbH	500661	X
-217Q1-U1 &EFS+/217.3	1	SKiiP 3 I Adapter	FRQ-M00080-1	Freqcon GmbH	500426	
-260B1 &EFS+/260.3	1	Optical smoke detector 12V, with alarm relais	130-60-457	ABUS Security-Center GmbH & Co. KG	500713	X
-279M1 &EFS+/279.1	1	SK TopTherm fan-and-filter unit, 550/600 m³/h, 230 V, 1~, 50/60 Hz, 70W	3243100	Rittal	500596	X
-279M2 &EFS+/279.2	1	SK TopTherm fan-and-filter unit, 550/600 m³/h, 230 V, 1~, 50/60 Hz, 70W	3243100	Rittal	500596	X
-279M3 &EFS+/279.3	1	SK TopTherm fan-and-filter unit, 550/600 m³/h, 230 V, 1~, 50/60 Hz, 70W	3243100	Rittal	500596	X
-279M4 &EFS+/279.5	1	SK TopTherm fan-and-filter unit, 550/600 m³/h, 230 V, 1~, 50/60 Hz, 70W	3243100	Rittal	500596	X
-279M5 &EFS+/279.6	1	SK TopTherm fan-and-filter unit, 550/600 m³/h, 230 V, 1~, 50/60 Hz, 70W	3243100	Rittal	500596	X
-N &EFS+/99.5	2	Busbar holder for busbars 12x 5 (10)-30x 5 (10) and 6x 6 mm	8US1923-1AA01	Siemens	501271	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-201L1 &EFS+/201.1	1	*** VX Single phase line Inductor, I= 1x 1000 A LN= 0,2mH ***	53053	Freqcon GmbH	53053	
-201L1 &EFS+/201.1	1	Inductor, 1050A, 0.2mH, 690V, 50/60Hz, 1-phas, 1x PT100, water-cooled	36231	Trafotek Oy	500889	X
-201U1 &EFS+/201.0	1	EMI Suppresion CAP DC	FRQ-M00110	Freqcon GmbH	500449	
-202L1 &EFS+/202.1	1	*** VX Single phase line Inductor, I= 1x 1000 A LN= 0,2mH ***	53053	Freqcon GmbH	53053	
-202L1 &EFS+/202.1	1	Inductor, 1050A, 0.2mH, 690V, 50/60Hz, 1-phas, 1x PT100, water-cooled	36231	Trafotek Oy	500889	X
-202U1 &EFS+/202.0	1	EMI Suppresion CAP DC	FRQ-M00110	Freqcon GmbH	500449	
-203L1 &EFS+/203.1	1	*** VX Single phase line Inductor, I= 1x 1000 A LN= 0,2mH ***	53053	Freqcon GmbH	53053	
-203L1 &EFS+/203.1	1	Inductor, 1050A, 0.2mH, 690V, 50/60Hz, 1-phas, 1x PT100, water-cooled	36231	Trafotek Oy	500889	X
-203U1 &EFS+/203.0	1	EMI Suppresion CAP DC	FRQ-M00110	Freqcon GmbH	500449	
-207L1 &EFS+/207.1	1	*** VX Trible phase line Inductor, I= 3x 250A LN= 0,6mH ***	53046	Freqcon GmbH	53046	
-207L1 &EFS+/207.1	1	3x Single phase line reactor, UN=690 V, 50/60 Hz, LN=0,6 mH, I=263,0 A	37106B	Trafotek Oy	501204	X
-211L1 &EFS+/211.1	1	*** VX Trible phase line Inductor, I= 3x 250A LN= 0,6mH ***	53046	Freqcon GmbH	53046	
-211L1 &EFS+/211.1	1	3x Single phase line reactor, UN=690 V, 50/60 Hz, LN=0,6 mH, I=263,0 A	37106B	Trafotek Oy	501204	X
-217L1 &EFS+/217.1	1	*** VX Trible phase line Inductor, I= 3x 250A LN= 0,6mH ***	53046	Freqcon GmbH	53046	
-217L1 &EFS+/217.1	1	3x Single phase line reactor, UN=690 V, 50/60 Hz, LN=0,6 mH, I=263,0 A	37106B	Trafotek Oy	501204	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-80Q1 &EFS+/80.0	1	*** VX BG Circuit Breaker IEC 1000 A ***	52955	Freqcon GmbH	52955	
-80Q1 &EFS+/80.1	1	Circuit breaker 3WL1112, 1250A, 42kA 690V, size 1, 3-pole, IEC, ETU15B, withdrawable	3WL1112-2BB36-1BJ2-ZA08+K07+M06+M21+R10	Siemens	501430	X
-83U1 &EFS+/83.2	1	*** VX BG AC Capacitor Bank 3 * 600µF ***	52918	Freqcon GmbH	52918	
-83U1-C1 &EFS+/83.4	1	CAPACITORS MKP AC B32362 150µF 680V AC / 480V rms	B32362A4157J080	EPCOS AG	500663	X
-83U1-C2 &EFS+/83.5	1	CAPACITORS MKP AC B32362 150µF 680V AC / 480V rms	B32362A4157J080	EPCOS AG	500663	X
-83U1-C3 &EFS+/83.5	1	CAPACITORS MKP AC B32362 150µF 680V AC / 480V rms	B32362A4157J080	EPCOS AG	500663	X
-83U1-C4 &EFS+/83.6	1	CAPACITORS MKP AC B32362 150µF 680V AC / 480V rms	B32362A4157J080	EPCOS AG	500663	X
-83U1-C7 &EFS+/83.4	1	CAPACITORS MKP AC B32362 150µF 680V AC / 480V rms	B32362A4157J080	EPCOS AG	500663	X
-83U1-C8 &EFS+/83.5	1	CAPACITORS MKP AC B32362 150µF 680V AC / 480V rms	B32362A4157J080	EPCOS AG	500663	X
-83U1-C9 &EFS+/83.5	1	CAPACITORS MKP AC B32362 150µF 680V AC / 480V rms	B32362A4157J080	EPCOS AG	500663	X
-83U1-C10 &EFS+/83.6	1	CAPACITORS MKP AC B32362 150µF 680V AC / 480V rms	B32362A4157J080	EPCOS AG	500663	X
-83U1-C13 &EFS+/83.4	1	CAPACITORS MKP AC B32362 150µF 680V AC / 480V rms	B32362A4157J080	EPCOS AG	500663	X
-83U1-C14 &EFS+/83.5	1	CAPACITORS MKP AC B32362 150µF 680V AC / 480V rms	B32362A4157J080	EPCOS AG	500663	X
-83U1-C15 &EFS+/83.5	1	CAPACITORS MKP AC B32362 150µF 680V AC / 480V rms	B32362A4157J080	EPCOS AG	500663	X
-83U1-C16 &EFS+/83.6	1	CAPACITORS MKP AC B32362 150µF 680V AC / 480V rms	B32362A4157J080	EPCOS AG	500663	X
-148B3 &EFS++CT+/148.5	1	Temperature sensor PT100, cable 6m Silicon	H2-012060-SDS	Fühler Direkt	500649	
-227U1 &EFS+/227.0	1	*** VX BG DC switch and Fuse 3*250A 1000V***	52882	Freqcon GmbH	52882	
-227U1-C1 &EFS+/227.1	1	CAPACITORS MKP DC B2562 340µF 1320V DC	B25620C1347K321	EPCOS AG	501405	X
-227U1-C7 &EFS+/227.3	1	CAPACITORS MKP DC B2562 340µF 1320V DC	B25620C1347K321	EPCOS AG	501405	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-227U1-C13 &EFS+/227.7	1	CAPACITORS MKP DC B2562 340µF 1320V DC	B25620C1347K321	EPCOS AG	501405	X
-227U1-F0 &EFS+/227.2	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-227U1-F1 &EFS+/227.1	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-227U1-F1 &EFS+/227.1	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-227U1-F1 &EFS+/227.1	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-227U1-F2 &EFS+/227.1	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-227U1-F2 &EFS+/227.1	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-227U1-F2 &EFS+/227.1	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-227U1-F3 &EFS+/227.1	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-227U1-F3 &EFS+/227.1	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-227U1-F3 &EFS+/227.1	1	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-227U1-F4 &EFS+/227.2	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-227U1-F4 &EFS+/227.2	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-227U1-F5 &EFS+/227.3	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-227U1-F5 &EFS+/227.3	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-227U1-F5 &EFS+/227.3	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-227U1-F6 &EFS+/227.3	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-227U1-F6 &EFS+/227.3	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-227U1-F6 &EFS+/227.3	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-227U1-F7 &EFS+/227.3	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-227U1-F7 &EFS+/227.3	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-227U1-F8 &EFS+/227.4	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-227U1-F8 &EFS+/227.4	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-227U1-F9 &EFS+/227.6	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-227U1-F9 &EFS+/227.6	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-227U1-F9 &EFS+/227.6	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-227U1-F10 &EFS+/227.7	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-227U1-F10 &EFS+/227.7	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-227U1-F10 &EFS+/227.7	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-227U1-F11 &EFS+/227.6	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-227U1-F11 &EFS+/227.6	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-227U1-F12 &EFS+/227.8	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-227U1-F12 &EFS+/227.8	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-227U1-F12 &EFS+/227.8	1	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-227U1-K1 &EFS+/227.a.1	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-227U1-K2 &EFS+/227.a.2	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-227U1-K3 &EFS+/227.a.2	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-227U1-K7 &EFS+/227.a.3	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-227U1-K8 &EFS+/227.a.4	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-227U1-K9 &EFS+/227.a.5	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-227U1-U1 &EFS+/227.4	1	EMI Suppresion CAP L1-L3; N; DC + & -	FRQ-M00111	Freqcon GmbH	500450	X
-227U1-X3.1 &EFS+/227.a.0;&EFS+/227.a.9	0					
-227U1-X3.1 &EFS+/227.a.1...&EFS+/227.a.9	17	Feed-through terminal block Push-in PT 2,5/1P	3210033	Phoenix Contact	501390	X
-227U1-X3.1 &EFS+/227.a.1	1	Plug Push-in, 1 Pol., 0,14 mm² - 4 mm², PP-H 2,5/1-L	3210062	Phoenix Contact	504126	X
-227U1-X3.1 &EFS+/227.a.1	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	X
-227U1-X3.1 &EFS+/227.a.1;&EFS+/227.a.9	2	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-227U1-X3.1 &EFS+/227.a.1;&EFS+/227.a.9	2	Latching PR	3040559	Phoenix Contact	504066	X
-227U1-X3.1 &EFS+/227.a.2...&EFS+/227.a.9	15	Plug Push-in, 1 Pol., 0,14 mm² - 4 mm², PP-H 2,5/1-M	3210091	Phoenix Contact	504129	X
-227U1-X3.1 &EFS+/227.a.9	1	Plug Push-in, 1 Pol., 0,14 mm² - 4 mm², PP-H 2,5/1-R	3210127	Phoenix Contact	10044	X
-227U1-X3.2 &EFS+/227.a.0	0					
-227U1-X3.2 &EFS+/227.a.1...&EFS+/227.a.7	13	Multi-level terminal block	3208511	Phoenix Contact	500560	X
-227U1-X3.2 &EFS+/227.a.1	1	End and partition plate for terminal block	3208579	Phoenix Contact	500504	X
-227U1-X3.2 &EFS+/227.a.1;&EFS+/227.a.7	2	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-227U1-X3.2 &EFS+/227.a.1;&EFS+/227.a.5	2	Plug-in bridge FBS 10-3,5	3213056	Phoenix Contact	501171	X
-231U1 &EFS+/231.0	1	*** VX BG DC switch and Fuse 3*250A 1000V***	52882	Freqcon GmbH	52882	
-231U1-C1 &EFS+/231.1	1	CAPACITORS MKP DC B2562 340µF 1320V DC	B25620C1347K321	EPCOS AG	501405	X
-231U1-C7 &EFS+/231.3	1	CAPACITORS MKP DC B2562 340µF 1320V DC	B25620C1347K321	EPCOS AG	501405	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-231U1-C13 &EFS+/231.7	1	CAPACITORS MKP DC B2562 340µF 1320V DC	B25620C1347K321	EPCOS AG	501405	X
-231U1-F0 &EFS+/231.2	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-231U1-F1 &EFS+/231.1	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-231U1-F1 &EFS+/231.1	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-231U1-F1 &EFS+/231.1	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-231U1-F2 &EFS+/231.1	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-231U1-F2 &EFS+/231.1	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-231U1-F2 &EFS+/231.1	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-231U1-F3 &EFS+/231.1	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-231U1-F3 &EFS+/231.1	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-231U1-F3 &EFS+/231.1	1	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-231U1-F4 &EFS+/231.2	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-231U1-F4 &EFS+/231.2	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-231U1-F5 &EFS+/231.3	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-231U1-F5 &EFS+/231.3	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-231U1-F5 &EFS+/231.3	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-231U1-F6 &EFS+/231.3	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-231U1-F6 &EFS+/231.3	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-231U1-F6 &EFS+/231.3	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-231U1-F7 &EFS+/231.3	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-231U1-F7 &EFS+/231.3	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-231U1-F8 &EFS+/231.4	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-231U1-F8 &EFS+/231.4	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-231U1-F9 &EFS+/231.6	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-231U1-F9 &EFS+/231.6	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-231U1-F9 &EFS+/231.6	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-231U1-F10 &EFS+/231.7	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-231U1-F10 &EFS+/231.7	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-231U1-F10 &EFS+/231.7	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-231U1-F11 &EFS+/231.6	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-231U1-F11 &EFS+/231.6	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-231U1-F12 &EFS+/231.8	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-231U1-F12 &EFS+/231.8	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-231U1-F12 &EFS+/231.8	1	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-231U1-K1 &EFS+/231.a.1	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-231U1-K2 &EFS+/231.a.2	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-231U1-K3 &EFS+/231.a.2	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-231U1-K7 &EFS+/231.a.3	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-231U1-K8 &EFS+/231.a.4	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-231U1-K9 &EFS+/231.a.5	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-231U1-U1 &EFS+/231.4	1	EMI Suppresion CAP L1-L3; N; DC + & -	FRQ-M00111	Freqcon GmbH	500450	X
-231U1-X3.1 &EFS+/231.a.0;&EFS+/231.a.9	0					
-231U1-X3.1 &EFS+/231.a.1...&EFS+/231.a.9	17	Feed-through terminal block Push-in PT 2,5/1P	3210033	Phoenix Contact	501390	X
-231U1-X3.1 &EFS+/231.a.1	1	Plug Push-in, 1 Pol., 0,14 mm² - 4 mm², PP-H 2,5/1-L	3210062	Phoenix Contact	504126	X
-231U1-X3.1 &EFS+/231.a.1	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	X
-231U1-X3.1 &EFS+/231.a.1;&EFS+/231.a.9	2	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-231U1-X3.1 &EFS+/231.a.1;&EFS+/231.a.9	2	Latching PR	3040559	Phoenix Contact	504066	X
-231U1-X3.1 &EFS+/231.a.2...&EFS+/231.a.9	15	Plug Push-in, 1 Pol., 0,14 mm² - 4 mm², PP-H 2,5/1-M	3210091	Phoenix Contact	504129	X
-231U1-X3.1 &EFS+/231.a.9	1	Plug Push-in, 1 Pol., 0,14 mm² - 4 mm², PP-H 2,5/1-R	3210127	Phoenix Contact	10044	X
-231U1-X3.2 &EFS+/231.a.0	0					
-231U1-X3.2 &EFS+/231.a.1...&EFS+/231.a.7	13	Multi-level terminal block	3208511	Phoenix Contact	500560	X
-231U1-X3.2 &EFS+/231.a.1	1	End and partition plate for terminal block	3208579	Phoenix Contact	500504	X
-231U1-X3.2 &EFS+/231.a.1;&EFS+/231.a.7	2	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-231U1-X3.2 &EFS+/231.a.1;&EFS+/231.a.5	2	Plug-in bridge FBS 10-3,5	3213056	Phoenix Contact	501171	X
-237U1 &EFS+/237.0	1	*** VX BG DC switch and Fuse 3*250A 1000V***	52882	Freqcon GmbH	52882	
-237U1-C1 &EFS+/237.1	1	CAPACITORS MKP DC B2562 340µF 1320V DC	B25620C1347K321	EPCOS AG	501405	X
-237U1-C7 &EFS+/237.3	1	CAPACITORS MKP DC B2562 340µF 1320V DC	B25620C1347K321	EPCOS AG	501405	X

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-237U1-C13 &EFS+/237.7	1	CAPACITORS MKP DC B2562 340µF 1320V DC	B25620C1347K321	EPCOS AG	501405	X
-237U1-F0 &EFS+/237.2	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-237U1-F1 &EFS+/237.1	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-237U1-F1 &EFS+/237.1	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-237U1-F1 &EFS+/237.1	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-237U1-F2 &EFS+/237.1	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-237U1-F2 &EFS+/237.1	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-237U1-F2 &EFS+/237.1	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-237U1-F3 &EFS+/237.1	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-237U1-F3 &EFS+/237.1	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-237U1-F3 &EFS+/237.1	1	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-237U1-F4 &EFS+/237.2	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-237U1-F4 &EFS+/237.2	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-237U1-F5 &EFS+/237.3	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-237U1-F5 &EFS+/237.3	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-237U1-F5 &EFS+/237.3	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-237U1-F6 &EFS+/237.3	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-237U1-F6 &EFS+/237.3	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-237U1-F6 &EFS+/237.3	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-237U1-F7 &EFS+/237.3	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-237U1-F7 &EFS+/237.3	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-237U1-F8 &EFS+/237.4	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-237U1-F8 &EFS+/237.4	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-237U1-F9 &EFS+/237.6	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-237U1-F9 &EFS+/237.6	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-237U1-F9 &EFS+/237.6	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-237U1-F10 &EFS+/237.7	1	HLS Fuse 1250V/400A Size 1KN/110	170M4243	Gemballa Electronics	501537	X
-237U1-F10 &EFS+/237.7	1	Fuse base Bussmann 1250A, 1400V, 110mm center distance, UR 43653	170H3006	Gemballa Electronics	501536	X
-237U1-F10 &EFS+/237.7	1	Microswitch 250V/2A Switch K1	170H0069	Gemballa Electronics	501455	X
-237U1-F11 &EFS+/237.6	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-237U1-F11 &EFS+/237.6	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-237U1-F12 &EFS+/237.8	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	X
-237U1-F12 &EFS+/237.8	1	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-237U1-F12 &EFS+/237.8	1	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-237U1-K1 &EFS+/237.a.1	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-237U1-K2 &EFS+/237.a.2	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-237U1-K3 &EFS+/237.a.2	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-237U1-K7 &EFS+/237.a.3	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-237U1-K8 &EFS+/237.a.4	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-237U1-K9 &EFS+/237.a.5	1	HX22 CAB 1500V, 300A, SPST-NO, 24Vdc	GIG/HX22CAB	GIGAVAC	509201	X
-237U1-U1 &EFS+/237.4	1	EMI Suppresion CAP L1-L3; N; DC + & -	FRQ-M00111	Freqcon GmbH	500450	X
-237U1-X3.1 &EFS+/237.a.0;&EFS+/237.a.9	0					
-237U1-X3.1 &EFS+/237.a.1...&EFS+/237.a.9	17	Feed-through terminal block Push-in PT 2,5/1P	3210033	Phoenix Contact	501390	X
-237U1-X3.1 &EFS+/237.a.1	1	Plug Push-in, 1 Pol., 0,14 mm² - 4 mm², PP-H 2,5/1-L	3210062	Phoenix Contact	504126	X
-237U1-X3.1 &EFS+/237.a.1	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	X
-237U1-X3.1 &EFS+/237.a.1;&EFS+/237.a.9	2	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-237U1-X3.1 &EFS+/237.a.1;&EFS+/237.a.9	2	Latching PR	3040559	Phoenix Contact	504066	X
-237U1-X3.1 &EFS+/237.a.2...&EFS+/237.a.9	15	Plug Push-in, 1 Pol., 0,14 mm² - 4 mm², PP-H 2,5/1-M	3210091	Phoenix Contact	504129	X
-237U1-X3.1 &EFS+/237.a.9	1	Plug Push-in, 1 Pol., 0,14 mm² - 4 mm², PP-H 2,5/1-R	3210127	Phoenix Contact	10044	X
-237U1-X3.2 &EFS+/237.a.0	0					
-237U1-X3.2 &EFS+/237.a.1...&EFS+/237.a.7	13	Multi-level terminal block	3208511	Phoenix Contact	500560	X
-237U1-X3.2 &EFS+/237.a.1	1	End and partition plate for terminal block	3208579	Phoenix Contact	500504	X
-237U1-X3.2 &EFS+/237.a.1;&EFS+/237.a.7	2	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-237U1-X3.2 &EFS+/237.a.1;&EFS+/237.a.5	2	Plug-in bridge FBS 10-3,5	3213056	Phoenix Contact	501171	X
-281M1 &EFS+/281.1	1	SK TopTherm fan-and-filter unit, 550/600 m³/h, 230 V, 1~, 50/60 Hz, 70W	3243100	Rittal	500596	X
-281M2 &EFS+/281.2	1	SK TopTherm fan-and-filter unit, 550/600 m³/h, 230 V, 1~, 50/60 Hz, 70W	3243100	Rittal	500596	X
-281M3 &EFS+/281.3	1	SK TopTherm fan-and-filter unit, 550/600 m³/h, 230 V, 1~, 50/60 Hz, 70W	3243100	Rittal	500596	X

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-78F1 &EFS+/78.6	1	Fuse switch disconnector 3NP1, 3-pole, NH00, 160 A, for mounting plate, flat terminal, Fuse monitoring: electromechanical	3NP11331CA11	Siemens	500738	
-78F1 &EFS+/78.6	3	Fuse link 690V AC, 100A, NH00, gL/gG, UL recognized, Bussmann	100NHG00B-690	Gemballa Electronics	501539	
-78F2 &EFS+/78.6	1	SURGE ARRESTER [Typ 1 + Typ 2] PP BC TNC 50-400/690	374504	LEUTRON GmbH	10055	
-78F3 &EFS+/78.7;&EFS+/78.8	3	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779	
-78F3 &EFS+/78.7;&EFS+/78.8	3	SITOR cylindrical fuse link, 10 x 38 mm, 20 A, aR, Un AC: 600 V, Un DC: 700 V, DC according to UL	3NC1020	Siemens	501545	
-78W1 &EFS+/78.3	1	*** BG connection rail 100x370 ***	53190	Freqcon GmbH	53190	
-78W2 &EFS+/78.3	0	*** BG connection rail 100x370 ***	53190	Freqcon GmbH	53190	
-78W3 &EFS+/78.3	0	*** BG connection rail 100x370 ***	53190	Freqcon GmbH	53190	
-78W4 &EFS+/78.3	1	*** VX BG PE + N busbar 50x380 - 600 MTS ***	53290	Freqcon GmbH	53290	
-78W5 &EFS+/78.2	1	*** BG connection rail 100x370 ***	50070	Freqcon GmbH	50070	
-227W10 &EFS+/227.1	1	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-227W11 &EFS+/227.1	0	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-227W12 &EFS+/227.4	1	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-227W13 &EFS+/227.4	0	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-227W14 &EFS+/227.7	1	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-227W15 &EFS+/227.7	0	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-228F1 &EFS+/228.0	1	Lightning/surge arrester type 1/2 2P 1500VDC	2905640	Phoenix Contact	501130	
-228F2 &EFS+/228.4	1	Lightning/surge arrester type 1/2 2P 1500VDC	2905640	Phoenix Contact	501130	
-228F3 &EFS+/228.7	1	Lightning/surge arrester type 1/2 2P 1500VDC	2905640	Phoenix Contact	501130	

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-231W10 &EFS+/231.1	1	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-231W11 &EFS+/231.1	0	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-231W12 &EFS+/231.4	1	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-231W13 &EFS+/231.4	0	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-231W14 &EFS+/231.7	1	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-231W15 &EFS+/231.7	0	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-237W10 &EFS+/237.1	1	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-237W11 &EFS+/237.1	0	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-237W12 &EFS+/237.4	1	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-237W13 &EFS+/237.4	0	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-237W14 &EFS+/237.7	1	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-237W15 &EFS+/237.7	0	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604	
-238F1 &EFS+/238a.0	1	Lightning/surge arrester type 1/2 2P 1500VDC	2905640	Phoenix Contact	501130	
-238F2 &EFS+/238a.4	1	Lightning/surge arrester type 1/2 2P 1500VDC	2905640	Phoenix Contact	501130	
-238F3 &EFS+/238a.7	1	Lightning/surge arrester type 1/2 2P 1500VDC	2905640	Phoenix Contact	501130	
-238F4 &EFS+/238b.0	1	Lightning/surge arrester type 1/2 2P 1500VDC	2905640	Phoenix Contact	501130	
-238F5 &EFS+/238b.4	1	Lightning/surge arrester type 1/2 2P 1500VDC	2905640	Phoenix Contact	501130	
-238F6 &EFS+/238b.7	1	Lightning/surge arrester type 1/2 2P 1500VDC	2905640	Phoenix Contact	501130	
-X3.43	20	Multi-level terminal block	3208511	Phoenix Contact	500560	X

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-113U5 &EFS/113c.1	1	Patch panel, connection field: one RJ45 socket on 8 spring-cage connection terminals	2901642	Phoenix Contact	10214	
-XT1 &EFS/136.0...&EFS/136.8	20	Feed-through terminal block	3209510	Phoenix Contact	500583	
-XT1 &EFS/136.0	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	
-XT1 &EFS/136.0	2	End bracket for terminal block	3022276	Phoenix Contact	500588	
-XT1 &EFS/136.0	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	

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Editor	Freqcon_DG			Statron	FREQCON	PARTS LIST	20250123_V1.3	= UNIT_01 Converter Container 1	
Date	21.01.2025							& EPC Parts List	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 1
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Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-84Q1 &EFS+/84.0	1	EMERGENCY STOP SWITCH	3LD2203-1TP53	Siemens	500810	X
-84Q1 &EFS+/84.0	1	Auxiliary switch	3LD9200-5B	Siemens	504922	X
-112A1 &EFS+/112.2	1	Panel PC 15,6" PPC-JWS156-J4125	PPC-JWS156-I/C-J4125/8GB/128GBSSD/W10	ICP	508475	
-126S1 &EFS+/126.1	1	PUSHBUTTON, BLACK, 1 NO	3SU1100-0AB10-3BA0	Siemens	10026	X
-126S1 &EFS+/126.1	1	Marker carriers - CARRIER-EMP 22 (27X12,5)	0827446	Phoenix Contact	500751	X
-140H1 &EFS+/140.1	1	Complete device, round, indicator light RED	3SU1102-6AA20-3AA0	Siemens	10019	X
-140H1 &EFS+/140.1	1	Marker carriers - CARRIER-EMP 22 (27X12,5)	0827446	Phoenix Contact	500751	X
-140H2 &EFS+/140.2	1	Complete device, round, indicator light YELLOW	3SU1102-6AA30-3AA0	Siemens	10021	X
-140H2 &EFS+/140.2	1	Marker carriers - CARRIER-EMP 22 (27X12,5)	0827446	Phoenix Contact	500751	X
-140H3 &EFS+/140.3	1	Complete device, round, indicator light GREEN	3SU1102-6AA40-3AA0	Siemens	10023	X
-140H3 &EFS+/140.3	1	Marker carriers - CARRIER-EMP 22 (27X12,5)	0827446	Phoenix Contact	500751	X
-140H4 &EFS+/140.4	1	Complete device, round, indicator light GREEN	3SU1102-6AA40-3AA0	Siemens	10023	X
-140H4 &EFS+/140.4	1	Marker carriers - CARRIER-EMP 22 (27X12,5)	0827446	Phoenix Contact	500751	X
-278M1 &EFS+/278.1	1	SK TopTherm fan-and-filter unit, 230/250 m³/h, 230 V, 1~, 50/60 Hz, 40W	3241100	Rittal	500594	X

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Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-110U1 &EFS+/110.2	1	SIMOTION P320-4 BOX WITH INTEL CORE I3 PROZESSOR; 2 X 1,6 GHZ	6AU1320-4DE65-3AF0	Siemens	500789	
-110U1 &EFS+/110.2	1	Connector RJ45, 4 Pol., Profinet, VS-PN-RJ45-5-Q/IP20	1658435	Phoenix Contact	500806	X
-114A1 &EFS+/114.2	1	WALL IE Industrial Ethernet Bridge and Firewall	700-860-WALL01	Helmholz	508505	
-114A1 &EFS+/114.2	1	5G Rundstrahlantenne mit Halterung (600-6000MHz)	B4BE-6-60-5SP	reichelt elektronik GmbH & Co. KG	507944	
-185R1 &EFS+/185.7	1	SK Enclosure heater, 800/870 W, 230 V, 1~, 50/60 Hz, WHD: 103x200x103 mm	3105400	Rittal	500621	X

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Editor	Freqcon_DG			Statron	FREQCON	PARTS LIST	20250123_V1.3	= UNIT_01 Converter Container 1	
Date	23.01.2025							& EPC Parts List	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 1
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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-84F1 &EFS+/84.6	1	Combination arrester type 1+2, UC 350V AC, 3-pole, FM, for TNC systems	5SD7443-1	Siemens	504070	
-84F2 &EFS+/84.0	1	SENTRON Miniature circuit breaker	5SY4332-7	Siemens	505272	X
-84F2 &EFS+/84.0	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	X
-84K1 &EFS+/84.5	1	CONT.RELAY,3NO+1NC,DC24V,DIODE	3RH2131-2FB40	Siemens	501288	X
-101Q1 &EFS+/101.2	1	CIRCUIT-BREAKER SPRING-L. CONN. 3.2A	3RV2011-1DA25	Siemens	501432	X
-101Q1 &EFS+/101.2	1	CABLE CONNECTOR SIZE S00	3RV2917-5AA00	Siemens	500797	X
-101Q1 &EFS+/101.2	1	3-PHASE BUSBAR W. INFEED	3RV2917-1A	Siemens	500799	X
-101Q1 &EFS+/101.2	1	3-phase busbar including extension connector for 3 circuit breakers Size S00 and S0	3RV2917-4B	Siemens	504254	X
-101T1 &EFS+/101.2	1	Power supply unit	2866404	Phoenix Contact	502745	X
-102G1 &EFS+/102.2	1	Uninterruptible power supply	2320241	Phoenix Contact	501836	X
-102G2 &EFS+/102.6	1	Energy storage UPS-BAT/VRLA/24DC/12AH	2320322	Phoenix Contact	501229	X
-103F1 &EFS+/103.2	1	Device circuit breaker 230VAC / 60VDC, 3kA, 1-pole, AS, F2, 10A	5SY1710-4	Siemens	10086	X
-103F2 &EFS+/103.4	1	Device circuit breaker 230VAC / 60VDC, 3kA, 1-pole, AS, F2, 10A	5SY1710-4	Siemens	10086	X
-103F3 &EFS+/103.6	1	Device circuit breaker 230VAC / 60VDC, 3kA, 1-pole, AS, F2, 10A	5SY1710-4	Siemens	10086	X
-103F4 &EFS+/103.8	1	Device circuit breaker 230VAC / 60VDC, 3kA, 1-pole, AS, F2, 10A	5SY1710-4	Siemens	10086	X
-103F5 &EFS+/103.9	1	Device circuit breaker 230VAC / 60VDC, 3kA, 1-pole, AS, F2, 10A	5SY1710-4	Siemens	10086	X
-111A1 &EFS+/111.0	1	Tree 8TX Metall - Unmanaged Switch - 8 Ports	58152	Murrelektronik	10287	
-113T1 &EFS+/113a.1	1	Network isolators - FL ISOLATOR 100-RJ/RJ	2313931	Phoenix Contact	501464	
-113T1 &EFS+/113a.1	1	0,5m Cat.6 PiMF-Patchcabel, green	PATCH-C6 05 GN	reichelt elektronik GmbH & Co. KG	504395	

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-113T2 &EFS+/113b.1	1	Network isolators - FL ISOLATOR 100-RJ/RJ	2313931	Phoenix Contact	501464	
-113T2 &EFS+/113b.1	1	0,5m Cat.6 PiMF-Patchcabel, green	PATCH-C6 05 GN	reichelt elektronik GmbH & Co. KG	504395	
-113U1 &EFS+/113a.3	1	Surge protection device	2881007	Phoenix Contact	504791	
-113U2 &EFS+/113a.5	1	Patch panel, connection field: one RJ45 socket on 8 spring-cage connection terminals	2901642	Phoenix Contact	10214	
-113U3 &EFS+/113b.3	1	Surge protection device	2881007	Phoenix Contact	504791	
-113U4 &EFS+/113b.5	1	Patch panel, connection field: one RJ45 socket on 8 spring-cage connection terminals	2901642	Phoenix Contact	10214	
-115A1 &EFS+/115.3	1	Router Ewon Cosy 131, 4G + VPN router, supply 24 VDC UMTS router	WEC6133G	Wachendorff Prozesstechnik GmbH & Co. KG	506838alt	
-120A1 &EFS+/120.1	1	SIMATIC ET 200SP, PROFINET Interface-Module, IM 155-6 PN ST, bundle of Server module + Busadapter	6ES7155-6AA01-0BN0	Siemens	501554	X
-134K1 &EFS+/134.8	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-134K1 &EFS+/134.8	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-135K1 &EFS+/135.1	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-135K1 &EFS+/135.1	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-135K2 &EFS+/135.2	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-135K2 &EFS+/135.2	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-135K3 &EFS+/135.3	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-135K3 &EFS+/135.3	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-135K4 &EFS+/135.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-135K4 &EFS+/135.4	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-135K5 &EFS+/135.5	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-135K5 &EFS+/135.5	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-136K7 &EFS+/136.5	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-136K8 &EFS+/136.7	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-136K9 &EFS+/136.8	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-137K1 &EFS+/137.1	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-137K1 &EFS+/137.1	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-137K2 &EFS+/137.2	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-137K2 &EFS+/137.2	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-137K3 &EFS+/137.3	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-137K3 &EFS+/137.3	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-137K4 &EFS+/137.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-137K4 &EFS+/137.4	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-138K1 &EFS+/138.1	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-138K1 &EFS+/138.1	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-138K2 &EFS+/138.2	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-138K2 &EFS+/138.2	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-138K3 &EFS+/138.3	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-138K3 &EFS+/138.3	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-138K4 &EFS+/138.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-138K4 &EFS+/138.4	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-138K5 &EFS+/138.5	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-138K5 &EFS+/138.5	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-138K6 &EFS+/138.6	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-138K6 &EFS+/138.6	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-138K7 &EFS+/138.7	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-138K7 &EFS+/138.7	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-139K1 &EFS+/139.1	1	CONTACTOR,AC3:3KW 1NO DC24V M. DIODE	3RT2015-2FB41	Siemens	501516	X
-139K2 &EFS+/139.2	1	CONTACTOR,AC3:3KW 1NO DC24V M. DIODE	3RT2015-2FB41	Siemens	501516	X
-139K3 &EFS+/139.3	1	CONTACTOR,AC3:3KW 1NO DC24V M. DIODE	3RT2015-2FB41	Siemens	501516	X
-150K1 &EFS+/150.1	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-150K1 &EFS+/150.1	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-150K2 &EFS+/150.3	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-150K2 &EFS+/150.3	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-150X1 &EFS+/150.1	1	End and partition plate for terminal block	3208579	Phoenix Contact	500504	X
-150X1 &EFS+/150.1	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-150X1 &EFS+/150.2;&EFS+/150.4;&EFS+/151.1;&EFS+/151.4;&EFS+/151.6	5	Multi-level terminal block	3208511	Phoenix Contact	500560	X
-151K1 &EFS+/151.0	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-151K1 &EFS+/151.0	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-151K2 &EFS+/151.2	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-151K2 &EFS+/151.2	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-151K3 &EFS+/151.3	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-151K3 &EFS+/151.3	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-151K4 &EFS+/151.5	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-151K4 &EFS+/151.5	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-171K3 &EFS+/171.5	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-171K3 &EFS+/171.5	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-173K3 &EFS+/173.6	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-173K3 &EFS+/173.6	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-181Q1 &EFS+/181.1	1	MOTOR PROTECTION S00, A-release 3.5...5 A, N-release 65 A, Spring-type terminal, auxiliary switches 1NO+1NC	3RV2011-1FA25	Siemens	500740	
-181Q1 &EFS+/181.1	1	Link module spring-type Electrical and mechanical for 3RV2011 and 3RT201	3RA2911-2AA00	Siemens	500845	
-181Q1 &EFS+/181.1	1	CABLE CONNECTOR SIZE S00	3RV2917-5AA00	Siemens	500797	
-181Q2 &EFS+/181.3	1	MOTOR PROTECTION S00, A-release 4.5...6.3 A, N-release 82 A, Spring-type terminal, auxiliary switches 1NO+1NC	3RV2011-1GA25	Siemens	500671	
-181Q2 &EFS+/181.3	1	Link module spring-type Electrical and mechanical for 3RV2011 and 3RT201	3RA2911-2AA00	Siemens	500845	
-181Q2 &EFS+/181.3	1	CABLE CONNECTOR SIZE S00	3RV2917-5AA00	Siemens	500797	
-182Q1 &EFS+/182.1	1	MOTOR PROTECTION S00, A-release 3.5...5 A, N-release 65 A, Spring-type terminal, auxiliary switches 1NO+1NC	3RV2011-1FA25	Siemens	500740	
-182Q1 &EFS+/182.1	1	Link module spring-type Electrical and mechanical for 3RV2011 and 3RT201	3RA2911-2AA00	Siemens	500845	
-182Q1 &EFS+/182.1	1	CABLE CONNECTOR SIZE S00	3RV2917-5AA00	Siemens	500797	

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-183F1 &EFS+/183.1	1	CIRCUIT BREAKER 230/400V 10KA 1POL C16	5SY4116-7	Siemens	503569	X
-183F1 &EFS+/183.1	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	X
-183F1 &EFS+/183.1	1	Pin busbar touch-safe, 16 mm2 3x 1-phase+AUX, 1016 mm long	5ST3714	Siemens	503364	X
-183F1 &EFS+/183.1	2	End cap for pin busbars 2 - 3-phase	5ST3750	Siemens	503570	X
-183F2 &EFS+/183.3	1	CIRCUIT BREAKER 10KA 1POL C10	5SY4110-7	Siemens	500681	X
-183F2 &EFS+/183.3	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	X
-185B1 &EFS+/185.6	1	Thermostat NC contact, -10 to 50 °C	8MR2170-1CA	Siemens	500816	X
-185F1 &EFS+/185.1	1	CIRCUIT BREAKER 10KA 1POL C10	5SY4110-7	Siemens	500681	X
-185F1 &EFS+/185.1	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	X
-185F2 &EFS+/185.7	1	SENTRON Miniature circuit breaker	5SY4106-7	Siemens	500682	X
-185F2 &EFS+/185.7	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	X
-186B1 &EFS+/186.6	1	Thermostat NO contact, -10 to 50 °C	8MR2170-1CB	Siemens	501577	X
-186K1 &EFS+/186.6	1	CONTACTOR,AC3:3KW 1NO DC24V M. DIODE	3RT2015-2FB41	Siemens	501516	X
-187F1 &EFS+/187.1	1	CIRCUIT BREAKER 230/400V 10KA 1POL C13	5SY4113-7	Siemens	504323	X
-187F1 &EFS+/187.1	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	X
-187F2 &EFS+/187.4	1	Device circuit breaker 230VAC / 60VDC, 3kA, 1-pole, AS, F2, 10A	5SY1710-4	Siemens	10086	X
-189K1 &EFS+/189.1	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-190F1 &EFS+/190.1	1	RCBO elm, TYP A, 230V, 10KA, 1 Pol.+N, 30mA, C, 16A	5SU1354-7KK16	Siemens	500765	X
-190F1 &EFS+/190.1	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-190F1 &EFS+/190.1	1	Handle coupler for residual current miniature circuit breaker D=70 mm	5ST3805-1	Siemens	500608	X
-190F2 &EFS+/190.3	1	RCBO elm, TYP A, 230V, 10KA, 1 Pol.+N, 30mA, C, 16A	5SU1354-7KK16	Siemens	500765	X
-190F2 &EFS+/190.3	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	X
-190F2 &EFS+/190.3	1	Handle coupler for residual current miniature circuit breaker D=70 mm	5ST3805-1	Siemens	500608	X
-190F3 &EFS+/190.5	1	RCBO elm, TYP A, 230V, 10KA, 1 Pol.+N, 30mA, C, 16A	5SU1354-7KK16	Siemens	500765	X
-190F3 &EFS+/190.5	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	X
-190F3 &EFS+/190.5	1	Handle coupler for residual current miniature circuit breaker D=70 mm	5ST3805-1	Siemens	500608	X
-190X10 &EFS+/190.9	1	5TE6 REG Socket Outlets, 16 A	5TE6800	Siemens	503215	X
-190XT1 &EFS+/190.0	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	X
-190XT1 &EFS+/190.0	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	X
-190XT1 &EFS+/190.1;&EFS+/190.3;&EFS+/190.5;&EFS+/190.7	4	Feed-through terminal block	3209510	Phoenix Contact	500583	X
-190XT1 &EFS+/190.1;&EFS+/190.3;&EFS+/190.5;&EFS+/190.7	4	Feed-through terminal block	3209523	Phoenix Contact	500584	X
-190XT1 &EFS+/190.1;&EFS+/190.5	3	Plug-in bridge FBS 2-5	3030161	Phoenix Contact	505211	X
-190XT1 &EFS+/190.1;&EFS+/190.3;&EFS+/190.5;&EFS+/190.7	4	Ground terminal block	3209536	Phoenix Contact	500813	X
-191F1 &EFS+/191.1	1	CIRCUIT BREAKER 10KA 3POL C16	5SY4316-7	Siemens	503340	X
-191F1 &EFS+/191.1	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	X
-191F2 &EFS+/191.3	1	CIRCUIT BREAKER 10KA 3POL C16	5SY4316-7	Siemens	503340	X
-191F2 &EFS+/191.3	1	SENTRON Auxiliary current switch Mountable	5ST3010	Siemens	500737	X
-191XT1 &EFS+/191.1;&EFS+/191.3	6	Feed-through terminal block Push-in PT 6	3211813	Phoenix Contact	501388	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-191XT1 &EFS+/191.1	1	End and partition plate for terminal block PT 6	3212044	Phoenix Contact	500503	X
-191XT1 &EFS+/191.1	2	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-191XT1 &EFS+/191.2;&EFS+/191.4	2	Feed-through terminal block Push-in PT 6 BU	3211819	Phoenix Contact	500585	X
-191XT1 &EFS+/191.2;&EFS+/191.4	2	Ground modular terminal block Push-in PT 6-PE	3211822	Phoenix Contact	500725	X
-195K1 &EFS+/195.3	1	SIRIUS contactor relay	3RH2362-2BB40	Siemens	501287	X
-195K1 &EFS+/195.3	1	SURGE SUPPRESSOR, DIODE COMBINATION, DC 12...250V, F. CONT. RELAYS A. MOTOR CONT. SZ S00	3RT29161EH00	Siemens	500534	X
-195K2 &EFS+/195.4	1	SIRIUS contactor relay	3RH2362-2BB40	Siemens	501287	X
-195K2 &EFS+/195.4	1	SURGE SUPPRESSOR, DIODE COMBINATION, DC 12...250V, F. CONT. RELAYS A. MOTOR CONT. SZ S00	3RT29161EH00	Siemens	500534	X
-195K3 &EFS+/195.1	1	SIRIUS SAFETY RELAY STD RELAY 3NO+1NC	3SK1111-2AB30	Siemens	501260	X
-AI_01 &EFS+/120.6	1	SIMATIC ET 200SP AI 8xRTD/TC 2-wire HF	6ES7134-6JF00-0CA1	Siemens	501550	X
-AI_01 &EFS+/120.6	1	BASEUNIT TYPE A0, BU15-P16+A0+2D	6ES7193-6BP00-0DA0	Siemens	500786	X
-AI_02 &EFS+/120.6	1	SIMATIC ET 200SP AI 8xRTD/TC 2-wire HF	6ES7134-6JF00-0CA1	Siemens	501550	X
-AI_02 &EFS+/120.6	1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787	X
-AI_03 &EFS+/120.7	1	SIMATIC ET 200SP AI 4x U/I 2-wire	6ES7134-6HD01-0BA1	Siemens	505054	X
-AI_03 &EFS+/120.7	1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787	X
-AI_04 &EFS+/120.7	1	SIMATIC ET 200SP AI 4x U/I 2-wire	6ES7134-6HD01-0BA1	Siemens	505054	X
-AI_04 &EFS+/120.7	1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787	X
-DI_01 &EFS+/120.3	1	ET 200SP, DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	Siemens		X
-DI_01 &EFS+/120.3	1	BASEUNIT TYPE A0, BU15-P16+A0+2D	6ES7193-6BP00-0DA0	Siemens	500786	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-DI_02 &EFS+/120.3	1	ET 200SP, DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	Siemens		X
-DI_02 &EFS+/120.3	1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787	X
-DI_03 &EFS+/120.3	1	ET 200SP, DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	Siemens		X
-DI_03 &EFS+/120.3	1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787	X
-DI_04 &EFS+/120.4	1	ET 200SP, DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	Siemens		X
-DI_04 &EFS+/120.4	1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787	X
-DI_05 &EFS+/120.4	1	ET 200SP, DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	Siemens		X
-DI_05 &EFS+/120.4	1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787	X
-DI_06 &EFS+/120.4	1	ET 200SP, DI 16x 24V DC ST, PU 1	6ES7131-6BH01-0BA0	Siemens		X
-DI_06 &EFS+/120.4	1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787	X
-DO_01 &EFS+/120.5	1	SIMATIC ET 200SP DQ 16x24 VDC/0.5 A ST	6ES7132-6BH01-0BA0	Siemens	504397	X
-DO_01 &EFS+/120.5	1	BASEUNIT TYPE A0, BU15-P16+A0+2D	6ES7193-6BP00-0DA0	Siemens	500786	X
-DO_02 &EFS+/120.5	1	SIMATIC ET 200SP DQ 16x24 VDC/0.5 A ST	6ES7132-6BH01-0BA0	Siemens	504397	X
-DO_02 &EFS+/120.5	1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787	X
-DO_03 &EFS+/120.5	1	SIMATIC ET 200SP DQ 16x24 VDC/0.5 A ST	6ES7132-6BH01-0BA0	Siemens	504397	
-DO_03 &EFS+/120.5	1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787	
-DO_04 &EFS+/120.6	1	SIMATIC ET 200SP DQ 16x24 VDC/0.5 A ST	6ES7132-6BH01-0BA0	Siemens	504397	
-DO_04 &EFS+/120.6	1	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787	
-X1 &EFS+/181.0	1	End and partition plate for terminal block	3030417	Phoenix Contact	500506	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-X1 &EFS+/181.0	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	X
-X1 &EFS+/181.1;&EFS+/181.3;&EFS+/181.4;&EFS+/182.1;&EFS+/182.3;&EFS+/182.4	12	Feed-through terminal block	3209510	Phoenix Contact	500583	X
-X1 &EFS+/181.4	1	Feed-through terminal block	3209523	Phoenix Contact	500584	X
-X1 &EFS+/181.1;&EFS+/181.4;&EFS+/182.1;&EFS+/182.4	4	Ground terminal block	3209536	Phoenix Contact	500813	X
-X3 &EFS+/127.1	1	End and partition plate for terminal block	3208579	Phoenix Contact	500504	X
-X3 &EFS+/127.1	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-X3.10 &EFS+/129.0	1	End and partition plate for terminal block	3208579	Phoenix Contact	500504	X
-X3.10 &EFS+/129.0	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-X3.10 &EFS+/129.0;&EFS+/129.2;&EFS+/129.4;&EFS+/129.6;&EFS+/129.8;&EFS+/129.9	6	Multi-level terminal block	3208511	Phoenix Contact	500560	X
-X3.10 &EFS+/129.0;&EFS+/129.4;&EFS+/129.6;&EFS+/129.9	4	Plug-in bridge FBS 3-3,5	3213027	Phoenix Contact	503102	X
-X3.11 &EFS+/130.0	1	End and partition plate for terminal block	3208579	Phoenix Contact	500504	X
-X3.11 &EFS+/130.0	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-X3.11 &EFS+/130.0;&EFS+/130.2;&EFS+/130.4;&EFS+/130.6;&EFS+/130.8;&EFS+/130.9	6	Multi-level terminal block	3208511	Phoenix Contact	500560	X
-X3.11 &EFS+/130.0;&EFS+/130.4;&EFS+/130.6;&EFS+/130.9	4	Plug-in bridge FBS 3-3,5	3213027	Phoenix Contact	503102	X
-X3.12 &EFS+/131.0	1	End and partition plate for terminal block	3208579	Phoenix Contact	500504	X
-X3.12 &EFS+/131.0	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-X3.12 &EFS+/131.0;&EFS+/131.2;&EFS+/131.4;&EFS+/131.6;&EFS+/131.8;&EFS+/131.9	6	Multi-level terminal block	3208511	Phoenix Contact	500560	X
-X3.12 &EFS+/131.0;&EFS+/131.6	4	Plug-in bridge FBS 3-3,5	3213027	Phoenix Contact	503102	X
-X3.13 &EFS+/132.0	1	End and partition plate for terminal block	3208579	Phoenix Contact	500504	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-X3.13 &EFS+/132.0	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-X3.13 &EFS+/132.0;&EFS+/132.2;&EFS+/132.4;&EFS+/132.6;&EFS+/132.8;&EFS+/132.9	6	Multi-level terminal block	3208511	Phoenix Contact	500560	X
-X3.13 &EFS+/132.0;&EFS+/132.6	4	Plug-in bridge FBS 3-3,5	3213027	Phoenix Contact	503102	X
-X3	21	Multi-level terminal block	3208511	Phoenix Contact	500560	X
-X3 &EFS+/127.1;&EFS+/127.5;&EFS+/128.3;&EFS+/188.1	5	Plug-in bridge FBS 2-3,5	3213014	Phoenix Contact	500802	X
-X5 &EFS+/145.0	1	End and partition plate for terminal block	3208579	Phoenix Contact	500504	X
-X5 &EFS+/145.0	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-X5.1 &EFS+/149.0	1	End and partition plate for terminal block	3211634	Phoenix Contact	500505	X
-X5.1 &EFS+/149.0	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-X5.1 &EFS+/149.0;&EFS+/149.2	2	Multi-level terminal block	3210583	Phoenix Contact	501385	X
-X5.1 &EFS+/149.0	1	Plug-in bridge FBS 2-5	3030161	Phoenix Contact	505211	X
-X5	15	Multi-level terminal block	3208511	Phoenix Contact	500560	X
-XDC1 &EFS+/103.1	1	End and partition plate for terminal block	3211634	Phoenix Contact	500505	X
-XDC1 &EFS+/103.1	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-XDC1 &EFS+/103.2;&EFS+/103.3	7	Multi-level terminal block	3210583	Phoenix Contact	501385	X
-XDC1 &EFS+/103.2	1	Plug-in bridge FBS 3-5	3030174	Phoenix Contact	503103	X
-XDC1 &EFS+/103.3	1	Plug-in bridge FBS 4-5	3030187	Phoenix Contact	500801	X
-XDC1 &EFS+/103.4	2	Protective conductor double-level terminal block Push-in PTTB 2,5-PE	3210596	Phoenix Contact	501389	X
-XDC2 &EFS+/103.3	1	End and partition plate for terminal block	3211634	Phoenix Contact	500505	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-XDC2 &EFS+/103.3	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-XDC2 &EFS+/103.4;&EFS+/103.5	4	Multi-level terminal block	3210583	Phoenix Contact	501385	X
-XDC2 &EFS+/103.4;&EFS+/103.5	2	Plug-in bridge FBS 2-5	3030161	Phoenix Contact	505211	X
-XDC3 &EFS+/103.5	1	End and partition plate for terminal block	3211634	Phoenix Contact	500505	X
-XDC3 &EFS+/103.5	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-XDC3 &EFS+/103.6;&EFS+/103.7	4	Multi-level terminal block	3210583	Phoenix Contact	501385	X
-XDC3 &EFS+/103.6;&EFS+/103.7	2	Plug-in bridge FBS 2-5	3030161	Phoenix Contact	505211	X
-XDC4 &EFS+/103.7	1	End and partition plate for terminal block	3211634	Phoenix Contact	500505	X
-XDC4 &EFS+/103.7	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-XDC4 &EFS+/103.8;&EFS+/103.9	4	Multi-level terminal block	3210583	Phoenix Contact	501385	X
-XDC4 &EFS+/103.8;&EFS+/103.9	2	Plug-in bridge FBS 2-5	3030161	Phoenix Contact	505211	X
-XDC5.1 &EFS+/103.8	1	End and partition plate for terminal block	3211634	Phoenix Contact	500505	X
-XDC5.1 &EFS+/103.8	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-XDC5.1 &EFS+/103.9	1	Multi-level terminal block	3210583	Phoenix Contact	501385	X
-XDC5.2 &EFS+/103.8	1	End and partition plate for terminal block	3211634	Phoenix Contact	500505	X
-XDC5.2 &EFS+/103.8	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-XDC5.2 &EFS+/103.9	1	Multi-level terminal block	3210583	Phoenix Contact	501385	X
-XE &EFS+/84.0	1	End and partition plate for terminal block PT 6	3212044	Phoenix Contact	500503	X
-XE &EFS+/84.0	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-XE &EFS+/84.0;&EFS+/84.1	6	Feed-through terminal block Push-in PT 6	3211813	Phoenix Contact	501388	X
-XE &EFS+/84.0;&EFS+/84.1	3	Plug-in bridge FBS 2-8	3030284	Phoenix Contact	502068	X
-XE &EFS+/84.1;&EFS+/84.2	4	Feed-through terminal block Push-in PT 6 BU	3211819	Phoenix Contact	500585	X
-XE &EFS+/84.1	1	Plug-in bridge FBS 3-8	3030297	Phoenix Contact	501568	X
-XE &EFS+/84.2;&EFS+/84.3	3	Ground modular terminal block Push-in PT 6-PE	3211822	Phoenix Contact	500725	X
-XT &EFS+/183.0	1	End and partition plate for terminal block	3211634	Phoenix Contact	500505	X
-XT &EFS+/183.0	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-XT &EFS+/183.1;&EFS+/183.2;&EFS+/185.1;&EFS+/185.7;&EFS+/187.1;&EFS+/187.2;&EFS+/187.4;&EFS+/187.5	8	Multi-level terminal block	3210567	Phoenix Contact	501386	X
-XT &EFS+/183.1	1	Plug-in bridge FBS 10-5	3030213	Phoenix Contact	500547	X
-XT &EFS+/187.4	1	Plug-in bridge FBS 2-5	3030161	Phoenix Contact	505211	X
-XT &EFS+/183.1;&EFS+/183.4;&EFS+/185.1;&EFS+/185.7;&EFS+/187.1;&EFS+/187.2	6	Protective conductor double-level terminal block Push-in PTTB 2,5-PE	3210596	Phoenix Contact	501389	X
-XV &EFS+/171.8	1	End and partition plate for terminal block	3211003	Phoenix Contact	503382	X
-XV &EFS+/171.8	1	Terminal strip marker carrier KLM 3	0811969	Phoenix Contact	501402	X
-XV &EFS+/134.5;&EFS+/150.7;&EFS+/151.7;&EFS+/151.8;&EFS+/171.8;&EFS+/173.9	9	Base terminal for component connector	3210185	Phoenix Contact	500828	X
-XV &EFS+/134.5;&EFS+/150.7;&EFS+/151.7;&EFS+/151.8;&EFS+/171.8;&EFS+/173.9	9	Component plug terminal block	3036796	Phoenix Contact	500533	X
-XV &EFS+/150.7;&EFS+/151.7;&EFS+/151.8;&EFS+/171.8;&EFS+/173.9	8	Suppression diode CB-417, 600W, 47V, -65...+175°C	P6KE47CA	reichelt elektronik GmbH & Co. KG	501574	X
-XV &EFS+/171.8	1	Plug-in bridge FBS 10-5	3030213	Phoenix Contact	500547	X
-XV &EFS+/134.5	1	Diode ZY12 - zener diode, DO-41, plastic, 12V, 2W	17060488	Distrelec Schuricht GmbH	500556	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-85U1 &EFS+/85.0	1	Power Bridge Rectifiers SKD 30/16A1, Vrrm = 1600V, Id = 30A	07122150	Semikron	501556	X
-85U10 &EFS+/85.0	1	EMI Filter X2 Y1 Version 2	505722	Freqcon GmbH	505722	X
-85U11 &EFS+/85.1	1	RC-Brückengleichrichter	507702	Freqcon GmbH	507702	
-149U1 &EFS+/149.5	1	Interface module	2959609	Phoenix Contact	501595	X
-171F1 &EFS+/171.2	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 2-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7023-4	Siemens	500780	X
-171F1 &EFS+/171.2	2	Fuse link 1000V AC/DC, 10A, 10x38mm, gR, 30kA	5019906-10	Schukat	501540	X
-171K1 &EFS+/171.7	1	DC contactor P115, 50A, 1500V DC, 1-pole, 24Vdc, SPST-NO	GIG/P115CDA	GIGAVAC	501487	X
-171K2 &EFS+/171.8	1	DC contactor P115, 50A, 1500V DC, 1-pole, 24Vdc, SPST-NO	GIG/P115CDA	GIGAVAC	501487	X
-171R1 &EFS+/171.1	1	Power Resistor 15R 10%(K) 300W, alu.-housing, VHPR/UL 300H	110072	Widap AG	501616	X
-171R2 &EFS+/171.2	1	Power Resistor 15R 10%(K) 300W, alu.-housing, VHPR/UL 300H	110072	Widap AG	501616	X
-173F2 &EFS+/173.2	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 2-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7023-4	Siemens	500780	X
-173F2 &EFS+/173.2	2	Fuse link 1000V AC/DC, 10A, 10x38mm, gR, 30kA	5019906-10	Schukat	501540	X
-173F3 &EFS+/173.4	1	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 2-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7023-4	Siemens	500780	X
-173F3 &EFS+/173.4	2	Fuse link 1000V AC/DC, 1A, 10x38mm, gR, 30kA	5019906.1	Schukat	500774	X
-173K1 &EFS+/173.8	1	DC contactor PNC113, 30A, 1500V DC, 1-pole, 24Vdc, SPST-NC	GIG/PNC113CDA	GIGAVAC	501488	X
-173K2 &EFS+/173.9	1	DC contactor PNC113, 30A, 1500V DC, 1-pole, 24Vdc, SPST-NC	GIG/PNC113CDA	GIGAVAC	501488	X
-173R1 &EFS+/173.2	1	Power resistor 500R 10%(K) 150W, alu.-housing, VHPR/UL 200H	110073	Widap AG	501615	X
-173R2 &EFS+/173.2	1	Power resistor 500R 10%(K) 150W, alu.-housing, VHPR/UL 200H	110073	Widap AG	501615	X
-173R3 &EFS+/173.3	1	Power resistor 500R 10%(K) 150W, alu.-housing, VHPR/UL 200H	110073	Widap AG	501615	X

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-173R4 &EFS+/173.3	1	Power resistor 500R 10%(K) 150W, alu.-housing, VHPR/UL 200H	110073	Widap AG	501615	X
-189X1 &EFS+/189.4	9	Measuring transformer disconnect terminal	3035696	Phoenix Contact	54498	X
-189X1 &EFS+/189.4	9	Test adapter - PAIS-4-FIX GY	3032791	Phoenix Contact	501482	X
-189X1 &EFS+/189.4	1	End cover D-DTME 6	3034426	Phoenix Contact	505468	X
-189X1 &EFS+/189.4	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-306K1 &EFS+/306.1	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-306K1 &EFS+/306.1	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-306K2 &EFS+/306.2	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-306K2 &EFS+/306.2	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-306K3 &EFS+/306.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-306K3 &EFS+/306.4	2	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-306K4 &EFS+/306.5	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-306K4 &EFS+/306.5	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-306K5 &EFS+/306.7	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-306K5 &EFS+/306.7	2	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-306K6 &EFS+/306.8	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-306K6 &EFS+/306.8	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-307K1 &EFS+/307.1	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-307K1 &EFS+/307.1	2	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	

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Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-307K2 &EFS+/307.2	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-307K2 &EFS+/307.2	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-307K3 &EFS+/307.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-307K3 &EFS+/307.4	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-307K4 &EFS+/307.5	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-307K4 &EFS+/307.5	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-307K5 &EFS+/307.7	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-307K5 &EFS+/307.7	2	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-307K6 &EFS+/307.8	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-307K6 &EFS+/307.8	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-308K1 &EFS+/308.1	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-308K1 &EFS+/308.1	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-308K2 &EFS+/308.2	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-308K2 &EFS+/308.2	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-308K3 &EFS+/308.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-308K3 &EFS+/308.4	2	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-308K4 &EFS+/308.5	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-308K4 &EFS+/308.5	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-308K5 &EFS+/308.7	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-308K5 &EFS+/308.7	2	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-308K6 &EFS+/308.8	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-308K6 &EFS+/308.8	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-350K1 &EFS+/350.1	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-350K1 &EFS+/350.1	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-350K2 &EFS+/350.3	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-350K2 &EFS+/350.3	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-350X1.21 &EFS+/350.1	1	End and partition plate for terminal block	3208579	Phoenix Contact	500504	
-350X1.21 &EFS+/350.1	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	
-350X1.21 &EFS+/350.1 &EFS+/350.2 &EFS+/350.4 &EFS+/350.5 &EFS+/351.1 &EFS+/351.3 &EFS+/351.4 &EFS+/351.5 &EFS+/352.1 &EFS+/352.2 &EFS+/352.3 &EFS+/352.4 &EFS+/352.5 &EFS+/353.1 &EFS+/353.2 &EFS+/353.3 &EFS+/353.4 &EFS+/353.5 &EFS+/354.1 &EFS+/354.2 &EFS+/354.3 &EFS+/354.4 &EFS+/354.5	9	Multi-level terminal block	3208511	Phoenix Contact	500560	
-350X1.21 &EFS+/352.1	0					
-351K1 &EFS+/351.1	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-351K1 &EFS+/351.1	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-351K2 &EFS+/351.2	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	X
-351K2 &EFS+/351.2	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	X
-351K3 &EFS+/351.4	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-351K3 &EFS+/351.4	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-351K4 &EFS+/351.5	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-351K4 &EFS+/351.5	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	

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Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-352K1 &EFS+/352.0	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-352K1 &EFS+/352.0	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-352K2 &EFS+/352.2	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-352K2 &EFS+/352.2	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-353K1 &EFS+/353.0	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-353K1 &EFS+/353.0	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-353K2 &EFS+/353.2	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-353K2 &EFS+/353.2	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-353K3 &EFS+/353.3	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-353K3 &EFS+/353.3	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-353K4 &EFS+/353.5	1	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726	
-353K4 &EFS+/353.5	1	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803	
-XE2 &EFS+/173.1	0					
-XE2 &EFS+/173.2...&EFS+/173.5	11	Feed-through terminal block Push-in PT 6	3211813	Phoenix Contact	501388	X
-XV.20 &EFS+/350.7;&EFS+/351.7;&EFS+/351.8;&EFS+/352.7;&EFS+/353.7;&EFS+/353.8	12	Base terminal for component connector	3210185	Phoenix Contact	500828	
-XV.20 &EFS+/350.7;&EFS+/351.7;&EFS+/351.8;&EFS+/352.7;&EFS+/353.7;&EFS+/353.8	12	Component plug terminal block	3036796	Phoenix Contact	500533	
-XV.20 &EFS+/350.7;&EFS+/351.7;&EFS+/351.8;&EFS+/352.7;&EFS+/353.7;&EFS+/353.8	12	Suppression diode CB-417, 600W, 47V, -65...+175°C	P6KE47CA	reichelt elektronik GmbH & Co. KG	501574	

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-147B1 &EFS+/147.5	1	Temperature sensor PT100, cable 1.5m, PVC	1101-6030-1211-110	S+S Regeltechnik GmbH	501787	X
-190H1 &EFS+/190.5	1	LED system light, Without socket, Length: 337 mm, Input voltage: 100 V - 240 V, 1~, 50 Hz/60 Hz	2500110	Rittal	10007	X
-190H1 &EFS+/190.5	1	Infeed, 2-pole (with socket, without connector), Input voltage: 100 V - 240 V, 1~, 50 Hz/60 Hz	2500420	Rittal	10009	X
-190H1 &EFS+/190.5	1	Door-Operated Switch, Input voltage: 230 V AC, 24 V DC, - 240 V, 1~, 50 Hz/60 Hz,	2500460	Rittal	500736	X

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Editor	Freqcon_DG			Statron	FREQCON	PARTS LIST	20250123_V1.3	= UNIT_01 Converter Container 1	
Date	05.11.2024							& EPC Parts List	
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ CT Control cabinets	page: 1
Date								+ CTRL_1.5 above	total: 492

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-20BG1 &EFS+/100.2	1	*** VX BG Steuerungseinheit IEC Standard-Batteriecontainer***	53550	Freqcon GmbH	53550	
-20BG1-X &EFS+/100.2	55	End bracket for terminal block	3022276	Phoenix Contact	500588	X

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-149X1 &EFS+/161.4...&EFS+/161.8	6	Feed-through terminal block Push-in PT 4	3211757	Phoenix Contact	500582	X
-149X1 &EFS+/161.4	1	End cover D-ST 4	3030420	Phoenix Contact	500502	
-149X1 &EFS+/161.4	2	End bracket for terminal block	3022276	Phoenix Contact	500588	
-149X1 &EFS+/161.4	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	
-160U1 &EFS+/160.0	1	HVIO Modul V5.0;ISO N-DC, N-AC	500390	Freqcon GmbH	500390	
-161U1 &EFS+/161.0	1	HVIO Modul V5.0;ISO N-DC, N-AC	500390	Freqcon GmbH	500390	
-162U1 &EFS+/162.0	1	HVIO Modul V5.0;ISO N-DC, N-AC	500390	Freqcon GmbH	500390	
-163U1 &EFS+/163.0	1	HVIO Modul V5.0;ISO N-DC, N-AC	500390	Freqcon GmbH	500390	
-164U1 &EFS+/164.0	1	HVIO Modul V5.0;ISO N-DC, N-AC	500390	Freqcon GmbH	500390	
-240U1 &EFS+/440.1	1	PIII IGBT IRT Interface 2.6 V4 cabinet	504890	Freqcon GmbH	504890	
-240U1 &EFS+/440.1	1	Connector screw connection, 4 Pol., 4 mm² - 6 mm², SACC-M12FS-4CON-PG7	1681114	Phoenix Contact	500805	
-240U1 &EFS+/440.1	1	Plug connector IE FC M12 PLUG PRO 2X2 M12	6GK1901-0DB20-6AA0	Siemens	500804	
-241U1 &EFS+/441.1	1	PIII IGBT IRT Interface 2.6 V4 cabinet	504890	Freqcon GmbH	504890	
-241U1 &EFS+/441.1	1	Connector screw connection, 4 Pol., 4 mm² - 6 mm², SACC-M12FS-4CON-PG7	1681114	Phoenix Contact	500805	
-241U1 &EFS+/441.1	2	Plug connector IE FC M12 PLUG PRO 2X2 M12	6GK1901-0DB20-6AA0	Siemens	500804	
-242U1 &EFS+/442.1	1	PIII IGBT IRT Interface 2.6 V4 cabinet	504890	Freqcon GmbH	504890	
-242U1 &EFS+/442.1	1	Connector screw connection, 4 Pol., 4 mm² - 6 mm², SACC-M12FS-4CON-PG7	1681114	Phoenix Contact	500805	
-242U1 &EFS+/442.1	2	Plug connector IE FC M12 PLUG PRO 2X2 M12	6GK1901-0DB20-6AA0	Siemens	500804	
-243U1 &EFS+/443.1	1	PIII IGBT IRT Interface 2.6 V4 cabinet	504890	Freqcon GmbH	504890	

Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-243U1 &EFS+/443.1	1	Connector screw connection, 4 Pol., 4 mm² - 6 mm², SACC-M12FS-4CON-PG7	1681114	Phoenix Contact	500805	
-243U1 &EFS+/443.1	2	Plug connector IE FC M12 PLUG PRO 2X2 M12	6GK1901-0DB20-6AA0	Siemens	500804	
-278M2 &EFS+/278.3	1	SK TopTherm fan-and-filter unit, 230/250 m³/h, 230 V, 1~, 50/60 Hz, 40W	3241100	Rittal	500594	X

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Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-173R5 &EFS+/173.5	1	Power Resistor 100W 1% 10K J	160141	Widap AG	501614	
-173R6 &EFS+/173.5	1	Power Resistor 100W 1% 10K J	160141	Widap AG	501614	
-173R7 &EFS+/173.5	1	Power Resistor 100W 1% 10K J	160141	Widap AG	501614	
-173R8 &EFS+/173.5	1	Power Resistor 100W 1% 10K J	160141	Widap AG	501614	

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Parts list

Freqcon-mit_FRQ-Nr_ABAS_de_en

Equipment identifier Schematic / position	Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.	subordinated part
-52G1 &EFS++CT/181.0;&EFS++CT/181.7	0					
-52G1-148B1 &EFS++CT/148.1	1	Temperature sensor PT100, cable 3m, PVC	1101-6030-1231-110	S+S Regeltechnik GmbH	501575	X
-52G1-181M1 &EFS++CT/181.1	1	Pump CM10-2, 3x380V-415V, 50Hz, 1,27 kW, 2,85-2,9 A, 2.950 - 2.960 rpm / 440V-480V, 60Hz, 2,2 kW, 4,0-3,7A, 3.520-3.530 rpm	99080211	GRUNDFOS GmbH	501409	X
-52G1-181R1 &EFS++CT/181.3	1	Screw-in heater SEHK, 3kW, 400V	106066	Siekerkotte GmbH & Co. KG	500620	X
-52G1-181S1 &EFS++CT/181.7	0					
-52G1-181X1 &EFS++CT/181.0	0					
-52G1-181X1 &EFS++CT/181.1;&EFS++CT/181.3;&EFS++CT/181.4;&EFS++CT/182.1	9	Feed-through terminal block	3209510	Phoenix Contact	500583	X
-52G1-181X1 &EFS++CT/181.3	1	End and partition plate for terminal block	3211003	Phoenix Contact	503382	X
-52G1-181X1 &EFS++CT/181.3	1	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-52G1-181X1 &EFS++CT/181.4	1	Feed-through terminal block	3209523	Phoenix Contact	500584	X
-52G1-181X1 &EFS++CT/181.1;&EFS++CT/181.4;&EFS++CT/182.1	3	Ground terminal block	3209536	Phoenix Contact	500813	X
-52G1-181X3 &EFS++CT/148.1;&EFS++CT/181.7	2	Multi-level terminal block	3210567	Phoenix Contact	501386	X
-52G1-181X3 &EFS++CT/181.7	1	End and partition plate for terminal block	3211634	Phoenix Contact	500505	X
-52G1-181X3 &EFS++CT/181.7	2	End bracket for terminal block	3022276	Phoenix Contact	500588	X
-52G1-181X3 &EFS++CT/181.7	1	Terminal strip marker carrier KLM 3-L	0814788	Phoenix Contact	500652	X
-52G1-182M1 &EFS++CT/182.1	1	Heat exchanger 40kW cooling capacity, alluminium, 1,72kW, 3,86A, 400V	FR6555950001	Bondioli & Pavesi S.p.A.	500850	X

Summarized parts list

Freqcon_ABAS_de_en

Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.
1	Anschlussschiene;100x370mm;Zeichnung 501153B	501153	Freqcon GmbH	501153
1	TMC Transformer 3150kVA-6300V/620V-50Hz-AL-IP00		TMC Transformers	508555

Editor	Freqcon_DG			Statron	FREQCON	SUMMARIZED PARTS LIST	20250123_V1.3	= UNIT_01	Converter Container 1
Date	05.11.2024							& EPA	Summarized part list
Proved by				Shell Crosswind BESS FQ 1MW 5MWh Offshore			10354_23A2007	++ TRA	medium voltage transformer
Date								+	

Summarized parts list

Freqcon_ABAS_de_en

Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.
1	*** BG connection rail 100x370 ***	50070	Freqcon GmbH	50070
9	*** BG connection rail 100x195 ***	50604	Freqcon GmbH	50604
1	DC Adapter 3.3535 (EN-AW 5754) Alu	51524	Freqcon GmbH	51524
3	*** VX BG PowerStack 3*250A***	52867	Freqcon GmbH	52867
3	*** VX BG PowerStack 1*1000A*** with SkiiP 2414 GB12E4-4DUW	52872	Freqcon GmbH	52872
3	*** VX BG DC switch and Fuse 3*250A 1000V***	52882	Freqcon GmbH	52882
1	*** VX BG AC Capacitor Bank 3 * 600µF ***	52918	Freqcon GmbH	52918
1	*** VX BG Circuit Breaker IEC 1000 A ***	52955	Freqcon GmbH	52955
3	*** VX Trible phase line Inductor, I= 3x 250A LN= 0,6mH ***	53046	Freqcon GmbH	53046
3	*** VX Single phase line Inductor, I= 1x 1000 A LN= 0,2mH ***	53053	Freqcon GmbH	53053
1	*** BG connection rail 100x370 ***	53190	Freqcon GmbH	53190
1	*** VX BG PE + N busbar 50x380 - 600 MTS ***	53290	Freqcon GmbH	53290
3	D SUB ADAPTER, PLUG-RECEPTACLE, 25-POL, L-COM DG9025MF1	506157	Freqcon GmbH	506157
3	SKiiP 3 I Adapter	FRQ-M00080-1	Freqcon GmbH	500426
3	EMI Suppresion CAP DC	FRQ-M00110	Freqcon GmbH	500449
1	Temperature sensor PT100, cable 3m Silicon	H2-012030-SDS	Fühler Direkt	500648
1	Temperature sensor PT100, cable 6m Silicon	H2-012060-SDS	Fühler Direkt	500649
3	Fuse link 690V AC, 100A, NH00, gL/gG, UL recognized, Bussmann	100NHG00B-690	Gemballa Electronics	501539

Summarized parts list

Freqcon_ABAS_de_en

Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.
1	SURGE ARRESTER [Typ 1 + Typ 2] PP BC TNC 50-400/690	374504	LEUTRON GmbH	10055
1	Auxiliary contacts S6000 SIZE 2	D5LAU01	Pronutec GmbH	503044
1	Direct handle S6000 SIZE 2	DS-LI21	Pronutec GmbH	503039
1	Switch-disconnector S6000, AC 600A at 690V AC (AC21B), size 2, 4-pole, to attach to the mounting plate	S6-08003NDO	Pronutec GmbH	10172
9	Lightning/surge arrester type 1/2 2P 1500VDC	2905640	Phoenix Contact	501130
3	SITOR cylindrical fuse link, 10 x 38 mm, 20 A, aR, Un AC: 600 V, Un DC: 700 V, DC according to UL	3NC1020	Siemens	501545
1	Fuse switch disconnector 3NP1, 3-pole, NH00, 160 A, for mounting plate, flat terminal, Fuse monitoring: electromechanical	3NP11331CA11	Siemens	500738
3	CYLINDRICAL FUSE-HOLDER 10X38 1000V 25A 1-POLE FOR PHOTOVOLTAIC-APPLICATION	3NW7013-4	Siemens	500779

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Summarized parts list

Freqcon_ABAS_de_en

Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.
1	*** VX BG Steuerungseinheit IEC Standard-Batteriecontainer***	53550	Freqcon GmbH	53550
4	PIII IGBT IRT Interface 2.6 V4 cabinet	504890	Freqcon GmbH	504890
1	RC-Brückengleichrichter	507702	Freqcon GmbH	507702
5	HVIO Modul V5.0;ISO N-DC, N-AC	500390	Freqcon GmbH	500390
1	WALL IE Industrial Ethernet Bridge and Firewall	700-860-WALL01	Helmholz	508505
1	Panel PC 15,6" PPC-JWS156-J4125	PPC-JWS156-I/C-J4125/8GB/128GBSSD/W10	ICP	508475
1	Tree 8TX Metall - Unmanaged Switch - 8 Ports	58152	Murrelektronik	10287
4	Connector screw connection, 4 Pol., 4 mm² - 6 mm², SACC-M12FS-4CON-PG7	1681114	Phoenix Contact	500805
2	Network isolators - FL ISOLATOR 100-RJ/RJ	2313931	Phoenix Contact	501464
2	Surge protection device	2881007	Phoenix Contact	504791
3	Patch panel, connection field: one RJ45 socket on 8 spring-cage connection terminals	2901642	Phoenix Contact	10214
38	Relay Module RIF-1-RPT-LDP-24DC/2X21AU	2903330	Phoenix Contact	500726
41	Plug-in bridge FBS 2-6 BU	3036932	Phoenix Contact	500803
1	5G Rundstrahlantenne mit Halterung (600-6000MHz)	B4BE-6-60-5SP	reichelt elektronik GmbH & Co. KG	507944
2	0,5m Cat.6 PiMF-Patchcabel, green	PATCH-C6 05 GN	reichelt elektronik GmbH & Co. KG	504395
3	Link module spring-type Electrical and mechanical for 3RV2011 and 3RT201	3RA2911-2AA00	Siemens	500845
2	MOTOR PROTECTION S00, A-release 3.5...5 A, N-release 65 A, Spring-type terminal, auxiliary switches 1NO+1NC	3RV2011-1FA25	Siemens	500740
1	MOTOR PROTECTION S00, A-release 4.5...6.3 A, N-release 82 A, Spring-type terminal, auxiliary switches 1NO+1NC	3RV2011-1GA25	Siemens	500671

Summarized parts list

Freqcon_ABAS_de_en

Amount	Designation	Order number	Manufacturer / Supplier	Freqcon ERP No.
3	CABLE CONNECTOR SIZE S00	3RV2917-5AA00	Siemens	500797
1	Combination arrester type 1+2, UC 350V AC, 3-pole, FM, for TNC systems	5SD7443-1	Siemens	504070
1	SIMOTION P320-4 BOX WITH INTEL CORE I3 PROZESSOR; 2 X 1,6 GHZ	6AU1320-4DE65-3AF0	Siemens	500789
2	SIMATIC ET 200SP DQ 16x24 VDC/0.5 A ST	6ES7132-6BH01-0BA0	Siemens	504397
2	BASEUNIT TYPE A0, BU15-P16+A0+2B, bridged to the left	6ES7193-6BP00-0BA0	Siemens	500787
7	Plug connector IE FC M12 PLUG PRO 2X2 M12	6GK1901-0DB20-6AA0	Siemens	500804
1	Router Ewon Cosy 131, 4G + VPN router, supply 24 VDC UMTS router	WEC6133G	Wachendorff Prozesstechnik GmbH & Co. KG	506838alt
4	Power Resistor 100W 1% 10K J	160141	Widap AG	501614

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Stat-X® Aerosol Fire Suppression

Electric Generator

Owner's Manual

Version 1.2.5
August 2021
P/N 19001

Fireaway Inc. 5852 Baker Road • Minnetonka,MN 55345

INTRODUCTION

Thank you for your purchase of a Stat-X® aerosol fire suppression product. This brief manual is designed to provide you with a general understanding of the product, as well as, general information on installation, operational, and maintenance parameters. It is not a detailed Design, Installation, Operation, and Maintenance Manual. A detailed manual may be obtained by contacting the manufacturer:

Fireaway Inc.
5852 Baker Road
Minnetonka, MN 55345
U.S.A.
www.statx.com

Stat-X systems and generators are to be installed and periodically inspected by trained personnel ONLY. No modifications are to be made to the installed system without consulting a qualified system designer. The system is made up of units tested within limitations contained in the detailed Design, Installation, Operation, and Maintenance Manual. The system designer must be consulted whenever changes are planned for the system or the protected area. An authorized installer or system designer must be consulted after the system has discharged.

SYSTEM DESCRIPTION

General

Stat-X systems combine an environmentally safe fire suppression agent, specially developed components, and fire detection devices for rapid agent application. The resulting timely suppression of fire may reduce property, facility, and equipment damage. These systems are electrically operated, are compact, and eliminate expensive pressure vessels, nozzles, and distribution piping associated with other gas and water based fire suppression systems. The Stat-X aerosol agent is extremely effective when compared to alternative agents and aerosol generators are strategically placed throughout the hazard area offering significant weight and space savings over conventional systems. Stat-X systems are designed for total flooding applications in accordance with established design criteria. All installations must meet the requirements of the local authority having jurisdiction.

A single or connected group of Stat-X electrically operated units (or generators) are used to suppress Class A (surface), Class B, and Class C fires in specific hazard areas, facilities, or within equipment located in enclosed areas and confined spaces where low weight/space to extinguishing capacity is a factor.

The fire-extinguishing agent is an ultra-fine aerosol, which hangs in suspension for extended periods of time (for at least 10 minutes) providing excellent protection against re-flash, with minimal clean up.

Stat-X systems and generators are suitable for use in normally occupied and unoccupied spaces. In areas where personnel may be present the system shall employ a pre-discharge alarm and 30 second time delay prior to activation. Provision for system isolation for system maintenance shall be provided when personnel may be in the protected area.

They are intended to protect the following typical applications:

- Electrical Cabinets and Rooms
- Generator Rooms
- Glove Boxes
- Telecommunications Facilities
- Flammable Liquid Storage Areas
- Process Control Rooms
- Storage Vaults
- Marine Engine Rooms*
- Gas Turbine Enclosure
- High Value Mobile Equipment*
- Power Plants
- High Value Industrial Equipment Areas

*Not part of the UL Listing under UL Subject 2775 but are covered under other applicable listings (American Bureau of Shipping, Marine and Coast Guard Agency, ECB, and others)

Stat-X generators are not suitable for the following hazards; or, where the following materials may be present:

- Materials, which burn with deep-seated characteristics (wood, fiber, cotton, etc.)

- Electrical equipment operating at over 40,000 V
- Metal hydrides, pyrophoric substances, and chemical substances that smolder and burn without air
- Metal powders (magnesium, titanium, etc.)
- Environments which require devices specifically listed/labeled for installation inside rated hazardous areas (explosive atmospheres).*

*Stat-X products suitable for use in classified hazardous areas are listed separately under UL File No. E495772.

Extinguishing Agent

The aerosol produced upon activation of a Stat-X generator suppresses fire by a combination of chemical and physical mechanisms similar to the Halons without negative effect on the environment. Because of the aerosol's ultra-fine particle size (≤2 micron) there is a dramatic increase in the surface area interaction between the agent and the fire.

Unlike gaseous agents the aerosol does not decompose in the presence of fire nor does it extinguish by oxygen deprivation. The aerosol is considered non-toxic to humans when applied in normal design concentrations necessary to extinguish most fires; however, certain safety restrictions should be observed when applying and handling the generators. Exposure to the aerosol should be limited and unnecessary exposure to the particulate should be avoided. Exposure to the aerosol is generally less concerning than exposure to the decomposition products of a fire.

Toxicity: Tests conducted by Charles River Laboratories (Tranent, Scotland) as well as others have shown that the aerosol does not present a health hazard due to limited accidental exposure at normal design concentrations. Exposures under five minutes are normally considered safe.

While the components of the aerosol are not considered toxic at normal concentration levels, ingestion of the ultra-fine particulate may cause short-term discomfort and unnecessary exposure should be avoided. Tests have shown no long-term negative effects from exposure to the aerosol. In addition, the aerosol has a high obscuration factor. US EPA has approved Stat-X for use as a total flooding system for normally occupied spaces.

NOTE

STAT-X SYSTEMS SHALL ONLY BE APPLIED IN AREAS WHERE PERSONNEL MAY BE PRESENT IN CONJUNCTION WITH A 30-SECOND TIME DELAY TO ENSURE EGRESS OF PERSONNEL PRIOR TO SYSTEM DISCHARGE. A SYSTEM MAINTENANCE ISOLATE SWITCH SHOULD BE INSTALLED IN NORMALLY OCCUPIED AREAS.

Residue and Cleaning: The ultra-fine aerosol discharge remains in suspension for an extended period and can be vented by a fan or air handling system. Aerosol residue, which may have settled on the floor, equipment, or other surfaces, can be vacuumed or wiped clean with a water & acetic acid solution (e.g. vinegar). Settled and agglomerated particulates following an aerosol discharge is initially deliquescent in spaces with high humidity and is soluble in water.

Other Safety Considerations: The aerosol discharged into the hazard area upon activation of the generator is relatively "cool." However, the aerosol stream as it leaves the generator is above 100°C for a short distance from the outlet of the generator. Maximum temperatures are realized only in the last seconds of discharge. Each model has a required installation clearance distance specified as its "C-Zone." Steps must be taken to ensure generator placement so that it complies with this installation requirement. The generator housing is approximately 90°C immediately after discharge and care should be taken if handling the post-discharge generator prior to its cooling to ambient temperature.

Generators must never be installed to discharge directly on walls or equipment being protected, as this will cause agglomeration.

Storage: Each Stat-X aerosol generator is sealed with a non-permeable membrane and is unaffected by fluctuations in temperature and humidity. Accelerated aging tests have shown the generator's charge maintains its viability for more than 15 years under conditions ranging from - 40°C to + 54°C and cycled relative humidity levels up to 95%.

INSTALLATION

Facility Considerations

Significant Obstructions/Agent Distribution: In cases where there is a large ratio of fixed equipment to total volume, or where the protected equipment is located in such a way as to present a barrier to the free flow and distribution of aerosol throughout the hazard area, the use of a larger number of smaller aerosol generators may be more suitable. This will allow for strategic placement of the aerosol generators and improved distribution characteristics throughout the protected area.

Mounting: Stat-X aerosol generators are listed for both sidewall and ceiling locations and may be mounted on walls, beams, constructions, and columns, as long as the unit is securely bolted to the support structure and is mounted in a position where its "C-zone" (clearance zone where momentary peak temperature of the discharge will not exceed 75°C) will not impact on personnel, facilities, equipment or combustible materials located within the protected area. Housing clearance is required spacing of generator from combustibles and structural materials.

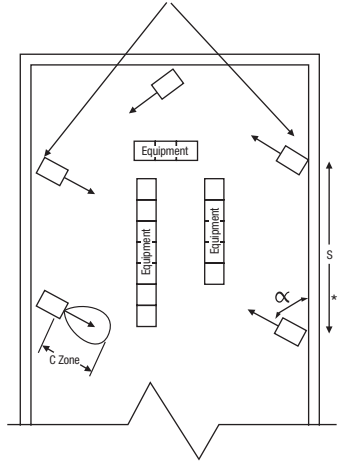
Aerosol Stream Characteristics			
Model	**C - Zone**	**Height Max.**	**Housing Clearance**
30E	0.25m/9.8"	0.5 to 1.22 m/19.7-48.0"	7mm/0.25"
60E	0.35m/13.8"	0.5 to 2.00 m/19.7-78.7"	7mm/0.25"
60ME	0.30m/11.8"	0.5 to 2.00m/19.7-78.7"	7mm/0.25"
100E	0.46m/18.1"	0.5 to 2.50 m/19.7-98.4"	13mm/0.50"
250E	0.75m/29.5"	0.5 to 2.75 m/19.7-108.3"	13mm/0.50"
500E	1.27m/50.0"	0.5 to 3.50 m/19.7-137.8"	13mm/0.50"
1000E	2.30m/90.6"	0.5 to 4.88 m/19.7-192.1"	13mm/0.50"
1500E	2.00m/78.7"	0.5 to 4.88 m/19.7-192.1"	30mm/1.00"
2500E	2.70m106.3"	0.5 to 4.88 m/19.7-192.1"	30mm/1.00"

Mounting Height: In general, the aerosol generators should be mounted at or near ceiling height and angled toward the floor at an angle to ensure three-dimensional distribution of aerosol and an unobstructed discharge path. (15° - 30° for sidewall mounting). To ensure maximum distribution of aerosol throughout the hazard area, the maximum height of generator placement from the floor must be limited as indicated above. Underfloor applications should be mounted horizontally.

Flow: Placement of the aerosol generators to ensure proper aerosol flow and distribution is extremely important as each generator functions as a flow nozzle. **Aerosol generators must never be positioned to discharge directly at each other!** This will cause agglomeration of the aerosol particulate, reducing the aerosol's extinguishing effectiveness. **For the same reason, aerosol generators must be positioned to ensure that the aerosol stream does not impinge directly on walls or the sides of equipment being protected.**

Typical Placement

Aerosol Generators



*Spacing "S" should be even unless prevented by obstruction.

Operating/Temperature Range: Stat-X aerosol generators are listed to operate within a temperature range of -40°C to +54°C/-40ºF to 129.2ºF. Generators are sealed with a non-permeable membrane and are unaffected by fluctuations in humidity and temperature.

EQUIPMENT INSTALLATION

General. All Stat-X generators must be installed to facilitate proper operation, inspection, testing, and any other maintenance as may be necessary. Equipment must not be subject to mechanical, chemical, or other damage, which could render the unit inoperative. Equipment must be installed in accordance with all applicable standards and the contents of this section of the manual.

WARNING

AEROSOL GENERATORS CONTAIN A FLAMMABLE SOLID AND MUST ONLY BE HANDLED, INSTALLED, AND SERVICED BY A TRAINED TECHNICIAN USING THE INSTRUCTIONS CONTAINED IN THIS SECTION. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD CAUSE A PREMATURE DISCHARGE AND/OR POTENTIAL INJURY.

Aerosol Generator Installation. The Stat-X aerosol generators should normally be located within the protected hazard area. The following installation instructions must be followed in the exact sequence outlined below to prevent accidental discharge, bodily injury, or property damage.

WARNING

TO PREVENT PERSONAL INJURY, DE-ENERGIZE ALL ELECTRICAL CONNECTIONS PRIOR TO GENERATOR INSTALLATION.

Single Generator System:

1. Position mounting bracket and securely fasten to wall, ceiling, or other supporting structure in a location and manner, which ensures the generator will not be subjected to accidental damage or movement.

2. Remove generator from shipping container and inspect integrity of the non-permeable membrane and generator. Do not install if the membrane is ruptured in any way or if the housing has been damaged in shipment. Verify igniter integrity with Ohmmeter. Do not install if reading > 2 ohms.

3. Securely attach generator to the mounting bracket with generator clamp taking care to ensure the clamp is free of the initiator mechanism and that all bolts are securely tightened.

4. Position generator, via the bracket-mounting swivel, to allow for an unimpeded discharge upon activation. Care must be taken so that the generator does not directly discharge at close range at the wall, ceiling, or vertical surfaces of the equipment within the hazard area.

5. Taking care to ensure that power is off, connect electrical lines to the initiator fitting at the top of the generator.

NOTE

THE INTERFACE BETWEEN THE GENERATOR AND THE FIRE ALARM CONTROL PANEL MAY REQUIRE ADDITIONAL ELECTRICAL DEVICES TO MEET LISTING COMPATIBILITY REQUIREMENTS. CONSULT FIRE ALARM CONTROL PANEL MANUAL FOR ANY LISTED SPECIAL FIELD DEVICES THAT MAY BE REQUIRED AS PART OF THE RELEASING CIRCUIT (E.G. EMATCH PROTECTION DEVICE, P/N 3005014).

WARNING

DE-ENERGIZE ALL ELECTRICAL CONNECTIONS PRIOR TO GENERATOR INSTALLATION. BE CAREFUL TO ENSURE THAT NO BODY PART IS PLACED DIRECTLY IN FRONT OF THE GENERATOR'S EXIT PORTS DURING INSTALLATION.

Multiple Generator System:

1. Position mounting brackets and securely fasten to wall, ceiling, or other supporting structure in a location and manner, which ensures the generators will not be subjected to accidental damage or movement.

2. Make sure mounting brackets are located in a manner to ensure a circular flow pattern and maximum dispersal and mixing of aerosol and air during discharge.

3. Remove generator from shipping container and inspect integrity of the non-permeable membrane and generator. Do not install if the membrane is ruptured or punctured in any way or if the housing has been damaged in shipment. Verify igniter integrity with ohmmeter. Do not install if reading is outside a range of 1.4 – 2.0 ohms.

4. Securely attach generators to the mounting brackets with generator clamps taking care to ensure the clamps are free of the initiator mechanism and that all bolts are securely tightened. **Aerosol gases discharged from the generator will add thrust loading on the clamps. It is essential that the fasteners are secure.**

5. Position generators, via the bracket-mounting swivel, to allow for unimpeded discharge upon activation. Care must be taken so that the generator does not directly discharge at close range on the wall, ceiling, or vertical surfaces of equipment within the hazard area. Generators must be positioned to promote circular flow and mixing of aerosol from multiple generators. Aerosol generators must never be positioned to discharge directly at each other! This will cause agglomeration of the aerosol particulate, reducing the aerosol's extinguishing effectiveness. The aerosol system is designed to flood the protected space when the generators are positioned in a balanced arrangement. It is not required for the generators to be aimed at specific hazards as local application streaming devices.

6. Generators can be wired in series or parallel to a releasing control panel. Activation current must be supplied to each generator as follows:

Activation parameters of the initiator are:

- Resistance: 1.4 – 2.0 Ohms
- Minimum parallel circuit firing current: 0.5A for 0.050 seconds.
- Minimum series circuit firing current: 1.0A for 0.050 seconds.
- Specified maximum test current: ≤0.025A.
- Specified maximum supervisory current: ≤.005A.

7. Install releasing control panel, detection, and ancillary devices per the directions contained in the manual supplied. Wiring is to be installed to local code requirements.

8. Once the electrical components of the system have been installed and tested, ensure power is off and then connect electrical lines to the initiator fitting at the top of the generator.

Post Installation Checkout: After the Stat-X generators have been installed and connected to the appropriate detection and/or control system perform the following inspection and tests.

1. Verify generators of the correct size are installed per the installation drawings.

2. Verify generator mounting brackets and clamps are properly installed and that all fittings and fasteners are tight.

3. Verify electrical connections have been made and test for electrical continuity using an ohmmeter.

4. Verify generators are positioned properly. Check for obstructions in the path of the aerosol discharge stream. Generators must be installed such that they cannot cause personnel injury upon activation. The aerosol discharge stream must not impinge at close range on walls, ceiling, or equipment.

5. Manual/electrical release stations must be properly installed, readily accessible, and clearly identified.

6. Verify time delay functionality and integrity.

7. All acceptance testing shall be in accordance with this manual, any applicable standards, and the authority having jurisdiction.

OPERATION

General. A solid charge of the aerosol composition is contained within the sealed generator. Upon activation of the initiator, the charge begins a controlled burn producing an ultra-fine aerosol. The aerosol passes through an oxidation filter, where CO is converted to minor amounts of CO_2, and then through a cooling bed where the temperature of the aerosol is rapidly reduced before it escapes through the discharge ports of the generator at low pressure. Generator placement within the hazard area provides proper flow and distribution of the aerosol within the protected area.

Operating Procedures

Electrical Automatic Operation: Electrical automatic operation occurs upon activation of the detection circuit, initiating a voltage source from the fire alarm control panel to the generators.

In areas where personnel may be present, a 30 second time delay is required to ensure egress time prior to system discharge. In normally occupied areas, a system maintenance isolate switch shall be installed outside the hazard area to ensure that activation of the system is "manual only" during maintenance of the system.

Personnel must evacuate the hazard area promptly upon hearing the pre-discharge alarm. Ensure no one enters the hazard area after discharge and call the fire department promptly.

NOTE

THE ABOVE INSTRUCTIONS MUST BE POSTED ON DISPLAY IN THE PROTECTED AREA.

Remote Electrical Manual Operation: Manual electrical operation is performed by manual release from a releasing device located outside the protected enclosure. Operate as follows:

1. Upon fire notification, leave the hazard area quickly

2. Proceed to the appropriate remote manual/electrical release station for the hazard.

3. Ensure all personnel have left the protected enclosure.

4. Operate manual pull station.

5. Allow no one to enter the hazard area. Call the fire department promptly.

Maintenance System Isolate Switch: Unless prohibited by the local authority having jurisdiction, the automatic operation of the system shall be prevented by means of a system isolate switch (lockout located outside the protected area) during maintenance when personnel are present. The operation of the system shall be manual only during maintenance operations on the fire detection system or on the generators. While the system isolate switch is active the automatic activation of the system is inhibited but the fire detection and alarm system shall continue to function. The system shall return to full automatic control when the switch is reactivated. An abort switch may be installed to allow personnel to delay the automatic operation of the system.

Post Discharge Operation: After discharge of a Stat-X fire suppression system, qualified fire suppression system maintenance personnel must perform post discharge maintenance and system installation procedures outlined in this manual. Observe all warnings, especially those pertaining to the length of elapsed time before entering the hazard area.

WARNING

DO NOT ENTER A HAZARD AREA WITH AN OPEN FLAME OR LIGHTED CIGARETTE. THE POSSIBLE PRESENCE OF FLAMMABLE VAPORS MAY CAUSE RE-IGNITION OR EXPLOSION.

WARNING

WHILE MAINTAINING ENCLOSURE INTEGRITY, ENSURE FIRE IS COMPLETELY EXTINGUISHED PRIOR TO VENTILATING AREA. BEFORE PERMITTING ANYONE TO ENTER THE HAZARD AREA, VENTILATE AREA THOROUGHLY OR USE SELF-CONTAINED BREATHING APPARATUS.

Post Fire Operation: The following procedures must be followed in the exact sequence to maintain and re-commission Stat-X generators as part of a suppression system:

1. After discharge, allow a minimum holding time of ten (10) minutes

2. Always be sure to have backup portable extinguishers at hand for use in the event of re-ignition.

3. Vent area thoroughly by operating the ventilation system, by fan extraction, or by opening doors and windows. Avoid opening doors leading to other occupied rooms. To avoid unwanted inhalation of fire by-products and aerosol, a protective breathing apparatus or mask should be worn if it is necessary to enter prior to complete ventilation of the hazard volume.

4. Inspect the area to ensure the fire is completely extinguished and that there are no localized hot spots or other sources of re-ignition present.

5. Clean residue which have not been removed during ventilation, by thoroughly vacuuming, blowing, brushing, or washing away (with a water and 3.5% vinegar or similar acetic acid solution) as appropriate. Check to make sure that there is no agglomeration due to discharge too close to equipment, walls etc. If any agglomeration exists it must be wiped or

washed clean. Consult Stat-X Safety Data Sheet for safety information.

6. **Important! Any residue which is not cleaned up shortly following discharge can absorb moisture in air.** A change in room temperature during a fire event or discharge can affect humidity and it is important to reduce the enclosure humidity as soon as possible following discharge.

7. Remove spent generators, being sure to wear gloves or other hand protection. The generators will remain quite warm to the touch for a time after actuation.

8. Dispose of spent generators per applicable federal, state, and local regulations

9. Contact your Stat-X distributor immediately for replacement generators. Replacement and commissioning should only be undertaken by trained personnel

NOTE
WARNING
Before performing post fire maintenance procedures refer to the Stat-X Safety Data Sheet.

MAINTENANCE

General: To ensure proper operation of your fire suppression system, a systematic maintenance program is required. A periodic maintenance schedule must be instituted including an inspection log maintained for reference. The log should, at a minimum, record: (1) inspection interval, (2) inspection procedure performed, (3) maintenance performed, if any, because of inspection, and (4) the name of the responsible person performing the operation.

Preventive Maintenance. Fireaway suggests that a preventive maintenance program require, at a minimum, the following schedule:

Type of Survey: Weekly/Six Month/On 15th year Inspection Steps	Date: Yes	No	N.A.
Perform a general visual inspection of all aerosol generators for damaged or missing parts. Examine each device for a puncture in the aluminum foil seal at orifice plate. Replace generator if foil is punctured or ripped.			
Verify at the control panel for any fault or trouble indication with regards to the panel output releasing circuit(s). If there is an indicated releasing circuit fault, verify electrical signal connection from panel to each aerosol generator electrical initiator. Test using a multi-meter, the line resistance of the releasing circuit signal line. Replace aerosol generator if each electrical initiator resistance exceeds operational range of 1.4Ω to 2.0Ω.			
Inspect aerosol generators for physical damage that is not superficial, such as cracks, dents, distortion, or corrosion. If damage is found, replace generator as instructed in the owner's manual.			
Verify mounting brackets and straps, tightness of mounting hardware, and generator alignment are properly secured. Tighten all loose hardware or replace damaged parts.			
Ensure paths of emergency egress from protected area is not impeded by an aerosol discharge as well as unobstructed access to manual pull stations and abort devices (where installed). Ensure there are no obstacles inhibiting the proper operation of the aerosol generators or distribution of aerosol in the event of fire.			
Ensure automatic dampers (where fitted) are functional. Verify leakage areas identified during the original system design have not been modified.			
Follow specific recommended manufacturer maintenance and test procedure for the fire detection/control system and fire detection devices, and per local codes.			
The aerosol generators have an installed service life of fifteen (15) years. Replace each generator fifteen (15) years from the marked date code in the lower right corner of the product label.			

N.A.: Not Applicable

Inspection Procedures

Weekly

1. Check all electrical connections to ensure operation of the Stat-X generators in the event of a fire. If connected to a fire alarm control panel, check the panel status.

2. Make a general visual inspection of all aerosol generators for damaged or missing parts, and visually inspect that generator mounting is secure.

Every Six Months

1. Ensure access to hazard areas, lines of egress, and manual release stations are unobstructed and that there are no obstacles inhibiting the proper operation of the aerosol generators or distribution of the aerosol in the event of a fire.

2. Inspect Stat-X aerosol generators for physical damage, such as cracks, dents, distortion, or corrosion. If damage is found, replace generator as instructed in the installation section of this manual.

3. Inspect mounting brackets, clamps, and associated hardware for loose, damaged, or broken parts. Replace damaged parts and tighten all loose hardware.

4. Inspect all manual release stations for damage, dirt, or distortion. Inspect station for signs of physical damage, replace if necessary.

5. Inspect all electrical connections and run electrical continuity tests using an ohmmeter. Repair and replace as necessary.

6. Replacement: The aerosol generators have an installed service life of fifteen (15) years. Generators are to be replaced fifteen years from the date code in the lower right corner of the product label as follows, the 2-digit numeric represents the year and then the month of shipment from the factory:

21	22	23	24	1	2	3	4	5	6	7	8	9	10	11	12

21 = 2021, 22 = 2022, etc. A unit marked 21 12, for example, would have shipped in December of 2021.

RECYCLING OF AEROSOL GENERATORS AFTER DISCHARGE:

In most cases the discharged generator can be disposed of in any landfill that handles industrial waste. However, local regulations must be researched and observed.

Each discharged aerosol generator will contain the following material:

1. Stainless steel outer shell – all

2. Mild steel cross members (30E, 60E, 100E, 250E, 500E)

3. Mild steel spacer ring - all

4. Stainless steel inner shell, top and bottom plates, screens (all sizes), and cross members (1000E, 1500E, 2500E)

5. Activated Alumina: CAS 1333-84-2 (Aluminum Oxide non-fibrous)

30E	60E	100E	250E	500E	1000E	1500E	2500E
20g	40g	100g	550g	970g	1670g	2350g	3600g

1. Fiberglass rope (ø1cm x 50cm).

2. Ceramic Paper < 150g.

3. Wire – 24gauge, PVC coated (< 1g)

4. Trace chemicals: K2CO3 (water-soluble particulate "trapped" in unit during discharge).

Un-discharged generators taken out of service should be returned to your local authorized distributor for replacement and re-cycling.

LIMITED WARRANTY STATEMENT

Fireaway represents this product is free from defects in material and workmanship, and it will repair or replace any product or part thereof which proves to be defective in workmanship or material for a period of eighteen (18) months from the date of first shipment from our factory. Defective units should be returned shipment prepaid to the factory.

Fireaway Inc. will repair or replace and return shipping prepaid. Return or repair shall be the purchaser's sole remedy for defect.

Limitations of Liability

This warranty does not cover equipment damaged during shipment or by misuse, accident, or negligence, or which has been repaired or altered by others. Fireaway Inc. shall not under any circumstances be liable for special or consequential damages such as, but not limited to, damage or loss of property or equipment, loss of profits or revenue, cost of capital, cost of purchased or replacement goods, or claims by customers of the original purchaser. Remedies set forth herein to the original purchaser and all others shall not exceed the price of the equipment supplied.

This warranty is exclusively and expressly in lieu of all other warranties, whether expressed or implied, including warranty of merchantability or fitness.

A DETAILED MANUAL MAY BE OBTAINED BY CONTACTING THE MANUFACTURER.

Stat-X products are manufactured in the USA, and sold worldwide (excluding the Federation of Russian States) exclusively by Fireaway Inc. under license from R-Amtech International.

IMPORTANT NOTE

Shutdown of Air Handling and Power Supply

Upon pre-discharge detection of a fire, the ventilation system for the protected volume must be shut-down to ensure the required application density is delivered and that the fire is not exacerbated by excessive air-flow. In addition, electrical power to protected equipment must be shut down. This eliminates the potential of re-ignition from a continuous short circuit.

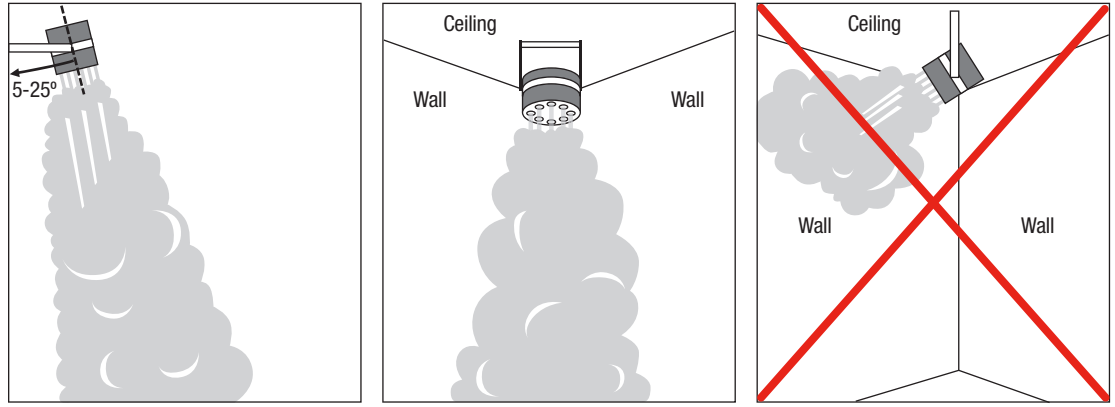
Questions concerning the information presented in this manual may be addressed to your authorized distributor or:

Fireaway Inc.
5852 Baker Road
Minnetonka, MN 55345
U.S.A.

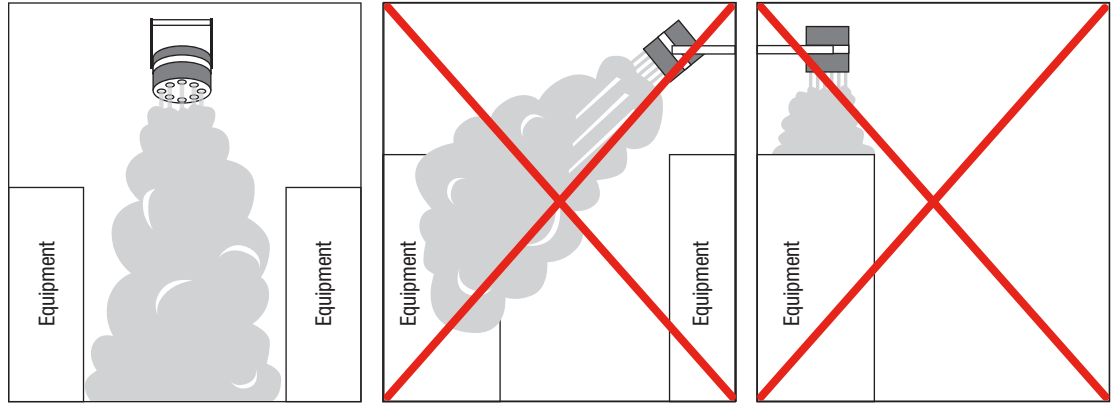
Tel: 952-935-9745
Fax: 952-935-9757
www.statx.com

Stat-X Installation Guidelines:

Aerosol generators should normally be mounted near ceiling height and angled to discharge down (under floor excepted) toward the floor at an angle to ensure three-dimensional distribution of aerosol. Normal orientation from vertical is 15° - 30°.



Generators must never be positioned to discharge directly at each other and must be mounted in such a way as to have an unobstructed discharge path, nor discharge at close range onto walls, ceiling, or equipment. Always check for obstructions in the path of the aerosol discharge stream. Generators must be installed such that they cannot cause personnel injury upon activation.





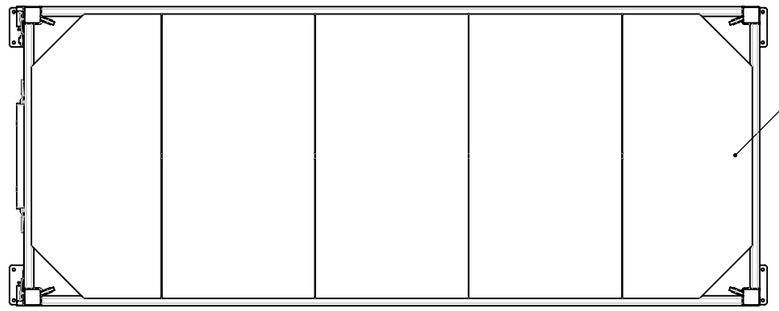
5852 Baker Road
Minnetonka, MN 55345
U.S.A.

Tel: 952-935-9745
Fax: 952-935-9757
www.statx.com

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~23,1 kN

~17,4 kN



~31,8 kN

~20,9 kN

Rev.:	Änderung (changes):	Datum (Date):	Name:

Allgemeintoleranzen für Längenmaße DIN ISO 2768-mK

Genauigkeitsgrad	Abmaße in mm für Nennmaßbereiche						
	0.5 ... 3	> 3 ... 6	> 6 ... 30	> 30 ... 120	> 120 ... 400	> 400 .. 1000	> 1000 ... 2000
m (mittel)	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2

Oberfläche: (surface) -

Werkstoff (material): 15899.18 kg

ISO 13715

	Datum (Date):	Name:
Drawn:	03.03.2023	Irina Hirsch
Checked:		

Bezeichnung (description):

Umrichtercontainer

PCS (Converter) Container

Scale: 1:50

Sheet: 1 (A3)

1 of: 1

Revision:

Artikel-Nr. (article number): 53396

alte Zeichnungs-Nr. (old drawing number):

CAD System SolidWorks

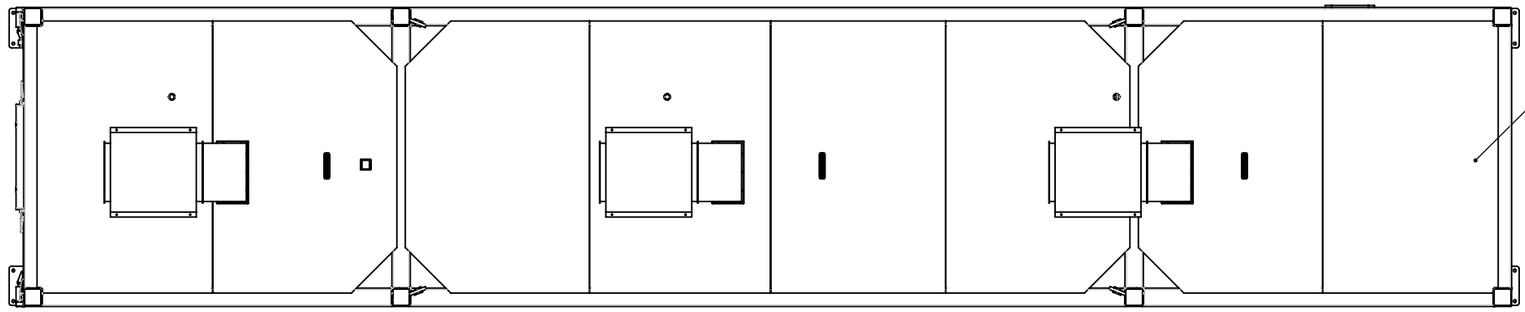
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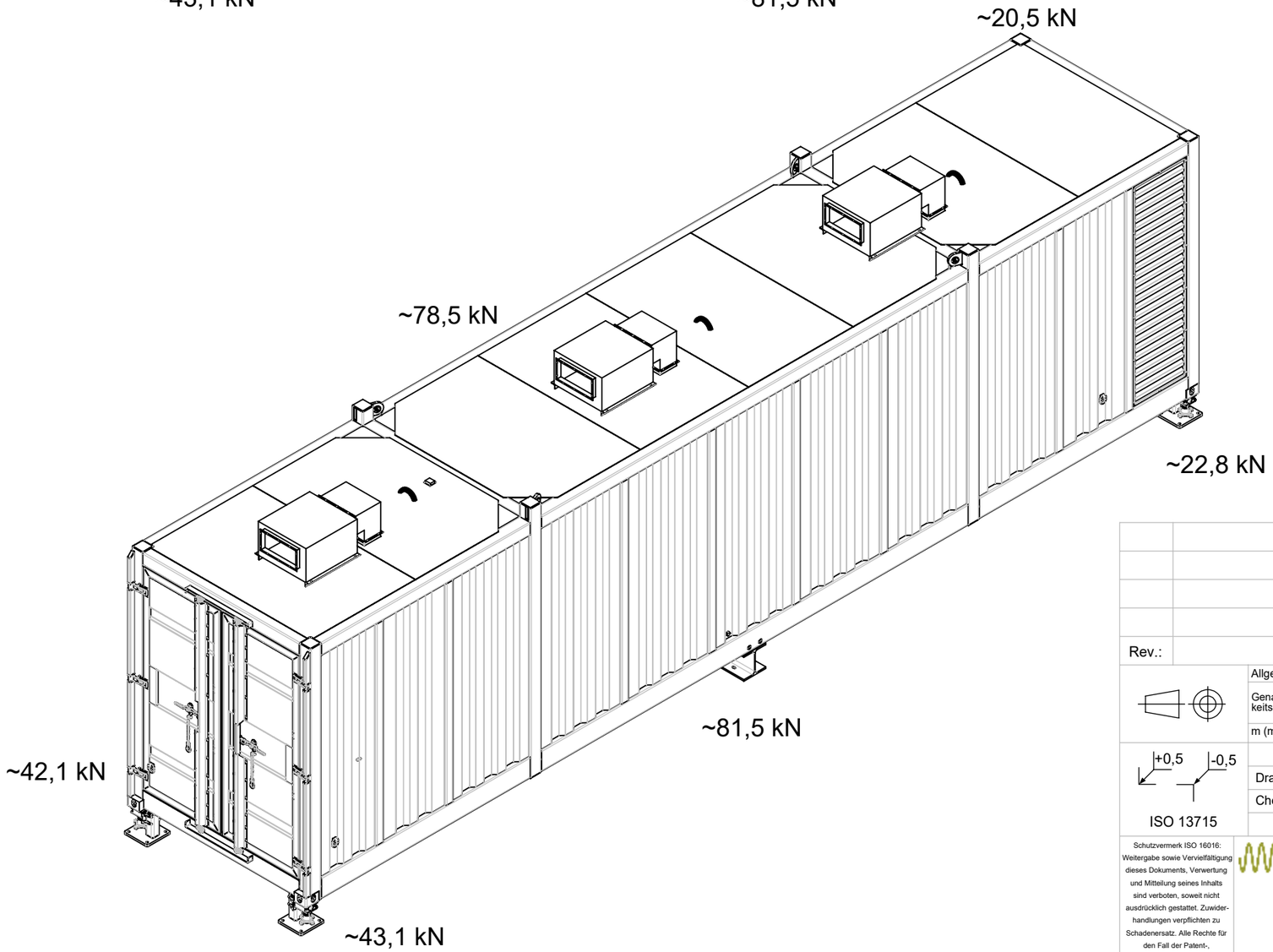
FREQCON

Freqcon GmbH
Bürgerwiesenweg 5
D-27336 Rethem
+49 (0) 5165 291760-0

~42,1 kN ~78,5 kN ~20,5 kN



~43,1 kN ~81,5 kN ~22,8 kN



Rev.:	Änderung (changes):	Datum (Date):	Name:

Allgemeintoleranzen für Längenmaße DIN ISO 2768-mK

Genauigkeitsgrad	Abmaße in mm für Nennmaßbereiche						
	0.5 ... 3	> 3 ... 6	> 6 ... 30	> 30 ... 120	> 120 ... 400	> 400 .. 1000	> 1000 ... 2000
m (mittel)	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2

Oberfläche: (surface) -

Werkstoff (material): 14791.35 kg

+0,5 -0,5

ISO 13715

	Datum (Date):	Name:
Drawn:	03.03.2023	Irina Hirsch
Checked:		

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FREQCON
Freqcon GmbH
Bürgerwiesenweg 5
D-27336 Rethem
+49 (0) 5165 291760-0

Bezeichnung (description):

Batteriecontainer 1

Battery Container 1

Scale: 1:50

Sheet: 1 (A3)

1 of: 1

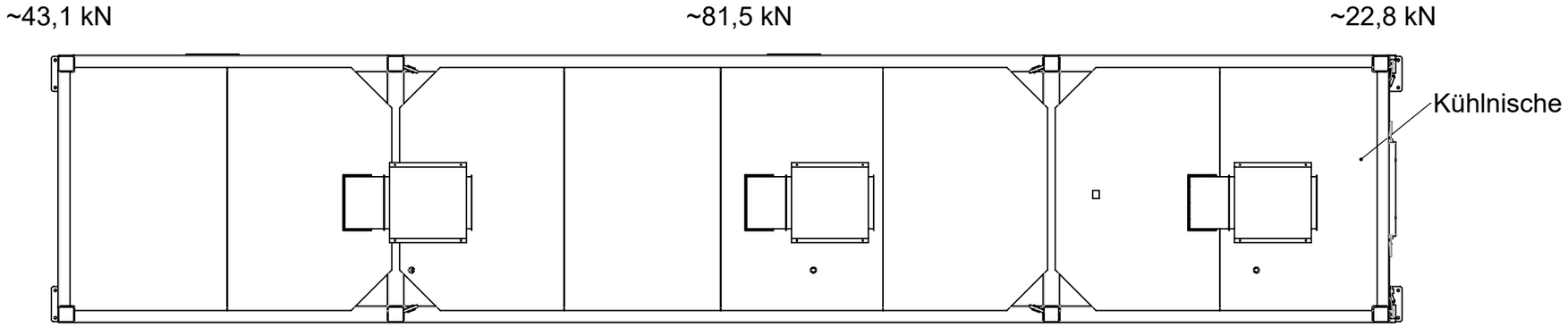
Artikel-Nr. (article number): 53406

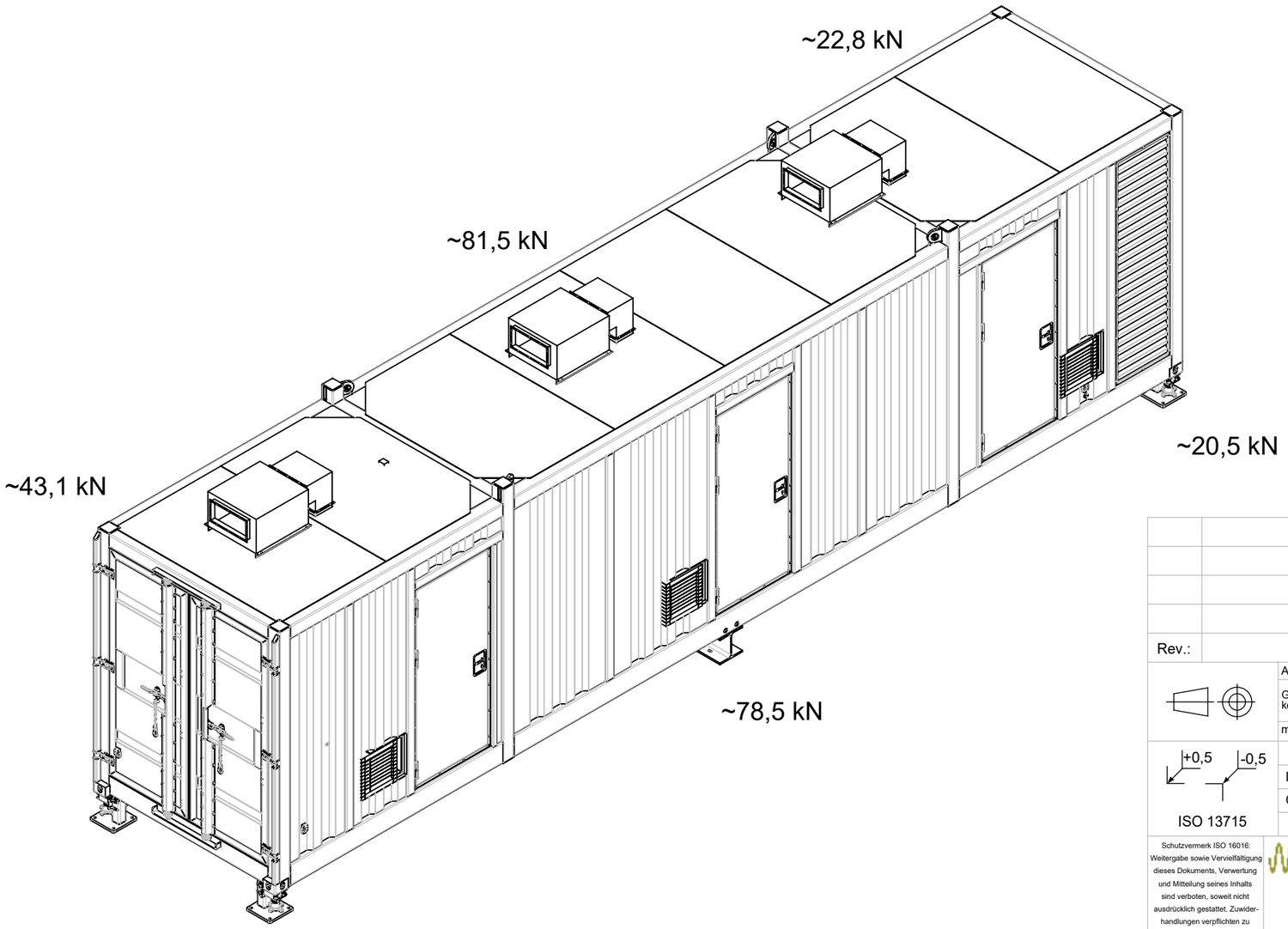
alte Zeichnungs-Nr. (old drawing number):

Revision:

CAD System SolidWorks

Status: Freigegeben





Rev.:	Änderung (changes):	Datum (Date):	Name:

Allgemeintoleranzen für Längenmaße DIN ISO 2768-mK							
Genauigkeitsgrad	Abmaße in mm für Nennmaßbereiche						
	0.5 ... 3	> 3 ... 6	> 6 ... 30	> 30 ... 120	> 120 ... 400	> 400 ... 1000	> 1000 ... 2000
m (mittel)	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2

Oberfläche: (surface) -

Werkstoff (material): 12214.44 kg

+0,5 -0,5

ISO 13715

	Datum (Date):	Name:
Drawn:	03.03.2023	Irina Hirsch
Checked:		

Bezeichnung (description):

Batteriecontainer 2

Battery Container 2

Scale: 1:50

Sheet: 1 (A3)

1 of: 1

Artikel-Nr. (article number): 53412

alte Zeichnungs-Nr. (old drawing number):

Revision:

CAD System SolidWorks

Status: Freigegeben

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PUMA FIRE

OPERATING AND MAINTENANCE INSTRUCTIONS

AIR MAKE UP DAMPERS (A.M.D) ALL UNITS

GENERAL DESCRIPTION

Air Make up Dampers (AMD), are designed to provide replacement air to the protected space whilst extracting gaseous extinguishant via a Puma gas extract unit. Refer to drawing No. COMMS 001.

The damper should be located as close as possible to the wall aperture. This will maintain the fire integrity of the wall. The fire rating of the fire smoke damper is 2 hours, tested to BS EN 1634.1:2008.

The casing and blades are constructed from galvanised steel. 25mm external flanges are fitted as standard, 50mm flanges are available upon request. Optional circular / rectangular spigot connections are also available on request.

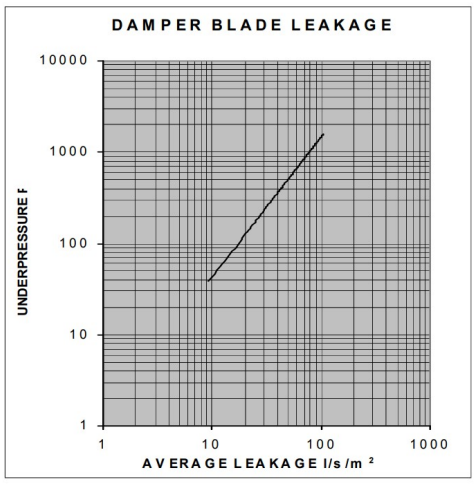
External Walls require a Telescopic Duct (TD) and Weather Louvre (WL).

Internal Walls require a Wall Sleeve (WS) and Egg Crate Grille (ECG).

The blades are fitted with high temperature silicon blade seals. They have a leakage performance of 53 ltr/s/m2 @ 250 Pa to 103 ltr/s/m2 @ 1000Pa.

All Dampers are available with a fusible link rated at 75˚C, electro thermal link or pneumatic actuators. HEVAC installation frames for masonry walls are available.

Compliant to BS EN 1366-2 with regards to leakage rates not exceeding 200m³/hr/m².



Unit C Alexander Bell Centre, Hopkinson Way, West Portway Business Park, Andover, Hampshire, England, SP10 3UR
Telephone: 0044 1264 333305 Co Reg No 3230570
Email: sales@pumafire.co.uk Website: www.pumaproducts.co.uk
Director Mr Phillip Newton M Inst.R, M.A.S.H.R.A.E.

DAMPER MOTOR

This motor type is 'powered open' and will 'spring return' on power failure. The mains supply must be interlocked with the Puma FE gas extract unit to open simultaneously.

The damper motor is a fully sealed unit and is provided with 1.5m mains supply cable. The motor is factory fitted to the damper casing to prevent any movement of the motor during operation.
Any tampering of the motor seal or cable will invalidate warranty.

In the event of a fire condition, the damper motor will commence opening and be fully open in 75 seconds. When power is removed, the damper will shut in 20 Seconds.

INSTALLATION

The fresh air make up damper is to be installed directly to the face of the wall using self-tapping screws or raw plugs and sufficient fixings, depending on the wall construction. Before fixing the damper to the wall, ensure the flange is lined with fire-rated sealant to allow for a tight seal between the wall and the damper.

SERVICE & MAINTENANCE

The Damper and motor require no service as such, but a periodic mechanical and electrical test of the working mechanisms should be carried out at least twice yearly, or to coincide with existing service and maintenance contracts.
See appropriate certified drawing of units for further information re: sizes etc.

Unit C Alexander Bell Centre, Hopkinson Way, West Portway Business Park, Andover, Hampshire, England, SP10 3UR
Telephone: 0044 1264 333305 Co Reg No 3230570
Email: sales@pumafire.co.uk Website: www.pumaproducts.co.uk
Director Mr Phillip Newton M Inst.R, M.A.S.H.R.A.E.

CROSSWIND

TECHNICAL NOTE

Title	**Inspection of low insulation resistance modules 12/02/2025**
Prepared by	Alessandro Sutto
Reviewed by	*Nicolas Le Brun*
Purpose	Highlighting possible causes that led to arc flash and possible mitigation measures for the way ahead of the BESS on BLPH
Doc No.	

Introduction

Following the arc flash event in January, the investigation on the possible causes lead to point towards low impedance between cells and ground in different modules linked to the same string.

To prevent other events to happen, a measurement campaign was carried out in which all installed modules impedance resistance between ground and both terminal was measured.

The expected healthy value should measure in the range of hundreds of MΩ to GΩ. Five modules had an impedance lower than the expected. The identified modules were sent back to Freqcon HQ for inspection to investigate the causes.

Once in Germany, Freqcon would:

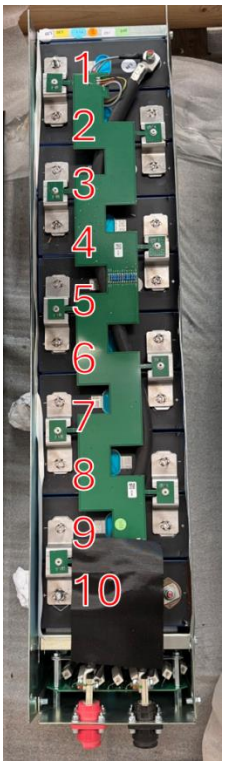
- visually inspect the modules for any external apparent damage,
- measure the impedance resistance (IR),
- connect the BMS to a diagnostic testing unit that can read the value of voltage and temperature inside the module,
- open the module and possibly extract components (BMS or cells) for internal visual check

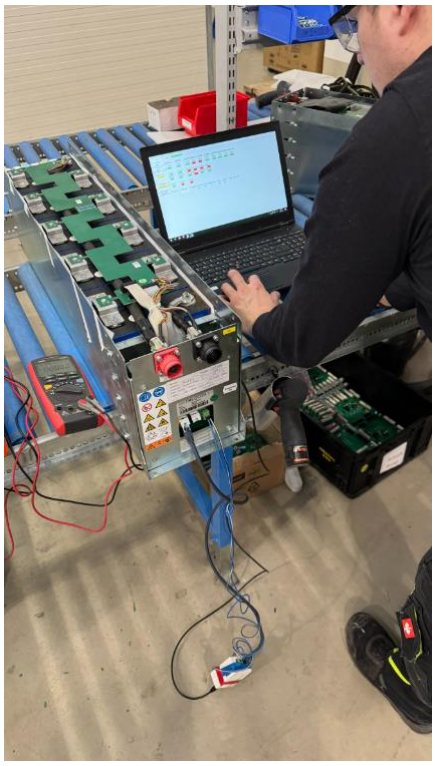
In the following document, a brief description of the findings per module is presented and conclusions on possible root causes and mitigation are presented.

In the pictures below :

LEFT : the “numbering” of cells inside a module
RIGHT : open module connected to the diagnostic unit

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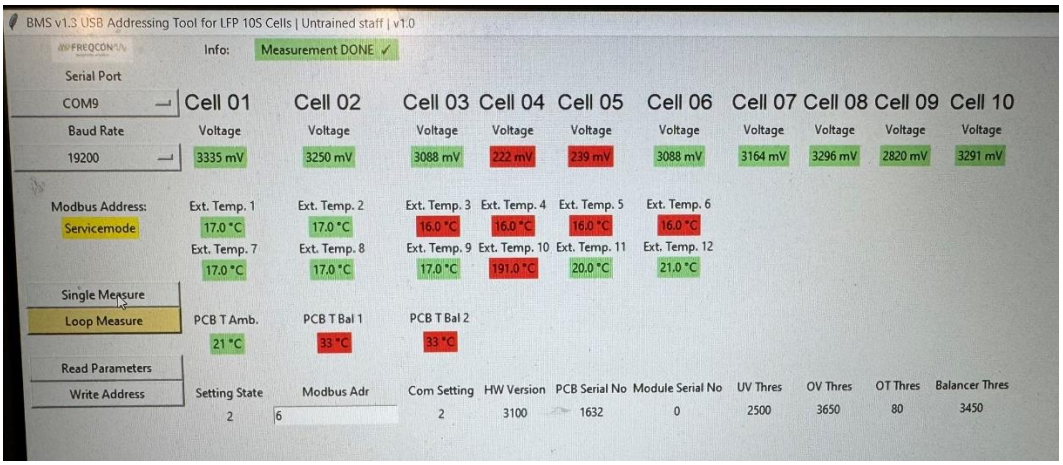
Inspection

Module #508972000323

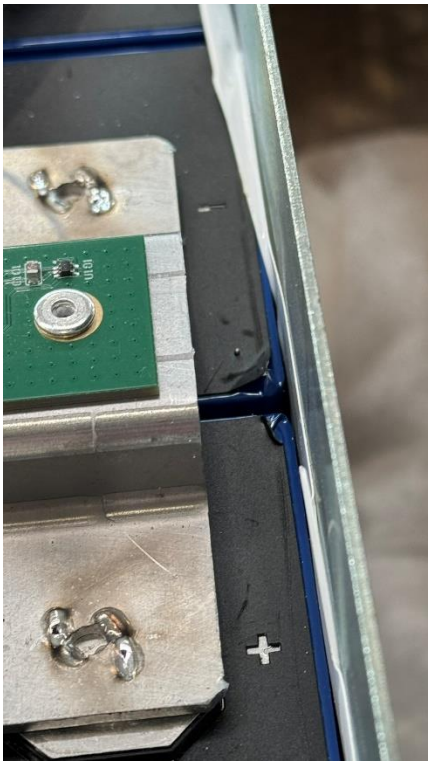
When tested the previous day, one could hear “zapping” when applying high voltage (2500Vac), suggesting small arcs between the cells and the case.

Diagnostic showed low voltage on cell 4 and 5, confirmed by a direct measurement with a multimeter.

Cell 9 had a lower voltage than the rest of the string.

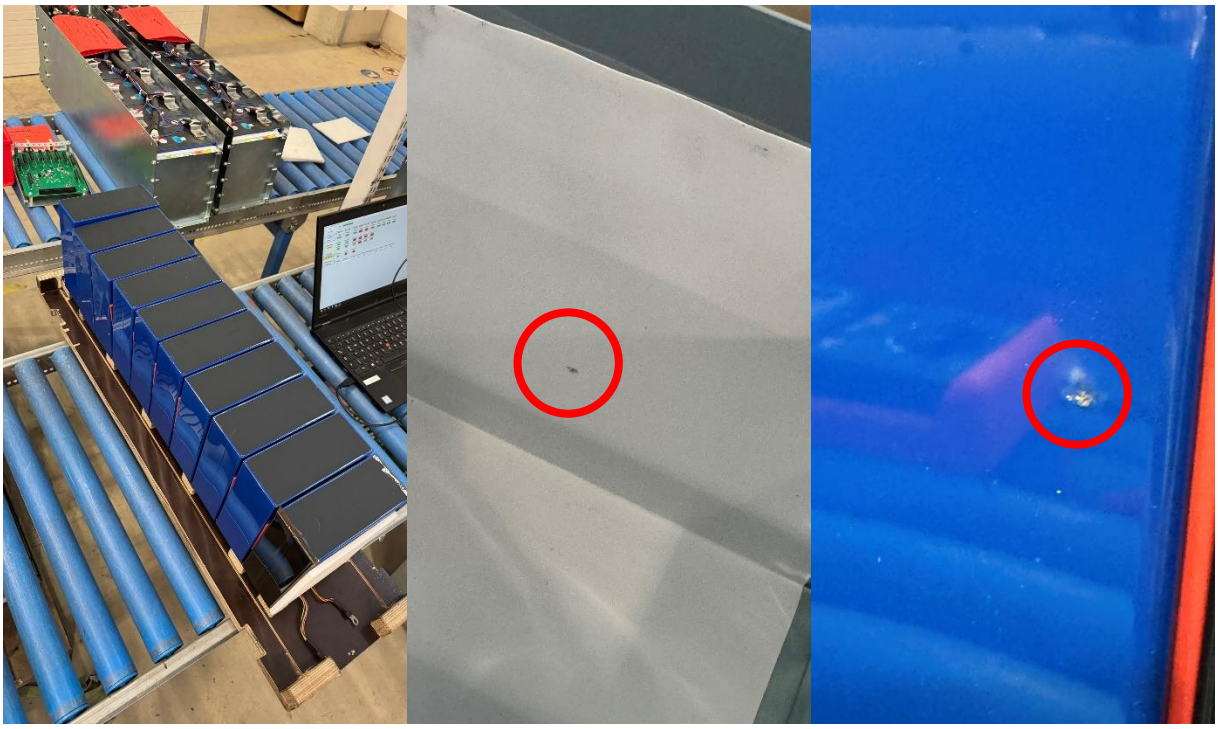


Once opened few visible damage on cell 4 and 5.



The string of cells were then taken out of the casing and flipped over. Visible damage on Cell 9 external blue insulation material linked to a damage on the white insulation sheet, possibly linked to a small fragment.

Other visible imperfections close to cell 4 and 5 was oxidized metal casing but not linked to any damage to the insulation sheet or to the cells themselves. No cause found for low voltage.



Module #509344000168

Module was damaged during transport to the yard. It was never installed in the racks.

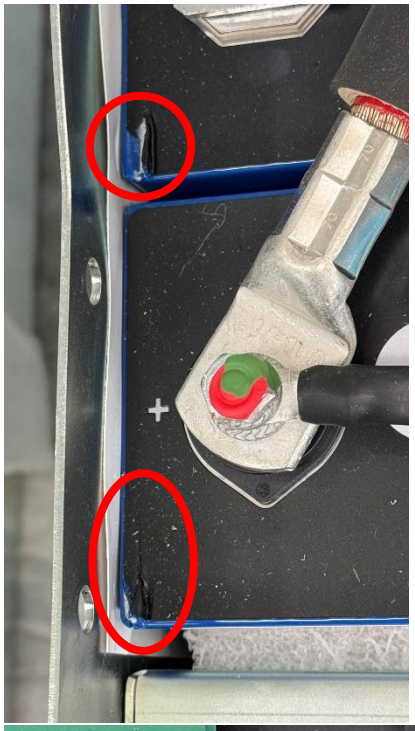
When testing for IR clear zapping could be heard, after opening the cover clear marks of discharge between the connectors of 2 cells and the case lid can be seen. Once the cover was removed there was no more contact or vicinity, so the IR went back to normal high values (GΩ scale). Also the diagnostic didn't highlight any particular issues with voltages.

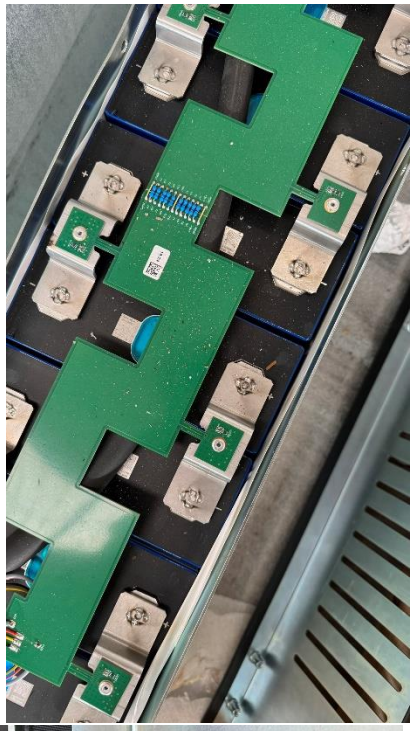
The module was particularly dirty with lots of debris and metal shaving (See magnet probe picture) and other clear damage on cell 10 and 9 on the edges.

Diagnostic showed temperature probe for cell 1 to be defective. Visual inspection confirmed that the PCB was bent and probably the connection damaged.

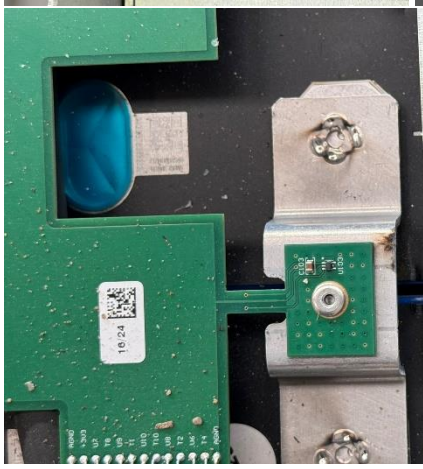
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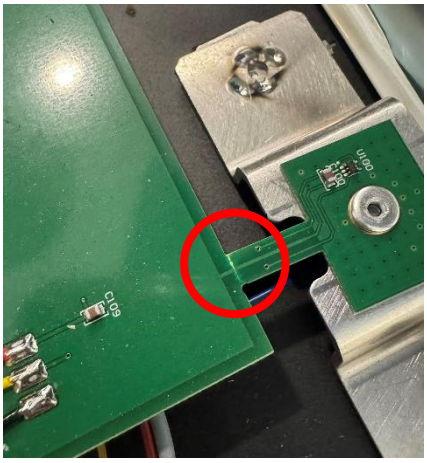


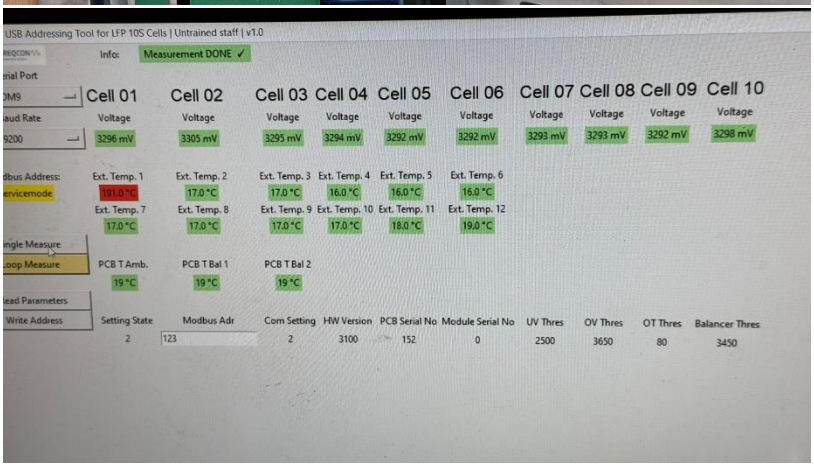










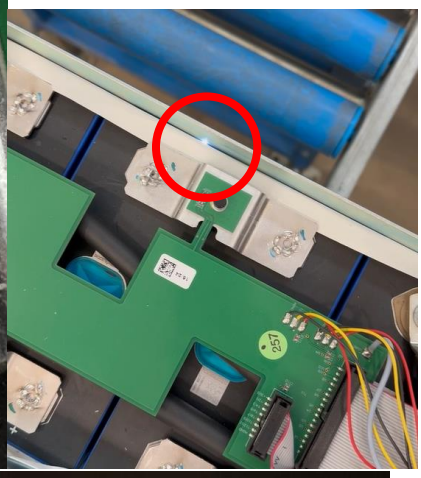


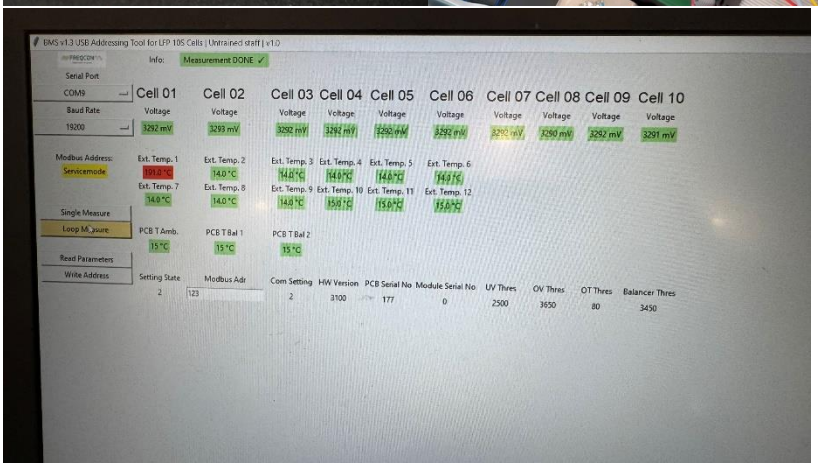
Module #503944000097

Diagnostic showed temperature probe to for cell 1 to be defective. Visual inspection didn't confirm the finding.

IR measurement produced intense zapping and small sparks could be seen between cell 8 and the case through the insulation sheet. Further inspection found a small metal debris that pierced the insulation sheet and the side of the cell reducing the IR.

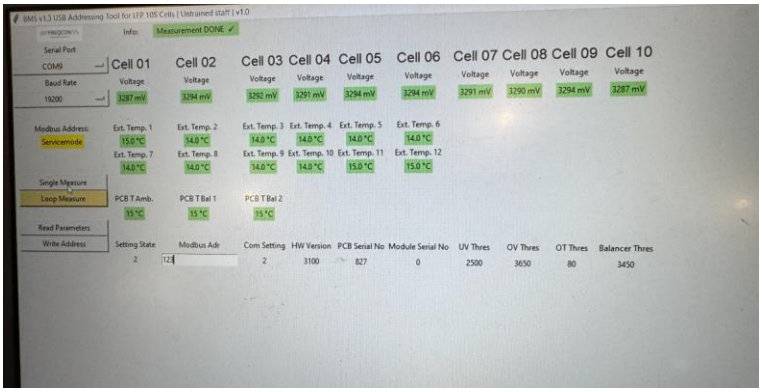






Module #508972000050

IR showed low values, after visual inspection found that case lid damaged the corner of cell 10. The insulating tape on the lid edge ripped while sliding it into position, damaged the cell and reduced the IR.





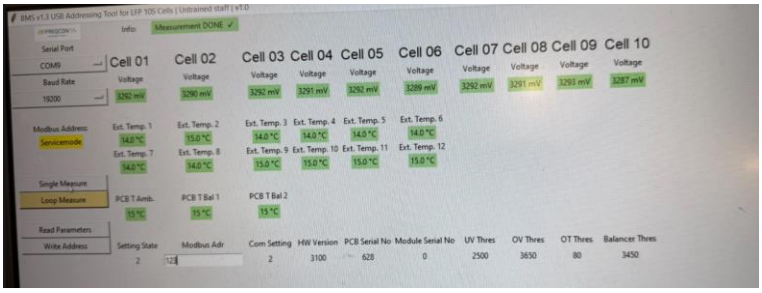


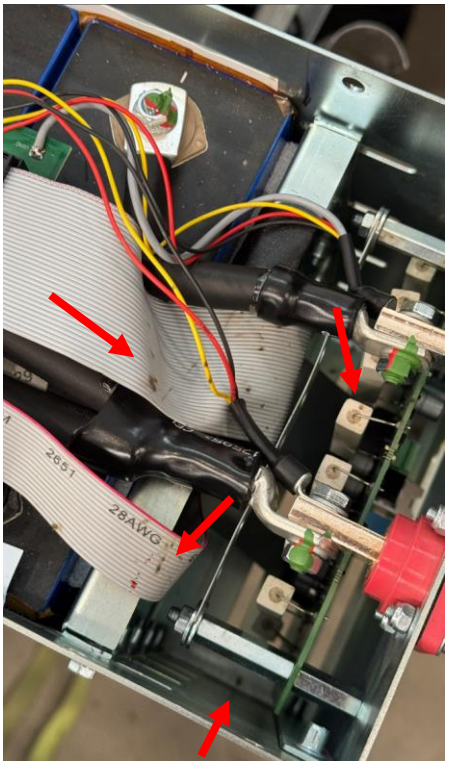
Module #509344000541

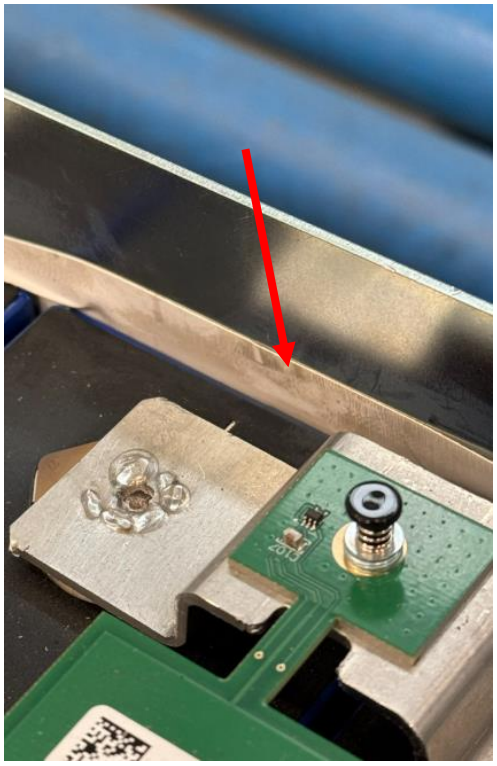
The diagnostic didn't highlight any issues across the cells.

No explicit evidence found after visual inspection. Probably the "damage" is located further down the side of the module in which, similarly to others, a small debris could have ripped the insulation sheet.

Interesting to notice burn-like marks on some parts close to the BMS, on some wiring and the bottom of the module. Not clear what caused them, but also no damage due to it.

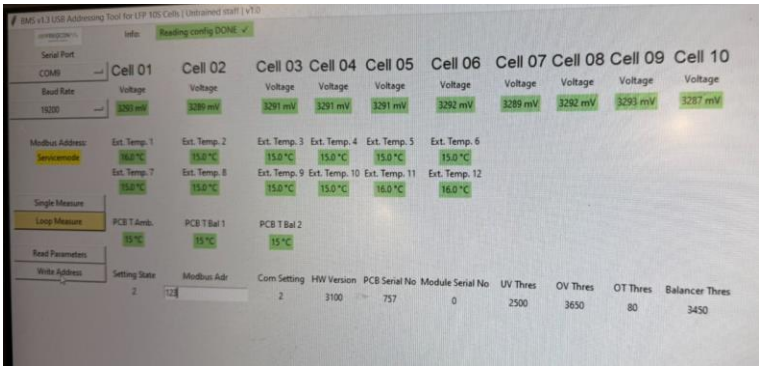


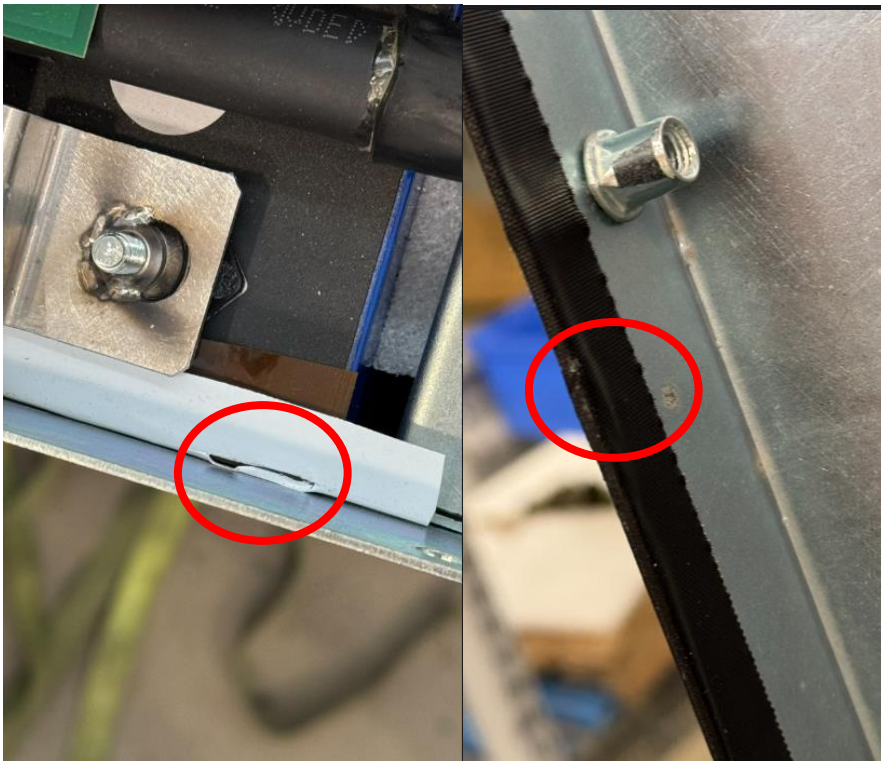




Module #508972000062

Visual inspection showed damage on cell 10 like for previous models. Most probably due to excessive pressure when applying the lid or movement during transport.





Root causes

Two main root causes can be identified for the failure and/or damage of the modules.

1. **Transport damage**
   Possibly due to poor fixing of the modules on the pallet, insufficient padding, and/or excessive vibrations during any of the transports (e.g. Germany to Italy, yard warehouse to platform). This might have caused movement of parts inside the modules leading to Printed circuit board bending, or contact between cell edges and the module's lid.
2. **External debris**
   Small particles entering the modules via the lid's aeration slots have resulted in damages to the insulation sheet between cells and the module and/or of the cells insulation themselves, consequently, reducing the IR.
   This could be also linked to the absence of any protective foil/sheet installed after manufacturing and before transportation, as not part of the packing specifications.
   Module 509344000168 was left un-installed and stored for safety reason inside the container, its contamination is clearly showing signs of debris coming from the yard environment. For all the other modules it is hard if not impossible to determine whether the debris and external particles inside them was due to the dusty environment of the yard or already present at the time of shipping from Freqcon.

Possible Mitigations

Insulation resistance has been measured and confirmed in range for all modules currently installed in the system. The remaining commissioning of the system will not involve moving the modules or expose them to dusty environment. It is expected that none of the highlighted root causes had caused damages to them.

Going forward with commissioning , no transport damage can be expected considering modules are now installed in their final location and the only foreseen transport is linked to the sea transport to bring it to the final offshore location. The system has been designed to withstand the calculated accelerations and extra temporary fastening will be provided where necessary.

Additionally, the cabinet covers and the air inlets filters significantly reduce the chance of external debris and particles entering the modules.

Further possible mitigation to improve the transport and preservation of modules might include for Freqcon to review their internal packaging requirements prior shipment, and the procedure and method statement for module installation ex:

- no direct contact between 2 modules on the pallet using appropriate padding material,
- adding damping material/cushioning below the module,
- adding some protective foil to prevent ingress of dust and other particles,
- using close wooden crates instead of open one,
- require IR measurements prior to DC connection,
- update the category of PPE required for certain activities

CROSSWIND



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INSPECTION REPORT

Inspection Visit Report No	NOI No	Inspector's Name	Date
CROSSWIND-123A90-FREQCON-IR-AT-001	None issued	Ali Tahannazif	18-Jul-2024

ASSIGNMENT DETAILS:			
Type of Inspection:	☐ Monitoring ☒ FAT ☐ Final Inspection *(Tickbox)*		
Scope of Inspection:	☐ Surveillance ☒ Witness Testing *(Tickbox)*		
Inspection Charge No:	FUL-30325	**Project PO:**	TBC
Client:	CrossWind C.V.	**Equipment / Material:**	PCS Container, BESS Container, and Converter
Project Name:	Hollandse Kust Noord Wind Park	**Client Contact:**	Martin Taylor
		Client Contact Email:	N/A
Next Visit Date:	N/A – no attendance on 18 and 19-Jul-2024 by inspector		

INSPECTION DETAILS:			
Vendor:	Rosetti Marino Spa	**Sub-Vendor:**	Freqcon GmbH
Vendor Location:	N/A	**Sub-Vendor Location:**	27336-Retham
Vendor PO Number:	N/A	**Sub-Vendor PO Number:**	N/A
Vendor Contact Name:	Alessandro Sutto	**Sub-Vendor Contact Name:**	Carlos Palenzuela
Vendor Contact Title:	Energy Storage Product Engineer	**Sub-Vendor Contact Title:**	Project Manager
Vendor Contact Tel:	N/A	**Sub-Vendor Contact Tel:**	N/A
PO Order Status:	☐ **Complete** ☒ **Partial**		***(NOTE: Select by clicking on Box)***

Attendees:			
Name	Company	Position	Remarks
Martin Taylor	Crosswind	N/A	N/A
Andrea Lambentini	Rosetti Marino SPA	N/A	N/A
Carlos Palenzeula	Freqcon	Project Manager	N/A
Alessandro Sutto	Energy Storage Product Engineer	N/A	N/A
Ali Tahannazif	Fulkrum obo Crosswind	Inspector	N/A

Purpose of Visit (Bullet Points):

- Visual Inspection
- FAT

Inspection Summary / Findings (Bullet Points):

The inspection was performed based on the client's request via email on July 17th at Freqcon Company, located in 27336-Retham, Germany. The scope of inspection has been specified according to the inspection application through email:

- FAT for PCS Container, BESS Container and Converter

Based on the inspection notification, the inspector was scheduled to participate in the Factory Acceptance Test (FAT). However, due to the lack of the Inspection Test Plan (ITP) and other essential project reference documents, as well as reference documents, there were uncertainties regarding the inspection.
Although some documents received by the inspector, such as the FAT protocol, outlined the acceptance criteria for visual inspection and testing of certain instruments (including smoke detectors, CO detectors, and hydrogen detectors), the overall documentation was incomplete. This report will be updated after receiving the supplementary docs.
Additionally, the vendor informed the attendees that the FAT for the batteries was not planned for this visit.

PCS Container: Serial No. FRQ-53396000001

Examination		Result
Container colour	Required colour/RAL colour code: 7035 (Light Grey)	☑ OK ☐ Defects ☐ N/A
Damage	The container is free of dents and unusual rust (minor rust spots, e.g. on crane eyes, are unavoidable)	☑ OK ☐ Defects ☐ N/A
Performances	The bushings correspond in size and position to the underlying CAD	☑ OK ☐ Defects ☐ N/A
Earthing connections	The earthing lugs are in the correct position (compare CAD) and are not painted	☑ OK ☐ Defects ☐ N/A
Doors/openings	Doors and other openings of the container correspond in size and position to the CAD on which they are based	☑ OK ☐ Defects ☐ N/A
Cooling niche	The cooling recess corresponds to the underlying CAD. The cooling units are in the correct position and can draw in sufficient fresh air.	☑ OK ☐ Defects ☐ N/A
Warnings	The required warning signs are located on the personnel doors	☑ OK ☐ Defects ☐ N/A

Examination		Result
Accessibility	The clearances in the container correspond to the CAD. All enclosure doors are in the correct position and accessible	☑ OK ☐ Defects ☐ N/A
Light/sockets	Sufficient lighting is available. There are service sockets (230 V) in the container interior. The sockets and lighting are usable and easily accessible.	☑ OK ☐ Defects ☐ N/A
Air conditioning	The air conditioning units are in the correct position and at least one control unit for the air conditioning units is present. The air conditioning units are functional and can cool the room to a satisfactory level.	☑ ☐ OK ☐ Defects ☐ N/A
Personal security	All steps in the container (if present) are marked in signal colours (yellow/black). There are no sharp edges in the container.	☐ OK ☑ Defects ☐ N/A
Installation of components and cables in the container	All components such as switch cabinets, cable trays, air conditioning units, etc. are properly installed and cannot fall or tip over.	☐ OK ☐ Defects ☐ N/A
Cable bushings	All cable ducts are present (possibly not fitted) and comply with the client's specification. Covers, cable bushings or similar are available for all openings in the container	☑ OK ☐ Defects ☐ N/A

Notes:

- [redacted] For all the RAL code checks, there was no printed RAL color chart available to check, although the color of the container was light gray.
- The required marked signal for steps shall be stuck.

- The vendor is not able to perform the FAT of some detectors that were installed inside the container.
- The wrong nameplate on the container shall be replaced with the correct one.
- The vendor is not able to do the testing of the earth connection.

BESS 1 Container: Serial No. FRQ-53406000001

Examination		Result
Container colour	Required colour/RAL colour code: 7035 (Light Grey)	☑ OK ☐ Defects ☐ N/A
Damage	The container is free of dents and unusual rust (minor rust spots, e.g. on crane eyes, are unavoidable)	☑ OK ☐ Defects ☐ N/A
Performances	The bushings correspond in size and position to the underlying CAD	☑ OK ☐ Defects ☐ N/A
Earthing connections	The earthing lugs are in the correct position (compare CAD) and are not painted	☑ OK ☐ Defects ☐ N/A
Doors/openings	Doors and other openings of the container correspond in size and position to the CAD on which they are based	☑ OK ☐ Defects ☐ N/A
Cooling niche	The cooling recess corresponds to the underlying CAD. The cooling units are in the correct position and can draw in sufficient fresh air.	☑ OK ☐ Defects ☐ N/A
Warnings	The required warning signs are located on the personnel doors	☑ OK ☐ Defects ☐ N/A

Examination		Result
Accessibility	The clearances in the container correspond to the CAD. All enclosure doors are in the correct position and accessible	☑ OK ☐ Defects ☐ N/A
Light/sockets	Sufficient lighting is available. There are service sockets (230 V) in the container interior. The sockets and lighting are usable and easily accessible.	☑ OK ☐ Defects ☐ N/A
Air conditioning	The air conditioning units are in the correct position and at least one control unit for the air conditioning units is present. The air conditioning units are functional and can cool the room to a satisfactory level.	☑ ☐ OK ☐ Defects ☐ N/A
Personal security	All steps in the container (if present) are marked in signal colours (yellow/black). There are no sharp edges in the container.	☐ OK ☑ Defects ☐ N/A
Installation of components and cables in the container	All components such as switch cabinets, cable trays, air conditioning units, etc. are properly installed and cannot fall or tip over.	☐ OK ☐ Defects ☐ N/A
Cable bushings	All cable ducts are present (possibly not fitted) and comply with the client's specification. Covers, cable bushings or similar are available for all openings in the container	☑ OK ☐ Defects ☐ N/A

Notes:

- For all the RAL code checks, there was no printed RAL color chart available to check, although the color of the container was light gray.
- The required marked signal for steps shall be stuck.
- The vendor is not able to perform the FAT of some detectors that were installed inside the container.
- The wrong nameplate on the container shall be replaced with the correct one.
- The vendor is not able to do the testing of the earth connection.

- **Container type** 40FT BESS **Serial No.** FRQ-53412000001

Examination		Result
Container colour	Required colour/RAL colour code: 7035 (Light Grey)	☑ OK ☐ Defects ☐ N/A
Damage	The container is free of dents and unusual rust (minor rust spots, e.g. on crane eyes, are unavoidable)	☑ OK ☐ Defects ☐ N/A
Performances	The bushings correspond in size and position to the underlying CAD	☑ OK ☐ Defects ☐ N/A
Earthing connections	The earthing lugs are in the correct position (compare CAD) and are not painted	☑ OK ☐ Defects ☐ N/A
Doors/openings	Doors and other openings of the container correspond in size and position to the CAD on which they are based	☑ OK ☐ Defects ☐ N/A
Cooling niche	The cooling recess corresponds to the underlying CAD. The cooling units are in the correct position and can draw in sufficient fresh air.	☑ OK ☐ Defects ☐ N/A
Warnings	The required warning signs are located on the personnel doors	☑ OK ☐ Defects ☐ N/A

Examination		Result
Accessibility	The clearances in the container correspond to the CAD. All enclosure doors are in the correct position and accessible	☑ OK ☐ Defects ☐ N/A
Light/sockets	Sufficient lighting is available. There are service sockets (230 V) in the container interior. The sockets and lighting are usable and easily accessible.	☑ OK ☐ Defects ☐ N/A
Air conditioning	The air conditioning units are in the correct position and at least one control unit for the air conditioning units is present. The air conditioning units are functional and can cool the room to a satisfactory level.	☑ ☐ OK ☐ Defects ☐ N/A
Personal security	All steps in the container (if present) are marked in signal colours (yellow/black). There are no sharp edges in the container.	☐ OK ☑ Defects ☐ N/A
Installation of components and cables in the container	All components such as switch cabinets, cable trays, air conditioning units, etc. are properly installed and cannot fall or tip over.	☑ OK ☐ Defects ☐ N/A
Cable bushings	All cable ducts are present (possibly not fitted) and comply with the client's specification. Covers, cable bushings or similar are available for all openings in the container	☑ OK ☐ Defects ☐ N/A

Notes:

- For all the RAL code checks, there was no printed RAL color chart available to check, although the color of the container was light gray.
- The required marked signal for steps shall be stuck.
- The vendor is not able to perform the FAT of some detectors that were installed inside the container.
- The wrong nameplate on the container shall be replaced with the correct one.
- The vendor is not able to do the testing of the earth connection.

BESS 1 MW / 5MWh

1.6	**Control elements description**	**Test Layout:** Check if the operating elements are explained in the operating manual. **Pass Fail Criteria:** The operating elements are explained in the operating manual. **Reference document:** 10354_23A2007_YYMMDD_Operating_Manual_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_EN_vx.x	☑ OK ☐ Defects ☐ N/A
1.7	**Data interface**	**Test Layout:** Check if data interface complies with the schematic. **Pass Fail Criteria:** The data interface corresponds to the circuit diagram. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	☑ OK ☐ Defects ☐ N/A
1.8	**Earthing**	**Test Layout:** Check if the control cabinet is properly earthed in accordance with the circuit diagram. **Pass Fail Criteria:** The control cabinet is properly earthed.	☐ OK ☑ Defects ☐ N/A
1.9	**Power supply**	**Test Layout:** Check the AC connection terminals of the control cabinet. Check if all three phases provide 230 V AC by using a Multimeter. **Pass Fail Criteria:** All three phases of the AC supply provide 230 V AC.	☐ OK ☐ Defects ☐ N/A
1.10	**UPS**	**Test Layout:** Check if the control cabinet is properly earthed in accordance with the circuit diagram. **Pass Fail Criteria:** The UPS complies with the specification. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	☐ OK ☐ Defects ☐ N/A

TR01	Test		Result
1.1	**Cleanliness**	**Test Layout:** Check covers and cabinet interior for cleanliness and rust. **Pass Fail Criteria:** Covers and interior are clean, without dirt or rust.	☑ OK ☐ Defects ☐ N/A
1.2	**Metal sheets**	**Test Layout:** Check metal sheets for sharp edges and damages. **Pass Fail Criteria:** No sharp edges or recognisable damage present.	☑ OK ☐ Defects ☐ N/A
1.3	**Wires and cables**	**Test Layout:** Visually inspect cable connections and wires inside the control cabinet for perfect condition and loose parts. **Pass Fail Criteria:** Cable connections in perfect condition, no loose parts present.	☑ OK ☐ Defects ☐ N/A
1.4	**Compliance with circuit diagram**	**Test Layout:** • Check if main components of the control cabinet are installed in accordance with the circuit diagram. • Check if labelling of the components in the control cabinet corresponds to the circuit diagram (exemplary test of some components). **Pass Fail Criteria:** • Essential parts of the control cabinet are available in accordance with the circuit diagram. • Labelling of the components in the control cabinet corresponds to the circuit diagram. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	☑ OK ☐ Defects ☐ N/A
1.5	**Control elements labelling**	**Test Layout:** Check if the operating elements on the control cabinet door are labelled according to the circuit diagram. **Pass Fail Criteria:** The operating elements are labelled according to the circuit diagram. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20240703_V0.62	☑ OK ☐ Defects ☐ N/A

Notes:

- For all the RAL code checks, there was no printed RAL color chart available to check, although the color of the container was light gray.
- The required marked signal for steps shall be stuck.
- The vendor is not able to perform the FAT of some detectors that were installed inside the container.
- The vendor is not able to do the testing of the earth connection.

Areas of Concern / Actions Required (Bullet Points):

- The vendor informed the attendees that the FAT for the batteries was not planned for this visit. Moreover, the vendor is not able to perform the FAT of some detectors that were installed inside the container. As a result, the inspection could not be completed in one day.
- Due to the large number of cables inside the container, the vendor must label all cables with numbers and tags.
- For all the RAL code checks, there was no printed RAL color chart available to check, although the color of the container was light gray.
- The required marked signal for steps shall be stuck.
- The vendor is not able to do the testing of the earth connection.

Inspection Criteria, i.e. Specifications / Standards / Drawings / ITP (*with revision*):

Documents / Specifications	Document Number	Revision	Approval code	Remarks
BESS 1 MW / 5MWh	23A2007-240708-FAT-BESS-Converter	2	N/A	N/A
40FT BESS	23A2007-240706-FAT-40FT-BESS-Container	2	N/A	N/A

Inspection Equipment		
Equipment Description	Serial Number	Calibration Expiry Date
Meter	-	-

HSE Findings / Summary (Bullet Points):

- During the inspection, the requirements of the health and safety manual were acceptably fulfilled. Safety instructions concerning shop access have been explained and their application has been followed during the inspection. No unsafe events were observed during the inspection visit. All personnel involved in the working area were properly skilled and they were provided with the correct procedure and work instructions. Inspection activities were carried out in a safe manner and the area in which the inspections took place was found clean and safe.

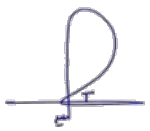
Specific Comments / Action(s) to be followed up (Bullet Points):

- The vendor informed the attendees that the FAT for the batteries was not planned for this visit. Moreover, the vendor is not able to perform the FAT of some detectors that were installed inside the container. As a result, the inspection could not be completed in one day.
- Due to the large number of cables inside the container, the vendor must label all cables with numbers and tags.
- For all the RAL code checks, there was no printed RAL color chart available to check, although the color of the container was light gray.
- The required marked signal for steps shall be stuck.
- The vendor is not able to do the testing of the earth connection.
- This report will be updated after receiving the supplementary docs.

Packaging/Shipping comments (Bullet Points):

- N/A

IRN No:	N/A
NCR Reference:	N/A
Punch List No:	-
Documentation Status (MDR/MDRB/MRB):	Not completed

Prepared by Inspector	Reviewed by Fulkrum	Accepted by Client
Name:Ali Tahannazif	Name: Lauren Smith	Name:
Date:18.07.2024	Date: 19-Jul-2024	Date:
Position: Inspector	Position: Senior QC Coordinator	Position:
Endorsement: 	Endorsement: 	Endorsement:

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Photos/ Pictures / Sketches:



Photo 1:	40FT BESS



Photo 2:	40FT BESS



Photo 3:	40FT BESS



Photo 4:	40FT BESS

Photos/ Pictures / Sketches:



Photo 5: 40FT BESS



Photo 6: 40FT BESS



Photo 7: Air Condition of container



Photo 8: Dimensional check

Photos/ Pictures / Sketches:



Photo 9: Earth connection



Photo 10: Warning signs on doors



Photo 11: BESS 1 Container



Photo 12: BESS 1 Container

Photos/ Pictures / Sketches:



Photo 13:	BESS 1 Container (Correct nameplate)

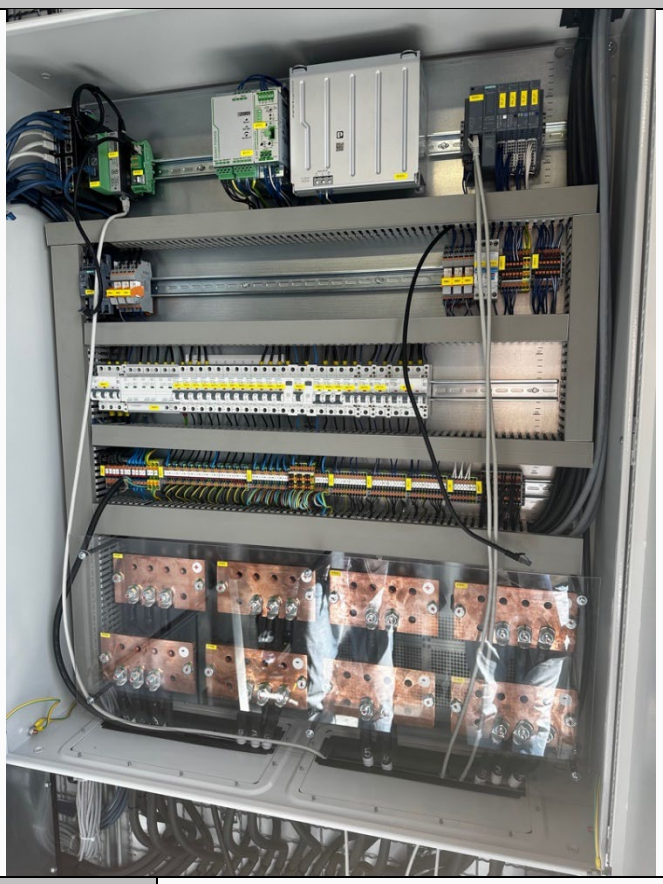


Photo 14:	BESS 1 Container



Photo 15:	Dimensional check

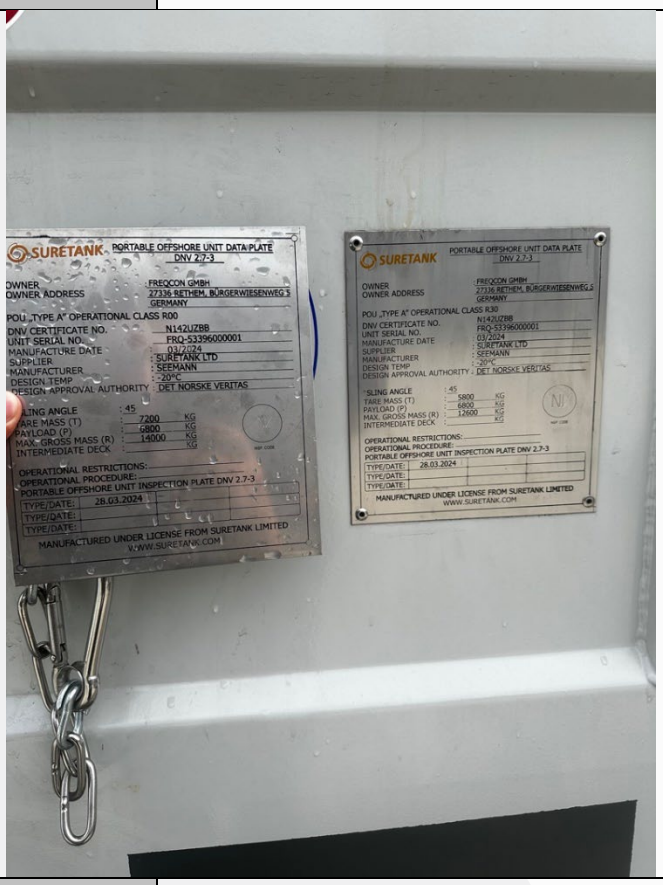


Photo 16:	PCS Container (Correct Name Plate)

Photos/ Pictures / Sketches:



Photo 17: PCS Container



Photo 18: PCS Container



Photo 19: BESS 1 Container (Dimensional Check)

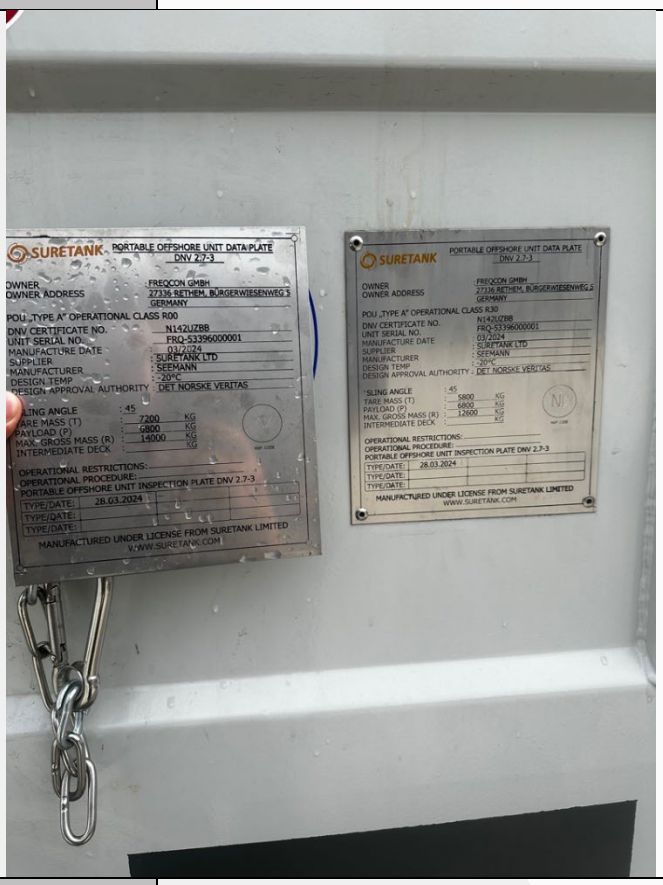


Photo 20: PCS Container (Correct Name Plate)

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Photos/ Pictures / Sketches:



Photo 21:	PCS Container



Photo 22:	PCS Container



Photo 23:	Dimensional Check

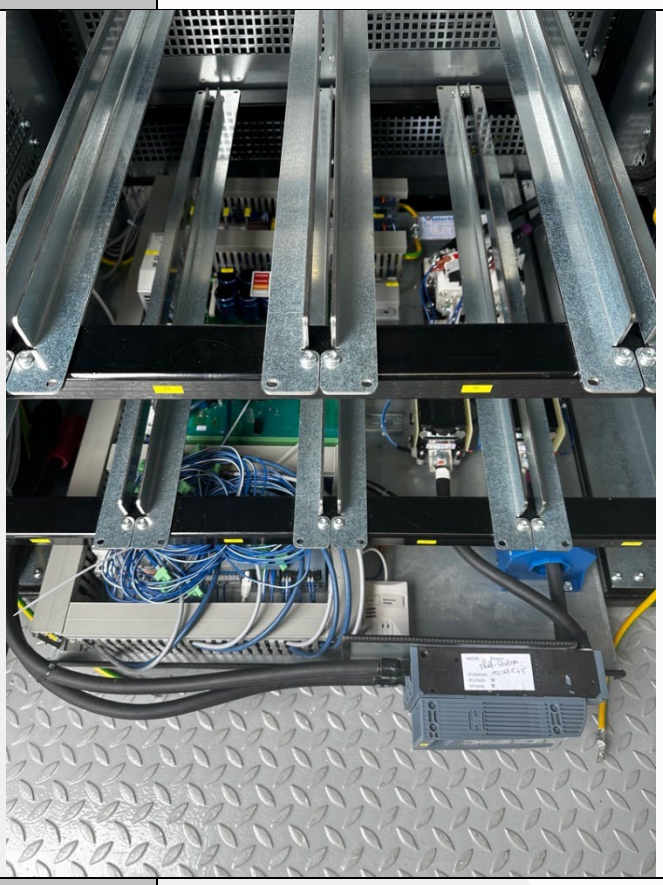
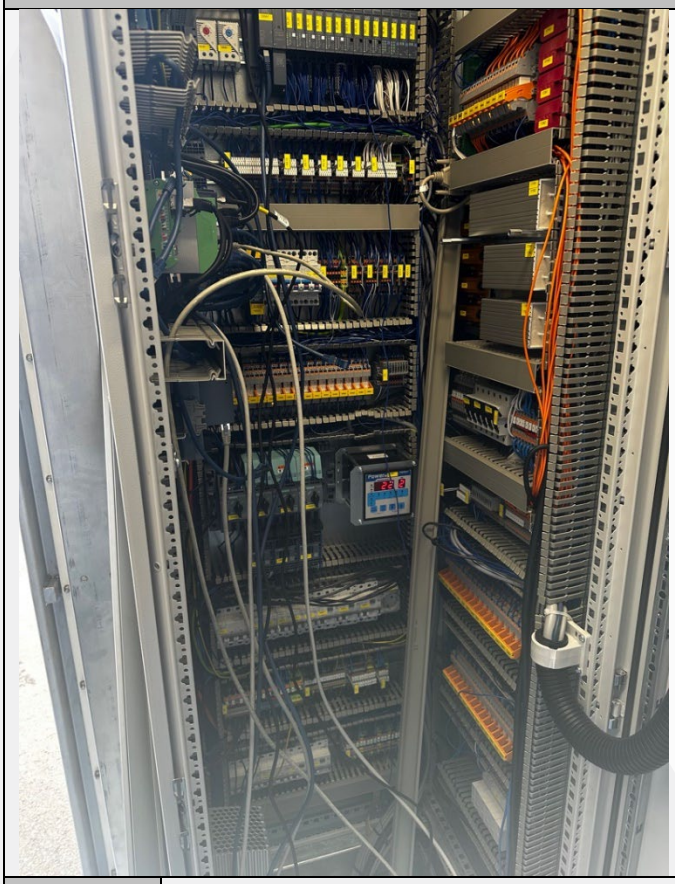
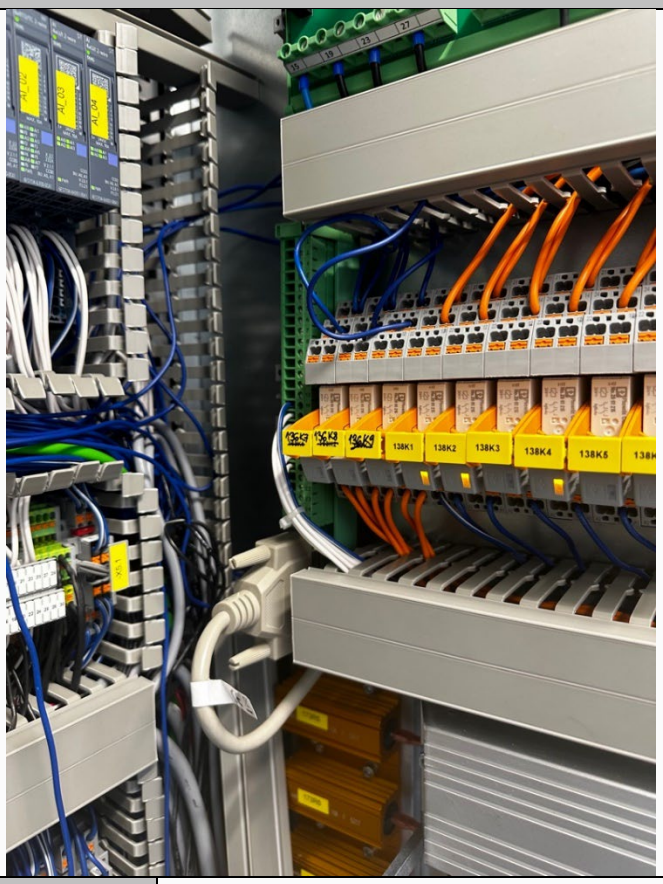


Photo 24:	CO detector

Photos/ Pictures / Sketches:			
			
Photo 25:	PCS Container	**Photo 26:**	The cable label shall be changed

End of Report



Dräger Polytron 8200/8310

Instructions for use

WARNING

Strictly follow the Instructions for Use.
The user must fully understand and strictly observe the instructions. Use the product only for the purposes specified in the Intended use section of this document.

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1 For your safety

1.1 General safety statements

- Before using this product, carefully read the Instructions for Use.
- Strictly follow the Instructions for Use. The user must fully understand and strictly observe the instructions. Use the product only for the purposes specified in the Intended use section of this document.
- Do not dispose of the Instructions for Use. Ensure that they are retained and appropriately used by the product user.
- Only fully trained and competent users are permitted to use this product.
- Comply with all local and national rules and regulations associated with this product.
- Only trained and competent personnel are permitted to inspect, repair and service the product as detailed in these Instructions for Use. Further maintenance work that is not detailed in these Instructions for Use must only be carried out by Dräger or personnel qualified by Dräger.
- Properly trained service personnel must inspect and service this product as detailed in the Maintenance section of this document.
- Use only genuine Dräger spare parts and accessories, or the proper functioning of the product may be impaired.
- Do not use a faulty or incomplete product, and do not modify the product.
- The flameproof threads for the explosion proof enclosure do not conform to the minimum/maximum values in EN/IEC 60079-1. The threads must not be modified by the user.
- The measuring function of the gas measurement transmitter for explosion protection according to Annex II, Sections 1.5.5, 1.5.6 and 1.5.7 of Directive 94/9/EG is not covered at present.
- Exchanging components may compromise the intrinsic safety. This only applies if the device is intrinsically safe.
- Only operate the product within the framework of a risk-based alarm signalling concept.

Safe coupling with electrical devices

- Electrical connections to devices which are not listed in these Instructions for Use should only be made following consultation with the respective manufacturers or an expert.

Use in areas subject to explosion hazards

- Devices or components for use in explosion-hazard areas which have been tested and approved according to national, European or international Explosion Protection Regulations may only be used under the conditions specified in the approval and with consideration of the relevant legal regulations. The devices or components may not be modified in any manner. The use of faulty or incomplete parts is forbidden. The appropriate regulations must be observed at all times when carrying out repairs on these devices or components.

1.2 Definitions of alert icons

The following alert icons are used in this document to provide and highlight areas of the associated text that require a greater awareness by the user. A definition of the meaning of each icon is as follows:



WARNING

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in physical injury, or damage to the product or environment. It may also be used to alert against unsafe practices.



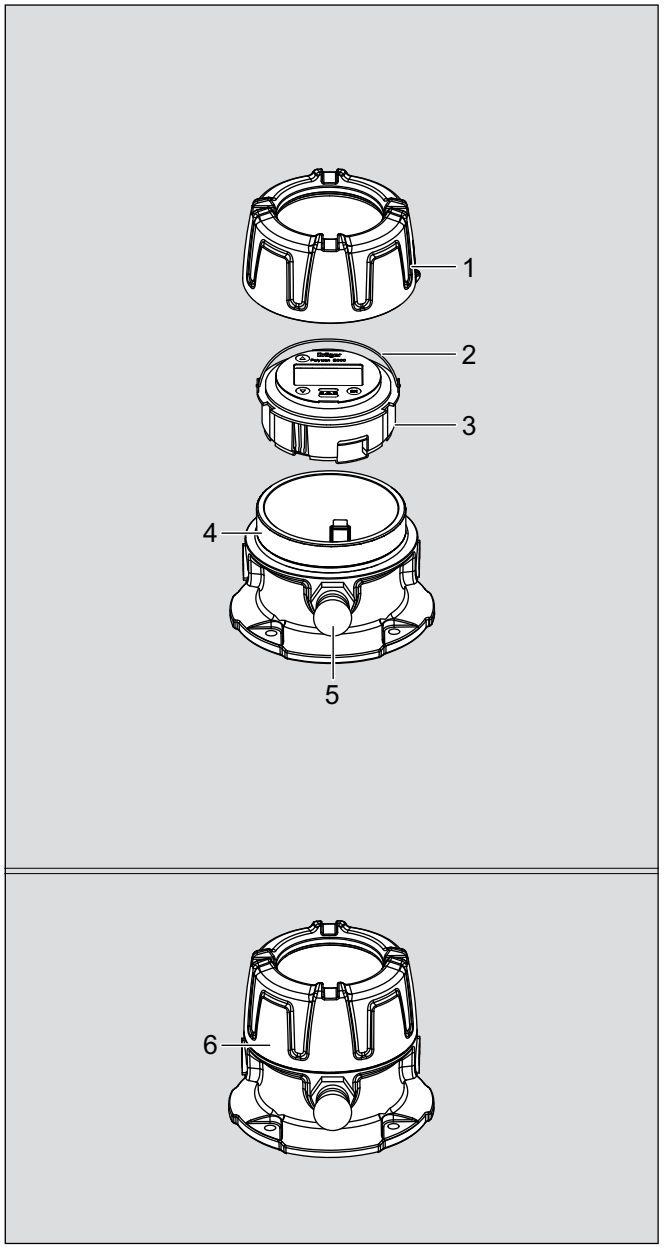
NOTICE

Indicates additional information on how to use the product.

2 Description

2.1 Product overview

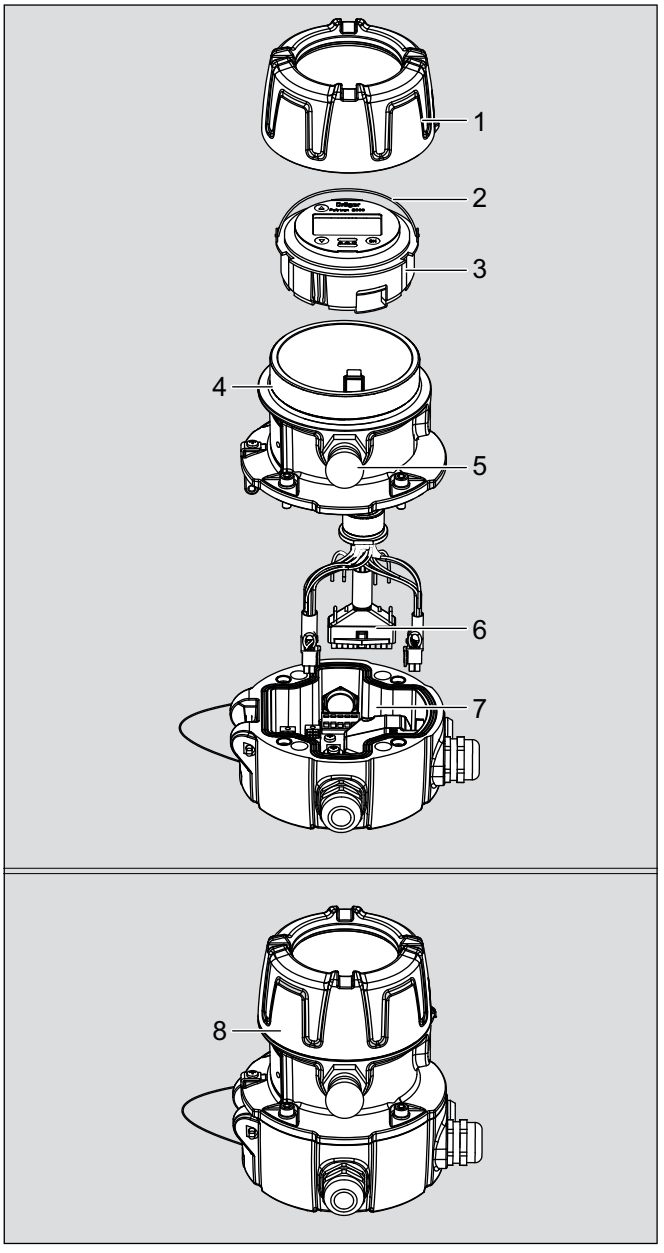
2.1.1 Explosion proof device



001233299.eps

1 Housing cover
2 Clip
3 Enclosure with main electronics (and optional relay)
4 Lower part of housing
5 Sensor
6 Assembled device

2.1.2 Explosion proof device with e-Box for increased safety



002233299.eps

1 Housing cover
2 Clip
3 Enclosure with main electronics (and optional relay)
4 Lower part of housing
5 Sensor
6 Feed through cable
7 e-Box
8 Assembled device

2.2 Functional description

2.2.1 Principle of operation of the DrägerSensor DD, LC

The DrägerSensor is a transducer for measuring the partial pressure of flammable gases and vapors in ambient air. It operates on the heat of combustion principle.

The ambient air to be monitored diffuses through the flame arrestor in the sensor. The mixture of flammable gases and vapors is burned catalytically on the heated measuring element (pellistor). The oxygen required for combustion is taken from the monitored ambient air (must be greater than 12 vol.%). The measuring element receives additional warming from the heat arising from the combustion. This warming causes a change in the resistance of the measuring element which is proportional to the concentration of the mixture of flamable gases and vapors in the air being monitored.

In addition to the catalytically activated measuring element, the sensor also has a compensating element. Both elements are part of a Wheatstone bridge circuit. Consequently, environmental influences such as changes in temperature or humidity are almost completely compensated for.

The DrägerSensor LC includes additional processing and amplification of the measuring signal. As a result, the sensor is suitable for the measuring range 0 - 10 %LEL.

2.2.2 Principle of operation of the DrägerSensor IR

The DrägerSensor IR infrared gas sensor is a gas transmitter for determining the concentration of gases and vapors in ambient air. The measuring principle is based on the concentration-dependent absorption of infrared radiation in the measured gases.

The ambient air to be monitored diffuses through a sintered body into the pressure-tight housing of a measurement cuvette. The broadband light produced by the emitter passes through the gas in the cuvette, is reflected from the cuvette walls and is focused on the entrance window of a dual-element detector. One channel of the detector measures the gas-dependent light transmission of the cuvette (measuring channel) and the other is used as the reference. The gas concentration in the cuvette can be determined from the ratio of the measured signal to the reference signal. The cuvette is heated to prevent condensation of atmospheric humidity.

The calculation of the concentration is performed by internal electronics and software. For the output signal, the gas sensor emulates the half bridge of a catalytic bead sensor.

2.2.3 Contaminating gases for the DrägerSensor DD, LC

NOTICE

Certain substances in the atmosphere to be measured can impair the sensitivity of the sensors.

a) Polymerizing substances such as acrylonitrile, butadiene and styrene

b) Corrosive compunds such as halogenated hydrocarbons (which release halogens such as bromine, chlorine or fluorine on oxidation) and halogen hydracids, as well as gaseous acidic compounds such as sulfur dioxide and oxides of nitrogen.

c) Catalyst poisons such as sulfur and phosphorus compounds, silicon compounds (particularly silicones) and organometallic vapors. The sensors used work with measuring elements (pellistors) that are poison-resistant (PR) and thus have a longer life than conventional sensors when catalyst poisons are present.

It may be necessary to check the calibration if the sensor has been exposed for a long time to a high concentration of flammable gases or vapors or the above-mentioned contaminating substances.

2.3 Intended use

The Dräger Polytron 8200/8310 is an explosion proof device for continuous monitoring of the concentration of gases and vapors containing hydrocarbons. The housing for the device consists of robust, non-corroding stainless steel or aluminum and is suitable for indoor or outdoor applications. The unit can be connected to a Dräger monitoring system or a programmable logic controller (PLC) by means of a sealed conduit or an appropriately approved cable gland. With the optionally integrated relay module, the device can be operated without a central controller (with additional local alarm signalling). The device is designed for fixed installation and is approved for use in potentially explosive atmospheres, see chapter 2.5 on page 7.

WARNING

Not tested in oxygen enriched atmospheres (>21% O_2). High off-scale readings may indicate an explosive concentration.

2.3.1 Dräger Polytron 8200 with DrägerSensor® [1] Ex DD

Catalytic bead sensor for monitoring flammable gases and vapors containing hydrocarbons

- Detection range: 0 to 100 % LEL [2]

2.3.2 Dräger Polytron 8200 with DrägerSensor Ex LC

Catalytic bead sensor for monitoring flammable gases and vapors containing hydrocarbons

- Detection range: 0 to 10 % LEL [2)]

1 DrägerSensor® is a registered trademark of Dräger.
2 Lower Explosion Limit, depending on substance and the locally applicable regulations.

2.3.3 Dräger Polytron 8310 with DrägerSensor IR

Infrared sensor for monitoring flammable gases and vapors containing hydrocarbons

- Detection range: 0 to 100 % LEL [2)]

WARNING

Explosive. Not to be used in oxygen enriched atmospheres. None of the Polytron 8000 transmitters is certified and approved to be operated in oxygen enriched atmospheres.

2.4 Intended operating area and operating conditions

Hazardous areas classified by zones:
The device is only designed for use in Zone 1 or Zone 2 potentially explosive atmospheres for which a temperature range as specified on the device must be observed and in which gases of Explosion Groups IIA, IIB or IIC and Temperature Classes T4 or T6 (depending on maximum ambient temperature) or dust of Groups IIIA, IIIB or IIIC may occur.

Hazardous areas classified by divisions:
The device is only designed for use in potentially explosive atmospheres of Classes I&II, Div. 1 or 2, for which a temperature range as specified on the device must be observed and in which gases or dust of Groups A, B, C, D or E, F, G and Temperature Classes T4 or T6 (depending on maximum ambient temperature) may occur.

2.5 Approvals



See printed version for approval markings.

2.6 Device marking

The device marking is supplied with the device as a copy on a separate document.

Key to the Serial Number: The third letter of the Serial Number specifies the year of manufacture: A = 2009, B = 2010, C = 2011, D = 2012, E = 2013, F = 2014, H = 2015, J = 2016, K = 2017 etc. Example: Serial Number ARBH-0054: The third letter is B, i.e. the device was manufactured in 2010.

3 Installation

3.1 General information for the installation

The selection of a suitable mounting location is crucial for the effectiveness and performance of the entire system. Every detail of the installation must be thoroughly thought out. The following must be noted in particular:

- the local and national rules and regulations for the installation of gas monitoring systems,
- the applicable regulations for running and connecting power and signal cables to gas monitoring systems,
- the full extent of environmental influences to which the device will be subjected,
- the physical properties of the gases and vapors to be measured,
- the details of the particular application (e.g., potential leaks, air movements/flows, etc.),
- accessibility for required maintenance activities,
- the geometric of the accessories that are used with the system,
- all other limiting factors and stipulations that may affect the installation of the system.
- For installation without a conduit, an approved cable gland (e.g. Hawke A501/421/A/¾" NPT or equivalent) must be used (see chapter 12 on page 28). To increase the RF interference immunity, it may be necessary to connect the cable screen to the cable gland and to the control unit.
- The explosion proof enclosure has three ¾" NPT connections, which can be used for field wiring, the direct attachment of a sensor or wiring an external sensor. Unused openings must be closed off with a plug. For the correct tightening torques for cable bushings, plugs, sensors and connectors, see chapter 12 on page 28.
- The secondary are supposed to be supplied from an isolating source (does not apply to relay contacts).
- The optional e-Box has up to four 20 mm connections, which can be used for field wiring or wiring an external sensor. The permissible cable diameter is 7 to 12 mm.
- If the device is installed in locations where ambient temperatures of over 55 °C prevail, appropriate cables which are specified for use at temperatures of 25 °C above the maximum ambient temperature must be used.
- Strip back the insulation on conductors by 5 to 7 mm.
- Connect the cable as shown in Chapter 3.5 on page 9 (shown here also with protective ground) oder Chapter 3.6 on page 10.
- The connecting wires for the optional relay module must be selected and fused according to the rated voltages, currents and environmental conditions.
- When stranded conductors are used, an end ferrule must also be used.

3.2 Restrictions on the installation

- The device requires a DC voltage between 10 and 30 V. The minimum supply voltage of 10 V and the cross-section of the conductors used determine the distance of the device from the supply or the central controller (see chapter 12 on page 28). The device is designed for cables of sizes 12 to 24 AWG (0.2 to 2.5 mm^2). Use a three-wire, shielded cable as a minimum.
- The device must not be subjected to any radiant heat (e.g. direct sunlight) as this will result in a temperature rise above the specified thresholds (see chapter 12 on page 28). The use of a reflective screen is recommended.
- The housing is weather resistant and suitable for outdoor applications. The use of the optional splash guard is recommended to protect the sensor from water and dust.
- The device must be installed and operated in an environment which conforms to the stated specifications (see chapter 12 on page 28).
- To insure proper operation of the device, the impedance of the 4 to 20 mA signal loop must not exceed 500 ohms. Depending on the operating voltage and according to the application (e.g. HART operation), certain minimum impedances must be adhered to (see chapter 3.3 on page 8). The conductors for the power supply must have an adequately low resistance to insure the correct supply voltage at the device.

NOTICE

A dust cap can be fitted to the cable entry of the device. This cap is only used for transport purposes and must be removed before the device is connected to a sealed conduit.

3.3 Impedance range of the signal loop

Devices with a HART interface can be operated with HART communication or in HART Multidrop mode.

Operating mode	Impedance range of the signal loop	Supply voltage range
Operation without HART communication	0 to 230 Ω	at 10 V DC
	Rising linearly with the supply voltage from: 0 to 230 Ω at 10 V to 0 to 500 Ω at 16 V	10 to 18 V DC
	0 to 500 Ω	18 to 30 V DC
Operation with HART communication (HART mode)	230 to 270 Ω	at 13 V DC
	Rising linearly with the supply voltage from: 230 to 270 Ω at 11 V to 230 to 500 Ω at 16 V	11 to 16 V DC
	230 to 500 Ω	18 to 30 V DC
HART Multidrop operation	230 to 500 Ω	10 to 30 V DC

3.4 Mechanical installation

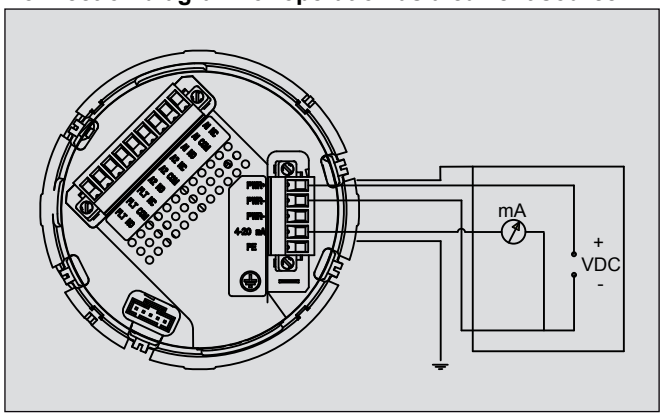
- Use the supplied drilling template for mounting on a wall.
- The mounting surface should be even and free of sharp edges.
- Dräger recommends using M6 Allen bolts.
- The openings must be readily accessible to the surrounding atmosphere.

3.5 Electrical installation without e-Box

CAUTION

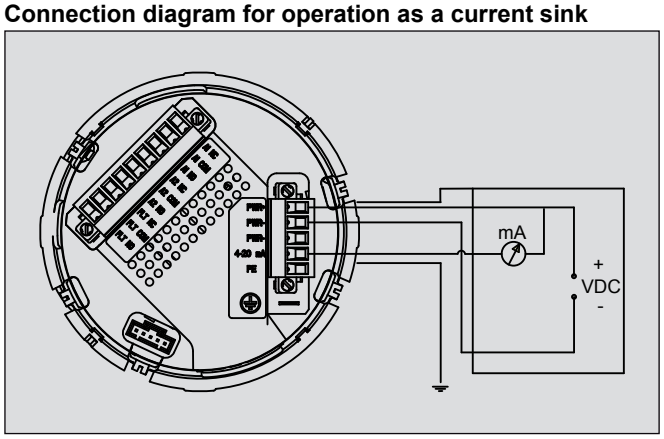
First connect the cables for the relays and make the connections to the sensor before connecting the device to the power supply.

Connection diagram for operation as a current source



01133300.eps

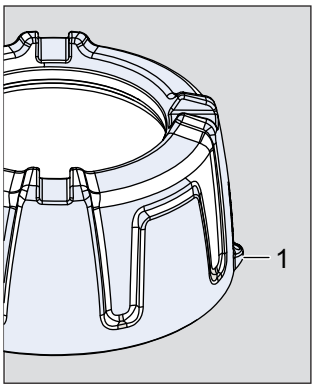
Connection diagram for operation as a current sink



01033300.eps

3.5.1 Power and signal cables

1. Release the set screw (1) and unscrew the housing cover from the device.
2. Lift the handle and remove the enclosure with the main electronics.
3. Connect the device electrically to the protective ground.
4. Rotate the main electronics and disconnect the 5-way plug.



00933300.eps

5. Connect the three cables for the power supply and the signal to the corresponding terminals (see following table of connections for the 5-way plug).

Connections for 5-way plug (power supply and signal):

5-way plug (power supply and signal)					
Terminal	1	2	3	4	5
Ident.	PWR+	PWR-	PWR-	4 to 20 mA signal	PE
Function	V+	V-	V-	4 to 20 mA signal (Operation as source or sink)	PE

6. For operation without a central controller: connect Terminal 3 to Terminal 4.
7. Fit the plug back in the socket and tighten the screws.
8. The screen of the cable must only be connected to the control unit.
9. Insert the main electronics back in the housing.
10. Screw the cover on again and tighten the set screw.

3.5.2 Version with relays

WARNING

At voltages >30 V AC or >42.4 V DC, the relay cables must be enclosed in protective tubing, or double-insulated cables must be used.

When the relay module is fitted, the wires for the alarm device are connected to the 9-way plug.

1. Disconnect the 9-way plug on the rear of the main electronics.
2. Connect the wires for Alarm Relay 1, Alarm Relay 2 and the Fault relay to the corresponding terminals, (see following table of connections for the 9-way plug).
3. The relays are energized when the default settings are used and in the measurement mode. This insures "fail-safe" operation. The terminal assignments in the connection table below apply when the default settings are used and when in measuring mode (see chapter 4.6 on page 13).
4. Fit the plug back in the socket and tighten the screws.
5. Fit the enclosed protective cover over the plug and secure it with cable ties if necessary.

NOTICE

For clear and far-ranging detection of a device fault, an alarm device should be switched by the fault relay.

Connections for 9-way plug (relays):

9-way plug (relays)									
	Fault relay			A2 relay			A1 relay		
Terminal	1	2	3	4	5	6	7	8	9
Ident.	FLT NO	FLT C	FLT NC	A2 NO	A2 C	A2 NC	A1 NO	A1 C	A1 NC

(NO = Normally open, NC = Normally closed, C = Common)

3.5.3 Remote Sensor

The remote junction box (Order Number 45 44 098 for stainless steel / Order Number 45 44 099 for aluminum) permits the installation of the sensors remote from the device electronics. This installation enables operation of the device in difficult to access or unfavourable positions (see the Instructions for Use for the Dräger Polytron 5000 Junction Box). The maximum permissible distance between the Polytron 8200/8310 and the sensors is 30 m.

3.6 Electrical installation with e-Box

- Install the e-Box in accordance with the Installation Instructions for the Polytron 5000/8000 e-Box.

NOTICE

The e-Box can be pre-installed, wired and closed off with the supplied cover. As soon as the installation is ready for commissioning, the device is connected to the e-Box and put into operation. This prevents the device from being damaged during the construction phase.

3.7 Connecting the device to a Dräger control unit

NOTICE

Information on connection can be found in the Instructions for Use accompanying the particular Dräger control unit (e.g. Regard, QuadGard).

Electrical connections to the control unit

- Connect the screen for the wires to the grounding point in the control unit (e.g., chassis, grounding rail).

3.8 Connecting the device to a PC

The separately available Polytron 5000/8000 IR connection kit is intended for use with the Polytron 5000/8000 and enables communication between the Polytron 5000/8000 and a PC.

3.9 PolySoft 8000 PC software (optional)

The PolySoft 8000 PC software is used to display device information, edit configuration settings and read out from the measurements memory.

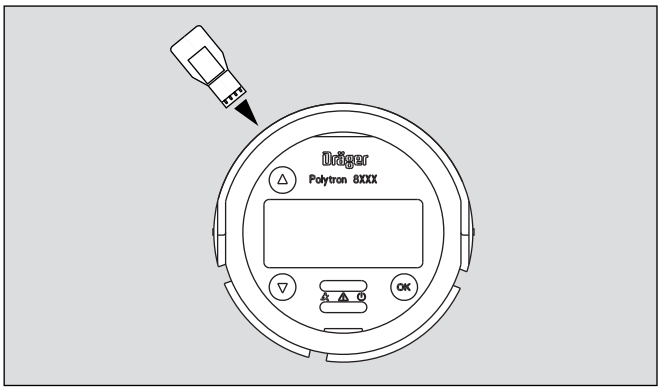
3.10 Installing software dongles

The following SW dongles are available for the Polytron 8200:

Datalogger dongle 83 17 618	Enables the datalogger and the graphic display of concentrations.
Sensor test dongle 83 17 619	Enables the sensor self test (for certain versions only)
Diagnostic dongle 83 17 860	Enables the sensor self test, the display of the remaining sensor activity and the sensor diagnostic function (for certain functions only)

Combi-dongle (datalogger and sensor test dongle)
83 23 218

Combi-dongle (datalogger and diagnostic dongle)
83 23 219



00833300.eps

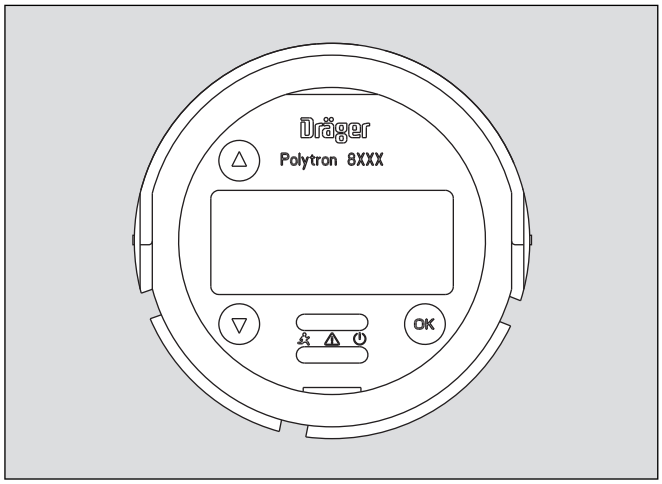
To install a SW dongle:

1. Switch off the power to the unit or declassify the area according to the local regulations.
2. Release the set screw and unscrew the housing cover from the device.
3. Lift the handle and remove the enclosure with the main electronics.
4. Insert the dongle in the slot with the Dräger lettering facing upwards.
5. Insert the main electronics back in the housing.
6. Screw the cover on again and tighten the set screw.
   The dongle is installed.
7. Switch on the power.

4 Operation

4.1 Operating fundamentals

4.1.1 Menu navigation



00733300.eps

It is possible to scroll throught he menu items by tapping the ▲ and ▼ symbols with the magnetic wand (Part Number 4544101, blue). OK confirms a function.

NOTICE

The housing cover should be fitted when using the magnetic wand. If the housing cover is not fitted, the magnetic wand might activate two or more buttons at the same time (crosstalk).

Graphic symbols facilitate navigation in the various menus.

- Together with the text » Back «, » Menu «, etc., exit the menu or go back 1 step.
- Closed folder
  Further functions or sub-menus are located under this item.
- Opened folder
  The functions and sub-menus available here are listed under this item.
- Function
  When activated, functions can be executed in one or more steps.
- Selection activated
  For functions that can be selected and activated, the activation is initiated by taping » OK «.
- List closed above / complete
  There are no further functions, menus or sub-menus listed above.
- List can be scrolled upwards
  There are further functions, menus or sub-menus listed above.
- List closed below / complete
  There are no further functions, menus or sub-menus listed below.
- List can be scrolled downwards
  There are further functions, menus or sub-menus listed below.
- Next
  Perform context-related action.
- 3/3 Number / total number of steps (screens) within the function.
- 2/2 Entry
  Enter data with » ▲ « and » ▼ «.

4.1.2 Changing parameter values or the parameter status

1. Select the desired menu item with ▲ and ▼.
2. Confirm the menu item with OK.
   The current value or status will be displayed.
3. Using ▲ and ▼, the value of a numerical parameter can be changed or preset values can be selected.
4. As soon as the desired value or the selection is displayed, tap OK to validate/confirm the new parameter.
5. Tap OK to access the next higher level.

- If exiting using **Back to menu** or **Previous**, all changes will be discarded.

4.1.3 Exiting menus

- ▲ Tap **Back to measurement** and OK to exit the menu.

4.2 Display and LEDs

In measurement mode, the current gas concentration, the name of the gas and the measurement units are shown on the display. The green LED lights.

In addition, the following symbols may be displayed:

- " ↑ ↑ ↑ ↑ ", if the measurement range is exceeded
- " **- - - -** " and " **X** " in the event of a malfunction. The yellow LED lights, (see chapter 4.2.2 on page 12).
- "SIL", when SIL status is activated.

When the optional relay PCB is used:

- If the first alarm has been triggered, the red LED gives single flashes.
- If the second alarm has been triggered, the red LED gives double flashes.

4.2.1 Special symbols

The following special symbols, which indicate the device state, may be displayed on the right hand side in measurement mode.

- Warning message present –
  to display warnings, see chapter 7.1.1 on page 17.
  Information can be called up in Info mode, see chapter 4.3 on page 12.
- Fault message present –
  To display the fault, see chapter 7.1.2 on page 17
- Maintenance signal will be output on the interface, see chapter 8.3.2 on page 21.
- Measurement range of analog interface exceeded
- Measurement less than range of analog interface
- Analog interface is set to a fixed value (e.g. Multidrop HART communication) and is not transmitting any measurements.
- "Preventive" maintenance: The sensor is ready for operation
- "Preventive" maintenance: The sensor is ready for operation but is close to the end of its life cycle.
- "Preventive" maintenance: The sensor is still ready for operation but should be changed as soon as possible.
- The datalogger is active in rolling mode.
  To activate/deactivate, see chapter 8.5.2 on page 24.
- The datalogger is active in stacking mode.
  To activate/deactivate, see chapter 8.5.2 on page 24.
- SIL SIL is activated (observe Safety Manual - Order Number 9033307).

4.2.2 LED symbols

Symbol	LED	Description
	red	Alarm triggered
	yellow	Malfunction / Warning
	green	Switched on Measurement mode

NOTICE

The alarm triggering function is only available when the optionally integrated relay module is used.

When the optional relay PCB is used:

- If the first alarm has been triggered, the red LED gives single flashes. A1 relay is activated.
- If the second alarm has been triggered, the red LED gives double flashes. A2 relay is activated.
- If an alarm can be acknowledged and is acknowledged, the LED stops flashing and lights continuously instead until the alarm condition is no longer present. The corresponding relay is deactivated.

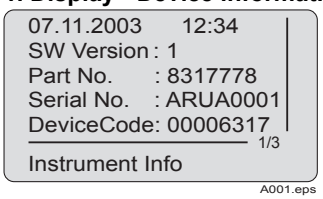
4.3 Activating the Info mode

The Info mode is used to present information about the central device settings and states.

- Tap ▲ and hold for 3 seconds.
  The device information appears on several displays. No changes can be made.
- Tap ▲ or ▼ briefly to switch between the displays.
- The Info mode can be ended at any time by selecting OK.
- If no button is selected within 30 seconds, the device reverts automatically to the measurement mode.

Example of the Info mode
(Displays vary depending on sensor):

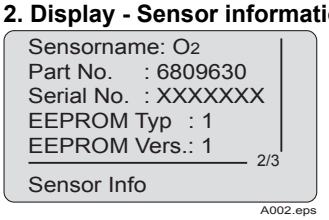
1. Display - Device information:



A001.eps

- Date and Time
- Software version
- Part number of the device
- Serial number of the device
- Device code

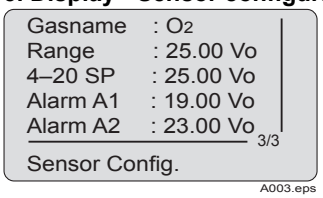
2. Display - Sensor information:



A002.eps

- Sensor description
- Part number of sensor (only for certain sensors)
- Serial number of sensor (only for certain sensors)
- Software version (only for certain sensors)
- Software revision (only for certain sensors)

3. Display - Sensor configuration:



A003.eps

- Gas description
- Maximum measurement limit and measurement units for the sensor
- Measurement range and measurement units for the analog interface. Only displayed when the 4-20 mA interface is enabled.

- A1 Alarm limit and measurement units[1]
- A2 Alarm limit and measurement units[1]

4.4 Switching to the Quick Menu mode

- Tap ▼ and hold for 1 to 2 seconds.
  The Quick Menu will open. This menu is displayed without any password request. No changes can be made.
  The selected information about status and device settings can be retrieved (e.g. warning messages, error messages, installed modules and calibration data).

4.5 Switching to Menu mode (password protected)

1. Tap ▼ and hold for longer than 3 seconds.
   The password request appears.
2. **Enter the password** and confirm.
   The screen for password entry appears.
3. Set the password and confirm the entry.
   The menu hierarchy corresponding to the entered password will open.

- An error message appears if the entered password is invalid.

Password presets:
Password for the **Calibration** menu: _ _ _ 1
Password for the **Settings** menu: _ _ _ 2

4.6 Measurement mode

WARNING

The configuration and calibration settings must be checked before the device is operated in measurement mode.

- Switch on the power.
  - The device runs through a start-up sequence (LCD test by inverting the video, LED test, software version and initialization) and starts the warm-up phase. The display indicates that the sensor will be ready to operate in hh:mm:ss (the countdown begins) and the Polytron 8200/8310 sends the Maintenance signal.
  - After the warm-up phase, the device passes into the measurement mode.
  - The current gas concentration, the selected gas and the units of measure appear on the display.
  - The ⏻ LED lights green.
  - The sensor is ready to take measurements.

NOTICE

The correct date and time settings are important for many functions (see chapter 8.2.3 on page 19).

4.6.1 Analog signals

In measurement mode the output current of the device is between 4 and 20 mA and is proportional to the measured gas concentration.

The device uses various current values to indicate different operating modes. This conforms to the NAMUR NE43 recommendation. The 4-20 mA interface on the device can be customized and configured to individual requirements. The device is provided with suitable standard settings at the factory (see chapter 12.3 on page 29).

1 Only displayed when relay is configured.

5 Calibration

Repeat the calibration of the device at regular intervals as specified in the particular sensor data sheet.

CAUTION

Danger to health! Do not inhale the test gas. Observe the hazard information in the corresponding safety data sheets. Provide venting into a fume cupboard or outside the building.

Always calibrate the zero point first before the sensitivity. Otherwise the calibration will be faulty!

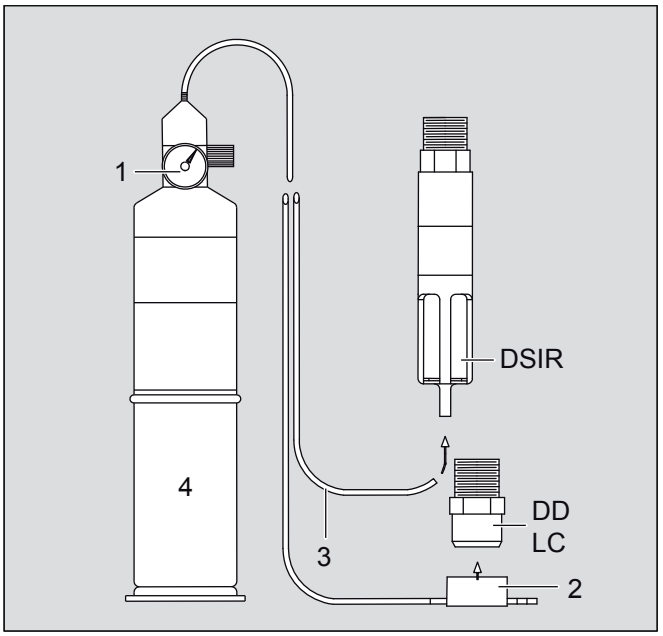
NOTICE

Calibration is not possible if the date and time are not set (see chapter 8.2.3 on page 19).

Dräger recommends calibrating devices with the gas that is to be measured operationally. This method of measured gas calibration is more accurate than a surrogate gas calibration. A surrogate gas calibration may only be performed as an alternative if a measured gas calibration is not possible.

5.1 Calibrating the device

1. Connect the pressure reducer to the calibration gas cylinder.
2. Attach the calibration adapter to the sensor.
3. The gas flow should be between 0.5 and 2.0 L/min.
4. Connect the hose to the calibration adapter.



1 Pressure reducer
2 Calibration adapter
3 Test gas cylinder
4 Hose

For DSIR only (see also Instructions for Use for DrägerSensor IR)

1. Position the magnetic wand on the sensor button marked with ⇩0 and hold it there for at least 5 seconds.
   A negative value will be displayed for as long as the magnetic wand is held on the button (e.g. -10 %LEL). This will start the automatic zeroing of the sensor.
2. Remove the magnetic wand.
   The sensor ends the automatic zeroing after approx. 30 seconds. A negative value (e.g. -10 %LEL) is displayed again as confirmation.

After the zero-point calibration of the DrägerSensor IR, the instrument should show 0 %LEL in the display. If this is not the case, a zero-point calibration must be performed on the instrument (see chapter 5.1.1 on page 14).

5.1.1 Zero point calibration

NOTICE

Ambient air can also be used instead of nitrogen or synthetic air to zero the sensor, provided it is insured that the ambient air contains no measured gas or any other gas for which the sensor may exhibit cross-sensitivity (see the details in the sensor data sheet). In this case, neither a gas cylinder nor a calibration adapter is required for the zero point calibration.

1. Select **Calibration > Zero Calibration** and confirm.
   The Maintenance signal is transmitted.
   The message **Apply zero gas** appears.
2. Apply zero gas (synthetic air or nitrogen) to the sensor.
3. Select **Next** and confirm.
   The current value is displayed.

After the displayed value is stable:

4. Set the value to 0 and confirm.
   The message **Please wait…** appears.
   The actual value is displayed.

- Actual value within the permissible range:
  - Select **Next** and confirm.
  - Shut off the test gas and remove the calibration adapter from the sensor or disconnect the hose.

5.1.2 Span calibration

1. Check which gas category is set (only for DrägerSensor IR, see also the Instructions for Use for the DrägerSensor IR).
1. Select **Calibration > Span calibration** and confirm.
2. Apply calibration gas (e.g., 50 % LEL methane).
   The current value is displayed.

After the displayed value is stable:

3. Set the value to 50 and confirm.
4. Shut off the test gas and remove the calibration adapter from the sensor or disconnect the hose.

5.2 Performing Auto Calibration

The device offers the option of an automatically sequenced calibration. This reduces the number of otherwise manual interactions with the device. The auto calibration is only suitable for experienced users, as calibration errors can occur here as a result of tightened procedures.

NOTICE

Not all of the available sensors and gases support auto calibration. If the function is not available, a manual calibration must be performed.

1. Select **Settings > Sensor > Autocal. set.** to enable or disable the function.
2. Supply fresh air or feed nitrogen or compressed air at a flow rate of 0.5 - 2.0 L/min to the sensor.

WARNING

It must be insured that during the zero point calibration, no measured gas is present in the supplied calibration gas. Particularly with a fresh air calibration, Dräger recommends performing a second, independent measurement. Some sensors may only be calibrated with synthetic air or nitrogen (observe the relevant sensor data sheets).

3. Select **Calibration > Auto cal.** and confirm.
   - **Please wait...** is displayed and a calibration of the zero point is performed automatically.
   - After a successful zero point calibration, the span calibration is started.
   - The calibration gas concentration, the units and, where appropriate, the calibration gas are displayed and can be changed.
4. Start the calibration with **Next**; **Back to menu** aborts the calibration.

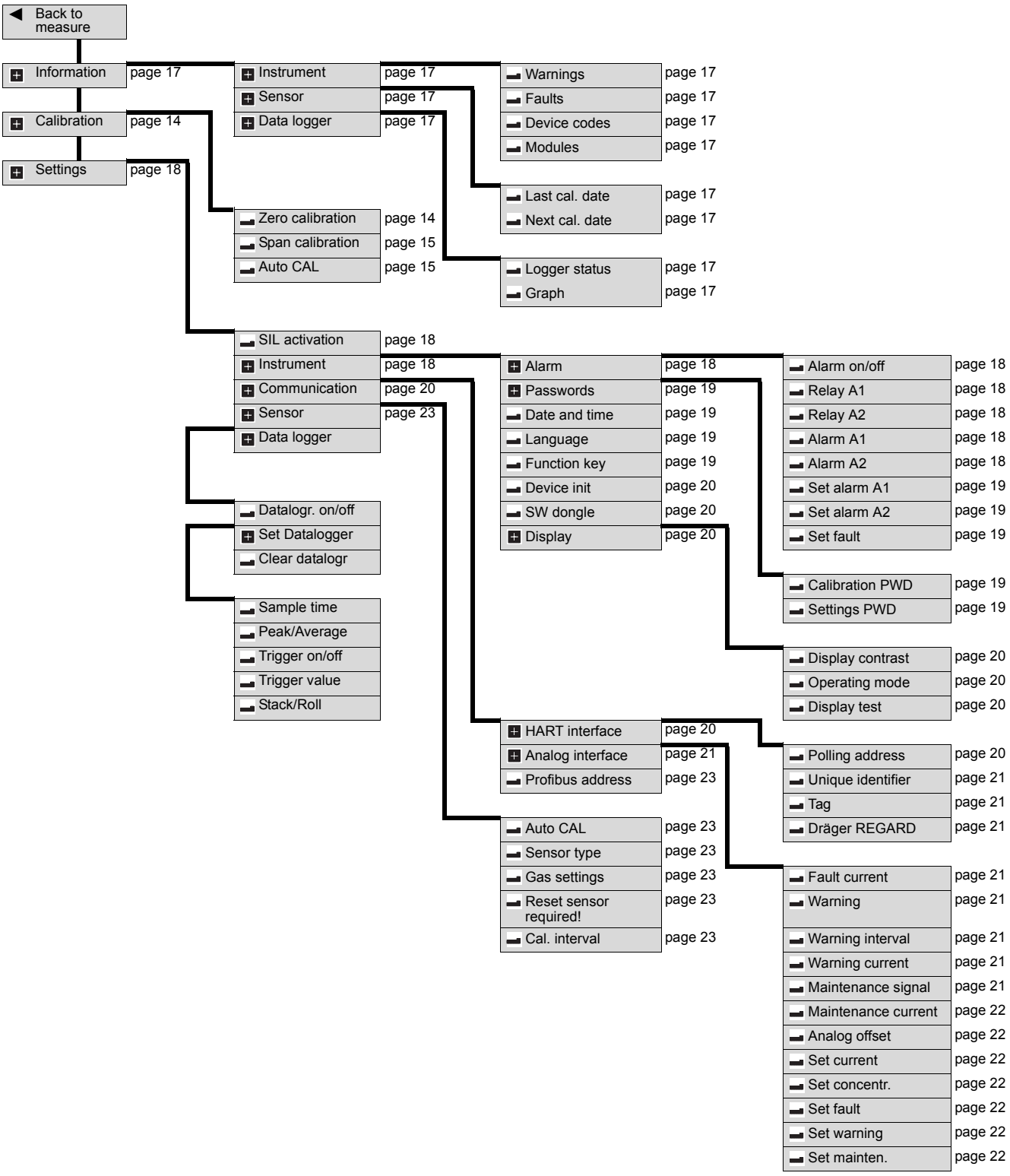
NOTICE

After 10 minutes, without confirmation the device reverts to measurement mode without performing a calibration.

5. Feed the relevant calibration gas to the sensor at a flow rate of 0.5 - 2.0 L/min.
   - When the measured value is stable, the device performs the calibration automatically.
   - After a successful calibration, the measurement and the message **Value OK?** are displayed
6. When the measurement is stable, shut off the calibration gas and wait until the measurement is below any possible alarm thresholds again.

- The calibration is performed again with **Redo**.
- Complete the calibration with **Accept value**.
  The device returns to the measurement mode.

6 Menu overview



7 Information menu

Specific data about the device, the sensor used and the measured gas are summarized in this menu. The menu can be accessed without a password. Changes to the data are not possible.

7.1 Device settings

7.1.1 Displaying warning messages

To display warnings in plain text with warning numbers, see chapter 9 on page 25.
The ⚠ symbol is displayed when there is a warning present.

- Select **Information > Instrument > Warnings** and confirm.
  Warnings are displayed in plain text.
  If several warnings are present, this is indicated in the upper right-hand corner of the display, e.g., 1/3 = Screen 1 of 3.

7.1.2 displaying fault messages

To display faults present in plain text with fault numbers, see chapter 9 on page 25.
The ☒ symbol is displayed when there is a fault present.

- Select **Information > Instrument > Faults** and confirm.
  Faults are displayed in plain text.
  If several faults are present, this is indicated in the upper right-hand corner of the display, e.g., 1/2 = Screen 1 of 2.

7.1.3 Displaying device codes

Display of codes for faults/warnings in a numerical table (hexadecimal).
The ☒ symbol is displayed when there is a fault present.

- Select **Information > Instrument > Device codes** and confirm.
  Faults are displayed as a hexadecimal numerical code in tabular form. If all the numerical groups are displayed as **00**, there are no faults or warnings present.

NOTICE

The fault code is very helpful for technical support and should always be stated in full in the event of a fault.

7.1.4 Displaying installed modules

Display of the installed hardware modules.

- Select **Information > Instrument > Modules** and confirm.
  A list of all possible modules is displayed. The installed modules are identified by a ■, those not installed by a □.
- Mark a module and request detailed information with OK.

7.2 Sensor information

This menu contains the functions for retrieving the calibration data.

7.2.1 Display last calibration date

Display the date of the last calibration.

- Select **Information > Sensor > Last cal. date** and confirm.
  The date of the last calibration is displayed

7.2.2 Display next calibration date

Display the date of the next calibration.

- Select **Information > Sensor > Next cal. date** and confirm.
  The date when the next calibration of the sensor is due is displayed.

7.3 Datalogger information (only with data dongle)

This menu contains the functions for querying the datalogger.

7.3.1 Displaying the datalogger status

- Select **Information > Datalogger > Logger status** and confirm.
  The current status of the datalogger is displayed: Datalogr. : on or off (datalogger on or off)
- To switch the datalogger on/off, see chapter 8.5.1 on page 24.

7.3.2 Displaying a graph of measured values

Show the measurements from the sensor on a 15-minute time axis.

- Select **Information > Datalogger > Graph** and confirm.

8 Settings menu

This menu contains all the functions that are required for the individual configuration of the device.

8.1 Switching SIL lock on or off

NOTICE

SIL lock is only available for certain sensors (see also the sensor data sheets or the Dräger Polytron 8X00 Safety Manual).

With this function, the device can be protected against unauthorized changes to the configuration with a password. Changing the configuration (e.g., changing the measurement range from 100 %LEL to 50 %LEL) will cause the device to display all the safety-relevant parameters to the user once more before it returns to the measurement mode. The correctness of the parameters and settings must be confirmed.

1. Select **Settings > Instrument > Set SIL**.
2. Select the desired state **On** or **Off** and confirm.

NOTICE

When SIL is activated, the device displays all the important parameters and setting before returning to measurement mode. Check the parameters and settings carefully and confirm.

8.2 Device settings

8.2.1 Alarm settings (only with installed relay module)

Alarms issued via relays and LEDs.

CAUTION

In the normal state, the relays in the relay module are energized. That is, the relays change their state if the power supply is interrupted!

Switching the alarm on or off

1. Select **Settings > Instrument > Alarm > Alarm on/off**.
2. Select the desired state **On** or **Off** and confirm.

CAUTION

If the alarm is inactive, the alarm state will not be issued by the LEDs or the relay interface! A warning message ▯ will be shown on the display!

Configuring Relay A1 or A2

This function is used to define whether the alarm relay is energized in standard operation or in an alarm state. If the configuration of the relay is set to "Normally energized", the corresponding relay contact is closed in the normal case and drops out in the event of an alarm. This configuration results in an alarm being triggered in the event of a loss of power to the transmitter (fail-safe). The fault relay is factory-configured to "Normally energized" and cannot be changed.

1. Select **Settings > Instrument > Alarm > Relay A1** or **Relay A2** and confirm.
2. Select **Normal energy supply** oder **Energy supply during alarm** and confirm.

Configuring Alarm A1 or A2

1. Select **Settings > Instrument > Alarm > Alarm A1** or **Alarm A2** and confirm.
2. Select the line for entering the alarm limit and confirm.
3. Set the threshold and confirm.
   The setting for the alarm threshold is displayed.
4. Select **Next** and confirm.
   The setting for the alarm direction is displayed.
5. Select **Rising** or **Falling** and confirm.
6. Select **Next** and confirm.
   The setting for the alarm direction is displayed.
7. Select **Latching** or **Non Latching** and confirm.
8. Select **Next** and confirm.
   The setting for the acknowledgement is displayed.
9. Select **Acknowledgeable** or **NonAcknowledgeabl** or **PreAcknowledgeabl** and confirm.
10. Select **Next** and confirm.
    The function for setting the A1 hysteresis is opened.

NOTICE

This function permits the setting of a zone within which a triggered relay maintains its status until the gas concentration is outside the zone. This function prevents relays from chattering at an alarm threshold.
Example: A2 at 40 %LEL methane
Maximum possible hysteresis: 3 %LEL
Alarm activation at measured values ≥40 %LEL
Alarm deactivation at measured values ≤37 %LEL (40 %LEL - 3 %LEL)

11. Select the line for entering the hysteresis and confirm.
12. Set the hysteresis for A1 and confirm.
    The hysteresis setting for A1 is displayed.
13. Select **Next** and confirm.
    The settings for A1 are displayed.
14. Select and confirm with **Confirm**.
    The settings for the A1 alarm are now complete.

The functional relationship between the various settings is explained in the following table:

Latching and acknowledgeable	The alarm must be acknowledged manually. The alarm can be acknowledged when the alarm condition is still present.
Latching and not acknowledgeable	The alarm must be acknowledged manually. The alarm can only be acknowledged when the alarm condition is no longer present.
Latching and pre-acknowledgeable	The alarm must be acknowledged manually. The alarm can be acknowledged when the alarm condition is still present but will only be reset when the alarm condition is no longer present.
Non-latching and acknowledgeable	The alarm is acknowledged automatically when there is no longer any alarm condition present, or it can be acknowledged manually.
Non-latching and not acknowledgeable	The alarm is acknowledged automatically when there is no longer any alarm condition present. The alarm cannot be acknowledged manually.
Non-latching and pre-acknowledgeable	Corresponds to the alarm behavior for "Non-latching" and "Not acknowledgeable".

Testing Alarm A1

NOTICE

When the function **Set Alarm A1** is exited in the menu, the Polytron 8200/8310 reverts automatically to measurement mode.

This function simulates the A1 alarm status.

1. Select **Settings > Instrument > Alarm > Set Alarm A1** and confirm.
2. Select **On** or **Off** and confirm.

When the function is activated, the relay and the interface are set to the A1 alarm status and the red LED gives single flashes.

Testing Alarm A2

NOTICE

When the function **Set Alarm A2** is exited in the menu, the Polytron 8200/8310 reverts automatically to measurement mode.

This function simulates the A2 alarm status.

1. Select **Settings > Instrument > Alarm > Set Alarm A2** and confirm.
2. Select **On** or **Off** and confirm.

When the function is activated, the relay and the interface are set to the A2 alarm status and the red LED gives double flashes.

Testing Fault status

NOTICE

When the function **Set fault** is exited in the menu, the Polytron 8200/8310 reverts automatically to measurement mode.

This function simulates the Fault alarm.

1. Select **Settings > Instrument > Alarm > Set fault** and confirm.
2. Select **On** or **Off** and confirm.

When the function is activated, the Fault relay and the 4-20 mA interface are set to the fault current and the yellow LED lights.

8.2.2 Changing passwords

The passwords for calibration (zero and span calibrations) and for the settings (full configuration) can be defined in this menu.

1. Select **Settings > Instrument > Passwords > Calibration/ Settings PWD** and confirm.
2. Select the line for the password settings and confirm.
3. Set the password and confirm.
   The setting for the password is displayed.
4. Select **Confirm** and confirm.

8.2.3 Setting the date and time

1. Select **Settings > Instrument > Date and time** and confirm.
2. Select the desired line and confirm in order to switch to the Change mode.
3. Set each digit and confirm each setting.
4. Select **Confirm** and confirm.

8.2.4 Changing the display language

1. Select **Settings > Instrument > Language** and confirm.
2. Select the desired language from the list and confirm.

8.2.5 Configuring the function key

This function is used to assign a predefined function to the ▲ key. The selected function is activated by briefly taping the ▲ key.

1. Select **Settings> Instrument > Function key** and confirm.
2. Select the desired function and confirm.

- Repeating the confirmation deactivates the selected function.
- If **Bumptest** is selected:
  The maintenance symbol 🔧 is shown on the right hand side of the display and the maintenance signal is output. Repeating the confirmation ends the bump test and the device reverts to the normal measurement mode.
- In measurement mode, the selected function can be activated by briefly taping ▲.

Selection options:

Graph (only with datalogger)	The measurements from the sensor are displayed graphically on a time axis (see chapter 7.3.2 on page 17).
Faults	Faults are displayed in plain text (see chapter 7.1.2 on page 17).
Warnings	Warnings are displayed in plain text (see chapter 7.1.1 on page 17).
Bump test	The bump test allows gas to be applied without an alarm being issued. The maintenance signal is output on the 4-20 mA output.
Sensor vitality	Shows the remaining sensor vitality (only available for certain sensors).

8.2.6 Resetting the device to factory settings

The following device parameters are reset to the factory settings with this function (see chapter 12.3 on page 29).

- Alarm parameters
- Passwords
- Language
- Function key
- HART interface
- Data logger
- Analog interface
- Relay configuration

1. Select **Settings > Instrument > Device init.** and confirm.
2. Select **Confirm** and confirm in order to reset the device to the factory settings.

8.2.7 Deactivating the software dongle

This function allows the SW dongles to be deactivated before they are removed or in the event of a fault.
A dongle can only be reactivated by switching the power to the device off and on.

1. Select **Settings > Instrument > SW dongle > Dongle datalogger/Dongle sensortest/Dongle diagnostic** and confirm.
2. Select **Deactivate func.** and deactivate Dongle datalogger/ Dongle sensortest/Dongle diagnostic with ⓞⓚ.

8.2.8 Display settings

Changing the contrast

1. Select **Settings > Instrument > Display > Display contrast** and confirm.
2. Change the contrast and confirm.

Changing the display mode
The display of measured values can be turned on or off with this function.

1. Select **Settings > Instrument > Display > Display mode** and confirm.
2. Select **Standard** or **Non display** and confirm.

If "Non display" has been selected, the display shows the start screen and the symbols.

If the relay option is set and an alarm is triggered, the display shows the current gas concentration and the red LED flashes, regardless of the selected display mode.

Switching the display test on or off
The function of the display and the LEDs is tested with this function.

1. Select **Settings > Instrument > Display > Displaytest** and confirm.
2. Select **On** or **Off** and confirm.

When this function is activated, the display is shown inverted and all the LEDs are lit.

8.3 Communication settings

8.3.1 Settings for the HART interface (only for devices with the optional HART interface)

This group contains the setting functions for the HART interface.

Setting the polling address
The polling address configures the device for analog operation (4 to 20 mA) or multidrop operation. Analog operation (4 to 20 mA) is activated by setting the polling address to 0. For multidrop operation the polling address must be configured to a value between 1 and 15, which will result in the analog interface being deactivated and set to a constant current of approx. 1 mA. To allow the control unit to request the Unique Identifier (unique HART address) with HART command #0, all the devices on a line must be configured with different polling addresses. It is advisable to choose a sequence starting with 1 and incrementing continuously.
This setting corresponds to HART command #6 (Write Polling Address).

1. Select **Settings > Communication > HART interface > Polling address** and confirm.
2. Select the address line for the entry and confirm in order to switch to the Change mode.
3. Set the polling address and confirm.
4. Select **Confirm** and confirm.

Displaying the Unique Identifier
This function enables reading of the Unique Identifier (unique HART address), which has to be known for almost all the HART addressing commands. However this information is only required for those systems that are not able to read back the Unique Identifier using HART command #0 in Short-Frame Format or HART command #11. The display corresponds to the address for HART command #0 (Read Unique Identifier) or #11 (Read Unique Identifier associated with Tag).

- Select **Settings > Communication > HART interface > Unique Identifier** and confirm.
  The Unique Identifier is displayed.

Changing the measuring point name
The tag can be used to identify special devices. It can contain up to 8 alphanumeric characters. The tag can also function as an address for reading the unique identifier from the device using HART command #11 (Read Unique Identifier Associated With Tag), even when the polling address is unknown.
This requires that a unique tag has previously been configured.

1. Select **Settings > Communication > HART interface > Tag** and confirm.
2. Select the tag line for the entry and confirm.
3. Set the tag and confirm.
4. Select **Confirm** and confirm.

Selecting Dräger REGARD
This function enables switching between different HART protocols.

NOTICE

REGARD SW 2.0 is the standard setting. REGARD SW 1.4 must be set on REGARD controllers with SW 1.4.

1. Select **Settings > Communication > HART interface > Dräger REGARD** and confirm.
2. Select **REGARD SW 2.0** or **REGARD SW 1.4** and confirm.

8.3.2 Settings for the analog interface

The test and setting functions for the analog interface are summarized in this menu.

Setting the fault current
This function is used to set the current for the fault signal on the analog interface.

1. Select **Settings > Communication > Analog interface > Fault current** and confirm.
2. Select the fault current line and confirm.
3. Set the currrent and confirm.
4. Select **Confirm** and confirm.

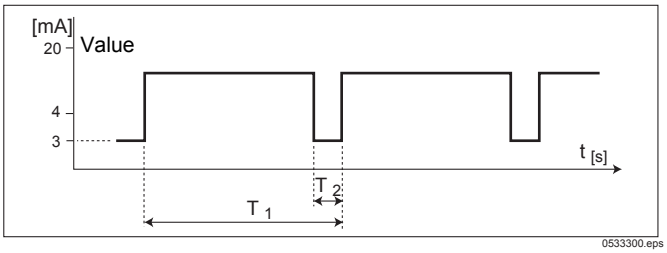
Switching the warning signal on or off
This function is used to switch the warning signal on the analog interface on and off. If an existing warning is to be output over the analog interface, the warning signal must be turned on. During a warning, the current on the analog interface is switched to the "Warning" status for one second. The measurement is transmitted for the rest of the time. The interval between warning signals and the analog signal phase can be customized.

To switch the warning signal on or off:

1. Select **Settings > Communication > Analog interface > Warning** and confirm.
2. Select **On** or **Off** and confirm.

Setting the warning interval
This function is used to set the interval between the warning signals and the analog interface.

1. Select **Settings > Communication > Analog interface > Warning interval** and confirm.
2. Select line **T1** for the entry and confirm.
3. Set the time and confirm.
   The setting for Time T1 is displayed.
4. Select **Next** and confirm.
5. Select line **T2** for the entry and confirm.
6. Set the time and confirm each setting.
   The setting for Time T2 is displayed.
7. Select **Confirm** and confirm.



Setting the warning current
This function is used to set the current for the warning signal on the analog interface.

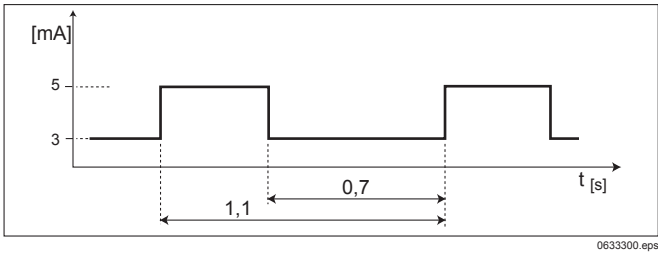
1. Select **Settings > Communication > Analog interface > Warning current** and confirm.
2. Select the current line for the entry and confirm.
3. Set the currrent and confirm.
   The setting for the warning current is displayed.
4. Select **Confirm** and confirm.

Changing the maintenance signal type
This function is sets the type of signal used on the analog interface for the maintenance signal.

1. Select **Settings > Communication > Analog interface > Maint. signal** and confirm.
2. Select **static** or **dynamic** signal type and confirm.

NOTICE

The **static** signal type is a constant current. The current can be configured.
The **dynamic** signal type is a square wave signal with the following characteristics:



Setting the maintenance current
This function is used to set the current for the maintenance signal on the analog interface.

1. Select **Settings > Communication > Analog interface > Maint. current** and confirm.
2. Select the current line for the entry and confirm.
3. Set the currrent and confirm.
   The setting for the maintenance current is displayed.
4. Select **Confirm** and confirm.

NOTICE

The maintenance current can only be set if the maintenance signal has been set to static. This function is not available otherwise.

Setting the 4-20 mA offset
This function can be used to set an adjustable offset current on the analog interface. The offset is constant over the entire range of the output signal.

1. Select **Settings > Communication > Analog interface > Analog offset** and confirm.
2. Select the current line for the entry (max. range: -0.2 to 1.5 mA) and confirm.
3. Set the currrent and confirm.
   The setting for the 4-20 mA offset is displayed.
4. Select **Confirm** and confirm.

Test functions for the analog interface

NOTICE

Alarms in the central controller may be triggered by these functions! If necessary, the alarms in the central controller must be disabled beforehand.

Setting current signals
Using this function, various currents in the range from 0 to 22 mA can be set on the analog interface.

1. Select **Settings > Communication > Analog interface > Set current** and confirm.
2. If the alarm in the control unit is disabled, confirm the message **Disable all alarm settings**.
3. Select the current line for the entry and confirm.
4. Set the currrent and confirm.
   The setting for the current is displayed.
5. Select **Next** and confirm.
6. Select **Set current out** or **Current off** and confirm.
7. Select **Next** and confirm. The function is terminated.
8. After the alarm settings in the control unit have been re-enabled, confirm the **Enable all alarm settings** message.

Setting the concentration
This function is used to set various concentrations in the range between 0 and 100 % of the selected unit of measure. The current output is set to correspond to the selected concentration.

1. Select **Settings > Communication > Analog interface > Set concentr.** and confirm.
2. If the alarm in the control unit is disabled, confirm the message **Disable all alarm settings**.
3. Select the concentration line for the entry and confirm.
4. Set the concentration and confirm.
   The setting for the concentration is displayed.
5. Select **Next** and confirm.
6. Select **Define concentr. output** or **Conc. off** and activate.
7. Select **Next** and confirm. The function is terminated.
8. After the alarm settings in the control unit have been re-enabled, confirm the **Enable all alarm settings** message.

Testing the Fault signal
This function is used to set the analog interface for the fault signal.

1. Select **Settings > Communication > Analog interface > Set fault** and confirm.
2. Select **On** or **Off** and confirm.
   The current for the Fault signal will be transmitted on the analog interface.

Testing the warning signal
This function is used to set the analog interface for the warning signal.

1. Select **Settings > Communication > Analog interface > Set warning** and confirm.
2. Select **On** or **Off** and confirm.
   The current for the warning signal will be transmitted on the analog interface.

Testing the maintenance signal
This function is used to set the analog interface for the maintenance signal.

1. Select **Settings > Communication > Analog interface > Set mainten.** and confirm.
2. Select **On** or **Off** and confirm.
   The current for the maintenance signal will be transmitted on the analog interface.

8.3.3 Profibus address

Not yet active - for future functions.

8.4 Sensor settings

8.4.1 Switching Auto CAL on or off

NOTICE

The auto-calibration from the **Calibration** menu is only available if this function is enabled.

1. Select **Settings > Sensor > Set auto calibration** and confirm.
2. Select **On** or **Off** and confirm.

8.4.2 Setting the sensor type (for DrägerSensor DD only)

This function is used to set the sensor type.

1. Select **Settings > Sensor > Sensor type** and confirm.

8.4.3 Changing the gas settings

Settings for gas type, measuring range and measurement units can be made in this menu.

1. Select **Settings > Sensor > Gas setting** and confirm.
2. Select the measured gas from the list and confirm.
   The measurement units display will be shown.
3. Select the measurement units and confirm.
   The full scale reading display will be shown.
4. Set the full scale reading and confirm.
   The setting for the full scale reading is displayed.
5. Select **Next** and confirm.
   an overview of the new gas settings is displayed.

- Return to the previous view with **Previous** or confirm the settings with **Confirm**.

Information about measurement units

The Polytron 8200/8310 represents the measured value in various optional units. The following are available:

- %LEL
- %LIE
- %UEG

The Polytron 8000 automatically calculates the correct value.

Information about the 20 mA measuring range

The full scale reading can be set with this function. At the full scale reading set, the device outputs 20 mA on the 4-20 mA interface.

8.4.4 Resetting the sensor to factory settings

This function resets all the sensor parameters to the factory default settings (see chapter 12.3 on page 29).

1. Select **Settings > Sensor > Reset sensor required!** and confirm.
2. Select **Confirm** and confirm.

8.4.5 Setting the calibration interval

NOTICE

The calibration interval can be set between 0 and 720 days.

1. Select **Settings > Sensor > Calibration interval** and confirm.
2. Set the calibration interval and confirm.

8.5 Datalogger settings (only with data dongle)

NOTICE

The functions are only available if the Polytron 8000 is fitted with the data dongle (Order Number 83 17 618), see chapter 3.10 on page 10.

The datalogger has a storage capacity of approx. 3000 measurements. At a sampling interval of 1 minute, this would allow monitoring for approx. 50 hours. The monitoring time can be significantly increased if the **Trigger** function is enabled.

The results in the datalogger can only be evaluated with the PolySoft 8000 PC software. An evaluation of the datalogger contents over the last 15 minutes is available in the menu under **Information > Datalogger > Graph** (see chapter 7.3.2 on page 17).

8.5.1 Switching the datalogger on or off

1. Select **Settings > Datalogger > Datalogr. on/off** and confirm.
2. Select **On** or **Off** and confirm.

8.5.2 Setting up the datalogger

Setting the sampling interval

1. Select **Settings > Datalogger > Datalogr. on/off > Sample time** and confirm.
2. Select the sample time and confirm.

Setting peak/average

1. Select **Settings > Datalogger > Set datalogger > Peak/average** and confirm.
2. Select the desired function and confirm.

Peak value	The measured maximum (for O_2, the minimum value) value of the concentration within the selected sampling interval is stored.
Average	The average value of all the concentrations measured within the selected sampling time is stored.

Switching the trigger on or off

1. Select **Settings > Datalogger > Set datalogger > Trigger on/off** and confirm.
2. Select **On** or **Off** and confirm.

On	Concentrations will only be stored if they exceed (relative to the last stored value) a threshold set under Trigger Value.
Off	The measurements made within the set sampling time are always stored.

Setting the trigger threshold

The trigger threshold is specified as a percentage of the full scale reading.
Example: A trigger threshold of 2 % is entered for a full scale reading of 500 ppm. Consequently the datalogger will only store measurements if they deviate (relative to the last stored value) by 10 ppm.

1. Select **Settings > Datalogger > Datalogr. on/off > Trigger value** and confirm.
2. Set the trigger value and confirm.

Setting the storage mode

1. Select **Settings > Datalogger > Set Datalogger > Stack/Roll** and confirm.
2. Select the desired condition and confirm

Overwrite	When the capacity of the datalogger is used up, the older data will be overwritten.
Hold	When the capacity of the datalogger is used up, no more data can be stored. An appropriate warning is issued.

8.5.3 Clearing the datalogger

1. Select **Settings > Datalogger > Clear Datalogr.** and confirm.
2. To clear the datalogger, select **Confirm** and confirm.

9 Troubleshooting

9.1 Fault reference

Fault number	Cause	Remedy
#001 #003 #004 #005 #011 - #014 #020 - #024 #043 #060 #067	Serious device fault, various causes.	Have the device checked by DrägerService®[1].
#002 #025 - #027 #030 - #034 #041 #042 #044 #050 #052 #081 #085	Serious data error in the device, various causes.	Reset the device to factory settings (see chapter 8.2.6 on page 20). If this fault occurs again: Have the device checked by DrägerService.
#10	4-20 mA interface cable not connected.	Disconnect the powwer supply, connect the 4-20 mA interface and reconnect the power supply.
#045	Device not detecting any sensor.	Check contacts. If this fault occurs again: Have the device checked by DrägerService.
#051 #054	Faulty zero-point.	Perform zero-point calibration (see chapter 5.1.1 on page 14).
#055	Faulty span calibration was performed.	Perform new span calibration (see chapter 5.1.2 on page 15).
#076 #080 - #084	Device fault.	Check contacts. If this fault occurs again: Have the device checked by DrägerService.

1 DrägerService® is a registered trademark of Dräger.

9.2 Warning reference

Warning number	Cause	Remedy
#101	Datalogger in Stack mode is 100 % full and is not logging any more data.	Read out the data, clear the datalogger and start again.
#102	Datalogger in Stack mode is 90 % full.	Read out the data as soon as possible, clear the datalogger and start again.
#103 #106	Data error in the device. Functions such as the datalogger or dongle functions may no longer be available.	Reset the device to factory settings (see chapter 8.2.6 on page 20). If this fault occurs again: Have the device checked by DrägerService.
#105	Device fault.	Have the device checked by DrägerService.
#104	No valid date or time set.	Set time and date (see chapter 8.2.3 on page 19).
#107	Battery almost used up.	Have the device checked by DrägerService.
#110 #111 #112	SW dongle has been removed without logging out.	Disable SW dongle (see chapter 8.2.7 on page 20).
#113	Alarms disabled.	Enable alarms (see chapter 8.2.1 on page 18).
#137	Device fault.	Restart. If this fault occurs again: Have device checked by DrägerService.
#164 #165	Sensor warm-up phase has not ended yet. Increased measurement error must be expected.	Wait until the sensor has warmed up.
#167 #170	Calibration interval expired.	Recalibrate the device (see chapter 5.1 on page 14).

10 Maintenance

10.1 Maintenance intervals

10.1.1 During commissioning

- Check calibration.
- Check signal transmission to controller and triggering of alarms.

10.1.2 Every 6 months

- Inspection by trained service personnel.

The inspection intervals must be established in each individual case and shortened if necessary, depending on technical safety considerations, engineering conditions, and the technical requirements of the equipment.
Contact DrägerService if you wish to take out a service contract and have any repairs carried out.

10.1.3 As required

- Change the sensor, see chapter 10.2 on page 27.

10.2 Changing the sensor

WARNING

As a matter of principle, always check a newly installed sensor with measured gas to insure correct operation.

CAUTION

When the sensor is changed, all settings and parameters must be checked for correctness.

The sensor is changed as follows:

1. Switch off the power to the device or declassify the area according to the local regulations.
2. Release the set screw and unscrew the housing cover from the device.
3. Lift the handle and remove the enclosure with the main electronics.
4. Disconnect the sensor cable.
5. Unscrew the DrägerSensor.
6. Pass the sensor cable through the threaded connection in the housing.
7. Screw in the DrägerSensor.

WARNING

Five threads must be engaged to insure explosion protection (see chapter 12.1 on page 29).

8. Plug the sensor cable into the socket.
9. Re-fit the sensor electronics and enclosure.
10. Screw the housing cover on again and tighten the set screw.
11. Switch on the power to the device.
12. If necessary, switch off SIL activation (see chapter 8.1 on page 18).
13. Calibrate the device if necessary (see chapter 5 on page 14).
14. If required, switch on SIL activation (see chapter 8.1 on page 18).

10.3 Changing the main electronics

CAUTION

When the main electronics are changed, all settings and parameters must be checked for correctness.

1. Switch off the power to the device or declassify the area according to the local regulations.
2. Release the set screw and unscrew the housing cover from the device.
3. Lift the handle and remove the enclosure with the main electronics.
4. Remove the protective caps for the connectors.
5. Unscrew the connector locking ring for the power supply and relay and withdraw the connector.
6. Change the main electronics.
7. Plug the sensor cable and the connector for the power supply and relay into the corresponding sockets and screw them tight.
8. Re-fit the dust caps for the connectors.
9. Re-fit the sensor electronics and enclosure.
10. Screw the housing cover on again and tighten the set screw.
11. Switch on the power to the device.
12. Check and adjust the configuration as required.
13. Calibrate the device if necessary (see chapter 5 on page 14).

11 Disposal

Disposal of electrical and electronic equipment:
EU-wide regulations governing the disposal of electric and electronic appliances which have been defined in the EU Directive 2002/96/EC and in national laws have been effective from August 2005 and apply to this device. Common household appliances can be disposed of using special collecting and recycling facilities. However, as this device has not been registered for household usage, it must not be disposed of through these means. The device can be returned to your national Dräger Safety Sales Organization for disposal. Please do not hesitate to contact the above if you have any further questions on this issue.

12 Technical data

CAUTION

Specifications and restrictions in the Instructions for Use and/or data sheets for the sensors used must be observed. For SIL applications the Dräger Polytron 8X00 Safety Manual must be observed.

The measuring range and performance characteristics are dependent on the sensor installed, see the Instructions for Use and/or data sheets for the sensors used.

Signal transmission to the central controller	
Analog	
Output current	4 mA to 20 mA
Drift below zero-point	3.8 mA to 4 mA
Measuring range exceeded	20 mA to 20.5 mA
Device malfunction	≤1.2 mA
Fault on analog output	>21 mA
Maintenance signal	3.4 mA constant signal or 1 Hz modulation between 3 and 5 mA (selectable)
Supply voltage	
Operating voltage	3-wire shielded cable, 10 to 30 V DC
Inrush current	2.5 A for 0.8 ms at 24 V DC, 10 Ω conductor resistance
Operating current (max.)	
with DrägerSensor Ex DD	105 mA at 24 V DC, no relay, sensor not remote 145 mA at 24 V DC, with relay, remote sensor
with DrägerSensor Ex LC	130 mA at 24 V DC, no relay, sensor not remote 165 mA at 24 V DC, with relay, remote sensor
with DrägerSensor IR	145 mA at 24 V DC, no relay, sensor not remote 185 mA at 24 V DC, with relay, remote sensor
Relay design (optional)	SPDT, 5 A at 230 V AC, 5 A at 30 V DC, resistive load For safety-related applications (SIL2), the maximum contact rating is reduced (see also the Dräger Polytron 8X00 Safety Manual).
Housing	NEMA 4X
Protection Class	IP 65/66/67
Dimensions (LxWxD)	
Without e-Box (DrägerSensor LC, DD)	approx. 180 x 150 x 130 mm (7" x 5.8" x 5.1")
With e-Box (DrägerSensor LC, DD)	approx. 185 x 180 x 190 mm (7.3" x 7.1" x 7.4")
Without e-Box (DrägerSensor IR)	approx. 295 x 150 x 130 mm (11,6" x 5,8" x 5,1")
With e-Box (DrägerSensor IR)	approx. 300 x 180 x 190 mm (11,9" x 7,1" x 7,4")
Weight	
Without e-Box, aluminum	approx. 2.2 kg (4.9 lbs.)
Without e-Box, stainless steel 316	approx. 4.0 kg (8.8 lbs.)
With e-Box, aluminum	approx. 3.5 kg (7.7 lbs.)
With e-Box, stainless steel 316	approx. 5.4 kg (11.9 lbs.)
Display	Resolution 128 x 64, back-lit

Environmental conditions	Specifications for the sensor: see sensor data sheet
Pressure	700 to 1300 hPa (20.7 to 38.4 in. Hg)
Humidity	0 to 100 % R. H., non-condensing
Temperature	
DrägerSensor DD, LC no relay	-40 to +80 °C (-40 to +176 °F)
DrägerSensor DD, LC with relay	-40 to +70 °C (-40 to +158 °F)
DrägerSensor IR no relay	-40 to +65 °C (-40 to +149 °F)
DrägerSensor IR with relay	-40 to +65 °C (-40 to +149 °F)
Environmental influences	See respective sensor data sheets.

12.1 Torques

(The torques are valid for the aluminum and stainless steel 316 variants)

Part	Torque Lb. In.	Torque Nm
Housing cover	min. 266	min. 30
Sensors	min. 266	min. 30
Plug	min. 266	min. 30
Cable bushing	min. 443	min. 50
Device to e-Box	71	8

If an optional e-Box is being used, fasten the device securely to the e-Box with 4 screws and a tightening torque of 8 Nm.

12.2 Tightening torque and cable size for field wiring terminals

Electronic		
Torque Lb. In.	**Cable size in AWG**	**Cable size in mm^2**
All field wiring terminals 4.4–7.0 (0.5–0.8 Nm)	20–12	0.5–2.5

12.3 Factory settings

12.3.1 Alterable settings for the Polytron 8200/8310

Menu	Standard setting	
	DrägerSensor DD, IR	**DrägerSensor LC**
A1 Alarm	20 %LEL	2.0 %LEL
A2 Alarm	40 %LEL	4.0 %LEL
A1 Relay alarm: Direction	Rising	Rising
A2 Relay Alarm: Direction	Rising	Rising
A1 latching mode	Non-latching	Non-latching
A2 latching mode	Latching	Latching
A1 Acknowledgement mode	Acknowledgeable	Acknowledgeable
A2 Acknowledgement mode	Not acknowledgeable	Not acknowledgeable
A1 enrg / wired in e-Box	Energized / NO	Energized / NO
A2 enrg / wired in e-Box	Energized / NO	Energized / NO
Maintenance password	0000	0000
LCD setting	on	on
Configuration/SIL password	_ _ _2	_ _ _2
SIL status	Off	Off
Language	English	English
Fault current	1.2 mA	1.2 mA
Warning current	3.0 mA	3.0 mA
Maintenance current	3.4 mA	3.4 mA
HART address	0	0
Auto-cal.	Off	Off
Calibration interval	360	360
Function key	Faults	Faults

12.3.2 Unalterable settings

Fault	Meaning
Fault relay / wired in e-Box	Energized / NO
Yellow Fault LED	Lights when a fault is present (see chapter 9 on page 25).
Red Alarm LED	Gives single flashes when an A1 alarm is present. Gives double flashes when an A2 alarm is present. If an alarm is configured as acknowledgeable and the alarm is acknowledged, the LED lights. Alarm hierarchy: A2 has a higher priority for the LED than A1. However the A1 and A2 relays operate independently of one another, i.e. if A1 is acknowledgeable and A2 is not and the gas concentration is so high that A1 and A2 are triggered, an acknowledgement results in the A1 relay dropping out. However the red LED continues to give double flashes as long as the A2 condition exists.

13 Order list

13.1 Dräger Polytron 8200/83X0

Name and description	Order Number
Dräger Polytron 8200 DD d A 4-20/HART	45 44 439
Dräger Polytron 8200 DD d A 4-20/HART Relay	45 44 440
Dräger Polytron 8200 DD d S 4-20/HART	45 44 448
Dräger Polytron 8200 DD d S 4-20/HART Relay	45 44 449
Dräger Polytron 8200 DD e A 4-20/HART	45 44 457
Dräger Polytron 8200 DD e A 4-20/HART Relay	45 44 458
Dräger Polytron 8200 DD e S 4-20/HART	45 44 466
Dräger Polytron 8200 DD e S 4-20/HART Relay	45 44 467
Dräger Polytron 8200 Remote DD e A 4-20/HART	45 44 511
Dräger Polytron 8200 Remote DD e A 4-20/ HART Relay	45 44 512
Dräger Polytron 8200 Remote DD e S 4-20/HART	45 44 520
Dräger Polytron 8200 Remote DD e S 4-20/ HART Relay	45 44 521
Dräger Polytron 8200 LC d A 4-20/HART	45 44 475
Dräger Polytron 8200 LC d A 4-20/HART Relay	45 44 476
Dräger Polytron 8200 LC d S 4-20/HART	45 44 484
Dräger Polytron 8200 LC d S 4-20/HART Relay	45 44 485
Dräger Polytron 8200 LC e A 4-20/HART	45 44 493
Dräger Polytron 8200 LC e A 4-20/HART Relay	45 44 494
Dräger Polytron 8200 LC e S 4-20/HART	45 44 502
Dräger Polytron 8200 LC e S 4-20/HART Relay	45 44 503
Dräger Polytron 8200 Remote e A 4-20/HART	45 44 529
Dräger Polytron 8200 Remote LC e A 4-20/ HART Relay	45 44 530
Dräger Polytron 8200 Remote LC e S 4-20/HART	45 44 538
Dräger Polytron 8200 Remote LC e S 4-20/ HART Relay	45 44 539
Dräger Polytron 8310 d A 4-20/HART	45 44 807
Dräger Polytron 8310 d A 4-20/HART Relay	45 44 808
Dräger Polytron 8310 d S 4-20/HART	45 44 816
Dräger Polytron 8310 d S 4-20/HART Relay	45 44 817
Dräger Polytron 8310 e A 4-20/HART	45 44 825
Dräger Polytron 8310 e A 4-20/HART Relay	45 44 826
Dräger Polytron 8310 e S 4-20/HART	45 44 834
Dräger Polytron 8310 e S 4-20/HART Relay	45 44 835
Dräger Polytron 8310 Remote e A 4-20/HART	45 44 843

Name and description	Order Number
Dräger Polytron 8310 Remote e A 4-20/ HART Relay	45 44 844
Dräger Polytron 8310 Remote e S 4-20/HART	45 44 852
Dräger Polytron 8310 Remote e S 4-20/ HART Relay	45 44 853
e-Box standard version (power only)	68 12 420
e-Box power / relay / remote version (with 2 cable glands)	68 12 275

13.2 Sensors for remote versions

NOTICE

The sensors are not included with the remote versions.

Name and description	Order Number
For Polytron 8200 DD remote e	
Sensing head, Polytron SE Ex PR M1 DD	68 12 711
Sensing head, Polytron SE Ex PR M2 DD	68 12 710
Sensing head, Polytron SE Ex PR M3 DD	68 12 718
Sensing head, Polytron SE Ex HT M DD	68 12 720
For Polytron 8200 LC remote e	
Sensing head, Polytron SE Ex LC M1 DD	68 12 722
Sensing head, Polytron SE Ex LC M2 DD	68 12 721
Sensing head, Polytron SE Ex LC M3 DD	68 12 719
For Polytron 8310 remote e	
Sensing head, DrägerSensor IR, complete set e	68 11 165
Sensing head, DrägerSensor IR, complete set e2	68 11 265

13.3 Replacement sensors (except for remote versions)

Name and description	Order Number
DrägerSensor Ex DD NPT	68 12 380
DrägerSensor Ex LC NPT	68 10 675
DrägerSensor IR NPT	68 11 901

13.4 Accessories

Name and description	Order Number
Accessories for Polytron 8200/83X0	
D-Junction Box, aluminum	45 44 099
D-Junction Box, stainless steel 316	45 44 098
Duct mounting kit, Polytron 5000 for DrägerSensor DD, LC, IR	68 12 725
Pipe mounting kit, Polytron 5000/8000	45 44 198
IR connection kit, 5000/8000	45 44 197
Magnetic wand with key chain	45 44 101
Accessories for DrägerSensor DD, LC	
Splash guard	68 12 510
Calibration adapter PE	45 09 314
Calibration adapter PE, Europe	68 06 978
Calibration adapter Viton	68 10 536
Process adapter (stainless steel, with M30 x 1.5 locking nut) for DrägerSensor DD	68 12 470
Process adapter (stainless steel, with M36 x 1.5 locking nut) for DrägerSensor LC	68 12 465
Calibration chamber	68 02 206
Accessories for DrägerSensor IR	
Splash guard	68 10 796
Calibration adapter	68 10 859
Process adapter	68 11 330
Labyrinth seal	68 11 135

13.5 Replacement parts

Description	Order Number
Bucket Polytron 8200/8310 4-20/HART,SPPT	45 44 788
Bucket Polytron 8200/8310 4-20/HART Relay, SPPT	45 44 789
Cable bushing, 3-pin	45 44 182
Cable bushing, 9-pin	45 44 169
Cable bushing, 14-pin	45 44 168
Hardware set, housing	45 44 167
Hardware set, e-Box	68 12 838
Cable gland, e-Box	68 12 868
e-Box PCB	60 12 839

14 Declaration of Conformity

EG-Konformitätserklärung
EC-Declaration of Conformity

Dokument Nr. / *Document No.* SE23109-00

Wir / *we* Dräger Safety AG & Co. KGaA, Revalstraße 1, 23560 Lübeck, Germany

erklären in alleiniger Verantwortung, dass das Produkt
declare under our sole responsibility that the product

Gasmess-Transmitter Typ I/XTR 04/5 (Polytron 8**0)**
*Gas Detection Instrument type I/XTR 04/5** (Polytron 8**0)*

mit der EG-Baumusterprüfbescheinigung
is in conformity with the EC-Type Examination Certificate **PTB 11 ATEX 1005X**

ausgestellt von der benannten Stelle
issued by the Notified Body **PTB, Bundesallee 100, D-38116 Braunschweig**

Kenn-Nr. der benannten Stelle
Identification Number of Notified Body **0102**

und mit den folgenden Richtlinien unter Anwendung der aufgeführten Normen übereinstimmt
and with the following directives by application of the listed standards

Bestimmungen der Richtlinie *provisions of directive*	**Nummer sowie Ausgabedatum der Norm** *Number and date of issue of standard*
94/9/EG: **ATEX-Richtlinie** *94/9/EC: ATEX Directive*	EN 60079-0:2009, EN 60079-1:2007, EN 60079-7:2007, EN 60079-31:2009
2004/108/EG: **EMV-Richtlinie** *2004/108/EC: EMC Directive*	EN 50270:2006 (type 2), EN 61000-6-3:2007
2006/95/EG: **Niederspannungs-Richtlinie** *2006/95/EC: Low Voltage Directive*	EN 61010-1:2010

Überwachung der Qualitätssicherung Produktion durch
Surveillance of Quality Assurance Production by **DEKRA EXAM GmbH, Dinnendahlstraße 9, D-44809 Bochum**

Kenn-Nr. der benannten Stelle
Identification Number of Notified Body **0158**

Lübeck, 2011.12.22

Ort und Datum (jjjj.mm.tt)
Place and date (yyyy.mm.dd)

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Dräger Polytron 8200/8310

Instructions for use

WARNING

Strictly follow the Instructions for Use.
The user must fully understand and strictly observe the instructions. Use the product only for the purposes specified in the Intended use section of this document.

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1 For your safety

1.1 General safety statements

- Before using this product, carefully read the Instructions for Use.
- Strictly follow the Instructions for Use. The user must fully understand and strictly observe the instructions. Use the product only for the purposes specified in the Intended use section of this document.
- Do not dispose of the Instructions for Use. Ensure that they are retained and appropriately used by the product user.
- Only fully trained and competent users are permitted to use this product.
- Comply with all local and national rules and regulations associated with this product.
- Only trained and competent personnel are permitted to inspect, repair and service the product as detailed in these Instructions for Use. Further maintenance work that is not detailed in these Instructions for Use must only be carried out by Dräger or personnel qualified by Dräger.
- Properly trained service personnel must inspect and service this product as detailed in the Maintenance section of this document.
- Use only genuine Dräger spare parts and accessories, or the proper functioning of the product may be impaired.
- Do not use a faulty or incomplete product, and do not modify the product.
- The flameproof threads for the explosion proof enclosure do not conform to the minimum/maximum values in EN/IEC 60079-1. The threads must not be modified by the user.
- The measuring function of the gas measurement transmitter for explosion protection according to Annex II, Sections 1.5.5, 1.5.6 and 1.5.7 of Directive 94/9/EG is not covered at present.
- Exchanging components may compromise the intrinsic safety. This only applies if the device is intrinsically safe.
- Only operate the product within the framework of a risk-based alarm signalling concept.

Safe coupling with electrical devices

- Electrical connections to devices which are not listed in these Instructions for Use should only be made following consultation with the respective manufacturers or an expert.

Use in areas subject to explosion hazards

- Devices or components for use in explosion-hazard areas which have been tested and approved according to national, European or international Explosion Protection Regulations may only be used under the conditions specified in the approval and with consideration of the relevant legal regulations. The devices or components may not be modified in any manner. The use of faulty or incomplete parts is forbidden. The appropriate regulations must be observed at all times when carrying out repairs on these devices or components.

1.2 Definitions of alert icons

The following alert icons are used in this document to provide and highlight areas of the associated text that require a greater awareness by the user. A definition of the meaning of each icon is as follows:



WARNING

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in physical injury, or damage to the product or environment. It may also be used to alert against unsafe practices.



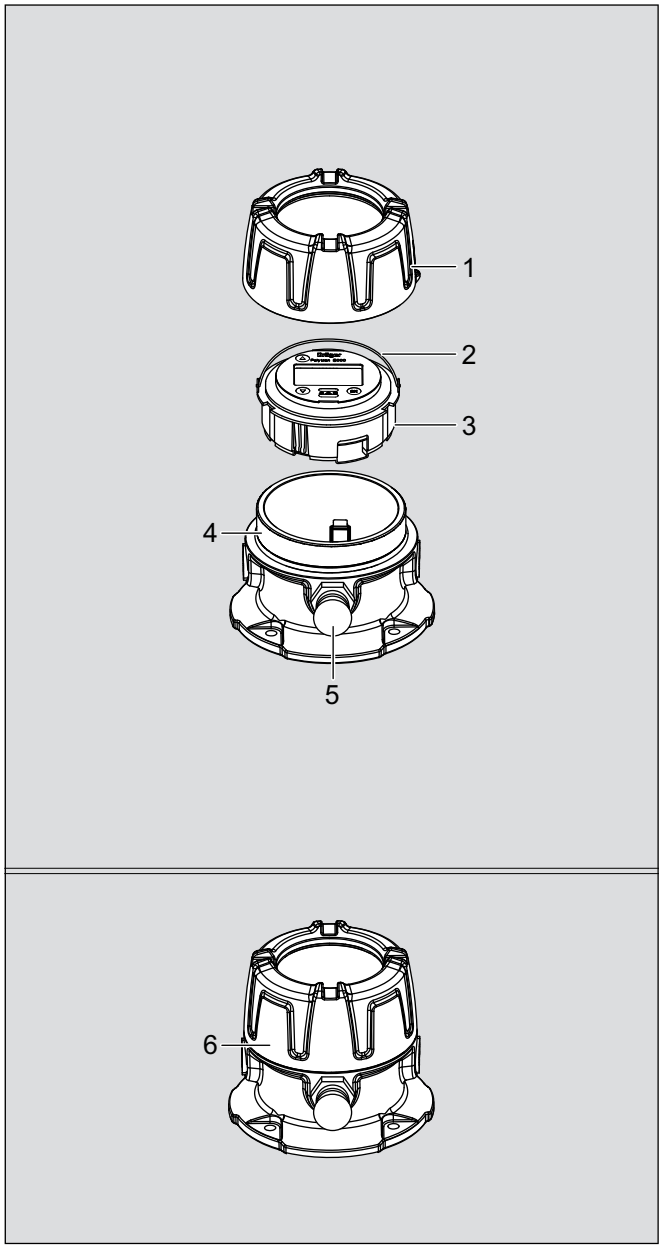
NOTICE

Indicates additional information on how to use the product.

2 Description

2.1 Product overview

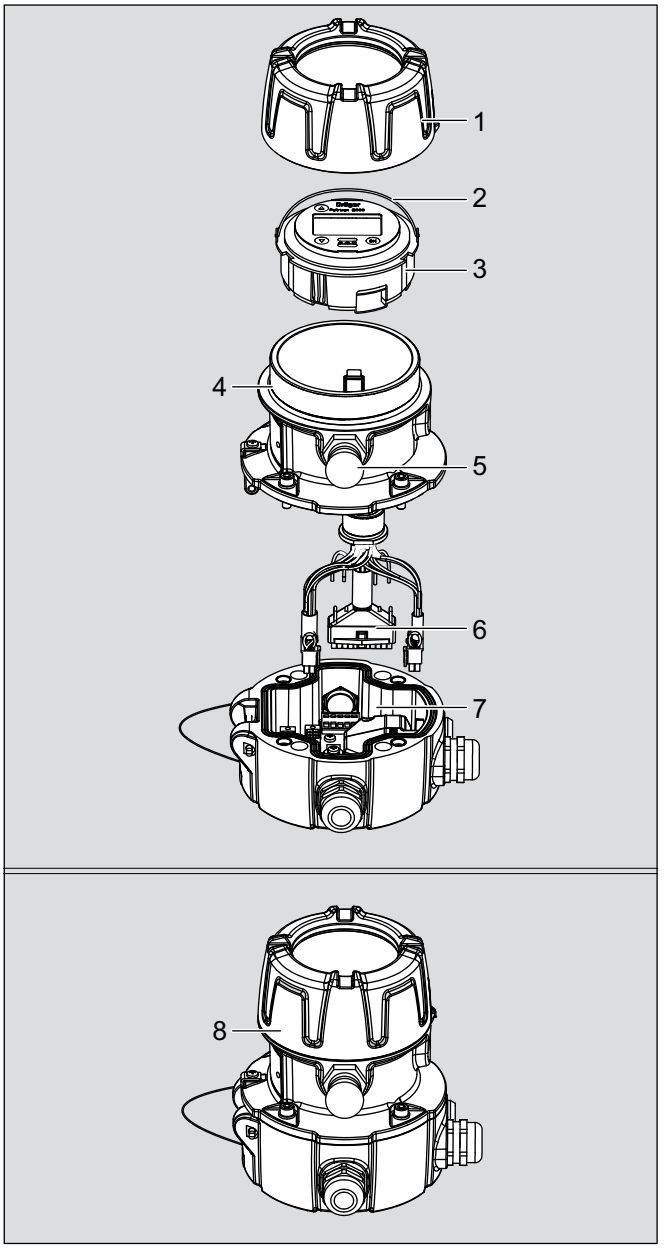
2.1.1 Explosion proof device



001233299.eps

1 Housing cover
2 Clip
3 Enclosure with main electronics (and optional relay)
4 Lower part of housing
5 Sensor
6 Assembled device

2.1.2 Explosion proof device with e-Box for increased safety



002233299.eps

1 Housing cover
2 Clip
3 Enclosure with main electronics (and optional relay)
4 Lower part of housing
5 Sensor
6 Feed through cable
7 e-Box
8 Assembled device

2.2 Functional description

2.2.1 Principle of operation of the DrägerSensor DD, LC

The DrägerSensor is a transducer for measuring the partial pressure of flammable gases and vapors in ambient air. It operates on the heat of combustion principle.

The ambient air to be monitored diffuses through the flame arrestor in the sensor. The mixture of flammable gases and vapors is burned catalytically on the heated measuring element (pellistor). The oxygen required for combustion is taken from the monitored ambient air (must be greater than 12 vol.%). The measuring element receives additional warming from the heat arising from the combustion. This warming causes a change in the resistance of the measuring element which is proportional to the concentration of the mixture of flamable gases and vapors in the air being monitored.

In addition to the catalytically activated measuring element, the sensor also has a compensating element. Both elements are part of a Wheatstone bridge circuit. Consequently, environmental influences such as changes in temperature or humidity are almost completely compensated for.

The DrägerSensor LC includes additional processing and amplification of the measuring signal. As a result, the sensor is suitable for the measuring range 0 - 10 %LEL.

2.2.2 Principle of operation of the DrägerSensor IR

The DrägerSensor IR infrared gas sensor is a gas transmitter for determining the concentration of gases and vapors in ambient air. The measuring principle is based on the concentration-dependent absorption of infrared radiation in the measured gases.

The ambient air to be monitored diffuses through a sintered body into the pressure-tight housing of a measurement cuvette. The broadband light produced by the emitter passes through the gas in the cuvette, is reflected from the cuvette walls and is focused on the entrance window of a dual-element detector. One channel of the detector measures the gas-dependent light transmission of the cuvette (measuring channel) and the other is used as the reference. The gas concentration in the cuvette can be determined from the ratio of the measured signal to the reference signal. The cuvette is heated to prevent condensation of atmospheric humidity.

The calculation of the concentration is performed by internal electronics and software. For the output signal, the gas sensor emulates the half bridge of a catalytic bead sensor.

2.2.3 Contaminating gases for the DrägerSensor DD, LC

NOTICE

Certain substances in the atmosphere to be measured can impair the sensitivity of the sensors.

a) Polymerizing substances such as acrylonitrile, butadiene and styrene

b) Corrosive compunds such as halogenated hydrocarbons (which release halogens such as bromine, chlorine or fluorine on oxidation) and halogen hydracids, as well as gaseous acidic compounds such as sulfur dioxide and oxides of nitrogen.

c) Catalyst poisons such as sulfur and phosphorus compounds, silicon compounds (particularly silicones) and organometallic vapors. The sensors used work with measuring elements (pellistors) that are poison-resistant (PR) and thus have a longer life than conventional sensors when catalyst poisons are present.

It may be necessary to check the calibration if the sensor has been exposed for a long time to a high concentration of flammable gases or vapors or the above-mentioned contaminating substances.

2.3 Intended use

The Dräger Polytron 8200/8310 is an explosion proof device for continuous monitoring of the concentration of gases and vapors containing hydrocarbons. The housing for the device consists of robust, non-corroding stainless steel or aluminum and is suitable for indoor or outdoor applications. The unit can be connected to a Dräger monitoring system or a programmable logic controller (PLC) by means of a sealed conduit or an appropriately approved cable gland. With the optionally integrated relay module, the device can be operated without a central controller (with additional local alarm signalling). The device is designed for fixed installation and is approved for use in potentially explosive atmospheres, see chapter 2.5 on page 7.

WARNING

Not tested in oxygen enriched atmospheres (>21% O_2). High off-scale readings may indicate an explosive concentration.

2.3.1 Dräger Polytron 8200 with DrägerSensor® [1] Ex DD

Catalytic bead sensor for monitoring flammable gases and vapors containing hydrocarbons

- Detection range: 0 to 100 % LEL [2]

2.3.2 Dräger Polytron 8200 with DrägerSensor Ex LC

Catalytic bead sensor for monitoring flammable gases and vapors containing hydrocarbons

- Detection range: 0 to 10 % LEL [2)]

1 DrägerSensor® is a registered trademark of Dräger.
2 Lower Explosion Limit, depending on substance and the locally applicable regulations.

2.3.3 Dräger Polytron 8310 with DrägerSensor IR

Infrared sensor for monitoring flammable gases and vapors containing hydrocarbons

- Detection range: 0 to 100 % LEL [2)]

WARNING

Explosive. Not to be used in oxygen enriched atmospheres. None of the Polytron 8000 transmitters is certified and approved to be operated in oxygen enriched atmospheres.

2.4 Intended operating area and operating conditions

Hazardous areas classified by zones:
The device is only designed for use in Zone 1 or Zone 2 potentially explosive atmospheres for which a temperature range as specified on the device must be observed and in which gases of Explosion Groups IIA, IIB or IIC and Temperature Classes T4 or T6 (depending on maximum ambient temperature) or dust of Groups IIIA, IIIB or IIIC may occur.

Hazardous areas classified by divisions:
The device is only designed for use in potentially explosive atmospheres of Classes I&II, Div. 1 or 2, for which a temperature range as specified on the device must be observed and in which gases or dust of Groups A, B, C, D or E, F, G and Temperature Classes T4 or T6 (depending on maximum ambient temperature) may occur.

2.5 Approvals



See printed version for approval markings.

2.6 Device marking

The device marking is supplied with the device as a copy on a separate document.

Key to the Serial Number: The third letter of the Serial Number specifies the year of manufacture: A = 2009, B = 2010, C = 2011, D = 2012, E = 2013, F = 2014, H = 2015, J = 2016, K = 2017 etc. Example: Serial Number ARBH-0054: The third letter is B, i.e. the device was manufactured in 2010.

3 Installation

3.1 General information for the installation

The selection of a suitable mounting location is crucial for the effectiveness and performance of the entire system. Every detail of the installation must be thoroughly thought out. The following must be noted in particular:

- the local and national rules and regulations for the installation of gas monitoring systems,
- the applicable regulations for running and connecting power and signal cables to gas monitoring systems,
- the full extent of environmental influences to which the device will be subjected,
- the physical properties of the gases and vapors to be measured,
- the details of the particular application (e.g., potential leaks, air movements/flows, etc.),
- accessibility for required maintenance activities,
- the geometric of the accessories that are used with the system,
- all other limiting factors and stipulations that may affect the installation of the system.
- For installation without a conduit, an approved cable gland (e.g. Hawke A501/421/A/¾" NPT or equivalent) must be used (see chapter 12 on page 28). To increase the RF interference immunity, it may be necessary to connect the cable screen to the cable gland and to the control unit.
- The explosion proof enclosure has three ¾" NPT connections, which can be used for field wiring, the direct attachment of a sensor or wiring an external sensor. Unused openings must be closed off with a plug. For the correct tightening torques for cable bushings, plugs, sensors and connectors, see chapter 12 on page 28.
- The secondary are supposed to be supplied from an isolating source (does not apply to relay contacts).
- The optional e-Box has up to four 20 mm connections, which can be used for field wiring or wiring an external sensor. The permissible cable diameter is 7 to 12 mm.
- If the device is installed in locations where ambient temperatures of over 55 °C prevail, appropriate cables which are specified for use at temperatures of 25 °C above the maximum ambient temperature must be used.
- Strip back the insulation on conductors by 5 to 7 mm.
- Connect the cable as shown in Chapter 3.5 on page 9 (shown here also with protective ground) oder Chapter 3.6 on page 10.
- The connecting wires for the optional relay module must be selected and fused according to the rated voltages, currents and environmental conditions.
- When stranded conductors are used, an end ferrule must also be used.

3.2 Restrictions on the installation

- The device requires a DC voltage between 10 and 30 V. The minimum supply voltage of 10 V and the cross-section of the conductors used determine the distance of the device from the supply or the central controller (see chapter 12 on page 28). The device is designed for cables of sizes 12 to 24 AWG (0.2 to 2.5 mm^2). Use a three-wire, shielded cable as a minimum.
- The device must not be subjected to any radiant heat (e.g. direct sunlight) as this will result in a temperature rise above the specified thresholds (see chapter 12 on page 28). The use of a reflective screen is recommended.
- The housing is weather resistant and suitable for outdoor applications. The use of the optional splash guard is recommended to protect the sensor from water and dust.
- The device must be installed and operated in an environment which conforms to the stated specifications (see chapter 12 on page 28).
- To insure proper operation of the device, the impedance of the 4 to 20 mA signal loop must not exceed 500 ohms. Depending on the operating voltage and according to the application (e.g. HART operation), certain minimum impedances must be adhered to (see chapter 3.3 on page 8). The conductors for the power supply must have an adequately low resistance to insure the correct supply voltage at the device.

NOTICE

A dust cap can be fitted to the cable entry of the device. This cap is only used for transport purposes and must be removed before the device is connected to a sealed conduit.

3.3 Impedance range of the signal loop

Devices with a HART interface can be operated with HART communication or in HART Multidrop mode.

Operating mode	Impedance range of the signal loop	Supply voltage range
Operation without HART communication	0 to 230 Ω	at 10 V DC
	Rising linearly with the supply voltage from: 0 to 230 Ω at 10 V to 0 to 500 Ω at 16 V	10 to 18 V DC
	0 to 500 Ω	18 to 30 V DC
Operation with HART communication (HART mode)	230 to 270 Ω	at 13 V DC
	Rising linearly with the supply voltage from: 230 to 270 Ω at 11 V to 230 to 500 Ω at 16 V	11 to 16 V DC
	230 to 500 Ω	18 to 30 V DC
HART Multidrop operation	230 to 500 Ω	10 to 30 V DC

3.4 Mechanical installation

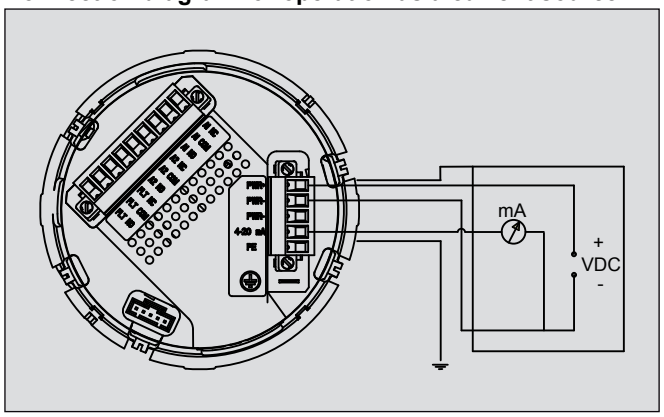
- Use the supplied drilling template for mounting on a wall.
- The mounting surface should be even and free of sharp edges.
- Dräger recommends using M6 Allen bolts.
- The openings must be readily accessible to the surrounding atmosphere.

3.5 Electrical installation without e-Box

CAUTION

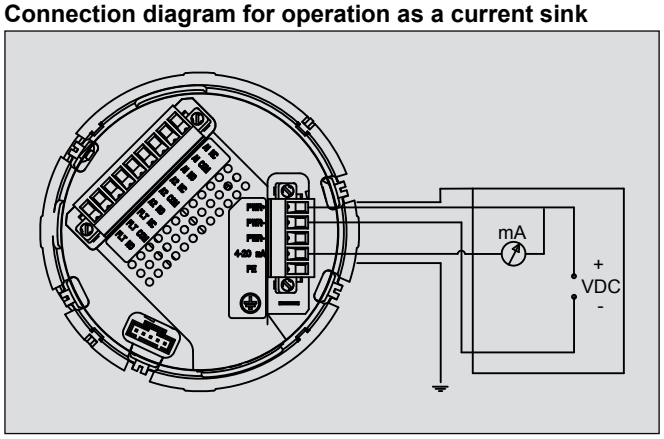
First connect the cables for the relays and make the connections to the sensor before connecting the device to the power supply.

Connection diagram for operation as a current source



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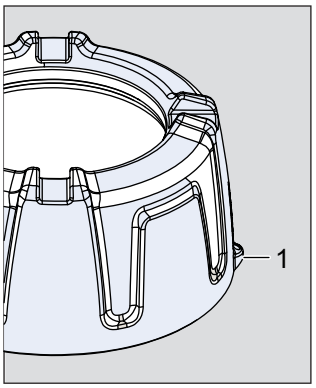
Connection diagram for operation as a current sink



01033300.eps

3.5.1 Power and signal cables

1. Release the set screw (1) and unscrew the housing cover from the device.
2. Lift the handle and remove the enclosure with the main electronics.
3. Connect the device electrically to the protective ground.
4. Rotate the main electronics and disconnect the 5-way plug.



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5. Connect the three cables for the power supply and the signal to the corresponding terminals (see following table of connections for the 5-way plug).

Connections for 5-way plug (power supply and signal):

5-way plug (power supply and signal)					
Terminal	1	2	3	4	5
Ident.	PWR+	PWR-	PWR-	4 to 20 mA signal	PE
Function	V+	V-	V-	4 to 20 mA signal (Operation as source or sink)	PE

6. For operation without a central controller: connect Terminal 3 to Terminal 4.
7. Fit the plug back in the socket and tighten the screws.
8. The screen of the cable must only be connected to the control unit.
9. Insert the main electronics back in the housing.
10. Screw the cover on again and tighten the set screw.

3.5.2 Version with relays

WARNING

At voltages >30 V AC or >42.4 V DC, the relay cables must be enclosed in protective tubing, or double-insulated cables must be used.

When the relay module is fitted, the wires for the alarm device are connected to the 9-way plug.

1. Disconnect the 9-way plug on the rear of the main electronics.
2. Connect the wires for Alarm Relay 1, Alarm Relay 2 and the Fault relay to the corresponding terminals, (see following table of connections for the 9-way plug).
3. The relays are energized when the default settings are used and in the measurement mode. This insures "fail-safe" operation. The terminal assignments in the connection table below apply when the default settings are used and when in measuring mode (see chapter 4.6 on page 13).
4. Fit the plug back in the socket and tighten the screws.
5. Fit the enclosed protective cover over the plug and secure it with cable ties if necessary.

NOTICE

For clear and far-ranging detection of a device fault, an alarm device should be switched by the fault relay.

Connections for 9-way plug (relays):

9-way plug (relays)									
	Fault relay			A2 relay			A1 relay		
Terminal	1	2	3	4	5	6	7	8	9
Ident.	FLT NO	FLT C	FLT NC	A2 NO	A2 C	A2 NC	A1 NO	A1 C	A1 NC

(NO = Normally open, NC = Normally closed, C = Common)

3.5.3 Remote Sensor

The remote junction box (Order Number 45 44 098 for stainless steel / Order Number 45 44 099 for aluminum) permits the installation of the sensors remote from the device electronics. This installation enables operation of the device in difficult to access or unfavourable positions (see the Instructions for Use for the Dräger Polytron 5000 Junction Box). The maximum permissible distance between the Polytron 8200/8310 and the sensors is 30 m.

3.6 Electrical installation with e-Box

- Install the e-Box in accordance with the Installation Instructions for the Polytron 5000/8000 e-Box.

NOTICE

The e-Box can be pre-installed, wired and closed off with the supplied cover. As soon as the installation is ready for commissioning, the device is connected to the e-Box and put into operation. This prevents the device from being damaged during the construction phase.

3.7 Connecting the device to a Dräger control unit

NOTICE

Information on connection can be found in the Instructions for Use accompanying the particular Dräger control unit (e.g. Regard, QuadGard).

Electrical connections to the control unit

- Connect the screen for the wires to the grounding point in the control unit (e.g., chassis, grounding rail).

3.8 Connecting the device to a PC

The separately available Polytron 5000/8000 IR connection kit is intended for use with the Polytron 5000/8000 and enables communication between the Polytron 5000/8000 and a PC.

3.9 PolySoft 8000 PC software (optional)

The PolySoft 8000 PC software is used to display device information, edit configuration settings and read out from the measurements memory.

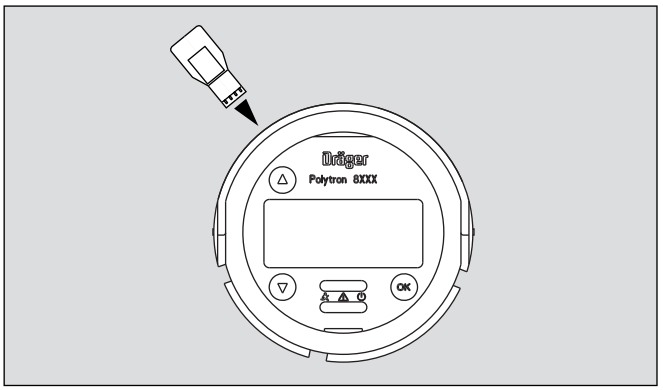
3.10 Installing software dongles

The following SW dongles are available for the Polytron 8200:

Datalogger dongle 83 17 618	Enables the datalogger and the graphic display of concentrations.
Sensor test dongle 83 17 619	Enables the sensor self test (for certain versions only)
Diagnostic dongle 83 17 860	Enables the sensor self test, the display of the remaining sensor activity and the sensor diagnostic function (for certain functions only)

Combi-dongle (datalogger and sensor test dongle)
83 23 218

Combi-dongle (datalogger and diagnostic dongle)
83 23 219



00833300.eps

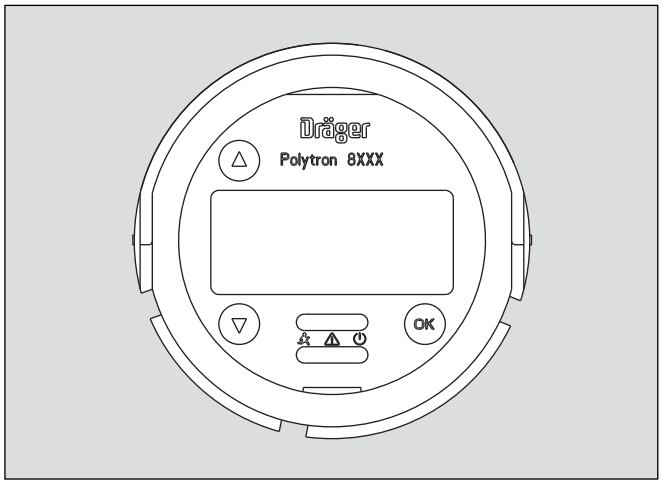
To install a SW dongle:

1. Switch off the power to the unit or declassify the area according to the local regulations.
2. Release the set screw and unscrew the housing cover from the device.
3. Lift the handle and remove the enclosure with the main electronics.
4. Insert the dongle in the slot with the Dräger lettering facing upwards.
5. Insert the main electronics back in the housing.
6. Screw the cover on again and tighten the set screw.
   The dongle is installed.
7. Switch on the power.

4 Operation

4.1 Operating fundamentals

4.1.1 Menu navigation



00733300.eps

It is possible to scroll throught he menu items by tapping the ▲ and ▼ symbols with the magnetic wand (Part Number 4544101, blue). OK confirms a function.

NOTICE

The housing cover should be fitted when using the magnetic wand. If the housing cover is not fitted, the magnetic wand might activate two or more buttons at the same time (crosstalk).

Graphic symbols facilitate navigation in the various menus.

- Together with the text » Back «, » Menu «, etc., exit the menu or go back 1 step.
- Closed folder
  Further functions or sub-menus are located under this item.
- Opened folder
  The functions and sub-menus available here are listed under this item.
- Function
  When activated, functions can be executed in one or more steps.
- Selection activated
  For functions that can be selected and activated, the activation is initiated by taping » OK «.
- List closed above / complete
  There are no further functions, menus or sub-menus listed above.
- List can be scrolled upwards
  There are further functions, menus or sub-menus listed above.
- List closed below / complete
  There are no further functions, menus or sub-menus listed below.
- List can be scrolled downwards
  There are further functions, menus or sub-menus listed below.
- Next
  Perform context-related action.
- 3/3 Number / total number of steps (screens) within the function.
- 2/2 Entry
  Enter data with » ▲ « and » ▼ «.

4.1.2 Changing parameter values or the parameter status

1. Select the desired menu item with ▲ and ▼.
2. Confirm the menu item with OK.
   The current value or status will be displayed.
3. Using ▲ and ▼, the value of a numerical parameter can be changed or preset values can be selected.
4. As soon as the desired value or the selection is displayed, tap OK to validate/confirm the new parameter.
5. Tap OK to access the next higher level.

- If exiting using **Back to menu** or **Previous**, all changes will be discarded.

4.1.3 Exiting menus

- ▲ Tap **Back to measurement** and OK to exit the menu.

4.2 Display and LEDs

In measurement mode, the current gas concentration, the name of the gas and the measurement units are shown on the display. The green LED lights.

In addition, the following symbols may be displayed:

- " ↑ ↑ ↑ ↑ ", if the measurement range is exceeded
- " **- - - -** " and " **X** " in the event of a malfunction. The yellow LED lights, (see chapter 4.2.2 on page 12).
- "SIL", when SIL status is activated.

When the optional relay PCB is used:

- If the first alarm has been triggered, the red LED gives single flashes.
- If the second alarm has been triggered, the red LED gives double flashes.

4.2.1 Special symbols

The following special symbols, which indicate the device state, may be displayed on the right hand side in measurement mode.

- Warning message present –
  to display warnings, see chapter 7.1.1 on page 17.
  Information can be called up in Info mode, see chapter 4.3 on page 12.
- Fault message present –
  To display the fault, see chapter 7.1.2 on page 17
- Maintenance signal will be output on the interface, see chapter 8.3.2 on page 21.
- Measurement range of analog interface exceeded
- Measurement less than range of analog interface
- Analog interface is set to a fixed value (e.g. Multidrop HART communication) and is not transmitting any measurements.
- "Preventive" maintenance: The sensor is ready for operation
- "Preventive" maintenance: The sensor is ready for operation but is close to the end of its life cycle.
- "Preventive" maintenance: The sensor is still ready for operation but should be changed as soon as possible.
- The datalogger is active in rolling mode.
  To activate/deactivate, see chapter 8.5.2 on page 24.
- The datalogger is active in stacking mode.
  To activate/deactivate, see chapter 8.5.2 on page 24.
- SIL SIL is activated (observe Safety Manual - Order Number 9033307).

4.2.2 LED symbols

Symbol	LED	Description
	red	Alarm triggered
	yellow	Malfunction / Warning
	green	Switched on Measurement mode

NOTICE

The alarm triggering function is only available when the optionally integrated relay module is used.

When the optional relay PCB is used:

- If the first alarm has been triggered, the red LED gives single flashes. A1 relay is activated.
- If the second alarm has been triggered, the red LED gives double flashes. A2 relay is activated.
- If an alarm can be acknowledged and is acknowledged, the LED stops flashing and lights continuously instead until the alarm condition is no longer present. The corresponding relay is deactivated.

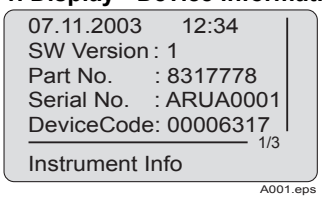
4.3 Activating the Info mode

The Info mode is used to present information about the central device settings and states.

- Tap ▲ and hold for 3 seconds.
  The device information appears on several displays. No changes can be made.
- Tap ▲ or ▼ briefly to switch between the displays.
- The Info mode can be ended at any time by selecting OK.
- If no button is selected within 30 seconds, the device reverts automatically to the measurement mode.

Example of the Info mode
(Displays vary depending on sensor):

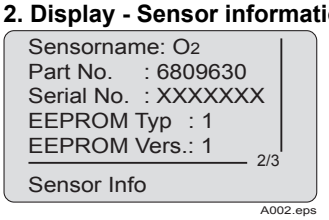
1. Display - Device information:



A001.eps

- Date and Time
- Software version
- Part number of the device
- Serial number of the device
- Device code

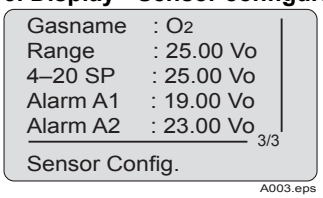
2. Display - Sensor information:



A002.eps

- Sensor description
- Part number of sensor (only for certain sensors)
- Serial number of sensor (only for certain sensors)
- Software version (only for certain sensors)
- Software revision (only for certain sensors)

3. Display - Sensor configuration:



A003.eps

- Gas description
- Maximum measurement limit and measurement units for the sensor
- Measurement range and measurement units for the analog interface. Only displayed when the 4-20 mA interface is enabled.

- A1 Alarm limit and measurement units[1]
- A2 Alarm limit and measurement units[1]

4.4 Switching to the Quick Menu mode

- Tap ▼ and hold for 1 to 2 seconds.
  The Quick Menu will open. This menu is displayed without any password request. No changes can be made.
  The selected information about status and device settings can be retrieved (e.g. warning messages, error messages, installed modules and calibration data).

4.5 Switching to Menu mode (password protected)

1. Tap ▼ and hold for longer than 3 seconds.
   The password request appears.
2. **Enter the password** and confirm.
   The screen for password entry appears.
3. Set the password and confirm the entry.
   The menu hierarchy corresponding to the entered password will open.

- An error message appears if the entered password is invalid.

Password presets:
Password for the **Calibration** menu: _ _ _ 1
Password for the **Settings** menu: _ _ _ 2

4.6 Measurement mode

WARNING

The configuration and calibration settings must be checked before the device is operated in measurement mode.

- Switch on the power.
  - The device runs through a start-up sequence (LCD test by inverting the video, LED test, software version and initialization) and starts the warm-up phase. The display indicates that the sensor will be ready to operate in hh:mm:ss (the countdown begins) and the Polytron 8200/8310 sends the Maintenance signal.
  - After the warm-up phase, the device passes into the measurement mode.
  - The current gas concentration, the selected gas and the units of measure appear on the display.
  - The ⏻ LED lights green.
  - The sensor is ready to take measurements.

NOTICE

The correct date and time settings are important for many functions (see chapter 8.2.3 on page 19).

4.6.1 Analog signals

In measurement mode the output current of the device is between 4 and 20 mA and is proportional to the measured gas concentration.

The device uses various current values to indicate different operating modes. This conforms to the NAMUR NE43 recommendation. The 4-20 mA interface on the device can be customized and configured to individual requirements. The device is provided with suitable standard settings at the factory (see chapter 12.3 on page 29).

1 Only displayed when relay is configured.

5 Calibration

Repeat the calibration of the device at regular intervals as specified in the particular sensor data sheet.

CAUTION

Danger to health! Do not inhale the test gas. Observe the hazard information in the corresponding safety data sheets. Provide venting into a fume cupboard or outside the building.

Always calibrate the zero point first before the sensitivity. Otherwise the calibration will be faulty!

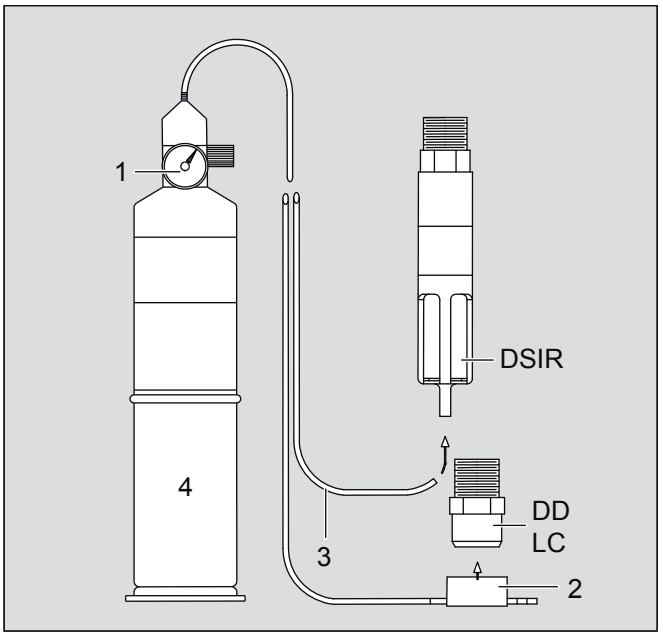
NOTICE

Calibration is not possible if the date and time are not set (see chapter 8.2.3 on page 19).

Dräger recommends calibrating devices with the gas that is to be measured operationally. This method of measured gas calibration is more accurate than a surrogate gas calibration. A surrogate gas calibration may only be performed as an alternative if a measured gas calibration is not possible.

5.1 Calibrating the device

1. Connect the pressure reducer to the calibration gas cylinder.
2. Attach the calibration adapter to the sensor.
3. The gas flow should be between 0.5 and 2.0 L/min.
4. Connect the hose to the calibration adapter.



1 Pressure reducer
2 Calibration adapter
3 Test gas cylinder
4 Hose

For DSIR only (see also Instructions for Use for DrägerSensor IR)

1. Position the magnetic wand on the sensor button marked with ⇩0 and hold it there for at least 5 seconds.
   A negative value will be displayed for as long as the magnetic wand is held on the button (e.g. -10 %LEL). This will start the automatic zeroing of the sensor.
2. Remove the magnetic wand.
   The sensor ends the automatic zeroing after approx. 30 seconds. A negative value (e.g. -10 %LEL) is displayed again as confirmation.

After the zero-point calibration of the DrägerSensor IR, the instrument should show 0 %LEL in the display. If this is not the case, a zero-point calibration must be performed on the instrument (see chapter 5.1.1 on page 14).

5.1.1 Zero point calibration

NOTICE

Ambient air can also be used instead of nitrogen or synthetic air to zero the sensor, provided it is insured that the ambient air contains no measured gas or any other gas for which the sensor may exhibit cross-sensitivity (see the details in the sensor data sheet). In this case, neither a gas cylinder nor a calibration adapter is required for the zero point calibration.

1. Select **Calibration > Zero Calibration** and confirm.
   The Maintenance signal is transmitted.
   The message **Apply zero gas** appears.
2. Apply zero gas (synthetic air or nitrogen) to the sensor.
3. Select **Next** and confirm.
   The current value is displayed.

After the displayed value is stable:

4. Set the value to 0 and confirm.
   The message **Please wait…** appears.
   The actual value is displayed.

- Actual value within the permissible range:
  - Select **Next** and confirm.
  - Shut off the test gas and remove the calibration adapter from the sensor or disconnect the hose.

5.1.2 Span calibration

1. Check which gas category is set (only for DrägerSensor IR, see also the Instructions for Use for the DrägerSensor IR).
1. Select **Calibration > Span calibration** and confirm.
2. Apply calibration gas (e.g., 50 % LEL methane).
   The current value is displayed.

After the displayed value is stable:

3. Set the value to 50 and confirm.
4. Shut off the test gas and remove the calibration adapter from the sensor or disconnect the hose.

5.2 Performing Auto Calibration

The device offers the option of an automatically sequenced calibration. This reduces the number of otherwise manual interactions with the device. The auto calibration is only suitable for experienced users, as calibration errors can occur here as a result of tightened procedures.

NOTICE

Not all of the available sensors and gases support auto calibration. If the function is not available, a manual calibration must be performed.

1. Select **Settings > Sensor > Autocal. set.** to enable or disable the function.
2. Supply fresh air or feed nitrogen or compressed air at a flow rate of 0.5 - 2.0 L/min to the sensor.

WARNING

It must be insured that during the zero point calibration, no measured gas is present in the supplied calibration gas. Particularly with a fresh air calibration, Dräger recommends performing a second, independent measurement. Some sensors may only be calibrated with synthetic air or nitrogen (observe the relevant sensor data sheets).

3. Select **Calibration > Auto cal.** and confirm.
   - **Please wait...** is displayed and a calibration of the zero point is performed automatically.
   - After a successful zero point calibration, the span calibration is started.
   - The calibration gas concentration, the units and, where appropriate, the calibration gas are displayed and can be changed.
4. Start the calibration with **Next**; **Back to menu** aborts the calibration.

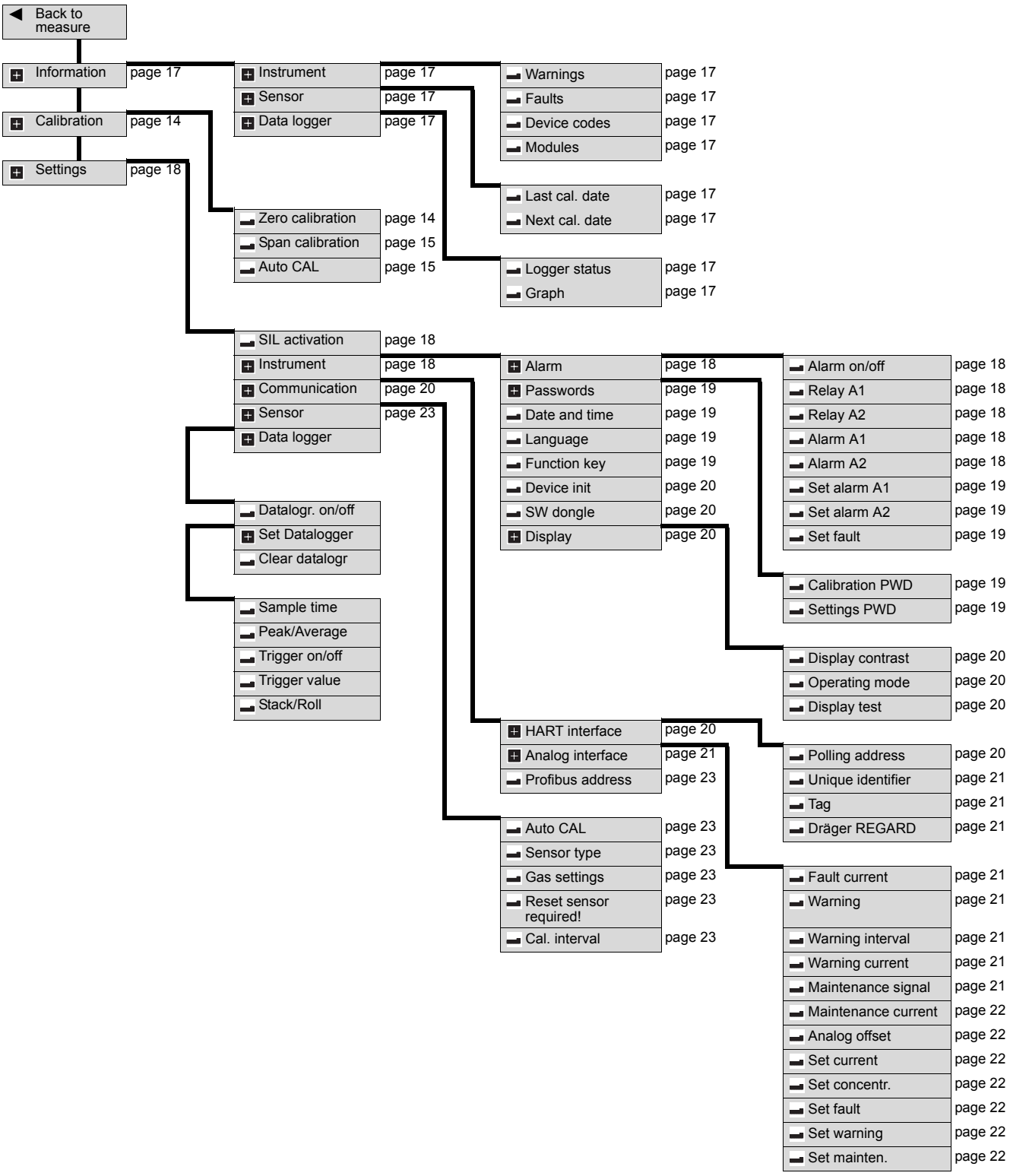
NOTICE

After 10 minutes, without confirmation the device reverts to measurement mode without performing a calibration.

5. Feed the relevant calibration gas to the sensor at a flow rate of 0.5 - 2.0 L/min.
   - When the measured value is stable, the device performs the calibration automatically.
   - After a successful calibration, the measurement and the message **Value OK?** are displayed
6. When the measurement is stable, shut off the calibration gas and wait until the measurement is below any possible alarm thresholds again.

- The calibration is performed again with **Redo**.
- Complete the calibration with **Accept value**.
  The device returns to the measurement mode.

6 Menu overview



7 Information menu

Specific data about the device, the sensor used and the measured gas are summarized in this menu. The menu can be accessed without a password. Changes to the data are not possible.

7.1 Device settings

7.1.1 Displaying warning messages

To display warnings in plain text with warning numbers, see chapter 9 on page 25.
The ⚠ symbol is displayed when there is a warning present.

- Select **Information > Instrument > Warnings** and confirm.
  Warnings are displayed in plain text.
  If several warnings are present, this is indicated in the upper right-hand corner of the display, e.g., 1/3 = Screen 1 of 3.

7.1.2 displaying fault messages

To display faults present in plain text with fault numbers, see chapter 9 on page 25.
The ☒ symbol is displayed when there is a fault present.

- Select **Information > Instrument > Faults** and confirm.
  Faults are displayed in plain text.
  If several faults are present, this is indicated in the upper right-hand corner of the display, e.g., 1/2 = Screen 1 of 2.

7.1.3 Displaying device codes

Display of codes for faults/warnings in a numerical table (hexadecimal).
The ☒ symbol is displayed when there is a fault present.

- Select **Information > Instrument > Device codes** and confirm.
  Faults are displayed as a hexadecimal numerical code in tabular form. If all the numerical groups are displayed as **00**, there are no faults or warnings present.

NOTICE

The fault code is very helpful for technical support and should always be stated in full in the event of a fault.

7.1.4 Displaying installed modules

Display of the installed hardware modules.

- Select **Information > Instrument > Modules** and confirm.
  A list of all possible modules is displayed. The installed modules are identified by a ■, those not installed by a □.
- Mark a module and request detailed information with OK.

7.2 Sensor information

This menu contains the functions for retrieving the calibration data.

7.2.1 Display last calibration date

Display the date of the last calibration.

- Select **Information > Sensor > Last cal. date** and confirm.
  The date of the last calibration is displayed

7.2.2 Display next calibration date

Display the date of the next calibration.

- Select **Information > Sensor > Next cal. date** and confirm.
  The date when the next calibration of the sensor is due is displayed.

7.3 Datalogger information (only with data dongle)

This menu contains the functions for querying the datalogger.

7.3.1 Displaying the datalogger status

- Select **Information > Datalogger > Logger status** and confirm.
  The current status of the datalogger is displayed: Datalogr. : on or off (datalogger on or off)
- To switch the datalogger on/off, see chapter 8.5.1 on page 24.

7.3.2 Displaying a graph of measured values

Show the measurements from the sensor on a 15-minute time axis.

- Select **Information > Datalogger > Graph** and confirm.

8 Settings menu

This menu contains all the functions that are required for the individual configuration of the device.

8.1 Switching SIL lock on or off

NOTICE

SIL lock is only available for certain sensors (see also the sensor data sheets or the Dräger Polytron 8X00 Safety Manual).

With this function, the device can be protected against unauthorized changes to the configuration with a password. Changing the configuration (e.g., changing the measurement range from 100 %LEL to 50 %LEL) will cause the device to display all the safety-relevant parameters to the user once more before it returns to the measurement mode. The correctness of the parameters and settings must be confirmed.

1. Select **Settings > Instrument > Set SIL**.
2. Select the desired state **On** or **Off** and confirm.

NOTICE

When SIL is activated, the device displays all the important parameters and setting before returning to measurement mode. Check the parameters and settings carefully and confirm.

8.2 Device settings

8.2.1 Alarm settings (only with installed relay module)

Alarms issued via relays and LEDs.

CAUTION

In the normal state, the relays in the relay module are energized. That is, the relays change their state if the power supply is interrupted!

Switching the alarm on or off

1. Select **Settings > Instrument > Alarm > Alarm on/off**.
2. Select the desired state **On** or **Off** and confirm.

CAUTION

If the alarm is inactive, the alarm state will not be issued by the LEDs or the relay interface! A warning message ▯ will be shown on the display!

Configuring Relay A1 or A2

This function is used to define whether the alarm relay is energized in standard operation or in an alarm state. If the configuration of the relay is set to "Normally energized", the corresponding relay contact is closed in the normal case and drops out in the event of an alarm. This configuration results in an alarm being triggered in the event of a loss of power to the transmitter (fail-safe). The fault relay is factory-configured to "Normally energized" and cannot be changed.

1. Select **Settings > Instrument > Alarm > Relay A1** or **Relay A2** and confirm.
2. Select **Normal energy supply** oder **Energy supply during alarm** and confirm.

Configuring Alarm A1 or A2

1. Select **Settings > Instrument > Alarm > Alarm A1** or **Alarm A2** and confirm.
2. Select the line for entering the alarm limit and confirm.
3. Set the threshold and confirm.
   The setting for the alarm threshold is displayed.
4. Select **Next** and confirm.
   The setting for the alarm direction is displayed.
5. Select **Rising** or **Falling** and confirm.
6. Select **Next** and confirm.
   The setting for the alarm direction is displayed.
7. Select **Latching** or **Non Latching** and confirm.
8. Select **Next** and confirm.
   The setting for the acknowledgement is displayed.
9. Select **Acknowledgeable** or **NonAcknowledgeabl** or **PreAcknowledgeabl** and confirm.
10. Select **Next** and confirm.
    The function for setting the A1 hysteresis is opened.

NOTICE

This function permits the setting of a zone within which a triggered relay maintains its status until the gas concentration is outside the zone. This function prevents relays from chattering at an alarm threshold.
Example: A2 at 40 %LEL methane
Maximum possible hysteresis: 3 %LEL
Alarm activation at measured values ≥40 %LEL
Alarm deactivation at measured values ≤37 %LEL (40 %LEL - 3 %LEL)

11. Select the line for entering the hysteresis and confirm.
12. Set the hysteresis for A1 and confirm.
    The hysteresis setting for A1 is displayed.
13. Select **Next** and confirm.
    The settings for A1 are displayed.
14. Select and confirm with **Confirm**.
    The settings for the A1 alarm are now complete.

The functional relationship between the various settings is explained in the following table:

Latching and acknowledgeable	The alarm must be acknowledged manually. The alarm can be acknowledged when the alarm condition is still present.
Latching and not acknowledgeable	The alarm must be acknowledged manually. The alarm can only be acknowledged when the alarm condition is no longer present.
Latching and pre-acknowledgeable	The alarm must be acknowledged manually. The alarm can be acknowledged when the alarm condition is still present but will only be reset when the alarm condition is no longer present.
Non-latching and acknowledgeable	The alarm is acknowledged automatically when there is no longer any alarm condition present, or it can be acknowledged manually.
Non-latching and not acknowledgeable	The alarm is acknowledged automatically when there is no longer any alarm condition present. The alarm cannot be acknowledged manually.
Non-latching and pre-acknowledgeable	Corresponds to the alarm behavior for "Non-latching" and "Not acknowledgeable".

Testing Alarm A1

NOTICE

When the function **Set Alarm A1** is exited in the menu, the Polytron 8200/8310 reverts automatically to measurement mode.

This function simulates the A1 alarm status.

1. Select **Settings > Instrument > Alarm > Set Alarm A1** and confirm.
2. Select **On** or **Off** and confirm.

When the function is activated, the relay and the interface are set to the A1 alarm status and the red LED gives single flashes.

Testing Alarm A2

NOTICE

When the function **Set Alarm A2** is exited in the menu, the Polytron 8200/8310 reverts automatically to measurement mode.

This function simulates the A2 alarm status.

1. Select **Settings > Instrument > Alarm > Set Alarm A2** and confirm.
2. Select **On** or **Off** and confirm.

When the function is activated, the relay and the interface are set to the A2 alarm status and the red LED gives double flashes.

Testing Fault status

NOTICE

When the function **Set fault** is exited in the menu, the Polytron 8200/8310 reverts automatically to measurement mode.

This function simulates the Fault alarm.

1. Select **Settings > Instrument > Alarm > Set fault** and confirm.
2. Select **On** or **Off** and confirm.

When the function is activated, the Fault relay and the 4-20 mA interface are set to the fault current and the yellow LED lights.

8.2.2 Changing passwords

The passwords for calibration (zero and span calibrations) and for the settings (full configuration) can be defined in this menu.

1. Select **Settings > Instrument > Passwords > Calibration/ Settings PWD** and confirm.
2. Select the line for the password settings and confirm.
3. Set the password and confirm.
   The setting for the password is displayed.
4. Select **Confirm** and confirm.

8.2.3 Setting the date and time

1. Select **Settings > Instrument > Date and time** and confirm.
2. Select the desired line and confirm in order to switch to the Change mode.
3. Set each digit and confirm each setting.
4. Select **Confirm** and confirm.

8.2.4 Changing the display language

1. Select **Settings > Instrument > Language** and confirm.
2. Select the desired language from the list and confirm.

8.2.5 Configuring the function key

This function is used to assign a predefined function to the ▲ key. The selected function is activated by briefly taping the ▲ key.

1. Select **Settings> Instrument > Function key** and confirm.
2. Select the desired function and confirm.

- Repeating the confirmation deactivates the selected function.
- If **Bumptest** is selected:
  The maintenance symbol 🔧 is shown on the right hand side of the display and the maintenance signal is output. Repeating the confirmation ends the bump test and the device reverts to the normal measurement mode.
- In measurement mode, the selected function can be activated by briefly taping ▲.

Selection options:

Graph (only with datalogger)	The measurements from the sensor are displayed graphically on a time axis (see chapter 7.3.2 on page 17).
Faults	Faults are displayed in plain text (see chapter 7.1.2 on page 17).
Warnings	Warnings are displayed in plain text (see chapter 7.1.1 on page 17).
Bump test	The bump test allows gas to be applied without an alarm being issued. The maintenance signal is output on the 4-20 mA output.
Sensor vitality	Shows the remaining sensor vitality (only available for certain sensors).

8.2.6 Resetting the device to factory settings

The following device parameters are reset to the factory settings with this function (see chapter 12.3 on page 29).

- Alarm parameters
- Passwords
- Language
- Function key
- HART interface
- Data logger
- Analog interface
- Relay configuration

1. Select **Settings > Instrument > Device init.** and confirm.
2. Select **Confirm** and confirm in order to reset the device to the factory settings.

8.2.7 Deactivating the software dongle

This function allows the SW dongles to be deactivated before they are removed or in the event of a fault.
A dongle can only be reactivated by switching the power to the device off and on.

1. Select **Settings > Instrument > SW dongle > Dongle datalogger/Dongle sensortest/Dongle diagnostic** and confirm.
2. Select **Deactivate func.** and deactivate Dongle datalogger/ Dongle sensortest/Dongle diagnostic with ⓞⓚ.

8.2.8 Display settings

Changing the contrast

1. Select **Settings > Instrument > Display > Display contrast** and confirm.
2. Change the contrast and confirm.

Changing the display mode
The display of measured values can be turned on or off with this function.

1. Select **Settings > Instrument > Display > Display mode** and confirm.
2. Select **Standard** or **Non display** and confirm.

If "Non display" has been selected, the display shows the start screen and the symbols.

If the relay option is set and an alarm is triggered, the display shows the current gas concentration and the red LED flashes, regardless of the selected display mode.

Switching the display test on or off
The function of the display and the LEDs is tested with this function.

1. Select **Settings > Instrument > Display > Displaytest** and confirm.
2. Select **On** or **Off** and confirm.

When this function is activated, the display is shown inverted and all the LEDs are lit.

8.3 Communication settings

8.3.1 Settings for the HART interface (only for devices with the optional HART interface)

This group contains the setting functions for the HART interface.

Setting the polling address
The polling address configures the device for analog operation (4 to 20 mA) or multidrop operation. Analog operation (4 to 20 mA) is activated by setting the polling address to 0. For multidrop operation the polling address must be configured to a value between 1 and 15, which will result in the analog interface being deactivated and set to a constant current of approx. 1 mA. To allow the control unit to request the Unique Identifier (unique HART address) with HART command #0, all the devices on a line must be configured with different polling addresses. It is advisable to choose a sequence starting with 1 and incrementing continuously.
This setting corresponds to HART command #6 (Write Polling Address).

1. Select **Settings > Communication > HART interface > Polling address** and confirm.
2. Select the address line for the entry and confirm in order to switch to the Change mode.
3. Set the polling address and confirm.
4. Select **Confirm** and confirm.

Displaying the Unique Identifier
This function enables reading of the Unique Identifier (unique HART address), which has to be known for almost all the HART addressing commands. However this information is only required for those systems that are not able to read back the Unique Identifier using HART command #0 in Short-Frame Format or HART command #11. The display corresponds to the address for HART command #0 (Read Unique Identifier) or #11 (Read Unique Identifier associated with Tag).

- Select **Settings > Communication > HART interface > Unique Identifier** and confirm.
  The Unique Identifier is displayed.

Changing the measuring point name
The tag can be used to identify special devices. It can contain up to 8 alphanumeric characters. The tag can also function as an address for reading the unique identifier from the device using HART command #11 (Read Unique Identifier Associated With Tag), even when the polling address is unknown.
This requires that a unique tag has previously been configured.

1. Select **Settings > Communication > HART interface > Tag** and confirm.
2. Select the tag line for the entry and confirm.
3. Set the tag and confirm.
4. Select **Confirm** and confirm.

Selecting Dräger REGARD
This function enables switching between different HART protocols.

NOTICE

REGARD SW 2.0 is the standard setting. REGARD SW 1.4 must be set on REGARD controllers with SW 1.4.

1. Select **Settings > Communication > HART interface > Dräger REGARD** and confirm.
2. Select **REGARD SW 2.0** or **REGARD SW 1.4** and confirm.

8.3.2 Settings for the analog interface

The test and setting functions for the analog interface are summarized in this menu.

Setting the fault current
This function is used to set the current for the fault signal on the analog interface.

1. Select **Settings > Communication > Analog interface > Fault current** and confirm.
2. Select the fault current line and confirm.
3. Set the currrent and confirm.
4. Select **Confirm** and confirm.

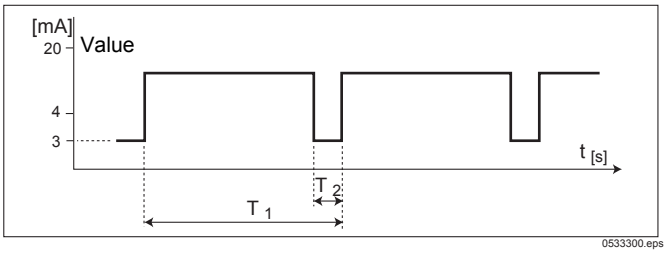
Switching the warning signal on or off
This function is used to switch the warning signal on the analog interface on and off. If an existing warning is to be output over the analog interface, the warning signal must be turned on. During a warning, the current on the analog interface is switched to the "Warning" status for one second. The measurement is transmitted for the rest of the time. The interval between warning signals and the analog signal phase can be customized.

To switch the warning signal on or off:

1. Select **Settings > Communication > Analog interface > Warning** and confirm.
2. Select **On** or **Off** and confirm.

Setting the warning interval
This function is used to set the interval between the warning signals and the analog interface.

1. Select **Settings > Communication > Analog interface > Warning interval** and confirm.
2. Select line **T1** for the entry and confirm.
3. Set the time and confirm.
   The setting for Time T1 is displayed.
4. Select **Next** and confirm.
5. Select line **T2** for the entry and confirm.
6. Set the time and confirm each setting.
   The setting for Time T2 is displayed.
7. Select **Confirm** and confirm.



Setting the warning current
This function is used to set the current for the warning signal on the analog interface.

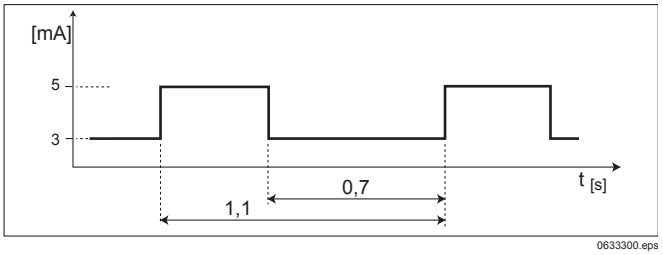
1. Select **Settings > Communication > Analog interface > Warning current** and confirm.
2. Select the current line for the entry and confirm.
3. Set the currrent and confirm.
   The setting for the warning current is displayed.
4. Select **Confirm** and confirm.

Changing the maintenance signal type
This function is sets the type of signal used on the analog interface for the maintenance signal.

1. Select **Settings > Communication > Analog interface > Maint. signal** and confirm.
2. Select **static** or **dynamic** signal type and confirm.

NOTICE

The **static** signal type is a constant current. The current can be configured.
The **dynamic** signal type is a square wave signal with the following characteristics:



Setting the maintenance current
This function is used to set the current for the maintenance signal on the analog interface.

1. Select **Settings > Communication > Analog interface > Maint. current** and confirm.
2. Select the current line for the entry and confirm.
3. Set the currrent and confirm.
   The setting for the maintenance current is displayed.
4. Select **Confirm** and confirm.

NOTICE

The maintenance current can only be set if the maintenance signal has been set to static. This function is not available otherwise.

Setting the 4-20 mA offset
This function can be used to set an adjustable offset current on the analog interface. The offset is constant over the entire range of the output signal.

1. Select **Settings > Communication > Analog interface > Analog offset** and confirm.
2. Select the current line for the entry (max. range: -0.2 to 1.5 mA) and confirm.
3. Set the currrent and confirm.
   The setting for the 4-20 mA offset is displayed.
4. Select **Confirm** and confirm.

Test functions for the analog interface

NOTICE

Alarms in the central controller may be triggered by these functions! If necessary, the alarms in the central controller must be disabled beforehand.

Setting current signals
Using this function, various currents in the range from 0 to 22 mA can be set on the analog interface.

1. Select **Settings > Communication > Analog interface > Set current** and confirm.
2. If the alarm in the control unit is disabled, confirm the message **Disable all alarm settings**.
3. Select the current line for the entry and confirm.
4. Set the currrent and confirm.
   The setting for the current is displayed.
5. Select **Next** and confirm.
6. Select **Set current out** or **Current off** and confirm.
7. Select **Next** and confirm. The function is terminated.
8. After the alarm settings in the control unit have been re-enabled, confirm the **Enable all alarm settings** message.

Setting the concentration
This function is used to set various concentrations in the range between 0 and 100 % of the selected unit of measure. The current output is set to correspond to the selected concentration.

1. Select **Settings > Communication > Analog interface > Set concentr.** and confirm.
2. If the alarm in the control unit is disabled, confirm the message **Disable all alarm settings**.
3. Select the concentration line for the entry and confirm.
4. Set the concentration and confirm.
   The setting for the concentration is displayed.
5. Select **Next** and confirm.
6. Select **Define concentr. output** or **Conc. off** and activate.
7. Select **Next** and confirm. The function is terminated.
8. After the alarm settings in the control unit have been re-enabled, confirm the **Enable all alarm settings** message.

Testing the Fault signal
This function is used to set the analog interface for the fault signal.

1. Select **Settings > Communication > Analog interface > Set fault** and confirm.
2. Select **On** or **Off** and confirm.
   The current for the Fault signal will be transmitted on the analog interface.

Testing the warning signal
This function is used to set the analog interface for the warning signal.

1. Select **Settings > Communication > Analog interface > Set warning** and confirm.
2. Select **On** or **Off** and confirm.
   The current for the warning signal will be transmitted on the analog interface.

Testing the maintenance signal
This function is used to set the analog interface for the maintenance signal.

1. Select **Settings > Communication > Analog interface > Set mainten.** and confirm.
2. Select **On** or **Off** and confirm.
   The current for the maintenance signal will be transmitted on the analog interface.

8.3.3 Profibus address

Not yet active - for future functions.

8.4 Sensor settings

8.4.1 Switching Auto CAL on or off

NOTICE

The auto-calibration from the **Calibration** menu is only available if this function is enabled.

1. Select **Settings > Sensor > Set auto calibration** and confirm.
2. Select **On** or **Off** and confirm.

8.4.2 Setting the sensor type (for DrägerSensor DD only)

This function is used to set the sensor type.

1. Select **Settings > Sensor > Sensor type** and confirm.

8.4.3 Changing the gas settings

Settings for gas type, measuring range and measurement units can be made in this menu.

1. Select **Settings > Sensor > Gas setting** and confirm.
2. Select the measured gas from the list and confirm.
   The measurement units display will be shown.
3. Select the measurement units and confirm.
   The full scale reading display will be shown.
4. Set the full scale reading and confirm.
   The setting for the full scale reading is displayed.
5. Select **Next** and confirm.
   an overview of the new gas settings is displayed.

- Return to the previous view with **Previous** or confirm the settings with **Confirm**.

Information about measurement units

The Polytron 8200/8310 represents the measured value in various optional units. The following are available:

- %LEL
- %LIE
- %UEG

The Polytron 8000 automatically calculates the correct value.

Information about the 20 mA measuring range

The full scale reading can be set with this function. At the full scale reading set, the device outputs 20 mA on the 4-20 mA interface.

8.4.4 Resetting the sensor to factory settings

This function resets all the sensor parameters to the factory default settings (see chapter 12.3 on page 29).

1. Select **Settings > Sensor > Reset sensor required!** and confirm.
2. Select **Confirm** and confirm.

8.4.5 Setting the calibration interval

NOTICE

The calibration interval can be set between 0 and 720 days.

1. Select **Settings > Sensor > Calibration interval** and confirm.
2. Set the calibration interval and confirm.

8.5 Datalogger settings (only with data dongle)

NOTICE

The functions are only available if the Polytron 8000 is fitted with the data dongle (Order Number 83 17 618), see chapter 3.10 on page 10.

The datalogger has a storage capacity of approx. 3000 measurements. At a sampling interval of 1 minute, this would allow monitoring for approx. 50 hours. The monitoring time can be significantly increased if the **Trigger** function is enabled.

The results in the datalogger can only be evaluated with the PolySoft 8000 PC software. An evaluation of the datalogger contents over the last 15 minutes is available in the menu under **Information > Datalogger > Graph** (see chapter 7.3.2 on page 17).

8.5.1 Switching the datalogger on or off

1. Select **Settings > Datalogger > Datalogr. on/off** and confirm.
2. Select **On** or **Off** and confirm.

8.5.2 Setting up the datalogger

Setting the sampling interval

1. Select **Settings > Datalogger > Datalogr. on/off > Sample time** and confirm.
2. Select the sample time and confirm.

Setting peak/average

1. Select **Settings > Datalogger > Set datalogger > Peak/average** and confirm.
2. Select the desired function and confirm.

Peak value	The measured maximum (for O_2, the minimum value) value of the concentration within the selected sampling interval is stored.
Average	The average value of all the concentrations measured within the selected sampling time is stored.

Switching the trigger on or off

1. Select **Settings > Datalogger > Set datalogger > Trigger on/off** and confirm.
2. Select **On** or **Off** and confirm.

On	Concentrations will only be stored if they exceed (relative to the last stored value) a threshold set under Trigger Value.
Off	The measurements made within the set sampling time are always stored.

Setting the trigger threshold

The trigger threshold is specified as a percentage of the full scale reading.
Example: A trigger threshold of 2 % is entered for a full scale reading of 500 ppm. Consequently the datalogger will only store measurements if they deviate (relative to the last stored value) by 10 ppm.

1. Select **Settings > Datalogger > Datalogr. on/off > Trigger value** and confirm.
2. Set the trigger value and confirm.

Setting the storage mode

1. Select **Settings > Datalogger > Set Datalogger > Stack/Roll** and confirm.
2. Select the desired condition and confirm

Overwrite	When the capacity of the datalogger is used up, the older data will be overwritten.
Hold	When the capacity of the datalogger is used up, no more data can be stored. An appropriate warning is issued.

8.5.3 Clearing the datalogger

1. Select **Settings > Datalogger > Clear Datalogr.** and confirm.
2. To clear the datalogger, select **Confirm** and confirm.

9 Troubleshooting

9.1 Fault reference

Fault number	Cause	Remedy
#001 #003 #004 #005 #011 - #014 #020 - #024 #043 #060 #067	Serious device fault, various causes.	Have the device checked by DrägerService®[1].
#002 #025 - #027 #030 - #034 #041 #042 #044 #050 #052 #081 #085	Serious data error in the device, various causes.	Reset the device to factory settings (see chapter 8.2.6 on page 20). If this fault occurs again: Have the device checked by DrägerService.
#10	4-20 mA interface cable not connected.	Disconnect the powwer supply, connect the 4-20 mA interface and reconnect the power supply.
#045	Device not detecting any sensor.	Check contacts. If this fault occurs again: Have the device checked by DrägerService.
#051 #054	Faulty zero-point.	Perform zero-point calibration (see chapter 5.1.1 on page 14).
#055	Faulty span calibration was performed.	Perform new span calibration (see chapter 5.1.2 on page 15).
#076 #080 - #084	Device fault.	Check contacts. If this fault occurs again: Have the device checked by DrägerService.

1 DrägerService® is a registered trademark of Dräger.

9.2 Warning reference

Warning number	Cause	Remedy
#101	Datalogger in Stack mode is 100 % full and is not logging any more data.	Read out the data, clear the datalogger and start again.
#102	Datalogger in Stack mode is 90 % full.	Read out the data as soon as possible, clear the datalogger and start again.
#103 #106	Data error in the device. Functions such as the datalogger or dongle functions may no longer be available.	Reset the device to factory settings (see chapter 8.2.6 on page 20). If this fault occurs again: Have the device checked by DrägerService.
#105	Device fault.	Have the device checked by DrägerService.
#104	No valid date or time set.	Set time and date (see chapter 8.2.3 on page 19).
#107	Battery almost used up.	Have the device checked by DrägerService.
#110 #111 #112	SW dongle has been removed without logging out.	Disable SW dongle (see chapter 8.2.7 on page 20).
#113	Alarms disabled.	Enable alarms (see chapter 8.2.1 on page 18).
#137	Device fault.	Restart. If this fault occurs again: Have device checked by DrägerService.
#164 #165	Sensor warm-up phase has not ended yet. Increased measurement error must be expected.	Wait until the sensor has warmed up.
#167 #170	Calibration interval expired.	Recalibrate the device (see chapter 5.1 on page 14).

10 Maintenance

10.1 Maintenance intervals

10.1.1 During commissioning

- Check calibration.
- Check signal transmission to controller and triggering of alarms.

10.1.2 Every 6 months

- Inspection by trained service personnel.

The inspection intervals must be established in each individual case and shortened if necessary, depending on technical safety considerations, engineering conditions, and the technical requirements of the equipment.
Contact DrägerService if you wish to take out a service contract and have any repairs carried out.

10.1.3 As required

- Change the sensor, see chapter 10.2 on page 27.

10.2 Changing the sensor

WARNING

As a matter of principle, always check a newly installed sensor with measured gas to insure correct operation.

CAUTION

When the sensor is changed, all settings and parameters must be checked for correctness.

The sensor is changed as follows:

1. Switch off the power to the device or declassify the area according to the local regulations.
2. Release the set screw and unscrew the housing cover from the device.
3. Lift the handle and remove the enclosure with the main electronics.
4. Disconnect the sensor cable.
5. Unscrew the DrägerSensor.
6. Pass the sensor cable through the threaded connection in the housing.
7. Screw in the DrägerSensor.

WARNING

Five threads must be engaged to insure explosion protection (see chapter 12.1 on page 29).

8. Plug the sensor cable into the socket.
9. Re-fit the sensor electronics and enclosure.
10. Screw the housing cover on again and tighten the set screw.
11. Switch on the power to the device.
12. If necessary, switch off SIL activation (see chapter 8.1 on page 18).
13. Calibrate the device if necessary (see chapter 5 on page 14).
14. If required, switch on SIL activation (see chapter 8.1 on page 18).

10.3 Changing the main electronics

CAUTION

When the main electronics are changed, all settings and parameters must be checked for correctness.

1. Switch off the power to the device or declassify the area according to the local regulations.
2. Release the set screw and unscrew the housing cover from the device.
3. Lift the handle and remove the enclosure with the main electronics.
4. Remove the protective caps for the connectors.
5. Unscrew the connector locking ring for the power supply and relay and withdraw the connector.
6. Change the main electronics.
7. Plug the sensor cable and the connector for the power supply and relay into the corresponding sockets and screw them tight.
8. Re-fit the dust caps for the connectors.
9. Re-fit the sensor electronics and enclosure.
10. Screw the housing cover on again and tighten the set screw.
11. Switch on the power to the device.
12. Check and adjust the configuration as required.
13. Calibrate the device if necessary (see chapter 5 on page 14).

11 Disposal

Disposal of electrical and electronic equipment:
EU-wide regulations governing the disposal of electric and electronic appliances which have been defined in the EU Directive 2002/96/EC and in national laws have been effective from August 2005 and apply to this device. Common household appliances can be disposed of using special collecting and recycling facilities. However, as this device has not been registered for household usage, it must not be disposed of through these means. The device can be returned to your national Dräger Safety Sales Organization for disposal. Please do not hesitate to contact the above if you have any further questions on this issue.

12 Technical data

CAUTION

Specifications and restrictions in the Instructions for Use and/or data sheets for the sensors used must be observed. For SIL applications the Dräger Polytron 8X00 Safety Manual must be observed.

The measuring range and performance characteristics are dependent on the sensor installed, see the Instructions for Use and/or data sheets for the sensors used.

Signal transmission to the central controller	
Analog	
Output current	4 mA to 20 mA
Drift below zero-point	3.8 mA to 4 mA
Measuring range exceeded	20 mA to 20.5 mA
Device malfunction	≤1.2 mA
Fault on analog output	>21 mA
Maintenance signal	3.4 mA constant signal or 1 Hz modulation between 3 and 5 mA (selectable)
Supply voltage	
Operating voltage	3-wire shielded cable, 10 to 30 V DC
Inrush current	2.5 A for 0.8 ms at 24 V DC, 10 Ω conductor resistance
Operating current (max.)	
with DrägerSensor Ex DD	105 mA at 24 V DC, no relay, sensor not remote 145 mA at 24 V DC, with relay, remote sensor
with DrägerSensor Ex LC	130 mA at 24 V DC, no relay, sensor not remote 165 mA at 24 V DC, with relay, remote sensor
with DrägerSensor IR	145 mA at 24 V DC, no relay, sensor not remote 185 mA at 24 V DC, with relay, remote sensor
Relay design (optional)	SPDT, 5 A at 230 V AC, 5 A at 30 V DC, resistive load For safety-related applications (SIL2), the maximum contact rating is reduced (see also the Dräger Polytron 8X00 Safety Manual).
Housing	NEMA 4X
Protection Class	IP 65/66/67
Dimensions (LxWxD)	
Without e-Box (DrägerSensor LC, DD)	approx. 180 x 150 x 130 mm (7" x 5.8" x 5.1")
With e-Box (DrägerSensor LC, DD)	approx. 185 x 180 x 190 mm (7.3" x 7.1" x 7.4")
Without e-Box (DrägerSensor IR)	approx. 295 x 150 x 130 mm (11,6" x 5,8" x 5,1")
With e-Box (DrägerSensor IR)	approx. 300 x 180 x 190 mm (11,9" x 7,1" x 7,4")
Weight	
Without e-Box, aluminum	approx. 2.2 kg (4.9 lbs.)
Without e-Box, stainless steel 316	approx. 4.0 kg (8.8 lbs.)
With e-Box, aluminum	approx. 3.5 kg (7.7 lbs.)
With e-Box, stainless steel 316	approx. 5.4 kg (11.9 lbs.)
Display	Resolution 128 x 64, back-lit

Environmental conditions	Specifications for the sensor: see sensor data sheet
Pressure	700 to 1300 hPa (20.7 to 38.4 in. Hg)
Humidity	0 to 100 % R. H., non-condensing
Temperature	
DrägerSensor DD, LC no relay	-40 to +80 °C (-40 to +176 °F)
DrägerSensor DD, LC with relay	-40 to +70 °C (-40 to +158 °F)
DrägerSensor IR no relay	-40 to +65 °C (-40 to +149 °F)
DrägerSensor IR with relay	-40 to +65 °C (-40 to +149 °F)
Environmental influences	See respective sensor data sheets.

12.1 Torques

(The torques are valid for the aluminum and stainless steel 316 variants)

Part	Torque Lb. In.	Torque Nm
Housing cover	min. 266	min. 30
Sensors	min. 266	min. 30
Plug	min. 266	min. 30
Cable bushing	min. 443	min. 50
Device to e-Box	71	8

If an optional e-Box is being used, fasten the device securely to the e-Box with 4 screws and a tightening torque of 8 Nm.

12.2 Tightening torque and cable size for field wiring terminals

Electronic		
Torque Lb. In.	**Cable size in AWG**	**Cable size in mm^2**
All field wiring terminals 4.4–7.0 (0.5–0.8 Nm)	20–12	0.5–2.5

12.3 Factory settings

12.3.1 Alterable settings for the Polytron 8200/8310

Menu	Standard setting	
	DrägerSensor DD, IR	**DrägerSensor LC**
A1 Alarm	20 %LEL	2.0 %LEL
A2 Alarm	40 %LEL	4.0 %LEL
A1 Relay alarm: Direction	Rising	Rising
A2 Relay Alarm: Direction	Rising	Rising
A1 latching mode	Non-latching	Non-latching
A2 latching mode	Latching	Latching
A1 Acknowledgement mode	Acknowledgeable	Acknowledgeable
A2 Acknowledgement mode	Not acknowledgeable	Not acknowledgeable
A1 enrg / wired in e-Box	Energized / NO	Energized / NO
A2 enrg / wired in e-Box	Energized / NO	Energized / NO
Maintenance password	0000	0000
LCD setting	on	on
Configuration/SIL password	_ _ _2	_ _ _2
SIL status	Off	Off
Language	English	English
Fault current	1.2 mA	1.2 mA
Warning current	3.0 mA	3.0 mA
Maintenance current	3.4 mA	3.4 mA
HART address	0	0
Auto-cal.	Off	Off
Calibration interval	360	360
Function key	Faults	Faults

12.3.2 Unalterable settings

Fault	Meaning
Fault relay / wired in e-Box	Energized / NO
Yellow Fault LED	Lights when a fault is present (see chapter 9 on page 25).
Red Alarm LED	Gives single flashes when an A1 alarm is present. Gives double flashes when an A2 alarm is present. If an alarm is configured as acknowledgeable and the alarm is acknowledged, the LED lights. Alarm hierarchy: A2 has a higher priority for the LED than A1. However the A1 and A2 relays operate independently of one another, i.e. if A1 is acknowledgeable and A2 is not and the gas concentration is so high that A1 and A2 are triggered, an acknowledgement results in the A1 relay dropping out. However the red LED continues to give double flashes as long as the A2 condition exists.

13 Order list

13.1 Dräger Polytron 8200/83X0

Name and description	Order Number
Dräger Polytron 8200 DD d A 4-20/HART	45 44 439
Dräger Polytron 8200 DD d A 4-20/HART Relay	45 44 440
Dräger Polytron 8200 DD d S 4-20/HART	45 44 448
Dräger Polytron 8200 DD d S 4-20/HART Relay	45 44 449
Dräger Polytron 8200 DD e A 4-20/HART	45 44 457
Dräger Polytron 8200 DD e A 4-20/HART Relay	45 44 458
Dräger Polytron 8200 DD e S 4-20/HART	45 44 466
Dräger Polytron 8200 DD e S 4-20/HART Relay	45 44 467
Dräger Polytron 8200 Remote DD e A 4-20/HART	45 44 511
Dräger Polytron 8200 Remote DD e A 4-20/ HART Relay	45 44 512
Dräger Polytron 8200 Remote DD e S 4-20/HART	45 44 520
Dräger Polytron 8200 Remote DD e S 4-20/ HART Relay	45 44 521
Dräger Polytron 8200 LC d A 4-20/HART	45 44 475
Dräger Polytron 8200 LC d A 4-20/HART Relay	45 44 476
Dräger Polytron 8200 LC d S 4-20/HART	45 44 484
Dräger Polytron 8200 LC d S 4-20/HART Relay	45 44 485
Dräger Polytron 8200 LC e A 4-20/HART	45 44 493
Dräger Polytron 8200 LC e A 4-20/HART Relay	45 44 494
Dräger Polytron 8200 LC e S 4-20/HART	45 44 502
Dräger Polytron 8200 LC e S 4-20/HART Relay	45 44 503
Dräger Polytron 8200 Remote e A 4-20/HART	45 44 529
Dräger Polytron 8200 Remote LC e A 4-20/ HART Relay	45 44 530
Dräger Polytron 8200 Remote LC e S 4-20/HART	45 44 538
Dräger Polytron 8200 Remote LC e S 4-20/ HART Relay	45 44 539
Dräger Polytron 8310 d A 4-20/HART	45 44 807
Dräger Polytron 8310 d A 4-20/HART Relay	45 44 808
Dräger Polytron 8310 d S 4-20/HART	45 44 816
Dräger Polytron 8310 d S 4-20/HART Relay	45 44 817
Dräger Polytron 8310 e A 4-20/HART	45 44 825
Dräger Polytron 8310 e A 4-20/HART Relay	45 44 826
Dräger Polytron 8310 e S 4-20/HART	45 44 834
Dräger Polytron 8310 e S 4-20/HART Relay	45 44 835
Dräger Polytron 8310 Remote e A 4-20/HART	45 44 843

Name and description	Order Number
Dräger Polytron 8310 Remote e A 4-20/ HART Relay	45 44 844
Dräger Polytron 8310 Remote e S 4-20/HART	45 44 852
Dräger Polytron 8310 Remote e S 4-20/ HART Relay	45 44 853
e-Box standard version (power only)	68 12 420
e-Box power / relay / remote version (with 2 cable glands)	68 12 275

13.2 Sensors for remote versions

NOTICE

The sensors are not included with the remote versions.

Name and description	Order Number
For Polytron 8200 DD remote e	
Sensing head, Polytron SE Ex PR M1 DD	68 12 711
Sensing head, Polytron SE Ex PR M2 DD	68 12 710
Sensing head, Polytron SE Ex PR M3 DD	68 12 718
Sensing head, Polytron SE Ex HT M DD	68 12 720
For Polytron 8200 LC remote e	
Sensing head, Polytron SE Ex LC M1 DD	68 12 722
Sensing head, Polytron SE Ex LC M2 DD	68 12 721
Sensing head, Polytron SE Ex LC M3 DD	68 12 719
For Polytron 8310 remote e	
Sensing head, DrägerSensor IR, complete set e	68 11 165
Sensing head, DrägerSensor IR, complete set e2	68 11 265

13.3 Replacement sensors (except for remote versions)

Name and description	Order Number
DrägerSensor Ex DD NPT	68 12 380
DrägerSensor Ex LC NPT	68 10 675
DrägerSensor IR NPT	68 11 901

13.4 Accessories

Name and description	Order Number
Accessories for Polytron 8200/83X0	
D-Junction Box, aluminum	45 44 099
D-Junction Box, stainless steel 316	45 44 098
Duct mounting kit, Polytron 5000 for DrägerSensor DD, LC, IR	68 12 725
Pipe mounting kit, Polytron 5000/8000	45 44 198
IR connection kit, 5000/8000	45 44 197
Magnetic wand with key chain	45 44 101
Accessories for DrägerSensor DD, LC	
Splash guard	68 12 510
Calibration adapter PE	45 09 314
Calibration adapter PE, Europe	68 06 978
Calibration adapter Viton	68 10 536
Process adapter (stainless steel, with M30 x 1.5 locking nut) for DrägerSensor DD	68 12 470
Process adapter (stainless steel, with M36 x 1.5 locking nut) for DrägerSensor LC	68 12 465
Calibration chamber	68 02 206
Accessories for DrägerSensor IR	
Splash guard	68 10 796
Calibration adapter	68 10 859
Process adapter	68 11 330
Labyrinth seal	68 11 135

13.5 Replacement parts

Description	Order Number
Bucket Polytron 8200/8310 4-20/HART,SPPT	45 44 788
Bucket Polytron 8200/8310 4-20/HART Relay, SPPT	45 44 789
Cable bushing, 3-pin	45 44 182
Cable bushing, 9-pin	45 44 169
Cable bushing, 14-pin	45 44 168
Hardware set, housing	45 44 167
Hardware set, e-Box	68 12 838
Cable gland, e-Box	68 12 868
e-Box PCB	60 12 839

14 Declaration of Conformity

EG-Konformitätserklärung
EC-Declaration of Conformity

Dokument Nr. / *Document No.* SE23109-00

Wir / *we* Dräger Safety AG & Co. KGaA, Revalstraße 1, 23560 Lübeck, Germany

erklären in alleiniger Verantwortung, dass das Produkt
declare under our sole responsibility that the product

Gasmess-Transmitter Typ I/XTR 04/5 (Polytron 8**0)**
*Gas Detection Instrument type I/XTR 04/5** (Polytron 8**0)*

mit der EG-Baumusterprüfbescheinigung
is in conformity with the EC-Type Examination Certificate **PTB 11 ATEX 1005X**

ausgestellt von der benannten Stelle
issued by the Notified Body **PTB, Bundesallee 100, D-38116 Braunschweig**

Kenn-Nr. der benannten Stelle
Identification Number of Notified Body **0102**

und mit den folgenden Richtlinien unter Anwendung der aufgeführten Normen übereinstimmt
and with the following directives by application of the listed standards

Bestimmungen der Richtlinie *provisions of directive*	**Nummer sowie Ausgabedatum der Norm** *Number and date of issue of standard*
94/9/EG: **ATEX-Richtlinie** *94/9/EC: ATEX Directive*	EN 60079-0:2009, EN 60079-1:2007, EN 60079-7:2007, EN 60079-31:2009
2004/108/EG: **EMV-Richtlinie** *2004/108/EC: EMC Directive*	EN 50270:2006 (type 2), EN 61000-6-3:2007
2006/95/EG: **Niederspannungs-Richtlinie** *2006/95/EC: Low Voltage Directive*	EN 61010-1:2010

Überwachung der Qualitätssicherung Produktion durch
Surveillance of Quality Assurance Production by **DEKRA EXAM GmbH, Dinnendahlstraße 9, D-44809 Bochum**

Kenn-Nr. der benannten Stelle
Identification Number of Notified Body **0158**

Lübeck, 2011.12.22

Ort und Datum (jjjj.mm.tt)
Place and date (yyyy.mm.dd)

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Maintenance Schedule

BESS

Maintenance schedule for battery energy storage systems

with LFP battery modules type LF280x

Imprint

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Name and Address of Manufacturer and Supplier

FREQCON GmbH
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Original document

This document is an original document of FREQCON GmbH.

Target Group

This document is intended for persons responsible for the maintenance of FREQCON Battery Energy Storage Systems.

Display Elements

Symbol	Significance
➜	Action with one or several steps for which the sequence is irrelevant.
Step 1 : **Step 2 :**	Action with several steps for which the sequence is relevant.
•	First level of list.
-	Second level of list.

1.1 Disclaimer of Liability

The contents of this publication have been reviewed to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, any necessary corrections are included in subsequent editions.

2 Maintenance

⚠ DANGER	
	**Hazard by electrolyte** Performing work on the battery storage unit and its components is only permitted for qualified personnel, trained and certified by FREQCON GmbH. It is not allowed to modify or manipulate the battery storage unit and its components. ➜ Do not open, disassemble or puncture the battery modules ➜ Do not short circuit the battery modules ➜ Do not drop the battery modules and avoid vibrations ➜ Do not a use defective or damaged battery modules ➜ Do not a use defective or damaged battery storage unit ➜ Do not touch defective or damaged batteries with bare hands. Defective or damaged batteries must only be handled by FREQCON personnel. **Avoid these dangerous situations, since it may lead to severe injuries or even death!**

⚠ DANGER	
	**Electric shock hazard!** **Always respect all the safety instructions and, in particular:** ➜ Always use protective devices suitable and approved for each type of activity. ➜ The instructions in this manual must be strictly followed. ➜ The electrical connection must be carried out in accordance with the local regulations of the utility company and /or VDE (in Germany). ➜ Use of the equipment must comply with all national and local regulations. ➜ Battery modules must only be accessed after disconnecting the electrical system from all electrical power sources.

The following describes the maintenance work that is necessary for trouble-free operation. Maintenance intervals must be taken into account*(see section 2.3 "Maintenance Schedule* BESS").

If increased wear of individual components or functional groups is determined during regular inspections, the operator has to reduce the required maintenance intervals on the basis of the actual signs of wear. Changes compared to the normal operation (increased power consumption, temperatures, vibrations, noises, etc. or respond of monitoring systems) might indicate the functionality of the device is impaired. These then have to be subjected to an inspection by qualified personnel.

2.1 Preparations Prior Maintenance

The following safety precautions must be carried out before commencing service and maintenance work.

Non-observation of these safety instructions can cause injury to persons, damage to objects or malfunction or damage to the device itself.

Do not operate!	**Lock and tag power switches and controller devices**
⚠ DANGER 	Disconnect power and block operation controller devices. Follow national laws regarding Occupational Safety and Health. 1. Identify the energy source(s). 2. Isolate the energy source(s). 3. Determine voltage-free status. 4. Ground device or equipment to protect from short circuiting and from shocks. 5. Lock and Tag the energy source(s). 6. Prove that the equipment isolation is effective. 7. When required, apply lock-out device or clamp and secure with padlock(s).

2.2 Maintenance Execution

The maintenance work described below may only be carried out by personnel authorized and trained by FREQCON GmbH. The individual maintenance tasks are performed and described during the training. In addition, participants will be given a detailed description of the maintenance work in the form of training documents.

2.3 Maintenance Schedule BESS

The maintenance intervals provided in the following must be adhered.

	Maintenance Instructions	Interval	Hours	Personnel
BESS container exterior	• Visual inspection for external damage, leakage and corrosion • If necessary, seal leaks, touch up corrosion protection • Visual inspection of ventilation, cleaning/replacement of filters and ventilation technology (fans) if necessary. • Checking the lock mechanism for function • Visual inspection of ground connections and measurement of ground resistance • Visual inspection for contamination and cleaning if necessary • Visual inspection of warning and safety instructions • Documentation of damage and activities performed	Annually	2	1
Battery modules and DC cabling	• Maintenance of the storage units according to manufacturer's specifications, visual inspection of ventilation, cleaning/replacement of filters and ventilation technology (fans) if necessary. • Visual inspection for external damage, leakage and corrosion • Testing of terminal points by means of thermography, function control of load-break switches and fuse switches • Visual inspection for contamination/dust and cleaning if necessary • Visual inspection of sensors for tight fit and damage • Documentation of damage and activities performed	Annually	2	1
	• If required or requested, replacement of the battery modules • Visual inspection of mechanical and electrical connections for tight fit, damage, corrosion - If necessary, repair before installing the new battery modules • Visual inspection of the slide rails, the holding frame and the rack system for damage, corrosion - If necessary, repair before installing the new battery modules • Include in overall system documentation	If needed	1 h per module + 1 h setup time	2

Electrical components and cabinet	• Check protective covers and insulation protection for completeness • Perform function test for on/off switch • Visual inspection of the cable fastening for electrical cables and communication cables • Random mechanical testing • Fastening of electrical cables and communication cables; retighten if necessary. • Functional test of fault-current circuit breaker • Check stability of cable ducts • Perform functional test of uninterruptible power supply (UPS), replace if necessary • Checking the server and network components, performing software and security updates, if necessary • Testing according to DGUV for stationary equipment	Annually	3	1
	• Inspect Stat-X aerosol generators for physical damage such as cracks, dents, deformation, or corrosion. Inspect Stat-X aerosol generators for physical damage, such as cracks, dents, distortion, or corrosion. If damage is found, replace generator as instructed in the installation section of this manual. • Inspect mounting brackets, clamps, and associated hardware for loose, damaged, or broken parts. Replace damaged parts and tighten all loose hardware. • Inspect all manual release stations for damage, dirt, or distortion. Inspect station for signs of physical damage, replace if necessary. • Inspect all electrical connections and run electrical continuity tests using an ohmmeter. Repair and replace as necessary.	Every 6 months	0.5/cartridge	1
	• Replacing Stat-X aerosol cartridges (see manufacturer documentation) The aerosol generators have an installed service life of fifteen (15) years. Generators are to be replaced fifteen years from the date code in the lower right corner of the product label.	Every 15 years	0.25/cartridge	1
Converter	• Converter maintenance according to manufacturer's specifications	Annually	3	1
Climate control	• Clean the device • Check for cleanliness and functional capability of the condensate drain • Check fans for overheating and unusual vibrations and whether they rotate freely • Check heat exchanger for contamination and effectiveness • Check refrigeration circuit for leakage, check pressure switch and refrigerant indicator • Check condition of filters - cleaning or replacement if necessary. • Check all electrical connections • Perform function tests for all switches and the control board, perform alarm signal test	Annually	1	1

Table 1: Maintenance schedule BESS

2.4 Visual Inspection

For functional and safety reasons, the customer is responsible that regular inspections of the BEES and its operating environment are carried out.

The following needs to be inspected/performed at least every six (6) months:

- ➜ Visually check for external signs of damage. Consult your authorized FREQCON representative if any damage is detected.
- ➜ Open the doors of the rack/front lid of the cabinet and visually check for signs of electrolyte leakage or any other deviation from normal conditions. Consult your authorized FREQCON representative if any leakage etc. is detected.
- ➜ Check that the cable connectors look undamaged and that the battery packs are properly positioned on the shelfs.
- ➜ Check for any deviation from normal conditions in the BMS (look, listen and smell). Consult your authorized FREQCON representative if any deviation is detected.
- ➜ Check general appearance and cleanliness. If necessary, clean by using a dry cloth.

Abnahmeprotokoll

Gaswarnanlagen

Dräger Safety AG & Co KGaA, Revalstraße 1, D-23560 Lübeck

Projektbezeichnung: Freqcon GmbH Rethem Kalibrierung Gaswarnanlage		**Referenz:** W07270432
Auftraggeber (AG): Freqcon GmbH Bürgerwiesenweg 5 27336 Rethem	**Kundennummer.:** 0091348163	**Auftragsnummer AG / Auftragsnummer AN** 24BE1283 **CO-Nr:** 000023148723
	Neuanlage: ☒	**Vorhandene Anlage erweitern:** ☐

Anlagenstandortadresse: Freqcon GmbH Bürgerwiesenweg 5 27336 Rethem	**Arbeiten ausgeführt durch**:	AG	AN
Ortsbeschreibung: Bess 1 Batterie Container	Kabelverlegung:	☒	☐
	Montage Geräte:	☒	☐
	Anschlussarbeiten:	☒	☐
	Inbetriebnahme:	☐	☒

Prüfgegenstand:	Stationäre Gaswarneinrichtung gemäß Abschnitt 2.1 T 021 / T 023
Prüfumfang:	Prüfung vor Inbetriebnahme gemäß § 15 BetrSichV und bei Gerät mit Explosionsschutz nach Maßgaben gemäß Anhang 2 Abschnitt 3 Nr. 4 BetrSichV
Prüfgrundlagen:	• BG RCI Merkblatt T 021 / T 0 23, Fassung 02/2016 • Betriebssicherheitsverordnung (BetrSichV), Fassung 07/2021 • TRBS 1201 Teil 1, Fassung 07/2022 • TRGS 722, Fassung 03/2022 (bei Gerät mit Explosionsschutz)

Anlagenübersicht:

Material	Typ	Anzahl
8344800	Polytron 8200 Series Customized	3

Bemerkung: -Wartezeit durch nicht fertig verdrahtete Transmitter.
Inbetriebnahme konnte nicht durchgeführt werden.
-Inbetriebnahme wurde daher abgebrochen.

Inbetriebnahme durchgeführt.

Die betriebsbereite Dräger- Anlage wurde heute nach Vorführung der Funktion gemäß Auftrag abgenommen. Eine eventuell notwendige Abnahme der Anlage durch einen Sachverständigen erfolgt durch den Auftraggeber. Der Auftraggeber bzw. dessen Beauftragter sowie der Betreiber wurden in den Betrieb der Anlage eingewiesen und die zugehörige Dokumentation wurde übergeben. Mit dem Tag der Abnahme beginnt die Gewährleistungsfrist gemäß Betriebsanleitung und den allgemeinen Geschäftsbedingungen der Dräger Safety AG & Co KGaA. Die Gewährleistung erstreckt sich nicht auf natürlichen Verschleiß entsprechend dem allgemeinen Stand der Technik oder wie im Auftrag vereinbart.

Teilnehmer der Abnahmebegehung:

Für den AG:	Für den AN: Lakic, Muharem

Heute, den 15.07.2024, ist für o.g. Gaswarnanlage eine Abnahmebegehung durchgeführt worden. Die Abnahme wurde erteilt.

An der Leistung wurden folgende Mängel festgestellt: (Mängel ggf. auf Anlage zum Protokoll auflisten)

Die übergebene Dräger-Anlage ist vorschriftsmäßig zu warten. Die Justage- und Wartungsintervalle sind den hierfür bekannten Vorschriften T 021, T 023 und der gültigen Gebrauchsanleitung zu entnehmen. Für Serviceleistungen empfehlen wir Ihnen, Kontakt zum Dräger Service in der für Sie zuständigen Niederlassung aufzunehmen.

Auftraggeber: Freqcon GmbH	Dräger Safety AG & Co KGaA
Rethem, den 15.07.2024	Rethem, den 15.07.2024
Ort, Datum, Unterschrift (Müller, Jan- Henrik)	Ort, Datum, Unterschrift (Lakic, Muharem)

Anlagen: Messstellenprotokoll, Protokolle der Sicht-, Funktions- und Systemkontrolle

Anlage zum Abnahmeprotokoll - Messstellenprotokoll -

Referenz:	W07270432	Name:	Lakic, Muharem	Datum:	15.07.2024
Kundenauftragsnummer	24BE1283	CO-Nr:	000023148723		

Prüfmittel / Prüfgase

Bezeichnung	Seriennummer / Lotnummer	Prüfmittel Nr.	Konzentration (Gas)	Nächste Kalibrierung / Gültig bis
O2 20,9 V% Sauerstoff	WO444748	21		2029-04-02T00:00:00
H2 1000ppm	WO430840	30		2028-12-28T00:00:00
RV Basic Druckminderer 0,5 l/min	BC Nr. 04976629	1		2024-09-04T00:00:00
RV Basic Druckminderer 0,5l/min	BC Nr. 04976630	2		2024-09-04T00:00:00

Material	Bezeichnung	Serien-Nr.	Standort	Kunden-inventar-Nummer	Sensor Sach-Nr.	Sensor Serien-Nr.	Einbaudatum	Zielgas	Prüfgas	Messwerteinheit	Wert Nullpunkt nach Justage	Wert Empfindlichkeit nach Justage	Alarmschwelle 1	Alarmschwelle 2	Fehlerschwelle (mA)	Messbereich	Kontrolle Sicherheits- und Schaltfunktionen				
8344800	**Polytron 8200 Series Customized**	**ARTF-0364**		**MK1**	6810675	ARTC-0035	16.07.2024	H2	H2	%UEG	0	2,5	2	4	1,2	0-10	ok				
8344800	**Polytron 8200 Series Customized**	**ARTF-0365**		**MK2**	6810675	ARTC-0025	16.07.2024	H2	H2	%UEG	0	2,5	2	4	1,2	0-10	ok				
8344800	**Polytron 8200 Series Customized**	**ARTF-0367**		**MK3**	6810675	ARTC-0037	16.07.2024	H2	H2	%UEG	0	2,5	2	4	1,2	0-10	ok				

Anlage zum Abnahmeprotokoll - Sichtkontrolle -

Referenz:	W07270432	Name:	Lakic, Muharem	Datum:	15.07.2024
Kundenauftragsnummer	24BE1283	CO-Nr:	000023148723		

Material	Serien-Nr.	Standort 2	Kundeninventar-Nummer	Sensor Sach-Nr.	Sensor Serien-Nr.	Einbaudatum	Kontrolle mechanische Beschädigung
8344800	**ARTF-0364**		**MK1**	6810675	ARTC-0035	16.07.2024	ok
8344800	**ARTF-0365**		**MK2**	6810675	ARTC-0025	16.07.2024	ok
8344800	**ARTF-0367**		**MK3**	6810675	ARTC-0037	16.07.2024	ok

Material	Serien-Nr.	Standort 2	Kundeninventar-Nummer	Kontrolle Gaseintrittsöffnung	Kontrolle Betriebs- und Statusanzeige		
8344800	**ARTF-0364**		**MK1**	ok	ok		
8344800	**ARTF-0365**		**MK2**	ok	ok		
8344800	**ARTF-0367**		**MK3**	ok	ok		

Anlage zum Abnahmeprotokoll - Funktionskontrolle -

Referenz:	W07270432	Name:	Lakic, Muharem	Datum:	15.07.2024
Kundenauftragsnummer	24BE1283	CO-Nr:	000023148723		

Material	Serien-Nr.	Standort 2	Kundeninventar-Nummer	Zielgas	Prüfgas	Prüfgaskonzentration	Messwerteinheit	Nullgas	Wert Nullpunkt bei Eingangskalibrierung	Nullpunkt bei Eingangskalibrierung	Wert Nullpunkt nach Justage	Nullpunkt nach Justage	Wert Empfindlichkeit bei Eingangskalibrierung	Empfindlichkeit bei Eingangskalibrierung	Wert Empfindlichkeit nach Justage	Empfindlichkeit nach Justage	Ansprechzeit	Gerätespezifische Testfunktionen überprüft					
8344800	**ARTF-0364**		**MK1**	H2	H2	2,5	%UEG	Syn. Luft	-3,44	ok	0	ok	3,03	ok	2,5	ok	ok	ok					
8344800	**ARTF-0365**		**MK2**	H2	H2	2,5	%UEG	Syn. Luft	-6,36	ok	0	ok	2,87	ok	2,5	ok	ok	ok					
8344800	**ARTF-0367**		**MK3**	H2	H2	2,5	%UEG	Syn. Luft	-6,86	ok	0	ok	2,74	ok	2,5	ok	ok	ok					

Anlage zum Abnahmeprotokoll - Systemkontrolle -

Referenz:	W07270432	Name:	Lakic, Muharem	Datum:	15.07.2024
Kundenauftragsnummer	24BE1283	CO-Nr:	000023148723		

Material	Serien-Nr.	Standort 2	Kundeninventar-Nummer	Zielgas	Prüfgas	Prüfgaskonzentration	Messwerteinheit	Alarmschwelle 1	Alarmschwelle 2	Fehlerschwelle (mA)	Kontrolle Parametrierung Soll/Ist	Messbereich	Kontrolle Sicherheits- und Schaltfunktionen	Alarmmittel	Melde- / Registriereinrichtungen	Relais Störung								
8344800	**ARTF-0364**		**MK1**	H2	H2	2,5	%UEG	2	4	1,2	ok	0-10	ok	ok	ok	ok								
8344800	**ARTF-0365**		**MK2**	H2	H2	2,5	%UEG	2	4	1,2	ok	0-10	ok	ok	ok	ok								
8344800	**ARTF-0367**		**MK3**	H2	H2	2,5	%UEG	2	4	1,2	ok	0-10	ok	ok	ok	ok								

Anlage zum Abnahmeprotokoll - Systemkontrolle -

Referenz:	W07270432	Name:	Lakic, Muharem	Datum:	15.07.2024
Kundenauftragsnummer	24BE1283	CO-Nr:	000023148723		

Material	Serien-Nr.	Standort 2	Kundeninventar-Nummer	Relais 1	Relais 2														
8344800	**ARTF-0364**		**MK1**	ok	ok														
8344800	**ARTF-0365**		**MK2**	ok	ok														
8344800	**ARTF-0367**		**MK3**	ok	ok														

Die Geräte wurden überprüft und ermittelte Messwerte entsprechen den Spezifikationen. Die für die Kalibrierung und Justierung verwendeten Messeinrichtungen werden regelmäßig kalibriert und sind rückführbar auf nationale Standards. Wenn keine nationalen Standards existieren, entspricht das Messverfahren den derzeitigen technischen Regeln und Normen.

Bemerkungen:

8344800 ARTF-0365 MK2:

- **Alarmmittel:**- keine akkustischen und visuellen Alarmmittel vorhanden.
- **Melde- / Registriereinrichtungen:**- Aufschaltung auf Fremdauswerteinheit nicht angeschlossen. Progammierarbeiten nicht abgeschlossen.
  -Testung der Alarme A1 , A2 sowie Fehlerstrom wurde getestet über die Analoge Schnittstelle des Polytron 8200 mit dem Programmierer von Firma Freqcon.
  Funktion war gegeben. Desweiteren wurden die Relais getest ob sie schalten.

  - Nur A2 Alarm wird ausgewertet.
  -Fehlerschwelle wird als Kabelbruch benannt , wenn Fehler ansteht.

  -Fehlerschwelle des Polytron 8200 ist bei 1,2mA. Der Kunde wurde davon in Kenntnis gesetzt.
  -Auswertung und quittierung der Alarme soll nach abgeschlossender Programmierung über eine GLT stattfinden.

  -Für die Verdrahtung der Transmitter wurde kein geschirmtes Kabel verwendet.
  -Der verwendete Kabeltyp F-CY-OZ (LIY-CY) 10x0,5 verwendet worden.

Anlage zum Abnahmeprotokoll - Systemkontrolle -

Referenz:	W07270432	Name:	Lakic, Muharem	Datum:	15.07.2024
Kundenauftragsnummer	24BE1283	CO-Nr:	000023148723		

Bemerkungen:

Mangel:
- In der Fremdauswerteinheit ist keine sicherheitsgerichtete SPS verbaut.

8344800 ARTF-0364 MK1:

- **Alarmmittel:**- keine akkustischen und visuellen Alarmmittel vorhanden.
- **Melde- / Registriereinrichtungen:**- Aufschaltung auf Fremdauswerteinheit nicht angeschlossen. Progammierarbeiten nicht abgeschlossen.
  -Testung der Alarme A1 , A2 sowie Fehlerstrom wurde getestet über die Analoge Schnittstelle des Polytron 8200 mit dem Programmierer von Firma Freqcon.
  Funktion war gegeben. Desweiteren wurden die Relais getest ob sie schalten.

  - Nur A2 Alarm wird ausgewertet.
  -Fehlerschwelle wird als Kabelbruch benannt , wenn Fehler ansteht.

  -Fehlerschwelle des Polytron 8200 ist bei 1,2mA. Der Kunde wurde davon in Kenntnis gesetzt.
  -Auswertung und quittierung der Alarme soll nach abgeschlossender Programmierung über eine GLT stattfinden.

  -Für die Verdrahtung der Transmitter wurde kein geschirmtes Kabel verwendet.
  -Der verwendete Kabeltyp F-CY-OZ (LIY-CY) 10x0,5 verwendet worden.

  Mangel:
  - In der Fremdauswerteinheit ist keine sicherheitsgerichtete SPS verbaut.

8344800 ARTF-0367 MK3:

- **Alarmmittel:**- keine akkustischen und visuellen Alarmmittel vorhanden.
- **Melde- / Registriereinrichtungen:**- Aufschaltung auf Fremdauswerteinheit nicht angeschlossen. Progammierarbeiten nicht abgeschlossen.
  -Testung der Alarme A1 , A2 sowie Fehlerstrom wurde getestet über die Analoge Schnittstelle des Polytron 8200 mit dem Programmierer von Firma Freqcon.
  Funktion war gegeben. Desweiteren wurden die Relais getest ob sie schalten.

  - Nur A2 Alarm wird ausgewertet.
  -Fehlerschwelle wird als Kabelbruch benannt , wenn Fehler ansteht.

  -Fehlerschwelle des Polytron 8200 ist bei 1,2mA. Der Kunde wurde davon in Kenntnis gesetzt.
  -Auswertung und quittierung der Alarme soll nach abgeschlossender Programmierung über eine GLT stattfinden.

  -Für die Verdrahtung der Transmitter wurde kein geschirmtes Kabel verwendet.
  -Der verwendete Kabeltyp F-CY-OZ (LIY-CY) 10x0,5 verwendet worden.

  Mangel:
  - In der Fremdauswerteinheit ist keine sicherheitsgerichtete SPS verbaut.

Anlage zum Abnahmeprotokoll - Systemkontrolle -

Referenz:	W07270432	Name:	Lakic, Muharem	Datum:	15.07.2024
Kundenauftragsnummer	24BE1283	CO-Nr:	000023148723		

15.07.2024	Lakic, Muharem	
Datum	Name Techniker	Unterschrift

- Einweisungsprotokoll -

Projektbezeichnung: Freqcon GmbH RethemKalibrierung Gaswarnanlage		**Referenz:** W07270432
Auftraggeber (AG): Freqcon GmbH 27336 Rethem	**Kundennummer.:** 0091348163	**Kundenauftragsnummer.:** 24BE1283
		CO-Nr: 000023148723
Anlagenstandortadresse: Freqcon GmbH 27336 Rethem		
Ortsbeschreibung:		

Anlagenübersicht

Material	Typ	Anzahl
8344800	Polytron 8200 Series Customized	3

Nachfolgende Mitarbeiter des Betreibers oder Auftraggebers bestätigen, dass sie heute am 16.07.2024, über den Aufbau und die Bedienung der Gaswarnanlage eingewiesen wurden.

Name	Unterschrift
Keine unterwiese Person vorhanden	

Sie wurden in die Anlagen von Muharem Lakic, Firma Dräger, eingewiesen

Abnahmeprotokoll

Gaswarnanlagen

Dräger Safety AG & Co KGaA, Revalstraße 1, D-23560 Lübeck

Projektbezeichnung: Freqcon GmbH Rethem Kalibrierung Gaswarnanlage		**Referenz:** W07270432
Auftraggeber (AG): Freqcon GmbH Bürgerwiesenweg 5 27336 Rethem	**Kundennummer.:** 0091348163	**Auftragsnummer AG / Auftragsnummer AN** 24BE1283 **CO-Nr:** 000023148723
	Neuanlage: ☒	**Vorhandene Anlage erweitern:** ☐

Anlagenstandortadresse: Freqcon GmbH Bürgerwiesenweg 5 27336 Rethem	**Arbeiten ausgeführt durch**:	AG	AN
Ortsbeschreibung: **Bess 2 Batterie Container**	Kabelverlegung:	☒	☐
	Montage Geräte:	☒	☐
	Anschlussarbeiten:	☒	☐
	Inbetriebnahme:	☐	☒

Prüfgegenstand:	Stationäre Gaswarneinrichtung gemäß Abschnitt 2.1 T 021 / T 023
Prüfumfang:	Prüfung vor Inbetriebnahme gemäß § 15 BetrSichV und bei Gerät mit Explosionsschutz nach Maßgaben gemäß Anhang 2 Abschnitt 3 Nr. 4 BetrSichV
Prüfgrundlagen:	• BG RCI Merkblatt T 021 / T 0 23, Fassung 02/2016 • Betriebssicherheitsverordnung (BetrSichV), Fassung 07/2021 • TRBS 1201 Teil 1, Fassung 07/2022 • TRGS 722, Fassung 03/2022 (bei Gerät mit Explosionsschutz)

Anlagenübersicht:

Material	Typ	Anzahl
8344800	Polytron 8200 Series Customized	3

Bemerkung: -Wartezeit durch nicht fertig verdrahtete Transmitter.
Inbetriebnahme konnte nicht durchgeführt werden.
-Inbetriebnahme wurde daher abgebrochen.

Inbetriebnahme durchgeführt.

Die betriebsbereite Dräger- Anlage wurde heute nach Vorführung der Funktion gemäß Auftrag abgenommen. Eine eventuell notwendige Abnahme der Anlage durch einen Sachverständigen erfolgt durch den Auftraggeber. Der Auftraggeber bzw. dessen Beauftragter sowie der Betreiber wurden in den Betrieb der Anlage eingewiesen und die zugehörige Dokumentation wurde übergeben. Mit dem Tag der Abnahme beginnt die Gewährleistungsfrist gemäß Betriebsanleitung und den allgemeinen Geschäftsbedingungen der Dräger Safety AG & Co KGaA. Die Gewährleistung erstreckt sich nicht auf natürlichen Verschleiß entsprechend dem allgemeinen Stand der Technik oder wie im Auftrag vereinbart.

Teilnehmer der Abnahmebegehung:

Für den AG:	Für den AN: Lakic, Muharem

Heute, den 15.07.2024, ist für o.g. Gaswarnanlage eine Abnahmebegehung durchgeführt worden. Die Abnahme wurde erteilt.

An der Leistung wurden folgende Mängel festgestellt: (Mängel ggf. auf Anlage zum Protokoll auflisten)

Die übergebene Dräger-Anlage ist vorschriftsmäßig zu warten. Die Justage- und Wartungsintervalle sind den hierfür bekannten Vorschriften T 021, T 023 und der gültigen Gebrauchsanleitung zu entnehmen. Für Serviceleistungen empfehlen wir Ihnen, Kontakt zum Dräger Service in der für Sie zuständigen Niederlassung aufzunehmen.

Auftraggeber: Freqcon GmbH	Dräger Safety AG & Co KGaA
Rethem, den 15.07.2024	Rethem, den 15.07.2024
Ort, Datum, Unterschrift (Müller Jan- Henrik)	Ort, Datum, Unterschrift (Lakic, Muharem)

Anlagen: Messstellenprotokoll, Protokolle der Sicht-, Funktions- und Systemkontrolle

Anlage zum Abnahmeprotokoll - Messstellenprotokoll -

Referenz:	W07270432	Name:	Lakic, Muharem	Datum:	15.07.2024
Kundenauftragsnummer	24BE1283	CO-Nr:	000023148723		

Prüfmittel / Prüfgase

Bezeichnung	Seriennummer / Lotnummer	Prüfmittel Nr.	Konzentration (Gas)	Nächste Kalibrierung / Gültig bis
O2 20,9 V% Sauerstoff	WO444748	21		2029-04-02T00:00:00
H2 1000ppm	WO430840	30		2028-12-28T00:00:00
RV Basic Druckminderer 0,5 l/min	BC Nr. 04976629	1		2024-09-04T00:00:00
RV Basic Druckminderer 0,5l/min	BC Nr. 04976630	2		2024-09-04T00:00:00

Material	Bezeichnung	Serien-Nr.	Standort	Kunden-inventar-Nummer	Sensor Sach-Nr.	Sensor Serien-Nr.	Einbaudatum	Zielgas	Prüfgas	Messwerteinheit	Wert Nullpunkt nach Justage	Wert Empfindlichkeit nach Justage	Alarmschwelle 1	Alarmschwelle 2	Fehlerschwelle (mA)	Messbereich	Kontrolle Sicherheits- und Schaltfunktionen				
8344800	**Polytron 8200 Series Customized**	**ARTF-0368**		**MK1**	6810675	ARTC-0005	16.07.2024	H2	H2	%UEG	0	2,5	2	4	1,2	0-10	ok				
8344800	**Polytron 8200 Series Customized**	**ARTF-0366**		**MK2**	6810675	ARTC-0006	16.07.2024	H2	H2	%UEG	0	2,5	2	4	1,2	0-10	ok				
8344800	**Polytron 8200 Series Customized**	**ARTF-0363**		**MK3**	6810675	ARTC-0007	16.07.2024	H2	H2	%UEG	0	2,5	2	4	1,2	0-10	ok				

Anlage zum Abnahmeprotokoll - Sichtkontrolle -

Referenz:	W07270432	Name:	Lakic, Muharem	Datum:	15.07.2024
Kundenauftragsnummer	24BE1283	CO-Nr:	000023148723		

Material	Serien-Nr.	Standort 2	Kundeninventar-Nummer	Sensor Sach-Nr.	Sensor Serien-Nr.	Einbaudatum	Kontrolle mechanische Beschädigung
8344800	**ARTF-0368**		**MK1**	6810675	ARTC-0005	16.07.2024	ok
8344800	**ARTF-0366**		**MK2**	6810675	ARTC-0006	16.07.2024	ok
8344800	**ARTF-0363**		**MK3**	6810675	ARTC-0007	16.07.2024	ok

Material	Serien-Nr.	Standort 2	Kundeninventar-Nummer	Kontrolle Gaseintrittsöffnung	Kontrolle Betriebs- und Statusanzeige		
8344800	**ARTF-0368**		**MK1**	ok	ok		
8344800	**ARTF-0366**		**MK2**	ok	ok		
8344800	**ARTF-0363**		**MK3**	ok	ok		

Anlage zum Abnahmeprotokoll - Funktionskontrolle -

Referenz:	W07270432	Name:	Lakic, Muharem	Datum:	15.07.2024
Kundenauftragsnummer	24BE1283	CO-Nr:	000023148723		

Material	Serien-Nr.	Standort 2	Kundeninventar-Nummer	Zielgas	Prüfgas	Prüfgaskonzentration	Messwerteinheit	Nullgas	Wert Nullpunkt bei Eingangskalibrierung	Nullpunkt bei Eingangskalibrierung	Wert Nullpunkt nach Justage	Nullpunkt nach Justage	Wert Empfindlichkeit bei Eingangskalibrierung	Empfindlichkeit bei Eingangskalibrierung	Wert Empfindlichkeit nach Justage	Empfindlichkeit nach Justage	Ansprechzeit	Gerätespezifische Testfunktionen überprüft					
8344800	**ARTF-0368**		**MK1**	H2	H2	2,5	%UEG	Syn. Luft	-5,81	ok	0	ok	2,79	ok	2,5	ok	ok	ok					
8344800	**ARTF-0366**		**MK2**	H2	H2	2,5	%UEG	Syn. Luft	-5,86	ok	0	ok	3,01	ok	2,5	ok	ok	ok					
8344800	**ARTF-0363**		**MK3**	H2	H2	2,5	%UEG	Syn. Luft	-7,21	ok	0	ok	3,05	ok	2,5	ok	ok	ok					

Anlage zum Abnahmeprotokoll - Systemkontrolle -

Referenz:	W07270432	Name:	Lakic, Muharem	Datum:	15.07.2024
Kundenauftragsnummer	24BE1283	CO-Nr:	000023148723		

Material	Serien-Nr.	Standort 2	Kundeninventar-Nummer	Zielgas	Prüfgas	Prüfgaskonzentration	Messwerteinheit	Alarmschwelle 1	Alarmschwelle 2	Fehlerschwelle (mA)	Kontrolle Parametrierung Soll/Ist	Messbereich	Kontrolle Sicherheits- und Schaltfunktionen	Alarmmittel	Melde- / Registriereinrichtungen	Relais Störung								
8344800	**ARTF-0368**		**MK1**	H2	H2	2,5	%UEG	2	4	1,2	ok	0-10	ok	ok	ok	ok								
8344800	**ARTF-0366**		**MK2**	H2	H2	2,5	%UEG	2	4	1,2	ok	0-10	ok	ok	ok	ok								
8344800	**ARTF-0363**		**MK3**	H2	H2	2,5	%UEG	2	4	1,2	ok	0-10	ok	ok	ok	ok								

Anlage zum Abnahmeprotokoll - Systemkontrolle -

Referenz:	W07270432	Name:	Lakic, Muharem	Datum:	15.07.2024
Kundenauftragsnummer	24BE1283	CO-Nr:	000023148723		

Material	Serien-Nr.	Standort 2	Kundeninventar-Nummer	Relais 1	Relais 2														
8344800	**ARTF-0368**		**MK1**	ok	ok														
8344800	**ARTF-0366**		**MK2**	ok	ok														
8344800	**ARTF-0363**		**MK3**	ok	ok														

Die Geräte wurden überprüft und ermittelte Messwerte entsprechen den Spezifikationen. Die für die Kalibrierung und Justierung verwendeten Messeinrichtungen werden regelmäßig kalibriert und sind rückführbar auf nationale Standards. Wenn keine nationalen Standards existieren, entspricht das Messverfahren den derzeitigen technischen Regeln und Normen.

Bemerkungen:

8344800 ARTF-0368 MK1:

- **Alarmmittel:**-keine akkustische und visuelle Alarmierung vorhanden.
- **Melde- / Registriereinrichtungen:**-Aufschaltung auf Fremdauswerteinheit nicht abgeschlossen. Programmiererarbeiten nicht abgeschlossen.
  - Testung der Alarme A1 , A2 sowie Fehlerstrom wurde getestet über die Analoge Schnittstelle des Polytron 8200 mit dem progammierer von Firma Freqcon, Funktion war gegeben. Desweiteren wurde die Relais getestet ob sie schalten.

  -Nur A2 Alarm wird ausgewertet.
  -Fehlerschwelle wird als Drahtbruch benannt, wenn Fehler ansteht.

  - Fehlerschwelle des Polytron 8200 ist bei 1,2mA . Kunde wurde in Kenntnis gesetzt.
  - Auswertung und quittierung der Alarme soll nach abgeschlossen Programmierung über eine GLT statt finden.

  -Für die Verdrahtung der Transmitter wurde kein geschirmtes Kabel verwendet.
  -Der verwendete Kabeltyp F-CY-OZ (LIY-CY) 10x0,5 verwendet worden.

Anlage zum Abnahmeprotokoll - Systemkontrolle -

Referenz:	W07270432	Name:	Lakic, Muharem	Datum:	15.07.2024
Kundenauftragsnummer	24BE1283	CO-Nr:	000023148723		

Bemerkungen:

Mangel:
- In der Fremdauswerteinheit ist keine sicherheitsgerichtete SPS verbaut.

8344800 ARTF-0363 MK3:

- **Alarmmittel:**-keine akkustische und visuelle Alarmierung vorhanden.

- **Melde- / Registriereinrichtungen:**-Aufschaltung auf Fremdauswerteinheit nicht abgeschlossen. Programmiererarbeiten nicht abgeschlossen.
  - Testung der Alarme A1 , A2 sowie Fehlerstrom wurde getestet über die Analoge Schnittstelle des Polytron 8200 mit dem progammierer von Firma Freqcon, Funktion war gegeben. Desweiteren wurde die Relais getestet ob sie schalten.

  -Nur A2 Alarm wird ausgewertet.
  -Fehlerschwelle wird als Drahtbruch benannt, wenn Fehler ansteht.

  - Fehlerschwelle des Polytron 8200 ist bei 1,2mA . Kunde wurde in Kenntnis gesetzt.
  - Auswertung und quittierung der Alarme soll nach abgeschlossen Programmierung über eine GLT statt finden.

  -Für die Verdrahtung der Transmitter wurde kein geschirmtes Kabel verwendet.
  -Der verwendete Kabeltyp F-CY-OZ (LIY-CY) 10x0,5 verwendet worden.

  Mangel:
  - In der Fremdauswerteinheit ist keine sicherheitsgerichtete SPS verbaut.

8344800 ARTF-0366 MK2:

- **Alarmmittel:**-keine akkustische und visuelle Alarmierung vorhanden.
- **Melde- / Registriereinrichtungen:**-Aufschaltung auf Fremdauswerteinheit nicht abgeschlossen. Programmiererarbeiten nicht abgeschlossen.
  - Testung der Alarme A1 , A2 sowie Fehlerstrom wurde getestet über die Analoge Schnittstelle des Polytron 8200 mit dem progammierer von Firma Freqcon, Funktion war gegeben. Desweiteren wurde die Relais getestet ob sie schalten.

  -Nur A2 Alarm wird ausgewertet.
  -Fehlerschwelle wird als Drahtbruch benannt, wenn Fehler ansteht.

Anlage zum Abnahmeprotokoll - Systemkontrolle -

Referenz:	W07270432	Name:	Lakic, Muharem	Datum:	15.07.2024
Kundenauftragsnummer	24BE1283	CO-Nr:	000023148723		

Bemerkungen:

- Fehlerschwelle des Polytron 8200 ist bei 1,2mA . Kunde wurde in Kenntnis gesetzt das die Alarmschwelle bei 1,2mA liegt.
- Auswertung und quittierung der Alarme soll nach abgeschlossen Programmierung über eine GLT statt finden.

-Für die Verdrahtung der Transmitter wurde kein geschirmtes Kabel verwendet.
-Der verwendete Kabeltyp F-CY-OZ (LIY-CY) 10x0,5 verwendet worden.

Mangel:
- In der Fremdauswerteinheit ist keine sicherheitsgerichtete SPS verbaut.

15.07.2024	Lakic, Muharem	
Datum	Name Techniker	Unterschrift

- Einweisungsprotokoll -

Projektbezeichnung: Freqcon GmbH RethemKalibrierung Gaswarnanlage		**Referenz:** W07270432
Auftraggeber (AG): Freqcon GmbH 27336 Rethem	**Kundennummer.:** 0091348163	**Kundenauftragsnummer.:** 24BE1283
		CO-Nr: 000023148723
Anlagenstandortadresse: Freqcon GmbH 27336 Rethem		
Ortsbeschreibung:		

Anlagenübersicht

Material	Typ	Anzahl
8344800	Polytron 8200 Series Customized	3

Nachfolgende Mitarbeiter des Betreibers oder Auftraggebers bestätigen, dass sie heute am 16.07.2024, über den Aufbau und die Bedienung der Gaswarnanlage eingewiesen wurden.

Name	Unterschrift
Keine unterwiesene Person	

Sie wurden in die Anlagen von Muharem Lakic, Firma Dräger, eingewiesen

Battery Energy Storage System (BESS)
BASE LOAD POWER HUB

Statron ref. 331497

Project Code: K559-2254
Purchase Order Number: CW-I-WP4-2022-01

SDRL Code: B04
Sequence Number: 001
Rev: 003
Document number: K559-2254-CWIWP4202201-B04-001
Document description: Foundation Loading Diagram & Support Detail

Revision	Date	Name	Description
001	01.03.2023	CPA / ADI	First Version
002	12.04.2023	CPA / ADI	Updated according to KBR comments
003	22.01.2025	MMÜ	Second revision

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Foundation Loading Diagram & Support Detail
B04

for Base Load Power Hub (BLPH) Project

Classification: confidential

Document no.	B04
Document name	Foundation Loading Diagram & Support Detail
Component / System	BESS
Project code	K559-2254

Version	Date	Name	Description
1.0	2023-03-01	C. Palenzuela	First version
2.0	2023-04-14	C. Palenzuela	Updated according to KBR comments
3.0	2025-01-22	C. Palenzuela	Second revision

Table 1: Version overview

	Date	Name
Editor	2023-04-14	C. Palenzuela
Checked by	2023-04-15	A. Fritz
Approved by	2023-04-15	C. Palenzuela

Table 2: Approval overview

Imprint

Hardware Development and Production Centre
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Bürgerwiesenweg 5
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You can also visit us on our website **http://www.freqcon.com** to find more information about our products and solutions.

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Identification

Product Version / Document Version

Product version
Prototype

Document release date
January 2025

Doc Code
K559-2254-CWIWP4202201-B04-001

Name and Address of Manufacturer

Manufacturer of the product
FREQCON GmbH
Bürgerwiesenweg 5
D-27336 Rethem, Germany

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Original document

This document is an original document of FREQCON GmbH.

1 Introduction

1.1 About this Document

This document is part of the documentation for the Base Load Power Hub (BLPH) Project (K559-2254). In case of any contradiction resulting by the information or specification given in this document, later documents supersede the information provided in this document.

1.2 Display Elements

Symbol	Meaning
➜	Action with one or several steps for which the sequence is irrelevant.
Step 1 : **Step 2 :**	Action with several steps for which the sequence is relevant.
•	First level of list.
-	Second level of list.

Table 1: Display Elements

1.3 Other Applicable Documents

The following documents are applicable:

Document type	Document Name
Foundation loading diagram and support detail	53396 PCS Container Foundation Load.pdf
Foundation loading diagram and support detail	53406 BESS Container 1 Foundation Load.pdf
Foundation loading diagram and support detail	53412 BESS Container 2 Foundation Load.pdf

Table 2: Other applicable documents

1.4 Generic Terms and Abbreviations Used

This following list should help you understand some of the abbreviations used in this document.

Generic Term and Abbreviation	Description
BESS	Battery Energy Storage System
BLPH	Base Load Power Hub
PCS	Power Conversion System

Table 3: Generic terms and abbreviations used

2 General

The foundation loading diagrams, and support details are attached to this document (*see section 1.3 "Other Applicable Documents"*).

Container	Manufacturer	FRQ part no.	File Name
PCS	FREQCON	53396	53396 PCS Container Foundation Load.pdf
BESS 1	FREQCON	53406	53406 BESS Container 1 Foundation Load.pdf
BESS 2	FREQCON	53412	53412 BESS Container 2 Foundation Load.pdf

Table 4: Other applicable documents

Battery Energy Storage System (BESS)
BASE LOAD POWER HUB

Statron ref. 331497

Project Code: K559-2254
Purchase Order Number: CW-I-WP4-2022-01

SDRL Code: C11
Sequence Number: 001
Rev: 003
Document number: K559-2254-CWIWP4202201-C11-001
Document description: Operation Manual

Operation Manual
C11

for Base Load Power Hub (BLPH) Project

Classification: confidential

Document no.	C11
Document name	Operation Manual
Component / System	BESS
Project code	K559-2254

Version	Date	Name	Description
1.0	2025-01-21	M. Müller	First version
2.0	2025-01-30	M. Müller	Updated version
3,0	2025-02-04	M. Müller	Updated version

Table 1: Version overview

	Date	Name
Editor	2025-01-20	M. Müller
Checked by	2025-01-21	C. Palenzuela
Approved by	2025-01-21	C. Palenzuela

Table 2: Approval overview

Imprint

Hardware Development and Production Centre
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Bürgerwiesenweg 5
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Identification

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K559-2254-CWIWP4202201-C11-001

Name and Address of Manufacturer

Manufacturer of the product
FREQCON GmbH
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Original document

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1 Introduction

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-	Second level of list.

Table 1: Display Elements

1.3 Other Applicable Documents

The following documents are applicable:

Document type	Document Name
Operation Manual	10354_23A2007_250205_Operating_Manual_BESS_1MW_5MWh_6.6kV_EN_v1.2

Table 2: Other applicable documents

1.4 Generic Terms and Abbreviations Used

This following list should help you understand some of the abbreviations used in this document.

Generic Term and Abbreviation	Description
BESS	Battery Energy Storage System
BLPH	Base Load Power Hub
PCS	Power Conversion System

Table 3: Generic terms and abbreviations used

2 General

The BESS operation manual is attached to this document (*see section 1.3 "Other Applicable Documents"*).

Battery Energy Storage System (BESS)
BASE LOAD POWER HUB

Statron ref. 331497

Project Code: K559-2254
Purchase Order Number: CW-I-WP4-2022-01

SDRL Code: C11
Sequence Number: 001
Rev: 003
Document number: K559-2254-CWIWP4202201-C11-001
Document description: Operation Manual

Operation Manual
C11

for Base Load Power Hub (BLPH) Project

Classification: confidential

Document no.	C11
Document name	Operation Manual
Component / System	BESS
Project code	K559-2254

Version	Date	Name	Description
1.0	2025-01-21	M. Müller	First version
2.0	2025-01-30	M. Müller	Updated version
3,0	2025-02-04	M. Müller	Updated version

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STATRON
NON STOP POWER

Battery Energy Storage System (BESS)
BASE LOAD POWER HUB

Statron ref. 331497

Project Code: K559-2254
Purchase Order Number: CW-I-WP4-2022-01

SDRL Code: E99-001
Sequence Number: 001
Rev: 002
Document number: K559-2254-CWIWP4202201-E99-001
Document description: Electrical Equipment List

Revision	Date	Name	Description
001	20.02.2023	CPA / ADI	First Version
002	12.04.2023	CPA / ADI	Updated according to KBR comments
003	21.01.2025	MMÜ	Second revision

Electrical Equipment List
E99-001

for Base Load Power Hub (BLPH) Project

Classification: confidential

Document no.	E99-001
Document name	Electrical Equipment List
Component / System	BESS
Project code	K559-2254

Version	Date	Name	Description
1.0	2023-03-28	C. Palenzuela	First version
2.0	2024-12-19	M. Mueller	Updated version
3.0	2025-01-21	M. Mueller	Second Revision

Table 1: Version overview

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Editor	2023-03-28	C. Palenzuela
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The following documents are applicable:

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Extract of BESS and PCS circuit diagram (Parts list PCS)	10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_Parts List PCS
Extract of BESS and PCS circuit diagram (Parts list Battery 1)	10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_Parts List Battery 1
Extract of BESS and PCS circuit diagram (Patrts list Battery 2)	10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_Parts List Battery 2

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Battery 1	10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_Parts List Battery 1
Battery 2	10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_Parts List Battery 2

3 Appendix

1. 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_Parts List PCS
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Battery Energy Storage System (BESS)
BASE LOAD POWER HUB

Statron ref. 331497

Project Code: K559-2254
Purchase Order Number: CW-I-WP4-2022-01

SDRL Code: E99-001
Sequence Number: 001
Rev: 002
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3. 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_Parts List Battery 2

BLPH BESS Safety description document

Title	**Thermal runaway mitigations and recommendations**
Prepared by	Alessandro Sutto
Reviewed by	
Purpose	
Doc No.	K559-2254-CWIWP4202201-E99-099

Introduction

*"Safety cannot be determined or evaluated by one criterion or parameter. Rather, safety is determined by the implementation of complementary approaches that work together to enhance safety by: (a) reducing the probability of an event and (b) lessening the severity of outcome, should an event occur. As this approach is applied to batteries, thermal stability is perhaps the most important of several parameters that determine safety of Li-ion cells, modules and battery packs." (*A General Discussion of Li Ion Battery Safety by Dan Doughty and E. Peter Roth - 2012)

Battery fires and in particular thermal runaway (TR) events represent the largest dangers to the safety of a Battery Energy Storage System (BESS) using Lithium-ion battery cells with consequences spanning from minor asset damage and inoperability to dramatic system and environmental harm and sometimes tragic human losses.

Industry best practices, standards, continuous technological advancement, alongside learnings from previously reported incidents and consequent investigation reports, are significantly contributing to increase the safety for the system, operators, and the surrounding environment.

This document will discuss the recommendations and mitigations implemented in the 1MW/5MWh system that will be installed on the BLPH and how they will positively affect the overall safety of the system.

May 2024

Acronyms

BESS	Battery Energy Storage System
BLPH	BaseLoad Power Hub
BMS	Battery Management System
FAT	Factory Acceptance Test
FSS	Fire Suppression System
LFL	Lower Flammable Level
LFP	Lithium Iron Phosphate
MAH	Major Accident Hazard
PCS	Power Conversion System
SECE	Safety & Environmentally Critical Elements
TR	Thermal Runaway

Thermal Runaway

Thermal runaway (TR) consists of a catastrophic release of energy in lithium-ion batteries. A TR is an event characterized by the onset of rapid uncontrolled self-heating of a battery cell. Generation and emission of flammable and toxic gases, ejection of particulate, extremely high temperatures, smoke and/or fire are common side-effects of a TR. Due to the high levels of energy released within a few minutes, TRs are very difficult to stop and therefore present a risk that must be understood and mitigated in battery deployments. Multiple reasons can initiate a TR in a lithium-ion cell, however, the final outcome remains the same: accelerated self-heating generating flammable and toxic gases, leading up to complete thermal decomposition.

The bowtie diagram in Figure 1 details the threats and consequences for a cell thermal runaway. It can be noticed that when unmitigated, this can lead to a complete system-level accident.

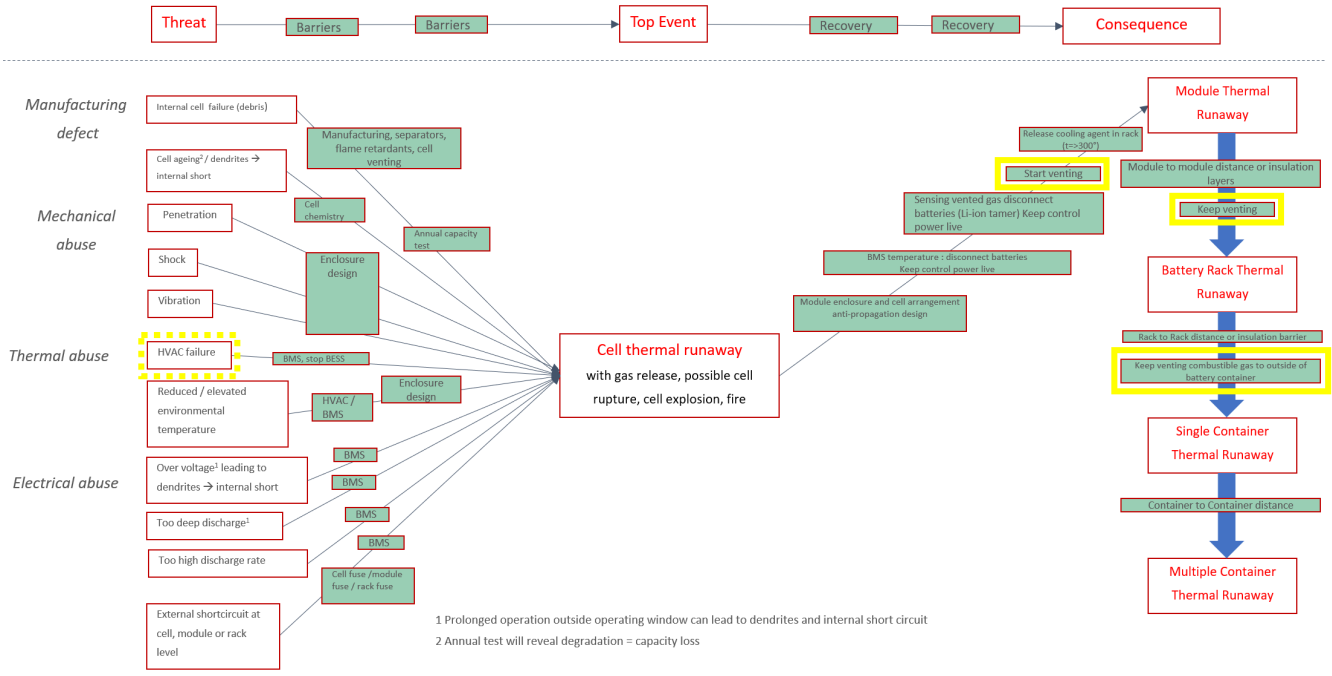


Figure 1 - Bowtie diagram for a lithium-ion battery

The main recognized **causes** for a TR event and relative barriers can be summarized as:

1. **Manufacturing defects**: productions defects might be detected with FATs and quality checks. Early replacements or disconnection of malfunctioning batteries can lower the chances of TR events.
2. **Mechanical damages**: punctures, shocks, falls and other hard impacts can be avoided by properly encasing cells in a hard and fixed protective module.
3. **Electrochemical stress**: currents higher than nominal for prolonged times or high intensity charge/discharge repetitive cycles can electrochemically stress the cell locally increasing temperature or leading to the creation of internal material degradation that can lead to TR.

General Layout

The BESS package for BLPH (1MW/5MWh) consists of a total of 3 containers: 2x 40ft BESS containers and 1x 20ft PCS (Power Conversion System) container. Figure 2 and Figure 3 illustrate the general arrangement.

The BESS containers host the battery modules arranged in racks (or cabinets), HVAC units for climate control, an automatic fire suppression system, a set of sensors and detectors and other minor electronic components forming the BMS (Battery Management System). The two containers include a total of **6160** 280Ah LFP cells grouped as follow:

(Column item/row item)	Cell	Module	Rack	Container
Module	10			
Rack	280	28		
Container	3080	308	11	
BESS	6160	616	22	2

The PCS container includes devices meant for power conversion (Inverters, transformers etc), a closed loop liquid cooling setup and other minor electronics.

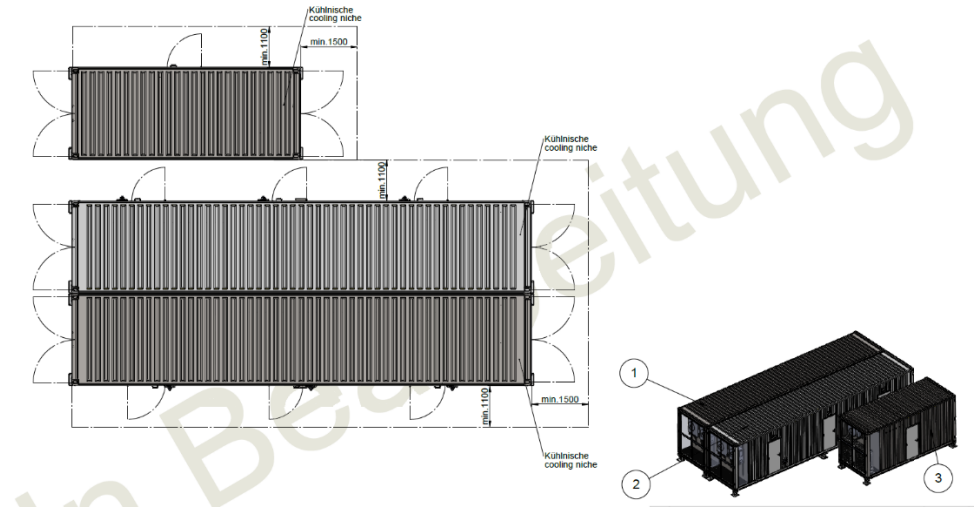


Figure 2 - General Arrangement of BESS. 1 & 2 BESS containers, 3 PCS container

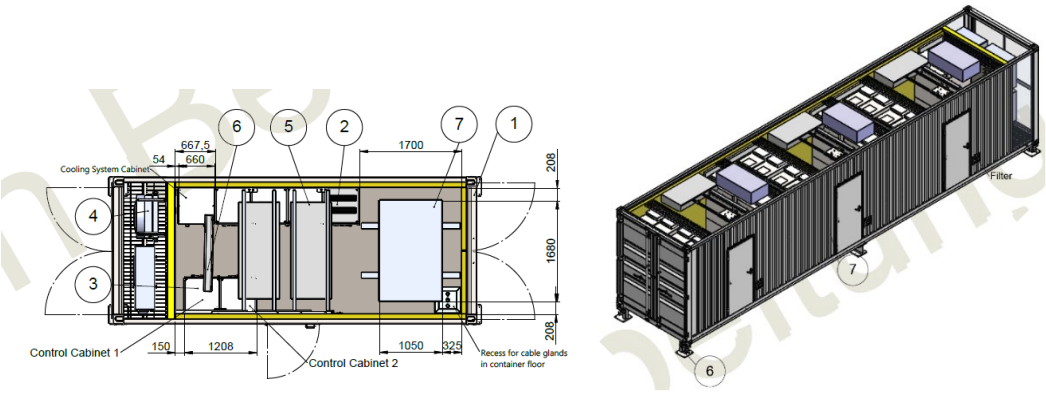


Figure 3 - Details of internal arrangement. Left) PCS container. Right) BESS container

Prevention and mitigation strategies

Throughout the project development, Crosswind supported Statron/Freqcon on the development of an effective prevention and mitigation strategy towards possible TR events.

Prevention

The product offered by Freqcon already presented a solid set of preventive measures to limit the chances of TR and to ensure safe operations. Additional barriers were included in the final design. They can be grouped in three main categories:

Mechanical	
Offered	Benefits
Stainless steel module casing with slots for aeration	Solid metal case protects the cells from impacts when handled and help preventing the propagation of fires. The slots on the top allows any offgas not to be accumulated in the module and being dispersed.
Cabinets/rack cooling and HVAC	The containers are equipped with active cooling via HVAC and each cabinet has a set of fans mounted on top that will force cool air through the modules helping keeping them at optimal working temperature.
Added	Benefits
Transport arrangement and reinforced cabinets	By installing reinforced cabinets to hosts the modules, it is possible to keep the system fully assembled during sea transport eliminating the risks related to module removal and re-commissioning once offshore. This will exclude additional mechanical shock and possible damage to the modules and cells. (Technical Note Transport recommendation for BLPH BESS system)

Software – Monitor & Control	
Offered	Benefits
Electrical design and BMS	The electrical design together with the software monitoring the cell status and controlling the operations of the system includes important features such as: - Capillary module temperature measurement (6 probes every 10 cells) - Individual cell voltage measurement - Current limiting and protection devices (e.g. DC fuses) - Cell internal resistance imbalance regulation
C-rate	The nominal power vs installed capacity ratio allows for lower c-rates of utilization decreasing the electrochemical stress on the individual cells.

Technological	
Offered	Benefits
LFP cells	LFP cells are considered “safer” in the industry due to the lower temperature expressed during TR and the composition of gasses produced. It has been demonstrated that LFP tends to not self-ignite and producing flames.
UL9540A testing on cell level	The company produced a UL9540A certificate for the cells used in their product demonstrating the consequences of induced TR including gas composition and temperature profiles.
Considered options	Explanation
UL9540A testing on module level	A module-level test was not pursued since it was agreed that the existing documentation and knowledge from the industry on the TR expected evolution was sufficient to ensure an adequate level of safety. (CWHKN-INN-BPH-TN-00005 - Requirement for UL9540A Test for BLPH BESS System)

Mitigation

The product offered by Freqcon already presented a solid set of mitigation measures against extended damages or TR propagation. Additional barriers were included in the final design. They can be grouped in two main categories:

Mechanical	
Offered	Benefits
Cell separators in module	Cells inside the module are not directly in contact with each other limiting thermal conductivity and ensuring room for expansion due to cell aging.
Container separation	Despite the limited area available on the platform, it was possible to ensure minimum separation between the BESS containers to limit thermal conductivity and possible fire propagation between containers.
Added	Benefits
Emergency ventilation, offgas extraction	A set of 3 emergency fans are installed on the BESS containers roofs alongside 3 electromechanical louvers on the bottom sides. They will activate in case of TR signalling and will support the cooling of the system as well as extract any off gasses and particles from the container atmosphere maintaining it below a critical level. (Technical Note Thermal Runaway scenario recommendations for BLPH BESS System)
Considered options	Explanation
Internal fire wall insulation	Adding a layer of insulating material inside the BESS containers to slow the thermal propagation was deemed not necessary for this particular application. The thickness required would have added considerable challenges to the internal redesign of the existing components and it was agreed that there would have been limited benefits in terms of safety.
Explosion hatches / Pressure release devices on container level	This option was discarded in favour of the emergency ventilation.
Individual module offgas exhaust	This option was discarded in favour of the emergency ventilation on the container level.

Software – Monitor & Control	
Offered	Benefits
Electrical design and BMS	The software monitoring the cell status and controlling the operations of the system includes important features such as: - Active disconnection in case of TR detection - Sensors and detectors (Smoke, CO, temperature) - Alarm notification
Flame extinguishing Stat-X	An active flame suppression system was present in the original design. The system consisting of aerosol capsules mounted in every cabinets was kept but its working principle was modified.
Added	Benefits
Upgraded BMS and TR system reaction	Modifications were made to the BMS reaction considering the existing and added components in the system. (see XXX for detailed information)

BMS Thermal Runaway response

Following industry's best practices and recommendations (e.g. DNV's "Technical Reference for Li-ion Battery Explosion Risk and Fire Suppression"), learnings from investigated BESS accidents, and the existing devices and strategy offered by Freqcon, the BESS Thermal Runaway response has been adjusted as follow.

The major indicators of an incoming possible TR are **voltage** deviations and **temperature** increases. The BMS monitors the cells behaviour and triggers reaction on the overall system. Keeping stable operating conditions (temperature, current, voltage etc.) ensures limited stress on the cells and lowers the risks of TR. By limiting or stopping providing energy to the system (electrical or thermal) a TR runaway process is slowed or limited in its outcome.

The bowtie in Figure 1 highlights how ventilation plays an essential role in both the prevention and mitigation of TR both on the cell, module, and system level.

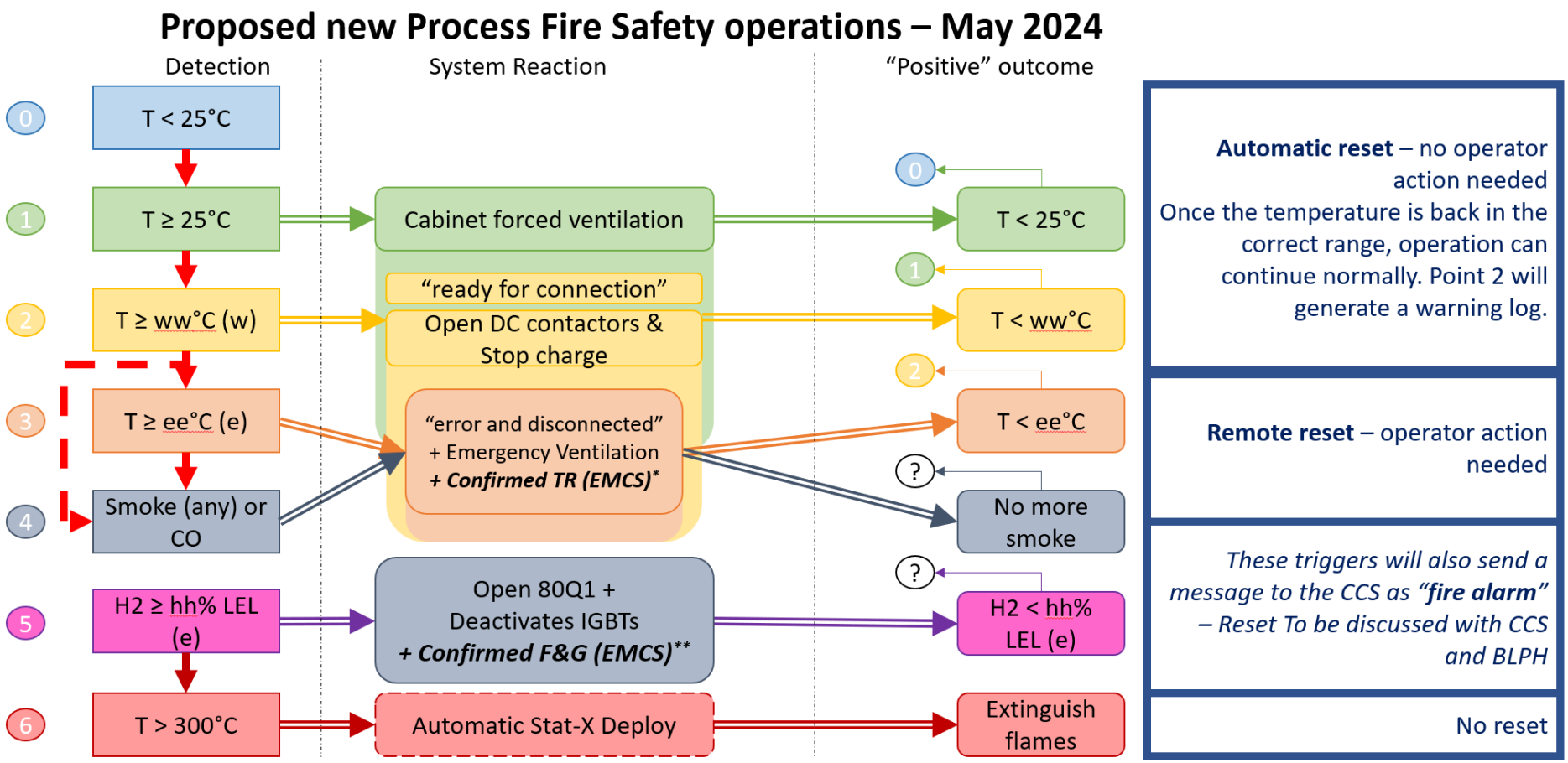
Figure 4 simplifies the functioning of the BMS linking specific TR indicator triggers to one or more reactions. It is easy to see that as the conditions become close to the one indicating a possible TR (High temperature, chemicals and smoke) the system progressively increases the ventilation provided and lowers the injected energy in the system by cutting down power and operations.

- "Open DC contactor" means the affected cabinet is disconnected
- "error and disconnected" means the whole BESS container stops operations.
- The fire suppression system (FSS) consists of Stat-X cartridges mounted on the battery racks that will automatically deploy their flame suppressant aerosol once the critical temperature (~300°C) is reached. It does not need aux power to be activated. The impact on the system after release is high. Inspection and cleaning before resuming operation will be needed.
- Current philosophy for BLPH control once the "fire" signal is communicated from the BESS is a complete shut down of power (aux included) and blow out of H2.

The following condition constitutes the basis for a realistic TR scenario:

- Only one module (10 cells), in one rack inside one BESS container would experience TR during the span of 6 to 8h. In the worse case scenario, each cell would undergo TR with one (1) min difference from the next;
- The amount and composition of gas released by each cell is assumed to be the one provided on the UL9540A test report;
- The full release of gas per cell is set to be taking place in one (1) minute;
- Smoke, temperature and gas detectors alongside the BMS are working correctly;
- There is no personnel present on the platform;

The schematic below (Figure 5) describes the steps and system reactions during a realistic TR event. It shows how the emergency ventilation will start operation long before any off-gasses (CO, CO2 or H2) are detected by the system. This lowers the risks of gas accumulations and promote air exchange before any gas is released.



*Aux still on

**Full platform shut down with H2 blowout

Figure 4 - Proposed BMS reaction

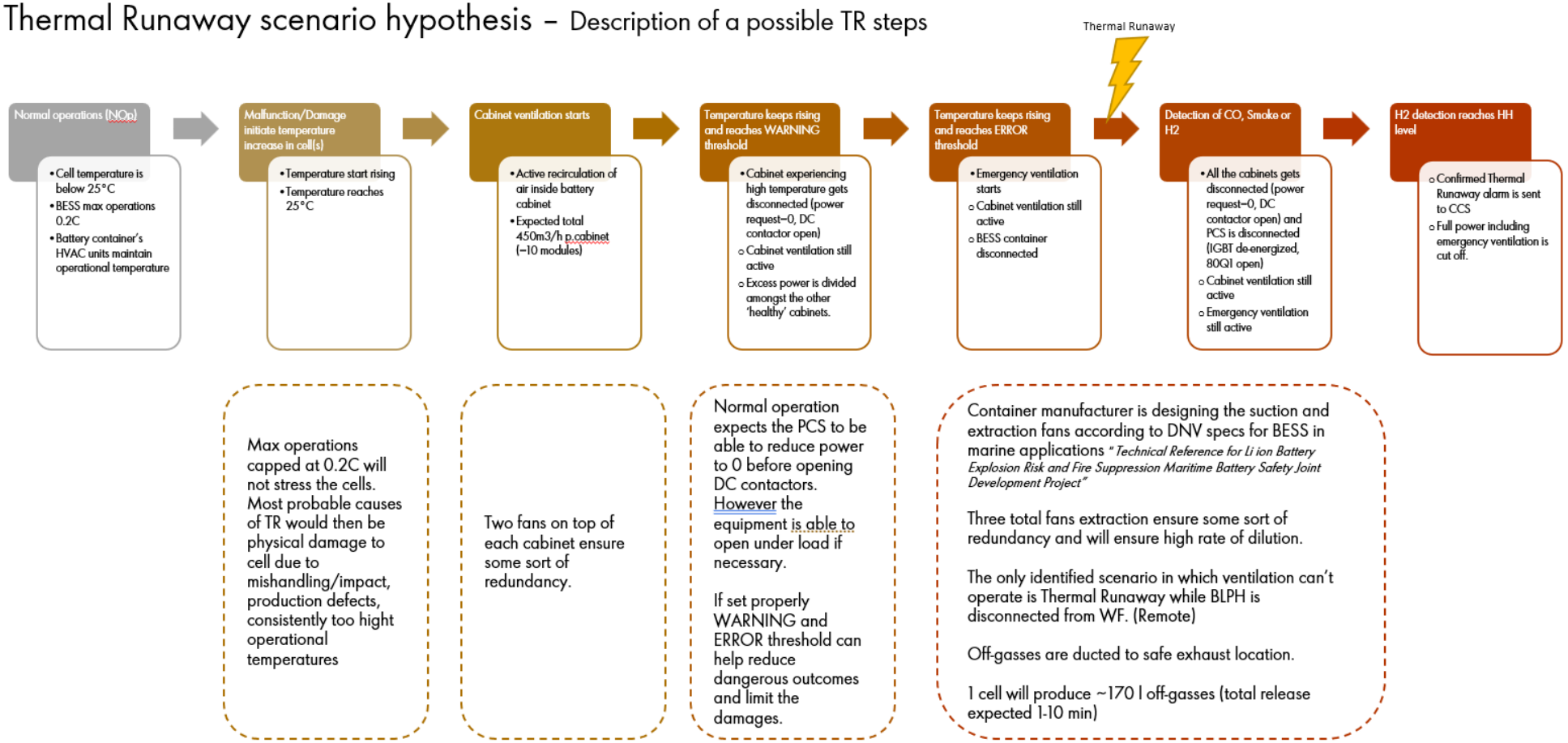


Figure 5 - Thermal runaway Scenario hypothesis - Description of possible TR steps

Appendix – Attached files

23A2007_230305_FRQCON_fire safety pro

STAT-X Fire Suppression Details.p

FREQCON Exhaust System Update.pdf

Fire-Extinguishant-Extract-Only-brochure.pas

Fire_Extinguishant_G_Extract_O_&_M_1(

Technical_Reference_for_Li-ion_Battery_Exp

Fire safety Con Edison - NYSERDA BE

EVE LF280K - UL 9540A.pdf

CWHKN-INN-BPH-TN-00005%20-%20Re

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STATRON
NON STOP POWER

Battery Energy Storage System (BESS)
BASE LOAD POWER HUB

Statron ref. 331497

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Stress Test Report
H20

for Base Load Power Hub (BLPH) Project

Classification: confidential

Document no.	H20
Document name	Stress Test Report
Component / System	BESS
Project code	K559-2254

Version	Date	Name	Description
1.0	2025-01-24	C. Palenzuela	First version

Table 1: Version overview

	Date	Name
Editor	2025-01-24	C. Palenzuela
Checked by	2025-01-24	C. Palenzuela
Approved by	2025-01-24	C. Palenzuela

Table 2: Approval overview

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3 Appendix ..... **Fehler! Textmarke nicht definiert.**

Identification

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Original document

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1 Introduction

1.1 About this Document

This document is part of the documentation for the Base Load Power Hub (BLPH) Project (K559-2254). In case of any contradiction resulting by the information or specification given in this document, later documents supersede the information provided in this document.

1.2 Display Elements

Symbol	Meaning
➜	Action with one or several steps for which the sequence is irrelevant.
Step 1 : **Step 2 :**	Action with several steps for which the sequence is relevant.
•	First level of list.
-	Second level of list.

Table 1: Display Elements

1.3 Other Applicable Documents

The following documents are applicable:

Document type	Document Name
Stress Test Report Battery Batch 1	Shell Modules 196 No. Report 15-11-2024
Stress Test Report Battery Batch 2	Shell Modules 196 No. Report 25-11-2024_Revised
Stress Test Report Battery Batch 3	Shell Modules 308 No. Report 04-12-2024_ 224

Table 2: Other applicable documents

1.4 Generic Terms and Abbreviations Used

This following list should help you understand some of the abbreviations used in this document.

Generic Term and Abbreviation	Description
BESS	Battery Energy Storage System
BLPH	Base Load Power Hub
PCS	Power Conversion System

Table 3: Generic terms and abbreviations used

2 General

The Stress Test Reports for the battery modules provided with the BESS are attached to this document (*see section 1.3 "Other Applicable Documents"*).

File name:

Shell Modules 196 No. Report 15-11-2024
Shell Modules 196 No. Report 25-11-2024_Revised
Shell Modules 308 No. Report 04-12-2024_ 224

Formular zur Berechnung der PSA-Störlichtbogenklasse

DC

Place of work:		Processor:	
Work order:		Date:	

Mains voltage:	900	V	
Continuous short-circuit current:	7,00	nA	
Conductor spacing:	30,0	mm	
Time constant = L/R:	10	ms	Justification:
Protective organ:			
Result Arc current I_{kLB}: (Section 4.3)	**5,899**	**nA**	
Switch-off time of the Overcurrent protection device t_K:	1,000	s	Note: Setting value of the circuit breaker / switch-off time from the fuse characteristic curve using I_{kLB}
Transmission factor kT: (Section 4.2.3)	1,50		Justification:
Distance of the person to the Arcing point a: (min. 300 mm)	400	mm	

Result:

Work with PPEgS of arc fault protection class 2 (APC2) possible

Invoice DC		Parameter	Result
Network parameters	Mains voltage	U_{Nn}	900,0 V
	Conductor spacing	d	30 mm
Calculation	Continuous short-circuit current	I_{kDC}	7,0 kA
	Time constant τ = L/R	τ	0,010 s
Arc current (fault current)	$I_{kLB\,(i+1)} = \frac{U_{Nn}}{\frac{(34 + 0{,}532 \cdot d)}{I_{kLB\,(i)}^{0{,}88}} + \frac{U_{Nn}}{I_{kDC}}}$	I_{kLB} =	5,90 kA
Arc voltage	$U_{LB} = (34 + 0{,}532 \cdot d) \cdot I_{kLB}^{0{,}12}$	U_{LB} =	141,6 V
Current limiting factor	$k_B = I_{kLB} / I_{kDC}$	k_B =	0,843
Characteristic curve NH fuse (Figure 5)		t_k	1,000 s
Short-circuit power	$P_k = U_{Nn} \cdot I_{kDC}$	P_k =	6,3 MW
Arc power	$P_{LB} = U_{LB} \cdot I_{LB}$	P_{LB} =	0,8 MW
LB power drawn	$k_p = P_{LB} / P_k$	kp=	0,133
Arc energy (expectation)	$W_{LB} = P_{LB} \cdot t_k$	W_{LB} =	835,3 kJ
Arc protection classes of the clothing (according to box test parameters)		W_{LBP_APC2}	320,0 kJ
		W_{LBP_APC1}	168,0 kJ
System parameters	Transmission factor	k_T	1,5
Working methods	Distance between person and arc source	a	400 mm
Protection level of the clothing at the arc location (extrapolation of the box test parameters to the arc location)	$W_{LBS} = k_T * (a/300\ mm)^2 * W_{LBP}$	W_{LBS_APC2} =	853,3 kJ
		W_{LBS_APC1} =	448,0 kJ

	Extrapolation of max. switch-off time for class 2	t_{k_APC2}	1,022 s
	Extrapolation of max. switch-off time for class 1	t_{k_APC1}	0,536 s
	Extrapolation min. distance for class 2	$a_{_APC2}$	396 mm
	Extrapolation min. distance for class 1	$a_{_APC1}$	546 mm

Ratio	$W_{LB} / W_{LBS ratio}$ for class 2	W_{LB} / W_{LBS_APC2}	0,98
	$W_{LB} / W_{LBS ratio}$ for class 1	W_{LB} / W_{LBS_APC1}	1,86

Work with PPEgS of arc fault protection class 2 (APC2) possible

DC

Probability of injury due to arc fault
Assessment scheme

DC

Please select the desired class at the beginning

Processor: 0 **Class:** APC2 **Date:** 00/01/1900

Place / type of activity: 0 / 0

Influence leads to probability of injury (0 = practically impossible, 2 = conceivable but very unlikely, 4 = unlikely, 7 = rare, 10 = occasionally to frequently)

a) Type/condition of the system — 4

Type/condition of the system with regard to bridgeable potentials (arc formation) or the limitation of arc effects

Explanation:

b) Technical measures — 4

Technical measures to prevent potential bridging (arcing) or to limit the effects of arcing

Explanation:

c) Organisational measures — 4

Organisational measures to avoid potential bridging (arcing) or to limit the effects of arcing

Explanation:

d) Personal measures — 4

Personal measures to avoid potential bridging (arcing) or to limit the effects of arcing

Explanation:

e) Statistical influencing factors — 4

Statistical influencing factors that play a role in assessing the probability of occurrence of an electric arc or an injury caused by an electric arc

Explanation:

f) Ergonomic influencing factors — 4

Ergonomic factors that play a role in assessing the probability of occurrence of an electric arc or an injury caused by an electric arc

Explanation:

Total evaluation points: 24,0

	Probability of occurrence of an injury	0 ...	10 ...	20 ...	31 ...	46 ...
Injury severity$_{WLB}$ / $_{WLBS}$		Practically impossible	Conceivable, very unlikely	untrue-probable	rare	Occasional to frequent
0 ...	Minor injury			APC2		
1 ...	Reversible injury					
3 ...	Irreversible injury					
10 ...	Fatal injury					

APC1 1,9
APC2 1,0

Result:

Performance of work with PPEgS APC2 permitted on the basis of the assessment approaches taken and in accordance with the specified protective measures

-

DC

Place of work:	Processor:
Work order:	Date:

Invoice		Parameter	Result
Network parameters	Mains voltage	UNn	900,0 V
System geometry	Conductor spacing	d	30 mm
Short-circuit current calculation	Continuous short-circuit current	IkDC	7,00 kA
	Time constant τ	τ	0,010 s
Current limitation		κB	0,843
Arc current (fault current)	$I_{kLB\,(i+1)} = \frac{U_{Nn}}{(34 + 0{,}532 \cdot d) + \frac{U_{Nn}}{I_{kDC}}}$	IkLB =	5,90 kA
Switch-off time of the overcurrent protection device (setting value of the circuit breaker / switch-off time from the fuse characteristic curve)		tk	1,000 s
Short-circuit power	Pk = UNn · IkDC	Pk =	6,3 MW
Arc power	$P_{LB} = I_{LB} \cdot U_{LB}$	PLB =	0,84 MW
LB power drawn	kp = PLB / Pk	kp=	0,133
Arc energy (expectation)	WLB = PLB · tk	WLB =	835,33 kJ
Working distance		a	400 mm
PSA standard test level		W_{LBP_K2} =	320,0 kJ
		W_{LBP_K1} =	168,0 kJ
Transmission factor		kT	1,50
Protection level of the clothing at the arc location (extrapolation of the box test parameters to the arc location)	$W_{LBS} = k_T \times (\frac{a}{300\,mm})^2 \times W_{LBP}$	W_{LBS_K2} =	853,3 kJ
		W_{LBS_K1} =	448,0 kJ

Comparison		
	$W_{LB} < W_{LBS_K2}$	YES
	$W_{LB} < W_{LBS_K1}$	NO

Result invoice:	**Work with PPEgS of arc fault protection class 2 (APC2) possible**
Result risk assessment:	**Performance of work with PPEgS APC2 permitted on the basis of the assessment approaches taken and in accordance with the specified protective measures**

Explanation of the time constant:
Explanation of the transmission factor:
Protective organ:

back DC

Legend of evaluation points for a) Type and condition of the system:

0	.. Practically impossible
2	.. Conceivable, but very unlikely
4	.. Unlikely
7	.. Rare
10	.. Occasionally to frequently

a) Type and condition of the system:

Type/condition of the system with regard to bridging potentials (arc formation) or the limitation o

Open, bridgeable potentials (potential distances, bridgeability, e.g. by tools/aids or possibly fa
Soiling, moisture, vegetation
Maintenance and testing
Age of the system
Special environmental conditions (e.g. climatic conditions)
Partitioning to neighbouring fields
System with closed doors
Protection against accidental contact (e.g. VDE 0660-514)
LV system in accordance with VDE 0660-600-2 supplement 1 (arc fault tested systems)
Base point-free LV system
Active arc fault protection system
MV systems in accordance with VDE 0671-200 (arc fault tested systems)

f arc fault effects, e.g.

lling conductive parts)

back DC

Key to the assessment points for technical measures to avoid potential bridging (arc formati

0	.. Practically impossible
2	.. Conceivable, but very unlikely
4	.. Unlikely
7	.. Rare
10	.. Occasionally to frequently
not applicab	... not applicable

Technical measures to prevent potential bridging (arcing) or to limit the effects of arc faults, e.g.

Use of tools and equipment (with regard to bridging safety, distance)
Use of protective and auxiliary equipment
Condition of the work equipment
Use of measuring devices (e.g. suitable measuring category)
Active arc fault protection
Adaptation of protective devices (e.g. fast fuse, adaptation of protection parameters, current

on) or to limit the effects of arc faults, e.g.

back DC

Legend of evaluation points for c) organisational measures:	
0	.. Practically impossible
2	.. Conceivable, but very unlikely
4	.. Unlikely
7	.. Rare
10	.. Occasionally to frequently
not applicab	... not applicable

c) organisational measures:

Organisational measures to prevent potential bridging (arcing) or to limit the effects of arc faults, e

Organisational regulations (e.g. operating/work instructions)
Responsibilities
Protective measures against SLB
Instruction/training
Review of effectiveness
Plant documentation
Access control to electrical systems
Instruction in electrical systems

Dealing with electrical accidents / near misses
Evaluation/communication
Measures/monitoring the effectiveness of measures

When carrying out switching operations
Operational regulations/organisation of switching operations
Documentation of switching operations
Switching capability/switching authorisation
Obtaining the qualification

For implementation AuS:
AuS work instructions (protective measures for arc fault protection)
Instructing electrician
Specialised training
Obtaining the qualification
Control (quality assurance)

Dealing with external personnel
Requirements/Prequalification
Instruction/training
Obtaining the qualification
Control (quality assurance)

e.g.

back DC

Legend of evaluation points for d) personal measures:	
0	.. Practically impossible
2	.. Conceivable, but very unlikely
4	.. Unlikely
7	.. Rare
10	.. Occasionally to frequently
not applicabl	... not applicable

d) personal measures:

Personal measures to avoid potential bridging (arcing) or to limit the effects of arc faults, e.g.

Use of PPEgS
Selection of PPEgS (e.g. SLK)
Use/inspection (e.g. visual inspection)
Care, maintenance and repair
Review of the application/quality assurance

Qualification of employees
Job-specific/plant-specific knowledge
Working methods and experience
Instructions
Special qualifications (e.g. switching qualification, AuS)
Obtaining the qualification
Checking the qualification

back DC

Legend of evaluation points for e) Statistical influencing factors:	
0	.. Practically impossible
2	.. Conceivable, but very unlikely
4	.. Unlikely
7	.. Rare
10	.. Occasionally to frequently
not applicabl	... not applicable

e) Statistical influencing factors:

Statistical influencing factors that can play a role in assessing the probability of occurrence of an ar

Accident statistics (e.g. accident frequency based on own operating experience or known acci
Other stochastic factors (e.g. frequency/duration of activities with arc fault hazard W-LB/W-LE

ȣS > 1, activity-related: e.g. voltage testing on disconnected systems)

back DC

Legend of evaluation points for f) Ergonomic influencing factors:

0	.. Practically impossible
2	.. Conceivable, but very unlikely
4	.. Unlikely
7	.. Rare
10	.. Occasionally to frequently
not applicable	... not applicable

f) Ergonomic influencing factors:

Ergonomic influencing factors that may play a role in assessing the probability of occurrence of

PSAgS

Wearing comfort (e.g. fit, hygiene, tactility)

Carrying acceptance

Working environment (e.g. freedom of movement, constrained posture, lighting, climatic c

Mental stress (e.g. time pressure)

an arc fault or an injury caused by an arc fault, e.g.

Formular zur Berechnung der PSA-Störlichtbogenklasse

DC

Arbeitsort:			Bearbeiter:	
Arbeitsauftrag:			Datum:	
Netzspannung:	900	V		
Dauerkurzschlussstrom:	7,00	kA		
Leiterabstand:	30,0	mm		
Zeitkonstante $\tau = L/R$:	10	ms	Begründung:	
Schutzorgan:				
Ergebnis Lichtbogenstrom I_{kLB}: (Abschnitt 4.3)	**5,899**	**kA**		
Abschaltzeit der Überstromschutzeinrichtung t_K:	1,000	s	Hinweis:	Einstellwert des Leistungsschalter / Abschaltzeit aus der Sicherungskennlinie mithilfe I_{kLB}
Transmissionsfaktor k_T: (Abschnitt 4.2.3)	1,50		Begründung:	
Abstand der Person zum Lichtbogenentstehungsort a: (mind. 300 mm)	400	mm		

Ergebnis:

Arbeiten mit PSAgS der Störlichtbogenschutzklasse 2 (APC2) möglich

Rechnung DC		Kenngröße	Resultat
Netzparameter	Netzspannung	U_{Nn}	900,0 V
	Leiterabstand	d	30 mm
Berechnung	Dauerkurzschlussstrom	I_{kDC}	7,0 kA
	Zeitkonstante τ = L/R	τ	0,010 s
Lichtbogenstrom (Fehlerstrom)	$I_{kLB\,(i+1)} = \frac{U_{Nn}}{\frac{(34 + 0{,}532 \cdot d)}{I_{kLB\,(i)}^{0{,}88}} + \frac{U_{Nn}}{I_{kDC}}}$	I_{kLB} =	5,90 kA
Lichbtogenspannung	$U_{LB} = (34 + 0{,}532 \cdot d) \cdot I_{kLB}^{0{,}12}$	U_{LB} =	141,6 V
Strombegrenzungsfaktor	$k_B = I_{kLB} / I_{kDC}$	k_B =	0,843
Kennlinie NH-Sicherung (Bild 5)		t_k	1,000 s
Kurzschlussleistung	$P_k = U_{Nn} \cdot I_{kDC}$	P_k =	6,3 MW
Lichtbogenleistung	$P_{LB} = U_{LB} \cdot I_{LB}$	P_{LB} =	0,8 MW
Bezogene LB-Leistung	$k_p = P_{LB} / P_k$	k_p =	0,133
Lichtbogenenergie (Erwartung)	$W_{LB} = P_{LB} \cdot t_k$	W_{LB} =	835,3 kJ
Lichtbogenschutzklassen der Kleidung (gemäß Box-Test-Parameter)		W_{LBP_APC2}	320,0 kJ
		W_{LBP_APC1}	168,0 kJ
Anlagenparameter	Transmissionsfaktor	k_T	1,5
Arbeitsverfahren	Abstand Person zu Lichtbogenentstehungsort	a	400 mm
Schutzpegel der Kleidung am Lichtbogenort (Hochrechnung der Boxtestparameter auf den Lichtbogenort)	$W_{LBS} = k_T * (a/300\ mm)^2 * W_{LBP}$	W_{LBS_APC2} =	853,3 kJ
		W_{LBS_APC1} =	448,0 kJ

	Hochrechnung max. Abschaltzeit für Klasse 2	t_{k_APC2}	1,022 s
	Hochrechnung max. Abschaltzeit für Klasse 1	t_{k_APC1}	0,536 s
	Hochrechnung min. Abstand für Klasse 2	$a_{_APC2}$	396 mm
	Hochrechnung min. Abstand für Klasse 1	$a_{_APC1}$	546 mm

Verhältnis	Verhältnis W_{LB} / W_{LBS} für Klasse 2	W_{LB} / W_{LBS_APC2}	0,98
	Verhältnis W_{LB} / W_{LBS} für Klasse 1	W_{LB} / W_{LBS_APC1}	1,86

Arbeiten mit PSAgS der Störlichtbogenschutzklasse 2 (APC2) möglich

Eintrittswahrscheinlichkeit einer Verletzung durch Störlichtbogen
Beurteilungsschema

DC

Bitte wählen Sie zu Beginn die angestrebte Klasse aus

Bearbeiter: 0 **Klasse:** APC2 **Datum:** 00/01/1900

Ort / Art der Tätigkeit: 0 / 0

		Einfluss führt zu Verletzungswahrscheinlichkeit (0 = praktisch unmöglich, 2 = denkbar, aber sehr unwahrscheinlich, 4 = unwahrscheinlich, 7 = selten, 10 = gelegentlich bis häufig)
a) Art/Zustand der Anlage Art/Zustand der Anlage hinsichtlich überbrückungsfähiger Potenziale (Lichtbogenentstehung) oder der Begrenzung von Lichtbogenauswirkung	4	**Erläuterung:**
b) Technische Maßnahmen Technische Maßnahmen zur Vermeidung von Potenzialüberbrückungen (Lichtbogenentstehung) oder zur Begrenzung von Lichtbogenauswirkungen	4	**Erläuterung:**
c) Organisatorische Maßnahmen Organisatorische Maßnahmen zur Vermeidung von Potenzialüberbrückungen (Lichtbogenentstehung) oder zur Begrenzung von Lichtbogenauswirkungen	4	**Erläuterung:**
d) Persönliche Maßnahmen Persönliche Maßnahmen zur Vermeidung von Potenzialüberbrückungen (Lichtbogenentstehung) oder zur Begrenzung von Lichtbogenauswirkungen	4	**Erläuterung:**
e) Statistische Einflussfaktoren Statistische Einflussfaktoren, die bei der Bewertung der Eintrittswahr-scheinlichkeit eines Lichtbogens oder einer Verletzung durch Lichtbogen eine Rolle spielen	4	**Erläuterung:**
f) Ergonomische Einflussfaktoren Ergonomische Einflussfaktoren, die bei der Bewertung der Eintrittswahrscheinlichkeit eines Lichtbogens oder einer Verletzung durch Lichtbogen eine Rolle spielen	4	**Erläuterung:**
Summe Bewertungspunkte:	**24,0**	

Verletzungs-schwere W_{LB} / W_{LBS}	Eintrittswahrschein-lichkeit einer Verletzung	0 ... Praktisch unmöglich	10 ... Denkbar, sehr unwahr-scheinlich	20 ... unwahr-scheinlich	31 ... selten	46 ... Gelegentlich bis häufig
0 ...	Leichte Verletzung			APC2		
1 ...	Reversible Verletzung					
3 ...	Irreversible Verletzung					
10 ...	Tödliche Verletzung					

APC1 1,9
APC2 1,0

Ergebnis:

Durchführung der Arbeiten mit PSAgS APC2 auf Basis der getroffenen Bewertungsansätze und gemäß der festgelegten Schutzmaßnahmen zulässig

DC

Arbeitsort:	Bearbeiter:
Arbeitsauftrag:	Datum:

Rechnung		Kenngröße	Resultat
Netzparameter	Netzspannung	U_{Nn}	900,0 V
Anlagengeometrie	Leiterabstand	d	30 mm
Kurzschlußstromberechnung	Dauerkurzschlussstrom	I_{kDC}	7,00 kA
	Zeitkonstante τ	τ	0,010 s
Strombegrenzung		k_B	0,843
Lichtbogenstrom (Fehlerstrom)	$I_{kLB\,(i+1)} = \frac{U_{Nn}}{\frac{(34 + 0{,}532 \cdot d)}{I_{kLB\,(i)}^{0{,}88}} + \frac{U_{Nn}}{I_{kDC}}}$	I_{kLB} =	5,90 kA
Abschaltzeit der Überstromschutzeinrichtung (Einstellwert des Leistungsschalter / Abschaltzeit aus der Sicherungskennlinie)		t_k	1,000 s
Kurzschlussleistung	$P_k = U_{Nn} \cdot I_{kDC}$	P_k =	6,3 MW
Lichtbogenleistung	$P_{LB} = U_{LB} \cdot I_{kLB}$	P_{LB} =	0,84 MW
Bezogene LB-Leistung	$k_p = P_{LB} / P_k$	k_p =	0,133
Lichtbogenenergie (Erwartung)	$W_{LB} = P_{LB} \cdot t_k$	W_{LB} =	835,33 kJ
Arbeitsabstand		a	400 mm
PSA Normprüfpegel		W_{LBP_KI2} =	320,0 kJ
		W_{LBP_KI1} =	168,0 kJ
Transmissionsfaktor		k_T	1,50
Schutzpegel der Kleidung am Lichtbogenort (Hochrechnung der Boxtestparameter auf den Lichtbogenort)	$W_{LBS} = k_T \times (\frac{a}{300\ mm})^2 \times W_{LBP}$	W_{LBS_KI2} =	853,3 kJ
		W_{LBS_KI1} =	448,0 kJ

Vergleich		
	$W_{LB} < W_{LBS_KI2}$	JA
	$W_{LB} < W_{LBS_KI1}$	NEIN

Ergebnis Rechnung:	**Arbeiten mit PSAgS der Störlichtbogenschutzklasse 2 (APC2) möglich**
Ergebnis Risikobwertung:	**Durchführung der Arbeiten mit PSAgS APC2 auf Basis der getroffenen Bewertungsansätze und gemäß der festgelegten Schutzmaßnahmen zulässig**

Begründung zur Zeitkonstante:
Begründung zum Transmissionsfaktor:
Schutzorgan:

zurück DC

Legende der Bewertungspunkte für a) Art und Zustand der Anlage:

0	.. Praktisch unmöglich
2	.. Denkbar, aber sehr unwahrscheinlich
4	.. Unwahrscheinlich
7	.. Selten
10	.. Gelegentlich bis häufig

a) Art und Zustand der Anlage:

Art/Zustand der Anlage hinsichtlich überbrückungsfähiger Potenziale (Lichtbogenentstehung) oder

- Offene, überbrückbare Potenziale (Potenzialabstände, Überbrückbarkeit, z. B. durch Werkzeu
- Verschmutzung, Feuchtigkeit, Bewuchs
- Wartung und Prüfung
- Alter der Anlage
- Besondere Umgebungsbedingung (z. B. klimatische Bedingungen)
- Schottung zu Nachbarfeldern
- Anlage mit geschlossenen Türen
- Berührungsschutz (z. B. VDE 0660-514)
- NS-Anlage gemäß VDE 0660-600-2 Beiblatt 1 (Störlichtbogengeprüfte Anlagen)
- Fußpunktfreie NS-Anlage
- Aktives Störlichtbogenschutzsystem
- MS-Anlagen gemäß VDE 0671-200 (Störlichtbogengeprüfte Anlagen)

· **der Begrenzung von Störlichtbogenauswirkung, z. B.**

ıge/Hilfmittel oder ggf. herabfallende leitfähige Teile)

zurück DC

Legende der Bewertungspunkte für Technische Maßnahmen zur Vermeidung von Potenzialü

0	.. Praktisch unmöglich
2	.. Denkbar, aber sehr unwahrscheinlich
4	.. Unwahrscheinlich
7	.. Selten
10	.. Gelegentlich bis häufig
nicht zutreff	.. nicht zutreffend

Technische Maßnahmen zur Vermeidung von Potenzialüberbrückungen (Lichtbogenentstehung) od

- Einsatz Werkzeugen und Ausrüstungen (hinsichtlich Überbrückungssicherheit, Abstand)
- Einsatz Schutz- und Hilfsmittel
- Zustand der Arbeitsmittel
- Einsatz Messgeräte (z. B. passende Messkategorie)
- Aktiver Störlichtbogenschutz
- Anpassung von Schutzorganen (z. B. flinke Sicherung, Anpassung Schutzparameter, Strombeg

iberbrückungen (Lichtbogenentstehung) oder zur Begrenzung von Störlichtbogenauswirkung

en, z. B.

zurück DC

Legende der Bewertungspunkte für c) organisatorische Maßnahmen:

0	.. Praktisch unmöglich
2	.. Denkbar, aber sehr unwahrscheinlich
4	.. Unwahrscheinlich
7	.. Selten
10	.. Gelegentlich bis häufig
nicht zutreff	.. nicht zutreffend

c) organisatorische Maßnahmen:

Organisatorische Maßnahmen zur Vermeidung von Potenzialüberbrückungen (Lichtbogenentstehu

- Organisatorische Regelungen (z. B. Betriebs-/ Arbeitsanweisungen)

Verantwortlichkeiten
Schutzmaßnahmen gegen SLB
Unterweisung/Schulung
Überprüfung der Wirksamkeit
Anlagendokumentation
Zutrittsregelung zu elektrischen Anlagen
Einweisung in elektrische Anlagen

- Umgang mit elektrischen Unfällen/Beinaheunfällen

Auswertung/Kommunikation
Maßnahmen/Wirksamkeitskontrolle von Maßnahmen

- Bei Durchführung Schalthandlungen:

Betriebliche Regelungen/Organisation von Schalthandlungen
Dokumentation von Schalthandlungen
Schaltbefähigung/Schaltberechtigung
Erhalt der Qualifikation

- Bei Durchführung AuS:

AuS-Arbeitsanweisungen (Schutzmaßnahmen zum Störlichtbogenschutz)
Anweisende Elektrofachkraft
Spezialausbildung
Erhalt der Qualifikation
Kontrolle (Qualitätssicherung)

- Umgang mit Fremdpersonal

Anforderungen/Präqualifizierung
Einweisung/Schulung
Erhalt der Qualifikation
Kontrolle (Qualitätssicherung)

ng) oder zur Begrenzung von Störlichtbogenauswirkungen, z. B.

zurück DC

Legende der Bewertungspunkte für d) persönliche Maßnahmen:	
0	.. Praktisch unmöglich
2	.. Denkbar, aber sehr unwahrscheinlich
4	.. Unwahrscheinlich
7	.. Selten
10	.. Gelegentlich bis häufig
nicht zutreff	.. nicht zutreffend

d) persönliche Maßnahmen:

Persönliche Maßnahmen zur Vermeidung von Potenzialüberbrückungen (Lichtbogenentstehung) o

- Nutzung von PSAgS

Auswahl der PSAgS (z. B. SLK)
Verwendung/Prüfung (z.B. Sichtprüfung)
Pflege, Wartung und Reparatur
Überprüfung der Anwendung/Qualitätssicherung

- Qualifikation der Mitarbeiter

Tätigkeitsspezifische/anlagenspezifische Kenntnisse
Arbeitsweise und Erfahrung
Unterweisungen
Spezielle Befähigungen (z. B. Schaltbefähigung, AuS)
Erhalt der Qualifikation
Überprüfung der Qualifikation

der zur Begrenzung von Störlichtbogenauswirkungen, z. B.

zurück DC

Legende der Bewertungspunkte für e) Statistische Einflussfaktoren:	
0	.. Praktisch unmöglich
2	.. Denkbar, aber sehr unwahrscheinlich
4	.. Unwahrscheinlich
7	.. Selten
10	.. Gelegentlich bis häufig
nicht zutreff	.. nicht zutreffend

e) Statistische Einflussfaktoren:

Statistische Einflussfaktoren, die bei der Bewertung der Eintrittswahrscheinlichkeit eines Störlichtb

- Unfallstatistik (z. B. Unfallhäufigkeit auf Basis eigener Betriebserfahrungen oder bekannter U
- Weitere stochastische Faktoren (z. B. Häufigkeit/Dauer der Tätigkeiten mit Störlichtbogengef

ährdung W-LB/W-LBS > 1, tätigkeitsbezogen: z. B. Spannungsprüfen an freigeschalteten Anlagen)

zurück DC

Legende der Bewertungspunkte für f) Ergonomische Einflussfaktoren:	
0	.. Praktisch unmöglich
2	.. Denkbar, aber sehr unwahrscheinlich
4	.. Unwahrscheinlich
7	.. Selten
10	.. Gelegentlich bis häufig
nicht zutreffe	.. nicht zutreffend

f) Ergonomische Einflussfaktoren:

Ergonomische Einflussfaktoren, die bei der Bewertung der Eintrittswahrscheinlichkeit eines Stö

- PSAgS

Tragekomfort (z. B. Passform, Hygiene, Taktilität)
Trageakzeptanz

- Arbeitsumgebung (z. B. Bewegungsfreiheit, Zwangshaltung, Beleuchtung, klimatische Bedi

Psychische Belastung (z. B. Zeitdruck)

rlichtbogens oder einer Verletzung durch Störlichtbogen eine Rolle spielen können, z. B.

Material Safety Data Sheet

Section 1 – IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Product Name: Li-ion Battery

Battery type: Li-ion Battery

Model	Voltage	Capacity（Ah）			Energy（Wh）
		Typical	Min	MAX	
LF280K	3.2V	280	/	/	896

Product Use: Energy Storage System

MSDS Date of Preparation: April 6th, 2021 ； Updated：/

Company Identification:

Name： EVE POWER Co., Ltd.

Address: No.68, Jingnan Avenue, Jingmen Hi-teck Zone, 448000 Jingmen City, Hubei Province

Post Code: 448000

Tel: +86-724-6079630

Fax:+86-724-6079688

Section 2 - Hazards Identification

- **Health Hazards (Acute and Chronic)**

These chemicals are contained in a sealed Al foil. Risk of exposure occurs only if the battery is mechanically or electrically abused. Contact of electrolyte with skin and eyes should be avoided.

- **Sign/Symptoms of Exposure**

A shorted battery can cause thermal and chemical burns upon contact with the skin. Maybe a reproductive hazard.

These products are classified as Articles under REACH and are not subject to the requirements for Information in the Supply Chain (Safety Data Sheets and Labels). While batteries may release hazardous substances if damaged, this is not an intended release as defined under REACH. Batteries are not classified as hazardous under the CLP.

The following information is provided to assist in the safe use of our products.

CAUTION: Battery can explode or leak if heated, disassembled, shorted, recharged, exposed to fire or high temperature or inserted incorrectly. Keep in original package until ready to use. Do not carry batteries

loose in your pocket or purse. Keep batteries away from children. If swallowed, consult a physician at once.

Under certain misuse conditions and by abusively opening the battery, exposed lithium can react with water or moisture in the air causing potential thermal burns or fire.

Section 3 – Composition/Information on Ingredient

Material or ingredient	Chemical Formula	CAS No.	Wt %

Lithium iron phosphate	$LiFePO_4$	/	37.0
Phosphate(1-),hexafluoro,lithium	$LiPF_6$	(CAS-No.)21324-40-3 (EC-No.)244-334-7	3.2
Graphite	C	(CAS-No.)7782-42-5 (EC-No.)231-955-3	19.1
Aluminum	Al	(CAS-No.)7429-90-5 (EC-No.)231-072-3 (EC Index-No.)013-002-00-1	4.6
Copper	Cu	(CAS-No.)7440-50-8 (EC-No.)231-159-6	7.5
Polypropylene	PP	(CAS-No.) 9003-07-0 (EC-No.)618-352-4	4.8

Section 4 - First Aid Measures

- **General Advice**

  The chemicals in this product are contained in a sealed package. Exposure to the contents will not occur unless the battery leaks, is exposed to high temperatures or is mechanically, physically, or electrically abused.

- **Eye**

  Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

- **Skin**

  Remove contaminated clothes and rinse skin with plenty of water or shower for 15 minutes. Get medical aid.

- **Inhalation**

  Remove from exposure and move to fresh air immediately. Use oxygen if available.

- **Ingestion**

  Give at least 2 glasses of milk or water. Induce vomiting unless patient is unconscious. Call a physician.

- **Note to Physician**

  Published reports recommend removal from the esophagus be done endoscopically (under direct visualization). Batteries beyond the esophagus need not be retrieved unless there are signs of injury to the GI tract or a large diameter battery fails to pass the pylorus. If asymptomatic, follow up x rays are necessary only to confirm the passage of larger batteries. Confirmation by stool inspection is preferable under most circumstances. Potential leakage of less than 50 milligrams of dimethoxyethane and propylene carbonate. Dimethoxyethane rapidly evaporates. Do not give ipecac.

Section 5 - Fire Fighting Measures

- **Fire and Explosion Hazards**: Batteries may burst and release hazardous decomposition products when exposed to a fire situation.
- **Extinguishing Media**

  CO_2.

- **Special Fire-Fighting Procedures**

  Self-contained breathing apparatus.
- **Unusual Fire and Explosion Hazards**

  Cell may vent when subjected to excessive heat-exposing battery contents.
- **Hazardous Combustion Products**

  Carbon monoxide, carbon dioxide, lithium oxide fumes.

Section 6 - Accidental Release Measures

- **Steps to be Taken in case Material is Released or Spilled**

  If the battery material is released, remove personnel from area until fumes dissipate. Provide maximum ventilation to clear out hazardous gases. Wipe it up with a cloth, and dispose of it in a plastic bag and put into a steel can. The preferred response is to leave the area and allow the battery to cool and vapors to dissipate. Provide maximum ventilation. Avoid skin and eye contact or inhalation of vapors. Remove spilled liquid with absorbent and incinerate.
- **Waste Disposal Method**

  It is recommended to discharge the battery to the end, handing in the abandoned batteries to related department unified, dispose of the batteries in accordance with approved local, state, and federal requirements. Consult state environmental protection agency and/or federal EPA.

Section 7 - Handling and Storage

The battery should not be opened, destroyed or incinerate, since they may leak or rupture and release to the environment the ingredients that they contain in the hermetically sealed container.

Do not short circuit terminals, or over charge the battery, forced over-discharge, throw to fire. Do not crush or puncture the battery, or immerse in liquids.

- **Precautions to be taken in Handling and Storing**

  Avoid mechanical or electrical abuse. Storage preferably in cool, dry and ventilated area, which is subject to little temperature change. Storage at high temperatures should be avoided.

  Do not place the battery near heating equipment, nor expose to direct sunlight for long periods.
- **Other Precautions**

  The battery may explode or cause burns, if disassembled, crushed or exposed to fire or high temperatures.

  Do not short or install with incorrect polarity.
- **Storage**

  Store batteries in a dry place at normal room temperature.

Section 8 - Exposure Controls, Personal Protection

- **Exposure Limits**: No exposure to the battery components should occur during normal use.
- **Ventilation:** Not necessary under conditions of normal use.
- **Respiratory Protection**

  In case of battery venting, provide as much ventilation as possible. Avoid confined areas with venting cell cores. Respiratory Protection is not necessary under conditions of normal use.
- **Skin Protection:** None required for normal use. Use butyl rubber gloves when handling leaking

batteries..

- **Eye Protection:** None required for normal use. Wear safety goggles when handling leaking batteries.
- **Protective Gloves**

  Not need
- **Other Protective Clothing or Equipment**

  Not necessary under conditions of normal use.

  Personal Protection is recommended for venting battery: Respiratory protection, Protective gloves, protective clothing and safety glass with side shields.

Section 9 - Physical and Chemical Properties

Appearance and Odor: prismatic cell, no odor.

Water Solubility: Insoluble

Flash Point: Not Applicable

Section 10 - Stability and Reactivity

- **Stability**

  Stable
- **Conditions to Avoid**

  Heating, mechanical abuse and electrical abuse.
- **Hazardous Decomposition Products**

  N/A.
- **Hazardous Polymerization**

  N/A.

Section 11 - Toxicological Information

- **Potential Health Effects**: The chemicals in this product are contained in a sealed package. Exposure to the contents will not occur unless the battery leaks, is exposed to high temperatures or is mechanically, physically, or electrically abused.
- **Eye Contact**: Contact with battery contents may cause irritation.
- **Skin Contact**: Contact with battery contents may cause irritation.
- **Inhalation**: Inhalation of vapors or fumes released due to heat or a large number of leaking batteries may cause respiratory and eye irritation.
- **Ingestion**: Seek immediate medical advice. Batteries lodged in the esophagus should be removed immediately since leakage, caustic burns and perforation package occur as soon as two hours after ingestion. Irritation to the internal/external mouth areas, may occur following exposure to a leaking battery.

Section 12 - Ecological Information

When promptly used or disposed the battery does not present environmental hazard. When disposed, keep away from water, rain and snow.

Section 13 - Disposal Considerations

- **APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION**

  If batteries are still fully charged or only partially discharged, they can be considered a reactive hazardous waste because of significant amount of not reaction or unconsumed lithium remaining in the spent battery. The battery must be neutralized through an approved secondary treatment facility prior to disposal as a hazardous waste. Recycling of battery can be done in authorized facility, through licensed waste carrier.

  lithium ion cell batteries are labeled in compliance with the EU Battery Directive 2006/66/EC.

Section 14 - Transport Information

Emergency Phone Number:

CHEMTREC 24 Hour Emergency Response Hotline （+86-752-2606966）

Persons who prepare or offer lithium batteries for transport are required by regulation to be trained and certified.

The information provided below is for informational purposes only.

Lithium Ion Batteries
UN No.：UN3480
EmS No.:F-A,S-I
Marine pollutant:No
Proper shipping name:Lithium ion battery（Including lithium ion ploymer batteries）
Hazard classification: The goods shall be complied with the requirements of section IA of Packing Instructions 965 of 61 th DGR Manual of IATA（2020）Edition and special provision 188 of IMDG CODE（Amdt.39-18）Edition,including the passing of the UN38.3 test.

The products meet all the requirements of the IATA DGR 61th edition, under special provisions including UN 38.3 test . If the package exceeds the table 965 - the - standard, so it belongs to the ninth category of dangerous goods. Only cargo transport. According to the packing instructions 965 Part IA IATA 61th version of the DGR requirements.

Lithium ion cells and batteries must be offered for transport at a state of charge (SoC) not exceeding 30% of their rated design capacity from 1 April 2016.

Shipping packages containing rechargeable lithium batteries must be labeled, regardless of size or number of batteries, with a lithium battery handling label.

More information concerning shipping, testing, marking and packaging can be obtained from Label master at http://www.labelmaster.com.

Separate battery when shipping to prevent short-circuiting. They should be packed in strong packaging for support during transport. Take in a cargo of them without falling, dropping, and breakage. Prevent

collapse of cargo piles and wet by rain.

Section 15 - Regulatory Information

- **Law Information**

  《Dangerous Goods Regulation》

  《Recommendations on the Transport of Dangerous Goods Model Regulations》

  《International Maritime Dangerous Goods》

  《Technical Instructions for the Safe Transport of Dangerous Goods》

  《Classification and code of dangerous goods》

  《Occupational Safety and Health Act》(OSHA)

  《Toxic Substances Control Act》(TSCA)

  《Consumer Product Safety Act》(CPSA)

  《Federal Environmental Pollution Control Act》(FEPCA)

  《The Oil Pollution Act》(OPA)

  《Superfund Amendments and Reauthorization Act Title III (302/311/312/313)》(SARA)

  《Resource Conservation and Recovery Act》(RCRA)

  《Safety Drinking Water Act》(CWA)

  《California Proposition 65》

  《Code of Federal Regulations》(CFR)

EU BATTERY DIRECTIVE: These batteries comply with the Directive substance limits and labeling requirements.

EU REACH REGISTRATION: These products are manufactured articles and not subject to REACH registration requirements.

EU Labeling: lithium ion cell batteries are labeled in compliance with the EU Battery Directive 2006/66/EC.

Section 16 – Other Information

EVE Hazard Rating: Health: 0 Fire: 0 Reactivity: 0

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Data supplied is for use only in connection with occupational safety and health.

DISCLAIMER: This MSDS is intended to provide a brief summary of our knowledge and guidance regarding the use of this material. The information contained here has been compiled from sources considered by EVE to be dependable and is accurate to the best of the Company's knowledge. It is not meant to be an all inclusive document on worldwide hazard communication regulations.

Einhell®

TC-EH 500

D **Originalbetriebsanleitung**
Seilhebezug

GB **Original operating instructions**
Electric hoist

F **Instructions d'origine**
Commande Bowden à câble

I **Istruzioni per l'uso originali**
Paranco elettrico

S **Original-bruksanvisning**
Vinsch

CZ **Originální návod k obsluze**
Lanový zvedák

SK **Originálny návod na obsluhu**
Lanový navijak

NL **Originele handleiding**
Elektrische kabeltakel

E **Manual de instrucciones original**
Polipasto (cable de acero)

FIN **Alkuperäiskäyttöohje**
Sähkövinssi

RUS **Оригинальное руководство по эксплуатации электротельфер**

SLO **Originalna navodila za uporabo**
Vrvni dvigalni škripec

H **Eredeti használati utasítás**
Kötélemelővonó

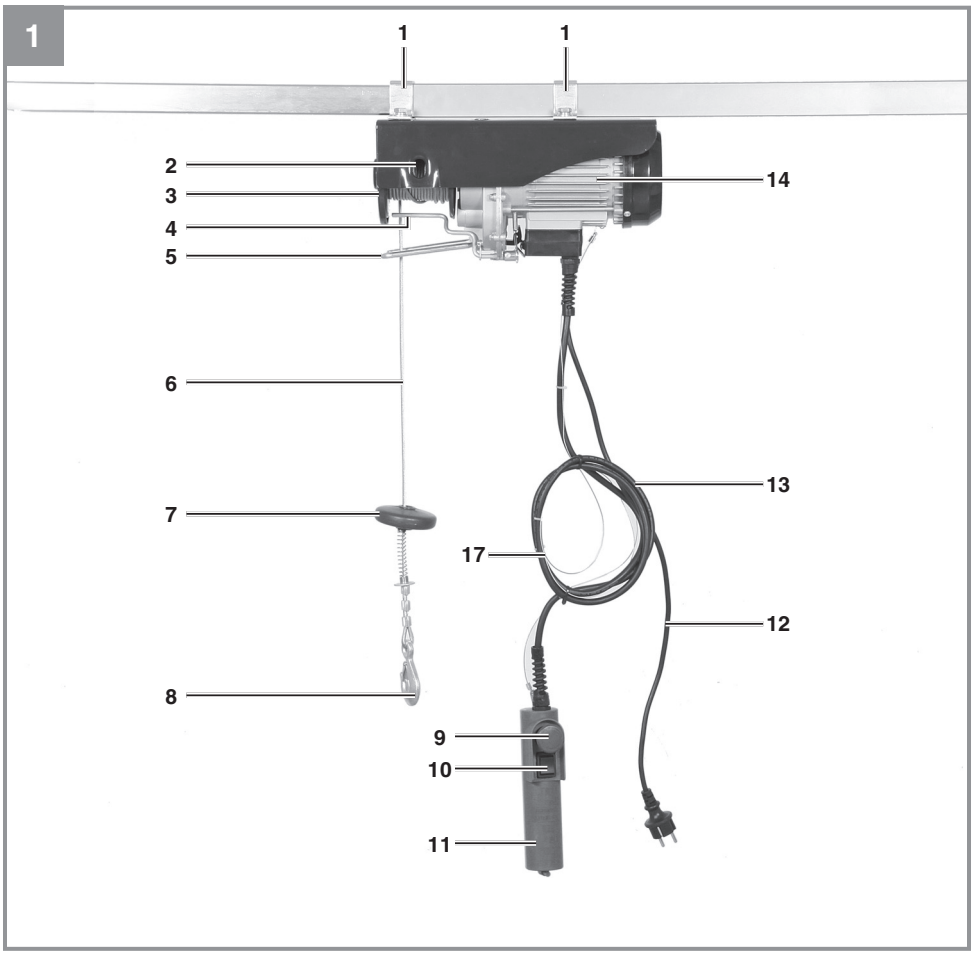
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Παλάγκο

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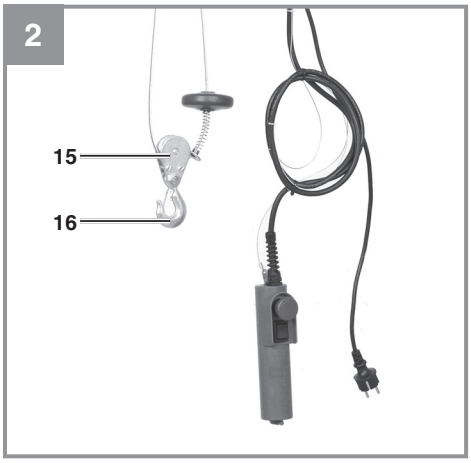
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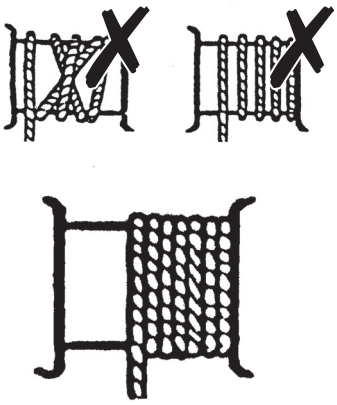
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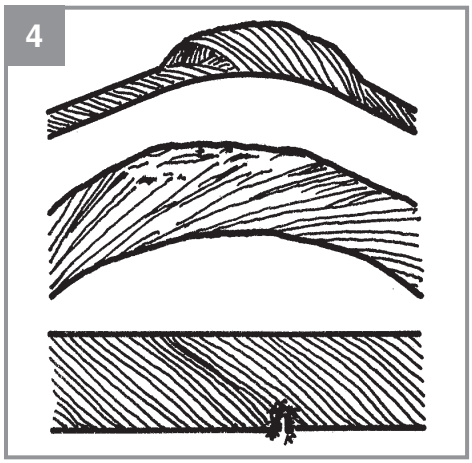
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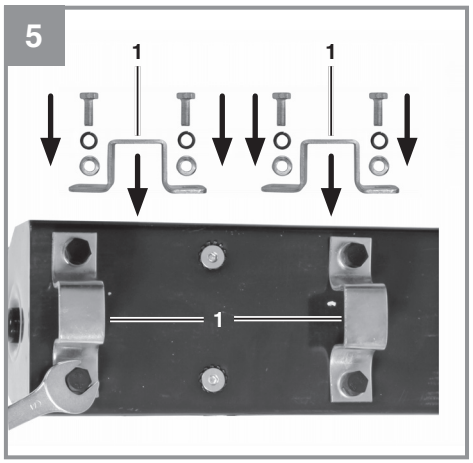


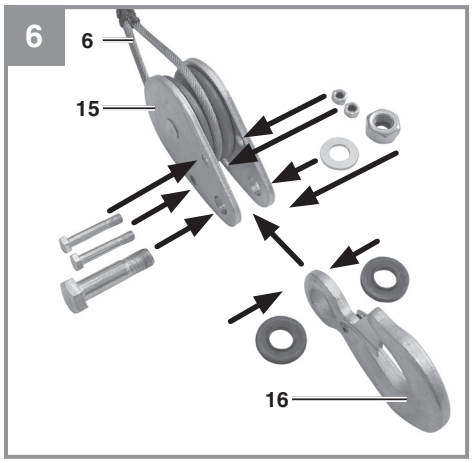
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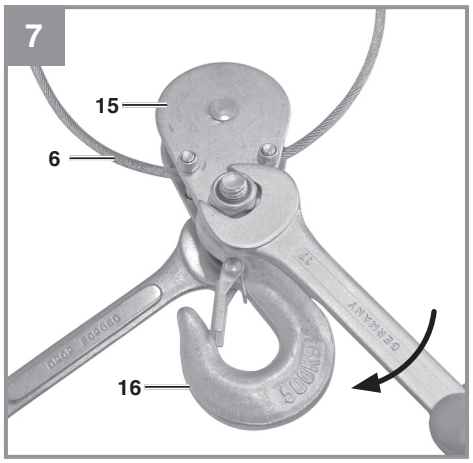


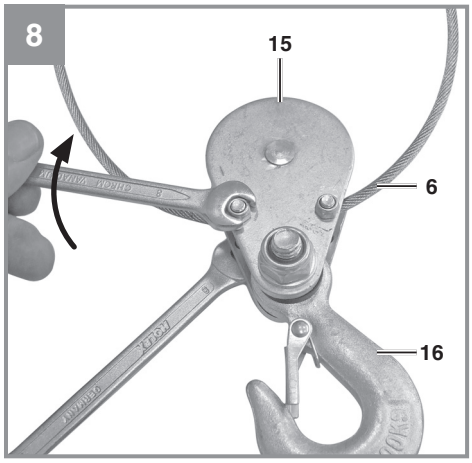
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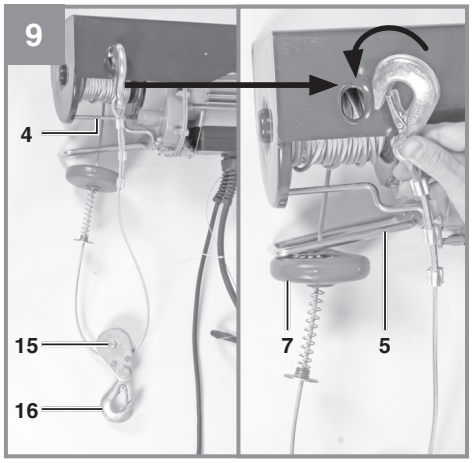












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Gefahr!
Beim Benutzen von Geräten müssen einige Sicherheitsvorkehrungen eingehalten werden, um Verletzungen und Schäden zu verhindern. Lesen Sie diese Bedienungsanleitung / Sicherheitshinweise deshalb sorgfältig durch. Bewahren Sie diese gut auf, damit Ihnen die Informationen jederzeit zur Verfügung stehen. Falls Sie das Gerät an andere Personen übergeben sollten, händigen Sie diese Bedienungsanleitung / Sicherheitshinweise bitte mit aus. Wir übernehmen keine Haftung für Unfälle oder Schäden, die durch Nichtbeachten dieser Anleitung und den Sicherheitshinweisen entstehen.

1. Sicherheitshinweise

Gefahr!
Lesen Sie alle Sicherheitshinweise und Anweisungen. Versäumnisse bei der Einhaltung der Sicherheitshinweise und Anweisungen können elektrischen Schlag, Brand und/oder schwere Verletzungen verursachen. **Bewahren Sie alle Sicherheitshinweise und Anweisungen für die Zukunft auf.**

1. Kontrollieren Sie stets ob die Netzspannung der Spannung auf dem Typenschild entspricht. Für den Fall, dass die Netzspannung nicht geeignet ist, kann dies zu abnormalem Arbeiten der Maschine und zu Personenschäden führen.
2. Die Stromversorgung muss eine Erdung besitzen und mit einem Fehlerstrom-Schutzschalter abgesichert sein.
3. Es ist verboten, Lasten die die Nennlast überschreiten, anzuheben.
4. Verwenden Sie das Gerät nur für den vorgesehenen Zweck. Nie Personen mit dem Seilhebezug anheben.
5. Ziehen Sie nicht am Kabel, um den Stecker zu ziehen. Halten Sie das Kabel von Hitze, Öl und scharfen Kanten fern.
6. Versuchen Sie nie, feste oder blockierte Lasten anzuheben.
7. Ziehen Sie den Netzstecker, wenn der Seilhebezug nicht in Gebrauch ist.
8. Halten Sie Kinder und andere nicht autorisierte Personen von der Maschine fern.
9. Es ist verboten Lasten seitwärts oder von einer Seite zu ziehen. Vermeiden Sie ein Schwingen der Last.
10. Stellen Sie sicher dass sich der Haken in die selbe Richtung wie auf dem Bedienschalter angezeigt bewegt.
11. Kontrollieren Sie den Seilhebezug regelmäßig auf Beschädigungen. Der Bedienschalter muss in gutem Zustand sein.
12. Lassen Sie Reparaturen und Wartungsarbeiten nur in autorisierten Fachwerkstätten durch einen Elektrofachmann durchführen. Reparaturen dürfen nur von einer Elektrofachkraft ausgeführt werden, andernfalls können Unfälle für den Betreiber entstehen.
13. Vermeiden Sie schnelles An- und Abschalten (Tippbetrieb).
14. Seien Sie bei der Bedienung des Seilhebezuges stets aufmerksam.
15. Stehen oder arbeiten Sie nicht unter der gehobenen Last.

2. Gerätebeschreibung und Lieferumfang

2.1 Gerätebeschreibung (Bild 1/2)
1. Befestigungsbügel
2. Befestigungsloch für Haken
3. Trommel
4. Hebel für maximale Seillänge
5. Hebel des automatischen Stoppmechanismus
6. Stahlseil
7. Abschaltgewicht
8. Haken
9. Not-Aus-Schalter
10. Drucktaster
11. Fernbedienung
12. Netzkabel
13. Steuerleitung
14. Motor
15. Umlenkrolle
16. Zusatzhaken
17. Seil für Fernbedienung

2.2 Lieferumfang
Bitte überprüfen Sie die Vollständigkeit des Artikels anhand des beschriebenen Lieferumfangs. Bei Fehlteilen wenden Sie sich bitte spätestens innerhalb von 5 Arbeitstagen nach Kauf des Artikels unter Vorlage eines gültigen Kaufbeleges an unser Service Center oder an die Verkaufstelle, bei der Sie das Gerät erworben haben. Bitte beachten Sie hierzu die Gewährleistungstabelle in den Service-Informationen am Ende der Anleitung.

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- Öffnen Sie die Verpackung und nehmen Sie das Gerät vorsichtig aus der Verpackung.
- Entfernen Sie das Verpackungsmaterial sowie Verpackungs-/ und Transportsicherungen (falls vorhanden).
- Überprüfen Sie, ob der Lieferumfang vollständig ist.
- Kontrollieren Sie das Gerät und die Zubehörteile auf Transportschäden.
- Bewahren Sie die Verpackung nach Möglichkeit bis zum Ablauf der Garantiezeit auf.

Gefahr!
Gerät und Verpackungsmaterial sind kein Kinderspielzeug! Kinder dürfen nicht mit Kunststoffbeuteln, Folien und Kleinteilen spielen! Es besteht Verschluckungs- und Erstickungsgefahr!

- Originalbetriebsanleitung

3. Bestimmungsgemäße Verwendung

Der Seilhebezug dient zum Heben und Absenken von Lasten in geschlossenen Räumen entsprechend der Geräteleistung.

Die Maschine darf nur nach ihrer Bestimmung verwendet werden. Jede weitere darüber hinausgehende Verwendung ist nicht bestimmungsgemäß. Für daraus hervorgerufene Schäden oder Verletzungen aller Art haftet der Benutzer/Bediener und nicht der Hersteller.

Bitte beachten Sie, dass unsere Geräte bestimmungsgemäß nicht für den gewerblichen, handwerklichen oder industriellen Einsatz konstruiert wurden. Wir übernehmen keine Gewährleistung, wenn das Gerät in Gewerbe-, Handwerks- oder Industriebetrieben sowie bei gleichzusetzenden Tätigkeiten eingesetzt wird.

4. Technische Daten

Spannung (V)	230 V ~ 50 Hz
Nennstrom (A)	4,4
Leistungsaufnahme (W)	1000
Betriebsart	S3 20% 10 min
Nennlast (kg)	250 / 500
Hebehöhe (m)	11,5 / 5,7
Nenngeschwindigkeit (m/min)	8 / 4
Durchmesser des Stahlseiles (mm)	4,0
Zugfestigkeit des Stahlseils (N/mm^2)	1870
Isolationsklasse	B
Schutzart	IP54
Triebwerksklasse	M1
Nettogewicht (kg)	16,2

Betriebsart S3 - 20% - 10min: S3 = Aussetzbetrieb ohne Einfluss des Anlaufvorganges. Dies bedeutet, dass während eines Zeitraums von 10 min die max. Betriebszeit 20% (2 Min) beträgt.

Beschränken Sie die Geräuschentwicklung und Vibration auf ein Minimum!
- Verwenden Sie nur einwandfreie Geräte.
- Warten und reinigen Sie das Gerät regelmäßig.
- Passen Sie Ihre Arbeitsweise dem Gerät an.
- Überlasten Sie das Gerät nicht.
- Lassen Sie das Gerät gegebenenfalls überprüfen.
- Schalten Sie das Gerät aus, wenn es nicht benutzt wird.
- Tragen Sie Handschuhe.

5. Vor Inbetriebnahme

Überzeugen Sie sich vor dem Anschließen, dass die Daten auf dem Typenschild mit den Netzdaten übereinstimmen.
Warnung!
Ziehen Sie immer den Netzstecker, bevor Sie Einstellungen am Gerät vornehmen.

- Der Seilhebezug ist nicht für den Transport von heißen und/oder geschmolzenen Massen geeignet, des Weiteren ist der Seilhebezug nicht für den Einsatz bei niedrigen Temperaturen und in aggressiver Umwelt vorgesehen.
- Mechanische Gruppe ist M1.
- Die Nutzungsdauer des Seilhebezuges ist ca. 8000 Zyklen (exkl. Verschleißteile). Wenn der

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Zug 8000 Zyklen durchlaufen hat, müssen alle mechanischen Teile kontrolliert und überholt werden.
- Lesen und verstehen Sie die Bedienungsanleitung, bevor Sie den Seilhebezug benutzen.
- Stellen Sie sicher, dass die Bedienperson weiß, wie die Maschine funktioniert, und wie sie betrieben werden sollte.
- Der Nutzer sollte immer in Übereinstimmung mit der Bedienungsanleitung operieren.
- Der Hebezug ist nicht für den Dauereinsatz vorgesehen. Die Betriebsart ist: Aussetzbetrieb ohne Einfluss des Anlaufvorganges.
- Die Nennleistung der Maschine variiert nicht mit der Position der Belastung.

5.1 Auspacken
Nach dem Öffnen der Verpackung inspizieren Sie bitte den Rahmen, das Stahlseil, die Haken, und den elektrischen Kontrollmechanismus auf mögliche Transportschäden.

5.2 Montage (Bild 5)
Der Seilhebezug ist mit 2 Befestigungsbügeln (1) ausgestattet, mit denen er an einem Vierkantrohr befestigt werden muss. Die Abmessungen des Auslegers müssen in Übereinstimmung mit der Größe der Befestigungsbügel (1) sein und er muss die zweifache Nennlast tragen können. Wir empfehlen Ihnen, Kontakt mit einem qualifizierten Techniker aufzunehmen.
Alle Schrauben müssen richtig angezogen werden. Vor der Inbetriebnahme sollte ein qualifizierter Techniker die Verankerung des Auslegers überprüfen.

5.3 Flaschenzugfunktion (Bild 6-9)
Der Seilhebezug ist mit einer Umlenkrolle (15) und einem Zusatzhaken (16) ausgestattet. Bei richtiger Verwendung kann der Seilhebezug die doppelte Last heben.
Montieren Sie Umlenkrolle (15) und Zusatzhaken (16) wie in Bild 6-8 dargestellt. Der fest montierte Haken (8) muss am Befestigungsloch (2) eingehängt werden (Bild 9).
Die Last wird nun mit Hilfe von zwei Stahlseilen angehoben, der Seilhebezug kann somit die doppelte Last anheben.

6. Bedienung

Gefahr!
6.1 Hinweise zum Betrieb
1. Entfernen Sie vor der ersten Benutzung das Klebeband von der Trommel (3).
2. Der Wert der A-bewerteten Lärmemission an der Betreiberposition ist niedriger als 75dB (Schalldruckpegel L_{pA}). Die Geräusch- und Vibrationswerte wurden entsprechend EN ISO 11201 ermittelt.
3. Versorgungsspannung: 230V ± 10%, 50Hz ± 1%.
4. Der Seilhebezug ist bei Umgebungstemperaturen zwischen 0 °C und 40 °C relative Luftfeuchtigkeit unter 50% zu betreiben. Höhe über dem Meeresspiegel: max. 1000 m.
5. Für Transport und Lagerung darf die Temperatur zwischen -25 °C und 55 °C betragen. Die höchste zulässige Temperatur darf nicht über 70 °C betragen.
6. Der Nutzer sollte die Last vom Boden mit der geringsten möglichen Geschwindigkeit anheben. Das Seil sollte gestrafft sein, wenn die Last angehoben wird.
7. Der Motor (14) des Seilhebezuges ist mit einem Thermostatschalter ausgestattet. Während des Betriebes des Seilhebezuges kann es daher zum Stoppen des Motors (14) kommen, dieser läuft automatisch wieder an wenn er abgekühlt ist.
8. Der elektrische Seilhebezug ist nicht mit einem Nennleistungsbegrenzer ausgestattet. Deshalb, bitte nicht weiter Versuchen die Last anzuheben, wenn der Überhitzungsschutz den Betrieb begrenzt. Die Last überschreitet in diesem Fall die Nennleistung des Seilhebezuges.
9. Lassen Sie keine hängenden Lasten unbeaufsichtigt ohne entsprechende Sicherheitsvorkehrungen getroffen zu haben.
10. Sichern Sie das Gerät mit einer 10 A Sicherung oder einem 10 mA Fehlerstrom-Schutzschalter ab um den Stromkreis zu schützen.
11. Verwenden Sie die Hebel (4/5) nicht als Routine Stoppvorrichtung. Diese dienen nur als Stoppvorrichtung für den Notfall.
12. Bevor Sie beginnen, stellen Sie sicher, dass das Stahlseil (6) korrekt um die Trommel (3) gewickelt ist und der Abstand zwischen den Windungen kleiner als das Stahlseil ist (Bild. 3)
13. Stellen Sie sicher, dass die Ladung ordnungsgemäß am Haken (8) beziehungsweise

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bei Flaschenzugbetrieb dem Zusatzhaken (16) gesichert ist und halten Sie stets Abstand zur Last und dem Stahlseil (6).

6.2 Betrieb (Bild 1)

- Überprüfen Sie, ob der Not-Aus-Schalter (9) gedrückt ist. Drehen Sie den roten Stoppschalter im Uhrzeigersinn um ihn zu entriegeln.
- Drücken Sie den Drucktaster ▲ (10) zum Anheben der Last.
- Drücken Sie den Drucktaster ▼ (10) zum Senken der Last.
- Hebel des automatischen Stoppmechanismus (5): Wenn die maximale Hebehöhe erreicht ist, drückt das Abschaltgewicht (7) den Hebel (5) nach oben. Dadurch wird ein Endschalter betätigt und die Last kann nicht weiter angehoben werden.
- Hebel für maximale Seillänge (4): Wenn die Last die niedrigste mögliche Position erreicht hat, wird ein Endschalter betätigt, der ein weiteres Absenken der Last nicht ermöglicht. Dieser Endschalter würde auch einen Betrieb des Seilhebezuges in falscher Richtung (Haken bewegt sich entgegengesetzt zur am Bedienschalter angezeigten Richtung) verhindern.
- Wenn der Not-Aus-Schalter (9) betätigt wird, hält der Seilhebezug an.
- Im Falle eines Notfalls, sofort Not-Aus-Schalter (9) betätigen um den Seilhebezug anzuhalten. Die Bedienung des Seilhebezuges ist nicht möglich, wenn der Not-Aus-Schalter betätigt wurde.

7. Austausch der Netzanschlussleitung

Gefahr!
Wenn die Netzanschlussleitung dieses Gerätes beschädigt wird, muss sie durch den Hersteller oder seinen Kundendienst oder eine ähnlich qualifizierte Person ersetzt werden, um Gefährdungen zu vermeiden.

8. Reinigung, Wartung und Ersatzteilbestellung

Gefahr!
Ziehen Sie vor allen Reinigungsarbeiten den Netzstecker.

8.1 Reinigung

- Halten Sie Schutzvorrichtungen, Luftschlitze und Motorengehäuse so staub- und schmutzfrei wie möglich. Reiben Sie das Gerät mit einem sauberen Tuch ab oder blasen Sie es mit Druckluft bei niedrigem Druck aus.
- Wir empfehlen, dass Sie das Gerät direkt nach jeder Benutzung reinigen.
- Reinigen Sie das Gerät regelmäßig mit einem feuchten Tuch und etwas Schmierseife. Verwenden Sie keine Reinigungs- oder Lösungsmittel; diese könnten die Kunststoffteile des Gerätes angreifen. Achten Sie darauf, dass kein Wasser in das Geräteinnere gelangen darf. Das Eindringen von Wasser in ein Elektrogerät erhöht das Risiko eines elektrischen Schlages.

8.2 Wartung
Gefahr! Stellen Sie stets sicher, dass die Maschine nicht mit dem Stromnetz verbunden ist, wenn Sie die Maschine pflegen.

- Nachstehend: Ein Zyklus entspricht einer Auf- und Abwärtsbewegung einer Last. Periodische Prüfung entspricht einer Prüfung nach 100 Zyklen.
- Überprüfen Sie periodisch, dass die Endschalter des Seilhebezugs ordnungsgemäß funktionieren. Die Prüfung erfolgt folgendermaßen: Wenn das Seil die maximale Hebehöhe erreicht, wird der Hebel des automatischen Stoppmechanismus (5) betätigt. Der Motor (14) muss nun stoppen. (ohne Last prüfen).
  Wenn das Stahlseil (6) so weit wie möglich abgewickelt ist, wird der Hebel für maximale Seillänge (4) betätigt. Der Motor (14) muss nun stoppen.
- Prüfen Sie periodisch das Netzkabel (12) und die Steuerleitung (13).
- Alle 200 Zyklen müssen Stahlseil (6) und Umlenkrolle (15) geschmiert werden.
- Alle 30 Zyklen muss entsprechend Bild 4 kontrolliert werden, ob das gesamte Stahlseil (6) in gutem Zustand ist. Falls es beschädigt ist, muss es durch ein den technischen Daten entsprechendes Stahlseil ersetzt werden.

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- Alle 1000 Zyklen prüfen, ob die Schrauben der Befestigungsbügel (1) und Umlenkrolle (15) gut angezogen sind.
- Alle 1000 Zyklen prüfen, ob die Haken (8/16) und die Umlenkrolle (15) in gutem Zustand sind.
- Schmieren Sie regelmäßig das Seil, Kette, Getriebe, Lager und Haken.
- Prüfen Sie alle 1000 Zyklen Verschleißteile wie: Seil, Kette, Haken, Bänder und Bremsbeläge.
- Kontrollieren Sie vor jeder Benutzung des Seilhebezuges, ob Not-Aus-Schalter (9) und Drucktaster (10) in einwandfreiem Betriebszustand sind.
- Alle 1000 Zyklen das Bremssystem überprüfen. Wenn der Motor (14) ungewöhnliche Geräusche macht oder die Nennlast nicht anheben kann, ist es möglich, dass das Bremssystem überholt werden muss:
  - Ersetzen Sie beschädigte oder abgenutzte Teile, und bewahren Sie die dazugehörige Wartungsdokumentation auf.
  - Für außerplanmäßige Instandhaltungsarbeiten wenden Sie sich bitte an ein autorisiertes Servicecenter.
- Lassen Sie ihr Elektrowerkzeug nur von qualifiziertem Fachpersonal reparieren.

8.3 Ersatzteilbestellung:
Bei der Ersatzteilbestellung sollten folgende Angaben gemacht werden;

- Typ des Gerätes
- Artikelnummer des Gerätes
- Ident-Nummer des Gerätes
- Ersatzteilnummer des erforderlichen Ersatzteils

Aktuelle Preise und Infos finden Sie unter www.isc-gmbh.info

9. Entsorgung und Wiederverwertung

Das Gerät befindet sich in einer Verpackung um Transportschäden zu verhindern. Diese Verpackung ist Rohstoff und ist somit wieder verwendbar oder kann dem Rohstoffkreislauf zurückgeführt werden. Das Gerät und dessen Zubehör bestehen aus verschiedenen Materialien, wie z.B. Metall und Kunststoffe. Defekte Geräte gehören nicht in den Hausmüll. Zur fachgerechten Entsorgung sollte das Gerät an einer geeigneten Sammelstellen abgegeben werden. Wenn Ihnen keine Sammelstelle bekannt ist, sollten Sie bei der Gemeindeverwaltung nachfragen.

10. Lagerung

Lagern Sie das Gerät und dessen Zubehör an einem dunklen, trockenen und frostfreiem Ort. Die optimale Lagertemperatur liegt zwischen 5 und 30 ˚C. Bewahren Sie das Elektrowerkzeug in der Originalverpackung auf.

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Nur für EU-Länder

Werfen Sie Elektrowerkzeuge nicht in den Hausmüll!

Gemäß europäischer Richtlinie 2012/19/EU über Elektro- und Elektronik-Altgeräte und Umsetzung in nationales Recht müssen verbrauchte Elektrowerkzeuge getrennt gesammelt werden und einer umweltgerechten Wiederverwertung zugeführt werden.

Recycling-Alternative zur Rücksendeaufforderung:
Der Eigentümer des Elektrogerätes ist alternativ anstelle Rücksendung zur Mitwirkung bei der sachgerechten Verwertung im Falle der Eigentumsaufgabe verpflichtet. Das Altgerät kann hierfür auch einer Rücknahmestelle überlassen werden, die eine Beseitigung im Sinne der nationalen Kreislaufwirtschafts- und Abfallgesetze durchführt. Nicht betroffen sind den Altgeräten beigefügte Zubehörteile und Hilfsmittel ohne Elektrobestandteile.

Der Nachdruck oder sonstige Vervielfältigung von Dokumentation und Begleitpapieren der Produkte, auch auszugsweise, ist nur mit ausdrücklicher Zustimmung der iSC GmbH zulässig.

Technische Änderungen vorbehalten

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Service-Informationen

Wir unterhalten in allen Ländern, welche in der Garantieurkunde benannt sind, kompetente Service-Partner, deren Kontakte Sie der Garantieurkunde entnehmen. Diese stehen Ihnen für alle Service-Belange wie Reparatur, Ersatzteil- und Verschleißteil-Versorgung oder den Bezug von Verbrauchsmaterialien zur Verfügung.

Es ist zu beachten, dass bei diesem Produkt folgende Teile einem gebrauchsgemäßen oder natürlichen Verschleiß unterliegen bzw. folgende Teile als Verbrauchsmaterialien benötigt werden.

Kategorie	Beispiel
Verschleißteile*	Stahlseil, Haken, Umlenkrolle, Zusatzhaken
Verbrauchsmaterial/ Verbrauchsteile*	
Fehlteile	

* nicht zwingend im Lieferumfang enthalten!

Bei Mängel oder Fehlern bitten wir Sie, den Fehlerfall im Internet unter www.isc-gmbh.info anzumelden. Bitte achten Sie auf eine genaue Fehlerbeschreibung und beantworten Sie dazu in jedem Fall folgende Fragen:

- Hat das Gerät bereits einmal funktioniert oder war es von Anfang an defekt?
- Ist Ihnen vor dem Auftreten des Defektes etwas aufgefallen (Symptom vor Defekt)?
- Welche Fehlfunktion weist das Gerät Ihrer Meinung nach auf (Hauptsymptom)? Beschreiben Sie diese Fehlfunktion.

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Garantieurkunde

Sehr geehrte Kundin, sehr geehrter Kunde,
unsere Produkte unterliegen einer strengen Qualitätskontrolle. Sollte dieses Gerät dennoch einmal nicht einwandfrei funktionieren, bedauern wir dies sehr und bitten Sie, sich an unseren Servicedienst unter der auf dieser Garantiekarte angegebenen Adresse zu wenden. Gerne stehen wir Ihnen auch telefonisch über die angegebene Servicerufnummer zur Verfügung. Für die Geltendmachung von Garantieansprüchen gilt folgendes:

1. Diese Garantiebedingungen richten sich ausschließlich an Verbraucher, d. h. natürliche Personen, die dieses Produkt weder im Rahmen ihrer gewerblichen noch anderen selbständigen Tätigkeit nutzen wollen. Diese Garantiebedingungen regeln zusätzliche Garantieleistungen, die der u. g. Hersteller zusätzlich zur gesetzlichen Gewährleistung Käufern seiner Neugeräte verspricht. Ihre gesetzlichen Gewährleistungsansprüche werden von dieser Garantie nicht berührt. Unsere Garantieleistung ist für Sie kostenlos.
2. Die Garantieleistung erstreckt sich ausschließlich auf Mängel an einem von Ihnen erworbenen neuen Gerät des u. g. Herstellers, die auf einem Material- oder Herstellungsfehler beruhen und ist nach unserer Wahl auf die Behebung solcher Mängel am Gerät oder den Austausch des Gerätes beschränkt. Bitte beachten Sie, dass unsere Geräte bestimmungsgemäß nicht für den gewerblichen, handwerklichen oder beruflichen Einsatz konstruiert wurden. Ein Garantievertrag kommt daher nicht zustande, wenn das Gerät innerhalb der Garantiezeit in Gewerbe-, Handwerks- oder Industriebetrieben verwendet wurde oder einer gleichzusetzenden Beanspruchung ausgesetzt war.
3. Von unserer Garantie ausgenommen sind:
   - Schäden am Gerät, die durch Nichtbeachtung der Montageanleitung oder aufgrund nicht fachgerechter Installation, Nichtbeachtung der Gebrauchsanleitung (wie durch z.B. Anschluss an eine falsche Netzspannung oder Stromart) oder Nichtbeachtung der Wartungs- und Sicherheitsbestimmungen oder durch Aussetzen des Geräts an anomale Umweltbedingungen oder durch mangelnde Pflege und Wartung entstanden sind.
   - Schäden am Gerät, die durch missbräuchliche oder unsachgemäße Anwendungen (wie z.B. Überlastung des Gerätes oder Verwendung von nicht zugelassenen Einsatzwerkzeugen oder Zubehör), Eindringen von Fremdkörpern in das Gerät (wie z.B. Sand, Steine oder Staub, Transportschäden), Gewaltanwendung oder Fremdeinwirkungen (wie z. B. Schäden durch Herunterfallen) entstanden sind.
   - Schäden am Gerät oder an Teilen des Geräts, die auf einen gebrauchsgemäßen, üblichen oder sonstigen natürlichen Verschleiß zurückzuführen sind.
4. Die Garantiezeit beträgt 24 Monate und beginnt mit dem Kaufdatum des Gerätes. Garantieansprüche sind vor Ablauf der Garantiezeit innerhalb von zwei Wochen, nachdem Sie den Defekt erkannt haben, geltend zu machen. Die Geltendmachung von Garantieansprüchen nach Ablauf der Garantiezeit ist ausgeschlossen. Die Reparatur oder der Austausch des Gerätes führt weder zu einer Verlängerung der Garantiezeit noch wird eine neue Garantiezeit durch diese Leistung für das Gerät oder für etwaige eingebaute Ersatzteile in Gang gesetzt. Dies gilt auch bei Einsatz eines Vor-Ort-Services.
5. Für die Geltendmachung Ihres Garantieanspruches melden Sie bitte das defekte Gerät an unter: www.isc-gmbh.info. Halten Sie bitte den Kaufbeleg oder andere Nachweise Ihres Kaufs des Neugeräts bereit. Geräte, die ohne entsprechende Nachweise oder ohne Typenschild eingesendet werden, sind von der Garantieleistung aufgrund mangelnder Zuordnungsmöglichkeit ausgeschlossen. Ist der Defekt des Gerätes von unserer Garantieleistung erfasst, erhalten Sie umgehend ein repariertes oder neues Gerät zurück.

Selbstverständlich beheben wir gegen Erstattung der Kosten auch gerne Defekte am Gerät, die vom Garantieumfang nicht oder nicht mehr erfasst sind. Dazu senden Sie das Gerät bitte an unsere Serviceadresse.
Für Verschleiß-, Verbrauchs- und Fehlteile verweisen wir auf die Einschränkungen dieser Garantie gemäß den Service-Informationen dieser Bedienungsanleitung.

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Sehr geehrte Kundin, sehr geehrter Kunde,
um Ihnen noch mehr Service zu bieten, haben Sie die Möglichkeit auf unserem Onlineportal weitere Informationen abzurufen.

Sollten einmal Probleme oder Fragen zu Ihrem Produkt auftreten, können Sie schnell und einfach unter www.isc-gmbh.info viele Aktionen durchführen. Hier einige Beispiele:

- Ersatzteile bestellen
- Aktuelle Preisauskünfte
- Verfügbarkeiten der Ersatzteile
- Servicestellen Vorort für Benzingeräte
- Defekte Geräte anmelden
- Garantieverlängerungen (nur bei bestimmten Geräten)
- Bestellverfolgung

Wir freuen uns auf Ihren Besuch online unter www.isc-gmbh.info!



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Danger!
When using the equipment, a few safety precautions must be observed to avoid injuries and damage. Please read the complete operating instructions and safety regulations with due care. Keep this manual in a safe place, so that the information is available at all times. If you give the equipment to any other person, hand over these operating instructions and safety regulations as well. We cannot accept any liability for damage or accidents which arise due to a failure to follow these instructions and the safety instructions.

1. Safety regulations

Danger!
Read all safety regulations and instructions.
Any errors made in following the safety regulations and instructions may result in an electric shock, fire and/or serious injury.
Keep all safety regulations and instructions in a safe place for future use.

1. Always check that the mains voltage is identical to the voltage quoted on the rating plate. In the event that the mains voltage is not suitable, it may cause the machine to work abnormally and thus result in personal injury.
2. The power supply must be earthed and be secured by a residual current operated circuit breaker (RCCB).
3. Do not attempt to lift loads that exceed the rated load.
4. Use the machine only for the purpose for which it is designed. Never lift personnel using the cable hoist.
5. Do not pull the power cable in order to pull out the plug. Protect the power cable from heat, oil and sharp edges.
6. Never attempt to raise fixed or jammed loads.
7. Pull out the plug when the cable hoist is not in use.
8. Keep children and other unauthorized persons away from the machine.
9. Do not pull loads sideways or from one side. Do not allow the load to swing.
10. Ensure that the hook moves in the same direction as shown on the control switch.
11. Check the cable hoist at regular intervals for signs of damage. The control switch must be in good condition.
12. Have repair and servicing work carried out only by authorized workshops by a trained electrician. Repair work must only be carried out by a trained electrician, otherwise the machine may cause accidents.
13. Do not switch the machine on and off quickly (inching mode).
14. Always concentrate fully when operating the cable hoist.
15. Do not stand or work under the raised load.

2. Layout and items supplied

2.1 Layout (Fig. 1/2)
1. Fastening bar
2. Fastening hole for hook
3. Drum
4. Lever for maximum cable length
5. Automatic stop mechanism lever
6. Steel cable
7. Cut-out weight
8. Hook
9. Emergency Stop switch
10. Pushbutton
11. Remote control
12. Power cable
13. Control cable
14. Motor
15. Return roller
16. Additional hook
17. Cable for remote control

2.2 Items supplied
Please check that the article is complete as specified in the scope of delivery. If parts are missing, please contact our service center or the sales outlet where you made your purchase at the latest within 5 working days after purchasing the product and upon presentation of a valid bill of purchase. Also, refer to the warranty table in the service information at the end of the operating instructions.
- Open the packaging and take out the equipment with care.
- Remove the packaging material and any packaging and/or transportation braces (if available).
- Check to see if all items are supplied.
- Inspect the equipment and accessories for transport damage.
- If possible, please keep the packaging until the end of the guarantee period.

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Danger!
The equipment and packaging material are not toys. Do not let children play with plastic bags, foils or small parts. There is a danger of swallowing or suffocating!

- Original operating instructions

3. Proper use

The cable hoist is designed for lifting and lowering loads in enclosed areas commensurate with the machine's capacity.

The equipment is to be used only for its prescribed purpose. Any other use is deemed to be a case of misuse. The user / operator and not the manufacturer will be liable for any damage or injuries of any kind caused as a result of this.

Please note that our equipment has not been designed for use in commercial, trade or industrial applications. Our warranty will be voided if the machine is used in commercial, trade or industrial businesses or for equivalent purposes.

4. Technical data

Voltage (V)	230 V ~ 50 Hz
Rated current (A)	4,4
Power consumption (W)	1000
Operating mode	S3 20% 10 min
Rated load (kg)	250 / 500
Lifting height (m)	11,5 / 5,7
Rated speed (m/min)	8 / 4
Diameter of steel cable (mm)	4,0
Tensile strength of the steel cable (N/mm²)	1870
Insulation class	B
Protection type	IP 54
Drive unit class	M1
Net weight (kg)	16,2

Operating mode S3 – 20% - 10 minutes:
S3 = Intermittent mode without influencing the starting process. This means that the maximum operating period over a time of 10 minutes is 20% (2 minutes).

Keep the noise emissions and vibrations to a minimum.
- Only use appliances which are in perfect working order.
- Service and clean the appliance regularly.
- Adapt your working style to suit the appliance.
- Do not overload the appliance.
- Have the appliance serviced whenever necessary.
- Switch the appliance off when it is not in use.
- Wear protective gloves.

5. Before starting the equipment

Before you connect the equipment to the mains supply make sure that the data on the rating plate are identical to the mains data.
Warning!
Always pull the power plug before making adjustments to the equipment.

- The cable hoist is not suitable for transporting hot and/or molten masses and in addition it is not suitable for use at low temperatures or in aggressive atmospheres.
- It is in mechanical group M1.
- The service life of the cable hoist is approximately 8000 cycles (excluding wearing parts). When the hoist has completed 8000 cycles, all its mechanical parts must be checked and overhauled.
- Read and absorb the operating instructions before you use the cable hoist.
- Ensure that the operator knows how the machine works and how it should be operated.
- The user should always operate as set out in the operating instructions.
- The cable hoist is not designed for continuous operation. Its mode of operation is: Intermittent mode without influencing the starting process.
- The rated capacity of the machine does not vary due to the position of the load.

5.1 Unpacking
After opening the packaging, inspect the frame, the steel cable, the hook and the electric control mechanism for signs of possible transit damage.

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5.2 Assembly (Fig. 5)
The cable hoist is fitted with two fastening bars (1) with which it has to be fastened to a rectangular tube. The dimensions of the arm must conform with the size of the fastening bars (1) and must be capable of supporting twice the rated load. We recommend that you seek advice from a qualified technician.
All screws must be tightened correctly. A qualified technician should check the anchoring of the arm before the machine is started.

5.3 Block and tackle function (Fig. 6 – 9)
The cable hoist is fitted with a return roller (15) and an additional hook (16). If these parts are used correctly, the cable hoist can lift twice its rated load.
Fit the return roller (15) and additional hook (16) as shown in Figure 6 – 8. The permanent hook (8) must be attached to the fastening hole (2) (Fig. 9). The load is now raised by two steel cables, which means that the cable hoist can lift twice its rated load.

6. Operation

Danger!
6.1 Information for operation
1. Remove the adhesive tape from the drum (3) before using the hoist for the first time.
2. The value of the A-rated noise emissions at the operator's position is less than 75 dB (sound pressure level LpA). Sound and vibration values were measured in accordance with EN ISO 11201.
3. Supply voltage: 230 V ± 10%, 50 Hz ± 1%.
4. The cable hoist must be operated in ambient temperatures of between 0°C and 40°C with a relative humidity of less than 50%. Height above sea level: max. 1,000 m.
5. The temperature for transport and storage may be between -25°C and 55°C. The maximum temperature must not exceed 70°C.
6. The user should lift the load off the ground at the slowest possible speed. The cable should be taut when the load is raised.
7. The motor (14) for the cable hoist is fitted with a thermostat switch. Whilst the cable hoist is operating, the motor (14) may therefore stop. It will restart automatically when it has cooled down.
8. The electric cable hoist is not fitted with a rated power limiter. You should therefore not repeat attempts to lift a load if the overload trip is limiting the hoist's operation. In this case the load exceeds the rated capacity of the cable hoist.
9. Do not leave any suspended loads unsupervised without first taking the appropriate safety precautions.
10. Fit the machine with a 10 A fuse or a 10 mA residual current operated circuit breaker (RCCB) to protect the circuit
11. Do not use the lever (4/5) as a routine stopping device. It should only be used to stop the machine in an emergency.
12. Before you start, ensure that the steel cable (6) is correctly wound around the drum (3) and that the spacing between the windings is smaller than the steel cable (Fig. 3)
13. Ensure that the load is correctly secured to the hook (8) or, if you are using the block and tackle, the additional hook (16) and always maintain a safe distance from the load and the steel cable (6).

6.2 Operation (Fig. 10)
- Check whether the Emergency Stop switch (9) is pressed. Turn the red stop switch clockwise to release it.
- Press the pushbutton ▲ (10) to raise the load.
- Press the pushbutton ▼ (10) to lower the load.
- Automatic stop mechanism lever (5): When the maximum lifting height has been reached, the cut-out weight (7) presses the lever (5) upwards. This trips a limit switch after which the load cannot be raised any further.
- Lever for maximum cable length (4): When the load has reached its lowest possible position, a limit switch is tripped which makes it impossible to lower the load any further. This limit switch also prevents the cable hoist operating in the wrong direction (hook moving in the opposite direction to the arrow shown on the control switch).
- The cable hoist will stop if the Emergency Stop switch (9) is pressed.
- In an emergency, immediately press the Emergency Stop switch (9) to stop the cable hoist. The cable hoist cannot be operated if the Emergency Stop switch has been pressed.

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7. Replacing the power cable

Danger!
If the power cable for this equipment is damaged, it must be replaced by the manufacturer or its after-sales service or similarly trained personnel to avoid danger.

8. Cleaning, maintenance and ordering of spare parts

Danger!
Always pull out the mains power plug before starting any cleaning work.

8.1 Cleaning

- Keep all safety devices, air vents and the motor housing free of dirt and dust as far as possible. Wipe the equipment with a clean cloth or blow it with compressed air at low pressure.
- We recommend that you clean the device immediately each time you have finished using it.
- Clean the equipment regularly with a moist cloth and some soft soap. Do not use cleaning agents or solvents; these could attack the plastic parts of the equipment. Ensure that no water can seep into the device. The ingress of water into an electric tool increases the risk of an electric shock.

8.2 Servicing

Danger! Always ensure that the machine is not connected to the mains supply before you start any servicing work.

- In the following: One cycle means one raising and lowering movement of a load. Periodic inspection means an inspection after 100 cycles.
- Test periodically that the limit switches on the cable hoist are in correct working order. Conduct this test as follows: When the cable has reached the maximum height, the lever on the automatic stopping mechanism (5) will be actuated. The motor (14) must then stop. (Test without a load).
  When the steel cable (6) has been unwound as far as possible, the lever for the maximum cable length (4) will be actuated. The motor (14) must then stop.
- Inspect the mains cable (12) and the control cable (13) periodically.
- The steel cable (6) and return roller (15) must be greased every 200 cycles.
- A check must be made every 30 cycles, as shown in Fig. 4, to find whether the entire steel cable (6) is in good condition. If it is damaged, it must be replaced by a steel cable of the type specified in the technical data.
- Check every 1000 cycles whether the screws for the fastening bars (1) and return roller (15) are properly tightened.
- Check every 1000 cycles whether the hooks (8/16) and return roller (15) are in good condition.
- Lubricate the cable, chain, gear unit, bearings and hooks regularly.
- Check wearing parts after every 1000 cycles, e.g.: cable, chain, hooks, belts and brake linings.
- Check before using the cable hoist whether the Emergency Stop switch (9) and pushbuttons (10) are in perfect working order.
- Check the braking system every 1000 cycles. If the motor (14) makes any unusual noises or cannot raise the rated load, it is possible that the braking system requires an overhaul:
  - Replace damaged or worn parts and keep the service documentation relating to this in a safe place.
  - Please contact an authorized service center for any unscheduled maintenance work.
- Have your electric tools repaired only by a qualified electrician.

8.3 Ordering replacement parts:

Please quote the following data when ordering replacement parts:

- Type of machine
- Article number of the machine
- Identification number of the machine
- Replacement part number of the part required

For our latest prices and information please go to www.isc-gmbh.info

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9. Disposal and recycling

The equipment is supplied in packaging to prevent it from being damaged in transit. The raw materials in this packaging can be reused or recycled. The equipment and its accessories are made of various types of material, such as metal and plastic. Never place defective equipment in your household refuse. The equipment should be taken to a suitable collection center for proper disposal. If you do not know the whereabouts of such a collection point, you should ask in your local council offices.

10. Storage

Store the equipment and accessories in a dark and dry place at above freezing temperature. The ideal storage temperature is between 5 and 30 °C. Store the electric tool in its original packaging.

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For EU countries only

Never place any electric power tools in your household refuse.

To comply with European Directive 2012/19/EC concerning old electric and electronic equipment and its implementation in national laws, old electric power tools have to be separated from other waste and disposed of in an environment-friendly fashion, e.g. by taking to a recycling depot.

Recycling alternative to the return request:
As an alternative to returning the equipment to the manufacturer, the owner of the electrical equipment must make sure that the equipment is properly disposed of if he no longer wants to keep the equipment. The old equipment can be returned to a suitable collection point that will dispose of the equipment in accordance with the national recycling and waste disposal regulations. This does not apply to any accessories or aids without electrical components supplied with the old equipment.

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Subject to technical changes

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Service information

We have competent service partners in all countries named on the guarantee certificate whose contact details can also be found on the guarantee certificate. These partners will help you with all service requests such as repairs, spare and wearing part orders or the purchase of consumables.

Please note that the following parts of this product are subject to normal or natural wear and that the following parts are therefore also required for use as consumables.

Category	Example
Wear parts*	Steel cable, Hook, Return roller, Additional hook
Consumables*	
Missing parts	

* Not necessarily included in the scope of delivery!

In the effect of defects or faults, please register the problem on the internet at www.isc-gmbh.info. Please ensure that you provide a precise description of the problem and answer the following questions in all cases:

- Did the equipment work at all or was it defective from the beginning?
- Did you notice anything (symptom or defect) prior to the failure?
- What malfunction does the equipment have in your opinion (main symptom)? Describe this malfunction.

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Warranty certificate

Dear Customer,
All of our products undergo strict quality checks to ensure that they reach you in perfect condition. In the unlikely event that your device develops a fault, please contact our service department at the address shown on this guarantee card. You can also contact us by telephone using the service number shown. Please note the following terms under which guarantee claims can be made:

1. These guarantee terms apply to consumers only, i.e. natural persons intending to use this product neither for their commercial activities nor for any other self-employed activities. These warranty terms regulate additional warranty services, which the manufacturer mentioned below promises to buyers of its new products in addition to their statutory rights of guarantee. Your statutory guarantee claims are not affected by this guarantee. Our guarantee is free of charge to you.
2. The warranty services cover only defects due to material or manufacturing faults on a product which you have bought from the manufacturer mentioned below and are limited to either the rectification of said defects on the product or the replacement of the product, whichever we prefer.
   Please note that our devices are not designed for use in commercial, trade or professional applications. A guarantee contract will not be created if the device has been used by commercial, trade or industrial business or has been exposed to similar stresses during the guarantee period.
3. The following are not covered by our guarantee:
   - Damage to the device caused by a failure to follow the assembly instructions or due to incorrect installation, a failure to follow the operating instructions (for example connecting it to an incorrect mains voltage or current type) or a failure to follow the maintenance and safety instructions or by exposing the device to abnormal environmental conditions or by lack of care and maintenance.
   - Damage to the device caused by abuse or incorrect use (for example overloading the device or the use or unapproved tools or accessories), ingress of foreign bodies into the device (such as sand, stones or dust, transport damage), the use of force or damage caused by external forces (for example by dropping it).
   - Damage to the device or parts of the device caused by normal or natural wear or tear or by normal use of the device.
4. The guarantee is valid for a period of 24 months starting from the purchase date of the device. Guarantee claims should be submitted before the end of the guarantee period within two weeks of the defect being noticed. No guarantee claims will be accepted after the end of the guarantee period. The original guarantee period remains applicable to the device even if repairs are carried out or parts are replaced. In such cases, the work performed or parts fitted will not result in an extension of the guarantee period, and no new guarantee will become active for the work performed or parts fitted. This also applies if an on-site service is used.
5. To make a claim under the guarantee, please register the defective device at: www.isc-gmbh.info. Please keep your bill of purchase or other proof of purchase for the new device. Devices that are returned without proof of purchase or without a rating plate shall not be covered by the guarantee, because appropriate identification will not be possible. If the defect is covered by our guarantee, then the item in question will either be repaired immediately and returned to you or we will send you a new replacement.

Of course, we are also happy offer a chargeable repair service for any defects which are not covered by the scope of this guarantee or for units which are no longer covered. To take advantage of this service, please send the device to our service address.

Also refer to the restrictions of this warranty concerning wear parts, consumables and missing parts as set out in the service information in these operating instructions.

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Danger !
Lors de l'utilisation d'appareils, il faut respecter certaines mesures de sécurité afin d'éviter des blessures et dommages. Veuillez donc lire attentivement ce mode d'emploi/ces consignes de sécurité. Veillez à le conserver en bon état pour pouvoir accéder aux informations à tout moment. Si l'appareil doit être remis à d'autres personnes, veillez à leur remettre aussi ce mode d'emploi/ ces consignes de sécurité. Nous déclinons toute responsabilité pour les accidents et dommages dus au non-respect de ce mode d'emploi et des consignes de sécurité.

1. Consignes de sécurité

Danger !
Veuillez lire toutes les consignes de sécurité et instructions. Tout non-respect des consignes de sécurité et instructions peut provoquer une décharge électrique, un incendie et/ou des blessures graves.
Conservez toutes les consignes de sécurité et instructions pour une consultation ultérieure.

1. Contrôlez toujours si la tension du secteur correspond bien à celle indiquée sur la place signalétique? Dans le cas où la tension de réseau ne serait pas adéquate, cela peut entraîner des travaux anormaux de la machine et même des blessures de personnes.
2. L'alimentation électrique doit avoir une prise de terre et être protégée par un disjoncteur à courant de défaut.
3. Il est interdit de soulever des charges qui dépassent la charge nominale.
4. Utilisez toujours l'appareil dans le but prévu. Ne soulevez jamais les personnes avec la commande Bowden à câble.
5. Ne tirez pas la fiche par le câble. Maintenez le câble à l'écart de la chaleur, d'huile et des arêtes vives.
6. N'essayez jamais de soulever des charges fixes ou bloquées.
7. Tirez la fiche de contact, lorsque vous n'utilisez pas la commande Bowden à câble.
8. Maintenez les enfants et autres personnes non autorisées à distance de la machine.
9. Il est interdit de tirer des charges latéralement ou par le côté. Evitez que la charge n'oscille.
10. Assurez-vous que le crochet se déplace dans la même direction que celle indiquée sur l'interrupteur de commande.
11. Contrôlez régulièrement la commande Bowden à câble pour découvrir les éventuelles détériorations. L'interrupteur de commande doit être en bon état.
12. Faites exécuter les réparations et les travaux d'entretien uniquement dans des ateliers spécialisés dûment autorisés par un(e) électricien(ne) spécialisé(e). Les réparations doivent uniquement être effectuées par un(e) électricien(ne) qualifié(e), si tel n'est pas le cas, cela peut entraîner des accidents pour l'entreprise exploitante.
13. Evitez une mise en et hors-circuit rapide (mode « pas à pas »).
14. Soyez toujours attentif lorsque vous maniez la commande Bowden à câble.
15. Ne vous tenez pas ni ne travaillez sous une charge suspendue.

2. Description de l'appareil et volume de livraison

2.1 Description de l'appareil (figure 1/2)
1. Etrier d'attache
2. Trou de montage pour crochet
3. Tambour
4. Levier pour une longueur de câble maximale
5. Levier du mécanisme d'arrêt automatique
6. Câble métallique
7. Poids de mise hors circuit
8. Crochet
9. Interrupteur d'arrêt d'urgence
10. Bouton-poussoir
11. Télécommande
12. Câble secteur
13. Ligne de commande
14. Moteur
15. Poulie de renvoi
16. Crochet supplémentaire
17. Câble pour commande à distance

2.2 Volume de livraison
Veuillez contrôler si l'article est complet à l'aide de la description du volume de livraison. S'il manque des pièces, adressez-vous dans un délai de 5 jours maximum après votre achat à notre service après-vente ou au magasin où vous avez acheté l'appareil muni d'une preuve d'achat valable. Veuillez consulter pour cela le tableau des garanties dans les informations service après-vente à la fin du mode d'emploi.
- Ouvrez l'emballage et prenez l'appareil en le

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sortant avec précaution de l'emballage.
- Retirez le matériel d'emballage tout comme les sécurités d'emballage et de transport (s'il y en a).
- Vérifiez si la livraison est bien complète.
- Contrôlez si l'appareil et ses accessoires ne sont pas endommagés par le transport.
- Conservez l'emballage autant que possible jusqu'à la fin de la période de garantie.

Danger !
L'appareil et le matériel d'emballage ne sont pas des jouets ! Il est interdit de laisser des enfants jouer avec des sacs et des films en plastique et avec des pièces de petite taille. Ils risquent de les avaler et de s'étouffer !

- Mode d'emploi d'origine

3. Utilisation conforme à l'affectation

La commande Bowden à câble sert à lever et à baisser des charges dans des endroits clos conformément la performance de l'appareil.

La machine doit exclusivement être employée conformément à son affectation. Chaque utilisation allant au-delà de cette affectation est considérée comme non conforme. Pour les dommages en résultant ou les blessures de tout genre, le producteur décline toute responsabilité et l'opérateur/l'exploitant est responsable.

Veillez au fait que nos appareils, conformément à leur affectation, n'ont pas été construits, pour être utilisés dans un environnement professionnel, industriel ou artisanal. Nous déclinons toute responsabilité si l'appareil est utilisé professionnellement, artisanalement ou dans des sociétés industrielles, tout comme pour toute activité équivalente.

4. Données techniques

Tension (V) ..... 230 V ~ 50 Hz
Courant nominal (A) 4,4
Puissance absorbée (W) 1000
Mode de travail ..... S3 20% 10 min
Charge nominale (kg) .....250 / 500
Hauteur de levage (m) .....11,5 / 5,7
Vitesse nominale (m/min) .....8 / 4
Diamètre du câble métallique (mm) 4,0
Résistance à la rupture
par traction du câble métallique (N/mm^2) 1870
Classe d'isolation.....B
Type de protection ..... IP 54
Catégorie de mécanisme d'entraînement M1
Poids net (kg)..... 16,2

Mode de service S3 - 20% - 10 mn. :
S3 = service discontinu sans influence du procédé de démarrage. Ceci signifie que pendant une période de 10 mn., la durée de fonctionnement maxi. est de 20% (2 mn).

Limitez le niveau sonore et les vibrations à un minimum !
- Utilisez exclusivement des appareils en excellent état.
- Entretenez et nettoyez l'appareil régulièrement.
- Adaptez votre façon de travailler à l'appareil.
- Ne surchargez pas l'appareil.
- Faites contrôler l'appareil le cas échéant.
- Mettez l'appareil hors circuit lorsque vous ne l'utilisez pas.
- Portez des gants.

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5. Avant la mise en service

Assurez-vous, avant de connecter la machine, que les données se trouvant sur la plaque de signalisation correspondent bien aux données du réseau.
Avertissement !
Enlevez systématiquement la fiche de contact avant de paramétrer l'appareil.

- La commande Bowden à câble ne convient pas au transport de masses brûlantes et/ou fondues. La commande Bowden à câble n'est pas prévue non plus pour un emploi à des températures basses et dans un milieu agressif.
- Le groupe mécanique est M1.
- La vie utile de la commande Bowden à câble est d'env. 8000 cycles (sauf les pièces d'usure). Lorsque la commande Bowden a réalisé 8000 cycles, toutes les pièces mécaniques doivent être contrôlées et révisées.
- Lisez et comprenez le mode d'emploi, avant d'utiliser la commande Bowden à câble.
- Assurez-vous que l'opérateur/l'opératrice sait bien comment la machine fonctionne, et comment il/elle doit la commander.
- L'utilisateur doit toujours opérer en conformité avec le mode d'emploi.
- Le palan ne convient pas à une utilisation continue. Le mode est : service discontinu sans influence du procédé de démarrage.
- La puissance nominale de la machine ne varie pas avec la position de la charge.

5.1 Déballage
Une fois l'emballage ouvert, effectuez une inspection du châssis, le câble métallique, les crochets et le mécanisme de contrôle électrique pour découvrir les éventuels dommages dus au transport.

5.2 Montage (figure 5)
La commande Bowden à câble est équipée d'étriers de fixation (1), avec lesquels elle peut être fixée à un tube carré. Les dimensions du bras doivent correspondre à la taille de l'étrier de fixation (1) et il doit pouvoir porter le double de la charge nominale. Nous vous recommandons de contacter un(e) technicien(ne) qualifié(e).
Toutes les vis doivent être correctement serrées. Avant la mise en service, un(e) technicien(ne) qualifié(e) doit contrôler l'ancrage du bras.

5.3 Fonction du palan (figure 6 – 9)
La commande Bowden à câble est équipée d'une poulie de renvoi (15) et d'un crochet supplémentaire (16). Lorsque la commande Bowden à câble est correctement utilisée, elle peut soulever le double de la charge.
Montez la poulie de renvoi (15) et le crochet supplémentaire (16) comme indiqué dans la figure 6-8. Le crochet monté fixement (8) doit être suspendu au trou de montage (2) (figure 9).
La charge est à présent soulevée à l'aide de deux câbles métalliques, la commande Bowden à câble peut alors soulever le double de la charge.

6. Commande

Danger !
6.1 Remarques relatives au fonctionnement
1. Avant de l'utiliser pour la première fois, retirez l'adhésif du tambour (3).
2. La valeur de l'émission sonore A, évaluée sur la position de l'exploitant, est inférieure à 75 dB (niveau de pression acoustique LpA). Les valeurs de bruits et de vibration ont été déterminées conformément à EN ISO 11201.
3. Tension d'alimentation : 230V ± 10%, 50Hz ± 1%.
4. La commande Bowden à câble doit être exploitée à des températures ambiantes situées entre 0 °C et 40 °C et avec une humidité relative ne dépassant pas 50%. Hauteur au-dessus du niveau de la mer : maxi. 1000 m.
5. Pour le transport et l'entreposage, la température doit se situer entre -25 °C et 55 °C. La température maximale admise ne doit pas dépasser 70 °.
6. L'utilisateur doit soulever la charge du sol à la vitesse la plus lente possible. Le câble doit être tendu lorsque la charge est soulevée.
7. Le moteur (14) de la commande Bowden à câble est doté d'un interrupteur à thermostat. Pendant le fonctionnement de la commande Bowden à câble, il est donc possible que le moteur (14) s'arrête, celui-ci se remet automatiquement en marche dès qu'il est refroidi.
8. La commande Bowden à câble électrique n'est pas dotée d'un limiteur de puissance nominale. Raison pour laquelle il ne faut pas essayer de soulever la charge lorsque la protection contre la surchauffe limite le fonctionnement. La charge dépasse dans ce cas la puissance nominale de la commande Bowden à câble.

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9. Ne laissez aucune charge suspendue sans surveillance sans avoir pris auparavant les mesures de sécurité correpondantes.
10. Protégez l'appareil avec un fusible de 10 A ou un disjoncteur à courant de défaut de 10 mA afin de protéger le circuit électrique.
11. N'utilisez pas le levier (4/5) comme dispositif d'arrêt de routine. Il sert uniquement de dispositif d'arrêt pour les situations d'urgence.
12. Avant de commencer, assurez-vous que le câble métallique (6) est bien enroulé correctement autour du tambour (3) et que la distance entre les spires est inférieure à la section du câble métallique (figure 3)
13. Assurez-vous que la charge est bien bloquée conformément aux spécifications au crochet (8) ou au crochet supplémentaire (16) pour le service avec palan et maintenez toujours une distance par rapport à la charge et au câble métallique (6).

6.2 Fonctionnement (figure 1)

- Contrôlez si l'interrupteur d'arrêt d'urgence (9) est bien enfoncé. Tournez l'interrupteur d'arrêt dans le sens des aiguilles d'une montre pour le déverrouiller.
- Appuyez sur le bouton-poussoir ▲ (10) pour soulever la charge.
- Appuyez sur le bouton-poussoir ▼ (10) pour abaisser la charge.
- Levier du mécanisme d'arrêt automatique (5): Lorsque la hauteur de levage est atteinte, le poids de mise hors circuit (7) pousse le levier (5) vers le haut. L'interrupteur fin de course est actionné et la charge ne peut plus être soulevée.
- Levier pour une longueur de câble maximale (4) : Lorsque la charge a atteint la position la plus basse possible, l'interrupteur fin de course est actionné, ce qui empêche de continuer l'abaissement de la charge. Cet interrupteur fin de course empêcherait également le fonctionnement de la commande Bowden à câble dans une mauvaise direction (lorsque le crochet se déplace dans le sens inverse de celui indiqué sur l'interrupteur de commande).
- Lorsque l'interrupteur d'arrêt d'urgence (9) est actionné, la commande Bowden à câble s'arrête.
- En cas d'urgence, actionnez immédiatement l'interrupteur d'arrêt d'urgence (9) pour stopper la commande Bowden à câble. La commande de la commande Bowden à câble est impossible lorsque l'interrupteur d'arrêt d'urgence est actionné.

7. Remplacement de le câble d'alimentation réseau

Danger !
Si le câble d'alimentation réseau de cet appareil est endommagée, il faut la faire remplacer par le producteur ou son service après-vente ou par une personne de qualification semblable afin d'éviter tout risque.

8. Nettoyage, maintenance et commande de pièces de rechange

Danger !
Retirez la fiche de contact avant tous travaux de nettoyage.

8.1 Nettoyage

- Maintenez les dispositifs de protection, les fentes à air et le carter de moteur aussi propres (sans poussière) que possible. Frottez l'appareil avec un chiffon propre ou soufflez dessus avec de l'air comprimé à basse pression.
- Nous recommandons de nettoyer l'appareil directement après chaque utilisation.
- Nettoyez l'appareil régulièrement à l'aide d'un chiffon humide et un peu de savon. N'utilisez aucun produit de nettoyage ni détergeant; ils pourraient endommager les pièces en matières plastiques de l'appareil. Veillez à ce qu'aucune eau n'entre à l'intérieur de l'appareil. La pénétration de l'eau dans un appareil électrique augmente le risque de décharge électrique.

8.2 Maintenance

Danger ! Assurez-vous toujours que la machine n'est pas raccordée au réseau de courant pendant que vous l'entretenez.

- Dans ce qui suit : Un cycle correspond à un mouvement de montée et descente d'une charge. Un contrôle périodique correspond à un contrôle après 100 cycles.
- Contrôlez périodiquement si les interrupteurs fin de course de la commande Bowden à câble fonctionnent bien conformément aux spécifications. Le contrôle doit se fait de la manière suivante : Lorsque le câble a atteint la hauteur maximale de levage, le levier du mécanisme d'arrêt automatique (5) est acti-

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onné. Le moteur (14) doit à présent s'arrêter. (sans contrôle de charge).
Lorsque le câble métallique (6) est déroulé le plus possible, le levier de longueur maximale du câble (4) est actionné. Le moteur (14) doit à présent s'arrêter.

- Vérifiez périodiquement le câble secteur (12) et la ligne de commande (13).
- Il faut lubrifier tous les 200 cycles le câble métallique (6) et la poulie de renvoi (15).
- Tous les 30 cycles, il faut contrôler conformément à la figure 4 si le câble métallique (6) complet est bien en bon état. S'il est endommagé, il faut le remplacer par un câble métallique conforme aux caractéristiques techniques.
- Contrôlez tous les 1000 cycles si les vis de l'étrier de fixation (1) et de la poulie de renvoi (15) sont bien serrées.
- Graissez régulièrement le câble, la chaîne, l'engrenage, les roulements et les crochets.
- Contrôlez tous les 1000 cycles, les pièces d'usures telles que : câble, chaîne, crochet, courroies et revêtement de freins.
- Tous les 1000 cycles, vérifiez si les crochets (8/16) et la poulie de renvoi (15) sont dans un bon état.
- Contrôlez avant chaque utilisation de la commande Bowden à câble, si l'interrupteur d'arrêt d'urgence (9) et le bouton-poussoir (10) sont bien dans un état de service impeccable.
- Tous les 1000 cycles, contrôlez le système de freinage. Lorsque le moteur (14) fait des bruits inhabituels ou que la charge nominale ne peut pas être soulevée, il est possible de devoir réviser le système de freinage :
  - Remplacez les pièces endommagées ou usées et conservez la documentation sur la maintenance les concernant.
  - Pour les travaux de maintenance hors plan, veuillez vous adresser à un centre de service clientèle autorisé.
- Faites réparer votre outil électrique uniquement par un personnel qualifié spécialisé.

8.3 Commande de pièces de rechange :
Pour les commandes de pièces de rechange, veuillez indiquer les références suivantes:

- Type de l'appareil
- No. d'article de l'appareil
- No. d'identification de l'appareil
- No. de pièce de rechange de la pièce requise

Vous trouverez les prix et informations actuelles à l'adresse www.isc-gmbh.info

9. Mise au rebut et recyclage

L'appareil se trouve dans un emballage permettant d'éviter les dommages dus au transport. Cet emballage est une matière première et peut donc être réutilisé ultérieurement ou être réintroduit dans le circuit des matières premières. L'appareil et ses accessoires sont en matériaux divers, comme par ex. des métaux et matières plastiques. Les appareils défectueux ne doivent pas être jetés dans les poubelles domestiques. Pour une mise au rebut conforme à la réglementation, l'appareil doit être déposé dans un centre de collecte approprié. Si vous ne connaissez pas de centre de collecte, veuillez vous renseigner auprès de l'administration de votre commune.

10. Stockage

Entreposez l'appareil et ses accessoires dans un endroit sombre, sec et à l'abri du gel tout comme inaccessible aux enfants. La température de stockage optimale est comprise entre 5 et 30 °C. Conservez l'outil électrique dans l'emballage d'origine.

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Uniquement pour les pays de l'Union Européenne

Ne jetez pas les outils électriques dans les ordures ménagères!

Selon la norme européenne 2012/19/CE relative aux appareils électriques et systèmes électroniques usés et selon son application dans le droit national, les outils électriques usés doivent être récoltés à part et apportés à un recyclage respectueux de l'environnement.

Possibilité de recyclage en alternative à la demande de renvoi :
Le propriétaire de l'appareil électrique est obligé, en guise d'alternative à un envoi en retour, à contribuer à un recyclage effectué dans les règles de l'art en cas de cessation de la propriété. L'ancien appareil peut être remis à un point de collecte dans ce but. Cet organisme devra l'éliminer dans le sens de la Loi sur le cycle des matières et les déchets. Ne sont pas concernés les accessoires et ressources fournies sans composants électroniques.

Toute réimpression ou autre reproduction de la documentation et des papiers joints aux produits, même sous forme d'extraits, est uniquement permise une fois l'accord explicite de l'ISC GmbH obtenu.

Sous réserve de modifications techniques

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Informations service après-vente

Nous disposons dans tous les pays mentionnés dans le bon de garantie de partenaires de service après-vente compétents dont vous trouverez les coordonnées dans le bon de garantie. Ceux-ci se tiennent à votre disposition pour tout ce qui concerne le service après-vente comme les réparations, l'approvisionnement en pièces de rechange et d'usure ou l'achat de pièces de consommation.

Il faut tenir compte du fait que pour ce produit les pièces suivantes sont soumises à une usure liée à l'utilisation ou à une usure naturelle ou que les pièces suivantes sont nécessaires en tant que consommables.

Catégorie	Exemple
Pièces d'usure*	Câble métallique, Crochet, Poulie de renvoi, Crochet supplémentaire
Matériel de consommation/ pièces de consommation*	
Pièces manquantes	

*Pas obligatoirement compris dans la livraison !

En cas de vices ou de défauts, nous vous prions d'enregistrer le cas du défaut sur internet à l'adresse www.isc-gmbh.info. Veuillez donner une description précise du défaut et répondre dans tous les cas aux questions suivantes :

- est-ce que l'appareil a fonctionné une fois ou était-il défectueux dés le départ ?
- avez-vous remarqué quelque chose avant la panne (symptôme avant la panne) ?
- quel est le défaut de fonctionnement de l'appareil à votre avis (symptôme principal) ? Décrivez ce défaut de fonctionnement.

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Bon de garantie

Chère cliente, cher client,
nos produits sont soumis à un contrôle de qualité très strict. Si toutefois, il arrivait que cet appareil ne fonctionne pas parfaitement, nous en sommes désolés et nous vous prions de vous adresser à notre service après-vente à l'adresse indiquée sur le bon de garantie. Nous nous tenons également volontiers à votre disposition par téléphone au numéro de service après-vente indiqué. La garantie est valable dans les conditions suivantes :

1. Ces conditions de garantie s'adressent uniquement à des consommateurs, c'est à dire à des personnes physiques qui ne souhaitent ni utiliser ce produit dans le cadre de leur activité industrielle ou artisanale, ni dans le cadre de toute autre activité indépendante. Les conditions de garantie réglementent les prestations de garantie supplémentaires que le fabricant mentionné ci-dessous promet aux acheteurs de ses appareils en supplément de la prestation de garantie légale. Vos droits légaux en matière de garantie restent inchangés. Notre prestation de garanti est gratuite pour vous.
2. La prestation de garantie s'étend exclusivement aux défauts résultant d'une erreur de fabrication ou de matériau d'un appareil neuf du fabricant mentionné ci-dessous et acheté par vos soins. La prestation de garantie se limite selon notre décision soit à la résolution de tels défauts sur l'appareil, soit à l'échange de l'appareil.
   Veillez au fait que nos appareils, conformément au règlement, n'ont pas été conçus pour être utilisés dans un environnement professionnel, industriel ou artisanal. Il n'y a donc pas de contrat de garantie quand l'appareil a été utilisé professionnellement, artisanalement ou par des sociétés industrielles ou exposé à une sollicitation semblable pendant la durée de la garantie.
3. Sont exclus de notre garantie :
   - les dommages liés au non-respect des instructions de montage ou en raison d'une installation incorrecte, au non-respect du mode d'emploi (en raison par ex. du branchement de l'appareil sur la tension de réseau ou le type de courant incorrect), au non-respect des dispositions de maintenance et de sécurité ou résultant d'une exposition de l'appareil à des conditions environnementales anormales ou d'un manque d'entretien et de maintenance.
   - les dommages résultant d'une utilisation abusive ou non conforme (comme par ex. une surcharge de l'appareil ou une utilisation d'outils ou d'accessoires non autorisés), de la pénétration d'objets étrangers dans l'appareil (comme par ex. du sable, des pierres ou de la poussière), de l'utilisation de la force ou de la violence (comme par ex. les dommages liés aux chutes).
   - les dommages sur l'appareil ou des parties de l'appareil résultant de l'usure normale liée à l'utilisation de l'appareil ou de toute autre usure naturelle.
4. La durée de garantie est de 24 mois et débute à la date d'achat de l'appareil. Les droits à la garantie doivent être revendiqués avant l'expiration de la durée de garantie dans un délai de deux semaines après avoir constaté le défaut. La revendication de droits à la garantie après expiration de la durée de garantie est exclue. La réparation ou l'échange de l'appareil n'entraîne ni une extension de la durée de garantie ni le début d'une nouvelle durée de garantie pour cet appareil ou toute autre pièce de rechange installée sur l'appareil. Cela est valable également dans le cas d'une intervention du service après-vente à domicile.
5. Pour faire valoir vos droits à la garantie, veuillez enregistrer l'appareil défectueux à l'adresse suivante : www.isc-gmbh.info. Veuillez garder à disposition la preuve d'achat ou tout autre justificatif de l'achat de votre nouvel appareil. Les appareils envoyés sans les justificatifs correspondants ou sans plaque signalétique sont exclus de la prestation de garantie en raison de l'impossibilité de les enregistrer. Si le défaut de l'appareil est inclut dans la garantie, vous recevrez sans délai un appareil réparé ou un nouvel appareil.

Bien entendu, nous réparons volontiers les défauts de votre appareil qui ne sont pas ou plus compris dans l'étendue de la garantie contre le remboursement des frais de réparation. Pour cela, veuillez envoyer l'appareil à notre adresse de service après-vente.

Pour les pièces d'usure, de consommation et manquantes, nous renvoyons aux restrictions de cette garantie conformément aux informations du service après-vente de ce mode d'emploi.

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Pericolo!
Nell'usare gli apparecchi si devono rispettare diverse avvertenze di sicurezza per evitare lesioni e danni. Quindi leggete attentamente queste istruzioni per l'uso/le avvertenze di sicurezza. Conservate bene le informazioni per averle a disposizione in qualsiasi momento. Se date l'apparecchio ad altre persone, consegnate queste istruzioni per l'uso/le avvertenze di sicurezza insieme all'apparecchio. Non ci assumiamo alcuna responsabilità per incidenti o danni causati dal mancato rispetto di queste istruzioni e delle avvertenze di sicurezza.

1. Avvertenze sulla sicurezza

Pericolo!
Leggete tutte le avvertenze di sicurezza e le istruzioni. Dimenticanze nel rispetto delle avvertenze di sicurezza e delle istruzioni possono causare scosse elettriche, incendi e/o gravi lesioni.
Conservate tutte le avvertenze e le istruzioni per eventuali necessità future.

1. Controllate sempre che la tensione di rete corrisponda a quella indicata sulla targhetta. Una tensione di rete non adatta può causare un funzionamento anomalo della macchina o danni alle persone.
2. L'alimentazione di corrente deve essere dotata di messa a terra e deve essere protetta con un interruttore di sicurezza per correnti di guasto.
3. È vietato sollevare carichi superiori al relativo valore nominale.
4. Utilizzate l'apparecchio esclusivamente per lo scopo previsto. Il paranco elettrico non deve mai essere usato per sollevare persone.
5. Non tirate mai il cavo per staccare la spina dalla presa di corrente. Tenete lontano il cavo dal calore, dall'olio e dagli spigoli.
6. Non tentate mai di sollevare carichi che siano fissi o bloccati.
7. Togliete la spina dalla presa di corrente quando il paranco elettrico non è in funzione.
8. Tenete lontano dall'apparecchio i bambini e le persone non autorizzate.
9. È vietato sollevare carichi lateralmente o da un lato. Evitate oscillazioni del carico.
10. Assicuratevi che il gancio si muova nella direzione indicata sull'interruttore di comando.
11. Controllate regolarmente che il paranco elettrico non presenti danni. L'interruttore di comando deve essere in buone condizioni.
12. Fate eseguire le riparazioni e i lavori di manutenzione esclusivamente da un elettricista specializzato in officine autorizzate. Le riparazioni devono essere eseguite solo da un elettricista specializzato, altrimenti ne possono derivare infortuni per l'utilizzatore.
13. Evitate di inserire e disinserire continuamente l'apparecchio (utilizzo a intermittenza).
14. Durante l'utilizzo del paranco elettrico prestate sempre molta attenzione.
15. Non sostate o lavorate sotto al carico sospeso.

2. Descrizione dell'apparecchio ed elementi forniti

2.1 Descrizione dell'apparecchio (Fig. 1/2)
1. Staffa di fissaggio
2. Foro di fissaggio per gancio
3. Tamburo
4. Leva per lunghezza massima cavi
5. Leva per meccanismo di arresto automatico
6. Cavo d'acciaio
7. Peso di disinserimento
8. Gancio
9. Interruttore di arresto di emergenza
10. Pulsante
11. Telecomando
12. Cavo di alimentazione
13. Cavo di comando
14. Motore
15. Carrucola di rinvio
16. Gancio aggiuntivo
17. Fune per telecomando

2.2 Elementi forniti
Verificate che l'articolo sia completo sulla base degli elementi forniti descritti. In caso di parti mancanti, rivolgetevi al nostro Centro Servizio Assistenza o al punto vendita in cui avete acquistato l'apparecchio presentando un documento di acquisto valido entro e non oltre i 5 giorni lavorativi dall'acquisto dell'articolo. Al riguardo fate attenzione alla Tabella Garanzia nelle informazioni sul Servizio Assistenza alla fine delle istruzioni.
- Aprite l'imballaggio e togliete con cautela l'apparecchio dalla confezione.
- Togliete il materiale d'imballaggio e anche i fermi di trasporto / imballo (se presenti).
- Controllate che siano presenti tutti gli elementi forniti.
- Verificate che l'apparecchio e gli accessori

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non presentino danni dovuti al trasporto.
- Se possibile, conservate l'imballaggio fino alla scadenza della garanzia.

Pericolo!
L'apparecchio e il materiale d'imballaggio non sono giocattoli! I bambini non devono giocare con sacchetti di plastica, film e piccoli pezzi! Sussiste pericolo di ingerimento e soffocamento!

- Istruzioni per l'uso originali

3. Utilizzo proprio

Il paranco elettrico serve per il sollevamento e l'abbassamento di carichi in ambienti chiusi in modo conforme alle prestazioni dell'apparecchio.

L'apparecchio deve venire usato solamente per lo scopo a cui è destinato. Ogni altro tipo di uso che esuli da quello previsto non è un uso conforme. L'utilizzatore/l'operatore, e non il costruttore, è responsabile dei danni e delle lesioni di ogni tipo che ne risultino.

Tenete presente che i nostri apparecchi non sono stati costruiti per l'impiego professionale, artigianale o industriale. Non ci assumiamo alcuna garanzia quando l'apparecchio viene usato in imprese commerciali, artigianali o industriali, o in attività equivalenti.

4. Caratteristiche tecniche

Tensione (V)	230 V ~ 50 Hz
Corrente nominale (A)	4,4
Potenza assorbita (W)	1000
Modalità operativa	S3 20% 10 min
Carico nominale (kg)	250 / 500
Altezza di sollevamento (m)	11,5 / 5,7
Velocità nominale (m/min)	8 / 4
Diametro del cavo d'acciaio (mm)	4,0
Resistenza del cavo alla trazione (N/mm^2)	1870
Classe di isolamento	B
Tipo di protezione	IP 54
Classe del motore	M1
Peso netto (kg)	16,2

Modalità operativa S3 - 20% - 10min:
S3 = esercizio intermittente senza influsso sul processo di avvio. Ciò significa che in un lasso di tempo di 10 min il tempo di utilizzo max. è il 20% (2 min).

Limitate al minimo lo sviluppo di rumore e le vibrazioni!
- Utilizzate soltanto apparecchi in perfetto stato.
- Eseguite regolarmente la manutenzione e la pulizia dell'apparecchio.
- Adattate il vostro modo di lavorare all'apparecchio.
- Non sovraccaricate l'apparecchio.
- Fate eventualmente controllare l'apparecchio.
- Spegnete l'apparecchio se non lo utilizzate.
- Indossate i guanti.

5. Prima della messa in esercizio

Prima di inserire la spina nella presa di corrente assicuratevi che i dati sulla targhetta di identificazione corrispondano a quelli di rete.
Avvertenza!
Staccate sempre la spina di alimentazione prima di ogni impostazione all'utensile.

- Il paranco elettrico non è adatto al trasporto di masse calde e/o fuse, inoltre non ne è previsto l'utilizzo a basse temperature e in un ambiente aggressivo.
- Il gruppo meccanico è M1.
- La durata utile del paranco elettrico è di circa 8000 cicli (escl. le parti soggette ad usura). Quando il cavo ha superato gli 8000 cicli tutte le parti meccaniche devono essere controllate e revisionate.
- Le istruzioni per l'uso devono essere lette e comprese prima di utilizzare il paranco elettrico.
- Assicuratevi che l'utilizzatore conosca il funzionamento e il modo di utilizzo della macchina.
- L'utilizzatore deve eseguire il lavoro in modo conforme alle istruzioni per l'uso.
- Il paranco non è adatto all'uso continuo. La modalità operativa è: esercizio intermittente senza influsso del processo di avvio.
- La potenza nominale dell'apparecchio non varia a seconda della posizione del carico.

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5.1 Disimballo
Dopo aver aperto l'imballo controllate che il telaio, il cavo d'acciaio, i ganci e il meccanismo elettrico di controllo non presentino danni.

5.2 Montaggio (Fig. 5)
Il paranco elettrico è dotato di 2 staffe di fissaggio (1) con le quali deve essere installato su un tubo quadro. Le misure del braccio, che deve poter sostenere il doppio del carico nominale, devono corrispondere alle dimensioni delle staffe di fissaggio (1). Vi consigliamo di contattare un tecnico qualificato.
Tutte le viti devono essere correttamente serrate. Prima della messa in esercizio un tecnico qualificato deve controllare l'ancoraggio del braccio.

5.3 Funzione con bozzello (Fig 6-9)
Il paranco elettrico è dotato di una carrucola di rinvio (15) e di un gancio aggiuntivo (16). Se utilizzato in modo corretto il paranco elettrico può sollevare un carico doppio.
Montate la carrucola di rinvio (15) e il gancio aggiuntivo (16) come indicato nelle Fig. 6-8. Il gancio (8) deve essere montato saldamente e appeso al foro di fissaggio (2) (Fig. 9).
Ora il carico viene sollevato con l'aiuto di due cavi in acciaio e in questo modo è possibile sollevare il doppio del carico.

6. Uso

Pericolo!
6.1 Avvertenze per l'esercizio
1. Prima di utilizzare l'apparecchio per la prima volta togliete il nastro adesivo dal tamburo (3).
2. Il livello di emissione sonora ponderato A nella posizione di esercizio è inferiore ai 75 dB (livello di pressione acustica LpA). I valori del rumore e delle vibrazioni sono stati rilevati secondo la norma EN ISO 11201.
3. Tensione di alimentazione: 230V ± 10%, 50Hz ± 1%.
4. Il paranco elettrico deve essere utilizzato ad una temperatura ambiente compresa tra 0 °C e 40 °C e con un'umidità relativa inferiore all'50%. Altezza sul livello del mare: max. 1.000 m
5. Per il trasporto e la conservazione la temperatura deve essere compresa tra i -25 °C e i 55 °C . La massima temperatura consentita non deve superare i 70 °C.
6. L'utilizzatore deve sollevare il carico dal terreno alla minima velocità possibile. Quando il carico viene sollevato il cavo deve essere teso.
7. Il motore (14) del paranco elettrico è dotato di interruttore a termostato. Durante l'esercizio del paranco elettrico ci può essere un arresto del motore (14), che si riavvia automaticamente una volta raffreddato.
8. Il paranco elettrico non è fornito di limitatore di corrente nominale. Si prega quindi di non riprovare a sollevare il carico se la protezione dal surriscaldamento ha interrotto l'esercizio. In questo caso il carico supera la potenza nominale del paranco elettrico.
9. Non lasciate incustodito alcun carico sospeso senza aver prima preso tutte le misure di sicurezza relative.
10. Assicurate l'apparecchio con una protezione di 10 A o con un interruttore di sicurezza per correnti di guasto 10 mA per proteggere il ciclo di corrente.
11. Non utilizzate la leva (4/5) come abituale dispositivo di arresto. Serve solo come dispositivo di arresto in caso di emergenza.
12. Prima di cominciare assicuratevi che il cavo di acciaio (6) sia avvolto correttamente al tamburo (3) e che la distanza tra gli avvolgimenti sia inferiore al cavo d'acciaio (Fig.3).
13. Accertatevi che il carico sia assicurato correttamente al gancio (8) ovvero al gancio aggiuntivo (16) durante la funzione con bozzello e tenetevi sempre a distanza dal carico e dal cavo d'acciaio (6).

6.2 Esercizio (Fig. 1)
- Controllate se l'interruttore di arresto di emergenza (9) sia premuto. Per sbloccarlo girate l'interruttore rosso di arresto in senso orario.
- Premete il pulsante ▲ (10) per sollevare il carico.
- Premete il pulsante ▼ (10) per abbassare il carico.
- Leva per meccanismo di arresto automatico (5): quando viene raggiunta la massima altezza di sollevamento il peso di disinserimento (7) spinge la leva (5) verso l'alto. In questo modo si aziona un interruttore di fine corsa e il carico non può essere sollevato ulteriormente.
- Leva per lunghezza massima cavi (4): quando il carico ha raggiunto la posizione più bassa possibile viene azionato un interruttore di fine corsa che non permette di abbassare ulteriormente il carico. Questo interruttore di

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fine corsa impedisce anche di usare il paranco elettrico nella direzione errata (il gancio si muove nella direzione opposta rispetto a quella indicata sull'interruttore di comando).
- Quando viene azionato l'interruttore di arresto di emergenza (9) il paranco elettrico si ferma.
- In caso di emergenza azionare immediatamente l'interruttore di arresto di emergenza (9) per fermare il paranco elettrico. L'utilizzo del paranco elettrico non è possibile se è stato azionato l'interruttore di arresto di emergenza.

7. Sostituzione del cavo di alimentazione

Pericolo!
Se il cavo di alimentazione di questo apparecchio viene danneggiato deve essere sostituito dal produttore, dal suo servizio di assistenza clienti o da una persona al pari qualificata al fine di evitare pericoli.

8. Pulizia, manutenzione e ordinazione dei pezzi di ricambio

Pericolo!
Prima di qualsiasi lavoro di pulizia staccate la spina dalla presa di corrente.

8.1 Pulizia
- Tenete il più possibile i dispositivi di protezione, le fessure di aerazione e la carcassa del motore liberi da polvere e sporco. Strofinate l'apparecchio con un panno pulito o soffiatelo con l'aria compressa a pressione bassa.
- Consigliamo di pulire l'apparecchio subito dopo averlo usato.
- Pulite l'apparecchio regolarmente con un panno asciutto ed un po' di sapone. Non usate detergenti o solventi perché questi ultimi potrebbero danneggiare le parti in plastica dell'apparecchio. Fate attenzione che non possa penetrare dell'acqua nell'interno dell'apparecchio. La penetrazione di acqua in un elettroutensile aumenta il rischio di una scossa elettrica.

8.2 Manutenzione
Pericolo! Assicuratevi che l'apparecchio non sia collegato alla rete elettrica durante i lavori di manutenzione.
- Seguente: un ciclo corrisponde ad un movimento di sollevamento ed abbassamento di un carico. Un controllo periodico è un controllo effettuato ogni 100 cicli.
- Controllate periodicamente che gli interruttori di fine corsa del paranco elettrico funzionino in modo regolare. Il controllo va eseguito nel modo seguente: quando il cavo raggiunge la massima altezza di sollevamento si aziona la leva per il meccanismo di arresto automatico (5). Il motore (14) si deve fermare. (controllare senza carico).
  Quando il cavo di acciaio (6) è svolto il più possibile viene azionata la leva per la lunghezza massima cavi (4). Il motore (14) si deve fermare.
- Controllate periodicamente il cavo di alimentazione (12) e il cavo di comando (13).
- Ogni 200 cicli il cavo d'acciaio (6) e la carrucola di rinvio (15) devono essere lubrificati.
- Ogni 30 cicli si deve controllare come mostrato in Fig. 4 che l'intero cavo di acciaio (6) sia in buone condizioni. Nel caso sia danneggiato deve essere sostituito con un cavo d'acciaio corrispondente ai dati tecnici.
- Controllare ogni 1000 cicli che le viti della staffa di fissaggio (1) e la carrucola di rinvio (15) siano ben serrate.
- Controllare ogni 1000 cicli che i ganci (8/16) e la carrucola di rinvio (15) siano in buone condizioni.
- Lubrificate regolarmente fune, catena, ingranaggio, cuscinetti e ganci.
- Controllate ogni 100 cicli le parti soggette a usura come: fune, catena, ganci, nastri e ferodi.
- Controllate prima di ogni utilizzo del paranco elettrico che l'interruttore di arresto di emergenza (9) e il pulsante (10) siano in perfette condizioni.
- Ogni 1000 cicli controllate il sistema frenante. Se il motore (14) produce rumori insoliti o non riesce a sollevare il carico nominale è possibile che il sistema frenante debba essere revisionato:
  - sostituite le parti danneggiate o consumate e conservate i relativi documenti di manutenzione
  - per operazioni di riparazione non programmate rivolgetevi ad un centro di assistenza autorizzato.

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- Fate riparare l'elettroutensile solo da personale qualificato.

8.3 Ordinazione di pezzi di ricambio:
Volendo commissionare dei pezzi di ricambio, si dovrebbe dichiarare quanto segue:
- modello dell'apparecchio
- numero dell'articolo dell'apparecchio
- numero d'ident. dell'apparecchio
- numero del pezzo di ricambio del ricambio necessitato.

Per i prezzi e le informazioni attuali si veda www.isc-gmbh.info

9. Smaltimento e riciclaggio

L'apparecchio si trova in un imballaggio per evitare i danni dovuti al trasporto. Questo imballaggio rappresenta una materia prima e può perciò essere utilizzato di nuovo o riciclato. L'apparecchio e i suoi accessori sono fatti di materiali diversi, per es. metallo e plastica. Gli apparecchi difettosi non devono essere gettati nei rifiuti domestici. Per uno smaltimento corretto l'apparecchio va consegnato ad un apposito centro di raccolta. Se non vi è noto nessun centro di raccolta, rivolgetevi per informazioni all'amministrazione comunale.

10. Conservazione

Conservate l'apparecchio e i suoi accessori in un luogo buio, asciutto, al riparo dal gelo e non accessibile ai bambini. La temperatura ottimale per la conservazione è compresa tra i 5 e i 30 °C. Conservate l'elettroutensile nell'imballaggio originale.

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Solo per paesi membri dell'UE

Non smaltite gli elettroutensili nei rifiuti domestici!

Secondo la direttiva europea 2012/19/CE sui rifiuti di apparecchiature elettriche ed elettroniche e il suo recepimento nelle normative nazionali, gli elettroutensili usati devono venire raccolti separatamente e venire smaltiti in modo ecocompatibile.

Alternativa di riciclaggio alla richiesta di restituzione:
il proprietario dell'apparecchio elettrico è tenuto in alternativa, invece della restituzione, a collaborare in modo che lo smaltimento venga eseguito correttamente in caso ceda l'apparecchio. L'apparecchio vecchio può anche venire consegnato ad un centro di raccolta che provvede poi allo smaltimento secondo le norme nazionali sul riciclaggio e sui rifiuti. Non ne sono interessati gli accessori e i mezzi ausiliari senza elementi elettrici forniti insieme ai vecchi apparecchi.

La ristampa o l'ulteriore riproduzione, anche parziale, della documentazione o dei documenti d'accompagnamento dei prodotti è consentita solo con l'esplicita autorizzazione da parte della iSC GmbH.

Con riserva di apportare modifiche tecniche

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Informazioni sul Servizio Assistenza

In tutti i Paesi indicati nel certificato di garanzia disponiamo di competenti partner per il Servizio Assistenza (per i relativi dati di contatto si veda il certificato di garanzia), che sono a vostra disposizione per tutte le richieste di assistenza come riparazione, fornitura di pezzi di ricambio e parti di usura o vendita di materiali di consumo.

Si deve tenere presente che le seguenti parti di questo prodotto sono soggette a un'usura naturale o dovuta all'uso ovvero che le seguenti parti sono necessarie come materiali di consumo.

Categoria	Esempio
Parti soggette ad usura *	Cavo d'acciaio, Gancio, Carrucola di rinvio, Gancio aggiuntivo
Materiale di consumo/parti di consumo *	
Parti mancanti	

* non necessariamente compreso tra gli elementi forniti!

In presenza di difetti o errori vi preghiamo di denunciare il caso sul sito internet www.isc-gmbh.info. Vi preghiamo di descrivere con precisione l'anomalia e a tal riguardo di rispondere in ogni caso alle seguenti domande:

- L'apparecchio ha già funzionato una volta o era difettoso fin dall'inizio?
- Avete notato qualcosa prima che si manifestasse il difetto (sintomo prima del difetto)?
- A vostro parere che cosa non funziona nell'apparecchio (sintomo principale)?
  Descrivete che cosa non funziona.

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Certificato di garanzia

Gentili clienti,
i nostri prodotti sono soggetti ad un rigido controllo di qualità. Se l'apparecchio non dovesse tuttavia funzionare correttamente, ci scusiamo e vi preghiamo di rivolgervi al nostro servizio di assistenza clienti all'indirizzo indicato in questa scheda di garanzia. Siamo a vostra disposizione anche telefonicamente al numero del Servizio Assistenza indicato. Per la rivendicazione dei diritti di garanzia vale quanto segue:

1. Le presenti condizioni di garanzia si rivolgono esclusivamente a consumatori, vale a dire a persone fisiche che non intendono utilizzare questo prodotto né in ambito professionale né per altre attività di lavoro autonomo. Le presenti condizioni di garanzia regolano prestazioni di garanzia supplementari che il produttore su indicato concede in aggiunta alla garanzia legale agli acquirenti di nuovi apparecchi. La presente garanzia non tocca i vostri diritti al ricorso in garanzia previsti dalla legge. Le nostre prestazioni di garanzia sono per voi gratuite.
2. La prestazione di garanzia riguarda esclusivamente i difetti di un nuovo apparecchio da voi acquistato del produttore di cui sopra, riconducibili a errori di materiale o di produzione, ed è limitata, a nostra discrezione, all'eliminazione di questi difetti dell'apparecchio o alla sostituzione dell'apparecchio stesso.
   Tenete presente che i nostri apparecchi non sono stati costruiti per l'impiego artigianale, professionale o imprenditoriale. Pertanto un contratto di garanzia non viene concluso se l'apparecchio è stato usato entro il periodo di garanzia in attività artigianali, imprenditoriali o industriali o se è stato sottoposto a sollecitazioni equivalenti.
3. Sono esclusi dalla nostra garanzia:
   - Danni all'apparecchio causati dalla mancata osservanza delle istruzioni di montaggio o per un'installazione non corretta, dalla mancata osservanza delle istruzioni per l'uso (come ad es. collegamento a una tensione di rete o a un tipo di corrente non corretti), dalla mancata osservanza delle norme relative alla manutenzione e alla sicurezza, dall'esposizione dell'apparecchio a condizioni ambientali anomale o per la mancata esecuzione di pulizia e manutenzione.
   - Danni all'apparecchio dovuti a usi impropri o illeciti (come per es. sovraccarico dell'apparecchio o utilizzo di utensili di ricambio o accessori non consentiti), alla penetrazione di corpi estranei nell'apparecchio (come per es. sabbia, pietre o polvere, danni dovuti al trasporto), all'impiego della forza o a influssi esterni (come per es. danni causati da caduta).
   - Danni all'apparecchio o a parti di esso da ricondurre a un'usura comune, dovuta all'uso o di altro tipo naturale.
4. Il periodo di garanzia è 24 mesi e inizia a partire dalla data di acquisto dell'apparecchio. I diritti di garanzia devono essere fatti valere prima della scadenza del periodo di garanzia, entro due settimane dopo avere accertato il difetto. È esclusa la rivendicazione di diritti di garanzia dopo la scadenza del relativo periodo. La riparazione o la sostituzione dell'apparecchio non comporta una proroga del periodo di garanzia e con questa prestazione per l'apparecchio o per pezzi di ricambio eventualmente installati non inizia un nuovo periodo di garanzia. Ciò vale anche nel caso in cui si ricorra a un servizio sul posto.
5. Per rivendicare il diritto di garanzia vi preghiamo di comunicare che l'apparecchio è difettoso tramite sito internet: www.isc-gmbh.info. Tenete a portata di mano il documento di acquisto o altri documenti come prova dell'acquisto del vostro apparecchio nuovo. Apparecchi inviati senza i relativi documenti o senza targhetta d'identificazione sono esclusi dalla prestazione di garanzia perché non possono essere classificati in modo corrispondente. Se il difetto dell'apparecchio rientra nella nostra prestazione di garanzia, ricevete prontamente l'apparecchio riparato o un apparecchio nuovo.

Naturalmente effettuiamo a pagamento anche riparazioni sull'apparecchio che non rientrano o non rientrano più nella garanzia. A tale scopo inviate l'apparecchio all'indirizzo del nostro Centro Assistenza.

Per parti mancanti, di consumo e soggette a usura rimandiamo alle limitazioni di questa garanzia secondo le informazioni sul Servizio Assistenza di queste istruzioni per l'uso.

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Fara!
Innan maskinen kan användas måste särskilda säkerhetsanvisningar beaktas för att förhindra olyckor och skador. Läs därför noggrant igenom denna bruksanvisning och dessa säkerhetsanvisningar. Förvara dem på ett säkert ställe så att du alltid kan hitta önskad information. Om maskinen ska överlåtas till andra personer måste även denna bruksanvisning och dessa säkerhetsanvisningar medfölja. Vi övertar inget ansvar för olyckor eller skador som har uppstått om denna bruksanvisning eller säkerhetsanvisningarna åsidosätts.

1. Säkerhetsanvisningar

Fara!
Läs alla säkerhetsanvisningar och instruktioner. Försummelser vid iakttagandet av säkerhetsanvisningarna och instruktionerna kan förorsaka elstöt, brand och/eller svåra skador. **Förvara alla säkerhetsanvisningar och instruktioner för framtiden.**

1. Kontrollera alltid att nätspänningen stämmer överens med spänningen som anges på typskylten. Om nätspänningen är olämplig kan detta leda till att maskinen inte fungerar på rätt sätt samt att personer kommer till skada.
2. Strömförsörjningen måste vara jordad och ha kopplats till en jordfelsbrytare.
3. Det är förbjudet att lyfta laster som överskrider den nominella lasten.
4. Använd maskinen endast till avsett syfte. Lyft aldrig personer med vinschen.
5. Dra inte i kabeln för att ta ut stickkontakten ur uttaget. Skydda kabeln mot värme, olja och vassa kanter.
6. Försök aldrig att lyfta fasta eller blockerade laster.
7. Dra ut stickkontakten om vinschen inte ska användas längre.
8. Se till att barn och andra ej behöriga personer inte vistas i närheten av maskinen.
9. Det är förbjudet att dra laster i sidled eller från sidan. Undvik att lasten svänger fram och tillbaka.
10. Säkerställ att kroken rör sig i samma riktning som märkningen på manöverreglaget.
11. Kontrollera regelbundet om vinschen har skadats. Manöverreglaget måste vara i fullgott skick.
12. Lämna alltid in elvinschen till en behörig elinstallatör vid en auktoriserad verkstad om vinschen behöver repareras eller underhållas. Reparationer får endast genomföras av behörig elektriker eftersom användaren i annat fall kan komma att utsättas för fara.
13. Undvik att slå på och ifrån vinschen alltför snabbt (krypdrift).
14. Var alltid uppmärksam när du använder vinschen.
15. Stå inte och arbeta inte under hängande last.

2. Beskrivning av maskinen samt leveransomfattning

2.1 Beskrivning av maskinen (bild 1/2)
1. Fästbygel
2. Fästhål för krok
3. Trumma
4. Arm för maximal vajerlängd
5. Arm för automatisk stoppmekanism
6. Stålvajer
7. Frånkopplingsvikt
8. Krok
9. Nödstopps-brytare
10. Tryckknapp
11. Fjärrkontroll
12. Nätkabel
13. Styrledning
14. Motor
15. Brytskiva
16. Extrakro
17. Lina för fjärrstyrning

2.2 Leveransomfattning
Kontrollera att produkten är komplett med hjälp av beskrivningen av leveransen. Om delar saknas vill vi be dig ta kontakt med vårt servicecenter eller butiken där du köpte produkten inom fem dagar efter att du köpte artikeln. Tänk på att du måste visa upp ett giltigt kvitto. Beakta även garantitabellen i serviceinformationen i slutet av bruksanvisningen.
- Öppna förpackningen och ta försiktigt ut produkten ur förpackningen.
- Ta bort förpackningsmaterialet samt förpackningss- och transportsäkringar (om förhanden).
- Kontrollera att leveransen är komplett.
- Kontrollera om produkten eller tillbehörsdelarna har skadats i transporten.
- Spara om möjligt på förpackningen tills garantitiden har gått ut.

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Fara!
Produkten och förpackningsmaterialet är ingen leksak! Barn får inte leka med plastpåsar, folie eller smådelar! Risk för att barn sväljer delar och kvävs!

- Original-bruksanvisning

3. Ändamålsenlig användning

Vinschen används till att lyfta och sänka laster i slutna rum enligt gällande prestanda.

Maskinen får endast användas till sitt avsedda ändamål. Användningar som sträcker sig utöver detta användningsområde är ej ändamålsenliga. För materialskador eller personskador som resulterar av sådan användning ansvarar användaren/operatören själv. Tillverkaren påtar sig inget ansvar.

Tänk på att våra produkter endast får användas till ändamålsenligt syfte och inte har konstruerats för yrkesmässig, hantverksmässig eller industriell användning. Vi ger därför ingen garanti om produkten ska användas inom yrkesmässiga, hantverksmässiga eller industriella verksamheter eller vid liknande aktiviteter.

4. Tekniska data

Spänning (V)	230 V ~ 50 Hz
Nom. ström (A)	4,4
Effektförbrukning (W)	1000
Driftslag	S3 20% 10 min
Nom. last (kg)	250 / 500
Lyfthöjd (m)	11,5 / 5,7
Nom. hastighet (m/min)	8 / 4
Stålvajerns diameter (mm)	4,0
Stålvajerns draghållfasthet (N/mm^2)	1870
Isoleringsklass	B
Kapslingsklass	IP 54
Växelklass	M1
Nettovikt (kg)	16,2

Driftslag S3 - 20 % - 10 min:
S3 = Intermittent drift utan att uppstart påverkas. Detta betyder att drifttiden uppgår till max. 20 % (2 min) under en tidsperiod på 10 minuter.

Begränsa uppkomsten av buller och vibration till ett minimum!
- Använd endast intakta maskiner.
- Underhåll och rengör maskinen regelbundet.
- Anpassa ditt arbetssätt till maskinen.
- Överbelasta inte maskinen.
- Lämna in maskinen för översyn vid behov.
- Slå ifrån maskinen om den inte används.
- Bär handskar.

5. Före användning

Innan du ansluter maskinen måste du övertyga dig om att uppgifterna på typskylten stämmer överens med nätets data.
Varning!
Dra alltid ut stickkontakten innan du gör några inställningar på maskinen.

- Vinschen är inte avsedd för transport av het och/eller smält massa. Dessutom ska vinschen inte användas vid låga temperaturer och i aggressiv miljö.
- Vinschen ingår i mekanisk grupp M1.
- Livslängden för vinschen uppgår till ca 8 000 cykler (exkl. slitagedelar). När vinschen har utfört 8 000 cykler måste samtliga mekaniska delar kontrolleras och ses över.
- Läs igenom och se till att du har förstått bruksanvisningen innan du använder vinschen.
- Se till att användaren vet hur maskinen fungerar och hur den ska användas.
- Användaren ska alltid använda maskinen enligt instruktionerna i bruksanvisningen.
- Vinschen är inte dimensionerad för kontinuerlig drift. Driftslaget är: Intermittent drift utan att uppstart påverkas.
- Maskinens nominella effekt varierar inte när lastens position förändras.

5.1 Packa upp maskinen
Efter att du har öppnat förpackningen måste du kontrollera om ramen, stålvajern, kroken och den elektriska kontrollmekanismen har skadats i transporten.

5.2 Montera maskinen (bild 5)
Vinschen är utrustad med två fästbyglar (1) så att den kan monteras på ett fyrkantsrör. Bommens mått måste stämma överens med fästbyglarnas (1) mått och måste dessutom kunna tåla en dubbel nominell last. Vi rekommenderar att du tar kontakt med en kvalificerad tekniker.

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Samtliga skruvar måste dras åt ordentligt.. Innan vinschen används för första gången bör förankringen av bommen kontrolleras av en kvalificerad tekniker.

5.3 Lyftblocksfunktion (bild 6 – 9)
Vinschen är utrustad med en brytskiva (15) och en extrakrok (16). Om denna utrustning används på rätt sätt kan vinschen lyfta den dubbla lasten. Montera brytskivan (15) och extrakroken (16) enligt beskrivningen i bild 6-8. Den fast monterade kroken (8) måse hängas in i fästhålet (2) (bild 9). Lasten lyfts nu med hjälp av två stålvajrar. Vinschen kan därmed lyfta den dubbla lasten.

6. Använda

Fara!
6.1 Information om drift
1. Ta bort tejpen från trumman (3) innan du använder vinschen för första gången.
2. Värdet för den A-vägda bulleremissionen vid användarens arbetsplats är lägre än 75 dB (ljudtrycksnivå LpA). Buller- och vibrationsvärden har bestämts enligt EN ISO 11201.
3. Matningsspänning: 230 V ± 10 %, 50 Hz ± 1 %.
4. Vinschen ska användas vid en omgivningstemperatur mellan 0°C och 40°C. Den relativa luftfuktigheten ska ligga under 50%. Höjd över havet: max. 1 000 m.
5. För transport och lagring får temperaturen befinna sig mellan -25°C och 55°C. Den högsta tillåtna temperaturen får inte överstiga 70°C.
6. Användaren bör lyfta lasten från golvet med lägsta möjliga hastighet. Vajern ska vara spänd när lasten lyfts upp.
7. Motorn (14) i vinschen är utrustad med en termostatbrytare. Därför är det möjligt att motorn (14) stannar medan vinschen används. Motorn startar automatiskt igen när den har svalnat.
8. Elvinschen är inte utrustad med en nominell effektbegränsare. Försök därför inte att lyfta lasten ytterligare när överhettningsskyddet redan begränsar driften. I detta fall överskrider lasten vinschens nominella effekt.
9. Lämna inga hängande laster utan uppsikt om inga säkerhetsåtgärder har tilltagits.
10. Skydda maskinen med en säkring med strömvärde 10 A eller en 10 mA jordfelsbrytare för att skydda strömkretsen.
11. Använd inte armarna(4/5) för att stoppa vinschen i normaldrift. Dessa är endast avsedda som stoppanordning i nödfall.
12. Innan du använder vinschen måste du se till att stålvajern (6) lindas rätt runt om trumman (3), och att avståndet mellan lindningarna är mindre än stålvajern (bild 3)
13. Säkerställ att lasten är fast förankrad i kroken (8) eller i extrakroken (16) om lyftblocket används. Håll alltid tillräckligt avstånd till lasten och stålvajern (6).

6.2 Drift (bild 1)
- Kontrollera om nödstopps-brytaren (9) har tryckts in. Vrid runt den röda stoppknappen i medsols riktning för att regla upp den.
- Tryck på tryckknapp ▲ (10) för att lyfta lasten.
- Tryck på tryckknapp ▼ (10) för att sänka lasten.
- Arm för automatisk stoppmekanism (5): Om den maximala lyfthöjden har nåtts, trycks armen (5) uppåt av frånkopplingsvikten (7). Därigenom aktiveras gränslägesbrytaren varefter lasten inte kan lyftas längre.
- Arm för maximal vajerlängd (4). När lasten har nått sitt lägsta möjliga läge aktiveras gränslägesbrytaren så att lasten inte kan sänkas ytterligare. Denna gränslägesbrytare förhindrar även att vinschen kör i fel riktning (kroken rör sig i motsatta riktningen mot märkningen vid manöverreglaget).
- Vinschen stannar om nödstopps-brytaren (9) trycks in.
- I ett nödfall ska nödstopps-brytaren (9) genast tryckas in för att stoppa vinschen. Vinschen kan inte manövreras efter att nödstopps-brytaren har tryckts in.

7. Byta ut nätkabeln

Fara!
Om nätkabeln till denna produkt har skadats måste den bytas ut av tillverkaren, kundtjänst eller av en annan person med liknande behörighet eftersom det annars finns risk för personskador.

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8. Rengöring, Underhåll och reservdelsbeställning

Fara!
Dra alltid ut stickkontakten inför alla rengöringsarbeten.

8.1 Rengöra maskinen
- Håll skyddsanordningarna, ventilationsöppningarna och motorkåpan i så damm- och smutsfritt skick som möjligt. Torka av maskinen med en ren duk eller blås av den med tryckluft med svagt tryck.
- Vi rekommenderar att du rengör maskinen efter varje användningstillfälle.
- Rengör maskinen med jämna mellanrum med en fuktig duk och en aning såpa. Använd inga rengörings- eller lösningsmedel. Dessa kan skada maskinens plastdelar. Se till att inga vätskor tränger in i maskinens inre. Om vatten tränger in i ett elverktyg höjs risken för elektriska slag.

8.2 Underhåll
Fara! Övertyga dig alltid om att maskinen inte är kopplad till elnätet när du ska vårda maskinen.
- Nedan: En cykel motsvarar en uppåt- och nedåtkörning med last. Regelbunden kontroll består av en test efter 100 cykler.
- Kontrollera regelbundet att gränslägesbrytarna i vinschen fungerar på rätt sätt. Kontrollera på följande sätt: När vajern har nått den maximala lyfthöjden kommer armen till den automatiska stoppmekanismen (5) att aktiveras. Motorn (14) måste nu stanna (kontrollera utan last).
  Om stålvajern (6) har lindats av så mycket som möjligt kommer armen för maximal vajerlängd (4) att aktiveras. Motorn (14) måste nu stanna
- Kontrollera regelbundet nätkabeln (12) och styrledningen (13).
- Smörj in stålvajern (6) och brytskivan (15) var 200:e cykel.
- Var 30:e cykel måste du kontrollera enligt bild 4 att den kompletta stålvajern (6) är i fullgott skick. Om bajern är skadad måste den bytas ut mot en ny stålvajer med samma tekniska data.
- Kontrollera var 1000:e cykel att skruvarna i fästbyglarna (1) och brytskivan (15) är väl åtdragna.
- Kontrollera var 1000:e cykel att krokarna (8/16) och brytskivan (15) är i fullgott skick.
- Smörj regelbundet in linan, kedjan, växeln, lagret och kroken.
- Kontrollera följande reservdelar i intervall om 1000 cykler: lina, kedja, krok, band och bromsbelägg.
- Kontrollera varje gång innan vinschen används att nödstopps-brytaren (9) och tryckknapparna (10) är i fullgott skick.
- Kontrollera bromssystemet var 1000:e cykel. Om motorn (14) avger ovanligt ljud eller om den inte kan lyfta den nominella lasten, är det möjligt att bromssystemet måste granskas:
  - Byt ut skadade och slitna delar och spara på underhållsdokumentationen för framtida bruk.
  - Om icke-ordinarie tillsyn krävs måste du kontakta ett behörigt kundcenter.
- Låt endast kvalificerad fackpersonal reparera elverktyg.

8.3 Reservdelsbeställning
Lämna följande uppgifter vid beställning av reservdelar:
- Maskintyp
- Maskinens artikel-nr.
- Maskinens ident-nr.
- Reservdelsnummer för erforderlig reservdel

Aktuella priser och ytterligare information finns på www.isc-gmbh.info

9. Skrotning och återvinning

Produkten ligger i en förpackning som fungerar som skydd mot transportskador. Denna förpackning består av olika material som kan återvinnas. Lämna in förpackningen till ett insamlingsställe för återvinning. Produkten och dess tillbehör består av olika material som t ex metaller och plaster. Defekta produkter får inte kastas i hushållssoporna. Lämna in produkten till ett insamlingsställe i din kommun för professionell avfallshantering. Hör efter med din kommun om du inte vet var närmsta insamlingsställe finns.

10. Förvaring

Förvara produkten och dess tillbehör på en mörk, torr och frostfri plats samt otillgängligt för barn. Den bästa förvaringstemperaturen är mellan 5 och 30˚C. Förvara elverktyget i originalförpackningen.

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Endast för EU-länder

Kasta inte elverktyg i hushållssoporna.

Enligt det europeiska direktivet 2012/19/EG om avfall som utgörs av eller innehåller elektriska eller elektroniska produkter och dess tillämpning i den nationella lagstiftningen, måste förbrukade elverktyg källsorteras och lämnas in för miljövänlig återvinning.

Återvinnings-alternativ till begäran om återsändning:
Som ett alternativ till returnering är ägaren av elutrustningen skyldig att bidraga till ändamålsenlig avfallshantering för det fall att utrustningen ska skrotas. Efter att den förbrukade utrustningen har lämnats in till en avfallsstation kan den omhändertas i enlighet med gällande nationella lagstiftning om återvinning och avfallshantering. Detta gäller inte för tillbehörsdelar och hjälpmedel utan elektriska komponenter vars syfte har varit att komplettera den förbrukade utrustningen.

Eftertryck eller annan duplicering av dokumentation och medföljande underlag för produkterna, även utdrag, är endast tillåtet med uttryckligt tillstånd från iSC GmbH.

Med förbehåll för tekniska ändringar.

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Serviceinformation

I alla länder som nämns i garantibeviset har vi kompetenta servicepartners. Adresserna till dessa partners finns i garantibeviset. Våra partners står gärna till tjänst för alla slags servicearbeten såsom reparation och tillhandahållande av reservdelar, slitagedelar och förbrukningsmaterial.

Kom ihåg att följande delar i denna produkt är utsatta för ett bruksmässigt och naturligt slitage samt att följande delar krävs som förbrukningsmaterial.

Kategori	Exempel
Slitagedelar*	Stålvajer, Krok, Brytskiva, Extrakro
Förbrukningsmaterial/förbrukningsdelar*	
Delar som saknas	

* ingår inte tvunget i leveransomfattningen!

Vid brister eller störningar kan du anmäla detta på webbplatsen www.isc-gmbh.info. Ge en detaljerad beskrivning av felet som har uppstått och besvara alltid följande frågor:

- Fungerade produkten först eller var den defekt från början?
- Märkte du av någonting innan produkten slutade att fungera (symptomer före defekt)?
- Enligt din åsikt, vilken funktion är felaktig i produkten (huvudsymptom)?
  Beskriv den felaktiga funktionen.

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Garantibevis

Bästa kund,
våra produkter genomgår en sträng kvalitetskontroll. Om denna produkt mot förmodan inte fungerar på rätt sätt, beklagar vi detta och ber dig att kontakta vår serviceavdelning under adressen som anges på garantikortet. Vi står även gärna till tjänst på telefon under servicenumret som anges nedan. Följande punkter gäller för att du ska kunna göra anspråk på garantin:

1. Dessa garantivillkor vänder sig enbart till konsumenter, dvs. naturliga personer som inte har för avsikt att använda denna produkt i kommersiellt syfte eller inom egen verksamhet. Dessa garantivillkor reglerar ytterligare garantitjänster som nedanstående tillverkare erbjuder köpare av nya produkter. Dessa tjänster är en komplettering till den lagstadgade garantin. Garantianspråk som regleras enligt lag påverkas inte av denna garanti. Våra garantitjänster är gratis för dig.
2. Garantitjänsterna omfattar endast sådana brister som bevisligen kan härledas till material- eller tillverkningsfel. Produkten som du har köpt ska vara ny och härstamma från nedanstående tillverkare. Vi avgör om sådana brister i produkten ska åtgärdas eller om produkten ska bytas ut.
   Tänk på att våra produkter endast får användas till ändamålsenligt syfte och inte har konstruerats för kommersiell, hantverksmässig eller yrkesmässig användning. Ett garantiavtal sluts därför ej om produkten inom garantitiden har använts inom yrkesmässiga, hantverksmässiga eller industriella verksamheter eller har utsatts för liknande påkänning.
3. Garantin omfattar inte:
   - Skador på produkten som kan härledas till att monteringsanvisningen missaktats eller på grund av felaktig installation, åsidosatt bruksanvisning (t ex anslutning till felaktig nätspänning eller strömart), missaktade underhålls- och säkerhetsbestämmelser, om produkten utsätts för onormala miljöfaktorer eller bristfällig skötsel och underhåll.
   - Skador på produkten som kan härledas till missbruk eller ej ändamålsenlig användning (t ex överbelastning av produkten eller användning av ej godkända insatsverktyg eller tillbehör), främmande partiklar som har trängt in i produkten (t ex sand, sten eller damm, transportskador), yttre våld eller yttre påverkan (t ex skador efter att produkten fallit ned).
   - Skador på produkten eller delar av produkten som kan härledas till bruksmässigt, normalt eller för övrigt naturligt slitage .
4. Garantitiden uppgår till 24 månader och gäller från datumet när produkten köptes. Medan garantitiden fortfarande gäller ska anspråk på garanti ställas inom två veckor efter att defekten fastställdes. Det är inte möjligt att ställa anspråk på garanti efter att garantitiden har löpt ut. Garantitiden förlängs inte när produkten repareras eller byts ut, dessutom medför sådana arbeten inte att en ny garantitid börjar gälla för produkten eller för ev. reservdelar som har monterats in. Detta gäller även vid hembesök.
5. Anmäl den defekta produkten på följande webbplats för att göra anspråk på garantin: www.isc-gmbh.info. Se till att du har sparat på kvittot eller ett annat köpebevis som påvisar att du har köpt denna produkt i nytt skick. Produkter som sänds in utan köpebevis eller utan märkskylt täcks inte av våra garantitjänster eftersom de inte kan identifieras. Om defekten i produkten täcks av våra garantitjänster, får du genast en reparerad eller ny produkt av oss.

Givetvis kan vi även, mot debitering, åtgärda skador som antingen inte täcks av garantin eller som har uppstått efter garantitidens slut. Skicka in produkten till nedanstående serviceadress.

För slitage- och förbrukningsdelar samt för delar som saknas hänvisar vi till begränsningarna i garantin enligt serviceinformationen som anges i denna bruksanvisning.

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Nebezpečí!
Při používání přístrojů musí být dodržována určitá bezpečnostní opatření, aby se zabránilo zraněním a škodám. Přečtěte si proto pečlivě tento návod k obsluze / bezpečnostní pokyny. Dobře si ho/ je uložte, abyste měli tyto informace kdykoliv po ruce. Pokud předáte přístroj jiným osobám, předejte s ním prosím i tento návod k obsluze/ bezpečnostní pokyny. Nepřebíráme žádné ručení za škody a úrazy vzniklé v důsledku nedodržování tohoto návodu k obsluze a bezpečnostních pokynů.

1. Bezpečnostní pokyny

Nebezpečí!
Přečtěte si všechny bezpečnostní pokyny a instrukce. Zanedbání při dodržování bezpečnostních pokynů a instrukcí mohou mít za následek úder elektrickým proudem, požár a/nebo těžká zranění. **Všechny bezpečnostní pokyny a instrukce si uložte pro budoucí použití.**

1. Vždy zkontrolujte, zda síťové napětí souhlasí s napětím uvedeným na typovém štítku. V tom případě, že není síťové napětí vhodné, může dojít k abnormálnímu chodu stroje a ke škodám na zdraví.
2. Zásobování proudem musí disponovat uzemněním a být jištěno ochranným vypínačem proti chybnému proudu.
3. Je zakázáno zvedat břemena, která překračují jmenovitou nosnost.
4. Používejte zařízení pouze pro účely, ke kterým je určeno. Nikdy nezvedejte lanovým zvedákem osoby.
5. Na vytažení zástrčky ze zásuvky netahejte za kabel. Nedávejte kabel do blízkosti horka, oleje a ostrých hran.
6. Nikdy se nepokoušejte zvedat uvázlá nebo zablokovaná břemena.
7. Pokud není lanový zvedák používán, vytáhněte síťovou zástrčku.
8. Nepouštějte do blízkosti stroje děti a jiné neautorizované osoby.
9. Je zakázáno tahat břemena bočně nebo ze strany. Vyhýbejte se kmitání břemena.
10. Přesvědčte se, zda se hák pohybuje tím směrem, který je zobrazen na ovládacím spínači.
11. Kontrolujte lanový zvedák pravidelně, zda není poškozen. Ovládací spínač musí být v dobrém stavu.
12. Opravy a údržbu nechte provádět pouze autorizovanou dílnou a odborným elektrikářem. Opravy smí provádět pouze odborný elektrikář; v jiném případě nelze vyloučit úrazy provozovatele.
13. Vyhýbejte se rychlému vypínání a zapínání (impulzový provoz).
14. Při obsluze lanového zvedáku buďte vždy pozorní.
15. Nikdy nestůjte nebo nepracujte pod zvednutým břemenem.

2. Popis přístroje a rozsah dodávky

2.1 Popis přístroje (obr. 1/2)
1. Upevňovací úchytka
2. Upevňovací otvor pro hák
3. Buben
4. Páka maximální délky lana
5. Páka automatického zastavovacího mechanismu
6. Ocelové lano
7. Vypínací závaží
8. Hák
9. Nouzový vypínač
10. Tlačítko
11. Dálkové ovládání
12. Síťový kabel
13. Ovládací vedení
14. Motor
15. Vodicí kladka
16. Přídavný hák
17. Lanko pro dálkové ovládání

2.2 Rozsah dodávky
Zkontrolujte prosím úplnost výrobku na základě popsaného rozsahu dodávky. V případě chybějících dílů se prosím obraťte nejpozději během 5 pracovních dnů po zakoupení výrobku za předložení platného dokladu o koupi na naše servisní středisko nebo prodejnu, kde jste přístroj zakoupili. Dbejte prosím na tabulku o záruce v servisních informacích na konci návodu.
- Otevřete balení a přístroj opatrně vyjměte z balení.
- Odstraňte obalový materiál a ochrany balení / dopravní pojistky (jsou-li k dispozici).
- Překontrolujte, zda je rozsah dodávky úplný.
- Zkontrolujte přístroj a příslušenství, zda nebyly při přepravě poškozeny.
- Balení si pokud možno uložte až do uplynutí záruční doby.

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Nebezpečí!
Přístroj a obalový materiál nejsou dětská hračka! Děti si nesmějí hrát s plastovými sáčky, fóliemi a malými díly! Hrozí nebezpečí spolknutí a udušení!

- Originální návod k obsluze

3. Použití podle účelu určení

Lanový zvedák slouží na zvedání a spouštění břemen v uzavřených místnostech příslušně podle výkonu stroje.

Přístroj smí být používán pouze podle svého účelu určení. Každé další, toto překračující použití, neodpovídá použití podle účelu určení. Za z toho vyplývající škody nebo zranění všeho druhu ručí uživatel/obsluhující osoba a ne výrobce.

Dbejte prosím na to, že naše přístroje nebyly podle svého účelu určení konstruovány pro živnostenské, řemeslnické nebo průmyslové použití. Nepřebíráme proto žádné ručení, pokud je přístroj používán v živnostenských, řemeslných nebo průmyslových podnicích a při srovnatelných činnostech.

4. Technická data

Napětí (V)	230 V ~ 50 Hz
Jmenovitý proud (A)	4,4
Příkon (W)	1000
Druh provozu	S3 20% 10 min
Jmenovitá nosnost (kg)	250 / 500
Výška zdvihání (m)	11,5 / 5,7
Jmenovitá rychlost (m/min)	8 / 4
Průměr ocelového lana (mm)	4,0
Pevnost ocelového lana v tahu (N/mm^2)	1870
Třída izolace	B
Druh ochrany	IP 54
Třída motoru	M1
Hmotnost netto (kg)	16,2

Druh provozu S3 - 20% - 10 min:
S3 = přerušovaný chod bez vlivu rozběhu. Toto znamená, že v rozmezí 10 minut činí max. doba provozu 20% (2 min).

Omezte tvorbu hluku a vibrace na minimum!
- Používejte pouze přístroje v bezvadném stavu.
- Pravidelně provádějte údržbu a čištění přístroje.
- Přizpůsobte Váš způsob práce přístroji.
- Nepřetěžujte přístroj.
- V případě potřeby nechte přístroj zkontrolovat.
- Přístroj vypněte, pokud ho nepoužíváte.
- Noste rukavice.

5. Před uvedením do provozu

Před zapnutím se přesvědčte, zda údaje na typovém štítku souhlasí s údaji sítě.
Varování!
Než začnete na přístroji provádět nastavení, vždy vytáhněte síťovou zástrčku ze zásuvky.

- Lanový zvedák není vhodný pro transport horkých a/nebo roztavených mas, kromě toho není lanový zvedák určen pro použití při nízkých teplotách a v agresivním prostředí.
- Mechanická skupina je M1.
- Životnost lanového zvedáku činí cca 8000 cyklů (kromě rychle opotřebitelných dílů). Poté, co lanový zvedák prošel 8000 cykly, musí být všechny mechanické díly zkontrolovány a opraveny.
- Přečtěte si návod k obsluze a porozumějte mu před tím, než budete s lanovým zvedákem pracovat.
- Zabezpečte, aby obsluha věděla, jak stroj funguje a jak má být obsluhován.
- Uživatel by měl vždy postupovat v souladu s návodem k obsluze.
- Lanový zvedák není určen pro trvalý provoz. Druh provozu: přerušovaný chod bez vlivu rozběhu.
- Jmenovitý výkon stroje se nemění s polohou břemena.

5.1 Vybalení
Po otevření balení prosím zkontrolujte rám, ocelové lano, háky a elektrický kontrolní mechanismus, zda nevykazují možné škody vzniklé při přepravě.

5.2 Montáž (obr. 5)
Lanový zvedák je vybaven 2 upevňovacími úchytkami (1), pomocí kterých musí být připevněn na čtyřhrannou trubku. Rozměry ramena musí odpovídat velikosti upevňovacích úchytek (1) a

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rameno musí být schopno unést dvojnásobnou jmenovitou zátěž. Doporučujeme Vám vyhledat kvalifikovaného technika.
Všechny šrouby musí být řádně utaženy. Před uvedením do provozu by měl ukotvení ramena zkontrolovat kvalifikovaný technik.

5.3 Funkce kladkostroje (obr. 6 – 9)
Lanový zvedák je vybaven vodicí kladkou (15) a přídavným hákem (16). Při správném použití může lanový zvedák zvedat dvojitou zátěž.
Vodicí kladku (15) a přídavný hák (16) namontujte tak, jak je znázorněno na obrázcích 6-8.
Pevně namontovaný hák (8) musí být zavěšen do upevňovacího otvoru (2) (obr. 9). Břemeno je nyní za pomoci dvou ocelových lan zvednuto, lanový zvedák tak může zvednout dvojitou zátěž.

6. Obsluha

Nebezpečí!
6.1 Pokyny k provozu
1. Před prvním použitím odstraňte z bubnu (3) lepicí pásku.
2. Hodnota hlukové emise na místě provozovatele hodnocená jako A je nižší než 75 dB (hladina akustického tlaku LpA). Hluk a vibrace byly měřeny podle normy EN ISO 11201.
3. Zásobovací napětí: 230 V ± 10%, 50 Hz ± 1%.
4. Lanový zvedák provozovat při teplotách okolí mezi 0 °C a 40 °C, relativní vlhkosti vzduchu nižší než 50%. Výška nad hladinou moře: max. 1000 m.
5. Pro transport a uložení smí teplota ležet v rozmezí -25 °C a 55 °C. Nejvyšší přípustná teplota nesmí být vyšší než 70 °C.
6. Uživatel by měl břemeno ze země nadzvedávat s nejnižší možnou rychlostí. Je-li břemeno zvednuté, mělo by být lano napnuté.
7. Motor (14) lanového zvedáku je vybaven tepelným spínačem. Během provozu lanového zvedáku proto může dojít k zastavení motoru (14), tento se po ochlazení automaticky opět rozběhne.
8. Elektrický lanový zvedák není vybaven omezovačem jmenovitého výkonu. Proto se prosím nesnažte dále zvedat břemeno, pokud tepelná pojistka provoz omezí. Břemeno v tomto případě překračuje jmenovitý výkon lanového zvedáku.
9. Nenechávejte zavěšená břemena bez dozoru a bez provedení potřebných bezpečnostních opatření.
10. Na ochranu proudového okruhu jistěte stroj 10 A pojistkou nebo 10 mA ochranným vypínačem proti chybnému proudu.
11. Nepoužívejte páky (4/5) jako běžné zařízení na zastavení. Tyto slouží pouze pro zastavení v nouzovém případě.
12. Než začnete pracovat, zkontrolujte, zda je ocelové lano (6) řádně navinuto na bubnu (3) a zda je vzdálenost mezi vinutím menší, než je ocelové lano (obr. 3).
13. Zkontrolujte, zda je břemeno na háku (8), resp. při provozu jako kladkostroj na přídavném háku (16), zajištěno a vždy udržujte odstup od břemena a ocelového lana (6).

6.2 Provoz (obr. 1)
- Zkontrolujte, zda je stisknutý nouzový vypínač (9). Na odblokování červeného tlačítkového spínače STOP s ním otáčejte ve směru hodinových ručiček.
- Na nadzvednutí břemena stiskněte tlačítko ▲ (10).
- Na spuštění břemena stiskněte tlačítko▼ (10).
- Páka automatického zastavovacího mechanismu (5): je-li dosaženo maximální výšky zdvihání, zatlačí vypínací závaží (7) páku (5) nahoru. Tím je aktivován koncový spínač a břemeno již nemůže být dále zvedáno.
- Páka maximální délky ocelového lana (4): když břemeno dosáhne nejnižší možné polohy, je aktivován koncový spínač a další spouštění břemena není možné. Tento koncový spínač by také zabránil pohybu lanového zvedáku v nesprávném směru (hák se pohybuje oproti směru zobrazeném na ovládacím spínači).
- Je-li stisknutý nouzový vypínač (9), lanový zvedák se zastaví.
- V nouzovém případě ihned zmáčknout nouzový vypínač (9), aby byl lanový zvedák zastaven. Pokud byl aktivován nouzový vypínač, není obsluha lanového zvedáku možná.

7. Výměna síťového napájecího vedení

Nebezpečí!
Pokud je síťové napájecí vedení poškozeno, musí být nahrazeno výrobcem nebo jeho zákaznickým servisem nebo kvalifikovanou osobou, aby se zabránilo nebezpečím.

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8. Čištění, údržba a objednání náhradních dílů

Nebezpečí!
Před všemi čisticími pracemi vytáhněte síťovou zástrčku.

8.1 Čištění

- Udržujte bezpečnostní zařízení, větrací otvory a kryt motoru tak prosté prachu a nečistot, jak jen to je možné. Otřete přístroj čistým hadrem nebo ho profoukněte stlačeným vzduchem při nízkém tlaku.
- Doporučujeme přímo po každém použití přístroj vyčistit.
- Pravidelně přístroj čistěte vlhkým hadrem a trochou mazlavého mýdla. Nepoužívejte čisticí prostředky nebo rozpouštědla; tyto by mohly narušit plastové díly přístroje. Dbejte na to, aby se do přístroje nedostala voda. Vniknutí vody do elektrického přístroje zvyšuje riziko úderu elektrickým proudem.

8.2 Údržba
Nebezpečí! Při údržbě stroje se ubezpečte, že není stroj připojen na síť.

- Dále: Jeden cyklus odpovídá jednomu pohybu jednoho břemena nahoru a dolu. Pravidelná kontrola odpovídá jedné kontrole po 100 cyklech.
- Pravidelně kontrolujte, zda koncové spínače lanového zvedáku řádně fungují. Kontrola se provádí následovně: dosáhlo-li lano maximální výšky zdvihnutí je aktivována páka automatického zastavovacího mechanismu (5). Motor (14) se musí nyní zastavit (zkoušku provádět bez břemena).
  Je-li ocelové lano (6) odvinuto tak dalece, jak je to možné, je aktivována páka maximální délky lana (4). Motor (14) se musí nyní zastavit.
- Pravidelně kontrolujte síťový kabel (12) a ovládací vedení (13).
- Každých 200 cyklů musí být namazáno ocelové lano (6) a vodicí kladka (15).
- Každých 30 cyklů musí být podle obrázku 4 zkontrolováno, zda je celé ocelové lano (6) v dobrém stavu. Pokud je poškozeno, musí být nahrazeno za lano odpovídající údajům v technických datech.
- Každých 1000 cyklů zkontrolovat, zda jsou šrouby upevňovacích úchytek (1) a vodicí kladky (15) dobře utaženy.
- Pravidelně promazávejte lano, řetěz, převodovku, ložiska a háky.
- Každých 1000 cyklů zkontrolovat rychle opotřebitelné díly jako: lano, řetěz, háky, pásy a brzdová obložení.
- Každých 1000 cyklů zkontrolovat, zda jsou háky (8/16) a vodicí kladka (15) v dobrém stavu.
- Před každým použitím lanového zvedáku zkontrolujte, zda jsou nouzový vypínač (9) a tlačítko (10) v bezvadném provozním stavu.
- Každých 1000 cyklů zkontrolovat brzdový systém. Pokud vydává motor (14) nezvyklé zvuky nebo nemůže zvednout jmenovitou zátěž, je možné, že musí být opraven brzdový systém:
  - vyměňte poškozené nebo opotřebované díly a uložte si příslušnou údržbovou dokumentaci.
  - s neplánovanými opravárenskými pracemi se obraťte prosím na autorizovaný servis.
- Nechte Váš elektrický přístroj opravovat pouze kvalifikovaným odborným personálem.

8.3 Objednání náhradních dílů:
Při objednávce náhradních dílů je třeba uvést následující údaje:

- Typ přístroje
- Číslo artiklu přístroje
- Identifikační číslo přístroje
- Číslo požadovaného náhradního dílu

Aktuální ceny a informace naleznete na www.isc-gmbh.info

9. Likvidace a recyklace

Přístroj je uložen v balení, aby bylo zabráněno poškození při přepravě. Toto balení je surovina a tím znovu použitelné nebo může být dáno zpět do cirkulace surovin. Přístroj a jeho příslušenství jsou vyrobeny z rozdílných materiálů, jako např. kov a plasty. Defektní přístroje nepatří do domovního odpadu. K odborné likvidaci by měl být přístroj odevzdán na příslušném sběrném místě. Pokud žádné takové sběrné místo neznáte, měli byste se informovat na místním zastupitelství.

10. Skladování

Skladujte přístroj a jeho příslušenství na tmavém, suchém a nezamrzajícím místě a mimo dosah dětí. Optimální teplota skladování leží mezi 5 a 30 ˚C. Uložte elektrický přístroj v originálním balení.

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Jen pro země EU

Elektrické nářadí a přístroje neodhazujte do domovního odpadu!

Podle evropské směrnice 2012/19/ES o odpadních elektrických a elektronických zařízeních (OEEZ) a při prosazování národního práva musí být spotřebované elektrické nářadí sbíráno samostatně a musí být dopraveno do odpovídajícího ekologického recyklačního závodu.

Alternativa recyklace k výzvě na zpětné odeslání výrobku:
Vlastník elektrického přístroje je povinen alternativně namísto zpětného odeslání zařízení spolupůsobit při jeho správném zužitkování v případě, že se vzdá jeho vlastnictví. Starý přístroj lze v takovém případě odevzdat také ve sběrně, která provede odstranění ve smyslu národního zákona o recyklaci a odpadech. Tyto předpisy se nevztahují na díly příslušenství a pomocné prostředky bez elektrických součástí přidané ke starým přístrojům.

Patisk nebo jiné rozmnožování dokumentace a průvodních listin, také ve výtažcích, je přípustný pouze s výslovným souhlasem firmy iSC GmbH.

Technické změny vyhrazeny

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Servisní informace

Ve všech zemích uvedených v záručním listu máme kompetentní servisní partnery, jejichž kontaktní údaje naleznete v záručním listu. Jsou Vám k dispozici pro všechny servisní požadavky jako opravy, objednávání náhradních a rychle opotřebitelných dílů nebo nákup spotřebních materiálů.

Je třeba dbát na to, že u tohoto přístroje podléhají následující díly opotřebení přiměřenému použití nebo přirozenému opotřebení, resp. jsou potřebné jako spotřební materiál.

Kategorie	Příklad
Rychle opotřebitelné díly*	Ocelové lano, Hák, Vodicí kladka, Přídavný hák
Spotřební materiál/spotřební díly*	
Chybějící díly	

* není nutně obsaženo v rozsahu dodávky!

V případě nedostatků nebo chyb Vás žádame, abyste příslušnou chybu nahlásili na internetové stránce www.isc-gmbh.info. Dbejte prosím na přesný popis chyby a odpovězte přitom v každém případě na následující otázky:

- Fungoval přístroj předtím nebo byl od začátku defektní?
- Všimli jste si něčeho před vyskytnutím poruchy (příznak před poruchou)?
- Jakou chybnou funkci přístroj podle Vašeho názoru vykazuje (hlavní příznak)? Popište tuto chybnou funkci.

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Záruční list

Vážená zákaznice, vážený zákazníku,
naše výrobky podléhají přísné kontrole kvality. Pokud i přesto tento přístroj bezvadně nefunguje, je nám to velice líto a prosíme Vás, abyste se obrátili na naši servisní službu na adrese uvedené na tomto záručním listu. Rádi Vám budeme k dispozici také telefonicky na uvedeném servisním telefonním čísle. Pro uplatňování požadavků poskytnutí záruky platí následující:

1. Tyto záruční podmínky jsou určeny výlučně pro spotřebitele, tzn. fyzické osoby, které tento výrobek nebudou používat ani v rámci své profesní, ani jiné výdělečně činné aktivity. Tyto záruční podmínky upravují dodatečné záruky, které níže uvedený výrobce poskytuje kupujícím nových přístrojů navíc k zákonné záruce. Vaše zákonem stanovené nároky na záruku zůstanou touto zárukou nedotčeny. Naše záruka je pro Vás bezplatná.
2. Záruka se vztahuje výhradně na nedostatky na vámi zakoupeném novém přístroji níže uvedeného výrobce, které jsou způsobené chybou materiálu nebo výrobní chybou, a podle našeho uvážení je omezena na odstranění těchto nedostatků na přístroji nebo výměnu přístroje.
   Dbejte prosím na to, že naše přístroje nebyly podle svého účelu určení konstruovány pro živnostenské, řemeslnické nebo odborné použití. Záruční smlouva se proto nenaplní, pokud byl přístroj během záruční doby používán v živnostenských, řemeslnických nebo průmyslových podnicích nebo byl vystaven srovnatelnému zatížení.
3. Z naší záruky jsou vyloučeny:
   - Škody na přístroji, které vznikly nedodržením montážního návodu nebo na základě neoborné instalace, nedodržením návodu k použití (jako např. připojení na chybné síťové napětí nebo druh el. proudu), nebo nedodržením pokynů k údržbě a bezpečnostních pokynů, vystavením přístroje nepřirozeným povětrnostním podmínkám nebo nedostatečnou péčí a údržbou.
   - Škody na přístroji, které vznikly neoprávněným nebo nesprávným použitím (jako např. přetížení přístroje nebo použití neschválených přídavných nástrojů nebo příslušenství), vniknutím cizích těles do přístroje (jako např. písek, kameny nebo prach, škody při přepravě), používáním násilí nebo cizím působením (jako např. škody způsobené pádem).
   - Škody na přístroji nebo na dílech přístroje, které jsou způsobeny běžným opotřebením přiměřeného použití nebo jiným přirozeným opotřebením.
4. Záruční doba činí 24 měsíců a začíná datem koupě přístroje. Požadavky poskytnutí záruky musí být uplatňovány před uplynutím záruční doby během dvou týdnů poté, co byla vada zjištěna. Uplatňování požadavků poskytnutí záruky po uplynutí záruční doby je vyloučeno. Oprava nebo výměna přístroje nevede ani k prodloužení záruční doby, ani nedojde tímto výkonem k zahájení nové záruční doby pro tento přístroj nebo pro jakékoli zabudované náhradní díly. To platí také při využití místního servisu.
5. Pro uplatňování požadavků na poskytnutí záruky nahlaste prosím váš defektní přístroj na: www.isc-gmbh.info. Mějte připravenu nákupní účtenku nebo jiné doklady o vašem nákupu. Přístroje, které jsou zaslány bez odpovídajících dokladů a bez typového štítku, jsou ze záručního plnění vyloučeny z důvodu nedostatečné možnosti jednoznačného přiřazení. Pokud je defekt přístroje zahrnut v naší záruce, obdržíte obratem zpátky opravený nebo nový přístroj.

Samozřejmě Vám rádi odstraníme nedostatky na přístroji na Vaše náklady, pokud tyto nedostatky nejsou nebo už nejsou zahrnuty v rozsahu záruky. V takovém případě nám prosím zašlete přístroj na naší servisní adresu.

V případě rychle opotřebitelných dílů, spotřebních dílů a chybějících dílů poukazujeme na omezení této záruky podle servisních informací uvedených v tomto návodu k obsluze.

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Nebezpečenstvo!
Pri používaní prístrojov sa musia dodržiavať príslušné bezpečnostné opatrenia, aby bolo možné zabrániť prípadným zraneniam a vecným škodám. Preto si starostlivo prečítajte tento návod na obsluhu/bezpečnostné pokyny. Následne ich starostlivo uschovajte, aby ste mali vždy k dispozícii potrebné informácie. V prípade, že budete prístroj požičiavať tretím osobám, prosím odovzdajte im spolu s prístrojom tento návod na obsluhu/bezpečnostné pokyny. Nepreberáme žiadne ručenie za nehody ani škody, ktoré vzniknú nedodržaním tohto návodu na obsluhu a bezpečnostných pokynov.

1. Bezpečnostné pokyny

Nebezpečenstvo!
Prečítajte si všetky bezpečnostné predpisy a pokyny. Nedostatky pri dodržovaní bezpečnostných predpisov a pokynov môžu mať za následok úraz elektrickým prúdom, vznik požiaru a/alebo ťažké poranenia. **Všetky bezpečnostné predpisy a pokyny si odložte pre budúce použitie.**

1. Vždy skontrolujte, či sa sieťové napätie zhoduje s napätím na výrobnom štítku. Pre prípad, že sieťové napätie nie je vhodné, môže dochádzať k abnormálnemu fungovaniu stroja a k ujme na zdraví.
2. Napájanie elektrickým prúdom musí mať uzemnenie a musí byť zabezpečené ochranným elektrickým spínačom pre chybový prúd.
3. Je zakázané zdvíhať bremená, ktoré prekračujú nominálne zaťaženie.
4. Zariadenie používajte len na účel, pre ktorý je určené. Lanovým zdvíhacím zariadením nikdy nezdvíhajte osoby.
5. Pri vyťahovaní zástrčky zo zásuvky neťahajte za kábel. Chráňte elektrický kábel pred teplom, olejom a ostrými hranami.
6. Nikdy neskúšajte zdvíhať pevné alebo zaseknuté bremená.
7. Keď nepoužívate zdvíhacie zariadenie, vytiahnite zástrčku zo zásuvky.
8. Zabráňte prístupu detí a iných neautorizovaných osôb k zariadeniu.
9. Je zakázané ťahať bremená do strany alebo zo strany. Zabráňte kolísaniu bremena.
10. Zabezpečte, aby sa hák pohyboval rovnakým smerom, ako je to zobrazené na ovládacom spínači.
11. Pravidelne kontrolujte, či nie je lanové zdvíhacie zariadenie poškodené. Ovládací spínač musí byť v dobrom stave.
12. Opravy a údržbové práce nechajte vykonávať len v autorizovaných odborných servisoch alebo u odborného elektrikára. Opravy smie vykonávať len odborný elektrikár, v opačnom prípade môže dôjsť k úrazu obsluhujúcej osoby.
13. Vyhýbajte sa rýchlemu zapínaniu a vypínaniu zariadenia (tlačidlová prevádzka).
14. Pri obsluhovaní lanového zdvíhacieho zariadenia buďte vždy pozorní.
15. Nestojte ani nepracujte pod zdvihnutým bremenom.

2. Popis prístroja a objem dodávky

2.1 Popis prístroja (obr. 1/2)
1. Upevňovacie strmene
2. Upevňovací otvor pre hák
3. Bubon
4. Páčka pre maximálnu dĺžku lana
5. Páčka pre automatický zastavovací mechanizmus
6. Oceľové lano
7. Vypínacie závažie
8. Hák
9. Núdzový vypínač
10. Tlačidlo
11. Diaľkové ovládanie
12. Sieťový kábel
13. Kábel ovládača
14. Motor
15. Kladka
16. Dodatočný hák
17. Lanko pre diaľkové ovládanie

2.2 Objem dodávky
Prosím, skontrolujte kompletnosť výrobku na základe uvedeného objemu dodávky. V prípade chýbajúcich častí sa prosím obráťte najneskôr do 5 pracovných dní od zakúpenia výrobku s predložením platného dokladu o kúpe na naše servisné stredisko alebo na obchod, v ktorom ste prístroj zakúpili. Prosím, dbajte pritom na záručnú tabuľku uvedenú v servisných informáciách na konci návodu.

- Otvorte balenie a opatrne vyberte prístroj von z balenia.
- Odstráňte obalový materiál ako aj obalové/transportné poistky (pokiaľ sú obsiahnuté).

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- Skontrolujte, či obsah dodávky kompletný.
- Skontrolujte, či nedošlo k poškodeniu prístroja a príslušenstva transportom.
- Pokiaľ možno, uschovajte si obal až do konca záručnej doby.

Nebezpečenstvo!
Prístroj a obalový materiál nie sú hračky! Deti sa nesmú hrať s plastovými vreckami, fóliami ani malými dielmi! Hrozí nebezpečenstvo prehltnutia a udusenia!

- Originálny návod na obsluhu

3. Správne použitie prístroja

Lanové zdvíhacie zariadenie slúži na zdvíhanie a spúšťanie bremien v uzatvorených miestnostiach primerane k výkonu zariadenia.

Prístroj smie byť použitý len na ten účel, na ktorý bol určený. Akékoľvek iné odlišné použitie sa považuje za nespĺňajúce účel použitia. Za škody alebo zranenia akéhokoľvek druhu spôsobené nesprávnym používaním ručí používateľ / obsluhujúca osoba, nie však výrobca.

Prosím berte ohľad na skutočnosť, že naše prístroje neboli svojim určením konštruované na profesionálne, remeselnícke ani priemyselné použitie. Nepreberáme žiadne záručné ručenie, ak sa prístroj bude používať v profesionálnych, remeselníckych alebo priemyselných prevádzkach ako aj na činnosti rovnocenné s takýmto použitím.

4. Technické údaje

Napätie (V)	230 V ~ 50 Hz
Menovitý prúd (A)	4,4
Príkon (W)	1000
Pracovný režim	S3 20%:10 min
Nominálne zaťaženie (kg)	250 / 500
Zdvíhacia výška (jednoduchý/dvojitý hák) (m)	11,5 / 5,7
Nominálna rýchlosť (jednoduchý/dvojitý hák) (m/min)	8 / 4
Priemer oceľového lana (mm)	4,0
Pevnosť oceľového lana v ťahu (N/mm^2)	1870
Trieda izolácie	B
Stupeň ochrany	IP 54
Trieda hnacej jednotky	M1
Hmotnosť netto (kg)	16,2

Prevádzkový režim S3 - 20% - 10 min: S3 = prerušovaná prevádzka bez vplyvu priebehu rozbehu. Znamená to, že počas doby 10 minút predstavuje maximálny prevádzkový čas 20% (2,0 min).

Obmedzte tvorbu hluku a vibráciu na minimum!
- Používajte len prístroje v bezchybnom stave.
- Pravidelne vykonávajte údržbu a čistenie prístroja.
- Prispôsobte spôsob práce prístroju.
- Prístroj nepreťažujte.
- V prípade potreby nechajte prístroj skontrolovať.
- Prístroj vypnite, pokiaľ ho nepoužívate.
- Používajte rukavice.

5. Pred uvedením do prevádzky

Presvedčte sa pred zapojením prístroja do siete o tom, či údaje na typovom štítku prístroja súhlasia s údajmi elektrickej siete.
Výstraha!
Skôr než začnete na prístroji robiť akékoľvek nastavenia, vytiahnite zo siete elektrický kábel.

- Lanové zdvíhacie zariadenie nie je vhodné na prepravu horúcich a / alebo roztavených hmôt, okrem toho nie je zdvíhacie zariadenie určené na použitie pri nízkych teplotách a v agresívnom prostredí.
- Mechanická skupina je M1.
- Doba používania lanového zdvíhacieho zariadenia je cca. 8000 cyklov (okrem náhradných dielov). Keď má zdvíhacie zariadenie za sebou 8000 cyklov, musia byť skontrolované a opravené všetky mechanické časti.
- Predtým ako začnete používať lanové zdvíhacie zariadenie si prečítajte a pochopte návod na obsluhu.
- Ubezpečte sa, že obsluhujúca osoba vie, ako zariadenie funguje a ako by sa malo prevádzkovať.
- Používateľ by mal konať vždy v súlade s návodom na obsluhu.
- Zdvíhacie zariadenie nie je vhodné pre trvalú prevádzku. Prevádzkový režim je: Prerušovaná prevádzka bez vplyvu priebehu

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rozbehu.
- Menovitý výkon zariadenia sa nemení s polohou zaťaženia.

5.1 Vybalenie
Po otvorení balenia prosím skontrolujte možné transportné poškodenia rámu, oceľového lana, hákov a elektrického kontrolného mechanizmu.

5.2 Montáž (obrázok 5)
Lanové zdvíhacie zariadenie je vybavené 2 upevňovacími strmeňmi (1), ktorými sa musí upevniť na štvorhrannú rúru. Rozmery konzoly musia byť v súlade s veľkosťou upevňovacích strmeňov (1) a konzola musí mať dvojnásobnú nominálnu nosnosť. Odporúčame Vám kontaktovať kvalifikovaného technika.
Všetky skrutky musia byť riadne dotiahnuté. Pred uvedením zariadenia do prevádzky by mal ukotvenie konzoly skontrolovať kvalifikovaný technik.

5.3 Funkcia kladkostroja (obrázok 6 – 9)
Lanové zdvíhacie zariadenie je vybavené kladkou (15) a dodatočným hákom (16). Pri správnom použití je možné pomocou lanového zdvíhacieho zariadenia zdvihnúť dvojnásobnú záťaž.
Namontujte kladku (15) a dodatočný hák (16) tak, ako to je znázornené na obrázku 6-8. Napevno namontovaný hák (8) musí byť zavesený v upevňovacom otvore (2) (obrázok 9).
Bremeno je teraz zdvíhané pomocou dvoch oceľových lán, lanové zdvíhacie zariadenie je takto schopné uniesť dvojnásobnú záťaž.

6. Obsluha

Nebezpečenstvo!
6.1 Pokyny k prevádzke
1. Pred prvým použitím odstráňte lepiacu pásku z bubna (3).
2. Hodnota emisií hluku na mieste obsluhujúcej osoby s hodnotením A je nižšia ako 75 dB (hladina akustického tlaku LpA). Hodnoty hluku a vibrácie boli merané podľa EN ISO 11201.
3. Napájacie napätie: 230 V ± 10%, 50 Hz ± 1%.
4. Lanové zdvíhacie zariadenie je potrebné prevádzkovať pri teplotách okolitého prostredia medzi 0 °C a 40 °C a relatívnej vlhkosti pod 50%. Nadmorská výška: max. 1000 m.
5. Pre transport a skladovanie sa môže pohybovať teplota v rozpätí -25 °C a 55 °C. Najvyššia prípustná teplota nesmie prekročiť 70 °C.
6. Používateľ by mal zdvíhať bremeno z podlahy najnižšou možnou rýchlosťou. Keď sa zdvíha bremeno, lano by malo byť napnuté.
7. Motor (14) lanového zdvíhacieho zariadenia je vybavený termostatovým spínačom. Počas prevádzky lanového zdvíhacieho zariadenia môže preto dôjsť k zastaveniu motora (14), tento sa znovu spustí, akonáhle sa znovu ochladí.
8. Elektrické lanové zdvíhacie zariadenie nie je vybavené obmedzovačom menovitého výkonu. Preto sa prosím ďalej nepokúšajte zdvíhať bremeno, keď prevádzku obmedzuje ochrana pred prehrievaním. V tomto prípade prekračuje záťaž menovitý výkon zdvíhacieho zariadenia.
9. Nenechávajte bez dozoru visiace bremená bez toho, aby ste prijali príslušné bezpečnostné opatrenia.
10. Pre ochranu elektrického okruhu zabezpečte zariadenie 10 A poistkou alebo 10 mA ochranným spínačom pre chybový prúd.
11. Nepoužívajte páčky (4/5) ako bežné zastavovacie zariadenie. Slúžia len ako zastavovacie zariadenie pre prípad núdze.
12. Skôr než začnete pracovať, ubezpečte sa, že je oceľové lano (6) správne navinuté na bubon (3), a že je vzdialenosť medzi návinmi menšia ako oceľové lano (obrázok 3).
13. Ubezpečte sa, že je náklad riadne zaistený na háku (8), resp. pri kladkostrojovej prevádzke na dodatočnom háku (16) a vždy udržiavajte odstup od bremena a oceľového lana (6).

6.2 Prevádzka (obrázok 1)
- Skontrolujte, či je stlačené tlačidlo núdzového vypnutia (9). Otočte červené tlačidlo Stop v smere hodinových ručičiek, aby ste ho odistili.
- Stlačte tlačidlo ▲ (10) pre nadvihnutie bremena.
- Stlačte tlačidlo ▼ (10) pre spustenie bremena.
- Páčka automatického zastavovacieho mechanizmu (5): Ak je dosiahnutá maximálna zdvíhacia výška, zatlačí vypínacie závažie (7) páčku (5) nahor. Dôjde tým k aktivácii koncového vypínača a bremeno už nemôže byť ďalej zdvíhané.
- Páčka pre maximálnu dĺžku lana (4): Keď dosiahne bremeno najnižšiu možnú polohu, aktivuje sa koncový spínač, ktorý neumožní ďalšie spúšťanie bremena. Tento koncový

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spínač môže rovnako zabrániť aj prevádzke zdvíhacieho zariadenia nesprávnym smerom (hák sa pohybuje opačným smerom, ako je zobrazené na ovládacom spínači).
- Keď sa aktivuje núdzový vypínač (9), lanové zdvíhacie zariadenie sa zastaví.
- V prípade núdze okamžite stlačte núdzový vypínač (9), aby ste zdvíhacie zariadenie zastavili. Obsluha lanového zdvíhacieho zariadenia nie je možná, keď je stlačený núdzový vypínač.

7. Výmena sieťového prípojného vedenia

Nebezpečenstvo!
V prípade poškodenia sieťového prípojného vedenia prístroja sa musí vedenie vymeniť výrobcom alebo jeho zákazníckym zastúpením alebo podobne kvalifikovanou osobou, aby sa zabránilo rizikám.

8. Čistenie, údržba a objednanie náhradných dielov

Nebezpečenstvo!
Pred všetkými údržbovými a čistiacimi prácami vytiahnite kábel zo siete.

8.1 Čistenie
- Udržujte ochranné zariadenia, vzduchové otvory a kryt motora vždy v čistom stave bez prachu a nečistôt. Utrite prístroj čistou utierkou alebo ho vyčistite vyfúkaním stlačeným vzduchom pri nastavení na nízky tlak.
- Odporúčame, aby ste prístroj čistili priamo po každom použití.
- Čistite prístroj pravidelne pomocou vlhkej utierky a malého množstva tekutého mydla. Nepoužívajte žiadne agresívne čistiace prostriedky ani riedidlá; tieto prostriedky by mohli napadnúť umelohmotné diely prístroja. Dbajte na to, aby sa do vnútra prístroja nedostala voda. Vniknutie vody do elektrického prístroja zvyšuje riziko úrazu elektrickým prúdom.

8.2 Údržba
Nebezpečenstvo! Vždy sa ubezpečte, že zariadenie nie je napojené do elektrickej siete, keď vykonávate jeho údržbu.
- Následne: Jeden cyklus zodpovedá jednému pohybu bremena hore a dolu. Periodická kontrola zodpovedá kontrole po 100 cykloch.
- Periodicky overujte, či riadne fungujú koncové spínače lanového zdvíhacieho zariadenia. Kontrola sa vykonáva nasledovne: Keď dosiahne lano maximálnu zdvíhaciu výšku, aktivuje sa páčka automatického zastavovacieho mechanizmu (5). Motor (14) sa teraz musí zastaviť. (skontrolujte záťaž).
  Ak je lano (6) odtočené tak ďaleko, ako sa dá, aktivuje sa páčka pre maximálnu dĺžku lana (4). Motor (14) sa teraz musí zastaviť.
- Pravidelne kontrolujte sieťový kábel (12) a kábel ovládača (13).
- Každých 200 cyklov sa musí oceľové lano (6) a kladka (15) premazať.
- Každých 30 cyklov sa musí podľa obrázku 4 skontrolovať, či je celé oceľové lano (6) v dobrom stave. Ak je lano poškodené, musí sa nahradiť novým, ktoré vyhovuje technickým údajom.
- Každých 1000 cyklov skontrolujte, či sú skrutky upevňovacích strmeňov (1) a kladky (15) dobre dotiahnuté.
- Každých 1000 cyklov skontrolujte, či sú háky (8/16) a kladka (15) v dobrom stave.
- Pravidelne premazávajte lano, reťaz, prevodovku, ložiská a háky.
- Skontrolujte každých 1000 cyklov opotrebovávané diely ako: lano, reťaz, háky, pásy a brzdové obloženie.
- Pred každým použitím lanového zdvíhacieho zariadenia skontrolujte, či je núdzový vypínač (9) a tlačidlo (10) v bezchybnom prevádzkovom stave.
- Každých 1000 cyklov skontrolujte brzdový systém. Ak z motora (14) vychádzajú nezvyčajné zvuky alebo ak motor nedokáže zdvihnúť nominálnu záťaž, je možné, že je potrebné opraviť brzdový systém:
  - Poškodené alebo opotrebované diely vymeňte a uložte si údržbovú dokumentáciu, ktorá k nim patrí.
  - Pre neplánované opravárenské práce sa prosím obráťte na autorizované zákaznícke centrum.
- Nechajte Váš elektrický nástroj opravovať len kvalifikovaným odborníkom.

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8.3 Objednávanie náhradných dielov:
Pri objednávaní náhradných dielov je potrebné uviesť nasledovné údaje:

- Typ prístroja
- Výrobné číslo prístroja
- Identifikačné číslo prístroja
- Číslo potrebného náhradného dielu

Aktuálne ceny a informácie nájdete na stránke www.isc-gmbh.info

9. Likvidácia a recyklácia

Prístroj sa nachádza v obale za účelom zabránenia poškodeniu pri transporte. Tento obal je vyrobený zo suroviny a tým pádom je ho možné znovu použiť alebo sa môže dať do zberu na recykláciu surovín. Prístroj a jeho príslušenstvo sa skladajú z rôznych materiálov, ako sú napr. kovy a plasty. Poškodené prístroje nepatria do domového odpadu. Prístroj by sa mal odovzdať k odbornej likvidácii na príslušnom zbernom mieste. Pokiaľ Vám nie je známe takéto zberné miesto, informujte sa prosím na miestnej samospráve.

10. Skladovanie

Skladujte prístroj a jeho príslušenstvo na tmavom, suchom a nezamŕzajúcom mieste mimo dosahu detí. Optimálna teplota pre skladovanie je medzi 5 až 30 °C. Skladujte tento elektrický prístroj v originálnom balení.

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Len pre krajiny EÚ

Neodstraňujte elektrické prístroje ako domový odpad!

Podľa Európskej smernice 2012/19/ES o odpade z elektrických a elektronických zariadení (OEEZ) a v súlade s národnými právnymi predpismi sa musia použité elektronické prístroje odovzdať do triedeného zberu a musí sa zabezpečiť ich špecifické spracovanie v súlade s ochranou životného prostredia (recyklácia).

Recyklačná alternatíva k výzve na spätné zaslanie výrobku:
Majiteľ elektrického prístroja je alternatívne namiesto spätnej zásielky povinný spolupracovať pri riadnej recyklácii prístroja v prípade vzdania sa jeho vlastníctva. Starý prístroj môže byť za týmto účelom taktiež prenechaný zbernému miestu, ktoré vykoná odstránenie v zmysle národného zákona o recyklácii a odpadovom hospodárstve. Netýka sa to dielov príslušenstva, priložených k starým prístrojom a pomocných prostriedkov bez elektronických komponentov.

Dodatočná tlač alebo iné reprodukovanie dokumentácie a sprievodných dokladov výrobkov, taktiež ich častí, je prípustná len s výslovným súhlasom spoločnosti iSC GmbH.

Technické zmeny vyhradené

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Servisné informácie

Vo všetkých krajinách uvedených na záručnom liste máme kompetentných servisných partnerov, ktorých kontakty je možné prevziať zo záručného listu. Sú Vám k dispozícii pre akékoľvek servisné požiadavky ako opravy, objednávanie náhradných a opotrebovávaných dielov alebo nákup spotrebných materiálov.

Je potrebné dbať na to, že v prípade tohto výrobku podliehajú nasledujúce diely bežnému pracovnému alebo prirodzenému opotrebeniu, resp. sú nasledujúce diely považované za spotrebný materiál.

Kategória	Príklad
Diely podliehajúce opotrebeniu*	Oceľové lano, Hák, Kladka, Dodatočný hák
Spotrebný materiál / spotrebné diely*	
Chýbajúce diely	

* nie je bezpodmienečne obsiahnuté v objeme dodávky!

V prípade nedostatkov alebo chýb Vás prosíme, aby ste príslušnú chybu nahlásili na adrese www.isc-gmbh.info. Prosím, dbajte na presný popis chyby a odpovedzte pritom v každom prípade na nasledujúce otázky:

- Fungoval prístroj predtým alebo bol od začiatku chybný?
- Všimli ste si niečo pred vyskytnutím poruchy (symptóm pred poruchou)?
- Aké chybné funkcie podľa Vás prístroj vykazuje (hlavný symptóm)?
  Popíšte túto chybnú funkciu.

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Záručný list

Vážená zákazníčka, vážený zákazník,
naše výrobky podliehajú prísnej kontrole kvality. V prípade, že nebude prístroj napriek tomu bezchybne fungovať, je nám to veľmi ľúto a prosíme Vás, aby ste sa obrátili na našu servisnú službu na adrese uvedenej na tomto záručnom liste. Radi Vám budeme k dispozícii taktiež telefonicky na uvedenom servisnom telefónnom čísle. Pre uplatnenie nárokov na záručné plnenie platia nasledujúce podmienky:

1. Tieto záručné podmienky sa týkajú výlučne štandardných spotrebiteľov, t.j. takých osôb, ktoré tento výrobok nechcú používať na účely v rámci svojich remeselníckych činností ani na iné samostatne zárobkové činnosti. Tieto záručné podmienky upravujú dodatočné záručné plnenia, ktoré nižšie uvedený výrobca poskytuje kupujúcim svojich nových prístrojov dodatočne k zákonnej záruke. Vaše zákonné nároky na záruku nie sú touto zárukou dotknuté. Naše záručné plnenie je pre Vás zadarmo.
2. Záručné plnenie sa vzťahuje výlučne len na nedostatky na Vami zakúpenom novom prístroji nižšie uvedeného výrobcu, ktoré sú spôsobené chybami materiálu alebo výrobnými chybami, a podľa nášho uváženia sa obmedzuje na odstránenie týchto nedostatkov na prístroji alebo výmenu prístroja. Prosím, dbajte na to, že naše prístroje neboli svojim určením konštruované na profesionálne, remeselnícke ani odborné použitie. Táto záručná zmluva sa preto neuzatvára, ak sa prístroj počas záručnej doby používal v profesionálnych, remeselníckych alebo priemyselných prevádzkach, alebo ak bol vystavený namáhaniu rovnocennému s takýmto použitím.
3. Z našej záruky sú vylúčené:
   - Škody na prístroji, ktoré boli spôsobené nedodržaním montážneho návodu alebo na základe neodbornej inštalácie, nedodržaním návodu na použitie (ako napr. pripojením na nesprávne sieťové napätie alebo druh prúdu) alebo nedodržaním pokynov pre údržbu a bezpečnostných pokynov alebo vystavením prístroja abnormálnym poveternostným podmienkam alebo nedostatočnou starostlivosťou a údržbou.
   - Škody na prístroji, ktoré boli spôsobené zneužívaním alebo nesprávnym používaním (ako napr. preťaženie prístroja alebo použitie neprípustných pracovných nástrojov alebo príslušenstva), vniknutím cudzích telies do prístroja (ako napr. piesok, kamene alebo prach, prepravné poškodenia), použitím násilia alebo cudzieho pôsobenia (napr. škody spôsobené pádom).
   - Škody na prístroji alebo na častiach prístroja, ktoré zodpovedajú príslušnému pracovnému, bežnému alebo inému prirodzenému opotrebeniu.
4. Doba záruky je 24 mesiacov a začína plynúť od dátumu zakúpenia prístroja. Nároky na záruku sa musia uplatniť pred koncom uplynutia záručnej doby do dvoch týždňov od zistenia nedostatku. Uplatnenie nárokov na záruku po uplynutí záručnej doby je vylúčené. Oprava alebo výmena prístroja nevedie k predĺženiu záručnej doby ani nedochádza na základe tohto plnenia ku vzniku novej záručnej doby pre prístroj ani pre akékoľvek inštalované náhradné diely. To platí taktiež pri použití miestneho servisu.
5. Pre uplatnenie Vášho nároku, prosím nahláste defektný prístroj na adrese: www.isc-gmbh.info. Prosíme, aby ste mali k dispozícii účtenku alebo iné doklady o zakúpení nového prístroja. Prístroje, ktoré budú zaslané bez príslušných dokladov alebo bez typového štítku, budú vylúčené zo záručného plnenia kvôli nedostatočnej možnosti identifikácie. Ak spadá defekt prístroja pod naše záručné plnenie, dostanete obratom naspäť opravený alebo nový prístroj.

Samozrejme Vám radi opravíme nedostatky na prístroji na Vaše náklady, ak tieto nedostatky nespadajú alebo už nespadajú do rozsahu záruky. Prosím, pošlite nám v takom prípade prístroj na našu servisnú adresu.

Ohľadne opotrebovávaných, spotrebných a chýbajúcich dielov poukazujeme na obmedzenia tejto záruky podľa servisných informácií uvedených v tomto návode na obsluhu.

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Gevaar!
Bij het gebruik van toestellen dienen enkele veiligheidsmaatregelen te worden nageleefd om lichamelijk gevaar en schade te voorkomen. Lees daarom deze handleiding / veiligheidsinstructies zorgvuldig door. Bewaar deze goed zodat u de informatie op elk moment kunt terugvinden. Mocht u dit toestel aan andere personen doorgeven, gelieve dan deze handleiding / veiligheidsinstructies mee te geven. Wij zijn niet aansprakelijk voor ongevallen of schade die te wijten zijn aan niet-naleving van deze handleiding en van de veiligheidsinstructies.

1. Veiligheidsaanwijzingen

Gevaar!
Lees alle veiligheidsinstructies en aanwijzingen. Nalatigheden bij de inachtneming van de veiligheidsinstructies en aanwijzingen kunnen elektrische schok, brand en/of zware letsels tot gevolg hebben. **Bewaar alle veiligheidsinstructies en aanwijzingen voor de toekomst.**

1. Controleer steeds of de netspanning overeenkomt met de spanning vermeld op het kenplaatje. Indien de netspanning niet geschikt is kan dit leiden tot een abnormale functie van de machine en tot lichamelijk letsel.
2. De stroomtoevoer moet voorzien zijn van een aarding en beveiligd zijn door een aardlekschakelaar.
3. Het is verboden lasten te hijsen die de nominale last overschrijden.
4. Gebruik het gereedschap enkel voor het voorziene doeleinde. Nooit personen met de kabeltakel hijsen.
5. Trek niet aan de kabel om de stekker uit het stopcontact te verwijderen. Hou de kabel verwijderd van hitte, olie en scherpe kanten.
6. Probeer nooit vast zittende of geblokkeerde lasten te hijsen.
7. Verwijder de netstekker uit het stopcontact als de kabeltakel niet in gebruik is.
8. Hou kinderen en andere niet geautoriseerde personen weg van de machine.
9. Het is verboden lasten zijwaarts of van de zijkant te trekken. Vermijdt het slingeren van de last.
10. Zorg ervoor dat de haak in dezelfde richting beweegt als aangeduid op de bedieningsschakelaar.
11. Controleer de kabeltakel regelmatig op beschadigingen. De bedieningsschakelaar dient in goede staat te verkeren.
12. Laat herstellingen en onderhoudswerkzaamheden enkel door geautoriseerde gespecialiseerde werkplaatsen uitvoeren door een elektrovakman. Herstellingen mogen enkel door een elektrovakman worden doorgevoerd, anders zouden zich ongelukken voor de gebruiker kunnen voordoen.
13. Vermijdt het snel in- en uitschakelen (tipmodus).
14. Wees steeds oplettend als u de kabeltakel bedient.
15. Ga nooit onder de gehesen last gaan staan of werken.

2. Beschrijving van het gereedschap en leveringsomvang

2.1 Beschrijving van het gereedschap (fig. 1/2)
1. Bevestigingsbeugel
2. Bevestigingsgat voor haak
3. Trommel
4. Hendel voor maximale kabellengte
5. Hendel van het automatische stopmechanisme
6. Staaldraadkabel
7. Uitschakelgewicht
8. Haak
9. Noodstopschakelaar
10. Drukknoppen
11. Afstandsbediening
12. Netkabel
13. Stuurleiding
14. Motor
15. Keerrol
16. Extra haak
17. Kabel voor afstandsbediening

2.2 Leveringsomvang
Gelieve de volledigheid van het artikel te controleren aan de hand van de beschreven omvang van de levering. Indien er onderdelen ontbreken, gelieve u dan binnen 5 werkdagen na aankoop van het artikel te wenden tot ons servicecenter of tot het verkooppunt waar u het apparaat heeft gekocht, en leg een geldig bewijs van aankoop voor. Gelieve daarvoor de garantietabel in de serviceinformatie aan het einde van de handleiding in acht te nemen.

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- Open de verpakking en neem het toestel voorzichtig uit de verpakking.
- Verwijder het verpakkingsmateriaal alsmede verpakkings-/transportbeveiligingen (indien aanwezig).
- Controleer of de leveringsomvang compleet is.
- Controleer het toestel en de accessoires op transportschade.
- Bewaar de verpakking indien mogelijk tot het verloop van de garantieperiode.

Gevaar!
Het toestel en het verpakkingsmateriaal zijn geen speelgoed voor kinderen! Kinderen mogen niet met plastic zakken, folies en kleine stukken spelen! Er bestaat inslik- en verstikkingsgevaar!

- Originele handleiding

3. Reglementair gebruik

De kabeltakel dient om lasten in gesloten ruimten overeenkomstig de capaciteit van het apparaat te hijsen en te laten zakken.

De machine mag slechts voor werkzaamheden worden gebruikt waarvoor ze bedoeld is. Elk ander verder gaand gebruik is niet reglementair. Voor daaruit voortvloeiende schade of verwondingen van welke aard dan ook is de gebruiker/bediener, niet de fabrikant, aansprakelijk.

Wij wijzen erop dat onze gereedschappen overeenkomstig hun bestemming niet geconstrueerd zijn voor commercieel, ambachtelijk of industrieel gebruik. Wij geven geen garantie indien het gereedschap in ambachtelijke of industriële bedrijven alsmede bij gelijk te stellen activiteiten wordt gebruikt.

4. Technische gegevens

Spanning [V] ..... 230 V ~ 50 Hz
Nominale stroom (A) 4,4
Opgenomen vermogen (W) 1000
Bedrijfsmodus ..... S3 20%:10 min
Nominale last (kg) .....250 / 500
Hefhoogte (enkele/dubbele haak) (m) ...11,5 / 5,7
Nominale snelheid
(enkele/dubbele haak) (m/min) .....8 / 4
Diameter van de staaldraadkabel (mm) 4,0
Treksterkte van de staaldraadkabel (N/mm^2) 1870
Isolatieklasse ..... B
Beschermklasse ..... IP 54
Transmissieklasse..... M1
Nettogewicht (kg)..... 16,2

Bedrijfsmodus S3 – 20% - 10 min.:
S3 = intermitterende modus zonder invloed van de aanloopprocedure. Dat betekent dat gedurende een periode van 10 min. de maximale werkingsduur 20% (2,0 min.) bedraagt.

Beperk de geluidsontwikkeling en vibratie tot een minimum!
- Gebruik enkel intacte toestellen.
- Onderhoud en reinig het toestel regelmatig.
- Pas uw manier van werken aan het toestel aan.
- Overbelast het toestel niet.
- Laat het toestel indien nodig nazien.
- Schakel het toestel uit als het niet wordt gebruikt.
- Draag handschoenen.

5. Vóór inbedrijfstelling

Controleer of de gegevens vermeld op het kenplaatje overeenkomen met de gegevens van het stroomnet alvorens het gereedschap aan te sluiten.
Waarschuwing!
Verwijder altijd de netstekker uit het stopcontact voordat u het gereedschap anders afstelt.

- De kabeltakel is niet geschikt voor het transport van warme en/of gesmolten massa's en is evenmin voorzien om bij lage temperaturen en in een agressieve omgeving te worden gebruikt.
- Mechanische groep is M1.
- De gebruiksduur van de kabeltakel is ca. 8000 cycli (excl. slijtstukken). Als de takel 8000 cycli heeft voltooid dienen alle mechanische componenten te worden gecontroleerd en gereviseerd.
- Lees en begrijp de handleiding alvorens de kabeltakel te gebruiken.
- Zorg ervoor dat de bedieningspersoon weet hoe de machine werkt en hoe zij moet wor-

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den gebruikt.
- De gebruiker is gehouden steeds in overeenstemming met de handleiding te werk te gaan.
- De kabeltabel is niet voorzien voor permanent gebruik. De bedrijfsmodus is: intermitterende modus zonder invloed van de aanloopprocedure.
- Het nominale vermogen van de machine varieert niet met de positie van de belasting.

5.1 Uitpakken
Gelieve na het openen van de verpakking het frame, de staaldraadkabel, de haak en het elektrische controlemechanisme op mogelijke transportschade te controleren.

5.2 Montage (fig. 5)
De kabeltakel is uitgerust met 2 bevestigingsbeugels (1) waarmee hij op een vierkante buis moet worden vastgemaakt. De afmetingen van de draagarm dienen overeen te komen met de grootte van de bevestigingsbeugels (1) en hij moet de dubbele nominale last kunnen dragen. Wij bevelen u aan om een gekwalificeerde technicus te contacteren.
Alle schroeven en bouten moeten naar behoren aangehaald zijn. Vóór de inbedrijfstelling moet een gekwalificeerde technicus de verankering van de draagarm controleren.

5.3 Takelfunctie (fig. 6-9)
De kabeltakel is voorzien van een keerrol (15) en een extra haak (16). Bij correct gebruik kan de kabeltakel de dubbele last hijsen.
Monteer de keerrol (15) en de extra haak (16) zoals voorgesteld in fig. 6-8. De vast gemonteerde haak (8) moet in het bevestigingsgat (2) worden vastgehaakt (fig. 9).
De last wordt dan gehesen m.b.v. twee staaldraadkabels; de kabeltakel kan op die manier de dubbele last hijsen.

6. Bediening

Gevaar!
6.1 Aanwijzingen omtrent het werken met de kabeltakel
1. Verwijder het plakband van de trommel (3) voordat u de takel voor het eerst in gebruik neemt.
2. De waarde van de A-beoordeelde geluidsemissie aan de positie van de bediener is lager dan 75dB (geluidsdrukniveau LpA). De geluids- en trilwaarden werden vastgesteld volgens EN ISO 11201.
3. Voedingsspanning: 230V ± 10%, 50Hz ± 1%.
4. De kabeltakel dient bij omgevingstemperaturen tussen 0° C en 40° C en bij een luchtvochtigheid van minder dan 50% te worden gebruikt. Hoogte boven zeespiegel: max. 1.000 m
5. Voor het transport en de opslag mag de temperatuur tussen -25° C en 55° C bedragen. De maximaal toelaatbare temperatuur mag niet meer dan 70° C bedragen.
6. De gebruiker dient de last met een zo laag mogelijke snelheid van de grond te hijsen. De draadkabel moet strak zijn als de last wordt gehesen.
7. De motor (14) van de kabeltakel is uitgerust met een thermostaatschakelaar. Tijdens de werking van de kabeltakel zou het dus kunnen dat de motor (14) stopt; de motor zal vanzelf herstarten zodra hij afgekoeld is.
8. De elektrische kabeltakel is niet voorzien van een nominale vermogensbegrenzer. Daarom zeker niet verder proberen de last te hijsen als de beveiliging tegen oververhitting de werking van de machine begrenst. De last overschrijdt in dit geval het nominale vermogen van de kabeltakel.
9. Laat geen zwevende lasten zonder toezicht zonder overeenkomstige veiligheidsmaatregelen te hebben genomen.
10. Beveilig het apparaat door een 10 A zekering of door een 10 mA aardlekschakelaar om de stroomkring te beschermen.
11. Gebruik de hendels (4/5) niet als normale stopzetinrichting. Zij dienen slechts als stopinrichting in geval van nood.
12. Voordat u begint dient u er zich van te vergewissen dat de draadkabel (6) correct rond de trommel (3) is gewikkeld en dat de afstand tussen de windingen kleiner is dan de draadkabel (fig. 3)
13. Zorg ervoor dat de lading naar behoren aan de haak (8) of bij gebruik als katrol aan de extra haak (16) veilig is vastgemaakt en hou steeds afstand tot de last en de staaldraadkabel (6).

6.2 Gebruik (fig. 1)
- Controleer of de noodstopschakelaar (9) is ingedrukt. Draai de rode stopschakelaar met de wijzers van de klok mee om hem te ontgrendelen.
- Druk op de drukknop ▲ (10) om de last te

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hijsen.
- Druk op de drukknop ▼ (10) om de last te laten zakken.
- Hendel van het automatische stopmechanisme (5): Als de maximale hijshoogte is bereikt, drukt het uitschakelgewicht (7) de hendel (5) omhoog. Daardoor wordt een eindschakelaar in werking gesteld en kan de last niet verder worden gehesen.
- Hendel voor maximale kabellengte (4): als de last de onderste mogelijke positie heeft bereikt wordt een eindschakelaar in werking gesteld die verhindert dat men de last verder kan laten zakken. Deze eindschakelaar zou ook voorkomen dat de kabeltakel in verkeerde richting in werking wordt gesteld (haak beweegt in andere richting dan aangeduid op de bedieningsschakelaar).
- Als u op de noodstopschakelaar (9) drukt stopt de kabeltakel.
- In geval van nood onmiddellijk de noodstopschakelaar (9) bedienen om de kabeltakel te stoppen. De bediening van de kabeltakel is niet mogelijk als de noodstopschakelaar is ingedrukt.

7. Vervanging van de netaansluitleiding

Gevaar!
Als de netaansluitleiding van dit apparaat beschadigd wordt, dan moet hij door de fabrikant of diens klantendienst of door een gelijkwaardig gekwalificeerde persoon vervangen worden, om gevaren te vermijden.

8. Reiniging, onderhoud en bestellen van wisselstukken

Gevaar!
Trek vóór alle schoonmaakwerkzaamheden de netstekker uit het stopcontact.

8.1 Reiniging
- Hou de veiligheidsinrichtingen, de ventilatiespleten en het motorhuis zo veel mogelijk vrij van stof en vuil. Wrijf het toestel met een schone doek af of blaas het met perslucht bij lage druk schoon.
- Het is aan te bevelen het toestel direct na elk gebruik te reinigen.
- Reinig het toestel regelmatig met een vochtige doek en wat zachte zeep. Gebruik geen reinigings- of oplosmiddelen; die zouden de kunststofcomponenten van het toestel kunnen aantasten. Let er goed op dat geen water in het toestel terechtkomt. Door binnendringen van water in een elektrische apparatuur verhoogt het risico van een elektrische schok.

8.2 Onderhoud
Gevaar! Zorg er steeds voor dat de machine niet met het stroomnet is verbonden als u de machine onderhoudt.
- Hieronder: een cyclus komt overeen met één op- en neerwaartse beweging van een last. Periodieke controle komt overeen met een controle na 100 cycli.
- Ga periodiek na of de eindschakelaars van de kabeltakel naar behoren werken. Ga bij de controle als volgt te werk: zodra de kabel de maximale hijshoogte heeft bereikt wordt de hendel van het automatische stopmechanisme (5) in werking gesteld. De motor (14) moet dan stoppen. (Zonder last controleren). Als de staaldraadkabel (6) zo ver mogelijk is afgewonden wordt de hendel voor maximale kabellengte (4) in werking gesteld. De motor (14) moet dan stoppen.
- Onderwerp de netkabel (12) en de stuurleiding (13) aan een periodieke controle.
- Om de 200 cycli moeten de staaldraadkabel (6) en de keerrol (15) worden gesmeerd.
- Om de 30 cycli dient u conform fig. 4 na te gaan of de gehele draadkabel (6) in goede staat verkeert. Indien de kabel beschadigd is dient hij door een staaldraadkabel te worden vervangen die overeenkomt met de technische gegevens.
- Om de 1000 cycli controleren of de bouten van de bevestigingsbeugels (1) en de keerrol (15) goed aangehaald zijn.
- Om de 1000 cycli controleren of de haken (8/16) en de keerrol (15) in goede staat verkeren.
- Smeer regelmatig de kabel, ketting, transmissie, lagers en haak.
- Controleer om de 1000 cycli slijtstukken zoals: kabel, ketting, haak, banden en remvoeringen.
- Controleer vóór elk gebruik van de kabeltakel of de noodstopschakelaar (9) en de drukknop (10) in perfecte bedrijfstoestand verkeren.
- Om de 1000 cycli het remsysteem controleren. Als de motor (14) ongewone geluiden maakt of de nominale last niet kan hijsen moet het remsysteem mogelijk worden gere-

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viseerd:
- vervang beschadigde of versleten onderdelen en bewaar de bijhorende onderhoudsdocumentatie.
- voor extra onderhoudswerkzaamheden gelieve zich tot een geautoriseerde servicecenter te wenden.

- Laat uw elektrisch gereedschap enkel door gekwalificeerd vakpersoneel herstellen.

8.3 Bestellen van wisselstukken:
Gelieve bij het bestellen van wisselstukken volgende gegevens te vermelden:
- Type van het toestel
- Artikelnummer van het toestel
- Ident-nummer van het toestel
- Wisselstuknummer van het benodigd stuk

Actuele prijzen en info vindt u terug onder www.isc-gmbh.info

9. Verwijdering en recyclage

Het toestel bevindt zich in een verpakking om transportschade te voorkomen. Deze verpakking is een grondstof en bijgevolg herbruikbaar of kan naar de grondstofkringloop worden teruggevoerd. Het toestel en zijn accessoires bestaan uit diverse materialen, zoals b.v. metaal en kunststof. Defecte toestellen horen niet thuis in het huisvuil. Om zich van het toestel naar behoren te ontdoen dient het naar een geschikte verzamelplaats te worden gebracht. Als u geen verzamelplaats kent gelieve u dan bij de gemeente te informeren.

10. Opbergen

Bewaar het toestel en de accessoires op een donkere, droge en vorstvrije plaats die voor kinderen ontoegankelijk is. De optimale opbergtemperatuur ligt tussen 5° C en 30° C. Bewaar het elektrische gereedschap in de originele verpakking.

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Enkel voor EU-landen

Elektrisch gereedschap hoort niet bij het huisvuil thuis!

Volgens de Europese richtlijn 2012/19/EG op afgedankte elektrische en elektronische toestellen en omzetting in nationaal recht dienen afgedankte elektrische gereedschappen afzonderlijk te worden verzameld en milieuvriendelijk te worden gerecycleerd.

Recyclagealternatief i.p.v. het toestel terug te sturen:
De eigenaar van het elektrische toestel is alternatief verplicht, i.p.v. het toestel terug te sturen, mede te werken bij de behoorlijke recyclage in geval hij zich van het eigendom ontdoet. Het afgedankte toestel kan hiervoor ook bij een verzamelplaats worden afgegeven die voor een verwijdering als bedoeld in de wetgeving in zake recyclage en afvalverwerking zorgt. Hieronder vallen niet bij de afgedankte toestellen gevoegde accessoires en hulpmiddelen zonder elektrische componenten.

Nadruk of andere reproductie van documentatie en geleidepapieren van de producten, geheel of gedeeltelijk, enkel toegestaan mits uitdrukkelijke toestemming van iSC GmbH.

Technische wijzigingen voorbehouden

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Service-informatie

Wij werken in alle landen die in het garantiebewijs zijn genoemd, samen met competente servicepartners, wier contactgegevens u kunt afleiden uit het garantiebewijs. Deze staan voor alle diensten zoals reparatie, het verschaffen van wisselstukken of slijtdelen of voor de aankoop van verbruiksmaterialen te uwer beschikking.

U moet er rekening mee houden dat bij dit product de volgende delen onderhevig zijn aan een slijtage door gebruik of een natuurlijke slijtage, resp. dat de volgende delen nodig zijn als verbruiksmaterialen.

Categorie	Voorbeeld
Slijtstukken*	Staaldraadkabel, Haak, Keerrol, Extra haak
Verbruiksmateriaal/verbruiksstukken*	
Ontbrekende onderdelen	

* niet verplicht bij de leveringsomvang begrepen!

Bij gebreken of defecten verzoeken wij u om de fout te melden op het internet onder www.isc-gmbh.info. Gelieve te zorgen voor een nauwkeurige beschrijving van de fout en daarbij in elk geval de volgende vragen te beantwoorden:

- Heeft het toestel reeds eenmaal gewerkt of was het vanaf het begin defect?
- Is u iets opgevallen voordat het defect zich voordeed (symptoom vóór het defect)?
- Welke foutieve werkwijze vertoont het toestel volgens u (hoofdsymptoom)?
  Beschrijf deze foutieve werkwijze.

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Garantiebewijs

Geachte klant,
onze producten worden onderworpen aan een strenge kwaliteitscontrole. Mocht dit apparaat echter ooit niet naar behoren functioneren, spijt dit ons ten zeerste en vragen u zich te wenden tot onze servicedienst onder het adres vermeld op dit garantiebewijs. Wij staan ook graag telefonisch tot uw dienst via het vermelde servicetelefoonnummer. Voor eisen in verband met het recht garantie geldt het volgende:

1. Deze garantievoorwaarden zijn uitsluitend gericht aan de gebruikers, d.w.z. natuurlijke personen die dit product niet in het kader van hun ambachtelijke noch van een andere zelfstandige activiteit willen gebruiken. Deze garantievoorwaarden regelen aanvullende garantieprestaties, die de hieronder genoemde fabrikant kopers van zijn nieuwe apparaten toezegt in aanvulling tot de wettelijke garantie. Uw wettelijke garantieclaims blijven onaangetast door deze garantie. Onze garantieprestatie is voor u gratis.
2. De garantieprestatie geldt uitsluitend voor gebreken aan een door u aangekocht nieuw apparaat van de hieronder genoemde fabrikant die aantoonbaar berusten op een materiaal- of productiefout, en is naar onze keuze beperkt tot het verhelpen van zulke gebreken aan het apparaat of de vervanging ervan.
   Wij wijzen erop dat onze apparaten overeenkomstig hun bestemming niet ontworpen zijn voor commercieel, ambachtelijk of industrieel gebruik. Van een garantiecontract is derhalve geen sprake, als het apparaat binnen de garantieperiode in commerciële, ambachtelijke of industriële bedrijven werd ingezet of aan een daarmee gelijk te stellen belasting werd blootgesteld.
3. Van onze garantie zijn uitgesloten:
   - Schade aan het apparaat als gevolg van niet-inachtneming van de montagehandleiding of op grond van ondeskundige installatie, als gevolg van niet-inachtneming van de gebruiksaanwijzing (zoals bijv. door aansluiting aan een verkeerde netspanning of stroomsoort) of niet-inachtneming van de onderhouds- en veiligheidsvoorschriften, door blootstelling van het apparaat aan abnormale omgevingsvoorwaarden of door nalatig onderhoud en verzorging.
   - Schade aan het apparaat als gevolg van misbruik of ondeskundige toepassingen (zoals bijv. overbelasting van het apparaat of de inzet van niet toegelaten gereedschappen of toebehoren), binnendringen van vreemde voorwerpen in het apparaat (zoals bijv. zand, stenen of stof, transportschade), gebruik van geweld of als gevolg van externe invloeden (zoals bijv. schade door vallen).
   - Schade aan het apparaat of aan delen van het apparaat die valt te herleiden tot slijtage als gevolg van gebruik, en als gevolg van normale of andere natuurlijke slijtage.
4. De garantieperiode bedraagt 24 maanden en gaat in op de datum van aankoop van het apparaat. Garantieclaims dienen voor het verloop van de garantieperiode binnen de twee weken na het vaststellen van het defect geldend te worden gemaakt. Het indienen van garantieclaims na verloop van de garantieperiode is uitgesloten. De herstelling of vervanging van het apparaat leidt niet tot een verlenging van de garantieperiode noch wordt door deze prestatie een nieuwe garantieperiode voor het apparaat of voor eventueel ingebouwde wisselstukken op gang gebracht. Dit geldt ook bij het ter plaatse uitvoeren van een serviceactiviteit.
5. Gelieve om een garantieclaim in te dienen het defecte apparaat aan te melden onder: www.isc-gmbh.info. Houd het aankoopbewijs of een ander bewijs van uw aankoop van het nieuwe apparaat bij de hand. Apparaten die zonder bijhorende bewijzen of zonder typeplaatje worden teruggestuurd, worden op grond van de ontbrekende mogelijkheid om het apparaat toe te kennen uitgesloten van de garantieprestatie. Valt het defect van het apparaat binnen onze garantieprestatie, dan bezorgen wij u per omgaande een gerepareerd of nieuw apparaat terug.

Uiteraard staan wij ook tot u dienst om, mits betaling van de kosten, defecten van het apparaat te verhelpen die buiten de garantieomvang vallen. Te dien einde stuurt u het apparaat aan ons serviceadres op.

Voor slijtstukken, verbruiksmateriaal en ontbrekende onderdelen wordt verwezen naar de beperkingen van deze garantie conform de service-informatie van deze handleiding.

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Peligro!
Al usar aparatos es preciso tener en cuenta una serie de medidas de seguridad para evitar lesiones o daños. Por este motivo, es preciso leer atentamente este manual de instrucciones/advertencias de seguridad. Guardar esta información cuidadosamente para poder consultarla en cualquier momento. En caso de entregar el aparato a terceras personas, será preciso entregarles, asimismo, el manual de instrucciones/advertencias de seguridad. No nos hacemos responsables de accidentes o daños provocados por no tener en cuenta este manual y las instrucciones de seguridad.

1. Instrucciones de seguridad

Peligro!
Lea todas las instrucciones de seguridad e indicaciones. El incumplimiento de dichas instrucciones e indicaciones puede provocar descargas, incendios y/o daños graves. **Guarde todas las instrucciones de seguridad e indicaciones para posibles consultas posteriores.**

1. Controlar en todo momento que la tensión de red coincida con la tensión indicada en la placa de identificación. Si la tensión de red no es la indicada, la máquina podrá trabajar de forma anormal y podría ocasionar daños personales.
2. La alimentación de corriente debe estar puesta a tierra y estar dotada de una protección diferencial.
3. Está prohibido elevar cargas superiores a la carga nominal.
4. Utilizar el aparato exclusivamente para su fin previsto. No elevar nunca a personas con el torno de cable.
5. No tirar del cable para desenchufar el aparato. Mantener el cable alejado de fuentes de calor, de aceites o bordes afilados.
6. No intentar nunca elevar cargas fijas o bloqueadas.
7. Desenchufar el torno de cable cuando no se utilice.
8. Mantener alejados de la máquina tanto a los niños como a otras personas no autorizadas.
9. Está prohibido elevar cargas lateralmente o desde un lateral. Evitar que la carga se balancee.
10. Asegurarse de que el gancho se mueva en la misma dirección que la indicada en el interruptor de control.
11. Controlar regularmente que el torno de cable no presente daños. El interruptor de control debe estar en buen estado.
12. Las reparaciones y los trabajos de mantenimiento solo serán llevados a cabo por electricistas profesionales y en talleres especializados. Sólo un electricista especializado puede llevar a cabo las reparaciones, ya que de otro modo el operario podría sufrir algún accidente.
13. Evitar conectar y desconectar rápidamente (servicio discontinuo).
14. Prestar atención en todo momento en que se esté operando el torno de cable.
15. No detenerse o trabajar bajo la carga en suspensión.

2. Descripción del aparato y volumen de entrega

2.1 Descripción del aparato (fig. 1/2)
1. Estribo de fijación
2. Orificio de fijación para gancho
3. Tambor
4. Palanca para longitud de cable máxima
5. Palanca para mecanismo de parada automática
6. Cable de acero
7. Peso de desconexión
8. Gancho
9. Interruptor de paro de emergencia
10. Pulsador
11. Mando a distancia
12. Cable de conexión a la red
13. Cable de control
14. Motor
15. Polea de inversión
16. Gancho adicional
17. Cable para mando a distancia

2.2 Volumen de entrega
Sirviéndose de la descripción del volumen de entrega, comprobar que el artículo esté completo. Si faltase alguna pieza, dirigirse a nuestro Service Center o a la tienda especializada más cercana en un plazo máximo de 5 días laborales tras la compra del artículo presentando un recibo de compra válido. A este respeto, observar la tabla de garantía de las condiciones de garantía que se encuentran al final del manual.

- Abrir el embalaje y extraer cuidadosamente el aparato.

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- Retirar el material de embalaje, así como los dispositivos de seguridad del embalaje y para el transporte (si existen).
- Comprobar que el volumen de entrega esté completo.
- Comprobar que el aparato y los accesorios no presenten daños ocasionados durante el transporte.
- Si es posible, almacenar el embalaje hasta que transcurra el periodo de garantía.

Peligro!
¡El aparato y el material de embalaje no son un juguete! ¡No permitir que los niños jueguen con bolsas de plástico, láminas y piezas pequeñas! ¡Riesgo de ingestión y asfixia!

- Manual de instrucciones original

3. Uso adecuado

El torno de cable sirve para elevar y bajar cargas adecuadas para la potencia del aparato en salas cerradas.

Utilizar la máquina sólo en los casos que se indican explícitamente como de uso adecuado. Cualquier otro uso no será adecuado. En caso de uso inadecuado, el fabricante no se hace responsable de daños o lesiones de cualquier tipo; el responsable es el usuario u operario de la máquina.

Tener en consideración que nuestro aparato no está indicado para un uso comercial, industrial o en taller. No asumiremos ningún tipo de garantía cuando se utilice el aparato en zonas industriales, comerciales o talleres, así como actividades similares.

4. Características técnicas

Tensión (V)..... 230 V ~ 50 Hz
Corriente nominal (A)..... 4,4
Consumo (W) 1000
Modo operativo..... S3 20% 10 min
Carga nominal (kg) .....250 / 500
Altura de elevación (m) .....11,5 / 5,7
Velocidad nominal (m/min).....8 / 4
Diámetro del cable de acero (mm)..... 4,0
Resistencia a la tracción
del cable de acero (N/mm^2) 1870
Clase de aislamiento .....B
Tipo de protección ..... IP 54
Categoría de mecanismo de propulsión M1
Peso neto (kg)..... 16,2

Modo operativo S3 - 20% - 10 min: S3 = Régimen de funcionamiento discontinuo independientemente del proceso de arranque. Es decir, durante un periodo de 10 min. el tiempo de funcionamiento máx. es del 20% (2 min).

¡Reducir la emisión de ruido y las vibraciones al mínimo!
- Emplear sólo aparatos en perfecto estado.
- Realizar el mantenimiento del aparato y limpiarlo con regularidad.
- Adaptar el modo de trabajo al aparato.
- No sobrecargar el aparato.
- En caso necesario dejar que se compruebe el aparato.
- Apagar el aparato cuando no se esté utilizando.
- Llevar guantes.

5. Antes de la puesta en marcha

Antes de conectar la máquina, asegurarse de que los datos de la placa de identificación coincidan con los datos de la red eléctrica.
Aviso!
Desenchufar el aparato antes de realizar ajustes.

- El torno de cable no ha sido concebido para transportar masas calientes y/o fundidas, ni para utilizarlo a bajas temperaturas ni en un entorno agresivo.
- El grupo mecánico es M1.
- La duración de uso del torno de cable es de unos 8000 ciclos (excl. piezas de desgaste). Cuando el torno ha realizado los 8000 ciclos, es preciso controlar y revisar todas las piezas mecánicas.
- Antes de utilizar el torno de cable es preciso haber leído y comprendido el manual de instrucciones.
- Asegurarse de que el operario sabe cómo funciona la máquina y cómo se opera.
- El operario debe actuar siempre de acuerdo con el manual de instrucciones.
- El torno no ha sido previsto para un uso ininterrumpido. El modo operativo es: régimen de funcionamiento discontinuo independiente-

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mente del proceso de arranque.
- La potencia nominal de la máquina no varía con la posición de la carga.

5.1 Desembalar
Después de abrir el embalaje inspeccionar que el bastidor, el cable de acero, los ganchos y el mecanismo eléctrico de control no presenten daños ocasionados por el transporte.

5.2 Montaje (fig. 5)
El torno de cable está dotado de 2 estribos de fijación (1) con los que se debe sujetar a un brazo de extensión cuadrado. Las dimensiones del brazo de extensión deben coincidir con el tamaño de los estribos de fijación (1) y el brazo debe poder soportar el doble de la carga nominal. Recomendamos ponerse en contacto con un técnico cualificado.
Es preciso apretar todos los tornillos. Antes de la puesta en marcha un técnico cualificado deberá comprobar el anclaje del brazo de extensión.

5.3 Función de polipasto (fig. 6 – 9)
El torno de cable está dotado de una polea de inversión (15) y un gancho adicional (16). Si se utiliza correctamente, el torno de cable puede elevar el doble de carga.
Montar la polea de inversión (15) y el gancho adicional (16) según se muestra en las fig. 6-8. El gancho fijo (8) debe colgar del orificio de fijación (2) (fig. 9).
La carga se eleva con ayuda de dos cables de acero, de forma que el torno de cable se puede elevar con el doble de carga.

6. Manejo

Peligro!
6.1 Advertencias sobre el funcionamiento
1. Antes del primer uso quitar la cinta adhesiva del tambor (3).
2. El valor de la emisión de ruido clasificado como A en la posición del usuario es inferior a los 75 dB (nivel de presión acústica LpA). Los valores de ruido y vibración se han determinado conforme a EN ISO 11201.
3. Tensión de alimentación: 230V ± 10%, 50Hz ± 1%.
4. Operar el torno de cable a temperaturas ambiente que oscilen entre los 0°C y los 40°C y a una humedad relativa inferior al 50%. Altura sobre el nivel del mar: máx. 1000 m.
5. La temperatura de transporte y almacenamiento puede ser entre -25 °C y 55 °C. La temperatura máxima admisible no puede superar los 70°C.
6. El usuario debe elevar la carga del suelo a la velocidad mínima posible. La cadena debe estar tensada al elevar la carga.
7. El motor (14) del torno de cable está dotado de un interruptor de termostato. Durante el funcionamiento del torno de cable es posible que el motor (14) se pare, pero volverá a ponerse en marcha de forma automática una vez se haya enfriado.
8. El torno de cable eléctrico no está dotado de un limitador de potencia nominal. Por este motivo, no seguir elevando la carga cuando la protección contra sobrecalentamiento suspenda el funcionamiento. En este caso la carga supera la potencia nominal del torno de cable.
9. No desatender ninguna carga en suspensión sin haber tomado previamente las medidas de seguridad necesarias.
10. Asegurar el aparato con un fusible de 10 A o con una protección diferencial de 10 mA para proteger el circuito eléctrico.
11. No utilizar la palanca (4/5) como dispositivo de parada rutinario, puesto que solo sirve como dispositivo de parada en caso de emergencia.
12. Antes de empezar asegurarse de que el cable de acero (6) esté bien enrollado alrededor del tambor (3) y que la distancia entre las vueltas sea inferior al diámetro cable de acero (fig. 3).
13. Asegurar que la carga esté correctamente asegurada en el gancho (8) o, en el modo de polipasto, los ganchos adicionales (16) y que mantienen en todo momento distancia con respecto de la carga y el cable de acero (6).

6.2 Funcionamiento (fig. 1)
- Comprobar si el interruptor de paro de emergencia (9) está pulsado. Girar el interruptor de paro rojo hacia la derecha para desbloquearlo.
- Presionar el pulsador ▲ (10) para elevar la carga.
- Presionar el pulsador ▼ (10) para bajar la carga.
- Palanca para mecanismo de parada automática (5): Una vez alcanzada la altura máxima de elevación, el peso de desconexión (7) presiona la palanca (5) hacia arriba. Así se activa un interruptor de fin de carrera y la

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carga no se puede elevar.
- Palanca para longitud de cable máxima (4): Una vez la carga ha alcanzado la posición más baja posible, se activa un interruptor de fin de carreta que no permite seguir bajando la carga. Este interruptor de fin de carrera evita asimismo que el torno de cable funcione en la dirección incorrecta (el gancho se mueve en dirección contraria a la indicada en el interruptor de control).
- Cuando se activa el interruptor de fin de carrera (9) el torno de cable se para.
- En caso de emergencia, activar de inmediato el interruptor de paro de emergencia (9) para parar el torno de cable. Si el interruptor de paro de emergencia está activado no es posible operar el torno de cable.

7. Cambio del cable de conexión a la red eléctrica

Peligro!
Cuando el cable de conexión a la red de este aparato esté dañado, deberá ser sustituido por el fabricante o su servicio de asistencia técnica o por una persona cualificada para ello, evitando así cualquier peligro.

8. Mantenimiento, limpieza y pedido de piezas de repuesto

Peligro!
Desenchufar siempre antes de realizar algún trabajo de limpieza.

8.1 Limpieza
- Reducir al máximo posible la suciedad y el polvo en los dispositivos de seguridad, las rendijas de ventilación y la carcasa del motor. Frotar el aparato con un paño limpio o soplarlo con aire comprimido manteniendo la presión baja.
- Se recomienda limpiar el aparato tras cada uso.
- Limpiar el aparato con regularidad con un paño húmedo y un poco de jabón blando. No utilizar productos de limpieza o disolventes ya que se podrían deteriorar las piezas de plástico del aparato. Es preciso tener en cuenta que no entre agua en el interior del aparato. Si entra agua en el aparato eléctrico existirá mayor riesgo de una descarga eléctrica.

8.2 Mantenimiento
Peligro! Asegurar que la máquina esté desenchufada de la red eléctrica siempre que se someta a trabajos de mantenimiento.
- A continuación: Un ciclo corresponde a un movimiento hacia arriba y hacia abajo de una carga. La comprobación periódica corresponde a una comprobación tras 100 ciclos.
- Comprobar de forma periódica que el interruptor de fin de carrera del torno de cable funcione correctamente. La comprobación tiene lugar de la siguiente manera: Cuando el cable ha alcanzado la altura de elevación máxima, la palanca activa el mecanismo de parada automático (5). El motor (14) se debe parar. (comprobar sin carga).
  Si el cable de acero (6) está desenrollado al máximo posible, se activa la palanca para la longitud máxima del cable (4). El motor (14) se debe parar.
- Comprobar periódicamente el cable de red (12) y el cable de control (13).
- Cada 200 ciclos es preciso lubricar el cable de acero (6) y la polea de inversión (15).
- Lubricar periódicamente el cable, la cadena, el engranaje, el rodamiento y el gancho.
- Comprobar cada 1000 ciclos las piezas de desgaste como: cable, cadena, gancho, cintas y guarniciones del freno.
- Cada 30 ciclos es preciso comprobar, según se muestra en la fig. 4, que todo el cable de acero (6) esté en buen estado. En caso de estar dañado, cambiarlo por uno nuevo que coincida con las características técnicas.
- Comprobar cada 1000 ciclos que todos los tornillos del estribo de fijación (1) y de la polea de inversión (15) estén bien apretados.
- Comprobar cada 1000 ciclos que los ganchos (8/16) y la polea de inversión (15) estén en buen estado.
- Antes de cada uso del torno de cable es preciso comprobar que el interruptor de paro de emergencia (9) y el pulsador (10) se encuentren en perfecto estado de funcionamiento.
- Comprobar cada 1000 ciclos el sistema de frenado. Cuando el motor (14) emita ruidos inusuales o no pueda elevar la carga nominal, es posible que se deba revisar el sistema de frenado.
  - Cambiar las piezas dañadas o desgastadas y guardar bien la documentación de mantenimiento correspondiente.
  - Para trabajos de cuidado no previstos ponerse en contacto con un centro de servicio autorizado.

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- La herramienta eléctrica solo debe ser reparada por personal especializado cualificado.

8.3 Pedido de piezas de recambio:
Al solicitar recambios se indicarán los datos siguientes:
- Tipo de aparato
- No. de artículo del aparato
- No. de identidad del aparato
- No. del recambio de la pieza necesitada.

Encontrará los precios y la información actual en www.isc-gmbh.info

9. Eliminación y reciclaje

El aparato está protegido por un embalaje para evitar daños producidos por el transporte. Este embalaje es materia prima y, por eso, se puede volver a utilizar o llevar a un punto de reciclaje. El aparato y sus accesorios están compuestos de diversos materiales, como, p. ej., metal y plástico. Los aparatos defectuosos no deben tirarse a la basura doméstica. Para su eliminación adecuada, el aparato debe entregarse a una entidad recolectora prevista para ello. En caso de no conocer ninguna, será preciso informarse en el organismo responsable del municipio.

10. Almacenamiento

Guardar el aparato y sus accesorios en un lugar oscuro, seco, protegido de las heladas e inaccesible para los niños. La temperatura de almacenamiento óptima se encuentra entre los 5 y 30 ˚C. Guardar la herramienta eléctrica en su embalaje original.

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Sólo para países miembros de la UE

No tirar herramientas eléctricas en la basura casera.

Según la directiva europea 2012/19/CE sobre aparatos usados electrónicos y eléctricos y su aplicación en el derecho nacional, dichos aparatos deberán recojerse por separado y eliminarse de modo ecológico para facilitar su posterior reciclaje.

Alternativa de reciclaje en caso de devolución:
El propietario del aparato eléctrico, en caso de no optar por su devolución, está obligado a reciclar adecuadamente dicho aparato eléctrico. Para ello, también se puede entregar el aparato usado a un centro de reciclaje que trate la eliminación de residuos respetando la legislación nacional sobre residuos y su reciclaje. Esto no afecta a los medios auxiliares ni a los accesorios sin componentes eléctricos que acompañan a los aparatos usados.

Sólo está permitido copiar la documentación y documentos anexos del producto, o extractos de los mismos, con autorización expresa de iSC GmbH.

Nos reservamos el derecho a realizar modificaciones técnicas

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Información de servicio

En todos los países mencionados en el certificado de garantía disponemos de distribuidores competentes cuyos datos de contacto podrán consultar en dicho certificado. Dichos distribuidores están a su disposición para cualquier asunto relacionado con el servicio como reparación, suministro de piezas de repuesto y desgaste, o con respecto a los materiales de consumo.

Es preciso tener en cuenta, que las siguientes piezas de este producto se someten a desgaste natural o provocado por el uso o que se necesitan las siguientes piezas como materiales de consumo.

Categoría	Ejemplo
Piezas de desgaste*	Cable de acero, Gancho, Polea de inversión, Gancho adicional
Material de consumo/Piezas de consumo*	
Falta de piezas	

*¡no tiene por qué estar incluido en el volumen de entrega!

En caso de deficiencia o fallo, rogamos que lo registre en la página web www.isc-gmbh.info. Describa exactamente el fallo y responda siempre a las siguientes preguntas:

- ¿Ha funcionado el aparato en algún momento o estaba defectuoso desde el principio?
- ¿Le ha llamado algo la atención antes de surgir el fallo (indicio antes del fallo)?
- ¿Qué fallo de funcionamiento le parece que presenta el aparato (indicio principal)? Describa ese fallo en el funcionamiento.

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Certificado de garantía

Estimado cliente:
Nuestros productos están sometidos a un estricto control de calidad. No obstante, lamentaríamos que este aparato dejara de funcionar correctamente, en tal caso, le rogamos que se dirija a nuestro servicio de atención al cliente en la dirección indicada en la parte inferior de la presente tarjeta de garantía. Con mucho gusto le atenderemos también telefónicamente en el número de servicio indicado a continuación. Para hacer válido el derecho de garantía, proceda de la siguiente forma:

1. Estas condiciones de garantía van dirigidas exclusivamente a los consumidores, es decir, personas naturales que no desean emplear este producto en el marco de su actividad comercial ni autónoma. Estas condiciones de garantía regulan prestaciones adicionales de garantía que el fabricante abajo mencionado se compromete a otorgar, de manera adicional a la garantía legal, a los compradores de sus nuevos aparatos. Las prestaciones de garantía que le corresponden conforme a ley no se ven afectadas por la presente. Nuestra prestación de garantía es gratuita para usted.
2. La garantía se extiende exclusivamente a defectos en un aparato nuevo adquirido por usted del fabricante abajo mencionado, ocasionados por fallos de material o de producción, y está limitada, según nuestra elección, a la reparación de los defectos o al cambio del aparato.
   Es preciso tener en consideración que nuestro aparato no está indicado para un uso comercial, industrial o en taller. Por lo tanto, no procederá un contrato de garantía cuando se utilice el aparato dentro del periodo de garantía en zonas industriales, comerciales o talleres, así como actividades similares.
3. Nuestra garantía no cubre:
   - Daños en el aparato ocasionados por la no observancia de las instrucciones de montaje o por una instalación no profesional, no observancia de las instrucciones de uso (como, p. ej., conexión a una tensión de red o corriente no indicada) o la no observancia de las disposiciones de mantenimiento y seguridad o por la exposición del aparato a condiciones anormales del entorno o por la falta de cuidado o mantenimiento.
   - Daños en el aparato ocasionados por aplicaciones impropias o indebidas (como, p. ej., sobrecarga del aparato o uso de herramientas o accesorios no homologados), introducción de cuerpos extraños en el aparato (como, p. ej., arena, piedras o polvo, daños producidos por el transporte), uso violento o influencias externa (como, p. ej., daños por caídas).
   - Daños en el aparato o en piezas del aparato provocados por el desgaste natural, habitual o producido por el uso.
4. El periodo de garantía es de 24 meses y comienza en la fecha de la compra del aparato. El derecho de garantía debe hacerse válido, antes de finalizado el plazo de garantía, dentro de un periodo de dos semanas una vez detectado el defecto. El derecho de garantía vence una vez transcurrido el plazo de garantía. La reparación o cambio del aparato no conllevará ni una prolongación del plazo de garantía ni un nuevo plazo de garantía ni para el aparato ni para las piezas de repuesto montadas. Esto también se aplica en el caso de un servicio in situ.
5. Para hacer efectivo su derecho a garantía, registre su aparato defectuoso en: www.isc-gmbh.info. Tenga a mano el recibo de compra o cualquier otro comprobante que acredite la compra del aparato nuevo. La garantía no cubre aquellos aparatos que se envíen sin el comprobante pertinente o sin la placa de identificación puesto que resulta difícil clasificarlos del modo correspondiente. Si nuestra prestación de garantía incluye el defecto aparecido en el aparato, recibirá de inmediato un aparato reparado o nuevo de vuelta.

Naturalmente, también solucionaremos los defectos del aparato que no se encuentren comprendidos o ya no se encuentren comprendidos en la garantía, en este caso contra reembolso de los costes. Para ello, envíe el aparato a nuestra dirección de servicio técnico.

Para piezas de desgaste, de repuesto y falta de piezas nos remitimos a las limitaciones de esta garantía conforme a la información de servicio de este manual de instrucciones.

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Vaara!
Laitteita käytettäessä tulee noudattaa tiettyjä turvallisuusvarotoimia tapaturmien ja vaurioiden välttämiseksi. Lue sen vuoksi tämä käyttöohje / nämä turvallisuusmääräykset huolellisesti läpi. Säilytä ne hyvin, jotta niissä olevat tiedot ovat myöhemminkin milloin vain käytettävissäsi. Jos luovutat laitteen muille henkilöille, ole hyvä ja anna heille myös tämä käyttöohje / nämä turvallisuusmääräykset laitteen mukana. Emme ota mitään vastuuta tapaturmista tai vaurioista, jotka ovat aiheutuneet tämän käyttöohjeen tai turvallisuusohjeiden noudattamisen laiminlyönnistä.

1. Turvallisuusmääräykset

Vaara!
Lue kaikki turvallisuusmääräykset ja ohjeet. Jos turvallisuusmääräyksiä tai muita ohjeita ei noudateta, saattaa tästä aiheutua sähköiskuja, tulipaloja ja/tai vaikeita vammoja. **Säilytä kaikki turvallisuusmääräykset ja ohjeet myöhempää tarvetta varten.**

1. Tarkasta aina, että käytettävissä oleva verkkojännite vastaa tyyppikilvessä ilmoitettua jännitettä. Siinä tapauksessa, että verkkojännite ei ole sovelias, saattaa tästä seurata koneen epänormaaleja toimintoja ja tapaturmia.
2. Virransyöttö tulee olla maadoitettu ja varmistettu vuotovirtasuojakatkaisimella.
3. Nimelliskuorman ylittävien kuormien nostaminen on kielletty.
4. Käytä laitetta vain sille määrättyyn tarkoitukseen. Älä koskaan nosta ihmisiä köysinosturilla.
5. Älä vedä sähköjohdosta, kun irroitat pistokkeen rasiasta. Suojaa johtoa kuumuudelta, öljyltä ja teräviltä reunoilta.
6. Älä koskaan yritä nostaa paikalleen kiinnitettyjä tai juuttuneita kuormia.
7. Irroita verkkopistoke sähköverkosta, kun köysinosturia ei käytetä.
8. Pidä lapset ja muut asiattomat henkilöt poissa koneen läheltä.
9. Kuormien nosto sivusuuntaan tai vetäminen sivulta on kielletty. Vältä kuorman heilahtelemista.
10. Varmista, että koukku liikkuu samaan suuntaan kuin käyttökatkaisimessa näytetään.
11. Tarkasta säännöllisesti, onko köysinosturissa vaurioita. Käyttökatkaisimen tulee olla hyväkuntoinen.
12. Anna korjaukset ja huoltotyöt aina vain valtuutetun korjaamon ja sähköalan asiantuntijan suoritettavaksi. Korjauksen saa tehdä vain sähköalan ammattihenkilö, muussa tapauksessa siitä voi aiheutua käyttäjälle tapaturmia.
13. Vältä nopeaa käynnistystä ja sammutusta (nykäyskäyttö).
14. Ole aina tarkkaavainen köysinosturia käyttäessäsi.
15. Älä oleskele tai työskentele ylösnostetun kuorman alapuolella.

2. Laitteen kuvaus ja toimituksen sisältö

2.1 Laitteen kuvaus (kuvat 1/2)
1. Kiinnityskaari
2. Koukun kiinnitysreikä
3. Rumpu
4. Suurimman köydenpituuden vipu
5. Automaattisen pysäytysmekanismin vipu
6. Teräsköysi
7. Sammutuspaino
8. Koukku
9. Hätä-Seis-katkaisin
10. Painonäppäin
11. Kauko-ohjain
12. Verkkojohto
13. Ohjausjohto
14. Moottori
15. Kääntörulla
16. Lisäkoukku
17. Kauko-ohjauksen köysi

2.2 Toimituksen sisältö
Tarkasta tässä kuvatun toimitusselostuksen avulla, että tuote on täysimääräinen. Jos osia puuttuu, ota viimeistään 5. arkipäivänä oston jälkeen yhteyttä asiakaspalveluumme tai siihen myyntipisteeseen, josta olet ostanut laitteen, ja esitä vastaava ostotosite. Huomioi tässä myös tämän ohjekirjan lopussa olevat asiakaspalveluohjeet ja takuusuoritustaulukko.
- Avaa pakkaus ja ota laite varovasti pakkauksesta.
- Poista pakkausmateiriaalit sekä pakkaus- ja kuljetusvarmistukset (mikäli käytetty).
- Tarkasta, onko toimitus täysilukuinen.
- Tarksta, onko laitteessa ja varusteissa kuljetusvaurioita.
- Säilytä pakkaus, mikäli mahdollista, takuuajan loppuun saakka.

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Vaara!
Laite ja pakkausmateriaalit eivät ole lasten leikkikaluja! Lapset eivät saa leikkiä muovipusseilla, kelmuilla tai pienillä osilla! Niistä uhkaa nielaisu- ja tukehtumisvaara!

- Alkuperäiskäyttöohje

3. Määräysten mukainen käyttö

Köysinosturia käytetään laitteen tehoa vastaavien kuormien nostamiseen ja laskemiseen suljetuissa tiloissa.

Konetta saa käyttää ainoastaan sille määrättyyn tarkoitukseen. Kaikkinainen tämän ylittävä käyttö ei ole määräysten mukaista. Kaikista tästä aiheutuvista vahingoista tai loukkaantumisista on vastuussa laitteen omistaja/käyttäjä eikä suinkaan sen valmistaja.

Ole hyvä ja ota huomioon, että laitteitamme ei ole suunniteltu ja valmistettu käytettäväksi pienteollisuus- tai teollisuustarkoituksiin. Emme siksi ota mitään vastuuta vaurioista, jos laitetta käytetään pienteollisuus-, käsityöläis- tai teollisuustyöpaikoilla tai näihin verrattavissa olevissa toimissa.

4. Tekniset tiedot

Jännite (V)	230 V ~ 50 Hz
Nimellisvirta (A)	4,4
Virranotto (W)	1000
Käyttötapa	S3 20% 10 min
Nimelliskuorma (kg)	250 / 500
Nostokorkeus (m)	11,5 / 5,7
Nimellisnopeus (m/min)	8 / 4
Teräsköyden halkaisija (mm)	4,0
Teräsköyden vetolujuus (N/mm²)	1870
Eristysluokka	B
Suojauslaji	IP 54
Käyttövoimaluokka	M1
Nettopaino (kg)	16,2

Käyttötapa S3 - 20% - 10min:
S3 = jaksottaiskäyttö ilman käynnistystapahtuman vaikutusta Tämä tarkoittaa, että 10 minuutin ajanjakson aikana suurin käyttöaika on 20% (2 minuuttia).

Rajoita melunpäästöt ja tärinä mahdollisimman vähäisiksi!
- Käytä ainoastaan moitteettomia laitteita.
- Huolla ja puhdista laite säännöllisesti.
- Sovita työskentelytapasi laitteen mukaiseksi.
- Älä ylikuormita laitetta.
- Tarkastuta laite aina tarvittaessa.
- Sammuta laite, kun sitä ei käytetä.
- Käytä suojakäsineitä.

5. Ennen käyttöönottoa

Tarkistakaa ennen käyttöönottoa, että tyyppikilven tiedot täsmäävät verkkotietojen kanssa.
Varoitus!
Vetäkää aina vahvavirtapistoke pistorasiasta, ennen kuin suoritatte laitteen säätöjä.

- Köysinosturi ei sovellu kuumien ja/tai sulatettujen massojen kuljetukseen, lisäksi köysinosturia ei ole tarkoitettu käytettäväksi alhaisissa lämpötiloissa tai syövyttävässä ympäristössä.
- Mekaaninen ryhmä on M1.
- Köysinosturin käyttöikä on n. 8000 työjaksoa (ei koske kuluvia osia). Kun nosturi on läpikäynyt 8000 jaksoa, täytyy kaikki mekaaniset osat tarkastaa ja kunnostaa.
- Lue käyttöohje ja ymmärrä se, ennen kuin käytät köysinosturia.
- Varmista, että käyttöhenkilöstö tietää, miten kone toimii ja miten sitä tulisi käyttää.
- Käyttäjän tulee aina toimia käyttöohjeessa annettujen ohjeiden mukaisesti.
- Köysinosturia ei ole tarkoitettu jatkuvaan käyttöön. Käyttötapa on: jaksottaiskäyttö ilman käynnistystapahtuman vaikutusta.
- Koneen nimellisteho ei vaihtele kuormitusaseman muuttuessa.

5.1 Pakkauksesta ottaminen
Pakkauksen avaamisen jälkeen tarkasta, onko kehyksessä, teräsköydessä, koukuissa tai sähköisessä valvontamekanismissa mahdollisesti kuljetusvaurioita.

5.2 Asennus (kuva 5)
Köysinosturi on varustettu 2 kiinnityskaarella (1), joiden avulla se täytyy kiinnittää nelikulmaiseen putkeen. Puomin mitoituksen tulee vastata kiinnityskaarien (1) kokoa ja sen kantokyvyn täytyy olla kaksinkertainen nimelliskuormaan verrattuna. Suosittelemme ottamaan yhteyttä pätevään te-

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knikkoon.
Kaikki ruuvit tulee kiristää oikein. Ennen käyttöönottoa tulee pätevän teknikon tarkastaa puomin kiinnitys.

5.3 Taljatoiminto (kuvat 6 – 9)
Köysinosturi on varustettu kääntörullalla (15) ja lisäkoukulla (16). Oikein käytettynä köysinosturilla voi nostaa kaksinkertaisen kuorman.
Asenna kääntörulla (15) ja lisäkoukku (16) kuten kuvissa 6-8 näytetään. Kiinteästi asennettu koukku (8) täytyy ripustaa kiinnitysreikään (2) (kuva 9). Kuorma nostetaan nyt kahta teräsköyttä käyttäen, täten voi köysinosturi nostaa kaksinkertaisen kuorman.

6. Käyttö

Vaara!
6.1 Ohjeita käyttöä varten
1. Ennen ensimmäistä käyttöä ota teippi pois rummusta (3).
2. A-arvotettujen melunpäästöjen arvo käyttäjän paikalla on alhaisempi kuin 75 dB (äänen painetaso LpA). Melu- ja tärinäarvot on mitattu standardin EN ISO 11201 mukaisesti.
3. Käyttöjännite: 230V ± 10%, 50Hz ± 1%.
4. Köysinosturia saa käyttää ympäristölämpötilan ollessa 0 °C ja 40 °C välillä ja alle 50 % suhteellisessa ilmankosteudessa. Korkeus merenpinnan yläpuolella: kork. 1.000 m.
5. Kuljetuksen ja varastoinnin aikana saa lämpötila olla -25 °C ja 55 °C välillä. Suurin sallittu lämpötila ei saa ylittää 70 °C.
6. Käyttäjän tulee nostaa kuorma lattialta pienimmällä mahdollisella nopeudella. Köyden tulee olla vedettynä kireälle, kun kuorma nostetaan.
7. Köysinosturin moottori (14) on varustettu termostaattikatkaisimella. Köysinosturin käytön aikana saattaa moottori (14) tämän vuoksi pysähtyä, se käynnistyy automaattisesti uudelleen, kun se on jäähtynyt.
8. Sähkökäyttöistä köysinosturia ei ole varustettu nimellistehorajoittimella. Sen vuoksi ole hyvä äläkä yritä nostaa kuormaa uudelleen, jos ylikuumenemissuoja on rajoittanur käyttöä. Tässä tapauksessa kuorma ylittää köysinosturin nimellistehon.
9. Älä jätä nostettua kuormaa riippumaan valvomatta ilman, että vastaavat turvallisuustoimenpiteet on suoritettu.
10. Varmista laite 10 A varokkeella tai 10 mA vuotovirtasuojakatkaisimella virtapiirin suojaamiseksi.
11. Älä käytä vipuja (4/5) tavallisina pysäytyslaitteina. Niitä tulee käyttää ainoastaan hätätilanteen pysäytyskeinona.
12. Ennen kuin aloitat, varmista, että teräsköysi (6) on kelattu oikein rummun (3) ympärille ja että kierrosten välimatka on pienempi kuin teräsköysi (kuva 3).
13. Varmista, että kuorma on kiinnitetty määräysten mukaisesti koukkuun (8) tai taljanostinkäytössä lisäkoukkuun (16) ja pysy aina turvallisen välimatkan päässä kuormasta ja teräsköydestä (6).

6.2 Käyttö (kuva 1)
- Tarkasta, onko Hätä-Seis-painike (9) painettu alas. Kierrä punaista pysäytysnuppia myötäpäivään sen vapauttamiseksi.
- Paina painiketta ▲ (10) kuorman nostamiseksi.
- Paina painiketta ▼ (10) kuorman laskemiseksi.
- Automaattisen pysäytysmekanismin vipu (5): Kun suurin nostokorkeus on saavutettu, niin sammutuspaino (7) painaa vivun (5) ylös. Tällöin rajakytkin toimintuu ja kuormaa ei enää voi nostaa ylemmäs.
- Suurimman köydenpituuden vipu (4): Kun kuorma on saavuttanut alhaisimman mahdollisen aseman, niin rajakatkaisin toimentuu ja kuorman laskeminen alemmaksi ei ole mahdollista. Tämä rajakatkaisin estää myös köysinosturin käytön väärään suuntaan (koukku liikkuu päinvastaiseen suuntaan kuin käyttökytkimessä näytetty suunta).
- Kun hätä-seis-katkaisinta (9) painetaan, niin köysinosturi pysähtyy.
- Hätätilanteen tullessa on heti painettava hätä-seis-katkaisinta (9) köysinosturin pysäyttämiseksi. Köysinosturin käyttö ei ole mahdollista, jos hätä-seis-katkaisinta on painettu.

7. Verkkojohdon vaihtaminen

Vaara!
Kun tämän laitteen verkkojohto vahingoittuu sen on korvattava joko valmistaja tai hänen asiakas-, huolto- ja varaosapalvelunsa tai vastaavan pätevyyden omaava henkilö, jotta vaaratilanteita ei pääse syntymään.

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8. Puhdistus, huolto ja varaosatilaus

Vaara!
Irroita verkkopistoke pistorasiasta ennen kaikkia puhdistusstoimia.

8.1 Puhdistus

- Pidä suojalaitteet, ilmaraot ja moottorin kotelo niin puhtaina pölystä ja liasta kuin suinki mahdollista. Pyyhi laite puhtaalla rievulla tai puhalla se puhtaaksi vähäpaineisella paineilmalla.
- Suosittelemme laitteen puhdistamista heti joka käytön jälkeen.
- Puhdista laite säännöllisin väliajoin käyttäen kosteaa riepua ja vähän saippuaa. Älä käytä sellaisia puhdistusaineita tai liuotteita, jotka saattavat syövyttää laitteen muoviosia. Huolehdi siitä, ettei laitteen sisäpuolelle pääse vettä. Veden tunkeutuminen sähkötyökaluun lisää sähköiskun vaaraa.

8.2 Huolto
Vaara! Varmista aina, että konetta ei ole liitetty sähköverkkoon, kun suoritat koneen hoitotoimet.

- Seuraavassa: Yksi jakso vastaa yhden kuorman yhtä liikettä ylös ja alas. Määräaikaistarkastus vastaa 100 jakson jälkeen suoritettua tarkastusta.
- Tarkasta määräajoin, että köysinosturin rajakatkaisimet toimivat määräysten mukaisesti. Tarkastus tehdään seuraavasti: Kun köysi on saavuttanut suurimman nostokorkeuden, toimennetaan automaattisen pysäytysmekanismin vipu (5). Moottorin (14) täytyy silloin pysähtyä. (tarkastus ilman kuormaa).
  Kun teräsköysi (6) on kelattu auki niin pitkälle kuin mahdollista, toimennetaan suurimman köydenpituuden vipu (4). Moottorin (14) täytyy silloin pysähtyä.
- Tarkasta määräajoin verkkoliitäntäjohto (12) ja ohjausjohto (13).
- Teräsköysi (6) ja kääntörulla (15) tulee voidella 200 jakson väliajoin.
- Aina 30 jakson jälkeen tulee tarkastaa kuvan 4 mukaan, onko teräsköysi (6) hyväkuntoinen koko pituudeltaan. Jos se on vahingoittunut, tulee sen tilalle vaihtaa teknisien tietojen mukainen teräsköysi.
- Tarkasta 1000 jakson välein, ovatko kiinnityskaarien (1) ja kääntörullan (15) ruuvit tiukasti kiinni.
- Tarkasta 1000 jakson välein, ovatko koukut (8/16) ja kääntörulla (15) hyväkuntoiset.
- Voitele köysi, ketju, vaihteisto, laakerit ja koukut säännöllisin väliajoin.
- Tarkasta aina 1000 työjakson jälkeen kuluvat osat, kuten köyden, ketjun, koukut, hihnat ja jarrupalat.
- Tarkasta ennen köysinosturin jokaista käyttöä, että hätä-seis-katkaisin (9) ja painonäppäin (10) ovat moitteettomassa käyttökunnossa.
- Tarkasta jarrujärjestelmä 1000 jakson välein. Jos moottori (14) pitää epätavallista ääntä tai ei voi nostaa nimelliskuormaa, on mahdollista, että jarrujärjestelmä täytyy kunnostaa:
  - vaihda vahingoittuneiden tai kuluneiden osien tilalle uudet, ja säilytä tähän kuuluva huoltosokumentaatio.
  - Määräaikaisen kunnossapidon ylittäviä töitä varten ole hyvä ja ota yhteyttä valtuutettuun huoltokeskukseen.
- Anna vain pätevän ammattihenkilön korjata sähkötyökalusi.

8.3 Varaosatilaus:
Varaosia tilatessasi anna seuraavat tiedot:

- Laitteen tyyppi
- Laitteen tuotenumero
- Laitteen tunnusnumero
- Tarvittavan varaosan varaosanumero.

Ajankohtaiset hinnat ja muut tiedot löydät osoitteesta www.isc-gmbh.info

9. Käytöstäpoisto ja uusiokäyttö

Laite on pakattu kuljetuspakkaukseen, jotta vältetään kuljetusvauriot. Tämä pakkaus on raaka-ainetta ja sitä voi siksi käyttää uudelleen tai sen voi toimittaa kierrätyksen kautta takaisin raaka-ainekiertoon. Laite ja sen varusteet on valmistettu eri materiaaleista, kuten esim. metallista ja muoveista. Vialliset laitteet eivät kuulu kotitalousjätteisiin. Laite tulee toimittaa asianmukaiseen keräyspisteeseen ammattitaitoista hävittämistä varten. Jos et tiedä, missä on tällainen keräyspiste, tiedustele asiaa kuntasi hallinnosta.

10. Säilytys

Säilytä laite ja sen varusteet valolta, kosteudelta ja pakkaselta suojatussa tilassa poissa lasten ulottuvilta. Paras säilytyslämpötila on 5°C ja 30°C välillä. Säilytä sähkötyökalut alkuperäispakkauksissaan.

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Koskee ainoastaan EU-maita

Älä heitä sähkötyökaluja kotitalousjätteisiin!

Euroopan direktiivin 2012/19/EY loppuunkäytetyistä sähkö- ja elektronisista laitteista ja sen kansalliseksi laiksi muuntamisen mukaan tulee käytetyt sähkötyökalut koota erikseen ja toimittaa ne ympäristöystävälliseen kierrätykseen.

Kierrätysvaihtoehto takaisinlähetykselle:
Sähkölaitteen omistaja on velvoitettu laitteen palauttamisen vaihtoehtona vaikuttamaan siihen, että hänen luovuttamansa omaisuus hävitetään asianmukaisesti. Loppuun käytetty laite voidaan tätä varten luovuttaa myös keräyspisteeseen, joka suorittaa sen käytöstäpoiston kansallisten kierrätystalous- ja jätehuoltolakien tarkoittamalla tavalla. Tämä ei koske käytettyihin laitteisiin liitettyjä lisävarusteita ja apuvälineitä, joissa ei ole sähköosia.

Tuotedokumentaation ja tuotteen mukana toimitettujen papereiden osittainenkin kopiointi tai muu monistaminen on sallittu ainoastaan iSC GmbH:n nimenomaisella luvalla.

Oikeus teknisiin muutoksiin pidätetään

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Asiakaspalvelutiedot

Meillä on kaikissa takuutodistuksessa mainituissa maissa päteviä asiakaspalvelusta huolehtivia kumppaneita, joiden yhteystiedot löydät takuutodistuksesta. Heidän kauttaan voit saada kaikki asiakaspalvelut, kuten korjaukset, varaosien ja kulumaosien sekä tarvittavien käyttömateriaalien toimitukset.

Huomaa, että seuraaviin tämän tuotteen osiin kohdistuu käytöstä johtuvaa, luonnollista kulumista, ja että seuraavia osia tarvitaan käyttömateriaaleina.

Laji	Esimerkki
Kuluvat osat*	Teräsköysi, Koukku, Kääntörulla, Lisäkoukku
Käyttömateriaali / käyttöosat*	
Puuttuvat osat	

* ei välttämättä kuulu toimitukseen!

Puutteellisuuksien tai vikojen ilmetessä pyydämme ilmoittamaan virheestä verkossa sivustoon www.isc-gmbh.info. Ole hyvä ja anna vian tarkka kuvaus ja vastaa sen lisäksi joka tapauksessa seuraaviin kysymyksiin:

- Onko laite toiminut jo ainakin kerran, vai oliko se jo alusta lähtien viallinen?
- Havaitsitko jotain erikoista ennen vian ilmenemistä (oireita ennen vikaa)?
- Mikä mielestäsi on laitteessa vikana (pääasiallinen vika)?
  Kuvaa tätä toimintavirhettä.

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Takuutodistus

Arvoisa asiakas,
tuotteemme läpikäyvät erittäin tiukan laadunvalvontatarkastuksen. Mikäli tämä laite ei kuitenkaan toimi moitteettomasti, valitamme tapahtunutta suuresti ja pyydämme sinua kääntymään teknisen asiakaspalvelumme puoleen käyttäen tässä takuukortissa annettua osoitetta. Selvitämme asian mielellämme myös puhelimitse allaolevan palvelunumeron kautta. Takuuvaateiden esittämistä koskevat seuraavat määräykset:

1. Nämä takuuehdot koskevat ainoastaan kuluttajia, ts. luonnollisia henkilöitä, jotka eivät käytä tätä tuotetta sen enempää pienteollisessa kuin muussakaan itsenäisessä ammatinharjoituksessa. Nämä takuuehdot säätelevät täydentäviä takuusuorituksia, jotka allamainittu valmistaja lupaa uusien laitteidensa ostajille lakimääräisen takuun lisäksi. Ne eivät vaikuta lakimääräisiin takuusuoritusvaateisiisi millään tavalla. Takuumme on sinulle maksuton.
2. Takuusuoritus kattaa ainoastaan sellaiset hankkimasi allamainitun valmistajan uuden laitteen puutteellisuudet, jotka todistettavasti aiheutuvat materiaali- tai valmistusvirheistä, ja se on rajattu valintamme mukaan ainoastaan näiden laitteen vikojen korjaamiseen tai laitteen korvaamiseen uudella.
   Ole hyvä ja ota huomioon, että laitteitamme ei ole suunniteltu käytettäväksi pienteollisuus-, käsityöläis- tai ammattitarkoituksiin. Takuusopimusta ei siksi synny, jos laitetta on takuun kestoaikana käytetty pienteollisuus-, käsityöläis- tai teollisuustyöpaikoilla tai siihen on kohdistunut näihin verrattavissa oleva rasitus.
3. Antamamme takuu ei kata näitä vaurioita:
   - laitteessa esiintyneet vauriot, jotka aiheutuvat asennusohjeen noudattamatta jättämisestä tai asiantuntemattomasta asennuksesta, käyttöohjeen noudattamatta jättämisestä (kuten esim. liitäntä väärään verkkojännitteeseen tai virtalajiin) tai huolto- ja turvallisuusmääräysten laiminlyönnistä tai laitteen altistamista epänormaaleille ympäristöolosuhteille tai puutteellisesta hoidosta ja huollosta.
   - laitteessa esiintyneet vauriot, jotka aiheutuvat määräysten vastaisesta tai virheellisestä käytöstä (esim. laitteen ylikuormitus tai hyväksymättömien liitostyökalujen tai varusteiden käyttö), vieraiden esineiden tunkeutumisesta laitteeseen (esim. hiekka, kivet tai pöly, kuljetusvauriot), väkivoiman käytöstä tai ulkopuolisista tekijöistä (esim. putoamisesta aiheutuneet vahingot).
   - laitteessa tai sen osissa esiintyneet vauriot, jotka aiheutuvat käytöstä johtuvasta, tavanomaisesta tai muuten tavallisesta kulumisesta.
4. Takuuajan kesto on 24 kuukautta ja se alkaa laitteen ostopäivästä. Takuuvaateet tulee esittää ennen takuuajan päättymistä kahden viikon kuluessa siitä, kun olet havainnut vian. Takuuvaateiden esittäminen takuuajan päätyttyä ei ole mahdollista. Laitteen korjaus tai vaihto ei johda takuuajan pitenemiseen tai laitteen tai siihen mahdollisesti asennettujen varaosien takuuajan alkamiseen uudelleen alusta. Tämä koskee myös paikan päällä suoritettuja palveluja.
5. Viallista laitetta koskevat takuuvaateet tulee esittää osoitteella: www.isc-gmbh.info. Pidä uuden laitteesi ostotosite tai muu ostonäyttö valmiina. Ilman vastaavia tositteita tai tyyppikilpeä meille lähetettyjen laitteiden osalta takuuvaateet on suljettu pois, koska mahdollisuudet laitteen tunnistamiseen puuttuvat. Mikäli takuumme kattaa laitteen vian, asiakkaalle toimitetaan korjattu tai uusi laite viipymättä.

Tietysti korjaamme mielellämme korvausta vastaan myös sellaiset laitteiden viat, jotka eivät kuulu tai eivät enää kuulu takuumme piiriin. Lähetä tätä varten laite teknisen asiakaspalvelumme osoitteeseen.

Kuluvien osien, käyttöosien ja puuttuvien osien suhteen viittaamme tämän takuun rajoituksiin, jotka on selostettu tämän käyttöohjeen asiakaspalvelutiedoissa.

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Опасность!
При использовании устройств необходимо соблюдать определенные правила техники безопасности для того, чтобы избежать травм и предотвратить ущерб. Поэтому внимательно прочитайте настоящее руководство по эксплуатации / указания по технике безопасности полностью. Храните их в надежном месте для того, чтобы иметь необходимую информацию, когда она понадобится. Если Вы даете устройство другим для пользования, то приложите к нему это руководство по эксплуатации / указания по технике безопасности. Мы не несем никакой ответственности за травмы и ущерб, которые были получены или причинены в результате несоблюдения указаний этого руководства и указаний по технике безопасности.

1. Указания по технике безопасности

Опасность!
Прочитайте все указания по технике безопасности и технические требования. При невыполнении указаний по технике безопасности и технических требований возможно получение удара током, возникновение пожара и/или получение серьезных травм. **Храните все указания по технике безопасности и технические требования для того, чтобы было возможно воспользоваться ими в будущем.**

1. Постоянно контролируйте соответствие напряжения сети напряжению, указанному на фирменной табличке. Если напряжение сети не подходит для устройства, это может привести к неправильной работе машины и травмированию людей.
2. Источник электропитания должен быть заземлен и оснащен автоматом защиты от тока утечки.
3. Запрещено поднимать грузы, вес которых превышает номинальную нагрузку.
4. Используйте устройство только для предусмотренной цели. Никогда не поднимайте людей при помощи канатной тали.
5. Не тяните за кабель для извлечения штекера. Защитите кабель от жары, контакта с маслом и острыми кромками.
6. Никогда не пытайтесь поднимать зафиксированные или заблокированные грузы.
7. Извлекайте штекер из розетки электросети, если канатная таль не используется.
8. Не подпускайте к машине детей и других неуполномоченных лиц.
9. Запрещено поднимать грузы боком или с одной стороны. Избегайте раскачивания груза.
10. Удостоверьтесь, что крюк движется в направлении, указанном на выключателе.
11. Регулярно проверяйте канатную таль на наличие повреждений. Выключатель должен быть в хорошем состоянии.
12. Поручайте выполнение ремонтных работ и работ по техническому обслуживанию только специалисту-электрику в авторизованных специализированных мастерских. Ремонт разрешается осуществлять только специалисту электрику, в противном случае пользователь может получить травмы.
13. Избегайте быстрого включения и выключения (шаговый режим).
14. Всегда соблюдайте осторожность при работе с канатной талью.
15. Не стойте и не работайте под подвешенным грузом.

2. Состав устройства и состав упаковки

2.1 Состав устройства (рисунки 1/2)
1. Крепежная скоба
2. Крепежное отверстие для крюка
3. Барабан
4. Рычаг для максимальной длины каната
5. Рычаг автоматического стопорного механизма
6. Стальной канат
7. Груз отключения
8. Крюк
9. Аварийный выключатель
10. Кнопка
11. Дистанционное управление
12. Кабель питания
13. Управляющая линия
14. Двигатель

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15. Направляющий ролик
16. Дополнительный крюк
17. Канат для дистанционного обслуживания

2.2 Состав комплекта устройства
Проверьте комплектность изделия на основании описанного объема поставки. При обнаружении недостатка компонентов обратитесь в наш сервисный центр или магазин, в котором Вы приобрели устройство, не позднее чем в течение 5-ти рабочих дней после приобретения изделия, предъявив действительную квитанцию о покупке. Обратите внимание на таблицу с указанием гарантийных сроков в документе с информацией о сервисном обслуживании.

- Откройте упаковку и выньте осторожно из упаковки устройство.
- Удалите упаковочный материал, а также приспособления защиты устройства при упаковывании и транспортировке (при наличии).
- Проверьте комплектность устройства.
- Проверьте устройство и принадлежности на наличие возникших при транспортировке повреждений.
- Сохраняйте упаковку по возможности до истечения срока гарантийных обязательств.

Опасность!
Устройство и упаковка не являются детскими игрушками! Запрещено детям играть с пластиковыми пакетами, пленками и мелкими деталями! Опасность заключается в том, что они могут проглотить или погибнуть от удушья!

- Оригинальное руководство по эксплуатации

3. Использование в соответствии с предназначением

Канатная таль служит для подъема и опускания грузов в закрытых помещениях в соответствии с мощностью устройства.

Разрешается использовать устройство только в соответствии с его предназначением. Любое другое, отличающееся от этого использование считается не соответствующим предназначению. За все возникшие в результате такого использования ущерб или травмы любого вида несет ответственность пользователь и работающий с устройством, а не его изготовитель.

Учтите, что конструкция наших устройств не предназначена для использования их в промышленной, ремесленной или индустриальной области. Мы не несем никакой ответственности по гарантийным обязательствам при использовании устройства в промышленной, ремесленной или индустриальной области, а также в подобной деятельности.

4. Технические данные

Напряжение (В) ..... 230 В ~ 50 Гц
Номинальный ток (А) 4,4
Потребляемая мощность (Вт) 1000
Режим работы ..... S3 20 % 10 минут
Номинальная нагрузка (кг) .....250 / 500
Высота подъема (м) .....11,5 / 5,7
Номинальная скорость (м/мин) .....8 / 4
Диаметр стального каната (мм) 4,0
Прочность стального каната
на разрыв (Н/мм^2) 1870
Класс изоляции ..... B
Степень защиты IP54
Класс привода M1
Масса нетто (кг) 16,2

Режим работы S3 - 20% - 10 минут:
S3 = повторно-кратковременный режим работы без влияния процесса запуска. Это означает, что во временном промежутке 10 минут максимальная продолжительность рабочего режима должна составлять 20% (2 минут).

Сведите образование шумов и вибрации к минимуму!

- Используйте только безукоризненно работающие устройства.
- Регулярно проводите техническое обслуживание и очистку устройства.
- При работе учитывайте особенности Вашего устройства.
- Не подвергайте устройство перегрузке.
- При необходимости дайте проверить устройство специалистам.

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- Отключайте устройство, если вы его не используете.
- Используйте перчатки.

5. Перед вводом в эксплуатацию

Убедитесь перед подключением, что данные на типовой табличке соответствуют параметрам сети.
Предупреждение!
Всегда вынимайте штекер из розетки прежде, чем осуществлять настройки устройства.

- Канатная таль не подходит для транспортировки горячих и/или расплавленных материалов, кроме того, канатная таль не предназначена для использования при низких температурах и в агрессивной среде.
- Механическая группа M1.
- Срок службы канатной тали составляет примерно 8000 циклов (за исключением быстроизнашивающихся деталей). После 8000 циклов необходимо проверить и отремонтировать все механические детали тали.
- Перед использованием канатной тали следует прочесть и понять руководство по эксплуатации.
- Удостоверьтесь в том, что оператор знает, как функционирует и эксплуатируется машина.
- Пользователь должен всегда действовать в соответствии с руководством по эксплуатации.
- Таль не предназначена для длительного режима работы. Предусмотренным режимом работы является повторно-кратковременный режим работы без влияния процесса запуска.

- Номинальная мощность машины не меняется в зависимости от положения груза.

5.1 Распаковка
После вскрытия упаковки проверьте раму, стальной канат, крюки и электрический контрольный механизм на наличие возможных повреждений при транспортировке.

5.2 Монтаж (рис. 5)
Канатная таль оснащена 2–мя крепежными скобами (1), при помощи которых ее необходимо закрепить на квадратной трубе. Размеры кронштейна должны соответствовать размеру крепежной скобы (1). Кронштейн должен выдерживать нагрузку вдвое больше номинальной нагрузки. Мы рекомендуем связаться с квалифицированным техником. Все винты должны быть правильно затянуты. Перед вводом в эксплуатацию квалифицированный техник должен проверить анкерное крепление кронштейна.

5.3 Использование в качестве полиспаста (рис. 6-9)
Канатная таль оборудована направляющим роликом (15) и дополнительным крюком (16). При правильном использовании при помощи канатной тали можно поднимать двойной груз. Смонтируйте направляющий ролик (15) и дополнительный крюк (16), как показано на рис. 6-8. Зафиксированный крюк (8) необходимо продеть в крепежное отверстие (2) (рис. 9).
После этого груз поднимается при помощи двух стальных тросов. Тем самым посредством канатной тали можно поднимать двойной груз.

6. Обращение с устройством

Опасность!
6.1 Указания касательно эксплуатации
1. Перед первым использованием удалите клейкую ленту с барабана (3).
2. Значение эмиссии шума в месте нахождения лица, эксплуатирующего устройство, по шкале A составляет менее 75 дБ (уровень звукового давления LpA). Данные шума и вибрации были определены в соответствии с нормами EN ISO 11201.
3. Питающее напряжение: 230 В ± 10 %, 50 Гц ± 1 %.
4. Эксплуатируйте канатную таль при температуре окружающей среды от 0 °C до 40 °C и относительной влажности воздуха менее 50 %. Высота над уровнем моря: макс. 1000 м.
5. Температура транспортировки и хранения составляет от -25 °C до 55 °C.

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Максимально допустимая температура не должна превышать 70 °C.

6. Пользователь должен поднимать груз с пола с минимальной возможной скоростью. Канат должен быть натянут во время подъема груза.
7. Двигатель (14) канатной тали оборудован термореле. Поэтому во время эксплуатации канатной тали двигатель (14) может останавливаться. Он снова запускается автоматически после остывания.
8. Электрическая канатная таль не имеет ограничителя номинальной мощности. Поэтому не пытайтесь поднять груз, если устройство защиты от перегрева ограничивает эксплуатацию. В таком случае нагрузка превышает номинальную мощность канатной тяги.
9. Не оставляйте подвешенные грузы без присмотра, не приняв соответствующие меры безопасности.
10. Оборудуйте устройство предохранителем 10 A или автоматом защиты от тока утечки 10 mA для защиты электрической цепи.
11. Не используйте рычаги (4/5) в качестве обычного стопорного приспособления. Они предназначены для использования в качестве стопорного приспособления только в аварийной ситуации.
12. Перед тем как приступить к работе, удостоверьтесь, что стальной канат (6) правильно намотан на барабан (3) и расстояние между витками меньше диаметра стального каната (рис. 3).
13. Удостоверьтесь в том, что груз надлежащим образом закреплен на крюке (8) или – при использовании в качестве полиспаста – на дополнительном крюке (16). Всегда соблюдайте дистанцию до груза и стального каната (6).

6.2 Эксплуатация (рис. 1)

- Проверьте, не нажат ли аварийный выключатель (9). Поверните красный выключатель по часовой стрелке для разблокировки.
- Нажмите кнопку ▲ (10) для подъема груза.
- Нажмите кнопку ▼ (10) для опускания груза.
- Рычаг автоматического стопорного механизма (5): если достигнута максимальная высота подъема, груз отключения (7) переключает рычаг (5) вверх. Посредством этого активируется конечный выключатель и груз больше нельзя поднимать.
- Рычаг для максимальной длины каната (4): если груз достиг самого нижнего положения, активируется конечный выключатель, который не позволяет продолжить опускание груза. Этот конечный выключатель также может применяться для предотвращения использования канатной тали с неправильным направлением движения (крюк движется в направлении, противоположном направлению, указанному на выключателе).
- При нажатии аварийного выключателя (9) канатная таль останавливается.
- В аварийной ситуации незамедлительно активируйте аварийный выключатель (9) для останова канатной тали. Работа с канатной талью невозможна, если активирован аварийный выключатель.

7. Замена кабеля питания электросети

Опасность!
Если будет поврежден кабель питания от электросети этого устройства, то его должен заменить изготовитель устройства, его служба сервиса или другое лицо с подобной квалификацией для того, чтобы избежать опасностей.

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8. Очистка, техобслуживание и заказ запасных деталей

Опасность!
Перед всеми работами по очистке необходимо вынуть штекер из розетки электросети.

8.1 Очистка

- Содержите защитные приспособления, вентиляционные щели и корпус двигателя свободными насколько это возможно от пыли и грязи. Протрите устройство чистой ветошью или продуйте сжатым воздухом под низким давлением.
- Мы рекомендуем очищать устройство сразу после каждого использования.
- Регулярно очищайте устройство влажной ветошью с небольшим количеством жидкого мыла. Не используйте средства для очистки или растворы; они могут повредить пластмассовые части устройства. Следите за тем, чтобы вода не попала вовнутрь устройства. Попадание воды в электрическое устройство повышает опасность получения удара током.

8.2 Техническое обслуживание
Опасность! Всегда необходимо удостоверяться в том, что машина не соединена с электросетью во время ухода за ней.

- Далее: один цикл соответствует одному подъему и опусканию груза. Периодическая проверка соответствует проверке через 100 циклов.
- Периодически проверяйте правильность функционирования конечных выключателей канатной тали. Проверка выполняется следующим образом: когда канат достигает максимальной высоты подъема, активируется рычаг автоматического стопорного механизма (5). Двигатель (14) должен остановиться. (Проверка без груза).
  Если стальной канат (6) максимально размотан, активируется рычаг для максимальной длины каната (4). Двигатель (14) должен остановиться.
- Периодически проверяйте кабель питания (12) и управляющую линию (13).
- Стальной канат (6) и направляющий ролик (15) необходимо смазывать каждые 200 циклов.
- Каждые 30 циклов контролируйте в соответствии с рис. 4 хорошее состояние всего стального каната (6). Если он поврежден, его следует заменить стальным канатом согласно техническим характеристикам.
- Каждые 1000 циклов проверяйте, хорошо ли затянуты винты крепежных скоб (1) и направляющего ролика (15).
- Каждые 1000 циклов проверяйте хорошее состояние крюков (8/16) и направляющего ролика (15).
- Регулярно смазывайте канат, цепь, привод, подшипники и крючки.
- Через каждую 1000 циклов проверяйте быстроизнашивающиеся детали: канат, цепь, крючки, ленты и тормозные накладки.
- Перед каждым использованием канатной тяги проверяйте безупречное рабочее состояние аварийного выключателя (9) и кнопок (10).
- Каждые 1000 циклов проверяйте тормозную систему. Если двигатель (14) издает необычные шумы или не может поднять груз, соответствующий номинальной нагрузке, возможно, требуется ремонт тормозной системы:
  - замените поврежденные или изношенные детали, соблюдайте указания в соответствующей документации по техническому обслуживанию;
  - для выполнения внеплановых ремонтных работ обращайтесь в авторизованный сервисный центр.
- Ремонтировать электроинструмент должны только квалифицированные специалисты.

8.3 Заказ запасных деталей:
При заказе запасных деталей необходимо указать следующие данные;

- Тип устройства
- Номер артикула устройства
- Идентификационный номер устройства
- Номер необходимой запасной детали

Актуальные цены и информация находятся на странице www.isc-gmbh.info

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9. Утилизация и вторичное использование

Устройство поставляется в упаковке для предотвращения повреждений при транспортировке. Эта упаковка является сырьем и поэтому может быть использована вновь или направлена на повторную переработку сырья. Устройство и его принадлежности изготовлены из различных материалов, например, металла и пластмасс. Не выбрасывайте дефектные устройства вместе с бытовыми отходами. Для правильной утилизации устройство необходимо сдать в подходящий пункт приема. Если Вы не знаете, где находится пункт приема, уточните это в органах коммунального управления.

10. Хранение

Храните устройство и его принадлежности в темном, сухом и неподверженном воздействию мороза, а также недоступном для детей месте. Оптимальная температура хранения находится между 5 ˚C и 30 ˚C. Храните электроинструмент в оригинальной упаковке.

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Только для стран ЕС

Запрещено выбрасывать электроинструмент в обычный домашний мусор.

Согласно европейской директиве 2012/19/EG об использованных электрических и электронных устройствах и реализации в правовой системе соответствующей страны необходимо использованный электрический инструмент утилизировать отдельно и направлять на вторичную переработку для охраны окружающей среды.

Вторичная переработка - альтернатива обязятельной отсылке устройства назад изґготовителю: Владелец электрическоґо устройства в случае избавления от собственности обязан,в качестве альтернативы отсылки назад изґготовителю, содействовать надлежащей утилизации. Пришедшее в неґодность устройство может быть передано в приемный пункт, который осуществит ликвидацию в соответствии с законом страны о цикличном производстве и обращении с мусором. Это не относится к приложенным к пришедшему в неґодность оборудованию дополнительным устройствам и вспомоґательным средствам, не содержащим электрические части.

Перепечатывание или прочие виды размножения документации и сопроводительных листов продукции фирмы, полностью или частично, разрешено производить только с однозначного разрешения ISC GmbH.

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Информация о сервисном обслуживании

Во всех странах, указанных в гарантийном свидетельстве, у нас имеются компетентные сервисные партнеры, контактные данные которых Вы найдете в гарантийном свидетельстве. Они всегда в Вашем распоряжении для решения любых вопросов, связанных с обслуживанием, например, для ремонта, поставки запчастей и быстроизнашивающихся деталей, а также приобретения расходных материалов.

Следует обратить внимание на то, что в этом изделии следующие детали подвержены естественному износу или износу в связи с эксплуатацией / следующие детали требуются в качестве расходных материалов.

Категория	Пример
Быстроизнашивающиеся детали*	Стальной канат, Крюк, Направляющий ролик, Дополнительный крюк
Расходный материал/расходные части*	
Недостающие компоненты	

* Не обязательно входят в объем поставки!

При обнаружении дефектов или неисправностей мы просим Вас заявить о таком случае в сети Интернет на сайте www.isc-gmbh.info. Обратите внимание на точное описание неисправности и в любом случае ответьте на следующие вопросы:

- Устройство уже работало или оно было неисправным с самого начала?
- Вам бросилось что-либо в глаза перед возникновением неисправности (признак перед неисправностью)?
- Какую неисправность имеет устройство, по Вашему мнению (основной признак)? Опишите эту неисправность.

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Гарантийное свидетельство

Уважаемая покупательница, уважаемый покупатель,
наши продукты проходят тщательнейший контроль качества. Если это устройство все же не будет функционировать безупречно, мы просим Вас обратиться в наш сервисный отдел по адресу, указанному в этом гарантийном талоне. Мы также охотно ответим на Ваши вопросы по телефону, номер которого приведен ниже. При предъявлении гарантийных требований действуют следующие условия.

1. Настоящие правила гарантии действуют исключительно в отношении пользователей, т.е. физических лиц, которые не намереваются использовать настоящее изделие в рамках своей профессиональной или другой самостоятельной деятельности. Настоящие правила гарантии регулируют дополнительные условия оказания гарантийных услуг, которые нижеупомянутый производитель обеспечивает покупателям своих новых устройств в дополнение к условиям гарантии в соответствии с законом. Эти гарантийные обязательства не затрагивают Ваши законные гарантийные требования. Наши гарантийные услуги для Вас бесплатны.
2. Гарантийные услуги распространяются только на дефекты нового устройства нижеупомянутого производителя, которое вы приобрели, связанные с недостатком материала или производственным браком, и ограничиваются по нашему выбору устранением таких дефектов устройства или заменой устройства. Учтите, что наши устройства не предназначены для использования в промышленных целях, в ремесленном производстве и на профессиональной основе. Поэтому гарантийный договор считается недействительным, если устройство использовалось в течение гарантийного срока на кустарных, промышленных предприятиях или в ремесленном производстве, а также подвергалось сопоставимой нагрузке.
3. Наша гарантия не распространяется на:
   - повреждения устройства, возникшие в результате несоблюдения руководства по монтажу или неправильного монтажа, несоблюдения руководства по эксплуатации (например, при подключении к сети с неправильным напряжением или родом тока), несоблюдения требований касательно технического обслуживания и требований техники безопасности, воздействия на устройство аномальных условий окружающей среды или недостаточного ухода и технического обслуживания;
   - повреждения устройства, возникшие в результате неправильного или ненадлежащего использования (например, перегрузка устройства или применение не допущенных к использованию насадок или принадлежностей), попадания в устройство посторонних предметов (например, песка, камней или пыли, повреждения при транспортировке), применения силы или внешних воздействий (например, повреждения при падении);
   - повреждения устройства или частей устройства, связанные с износом в связи с эксплуатацией, обычным или другим естественным износом.
4. Гарантийный срок составляет 24 месяца, отсчет начинается со дня покупки устройства. Гарантийные права необходимо предъявлять до истечения срока гарантии в течении двух недель после того как будет обнаружена неисправность. Заявления на гарантийное обслуживание после истечения срока гарантии не принимаются. Ремонт или замена устройства не ведет к продлению гарантийного срока, также при оказании такой услуги отсчет нового гарантийного срока на устройство или возможно установленные детали не начинается заново. Это условие действует также при обращении в местный сервисный отдел.
5. Для предъявления гарантийных требований сообщите о неисправности устройства на сайте www.isc-gmbh.info. Приготовьте квитанцию о покупке или другие доказательства приобретения Вами нового устройства. Оказание гарантийных услуг применительно к устройствам, направленным на рассмотрение без соответствующих доказательств или фирменной таблички, исключается ввиду недостатка данных для идентификации таких устройств. Если наша гарантия распространяется на неисправность устройства, Вы немедленно получите отремонтированное или новое устройство.

Само собой разумеется, мы можем также устранить при оплате затрат неисправности устройства, которые не входят в объем гарантийных услуг или при истечении срока гарантии. Для этого Вам необходимо выслать устройство на адрес нашей службы сервиса.

Что касается быстроизнашивающихся, расходных деталей и недостающих компонентов, мы обращаем внимание на ограничения этой гарантии согласно информации о сервисном обслуживании настоящего руководства по эксплуатации.

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Nevarnost!
Pri uporabi naprav je potrebno upoštevati nekaj varnostnih ukrepov, da bi preprečili poškodbe in materialno škodo. Zato skrbno preberite ta navodila za uporabo/varnostne napotke. Le-te dobro shranite tako, da boste imeli zmeraj pri roki potrebne informacije. Če bi napravo izročili drugim osebam, Vas prosimo, da jim izročite tudi ta navodila za uporabo/varnostne napotke. Ne prevzemamo nobene odgovornosti za nezgode ali škodo, ki bi nastale zaradi neupoštevanja teh navodil za uporabo in varnostnih napotkov.

1. Varnostni napotki

Nevarnost!
Preberite varnostne napotke in navodila. Neupoštevanje varnostnih napotkov in navodil ima lahko za posledico električni udar, požar in/ali hude poškodbe. **Shranite vse varnostne napotke in navodila za kasnejšo uporabo.**

1. Preverite, če se napetost električnega omrežja ustreza napetosti, ki je navedena na tipski tablici. V primeru, da napetost električnega omrežja ni ustrezna, lahko to vodi do nenormalnega delovanja stroja in povzroči telesne poškodbe.
2. Pri oskrbi z električnim tokom mora biti prisotna tudi ozemljitev, oskrba z električnim tokom pa mora biti opremljena tudi z zaščitnim stikalom proti okvarnemu toku.
3. Prepovedano je dvigovanje tovora, katerega teža je večja od navedene nazivne teže.
4. Napravo uporabljajte le v namen, za katerega je ta naprava predvidena. Z dvigalno napravo na vrv nikoli ne dvigujte ljudi.
5. Nikoli ne vlecite za kabel z namenom, da bi tako potegnili električi vtikač iz električne priključne vtičnce. Kabel varujte pred vročino, oljem in ostrimi robovi.
6. Nikoli ne poskušajte z napravo dvigniti utrjen ali blokiran tovor.
7. Ko dvigalna naprava ni v rabi, jo izklopite iz električnega omrežja tako, da električni vtikač potegnete iz električne omrežne vtičnice.
8. Otroke in ostale nepooblaščene osebe ne pustite v bližino naprave.
9. Tovor je prepovedano vleči bočno ali z ene strani. Preprečite nihanje tovora.
10. Prepričajte se, da se kavelj preemika v isti smeri, kot je to prikazano na upravljalnem stikalu.
11. Dvigalno napravo na vrv je potrebno v rednih časovnih intervalih pregledati glede poškodb. Upravljalno stikalo mora biti v dobrem stanju.
12. Popravila in vzdrževalna dela na napravi se naj izvajajo pri pooblaščenih servisih preko strokovnjaka za elektriko. Popravila lahko izvaja le strokovnjak za elektriko, ker lahko v drugačnem primeru uporabniku preti nevarnost, da pride do nezgode.
13. Izogibajte se hitremu vklopu in izklopu (impulzno krmiljenje).
14. Pri upravljanju z dvigalno napravo na vrv morate biti ves čas pozorni.
15. Pod dvignjenim tovorom ne smete stati ali delati.

2. Opis naprave na obseg dobave

2.1 Opis naprave (Slika 1/2)
1. Pritrdilo
2. Luknja za pritrditev kavlja
3. Boben
4. Ročica za maksimalno dolžino vrvi
5. Ročica avtomatskega zavornega mehanizma
6. Jeklena vrv
7. Odklopna utež
8. Kavelj
9. Stikalo za izklop v sili
10. Tipka
11. Daljinsko upravljanje
12. Električni omrežni kabel
13. Kabel naprave za daljinsko upravljanje
14. Motor
15. Preusmerjevalni škripec
16. Dodatni kavelj
17. Vrv za daljinsko upravljanje

2.2 Obseg dobave
S pomočjo opisanega obsega dobave preverite, ali je artikel popoln. Če deli manjkajo, se najkasneje v 5 delovnih dnevih po nakupu izdelka obrnite na naš servisni center ali na prodajno mesto, kjer ste napravo kupili, in predložite račun. Upoštevajte preglednico garancijskih storitev ob koncu tega navodila.
- Odprite embalažo in previdno vzemite napravo iz embalaže.
- Odstranite embalažni material in embalažne in transportne varovalne priprave (če obstajajo).
- Preverite, če je obseg dobave popoln.
- Preverite morebitne poškodbe naprave in delov pribora, do katerih bi lahko prišlo med

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transportom.
- Po možnosti shranite embalažo do poteka garancijskega roka.

Nevarnost!
Naprava in embalažni material nista igrača za otroke! Otroci se ne smejo igrati s plastičnimi vrečkami, folijo in malimi deli opreme! Obstaja nevarnost zadušitve in zaužitja takšnih delov materiala!

- Originalna navodila za uporabo

3. Predpisana namenska uporaba

Dvigalna naprava je namenjena za dvigovanje in spuščanje tovora v zaprtih prostorih. Tovor mora biti primeren glede na zmogljivost naprave.

Ta stroj se lahko uporablja le v skladu z njegovo namembnostjo. Vsaka druga uporaba šteje kot nenamenska nedovoljena uporaba. Za kakršnekoli poškodbe ali škodo, ki bi nastale zaradi nedovoljene uporabe, nosi odgovornost uporabnik/upravljalec in ne proizvajalec.

Prosimo, da upoštevate, da naše naprave niso bile konstruirane za namene uporabe v obrtništvu ali industriji. Ne prevzemamo nobene odgovornosti, če je bila naprava uporabljana v obrtništvu ali industriji ter v podobnih dejavnostih.

4. Tehnični podatki

Napetost (V)	230 V ~ 50 Hz
Nazivni tok (A)	4,4
Sprejem moči (W)	1000
Način delovanja	S3 20% 10 min
Nazivna teža (kg)	250 / 500
Višina dviga (m)	11,5 / 5,7
Nazivna hitrost (m/min)	8 / 4
Premer jeklene vrvi (mm)	4,0
Natezna trdnost jeklene vrvi (N/mm^2)	1870
Izolacijski razred	B
Vrsta zaščite	IP 54
Razred pogonske naprave	M1
Neto teža (kg)	16,2

Delovanje v načinu S3 - 20% - 10 min: S3 = V prekinjenem načinu obratovanja brez vpliva zagonskega postopka. To pomeni, da znaša v času 10 minut max. čas obratovanja naprave 20% (2 minut).

Omejite hrupnost in vibracije na minimum!
- Uporabljajte samo brezhibne naprave.
- Redno vzdržujte in čistite napravo.
- Vaš način dela prilagodite napravi.
- Ne preobremenjujte naprave.
- Po potrebi dajte napravo v preverjanje.
- Izključite napravo, ko je ne uporabljate.
- Uporabljajte rokavice.

5. Pred uporabo

Pred priklopom se prepričajte, če se podatki na tipski podatkovni tablici skladajo s podatki o električnem omrežju.
Opozorilo!
Zmeraj izvlecite električni priključni vtikač preden začnete izvajati nastavitve na skobljiču.

- Dvigalna naprava na vrv ni primerna za transport vroče in/ali staljene mase, nadalje pa dvigalna naprava ni predvidena za upoprabo pri nizkih temperaturah in v agresivnem okolju.
- Mehanska skupina je M1.
- Amortizacijska doba dvigalne naprave na vrv je pribl. 8000 ciklov (razen deli, ki se hitro obrabijo). Ko dvigalna naprava odsluži 8000 ciklov, je potrebno mehanske dele pregledati in jih servisirati.
- Preden pričnete dvigalno napravo uporabljati, preberite navodila za uporabo.
- Prepričajte se, da bo uporabnik vedel kako stroj deluje in kako ga je potrebno uporabljati.
- Uporabnik mora stroj vedno uporabljati v skladu z navodili za uporabo.
- Dvigalna naprava ni namenjena za trajno uporabljanje. Način obratovanja: prekinjeno obnratovanje brez vpliva zagonskega postopka.
- Nazivna moč stroja se ne spreminja s položajem obremenitve.

5.1 Razpakirati
Po tem, ko odprete embalažo, je potrebno pregledati okvir, jekleno vrv, kavelj in električni kontrolni mehanizem glede eventualnih poškodb zaradi transporta.

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5.2 Montaža (Slika 5)
Dvigalna priprava je opremljena z 2 pritrdilnima ročajema (1), s katerima jo je potrebno pritrditi na štirikotno cev. Dimenzije previsnega nosilca se morajo skladati z velikostjo pritrdilnih ročajev (1) in nosilec mora zmožen nositi dvakratno nazivno breme. Priporočamo, da se obrnete na strokovno usposobljenega tehnika.
Vse vijake je potrebno pravilno priviti. Pred prvim zagonom pa naj kvalificirani tehnik preveri zasidranje previsnega nosilca.

5.3 Delo s pomočjo škripčevja (Slike 6 – 9)
Dvigalna naprava na vrv je opremljena s preusmerjevalnim škripcem (15) in z dodatnim kavljem (16). S pravilno uporabo lahko dvigalna naprava dvigne dvojni tovor.
Preusmerjevalni škripec (15) in dodaten kavelj (16) montirajte tako kot je to prikazano na slikah 6-8. Fiksno montiran kavelj (8) je potrebno obesiti v odprtino za pritrditev kavlja (2) (Slika 9).
Tovor se zdaj dviga s pomočjo dveh jeklenih vrvi, dvigalna naprava lahko tako dvigne dvojni tovor.

6. Uporaba

Nevarnost!
6.1 Navodila za delovanje
1. Pred prvo uporabo z bobna (3) odstranite lepilni trak.
2. Vrednost z A ocenjene emisije hrupa na delovnem mestu upravljavca je nižja kot 75dB (raven zvočnega tlaka LpA). Vrednosti hrupa in vibracij so bile izmerjene v skladu z EN 11201.
3. Napetost oskrbe z električnim tokom: 230 V ± 10%, 50 Hz ± 1%.
4. Dvigalno napravo na vrv se uporablja pri temperaturah okolja med 0 °C in 40 °C in pri relativni vlažnosti pod 50%. Do nadmorske višine: maks. 1000 m.
5. Stroj se lahko transportira in skladišči pri temperaturah med -25 °C in 55 °C. Najvišja dopustna temperatura ne sme presegati 70 °C.
6. Uporabnik mora tovor s tal dvigniti z najmanjšo možno hitrostjo. Tik preden se tovor začenja dvigovati, mora vrv biti napeta.
7. Motor (14) dvigalne naprave na vrv je opremljen s termostatskim stikalom. Zato lahko med delovanjem pride do zaustavitve motorja (14), ta pa se avtomatsko ponovno zažene, ko se ohladi.
8. Električna dvigalna naprava na vrv ni opremljena z omejevalom nazivne moči. Zato Vas prosimo, da v primeru, ko zaščita proti pregrevanju omeji delovanje, tovora ne poskušajte dvigovati dalje. V tem primeru je obremenitev večja od nazivne moči dvigalne naprave na vrv.
9. Nobenega tovora ne smete pustiti viseti nenadzorovano brez, da bi zagotovili preventivne varnostne ukrepe.
10. Da bi zavarovali električni krog, je napravo potrebno zavarovati z 10 A varovalko ali z 10 mA varnostnim stikalom proti okvarnemu toku.
11. Ročico (4/5) ne uporabljajte kot rutinsko zavorno napravo. Ta služi le kot naprava za zaustavitev v skrajni sili.
12. Preden začnete z delom, se prepričajte, da je jeklena vrv (6) pravilno navita okoli bobna (3) in da je razmak med navoji manjši od premera jeklene vrvi (Slika 3).
13. Poskrbite, da bo tovor, na primer pri delovanju s škripci, pravilno zavarovan na kavlju (8) in na dodatnem kavlju (16), vedno pa poskrbite tudi za varnostno razdaljo do tovora in do jeklene vrvi (6).

6.2 Delovanje (Slika 1)
- Preverite, če je stikalo za izklop v sili (9) aktivirano. Da bi stikalo sprostili, zavrtite rdeče zavorno stikalo v smeri urinega kazalca.
- Za dvigovanje tovora pritisnite na tipko ▲ (10).
- Za spuščanje tovora pritisnite na tipko ▼ (10).
- Ročica avtomatskega zavornega mehanizma (5): Ko je maksimalna dvižna višina dosežena, odklopna utež (7) pritisne ročico (5) navzgor. S tem se aktivira končno stikalo in tovora ni mogoče več dvigniti višje.
- Ročica za maksimalno dolžino vrvi (4): Ko tovor doseže najnižji možni položaj, se aktivira končno stikalo, ki onemogoča nadalnje spuščanje tovora. To končno stikalo bi preprečilo tudi delovanje dvižne naprave v nepravilno smer (kavelj se premika v nasprotni smeri, kot je prikazana na konzoli za daljinsko upravljanje).
- Če se aktivira stikalo za izklop v sili (9), se dvigalna naprava zaustavi.
- V skrajnem primeru sile takoj pritisnite na stikalo za izklop v sili (9), da s tem zaustavite dvigalno napravo. V primeru aktiviranja stikala za izklop v sili, je delo z dvigalno napravo onemogočeno.

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7. Zamenjava električnega priključnega kabla

Nevarnost!
Če se električni priključni kabel te naprave poškoduje, ga mora zamenjati proizvajalec ali njegova servisna služba ali podobno strokovno usposobljena oseba, da bi preprečili ogrožanje varnosti.

8. Čiščenje, vzdrževanje in naročanje nadomestnih delov

Nevarnost!
Pred izvajanjem vsakega čistilnega dela izvlecite električni priključni kabel.

8.1 Čiščenje

- Zaščitno opremo, zračne reže in ohišje motorja vzdržujte kar se le da v stanju brez prisotnosti prahu in umazanije. Napravo obrišite s suho krpo ali s komprimiranim zrakom pod nizkim pritiskom.
- Priporočamo, da napravo očistite neposredno po vsakem končanem delu.
- Redno čistite napravo z vlažno krpo in nekaj milnice. Ne uporabljajte nobenih čistilnih ali razredčilnih sredstev; le-ta lahko poškodujejo plastične dele naprave. Pazite na to, da ne pride voda v notranjost naprave. Vstop vode v električno napravo povečuje tveganje električnega udara.

8.2 Vzdrževanje
Nevarnost! Vedno, ko na stroju opravljate vzdrževalna del, se prepričajte, da stroj ni priključen na električno omrežje.

- V nadaljevanju: En ciklus ustreza enemu premiku tovora v smeri gor in dol. Periodična kontorla pomeni kontrolo po 100 ciklih.
- Periodično kontrolirajte, če končno stikalo dvigalne naprave deluje pravilno. Kontrolo izvedete na naslednji način: Ko jeklena vrv doseže maksimalno dvižno višino, se aktivira ročica avtomatskega zavornega mehanizma (5). Motor (14) se zdaj mora zaustaviti. (kontrolo izvedite brez tovora).
  Ko se jeklena vrv (6) odvije do konca, se aktivira ročica za maksimalno dolžino vrvi (4). Motor (14) se zdaj mora zaustaviti.
- Periodično izvršite kontrolo električnega omrežnega kabla (12) in kabla naprave za daljinsko upravljanje (13).
- Vsakih 200 ciklov je potrebno namazati jekleno vrv (6) in preusmerjevalni škripec (15).
- Vsakih 30 ciklov se je potrebno prepričati (kot je prikazano na sliki 4), da je celotna jeklena vrv (6) v dobrem stanju. V primeru, da je poškodovana, jo je potrebno zamenjati z jekleno vrvjo, ki ima ustrezne tehnične podatke.
- Vsakih 1000 ciklov preverite, če so vijaki pritrdil (1) in preusmerjevalnega škripca (15) dobro priviti.
- Redno mažite vrv, verigo, menjalnik, ležaj in kavlje.
- Vsakih 1000 ciklov preverite obrabne dele, kot so: vrv, veriga, kavlji, trakovi in zavorne obloge.
- Vsakih 1000 ciklov preverite, če sta kavelj (8/16) in preusmerjevalni škripec (15) v dobrem stanju.
- Pred vsako uporabo dvigalne naprave preverite, če sta stikalo za izklop v sili (9) in pritisna tipka (10) v brezhibnem obratovalnem stanju.
- Vsakih 1000 ciklov preverite zavorni sistem. Če motor (14) ustvarja nenavaden hrup ali ne more dvigniti nazivne teže, je možno, da je potrebno servisirati zavorni sistem:
  - Zamenjajte poškodovane ali obrabljene dele in shranite servisno dokumentacijo, ki spada zraven.
  - Za nenačrtovana vzdrževalna dela se obrnite na pooblaščeni servisni center.
- Električno orodje sme popravljati le usposobljeno osebje.

8.3 Naročanje nadomestnih delov:
Pri naročanju nadomestnih delov je potrebno navesti naslednje navedbe:

- Tip naprave
- Art. številko naprave
- Ident- številko naprave
- Številka potrebnega nadomestnega dela

Aktualne cene in informacije najdete na spletni strani www.isc-gmbh.info

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9. Odstranjevanje in ponovna uporaba

Naprava se nahaja v embalaži, da ne bi prišlo do poškodb med transportom. Ta embalaža je surovina in s tem ponovno uporabna ali pa jo je možno reciklirati. Naprava in njen pribor sta izdelana iz različnih materialov kot npr. kovine in plastika. Okvarjene naprave ne sodijo med gospodinjske odpadke. Napravo odložite na ustreznem zbirališču, da bo pravilno odstranjena. Če ne poznate primernih zbirališč, se pozanimajte pri svoji občinski upravi.

10. Skladiščenje

Napravo in pribor za napravo skladiščite na temnem, suhem in pred mrazom zaščitenem in za otroke nedostopnem mestu. Optimalna skladiščna temperature je med 5 in 30 ˚C. Električno orodje shranjujte v originalni embalaži.

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Samo za dežele EU

Električnega orodja ne mečite med gospodinjske odpadke!

V skladu z evropsko smernico 2012/19/EG o starih električnih in elektronskih napravah in v skladu z izvajanjem nacionalne zakonodaje morate ločeno zbirati izrabljena električna orodja in jih predati v okoljsko varno ponovno predelavo.

Reciklažna alternativa za poziv za vračanje:
Lastnik električne naprave je alternativno zavezan, da namesto vračanja sodeluje pri pri strokovno ustreznem recikliranju v primeru predaje lastnine. Staro napravo se lahko v ta namen tudi prepusti na odvzemnem mestu, ki izvaja odstranjevanje v smislu nacionalne zakonodaje o odstranjevanju takšnih odpadkov. To se ne nanaša na starim napravam priložene dele pribora in opreme brez električnih komponent.

Ponatis ali kakršnokoli razmnoževanje dokumentacije in spremljajočih papirjev o proizvodu, tudi po izvlečkih, je dovoljeno samo z izrecnim soglasjem ISC GmbH.

Pridržana pravica do tehničnih sprememb

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Servisne informacije

V vseh državah, ki so navedene v garancijski listini, sodelujemo s kompetentnimi servisnimi partnerji, katerih kontakti so razvidni iz garancijske listine. Na voljo so vam za vse potrebne servisne storitve, kot so popravila, oskrba z nadomestnimi in obrabnimi deli ali oskrba s potrošnimi materiali.

Upoštevajte, da so nekateri deli tega izdelka izpostavljeni naravni obrabi zaradi uporabe oz. da so nekateri deli potrošni material.

Kategorija	Primer
Obrabni deli*	Jeklena vrv, Kavelj, Preusmerjevalni škripec, Dodatni kavelj
Obrabni material/ obrabni deli*	
Manjkajoči deli	

* ni nujno, da je v obsegu dobave!

Pri pomanjkljivostih ali napakah vas prosimo, da napako prijavite na www.isc-gmbh.info. Napako kar najbolj natančno opišite in v vsakem primeru odgovorite na naslednja vprašanja:

Odgovorite na naslednja vprašanja:
- Je naprava nekoč delovala, ali je bila od vsega začetka okvarjena?
- Ste pred okvaro opazili kaj neobičajnega (simptom ali okvaro)?
- Kaj na napravi po vašem mnenju ne dela (glavni znak)?
  Opišite to napačno delovanje.

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Garancijska listina

Spoštovani uporabnik,
za naše izdelke izvajamo strogo končno kontrolo kakovosti. Če ta naprava kljub temu ne deluje brezhibno, to zelo obžalujemo in vas prosimo, da se obrnete na našo servisno službo na naslovu, ki je naveden na tej garancijski kartici. Z veseljem vam bomo svetovali tudi po telefonu na navedeni številki servisne službe. Za uveljavljanje garancijskih zahtevkov velja naslednje:

1. Ti garancijski pogoji so namenjeni izključno porabniku, tj. fizičnim osebam, ki tega izdelka ne bodo uporabljale za svojo obrt ali druge samostojne dejavnosti. Ti garancijski pogoji urejajo dodatne garancijske storitve, ki jih spodaj navedeni proizvajalec zagotavlja svojim kupcem novih naprav dodatno k zakonskemu jamstvu.Ta garancija ne vpliva na vaše zakonske garancijske zahtevke. Naše garancijske storitve so za vas brezplačne.
2. Garancijske storitve se nanašajo izključno na pomanjkljivosti na novih napravah zgoraj navedenega proizvajalca, ki ste jih kupili, in so posledica materialnih ali tovarniških napak, in ki jih po lastni presoji odpravimo na tej napravi ali napravo nadomestimo z drugo.
   Prosimo, upoštevajte, da naše naprave niso bile zasnovane za uporabo v poklicu, obrti ali za poklicno uporabo. Garancijska pogodba tako ne nastane, če napravo v garancijskem obdobju uporabljate za v obrtnih, rokodelskih ali industrijskih obratih ali če je bila izpostavljena obremenitvam, ki so temu enakovredna.
3. Iz garancije so izvzeti:
   - Škoda na napravi, ki je nastala zaradi neupoštevanja navodil za montažo ali zaradi nestrokovne inštalacije, neupoštevanja navodil za uporabo (kot npr. s priključitvijo na napačno omrežno napetost ali vrsto toka), neupoštevanja navodil za vzdrževanje in varnostnih določil ali zaradi izpostavitve naprave nenormalnim okoljskim pogojem ali zaradi neustrezne nege in vzdrževanja.
   - Škoda na napravi, ki je nastala zaradi nenamenske ali nestrokovne uporabe (npr. zaradi preobremenitve naprave ali uporabe v orodjih ali opremi, za katera ni odobrena), vdor tujkov v napravo (npr. peska, kamnov ali prahu, poškodb pri transportu), uporabe sile ali zunanje sile (npr. poškodbe pri padcih).
   - Škode na napravi ali delih naprave, ki je nastala kot posledica uporabe oz. običajne ali drugačne obrabe.
4. Garancijsko obdobje traja 24 mesecev in se začne z datumom nakupa naprave. Garancijske zahtevke je treba uveljaviti pred potekom garancijskega obdobja v roku dveh tednov, ko opazite okvaro. Uveljavljanje garancijskih zahtevkov po poteku garancijskega obdobja je izključeno. Popravilo ali menjava naprave ne podaljša garancijskega obdobja, niti ne predstavlja začetka novega garancijskega obdobja za storitev, izvedeno na napravi ali za morebitne vgrajene nadomestne dele. To velja tudi pri servisih na kraju samem.
5. Za uveljavljanje vašega garancijskega zahtevka okvarjeno napravo prijavite na: www.isc-gmbh.info. Pripravite račun ali drugo dokazilo o vašem nakupu nove naprave. Naprave, poslane brez ustreznega dokazila ali tipske tablice, so izključene iz garancijskih storitev, saj jih ni možno uvrstiti. Če je okvara zajeta v naših garancijskih storitvah, boste takoj prejeli popravljeno ali novo napravo.

Seveda bomo proti plačilu z veseljem odpravili tudi okvare na napravi, ki v garancijski obseg ne sodijo ali ne sodijo več. Napravo nam pošljite na spodaj naveden naslov servisa.

Opozarjamo na omejitve v okviru te garancije za obrabne, potrošne in manjkajoče dele v skladu s servisnimi informacijami, opisanimi v teh navodilih za uporabo.

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Veszély!
A készülékek használatánál, a sérülések és a károk megakadályozásának az érdekébe be kell tartani egy pár biztonsági intézkedést. Ezért ezt a használati utasítást / biztonsági utasításokat gondosan átolvasni. Őrizze ezeket jól meg, azért hogy mindenkor a rendelkezésére álljanak az információk. Ha más személyeknek adná át a készüléket, akkor kérjük kézbesítse ki vele együtt ezt a használati utasítást / biztonsági utasításokat is. Nem vállalunk felelőséget olyan balesetekért vagy károkért, amelyek ennek az utasításnak és a biztonsági utasításoknak a figyelmen kívül hagyásából keletkeznek.

1. Biztonsági utasítások

Veszély!
Olvason minden biztonsági utalást és utasítást el. A biztonsági utalások és utasítások betartásán belüli mulasztások következménye áramcsapás, tűz és/vagy nehéz sérülések lehetnek. **Őrizze meg a biztonsági utalásokat és utasításokat a jövőre nézve.**

1. Elleőrizze mindig le, hogy a hálózati feszültség a típustáblán levő feszültségnek megfelel e. Abban az esetben, ha nem megfelelő a hálózati feszültség, akkor ez a gép abnormális működéséhez és személysérülésekhez vezethet.
2. Az áramellátásnak földeléssel kell rendelkeznie és egy hibaáram védőkapcsolóval lebiztosítva lennie.
3. Tilos olyan terheknek az emelése, amelyek túllépik a névleges tehert.
4. A készüléket csak az előrelátott célra használni. Ne emeljen sohasem személyeket a kötélemelővonóval.
5. Ne húzzon a kábelon a dugó kihúzására. Tartsa a kábelt hőségtől, olajtól és éles szélektől távol.
6. Ne próbáljon sohasem feszes vagy blokkolt terheket megemelni.
7. Húzza ki a hálózati dugót, ha nincs használatban a kötélemelővonó.
8. Gyerkeket és más nem autorizált személyeket távol tartani a géptől.
9. Tilos terheket oldalvást vagy egy oldalról húzni. Kerülje el a teher lengését.
10. Biztosítsa, hogy a kampó ugyanabba az irányba mozog, mint ami a kezelőkapcsolón mutatva van.
11. Ellenőrizze rendszeresen le a kötélemelővonót sérülésekre. A kezelőkapcsolónak jó állapotban kell lennie.
12. A javítási és karbantartási munkákat csak egy feljogosított szakműhelyben, egy villamossági szakember által elvégeztetni. Javításokat csak egy villamossági szakember végezheti el, különben balesetek érhetik a használót.
13. Kerülje el a gyors be- és kikapcsolást (megérintésiüzem).
14. Legyen a kötélemelővonó kezelésénél mindig figyelmes.
15. Ne álljon vagy dolgozzon a felemelt teher alatt.

2. A készülék leírása és a szállítás terjedelme

2.1 A készülék leírása (képek 1/2)
1. Felerősítési fül
2. Felerősítési lyuk a kampónak
3. Dob
4. Kar a maximális kötélhosszúsághoz
5. Az automatikus stopmechanizmus karja
6. Acélkötél
7. Lekapcsolótömeg
8. Kampó
9. Vész-ki-kapcsoló
10. Nyomótaszter
11. Távirányító
12. Hálózati kábel
13. Vezérlővezeték
14. Motor
15. Terelőgörgő
16. Pótkampó
17. Kötél a távvezérléshez

2.2 A szállítás terjedelme
Kérjük a leírott szállítási terjedelem alapján leellenőrizni a cikk teljességét. Hiányzó részek esetén forduljon a cikk vásárlása után legkésőbb 5 munkanapon belül egy érvényes vásárlási igazolás felmutatása mellett a szervízközponthoz vagy a eladóhelyhez, ahol vette a készüléket. Kérjük vegye ehhez figyelembe az utasítás végén a szervíz-információkban található szavatossági táblázatot.
- Nyissa ki a csomagolást és vegye ki óvatosan a készüléket a csomagolásból.
- Távolítsa el a csomagolási anyagot valamint a csomagolási- / és szállítási biztosítékot (ha létezik).
- Ellenőrizze le, hogy teljes a szállítás terjedel-

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me.
- Ellenőrizze le a készüléket és a tartozékrészeket szállítási károkra.
- Ha lehetséges, akkor őrizze meg a csomagolást a garanciaidő lejáratának a végéig.

Veszély!
A készülék és a csomagolási anyag nem gyerekjáték! Nem szabad a gyerekeknek a műanyagtasakokkal, foliákkal és aprórészekkel játszaniuk! Fennáll a lenyelés és a megfulladás veszélye!

- Eredeti használati utasítás

3. Rendeltetésszerűi használat

A kötélemelővonó zárt termekben a készülékteljesítményének megfelelő terhek emelésére és leeresztésére szolgál.

A készüléket csak rendeltetése szerint szabad használni. Ezt túlhaladó bármilyen használat, nem számít rendeltetésszerűnek. Ebből adódó bármilyen kárért vagy bármilyen fajta sérülésért a használó ill. a kezelő felelős és nem a gyártó.

Kérjük vegye figyelembe, hogy a készülékeink rendeltetésük szerint nem az ipari, kézműipari vagy gyári használatra lettek konstruálva. Nem vállalunk szavatosságot, ha a készülék ipari, kézműipari vagy gyári üzemek területén valamint egyenértékű tevékenységek területén van használva.

4. Technikai adatok

Feszültség (V)	230 V ~ 50 Hz
Névleges áram (A)	4,4
Teljesítményfelvétel (W)	1000
Üzemmód	S3 20% 10 min
Névleges teher (kg)	250 / 500
Emelőmagasság (m	11,5 / 5,7
Névleges sebesség (m/perc)	8 / 4
Az acélkötél átmérője (mm)	4,0
Az acélkötél húzószilárdsága (N/mm^2)	1870
Izolációosztály	B
Védelmi osztály	IP 54
Hajtóműosztály	M1
Nettó tömeg (kg)	16,2

Üzemmód S3 - 20% - 10perc:
S3 = megszakításos üzem az indulási folyamat befolyása nélkül. Ez annyit jelent, hogy egy 10 perces időtartam alatt a max. üzemidő 20% (2 perc).

Csökkentse le a zajkibocsátást és a vibrálást egy minimumra!
- Csak kifogástalan készülékeket használni.
- A készüléket rendszeresen karbantartani és megtisztítani.
- Illessze a munkamódját a készülékhez.
- Ne terhelje túl a készüléket.
- Hagyja adott esetben leellenőrizni a készüléket.
- Kapcsolja ki a készüléket, ha nem használja.
- Hordjon kesztyűket.

5. Beüzemeltetés előtt

Győződjön meg a rákapcsolás előtt arról, hogy a típustáblán megadott adatok megegyeznek a hálózati adatokkal.
Figyelmeztetés!
Húzza mindig ki a hálózati csatlakozót, mielőtt beállításokat végezne el a készüléken.

- A kötélemelővonó nem alkalmas forró vagy olvadt tömegek szállítására, továbbá a kötélemelővonó nem lett alacsony hőmérsékleteknéli és agrasszív környezeten belüli használatra előrelátva.
- A mechanikus csoport az M1.
- A kötélemelővonó használati tartama cca. 8000 ciklus (exkl. a gyorsan kopó részek). Ha a vonó meghaladta a 8000 ciklust, akkor minden mechanikus részt le kell ellenőrizni és generáljavítást kell elvégezni rajtuk.
- Olvassa és értse meg a használati utasítást mielőtt használná a kötélemelővonót.
- Biztosítsa, hogy a kezelő személyzet tudja, hogy hogyan működik a gép és hogy hogyan kellene üzemeltetni.
- A használónak mindig a használati utasítással megegyezően kellen tevékenykednie.
- Az emelővonó nem lett tartósüzemre előrelátva. Az üzemód: megszakításos üzem az indulási folyamat befolyása nélkül.
- A gép névleges teljesítménye variál a megterhelés helyzetével.

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5.1 Kicsomagolni
A csomagolás kinyitása után ellenőrizze le a keretet, az acélkötelet, a kampót és az elektromos kontrollmechanizmust lehetséges szállítási károkra.

5.2 Összeszerelés (5-ös kép)
A kötélemelővonó 2 rögzítőfüllel (1) van felszerelve, amelyekkel egy négyszögű csőre kell felerősíteni. A kinyúlókar méreteinek meg kell egyeznie a rögzítőfül (1) nagyságával és a névleges teher kétszeresét kell tudnia hordani. Ajánljuk, hogy vegye fel a kapcsolatot egy kvalifikált technikussal.
Minden csavarnak helyesen meg kell húzva lennie. A beüzemeltetés előtt le kellene egy kvalifikált technikusnak ellenőriznie a kinyúlókar lerögzítését.

5.3 Emelő csigasorfunkció (képek 6-tól – 9-ig)
A kötélemelővonó egy terelőgörgővel (15) és egy kiegészítő kampóval (16) van felszerelve. Helyes használatnál a kötélemelővonó a dupla terhet tudja emelni.
A terelőgörgőt (15) és a pótkapmót (16) a 6-tól – 8-ig levő képeken mutatottak szerint felszerelni. A feszesen felszerelt kampót (8) be kell akasztani a rögzítőlyukba (2) (9-es kép).
A teher most két acélkötél segítségével lesz megemelve, így a kötélemelővonó a duplat terhet tudja megemelni.

6. Kezelés

Veszély!
6.1 Utasítások az üzemhez
1. Az első használat előtt távolítsa el a ragasztószalagot a dobról (3).
2. Az A-értékelt zajemisszió értéke az üzemeltető helyén 75dB-nél alacsonyabb (hangnyomásszint LpA). A zaj és a vibrálási értékek az EN ISO 11201-nek megfelelően lettek megállapítva.
3. Ellátófeszültség: 230V ± 10%, 50Hz ± 1%.
4. A kötélemelővonót 0°C és 40°C fok között, 50% alatti relatív nedvességű környezetben kell üzemeltetni. A tengerszint feletti magasság: max. 1000 m.
5. A szállításhoz és tároláshoz a hőmérsékletnek -25°C és 55°C között szabad lennie. A legnagyobb engedélyezett hőmérsékletnek nem szabad 70°C felett lennie.
6. A használónak a tehert a talajról a lehetséges legkisebb sebességgel kellene hogy megemelje. A kötélnek a teher megemelésénél feszítve kellene lennie.
7. A kötélemelővonó motorja (14) egy termosztátkapcsolóval van felszerelve. Ezért a kötélemelővonó üzemeltetése alatt lestoppolhat a motor (14), amely lehüles után automatikusan ismét beindul.
8. Az elektromos kötélemelővonó nincs egy névleges teljesítményhatárolóval felszerelve. Ezért kérjük ne próbálja tovább megemelni a tehert, ha a túlhevülés elleni védelem korlátolja az üzemet. Ebben az esetben túllépi a teher a kötélemelővonó névleges teljesítményét.
9. Ne hagyjon logó terheket, anélkül hogy megfelelő biztonsági intézkedéseket végezett volna el felügyelet nélkül.
10. Az áramkör biztosításához biztosítsa le a készüléket egy 10 A-os biztosítékkal vagy egy 10 mA-os hibaáram-védőkapcsolóval.
11. Ne használja a kart (4/5) rutin stopbrendezésként. Ez csak szükség esetén szolgál stopberendezésként.
12. Mielőtt kezdene, biztosítsa hogy az acélkötél (6) helyesen fel van tekerve a dobra (3) és a csavarulatok közötti távolság kisebb az acélkötéltől (3-as kép).
13. Biztosítsa, hogy a rakomány a kampón (8) illetve a láncos csigasoros üzemnél a pótkampón (16) helyesen biztosítva van és tartson mindig távolságot a teherhez és az acélkötélhez (6).

6.2 Üzem (1-es kép)
- Ellenőrizze le, hogy a vész-ki-kapcsoló (9) nyomva van e. Fordítsa kireteszeléshez a piros stopkapcsolót az óramutató forgási irányába.
- A teher megemeléséhez nyomja meg a nyomótasztert ▲ (10).
- A teher leeresztéséhez nyomja meg a nyomótasztert ▼ (10).
- Az automatikus stopmechanizmus (5) karja: Ha elérte a maximális emelőmagasság, akkor a lekapcsolótömeg (7) felnyomja a kart (5). Azáltal üzemeltetve lesz a végkapcsoló és nem lehet tovább felemelni a terhet.
- Kar a maximális kötélhosszúsághoz (4): Ha a teher elérte a lehető legalacsonyabb pozíciót, akor egy végkapcsoló üzemeltetve lesz, amely lehetetlené teszi a teher további leeresztését. Ez a végkapcsoló úgyszintén megakadá-

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lyozná a kötélemelővonónak a rosz irányba történő üzemét (a kampó a kezelőkapcsolón mutatott iránnyal ellenkezően mozog).
- Ha üzemeltetve lesz a vész-ki-kapcsoló (9), akkor megáll a kötélemelővonó.
- Egy vész szükség esetén, a kötélemelővonó megállításához azonnal üzemeltetni a vész-ki-kapcsolót (9). A kötélemelővonó kezelése nem lehetséges, ha a vész-ki-kapcsoló üzemeltetve lett.

7. A hálózati csatlakozásvezeték kicserélése

Veszély!
Ha ennek a készüléknek a hálózatra csatlakoztató vezetéke megsérült, akkor ezt a gyártó vagy annak a vevőszolgáltatása, vagy egy hasonlóan szakképzett személy által ki kell cseréltetni, azért hogy elkerülje a veszélyeztetéseket.

8. Tisztítás, karbantartás és pótalkatrészmegrendelés

Veszély!
Tisztítási munkák előtt húzza ki a hálózati csatlakozót.

8.1 Tisztítás
- Tartsa a védőberendezéseket, szellőztető réseket és a gépházat annyira por- és piszokmentesen, amennyire csak lehet. Dörzsölje le a készüléket egy tiszta posztóval vagy pedig fújja ki alacsony nyomás alatt sűrített levegővel.
- Ajánljuk, hogy minden használat után azonnal kitisztítsa a készüléket.
- A készüléket rendszeresen egy nedves posztóval és egy kevés kenőszappannal megtisztítani. Ne használjon tisztító vagy oldó szereket; ezek megtámadhatják a készülék műanyagrészeit. Ügyeljen arra, hogy ne kerüljön víz a készülék belsejébe. A víz elektromos készülékbe való behatolása megnöveli az áramcsapás veszélyét.

8.2 Karbantartás
Veszély! Mindig biztosítani, hogy a gép ápolásánál a gép nincs összekötve az áramhálózattal.
- Alábbi: Egy ciklus, egy tehernek a fel- és lefelé való mozgásának felel meg. A periodikus leellenőrzés, egy 100 ciklus utáni leellenőrzésnek felel meg.
- Ellenőrizze le periodikusan, hogy a kötélemelővonó végkapcsolója rendeltetésszerűen működik. A leellenőrzés a következő képpen történik: Ha a kötél elérte a maximális emelőmagasságot, akkor üzemeltetve lesz az automatikus stopmechanizmus (5) karja. A motornak (14) most le kell stoppolnia. (teher nélkül leellenőrizni).
  Ha az acélkötél (6) annyira le van tekerve amennyire csak lehet, akkor üzemeltetve lesz a maximális kötélhosszúság (4) karja. A motornak (14) most le kell stoppolnia.
- Ellenőrizze periodikusan le a hálózati kábelt (12) és a vezérlővezetéket (13).
- Minden 200 ciklusnál meg kell kenni az acélkötelet (6) és a terelőgörgőt (15).
- Minden 30 ciklusnál a 4-es képnek megfelelően le kell ellenőrizni, hogy az egész acélkötél (6) jó állapotban van e. Ha károsut, akkor ki kell cserélni a technikai adtoknak megfelelő acélkötéllel.
- Minden 1000 ciklusnál leellenőrizni, hogy a rögzítőfül (1) és a terelőgörgő (15) csavarjai jól megvannak e húzva.
- Minden 1000 ciklusnál leellenőrizni, hogy a kampók (8/16) és a terelőgörgő (15) jó állapotban van e.
- A kötelet, láncot, hajtóművet, csapágyat és a kampót rendszeresen kenni.
- Minden 1000 ciklus után leellenőrizni a gyorsan kopó részezeket, mint a: Kötelet, láncot, kampót, szallagokat és a fékbevonatokat.
- A kötélemelővonó minden használata előtt leellenőrizni, hogy a vész-ki-kapcsoló (9) és a nyomótaszter (10) kifogástalan üzemállapotban van e.
- Minden 1000 ciklusban leellenőrizni a fékszisztémát. Ha a motor (14) szokatlan zajokat bocsájtana ki vagy nem tudná megemelni a névleges tehert, akkor lehetséges, hogy a fékszisztémán egy generáljavítást kell elvégezni:
  - Cserélje ki a károsult vagy elkopott részeket és őrizze meg a hozzátartozó karbantartási dokumentációt.
  - A terven kívüli gondozási munkákhoz kérjük forduljon egy feljogosított szervízközponthoz.

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- Az elektromos szerszámát csak egy kvalifikált szakszemélyzet által javíttatni.

8.3 A pótalkatrész megrendelése:
Pótalkatrész megrendésénél a következő adatokat kellene megadni:
- A készülék típusát
- A készülék cikk-számát
- A készülék ident- számát
- A szükséges pótalkatrész pótalkatrész számát

Aktuális árak és inforációk a www.isc-gmbh.info alatt találhatóak.

9. Megsemmisítés és újrahasznosítás

A szállítási károk megakadályozásához a készülék egy csomagolásban található. Ez a csomagolás nyersanyag és ezáltal ismét felhasználható vagy pedig visszavezethető a nyersanyagi körforgáshoz. A készülék és annak a tartozékai különböző anyagokból állnak, mint például fémből és műanyagokból. Defektes készülékek nem tartoznak a házi hulladékok közé. Szakszerű megsemmisítéshez le kellene adni a készüléket egy megfelelő gyűjtőhelyen. Ha nem ismer gyűjtőhelyeket, akkor érdeklődjön ütánna a községi önkormányzatnál.

10. Tárolás

A készüléket és a készülék tartozékait egy sötét, száraz és fagymentes valamint gyerekek számára nem hozzáférhető helyen tárolni. Az optimális tárolási hőmérséklet 5 és 30 °C között van. Az elektromos szerszámot az eredeti csomagolásban őrizni.

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Csak az EU-országoknak

Ne dobja az elektromos szerszámokat a háztartási hulladék közé!

Az elektromos és elektronikus-öregkészülékek 2012/19/EG európai irányvonala és anemzeti jogba való átvétele szerint az elhasznált elektromos szerszámokat szétválasztva kell összegyüjteni és vissza kell vezetni egy környezetvédelemnek megfelelő újrafelhasználáshoz.

Recycling-alternatívák a visszaküldési felszólításhoz:
Az elektromos készülék tulajdonosa, a tulajdon feladása esetében köteles a visszaküldés helyett alternativ a szakszerű értékesítéssel kapcsolatban összedolgozni. Az öreg készüléket ehhez egy visszavevő helynek is át lehet hagyni, amely elvégzi a nemzeti körforgásipari- és hulladéktörvények értelmében levő megsemmisítést. Ez nem érrinti az öreg készülékek mellékelt elektromos alkotórészek nélküli tartozékait és segítőeszközeit

A termékek dokumentációjának és a kisérőpapírjainak az utánnyomtatása vagy egyébb sokszorosítása, kivonatosan is csak az iSC GmbH kihangsúlyozott beleegyezésével engedélyezett.

Technikai változtatások jogát fenntartva

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Szervíz-információk

A garanciaokmányokban megnevezett minden országban kompetens szervíz-partnereket tartunk fenn, akik kontaktusi lehetőségét kérjük vegye ki a garanciaokmányból. Ezek minden szervíz-ügyben mint javítás, pótalkatrész- és gyorsan kopó rész-ellátás vagy a fogyóeszközök megrendelhetőségével kapcsolatban a rendelkezésére állnak.

Figyelembe kell venni, hogy ennél a terméknél a következő részek már használat szerinti vagy természetes kopásnak vannak alávetve ill. a következő részekre van mint fogyóeszközökre szükség.

Kategória	Példa
Gyorsan kopó részek*	Acélkötél, Kampó, Terelőgörgő, Pótkampó
Fogyóeszköz/ fogyórészek*	
Hiányzó részek	

* nincs okvetlenül a szállítás terjedelmében!

Hiányok vagy hibák esetén kérjük a hibaesetet a www.isc-gmbh.info alatt bejelenteni. Kérjük ügyeljen egy pontos hibaleírásra és felelje meg mindenesetre a következő kérdéseket:

- Működött már egyszer a készülék, vagy elejétől kezdve már defekt volt?
- Feltünt Önnek a defekt fellépése előtt valami a készüléken (tünet a defekt előtt)?
- Az Ön véleménye szerint mi a készülék hibás működése (főtünet)?
  Írja le ezt a hibás működést.

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Garanciaokmány

Tisztelt Vevő,
termékeink szigorú minőségi ellenőrzés alá vannak vetve. Ha ez a készülék mégis egyszer nem működne kifogástalanul, akkor azt nagyon sajnáljuk és kérjük Önt forduljon a szervízszolgáltatásunkhoz amely ebben a garanciakártyában megadott cím alatt található. Szívesen állunk a rendelkezésére telefonon is, az alul megadott szervízszám alatt. A garanciaigény érvényesítésével kapcsolatban a következő érvényes:

1. Ezek a garanciafeltételek csak kizárólagosan a fogyasztóknak szólnak, ez annyit jelent hogy természetes személyeknek, akik nem szánják ezt a terméket sem üzemszerű sem egyébb önálló tevékenységeik körén belül használni. Ezek a garanciafeltételek szabályozzák a kiegészítő garanciateljesítményeket, amelyeket a lent megnevezett gyártó a vásárlóknak az új készülékeire igér a törvényileg előírt garanciaszolgálathoz kiegészítően. A jogi szavatossági igényei, nincsennek ez a garnacia által érintve. A garanciateljesítményünk az Ön számára díjmentes.
2. A garanciateljesítmény csak kizárólagosan az Ön által, a lent megnevezet gyártótol megvásárolt új készüléken felmerülő olyan hibákra terjed ki, amelyek bebizonyíthatóan egy anyaghibán vagy egy gyári hibán alapszanak és korlátolva van választásunk szerint, vagy ezeknek a hibáknak az elhárítására vagy a készülék kicserélésére.
   Kérjük vegye figyelembe, hogy a készülékeink rendeltetésük szerint nem az ipari, kézműipari vagy szakmai használatra lettek konstruálva. Ezért a garanciaszerződés nem jön létre, ha a készülék a garancia ideje alatt kisipari, kézműipari vagy ipari üzemek területén lett használva vagy ha, egyenértékű igénybevételnek lett kitéve.
3. A szavatosságunk alol ki vannak véve:
   - olyan károk a készüléken, amelyek az összeszerelési utasítás figyelmen kívül hagyása vagy amelyek a nem szakszerű felszerelés, a használati utasítás figyelmen kívül hagyása (mint például egy rossz hálózati feszültségre vagy áramfajtára való rákapcsolás), vagy a karbantartási és biztonsági határozatok figyelmen kívül hagyása vagy a készüléknek egy nem normális környezeti feltételeknek történő kitétele vagy egy hiányos ápolás és karbantartás által keletkeztek.
   - károk a készüléken, amelyek egy rossz bánásmód vagy nem szakszerű használatok (mint például a készülék túlterhelése vagy nem engedélyezett betétszerszámok vagy tartozékok használata), idegen testeknek a készülékbe levő behatolása (mint például homok, kövek és por, szállítási károk), erőszak kifejtése vagy idegenkezűség (mint például leesés általi károk) által jöttek létre.
   - károk a készüléken vagy a készülék részein, amelyek a használatnak megfelelő, szokásos vagy egyébb természetes elkopásra vezethetőek vissza.
4. A garancia időtartama 24 hónap és a készülék vásárlasi napjával kezdődik. Garanciaigényeket a garancia idő lejárata előtt kell, két héten belül, a defekt felismerése után érvényesíteni. Ki van zárva a garanciaigények érvényesítése a garanciaidő letelte után. A készülék javítása vagy kicserélése nem hosszabbítja meg a szavatosság idejét, se nem indul ez a teljesítmény által egy új garanciaidő a készülékre vagy az esetleg beépített pótalkatrészekre. Ez egy helyszíni szervíz esetében is érvényes.
5. A garanciajogának az érvénysítéséhez kérjük jelentse be a defektes készüléket a következő cím alatt: www.isc-gmbh.info. Kérjük tartsa készenlétben az új készülék ön általi vásárlásának a bizonylatát vagy más igazolásait. Olyan készülékeket, amelyek megfelelő igazolás vagy típustábla nélkül kerülnek beküldésre, azok hiányzó hozzárendelési lehetőség miatt ki vannak zárva a garnciateljesítmény alol. Ha a készülék defektjére kiterjed a garnciateljesítményünk, akkor azonnal visszakap egy megjavított vagy egy új készüléket.

Magától érthetődő, hogy a költségek megtérítése ellenében szívesen megjavítsuk azokat a készüléken levő defekteket, amelyek nem esnek a garancia terjedelme alá vagy amelyeket már nem érinti a garancia. Ehhez kérjük a készüléket a szervízcímünkre beküldeni.

Ennek a használati utasításnak a szervíz-információja szerint utalunk ennek a garanciának a gyorsan kopó részekkel, használati részekkel és hiányzó részekkel kapcsolatban fennálló fenntartásáira.

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Κίνδυνος!
Κατά τη χρήση των συσκευών πρέπει, προς αποφυγή τραυματισμών, να τηρούνται και να λαμβάνονται ορισμένα μέτρα ασφαλείας. Διαβάστε για το λόγο αυτό προσεκτικά τις Οδηγίες χρήσης / Υποδείξεις ασφαλείας. Φυλάξτε τις καλά για να έχετε τις πληροφορίες πάντα στη διάθεσή σας. Εάν παραδώσετε τη συσκευή σε άλλα άτομα, δώστε μαζί και αυτές τις Οδηγίες χρήσης / Υποδείξεις ασφαλείας. Δεν αναλαμβάνουμε καμία ευθύνη για ατυχήματα ή βλάβες που οφείλονται σε μη τήρηση αυτών των Οδηγιών χρήσης και των Υποδείξεων ασφαλείας.

1. Υποδείξεις ασφαλείας

Κίνδυνος!
Διαβάστε όλες τις Υποδείξεις ασφαλείας και τις Οδηγίες. Εάν δεν ακολουθήσετε τις Υποδείξεις ασφαλεία και τις Οδηγίες δεν αποκλείονται ηλεκτροπληξία, πυρκαγιά και/ή σοβαροί τραυματισμοί. **Φυλάξτε προσεκτικά όλες τις Υποδείξεις ασφαλεάις και τις Οδηγίες για το μέλλον.**

1. Να ελέγχετε πάντα εάν η τάση του δικτύου αντιστοιχεί στην τάση που αναγράφεται στην ετικέτα. Σε περίπτωση ακατάλληλης τάσης δικτύου, δεν αποκλείεται η όχι σωστή λειτουργία της μηχανής και η πρόκληση σωματικών βλαβών.
2. Η παροχή ρεύματος να διαθέτει γείωση και να ασφαλίζεται με διακόπτη διαρροής έντασης.
3. Απαγορεύεται η ανύψωση φορτίων που υπερρβαίνουν το ονομαστικό φορτίο.
4. Να χρησιμοποιε΄τιε τη συσκευή μόνο για το σκοπό για τον οποίο προορίζεται. Ποτέ μην μεταφέρετε άτομα με το παλάγκο.
5. Πην τραβάτε απ΄οτο καλώδιο για να βγ΄΄αλετε το βύσμα από την πρ΄ζια. Να προστατεύετε το καλώδιο από ψηλές θερμοκρασίες, λάδι και αιχμηρές άκρες.
6. Ποτέ μην προσπαθείτε να ανυψώσετε στερεά ή μπλοκαρισμένα φορτία.
7. Να βγάζετε το βύσμα από την πρίζα, όταν χρησιμοποιείτε το παλάγκο.
8. Να κρατάτε παιδιά και άλλα μη εξιουσιοδοτημένα άτομα μακριά από τη μηχανή.
9. Απαγορεύεται να τραβάτε φορτία από το πλάϊ ή προς το πλαϊ. Να αποφεύγετε την ταλάντωση των φορτίων.
10. Εξασφαλίστε την κίνηση των γάντζων προς την ίδια κατεύθυνση όπως εμφαν΄ζιεται στον διακόπτη χειρισμού.
11. Να ελέγχετε το παλάγκο τακτικά για ενδεχόμενες βλάβες. Ο διακόπτης χειρισμού να είναι πάντα σε καλή κατάσταση.
12. Οι επισκευές και εργασίες συντήρησης να εκτελούνται πάντα μόνο σε συμβεβλημένα συνεργεία από ειδικευμένους ηλεκτρολόγους. Οι επισκευές επιτρέπεται να εκτελούνται μόνο από ειδικευμένους ηλεκτρολόγους, διαφορετικά δεν αποκλείονται τραυματισμοί του χειριστή.
13. Να αποφεύγετε απότομη ενεργοποίηση και απενεργοποίηση (βηματική λειτουργία).
14. Κατά τον χειρισμό του παλάγκου να είστε πάντα ιδιαίτερα προσεκτικοί.
15. Μη στέκεστε και μην εργάζεστε κάτω από ανυψωμένο φορτίο.

2. Περιγραφή της συσκευής και συμπαραδιδόμενα

2.1 Περιγραφή της συσκευής (εικ. 1/2)
1. Βραχίονας στερέωσης
2. Τρύπα στερέωσης για το γάντζο
3. Κύλινδρος
4. Μοχλός για μέγιστο μήκος σχοινιού
5. Μοχλός του αυτόματου μηχανισμού στοπ
6. Ατσάλινο σχοινί
7. Βάρος απενεργοποίησης
8. Γάντζος
9. Διακόπτης ενεργοποίησης/απενεργοποίησης έκτακτης ανάγκης
10. Διακόπτης πίεσης
11. Τηλεχειρισμός
12. Καλώδιο σύνδεσης με το δίκτυο
13. Αγωγός ελέγχου
14. Κινητήρας
15. Τροχός ανατροπής
16. Πρόσθετος γάντζος
17. Σχοινί για τηλεχειρισμό

2.2 Συμπαραδιδόμενα
Βάσει της περιγραφής των συμπαραδιδόμενων παρακαλούμε να ελέγξετε την πληρότητα του προϊόντος. Σε περίπτωση ελλείψεων τμημάτων παρακαλούμε να αποτανθείτε εντός 5 εργάσιμων ημερών από την ημερομηνία αγοράς στο Κέντρο Σέρβις (Service Center) της εταιρείας μας ή στο κατάστημα από το οποίο αγοράσατε τη συσκευή, προσκομίζοντας την

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ισχύουσα απόδειξη αγοράς. Παρακαλούμε να προσέξετε τον πίνακα εγγύησης στους όρους εγγύησης στο τέλος των οδηγιών.

- Ανοίξτε τη συσκευασία και βγάλτε προσεκτικά τη συσκευή.
- Απομακρύντε τα υλικά συσκευασίας καθώς και τα συστήματα προστασίας της συσκευασίας / μεταφοράς (εάν υπάρχουν).
- Ελέγξτε εάν είναι πλήρες το περιεχόμενο.
- Ελέγξτε τη συσκευή και τα αξεσουάρ για ενδεχόμενες ζημιές από τη μεταφορά.
- Φυλάξτε τη συσκευασία αν γίνεται μέχρι την πάροδο της προθεσμάις της εγγύησης.

Κίνδυνος!
Η συσκευή και τα υλικά συσκευασίας δεν είναι παιχνίδια! Τα παιδιά δεν επιτρέπεται να παίζουν με πλαστικές σακούλες, πλαστικές μεμβράνες και μικροαντικείμενα! Υφίσταται κίνδυνος κατάποσης και ασφυξίας!

- Πρωτότυπες Οδηγίες χρήσης

3. Σωστή χρήση

Το παλάγκο προορίζεται για την ανύψωση και το χαμήλωμα φορτίων σε κλειστούς χ΄ρους ανάλογα με την ισχύ της συσκευής

Η μηχανή επιτρέπεται να χρησιμοποιηθεί μόνο για τον σκοπό για τον οποίο προορίζεται. Κάθε πέραν τούτου χρήση δεν ανταποκρίενται στο σκοπό για τον οποίο προορίζεται. Για βλάβες που οφείλονται σε παρόμοια χρήση ή για τραυματισμούς παντός είδους ευθύνεται ο χρήστης/χειριστής και όχι ο κατασκευαστής.

Παρακαλούμε να προσέξετε πως οι συσκευές μας δεν προορίζονται και δεν έχουν κατασκευαστεί για επαγγελματική, βιοτεχνική ή βιομηχανική χρήση. Δεν αναλαμβάνουμε εγγύηση σε περίπτωση κατά την οποία η συσκευή χρησιμοποιήθηκε σε συνεργεία, βιοτεχνίες ή στη βιομηχανία ή σε εργασίες παρόμοιες με αυτές.

4. Τεχνικά χαρακτηριστικά

Τάση (V) ..... 230 V ~ 50 Hz
Ονομαστικό ρεύμα (A)..... 4,4
Απορρόφηση ισχύος (W)..... 1000
Είδος λειτουργίας..... S3 20%:10 min
Ονομαστικό φορτίο (kg) .....250 / 500
Ύψος ανύψωσης (απλό/διπλό άγκιστρο)(m) .....
.....11,5 / 5,7
Ονομαστική ταχύτητα .....
(απλό/διπλό άγκιστρο) (m/min) .....8 / 4
Διάμετρος του ατσάλινου σχοινιού (mm) 4,0
Αντοχή σε εφελκυσμό του
ατσάλινου σχοινιού (N/mm^2)..... 1870
Κλάση μόνωσης .....B
Είδος προστασίας..... IP 54
Τάση προωστικού κινητήρα M1
Καθαρό βάρος (kg) 16,2

Είδος λειτουργίας S3 - 20%-10min:
S3 = λειτουργία διακοπής χωρίς επίδραση της διαδικασίας εκκίνησης Αυτό σημαίνει πως σε διάστημα 10 λεπτών η μέγιστη διάρκεια λειτουργίας ανέρχεται σε 20% (2,0 λεπτά).

Περιορίστε την δημιουργία θορύβου και τις δονήσεις στο ελάχιστο!

- Να χρησιμοποιείτε μόνο συσκευές σε άψογη κατάσταση.
- Να συντηρείτε και να καθαρίζετε τακτικά τη συκσευή.
- Να προσαρμόζετε στη συσκευή τον τρόπο εργασίας σας.
- Προσέξτε να μην υπερφορτώνετε τη συσκευή.
- Αφήστε τη συσκευή νδεχομένως να ελεγχθεί από ειδικό τεχνίτη.
- Να απενεργοποιείτε τη συσκευή όταν δεν την χρησιμοποιείτε.
- Να φοράτε γάντια.

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5. Πριν τη θέση σε λειτουργία

Πριν τη σύνδεση σιγουρευτείτε πως τα στοιχεία στην ετικέτα του συμφωνούν με τα στοιχεία του δικτύου.

Προειδοποίηση!
Πριν κάνετε ρυθμίσεις στη συσκευή να βγάζετε πάντα το βύσμα από την πρίζα.

- Το παλάγκο δεν είναι κατάλληλο για τη μεταφορά θερμών και/ή τηγμένων μαζών, επίσης δεν είναι κατάλληλο για τη χρήση σε χαμηλές θερμοκρασίες και σε διαβρωτικό περιβάλλον.
- Μηχανική ομάδα είναι M1.
- Η διάρκεια χρήσης του παλάγκου είναι περ. 8000 κύκλοι (εξαιρουμένων των αναλώσιμων). Όταν έχουν εκτελεσθεί 8000 κύκλοι, πρέπει να ελεγχθούν και να επιθεωρηθούν όλα τα μηχανικά τμήματα.
- Να διαβάσετε και να καταλάβετε τις Οδηγίες χρήσης πριιν τη χρήση του παλάγκου.
- Εξασφαλ΄σιτε πως ο χειριστ΄ςη γνωρίζει πώς λειτουργεί η μηχανή και πως πρέπει να χειριστεί.
- Ο χρήστης να ακολουθεί τις οδηγίες στις Οδηγίες χρήσης.
- Το παλάγκο δεν προορίζεται για συνεχή χρήση. Το είδος λειτουργίας είναι: λειτουργία διακοπής χωρίς επίδραση της διαδικασίας εκκίνησης
- Η ονομαστική ισχύς της μηχανής δεν διαφέρει ανάλογα με τη θέση του φορτίου.

5.1 Ξεπακετάρισμα
Αφού ανοίξετε τη συσκευασία, ελέγξτε πρώτα το πλαίσιο, το ατσάλινο σχοινί, τα γάντζα και τον ηλεκτρικό μηχανισμό ελέγχου για ενδεχόμενες ζημιές κατά τη μεταφορά.

5.2 Συναρμολόγηση (εικ. 5)
Η συσκευή ανύψωσης διαθέτει 2 βραχίονες στερέωσης (1), με τους οποίους πρέπει να στερεωθεί σε τετράγωνο σωλήνα. Οι διαστάσεις του προώστη πρέπει να συμφωνούν με το μέγεθος του βραχίονα στερέωσης (1) και πρέπει να μπορεί να φέρει το διπλό ονομαστικό φορτίο. Σας συνιστούμε να έλθετε σε επαφή με εξειδικευμένο τεχνικό.
Όλες οι βίδες πρέπει να είναι καλά σφιγμένες. Πριν τη θέση σε λειτουργία να ελέγξει ένας ειδικευμένος τεχνικός τη στερέωση του βραχίονα.

5.3 Λειτουργία του πάλαγκου (εικ. 6-9)
Το παλαγκο διαθέτει ένα τροχό ανατροπής (15) και ένα πρόσθετο γάντζο (16). Με σωστή χρήση το παλάγκο μπορεί να φέρει το διπλάσιο φορτίο. Στερεώστε τον τροχό ανατροπής (15) και τον πρόσθετο γάντζο (16) όπως παριστάνεται στην εικόνα 6-8. Ό σταθερά τοποθετημένος γάντζος (8) πρέπει να κρεμαστεί στην τρύπα στερέωσης (2) (απεικ. 9).
Το φορτίο ανυψώνεται με τη βοήθεια δύο ατσάλινων σχοινιών, έτσι το παλαγκο μπορεί να σηκώσει το διπλό φορτίο.

6. Χειρισμός

6.1 Υποδείξεις για το χειρισμό
1. Πριν την πρώτη χρήση αφαιρέστε την ταινία από τον κύλινδρο (3).
2. Η τιμή της εκπομπής θορύβου A στη θέση του χειριστή είναι κάτω των 75dB (στάθμη ηχητικής πίεσης! LpA) Ο θόρυβος και οι δονήσεις μετρήθηκαν σύμφωνα με το πρότυπο EN 11201.
3. Τάση τροφοδοσίας: 230V ± 10%, 50Hz ± 1%.
4. Το παλάγκο να χρησιμοποιείται σε θερμοκρασίες περιβάλλοντος μεταξύ 0°C και 40°C και σχετική υγρασία αέρα κάτω από 50%. Ύψος πάνω από το επίπεδο της θάλασσας: Μέγ. 1000 m.
5. Για μεταφορά και αποθήκευση η θερμοκρασία να κυμαίνεται μεταξύ -25 °C και 55 °C. Η μέγιστη επιτρεπτή θερμοκρας΄΄ια δεν επιτρέπεται να ανέρχεται πάνω από 70°C.
6. Ο χρήστης να ανυψώνει το φορτίο από το δάπεδο με τη χαμηλότερη δυνατή ταχύτητα. Το σχοινί να είναι τεντωμένο, όταν ανυψώνεται το φορτίο.
7. Ο κινητήρας (14) του παλάγκου είναι εξοπλισμένος με διακόπτη θερμοστάτη. Κατά τη διάρκεια της λειτουργίας του παλάγκου μπορεί να ΄διακοπεί η λειτουργία του κινητήρα (14), ο οποίος ξαναλειτουργεί αυτόματα όταν κρυώσει.
8. Το ηλεκτρικό παλαγκο δεν΄διαθέτει σύστημα περιορισμού της ονομαστικής ισχύος. Γιαυτό παρακαλούμε να μη προσπαθε΄τιε να ανασηκώσετε το φορτίο, όταν το σύστημα προστασίας από υπερθέρμανσης περιορίζει τη λειτουργία. Στην περίπτωση αυτή το φορτίο υπερβαίνει την ονομαστική ισχύ του παλαγκου.
9. Μην αφήνετε αιωρούμενα φορτία χωρίς

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επίβλεψη και χωρίς να έχετε λάβει τα απαιτούμενα μέτρα ασφαλείας.
10. Ασφαλίστε τη συσκευή με ασφάλεια 10A ή με διακόπτη διαρροής έντασης 10mA για να προστατέψετε το κύκλωμα.
11. Μη χρησιμοποιείτε τους μοχλούς (4/5) σαν σύστημα στοπ ρουτίνας. Οι μοχλοί αυτοί αποτελούν σύστημα διακοπής της λειτουργίας μόνο ια περίπτωση ανάγκης.
12. Πριν αρχίσετε, σιγουρευτείτε πως το ατσάλινο σχοινί (6) έχει τυλιχτεί σωστά γύρω από τον κύλινδρο (3) και πως η απόσταση μεταξύ των περιελίξεων είναι μικρότερη από το ατσάλινο σχοινί (εικ. 3)
13. Σιγουρευτε΄τιε πως το φορτίο κρέμετε σωστά στο γάντζο (8) ή σε περίπτωση λειτουργίας σύσπαστου, πως το φορτίο είναι καλά ασφαλισμένο στον πρόσθετο γάντζο (16). Να τηρε΄τιε πάντα απ΄σοταση προς το φορτίο και το ατσάλινο σχοινί (6).

6.2 Λειτουργία (εικ. 1)
- Ελέγξτε εάν είναι πιεσμένος ο διακόπτης έκτακτης ανάγκης (9). Στρίψτε δεξιόστροφα τον κόκκινο διακόπτη στοπ για να τον απομανδαλώσετε.
- Πιέστε τον διακόπτη πίεσης ▲ (10) για την ανύψωση του φορτίου.
- Πιέστε το διακόπτη πίεσης ▲ (10) για το χαμήλωμα του φορτίου.
- Μοχλός του αυτόματου μηχανισμού στοπ (5): Όταν επιτευχθεί το μέγιστο ύψος, το βάρος απενεργοποίησης (7) πιέζει το μοχλό (5) προς τα επάνω. έτσι ενεργοποιείται ο τερματικός διακόπτης και το φορτίο δεν μπορεί πλέον να ανασηκωθεί.
- Μοχλός για μέγιστο μήκος σχοινιού (4): Όταν το φορτίο φτάσει τη χαμηλότερη θέση, ενεργοποιείται ένας τερματικός διακόπτης, που δεν επιτρέπει το χαμήλωμα του φορτίου. Αυτός ο τερματικός διακόπτης θα εμπόδιζε και μία λειτουργία του παλάγκου προς τη λάθος κατεύθυνση (ο γάντζος κινείται αντίστροφα προς την κατεύθυνση που φαίνεται στο διακόπτη χειρισμού).
- Εάν ενεργοποιηθεί ο διακόπτης έκτακτης ανάγκης (9), διακόπτεται η κίνηση του παλάγκου.
- Σε περίπτωση κινδύνου, πιέστε αμέσως τον διακόπτη έκτακτης ανάγκης (9), για να διακόψετε την κίνηση του παλάγκου. Ο χειρισμός του παλάγκου δεν είναι δυνατός, όταν έχει γίνει χειρισμός το διακόπτη έκτακτης ανάγκης.

7. Αντικατάσταση του αγωγού σύνδεσης με το δίκτυο

Κίνδυνος!
Εάν πάθει βλάβη το καλώδιο σύνδεση της συσκευής με το δίκτυο, πρέπει προς αποφυγή κινδύνου, να αντικατασταθεί από τον κατασκευαστή ή το τμήμα του εξυπηρέτησης πελατών ή από παρόμοια εξειδικευμένο πρόσωπο.

8. Καθαρισμός, συντήρηση και παραγγελία ανταλλακτικών

Κίνδυνος!
Πριν από όλες τις εργασίες τοποθέτησης να βγάζετε το φις από την πρίζα

8.1 Καθαρισμός
- Να κρατάτε όσο πιο ελεύθερα από σκόνη και ακαθαρσίες γίνεται τα συστήματα προστασίας, τις σχισμές εξαερισμού και το κέλυφος του μοτέρ. Σκουπίζετε τη συσκευή με ένα καθαρό πανί, ή καθαρίστε το με πεπεισμένο αέρα σε χαμηλή πίεση.
- Συνιστούμε να καθαρίζετε τη συσκευή αμέσως μετά από κάθε χρήση.
- Να καθαρίζετε τη συσκευή τακτικά με ένα νωπό πανί και λίγο μαλακό σαπούνι. Μη χρησιμοποιείτε καθαριστικά ή διαλύτες, γιατί δεν αποκλείεται να καταστρέψουν την επιφάνεια της συσκευής. Προσέξτε να μην περάσει νερό στο εσωτερικό της συσκευής. Η διείσδυση νερού σε ηλεκτρική συσκευή αυξάνει τον κίνδυνο ηλεκτροπληξίας.

8.2 Συντήρηση
Κίνδυνος! Να σιγουρεύεστε πάντα πως η μηχανή δεν είναι συνδεδεμένη με το δίκτυο όταν περιποιήστε τη μηχανή.
- Προσοχή: Ένας κύκλος αντιστοιχεί στην κίνηση προς τα επάνω και προς τα κάτω ενός φορτίου. Έλεγχος κατά διαστήματα σημαίνει έλεγχος μετά από 100 κύκλους.
- Να ελέγχετε κατά διαστήματα, πως λειτουργούν άψογα οι τερματικοί διακόπτες του παλάγκου. Ο έλεγχος γίνεται ως εξής: Όταν το σχοινί φτάσει το μέγιστο ύψος, χειρίζεστε το μοχλό του αυτόματου μηχανισμού διακοπής λειτουργίας (5). Τώρα πρέπει να διακοπεί η λειτουργία του κινητήρα (14). (έλεγχος χωρίς φορτίο). Όταν ξετυλιχτεί το ατσάλινο σχοινί (6) μέχρι

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το τέρμα, γίενται χιερισμός του μοχλού για με΄γιστο μήκος σχοινιού (4). Τώρα πρέπει να διακοπεί η λειτουργία του κινητήρα (14).
- Παρακαλούμε να ελέγχετε κατά διαστήματα το καλώδιο (12) και τον αγωγό ελέγχου (13).
- Κάθε 200 κύκλους πρέπει να λιπαίνονται το ατσάλινο σχοινί (6) και ο τροχός ανατροπής (15).
- Κάθε 30 κύκλους πρέπει σύμφωνα με την εικόνα 4 να ελέγχετε, εάν είναι σε καλή κατάσταση όλο το ατσάλινο σχοινί (6). Εάν είναι ελαττωματικό, πρέπει να αντικαταστυαθεί από άλλο ατσάλινο σχοινί σύμφωνα με τα τεχνικά χαρακτηριστικά.
- Κάθε 1000 κύκλους να ελέγχετε εάν οι βίδες των βραχιόνων στερέωσης (1) και ο τροχός ανατροπής (15) είναι καλά σφικτές/οί.
- Να λαδώνετε τακτικά το σχοινί, το καλώδιο, το κιβώτιο, τα ρουλεμάν και άγκιστρα.
- Κάθε 1000 κύκλους εργασίας να ελέγχετε τα αναλώσιμα όπως π.χ. σχοινί, αλυσίδα, άγκσιτρα, ταινίες και τακάκια φρένων.
- Κάθε 1000 κύκλους να ελέγχετε, εάν οι γάντζοι (8/16) και ο τροχός ανατροπής (15) είναι σε καλή κατάσταση.
- Να ελέγχετε πριν από κάθε χρήση του παλάγκου, εάν ο διακόπτης έκτακτης ανάγκης (9) και ο διακόπτης πίεσης (10) είναι σε άψογη κατάσταση.
- Κάθε 1000 κύκλους να ελέγχετε το σύστημα πέδησης. Όταν ο κινητήρας (14) κάνει ασυνήθιστους θόρυβους ή δεν είναισε θέση να ανασηκώσει το ονομαστικό φορτίο, μπορεί να χρειάζεται έλεγχο το σύστημα πέδησης.
  - Να αντικαθίστανται τα ελαττωματικά ή φθαρμένα τμήματα και να φυλάγετε την τεκμηρίωση των εργασιών συντήρησης.
  - Για έκτακτες εργασίες έπισκευής, να επικοινωνείτε με συμβεβλημένο κέντρο σέρβις.
- Τα ηλεκτρικά εργαλεία να επισκευάζονται μόνο από εξειδικευμένους ηλεκτρολόγους.

8.3 Παραγγελία ανταλλακτικών:
Κατά την παραγγελία ανταλλακτικών να αναφέρετε τα εξής:
- Τύπος της συσκευής
- Αριθμός είδους της συσκευής
- Αριθμός ταύτισης της συσκευής
- Αριθμός ανταλλακτικού

Θα βρείτε τις ισχύουσες τιμές και πληροφορίες στην ιστοσελίδα www.isc-gmbh.info

9. Διάθεση στα απορρίμματα και επαναχρησιμοποίηση

Η συσκευή βρίσκεται σε μία συσκευασία προς αποφυγή ζημιών κατά τη μεταφορά Αυτή η συσκευασία αποτελείται από πρώτες ύλες και έτσι μπορεί να επαναχρησιμοποιηθεί ή να ανακυκλωθεί. Η συσκευή και τα εξαρτήματά της αποτελούνται από διάφορα υλικά, όπως π.χ. μέταλλο και πλαστικά υλικά. Δεν επιτρέπεται η απόρριψη ελαττωματικών συσκευών στα οικιακά απορρίμματα. Σωστή απόρριψη είναι η παράδοση σε κατάλληλα κέντρα συλλογής μεταχειρισμένων συσκευών. Εάν δεν γνωρίζετε πού βρίσκεται παρόμοιο κέντρο συλλογής μεταχειρισμένων συσκευών, ρωτήστε στη διοίκηση της κοινότητάς σας.

10. Φύλαξη

Να διατηρείτε τη συσκευή και ταξεσουάρ της σε σκοτεινό, στεγνό χώρο, χωρίς παγετό, και μακριά από παιδιά. Η ιδανική θερμοκρασία αποθήκευσης είναι μεταξύ 5 και 30 °C. Να φυλάξετε την ηλεκτρική σας συσκευή στην πρωτότυπη συσκευασία της.

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Μόνο για κράτη-μέλη της Ε.Ε.

Μη πετάτε τις ηλεκτρικές συσκευές στα οικιακάαπορρίμματα!

Σύμφωνα με την ευρωπαϊκή Οδηγία 2012/19/ΕΚ για απόβλητα ειδών ηλεκτρικού και ηλεκτρονικού εξοπλισμού και την ενσωμάτωσή της σε εθνικό δίκαιο, πρέπει η παλιές ηλεκτρικές συσκευές να συγκεντρώνονται και να παραδίδονται για ανακύκλωση φιλική για το περιβάλλον.

Εναλλακτική λύση ανακύκλωσης αντί για επιστροφή
Ο ιδιοκτήτης της ηλεκτρικής συσκευής υποχρεούται αντί της επιστροφής να συμβάλει στη σωστή ανακύκλωση σε περίπτωση που δεν συνεχίζει να χρησιμοποιεί τη συσκευή. Η παλιά συσκευή μπορεί να παραχωρηθεί σε κέντρο επιστροφής ηλεκτρικών συσκευών με την έννοια των εθνικών νόμων ανακύκλωσης και διαχείρισης αποβλήτων. Δεν συμπεριλαμβάνονται τα τμήματα παλιών συσκευών και τα βοηθητικά στοιχεία χωρίς ηλεκτρικά εξαρτήματα.

Η ανατύπωση ή οποιασδήποτε άλλης μορφής αναπαραγωγή της τεκμηρίωσης ή άλλων δικαιολογητικών που αναφέρονται στα προϊόντα, ακόμη και αποσπασματικά, επιτρέπεται μόνο με ρητή συγκατάθεση της iSC GmbH.

Με επιφύλαξη τεχνικών τροποποιήσεων

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Ενημέρωση για το σέρβις

Σε όλες τις χώρες που αναφέρονται στην εγγύηση έχουμε αρμόδια συνεργεία που συνεργάζονται μαζί μας, η διεύθυνση των οποίων προκύπτει από την εγγύηση. Τα συνεργεία αυτά βρίσκονται στη διάθεσή σας για επισκευές, ανταλλακτικά ή αξεσουάρ ή για την αγορά αναλώσιμων.

Προσέξτε ότι στη συσκευή αυτή τα ακόλουθα εξαρτήματα υπόκεινται σε κοινή φθορά ή ότι χρειάζονται τα ακόλουθα αναλώσιμα.

Κατηγορία	Παράδειγμα
Φθειρόμενα εξαρτήματα*	Ατσάλινο σχοινί, Γάντζος, Τροχός ανατροπής, Πρόσθετος γάντζος
Αναλώσιμα υλικά/αναλώσιμα τμήματα*	
Ελλείψεις	

* δεν συμπεριλαμβάνονται υποχρεωτικά στο περιεχόμενο της συσκευασίας!

Σε περίπτωση ελαττωμάτων ή σφαλμάτων σας παρακαλούμε να δηλώστε την περίπτωση στο ίντερνετ στο www.isc-gmbh.info. Προσέξτε να περιγράψετε με ακρίβεια το σφάλμα και απαντήστε στις ακόλουθες ερωτήσεις:

- Λειτούργησε σωστά η συσκευή ή είχε από την αρχή κάποιο ελάττωμα?
- Μήπως προσέξατε κάτι περίεργο προτού παρουσιαστεί το ελάττωμα (σύμπτωμα ή βλάβη)?
- Ποια δυσλειτουργία παρατηρείται στη συσκευή (κύριο σύμπτωμα)?
  Περιγράψετε αυτή τη δυσλειτουργία.

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Εγγύηση

Αξιότιμη πελάτισα, αξιότιμε πελάτη,
τα προϊόντα μας υπόκεινται σε αυστηρό έλεγχο ποιότητας. Εάν η συσκευή αυτή παρ΄όλα αυτά κάποτε δεν λειτουργήσει άψογα, λυπούμαστε πολύ και σας παρακαλούμε να αποτανθείτε προς το τμήμα μας εξυπηρέτησης πελατών στην διεύθυνση που αναφέρεται στην κάρτα αυτή. Ευχαρίστως είμαστε και τηλεφωνικά στη διάθεσή σας στον αριθμό σέρβις που αναφέρεται στην κάρτα εγγύησης. Για την αξίωση της εγγύησης ισχύουν τα εξής:

1. Αυτοί οι όροι εγγύησης ισχύουν μόνο για καταναλωτές, δηλ. για φυσικά πρόσωπα που δεν χρησιμοποιούν το προϊόν αυτό ούτε για επαγγελματικούς σκοπούς ούτε για άλλη ανεξάρτητη απασχόληση. Αυτοί οι όροι εγγύησης ρυθμίζουν πρόσθετες παροχές εγγύησης που υπόσχεται ο πιο κάτω κατασκευαστής πέραν της νόμιμης εγγύησης στους αγοραστές των νέων συσκευών του. Δεν θίγονται από την εγγύηση αυτή οι νόμιμες αξιώσεις σας εγγύησης. Η εγγύησή μας σας παρέχεται δωρεάν.
2. Η εγγύηση επεκτείνεται αποκλειστικά και μόνο σε ελαττώματα σε μία συσκευή του πιο κάτω κατασκευαστή και που αφορούν ελαττώματα υλικού ή κατασκευής και περιορίζεται ατά την κρίση μας στην αποκατάσταση αυτών των ελαττωμάτων της συσκευής ή στην αντικατάστασή της. Παρακαλούμε να προσέξετε πως οι συσκευές μας δεν προορίζονται για επαγγελματική, βιοτεχνική ή βιομηχανική χρήση. Για το λόγο αυτό δεν συνάπτεται σύμβαση εγγύησης σε περίπτωση κατά την οποία η συσκευή χρησιμοποιήθηκε κατά τη διάρκεια της εγγύησης σε βιομηχανικές ή βιοτεχνικές επιχειρήσεις ή εάν εκτέθηκε σε παρόμοια εντατική χρήση.
3. Από την εγγύησή μας εξαιρούνται τα εξής:
   - Βλάβες της συσκευής που οφείλονται σε μη τήρηση των οδηγιών συναρμολόγησης ή σε όχι σωστή εγκατάσταση, μη τήρηση των οδηγιών χρήσης (όπως π.χ. σύνδεση σε εσφαλμένη τάση ή σε λάθος είδος ρεύματος) ή σε μη τήρηση των όρων συντήρησης και ασφαλείας ή σε περίπτωση έκθεσης της συσκευής σε ασυνήθιστες καιρικές συνθήκες ή σε έλλειψη φροντίδας και συντήρησης.
   - Βλάβες της συσκευής που οφείλονται σε καταχρηστική ή εσφαλμένη χρήση (όπως π.χ. υπερφόρτωση της συσκευής ή χρήση μη εγκεκριμένων εργαλείων ή αξεσουάρ), σε είσοδο ξένων αντικειμένων στη συσκευή (όπως π.χ. άμμος, πέτρες ή σκόνη, βλάβες μεταφοράς), άσκηση βίας ή ξένη επέμβαση (όπως π. χ. βλάβη από πτώση).
   - Βλάβες της συσκευής ή τμημάτων της συσκευής που οφείλονται σε συνήθη ή φυσική φθορά.
4. Η διάρκεια της εγγύησης ανέρχεται σε 24 μήνες και αρχίζει από την ημερομηνία της αγοράς της συσκευής. Οι αξιώσεις εγγύησης πρέπει να εγερθούν πριν τη λήξη της διάρκειας της εγγύησης εντός δύο εβδομάδων από την διαπίστωση του ελαττώματος. Αποκλείονται αξιώσεις εγγύησης μετά την πάροδο της διάρκειας της εγγύησης. Η επισκευή ή η αντικατάσταση δεν συνεπάγεται την επέκταση της διάρκειας της εγγύησης ούτε την νέα έναρξη της διάρκειας της εγγύησης για τη συσκευή ή για ενδεχομένως χρησιμοποιηθέντα νέα ανταλλακτικά. Αυτό ισχύει και στην περίπτωση σέρβις επί τόπου.
5. Για την αξίωση της εγγύησης παρακαλούμε να δηλώσετε την ελαττωματική σας συσκευή στο: www.isc-gmbh.info. Να έχετε μαζί σας την απόδειξη της νέας συσκευής. Οι συσκευές που αποστέλλονται χωρίς αποδείξεις και χωρίς πινακίδα στοιχείων, αποκλείονται από την εγγύηση λόγω μη δυνατότητας ταξινόμησης. Εάν το ελάττωμα καλύπτεται από την εγγύηση, θα σας επιστραφεί αμέσως είτε η επισκευασμένη συσκευή είτε μία καινούργια συσκευή.

Ευχαρίστως επισκευάζουμε ελαττώματα της συσκευής έναντι πληρωμής, εάν τα ελαττώματα αυτά δεν καλύπτονται από την εγγύηση. Για το σκοπό αυτό παρακαλούμε να στείλετε τη συσκευή στη διεύθυνση του σέρβις μας.

Για αναλώσιμα και σε περίπτωση που λείπουν εξαρτήματα παραπέμπουμε στους περιορισμούς αυτής της εγγύησης σύμφωνα με τους πληροφορίες σέρβις αυτών των οδηγιών χρήσης.

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ISC GmbH · Eschenstraße 6 · D-94405 Landau/Isar

CE

Konformitätserklärung

D erklärt folgende Konformität gemäß EU-Richtlinie und Normen für Artikel
GB explains the following conformity according to EU directives and norms for the following product
F déclare la conformité suivante selon la directive CE et les normes concernant l'article
I dichiara la seguente conformità secondo la direttiva UE e le norme per l'articolo
NL verklaart de volgende overeenstemming conform EU richtlijn en normen voor het product
E declara la siguiente conformidad a tenor de la directiva y normas de la UE para el artículo
P declara a seguinte conformidade, de acordo com as diretiva CE e normas para o artigo
DK attesterer følgende overensstemmelse i medfør af EU-direktiv samt standarder for artikel
S förklarar följande överensstämmelse enl. EU-direktiv och standarder för artikeln
FIN vakuuttaa, että tuote täyttää EU-direktiivin ja standardien vaatimukset
EE tõendab toote vastavust EL direktiivile ja standarditele
CZ vydává následující prohlášení o shodě podle směrnice EU a norem pro výrobek
SLO potrjuje sledečo skladnost s smernico EU in standardi za izdelek
SK vydáva nasledujúce prehlásenie o zhode podľa smernice EÚ a noriem pre výrobok
H a cikkekhez az EU-irányvonal és Normák szerint a következő konformitást jelenti ki
PL deklaruje zgodność wymienionego poniżej artykułu z następującymi normami na podstawie dyrektywy WE.
BG декларира съответното съответствие съгласно Директива на ЕС и норми за артикул
LV paskaidro šādu atbilstību ES direktīvai un standartiem
LT apibūdina šį atitikimą EU reikalavimams ir prekės normoms
RO declară următoarea conformitate conform directivei UE şi normelor pentru articolul
GR δηλώνει την ακόλουθη συμμόρφωση σύμφωνα με την Οδηγία ΕΚ και τα πρότυπα για το προϊόν
HR potvrđuje sljedeću usklađenost prema smjernicama EU i normama za artikl
BIH potvrđuje sljedeću usklađenost prema smjernicama EU i normama za artikl
RS potvrđuje sledeću usklađenost prema smernicama EZ i normama za artikal
RUS следующим удостоверяется, что следующие продукты соответствуют директивам и нормам ЕС
UKR проголошує про зазначену нижче відповідність виробу директивам та стандартам ЄС на виріб
MK ја изјавува следната сообрзност согласно ЕУ-директивата и нормите за артикли
TR Ürünü ile ilgili AB direktifleri ve normları gereğince aşağıda açıklanan uygunluğu belirtir
N erklærer følgende samsvar i henhold til EU-direktivet og standarder for artikkel
IS Lýsir uppfyllingu EU-reglna og annarra staðla vöru

Seilhebezug TC-EH 500 (Einhell)

☐ **2014/29/EU**
☐ **2005/32/EC_2009/125/EC**
☐ **2014/35/EU**
☐ **2006/28/EC**
☒ **2014/30/EU**
☐ **2014/32/EU**
☐ **2014/53/EC**
☐ **2014/68/EU**
☐ **90/396/EC_2009/142/EC**
☐ **89/686/EC_96/58/EC**
☒ **2011/65/EU**

☒ **2006/42/EC**
☐ **Annex IV**
Notified Body:
Notified Body No.:
Reg. No.:

☐ **2000/14/EC_2005/88/EC**
☐ **Annex V**
☐ **Annex VI**
Noise: measured L_{WA} = dB (A); guaranteed L_{WA} = dB (A)
P = KW; L/Ø = cm
Notified Body:

☐ **2012/46/EU**
Emission No.:

Standard references: EN 14492-2; EN 60204-32; EN 55014-1; EN 55014-2; EN 61000-3-2; EN 61000-3-3

Landau/Isar, den 03.03.2017

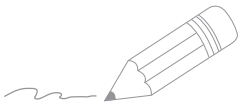
Weichselgartner/General-Manager

Dong/Product-Management

First CE: 17
Art.-No.: 22.551.40 I.-No.: 11017
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Project documentation

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SIMARIS design

Version: 24.1.0 (2024-05-07)
Subrevision: 1218

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Master data

Project name:	Shell Crosswind Offshore
Project description:	BESS FQ 1MW 5MWh
Editor:	Freqcon_DG
Planning office:	Freqcon GmbH
Created at:	Wednesday, 4. September 2024
Changed at:	Tuesday, 8. October 2024

Customer data

City:	
Customer:	Statron AG

Comment:

Converter Container

Network parameters:

General	
Standard	IEC
Attitude of Site	< 1000 m

Medium Voltage	
Rated voltage	6.6 kV
Relative operating voltage at feeding point	100 %
Voltage factor c max	1.1
Voltage factor c min	1
Max./Min short-circuit power	92.71 / 92.71 MVA
Max./Min. short-circuit current	8.11 / 8.11 kA
Neutral System	Low-resistance
Relation R1/X1	0.2

Low Voltage	
Rated voltage	620 V
System configuration	TN-S
Frequency	50 Hz
Tolerable touch voltage	50 V
Ambient temperature of devices	30 °C
Voltage factor c max	1.1
Voltage factor c min	0.9
Base point of voltage drop calculation	Transformer-secondary terminals
Max. permissible voltage drop in network	8 %

Defined network modes for calculation and dimensioning:

Operating mode: Betriebsart 1

Starting point	Target point	Connection	Status
Transformer 18T1	LVMD 4	LVMD 4.1	On

List of devices:

Sources of feeding:

Transformers:

Designation	Type	Sn [kVA]	ukr [%]	Uprim [kV]/ Usec [V]	Pk [kW]	P0 [kW]	Vector group	Δu_transformer [%]	Air forced	Catalog Reference
Transformer 18T1		1,250	6	6.6/ 620	1.8	0.252	Dyn5	3.629	No	-

Output Δu_transformer [%] is independent from defined reference point for voltage drop calculation.

Switches/Fuses:

Circuit Breaker/Miniature circuit-breaker:

Place	Designation	Catalog Reference	In [A]	Icu/Icn [kA]	Icu/Icn [kA] required	Release type / characteristics	Quantity
CONV	-80Q1	3WL11122BB611AA2	1,250	42	17.603	ETU15B	1

Connections and line distribution:

Cable/Conductor Low voltage:

Designation	Type/ Profile [mm²]	Starting point / Target point	Ib [A] Iz [A]	Material	Length [m]	Isolation	Installation type / ftot	u [%] / Δu [%] / ∑ Δu [%]	θΔu [°C] / θlkmax [°C] / θlkmin [°C]	Number of runs
-	e.g. NYY, NYCWY, NYCY, NYKY 3x240/240/ 120	LVMD 4.1 LVMD 4	1,164.013 1,209	Cu	20	PVC70	C 1	96.12 0.253 0.253	55 20 80	3
-	e.g. NYY, NYCWY, NYCY, NYKY 3x300/300/ 150	LVMD 4 CONV	1,164.013 1,392	Cu	5	PVC70	C 1	96.06 0.055 0.308	55 20 80	3

Loads:

Stationary loads:

Designation	Place	Pn [kW]	In [A]	Un [V]	cos φ	ai	Phase connection	Type of load	Quantity
CONV	Inner zone	1,000	1,164.013	620	0.8	1	L1-L2-L3-N	inductive	1

Messages

Designation	Message
LVMD 4.1	Protective device required due to possible selectivity requirement

Personal protection against electric shock

All circuits of the project have a permissable break time ta-req > ta-cur and therefor fulfill the requirements for Personal protection against electric shock.

Disclaimer:

Dimensioned protection devices inside tap-off units of busbar trunking systems may not correspond to the actual available devices for those components. Please verify the dimensioning results in the device lists and correct them accordingly.

Symbols legend:

Symbol [Unit]	Description
ai	Load factor
cos φ	Power factor
ftot	Derating factor
Ia/In	Inrush current relation
Ib [A] Iz [A]	Operating current / allowed load capacity
Icu(fuse) [kA]	Rated ultimate short-circuit breaking capacity - fuse
Icu [kA] Icn [kA]	Rated ultimate short-circuit breaking capacity according to IEC 60947-2 Rated short-circuit breaking capacity according to IEC 60898-1
Icu/Icn [kA] required	the required breaking capacity of the protection device at installation location
Icw 1s [kA]	Rated short-time withstand current 1s
IΔn [mA]	Residual current - RCD
Ik1max	Maximum single phase short-circuit current
Ik1min	Minimum single phase short-circuit current
Ik3max	Maximum three phase short-circuit current
Ik3min	Minimum three phase short-circuit current
Ik1D [kA]	single pole uninterrupted short-circuit current
Ik3D [kA]	three pole uninterrupted short-circuit current
Ikmax/Ikmin	Relation of maximum and minimum short-circuit current
Ikre	Short-circuit current recovery factor
In [A]	Nominal current
P0 [kW]	No-load losses
Pk [kW]	Short-circuit losses
Pmech [kW]	mechan. Power
Pn [kW]	Active power
R0 N [mΩ]	Zero phase-sequence resistance phase-neutral conductor
R0 PE(N) [mΩ]	Zero phase-sequence resistance phase-PE(N) conductor
R0/R1	Resistance relation positive / zero phase-sequence system
r1 [%]	Relative value of positive phase-sequence resistance
R1 [mΩ]	Positive phase-sequence resistance

Sn [kVA]	Nominal apparent power
ukr [%]	Short-circuit voltage
Un [V]	Nominal voltage
Uprim [kV]	Primary voltage
Usec [V]	Secondary voltage
X0 N [mΩ]	Zero phase-sequence reactance phase-neutral conductor
X0 PE(N) [mΩ]	Zero phase-sequence reactance phase-PE(N) conductor
X0/X1	Reactance relation positive / zero phase-sequence system
X1 [mΩ]	Positive phase-sequence reactance
xd" [%]	Subtransient reactance
Z1 max	Maximum impedance in positive phase-sequence system
Z1 min	Minimum impedance in positive phase-sequence system
Zs	Faulted circuit impedance
Zs max	Maximum faulted circuit impedance
Zs min	Minimum faulted circuit impedance
u [%] / Δu [%] / ∑ Δu [%]	Relative nominal voltage / voltage drop between beginning and end of a section / cumulated voltage drop from the transformer primary/ secondary clamps to the specified point
θΔu [°C] / θIkmax [°C] / θIkmin [°C]	Conductor temperature of MV cable / Conductor temperature of LV cable for voltage drop / on beginning of short circuit / for disconnection
η	Efficiency
φ [°]	Phase angle
φ1 min/max [°]	Phase angle at Ik1 min/max
φ3 min/max [°]	Phase angle at Ik3 min/max

Standards for computation:

Title	IEC	HD	EN	DIN VDE
Low-voltage electrical installations *	60364-1…6	384		0100 – 100...710
Short-circuit currents in three-phase a.c. systems – Calculation of currents	60909		60909	0102
Short-circuit currents – calculation of effects Definitions and calculation methods	60865		60865	0103
Low-voltage switchgear and controlgear – Circuit-breakers	60947-2		60947-2	0660 – 101
Low-voltage switchgear and controlgear assemblies	61439		61439	0660 – 600
A method of temperature-rise assessment by extrapolation for partially type-tested assemblies (PTTA) of low-voltage switchgear and controlgear	60890+C	528 S2		0660 – 507
Electrical installations of buildings – Part 5-52: Selection and erection of electrical equipment – Wiring systems	60364-5-52	384		0298 – 4
Low-voltage electrical installations – Selection and erection of electrical equipment – Part 520: Wiring systems – Supplement 3: Current-carrying capacity of cables in three-phase distribution circuits at load currents with harmonic content				0100-520 Supplement 3
Electrical accessories – Circuit-breakers for overcurrent protection for household and similar installations – Circuit-breakers for a.c. operation	60898-1		60898-1	0641 – 11
High-voltage switchgear and controlgear – Alternating Current switch-fuse combinations	62271		62271	0671 – 105
Electrical installations of buildings – Selection and erection of electrical equipment – Isolation, switching and control	60364-5-53	60364-5-534		0100-534
Low-voltage electrical installations – Protection for safety – Protection against voltage disturbances and electromagnetic disturbances	60364-4-44	60364-4-443		0100-443
Protection against lightning – Part 1…4	62305-1…4			0185 – 1…4
Low-voltage surge protective devices - Surge protective devices connected to low-voltage power systems; Requirements and tests	61643-11			0675-6-11
Tests for electric cables under fire conditions – Circuit integrity	60331-11, 21		50200	0472-814 0482-200
Fire behaviour of building materials and building components — Part 12: Circuit integrity maintenance of electric cable systems, requirements and testing				4102-12 : 1998-11
Electrical equipment of electric road vehicles - Electric vehicles conductive charging system	61851		61851	

*) Special national conditions and deviations from IEC 60364-4-41: 2005 are not implemented and need to be considered!

Project documentation

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SIMARIS design

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Subrevision: 1218

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Master data

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Project description:	BESS FQ 1MW 5MWh
Editor:	Freqcon_DG
Planning office:	Freqcon GmbH
Created at:	Wednesday, 4. September 2024
Changed at:	Wednesday, 30. October 2024

Customer data

City:	
Customer:	Statron AG

Comment:

Battery Container

Network parameters:

General	
Standard	IEC
Attitude of Site	< 1000 m

Medium Voltage	
Rated voltage	6.6 kV
Relative operating voltage at feeding point	100 %
Voltage factor c max	1.1
Voltage factor c min	1
Max./Min short-circuit power	91.452 / 91.452 MVA
Max./Min. short-circuit current	8 / 8 kA
Neutral System	Low-resistance
Relation R1/X1	0.2

Low Voltage	
Rated voltage	400 V
System configuration	TN-S
Frequency	50 Hz
Tolerable touch voltage	50 V
Ambient temperature of devices	30 °C
Voltage factor c max	1.1
Voltage factor c min	0.9
Base point of voltage drop calculation	Transformer-secondary terminals
Max. permissible voltage drop in network	8 %

Defined network modes for calculation and dimensioning:

Operating mode: Betriebsart 1

Starting point	Target point	Connection	Status
NSHV 3	NSHV 4	NSUV 3.1	On
Supply	NSHV 3	NSHV 3.2	On
NSHV 3	NSHV 5	LVSD 4.1	On
NSHV 3	NSHV 6	LVSD 5.1	On

List of devices:

Sources of feeding:

Neutral Infeed:

Designation	Un [V]	In [A]	Imp. in positive phase system [mΩ] Z1 max Z1 min Zs max Zs min	Loop Impedance Zs [mΩ] φ [°] R0/R1 X0/X1 Ikmax/Ikmin	Short circuit current [kA] Ik3max Ik3min Ik1max Ik1min
Supply	400	160			50 50 50 50

Switches/Fuses:

Circuit Breaker/Miniature circuit-breaker:

Place	Designation	Catalog Reference	In [A]	Icu/Icn [kA]	Icu/Icn [kA] required	Release type / characteristics	Quantity
LVSD 4.1	-684F3	5SY43327	32	10	4.291	C	1
LVSD 5.1	-684F1	5SY43327	32	10	4.291	C	1
NSUV 3.1	-684F4	5SY43327	32	10	4.291	C	1
230V Bat Cabinet 1	-687F1	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 2	-687F2	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 3	-687F3	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 4	-687F4	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 5	-687F5	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 6	-687F6	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 7	-688F1	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 8	-688F2	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 9	-688F3	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 10	-688F4	5SY41167	16	10	2.054	C	1
230V Bat Cabinet 11	-688F5	5SY41167	16	10	2.054	C	1
400V/230V Power Supply	-101Q1	3RV20111DA25	3.2	100	4.291	TM	1
Clima	-691F4	5SY43167	16	10	3.982	C	1
Crane 1	-690F3	5SY41067	6	10	2.054	C	1
Crane 2	-690F4	5SY41067	6	10	2.054	C	1
Crane 3	-690F5	5SY41067	6	10	2.054	C	1
Exhaust Unit / shut-off flap	-691F1	5SY41067	6	10	2.054	C	1
Exhaust Unit / shut-off flap	-691F2	5SY41067	6	10	2.054	C	1
Exhaust Unit / shut-off flap	-691F3	5SY41067	6	10	2.054	C	1

Residual current circuit breaker with integral overload protection (RCBO):

Place	Designation	Catalog Reference	In [A]	Icn [kA] IΔn [mA]	Icu/Icn [kA] required	Release type / characteristics	Quantity
Container Light	-690F1	5SU13546KK10	10	10 30	2.054	B	1
Container Sockets	-690F2	5SU13547KK20	20	10 30	2.219	C	1

Connections and line distribution:

Cable/Conductor Low voltage:

Designation	Type/ Profile [mm²]	Starting point / Target point	Ib [A] Iz [A]	Material	Length [m]	Isolation	Installation type / ftot	u [%] / Δu [%] / ∑ Δu [%]	θΔu [°C] / θIkmax [°C] / θIkmin [°C]	Number of runs
K/L 3.2	e.g. NYY, NYCWY, NYCY, NYKY 3x10/10/10	NSHV 3.2 NSHV 3	39.65 57	Cu	30	PVC70	C 1	99.11 0.887 0.887	55 20 80	1
C/L 4.1	e.g. NYY, NYCWY, NYCY, NYKY 3x4/4/4	NSHV 3 NSHV 5	8.1 32	Cu	1	PVC70	C 1	99.1 0.015 0.902	55 20 80	1
C/L 5.1	e.g. NYY, NYCWY, NYCY, NYKY 3x4/4/4	NSHV 3 NSHV 6	11.95 32	Cu	1	PVC70	C 1	99.09 0.022 0.909	55 20 80	1
K/L 3.1	e.g. NYY, NYCWY, NYCY, NYKY 3x4/4/4	NSHV 3 NSHV 4	8 32	Cu	1	PVC70	C 1	99.1 0.015 0.902	55 20 80	1
-290W1-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 1	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-290W2-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 2	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-290W3-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 3	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-291W1-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 4	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-291W2-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 5	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-292W1-1	e.g. NYY, NYCWY, NYCY, NYKY	NSHV 4 230V Bat Cabinet 6	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1

Designation	Type/ Profile [mm²]	Starting point / Target point	Ib [A] Iz [A]	Material	Length [m]	Isolation	Installation type / ftot	u [%] / Δu [%] / ∑ Δu [%]	θΔu [°C] / θlkmax [°C] / θlkmin [°C]	Number of runs
	1x1.5/1.5/1.5									
-292W2-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 7	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-292W3-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 8	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-293W1-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 9	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-293W2-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 10	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
-293W3-1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 4 230V Bat Cabinet 11	2 19.5	Cu	5	PVC70	C 1	99 0.097 0.998	55 20 80	1
C/L 3.4	e.g. NYY, NYCWY, NYCY, NYKY 3x1.5/1.5/1.5	NSHV 3 400V/230V Power Supply	1.6 17.5	Cu	2	PVC70	C 1	99.1 0.015 0.903	55 20 80	1
C/L 5.8	e.g. NYY, NYCWY, NYCY, NYKY 3x1.5/1.5/1.5	NSHV 6 Clima	9 17.5	Cu	10	PVC70	C 1	98.66 0.434 1.343	55 20 80	1
C/L 5.2	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 6 Container Light	1 19.5	Cu	10	PVC70	C 1	98.99 0.097 1.005	55 20 80	1
C/L 3.3	e.g. NYY, NYCWY, NYCY, NYKY 1x2.5/2.5/2.5	NSHV 3 Container Sockets	10 27	Cu	10	PVC70	C 1	98.53 0.581 1.468	55 20 80	1

Designation	Type/ Profile [mm²]	Starting point / Target point	Ib [A] Iz [A]	Material	Length [m]	Isolation	Installation type / ftot	u [%] / Δu [%] / ∑ Δu [%]	θΔu [°C] / θIkmax [°C] / θIkmin [°C]	Number of runs
C/L 5.4	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 6 Crane 1	1.95 19.5	Cu	10	PVC70	C 1	98.9 0.188 1.097	55 20 80	1
C/L 5.5	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 6 Crane 2	1.95 19.5	Cu	10	PVC70	C 1	98.9 0.188 1.097	55 20 80	1
C/L 5.7	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 6 Crane 3	1.95 19.5	Cu	10	PVC70	C 1	98.9 0.188 1.097	55 20 80	1
C/L 4.2	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 5 Exhaust Unit / shut-off flap	2.7 19.5	Cu	1	PVC70	C 1	99.07 0.026 0.928	55 20 80	1
C/L 4.3	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 5 Exhaust Unit / shut-off flap	2.7 19.5	Cu	1	PVC70	C 1	99.07 0.026 0.928	55 20 80	1
C/L 4.4	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 5 Exhaust Unit / shut-off flap	2.7 19.5	Cu	1	PVC70	C 1	99.07 0.026 0.928	55 20 80	1

Loads:

Stationary loads:

Designation	Place	Pn [kW]	In [A]	Un [V]	cos φ	ai	Phase connection	Type of load	Quantity
230V Bat Cabinet 1	Inner zone	0.37	2	230	0.8	1	L1-N	inductive	1
230V Bat Cabinet 2	Inner zone	0.37	2	230	0.8	1	L2-N	inductive	1
230V Bat Cabinet 3	Inner zone	0.37	2	230	0.8	1	L3-N	inductive	1
230V Bat Cabinet 4	Inner zone	0.37	2	230	0.8	1	L1-N	inductive	1
230V Bat Cabinet 5	Inner zone	0.37	2	230	0.8	1	L2-N	inductive	1
230V Bat Cabinet 6	Inner zone	0.37	2	230	0.8	1	L3-N	inductive	1
230V Bat Cabinet 7	Inner zone	0.37	2	230	0.8	1	L1-N	inductive	1
230V Bat Cabinet 8	Inner zone	0.37	2	230	0.8	1	L2-N	inductive	1
230V Bat Cabinet 9	Inner zone	0.37	2	230	0.8	1	L3-N	inductive	1
230V Bat Cabinet 10	Inner zone	0.37	2	230	0.8	1	L1-N	inductive	1
230V Bat Cabinet 11	Inner zone	0.37	2	230	0.8	1	L2-N	inductive	1
400V/230V Power Supply	Inner zone	0.887	1.6	400	0.8	1	L1-L2-L3-N	inductive	1
Clima	Inner zone	4.988	9	400	0.8	1	L1-L2-L3-N	inductive	1
Container Light	Inner zone	0.185	1	230	0.8	1	L2-N	inductive	1
Container Sockets	Inner zone	1.848	10	230	0.8	1	L3-N	inductive	1
Crane 1	Inner zone	0.36	1.95	230	0.8	1	L1-N	inductive	1
Crane 2	Inner zone	0.36	1.95	230	0.8	1	L2-N	inductive	1
Crane 3	Inner zone	0.36	1.95	230	0.8	1	L3-N	inductive	1
Exhaust Unit / shut-off flap	Inner zone	0.499	2.7	230	0.8	1	L1-N	inductive	1
Exhaust Unit / shut-off flap	Inner zone	0.499	2.7	230	0.8	1	L1-N	inductive	1
Exhaust Unit / shut-off flap	Inner zone	0.499	2.7	230	0.8	1	L1-N	inductive	1

Messages

Designation	Message
NSHV 3.2	Protective device required due to possible selectivity requirement

Personal protection against electric shock

All circuits of the project have a permissable break time ta-req > ta-cur and therefor fulfill the requirements for Personal protection against electric shock.

Disclaimer:

Dimensioned protection devices inside tap-off units of busbar trunking systems may not correspond to the actual available devices for those components. Please verify the dimensioning results in the device lists and correct them accordingly.

Symbols legend:

Symbol [Unit]	Description
ai	Load factor
cos φ	Power factor
ftot	Derating factor
Ia/In	Inrush current relation
Ib [A] Iz [A]	Operating current / allowed load capacity
Icu(fuse) [kA]	Rated ultimate short-circuit breaking capacity - fuse
Icu [kA] Icn [kA]	Rated ultimate short-circuit breaking capacity according to IEC 60947-2 Rated short-circuit breaking capacity according to IEC 60898-1
Icu/Icn [kA] required	the required breaking capacity of the protection device at installation location
Icw 1s [kA]	Rated short-time withstand current 1s
IΔn [mA]	Residual current - RCD
Ik1max	Maximum single phase short-circuit current
Ik1min	Minimum single phase short-circuit current
Ik3max	Maximum three phase short-circuit current
Ik3min	Minimum three phase short-circuit current
Ik1D [kA]	single pole uninterrupted short-circuit current
Ik3D [kA]	three pole uninterrupted short-circuit current
Ikmax/Ikmin	Relation of maximum and minimum short-circuit current
Ikre	Short-circuit current recovery factor
In [A]	Nominal current
P0 [kW]	No-load losses
Pk [kW]	Short-circuit losses
Pmech [kW]	mechan. Power
Pn [kW]	Active power
R0 N [mΩ]	Zero phase-sequence resistance phase-neutral conductor
R0 PE(N) [mΩ]	Zero phase-sequence resistance phase-PE(N) conductor
R0/R1	Resistance relation positive / zero phase-sequence system
r1 [%]	Relative value of positive phase-sequence resistance
R1 [mΩ]	Positive phase-sequence resistance

Sn [kVA]	Nominal apparent power
ukr [%]	Short-circuit voltage
Un [V]	Nominal voltage
Uprim [kV]	Primary voltage
Usec [V]	Secondary voltage
X0 N [mΩ]	Zero phase-sequence reactance phase-neutral conductor
X0 PE(N) [mΩ]	Zero phase-sequence reactance phase-PE(N) conductor
X0/X1	Reactance relation positive / zero phase-sequence system
X1 [mΩ]	Positive phase-sequence reactance
xd" [%]	Subtransient reactance
Z1 max	Maximum impedance in positive phase-sequence system
Z1 min	Minimum impedance in positive phase-sequence system
Zs	Faulted circuit impedance
Zs max	Maximum faulted circuit impedance
Zs min	Minimum faulted circuit impedance
u [%] / Δu [%] / ∑ Δu [%]	Relative nominal voltage / voltage drop between beginning and end of a section / cumulated voltage drop from the transformer primary/ secondary clamps to the specified point
θΔu [°C] / θIkmax [°C] / θIkmin [°C]	Conductor temperature of MV cable / Conductor temperature of LV cable for voltage drop / on beginning of short circuit / for disconnection
η	Efficiency
φ [°]	Phase angle
φ1 min/max [°]	Phase angle at Ik1 min/max
φ3 min/max [°]	Phase angle at Ik3 min/max

Standards for computation:

Title	IEC	HD	EN	DIN VDE
Low-voltage electrical installations *	60364-1…6	384		0100 – 100...710
Short-circuit currents in three-phase a.c. systems – Calculation of currents	60909		60909	0102
Short-circuit currents – calculation of effects Definitions and calculation methods	60865		60865	0103
Low-voltage switchgear and controlgear – Circuit-breakers	60947-2		60947-2	0660 – 101
Low-voltage switchgear and controlgear assemblies	61439		61439	0660 – 600
A method of temperature-rise assessment by extrapolation for partially type-tested assemblies (PTTA) of low-voltage switchgear and controlgear	60890+C	528 S2		0660 – 507
Electrical installations of buildings – Part 5-52: Selection and erection of electrical equipment – Wiring systems	60364-5-52	384		0298 – 4
Low-voltage electrical installations – Selection and erection of electrical equipment – Part 520: Wiring systems – Supplement 3: Current-carrying capacity of cables in three-phase distribution circuits at load currents with harmonic content				0100-520 Supplement 3
Electrical accessories – Circuit-breakers for overcurrent protection for household and similar installations – Circuit-breakers for a.c. operation	60898-1		60898-1	0641 – 11
High-voltage switchgear and controlgear – Alternating Current switch-fuse combinations	62271		62271	0671 – 105
Electrical installations of buildings – Selection and erection of electrical equipment – Isolation, switching and control	60364-5-53	60364-5-534		0100-534
Low-voltage electrical installations – Protection for safety – Protection against voltage disturbances and electromagnetic disturbances	60364-4-44	60364-4-443		0100-443
Protection against lightning – Part 1…4	62305-1…4			0185 – 1…4
Low-voltage surge protective devices - Surge protective devices connected to low-voltage power systems; Requirements and tests	61643-11			0675-6-11
Tests for electric cables under fire conditions – Circuit integrity	60331-11, 21		50200	0472-814 0482-200
Fire behaviour of building materials and building components — Part 12: Circuit integrity maintenance of electric cable systems, requirements and testing				4102-12 : 1998-11
Electrical equipment of electric road vehicles - Electric vehicles conductive charging system	61851		61851	

*) Special national conditions and deviations from IEC 60364-4-41: 2005 are not implemented and need to be considered!

Project documentation

created with

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Master data

Project name:	Shell Crosswind Offshore
Project description:	BESS FQ 1MW 5MWh
Editor:	Freqcon_DG
Planning office:	Freqcon GmbH
Created at:	Wednesday, 4. September 2024
Changed at:	Tuesday, 8. October 2024

Customer data

City:	
Customer:	Statron AG

Comment:

Converter Container

Network parameters:

General	
Standard	IEC
Attitude of Site	< 1000 m

Medium Voltage	
Rated voltage	6.6 kV
Relative operating voltage at feeding point	100 %
Voltage factor c max	1.1
Voltage factor c min	1
Max./Min short-circuit power	91.452 / 91.452 MVA
Max./Min. short-circuit current	8 / 8 kA
Neutral System	Low-resistance
Relation R1/X1	0.2

Low Voltage	
Rated voltage	400 V
System configuration	TN-S
Frequency	50 Hz
Tolerable touch voltage	50 V
Ambient temperature of devices	30 °C
Voltage factor c max	1.1
Voltage factor c min	0.9
Base point of voltage drop calculation	Transformer-secondary terminals
Max. permissible voltage drop in network	8 %

Defined network modes for calculation and dimensioning:

Operating mode: Betriebsart 1

Starting point	Target point	Connection	Status
NSHV 1	NSHV 2	NSUV 3.1	On
Supply	NSHV 1	NSHV 3.2	On

List of devices:

Sources of feeding:

Neutral Infeed:

Designation	Un [V]	In [A]	Imp. in positive phase system [mΩ] Z1 max Z1 min Zs max Zs min	Loop Impedance Zs [mΩ] φ [°] R0/R1 X0/X1 Ikmax/Ikmin	Short circuit current [kA] Ik3max Ik3min Ik1max Ik1min
Supply	400	160			50 50 50 50

Switches/Fuses:

Circuit Breaker/Miniature circuit-breaker:

Place	Designation	Catalog Reference	In [A]	Icu/Icn [kA]	Icu/Icn [kA] required	Release type / characteristics	Quantity
NSUV 3.1	=UNIT_01++CT+CTRL_1.3-84F2	5SY43327	32	10	4.291	C	1
230V 3WL	-187F1	5SY41137	13	10	2.054	C	1
400V/24V Power Supply	-101Q1	3RV20111DA25	3.2	100	4.291	TM	1
Cabinet Heating	-185F2	5SY41067	6	10	2.054	C	1
CIR Cabinet Fans	-183F2	5SY41107	10	10	2.054	C	1
Clima 1	-191F1	5SY43167	16	10	4.291	C	1
Clima 2	-191F2	5SY43167	16	10	4.291	C	1
CON Cabinet Fans	-183F1	5SY41167	16	10	2.054	C	1
CTRL Cabinet Fan	-185F1	5SY41107	10	10	2.054	C	1
Fan Heat Exchanger	-182Q1	3RV20111FA25	5	100	3.982	TM	1
Water Heating	-181Q2	3RV20111GA25	6.3	50	3.982	TM	1
Water Pump	-181Q1	3RV20111FA25	5	100	3.982	TM	1

Residual current circuit breaker with integral overload protection (RCBO):

Place	Designation	Catalog Reference	In [A]	Icn [kA] IΔn [mA]	Icu/Icn [kA] required	Release type / characteristics	Quantity
Cabinet Light / Socket	-190F3	5SU13547KK16	16	10 30	2.219	C	1

Connections and line distribution:

Cable/Conductor Low voltage:

Designation	Type/ Profile [mm²]	Starting point / Target point	Ib [A] Iz [A]	Material	Length [m]	Isolation	Installation type / ftot	u [%] / Δu [%] / ∑ Δu [%]	θΔu [°C] / θIkmax [°C] / θIkmin [°C]	Number of runs
K/L 3.2	e.g. NYY, NYCWY, NYCY, NYKY 3x10/10/10	NSHV 3.2 NSHV 1	51.81 57	Cu	30	PVC70	C 1	98.84 1.158 1.158	55 20 80	1
K/L 3.1	e.g. NYY, NYCWY, NYCY, NYKY 3x4/4/4	NSHV 1 NSHV 2	15.61 32	Cu	1	PVC70	C 1	98.81 0.028 1.187	55 20 80	1
-80W2	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 2 230V 3WL	0.57 19.5	Cu	6	PVC70	C 1	98.78 0.033 1.22	55 20 80	1
-	e.g. H07V2-U, H07V2-R, H07V2-K 3x1.5/1.5/1.5	NSHV 1 400V/24V Power Supply	2 22	Cu	1	PVC heat-resistant	C 1	98.83 0.01 1.168	55 20 80	1
-185W1	e.g. H07V2-U, H07V2-R, H07V2-K 1x1.5/1.5/1.5	NSHV 2 Cabinet Heating	3.48 24	Cu	3	PVC heat-resistant	C 1	98.71 0.101 1.288	55 20 80	1
K/L 3.6	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 1 Cabinet Light / Socket	16 19.5	Cu	1	PVC70	C 1	98.69 0.154 1.313	55 20 80	1
-281W1	e.g. NYY, NYCWY, NYCY, NYKY 1x1.5/1.5/1.5	NSHV 2 CIR Cabinet Fans	0.9 19.5	Cu	5	PVC70	C 1	98.77 0.043 1.23	55 20 80	1
-	e.g. NYY, NYCWY, NYCY, NYKY 3x1.5/1.5/1.5	NSHV 1 Clima 1	9.1 17.5	Cu	10	PVC70	C 1	98.4 0.438 1.597	55 20 80	1
-	e.g. NYY, NYCWY, NYCY, NYKY 3x1.5/1.5/1.5	NSHV 1 Clima 2	9.1 17.5	Cu	10	PVC70	C 1	98.4 0.438 1.597	55 20 80	1
-279W1	e.g. NYY, NYCWY, NYCY, NYKY	NSHV 2 CON Cabinet Fans	1.5 19.5	Cu	5	PVC70	C 1	98.74 0.072 1.259	55 20 80	1

Designation	Type/ Profile [mm²]	Starting point / Target point	Ib [A] Iz [A]	Material	Length [m]	Isolation	Installation type / ftot	u [%] / Δu [%] / ∑ Δu [%]	θΔu [°C] / θIkmax [°C] / θIkmin [°C]	Number of runs
	1x1.5/1.5/1.5									
-278W1	e.g. H07V2-U, H07V2-R, H07V2-K 1x1.5/1.5/1.5	NSHV 2 CTRL Cabinet Fan	0.17 24	Cu	5	PVC heat-resistant	C 1	98.8 0.008 1.195	55 20 80	1
-181W1	e.g. NYY, NYCWY, NYCY, NYKY 3x1.5/1.5/1.5	NSHV 2 Fan Heat Exchanger	2.5 17.5	Cu	8	PVC70	C 1	98.72 0.096 1.283	55 20 80	1
-181W1	e.g. NYY, NYCWY, NYCY, NYKY 3x1.5/1.5/1.5	NSHV 2 Water Heating	4.33 17.5	Cu	8	PVC70	C 1	98.65 0.167 1.354	55 20 80	1
-181W1	e.g. NYY, NYCWY, NYCY, NYKY 3x1.5/1.5/1.5	NSHV 2 Water Pump	3.8 17.5	Cu	8	PVC70	C 1	98.67 0.146 1.333	55 20 80	1

Loads:

Stationary loads:

Designation	Place	Pn [kW]	In [A]	Un [V]	cos φ	ai	Phase connection	Type of load	Quantity
230V 3WL	Inner zone	0.105	0.57	230	0.8	1	L2-N	inductive	1
400V/24V Power Supply	Inner zone	1.109	2	400	0.8	1	L1-L2-L3-N	inductive	1
Cabinet Heating	Inner zone	0.643	3.48	230	0.8	1	L1-N	inductive	1
Cabinet Light / Socket	Inner zone	2.956	16	230	0.8	1	L2-N	inductive	1
CIR Cabinet Fans	Inner zone	0.166	0.9	230	0.8	1	L2-N	inductive	1
Clima 1	Inner zone	5.044	9.1	400	0.8	1	L1-L2-L3-N	inductive	1
Clima 2	Inner zone	5.044	9.1	400	0.8	1	L1-L2-L3-N	inductive	1
CON Cabinet Fans	Inner zone	0.277	1.5	230	0.8	1	L1-N	inductive	1
CTRL Cabinet Fan	Inner zone	0.031	0.17	230	0.8	1	L3-N	inductive	1
Fan Heat Exchanger	Inner zone	1.386	2.5	400	0.8	1	L1-L2-L3-N	inductive	1
Water Heating	Inner zone	2.4	4.33	400	0.8	1	L1-L2-L3-N	inductive	1
Water Pump	Inner zone	2.106	3.8	400	0.8	1	L1-L2-L3-N	inductive	1

Messages

Designation	Message
NSHV 3.2	Protective device required due to possible selectivity requirement

Personal protection against electric shock

All circuits of the project have a permissable break time ta-req > ta-cur and therefor fulfill the requirements for Personal protection against electric shock.

Disclaimer:

Dimensioned protection devices inside tap-off units of busbar trunking systems may not correspond to the actual available devices for those components. Please verify the dimensioning results in the device lists and correct them accordingly.

Symbols legend:

Symbol [Unit]	Description
ai	Load factor
cos φ	Power factor
ftot	Derating factor
Ia/In	Inrush current relation
Ib [A] Iz [A]	Operating current / allowed load capacity
Icu(fuse) [kA]	Rated ultimate short-circuit breaking capacity - fuse
Icu [kA] Icn [kA]	Rated ultimate short-circuit breaking capacity according to IEC 60947-2 Rated short-circuit breaking capacity according to IEC 60898-1
Icu/Icn [kA] required	the required breaking capacity of the protection device at installation location
Icw 1s [kA]	Rated short-time withstand current 1s
IΔn [mA]	Residual current - RCD
Ik1max	Maximum single phase short-circuit current
Ik1min	Minimum single phase short-circuit current
Ik3max	Maximum three phase short-circuit current
Ik3min	Minimum three phase short-circuit current
Ik1D [kA]	single pole uninterrupted short-circuit current
Ik3D [kA]	three pole uninterrupted short-circuit current
Ikmax/Ikmin	Relation of maximum and minimum short-circuit current
Ikre	Short-circuit current recovery factor
In [A]	Nominal current
P0 [kW]	No-load losses
Pk [kW]	Short-circuit losses
Pmech [kW]	mechan. Power
Pn [kW]	Active power
R0 N [mΩ]	Zero phase-sequence resistance phase-neutral conductor
R0 PE(N) [mΩ]	Zero phase-sequence resistance phase-PE(N) conductor
R0/R1	Resistance relation positive / zero phase-sequence system
r1 [%]	Relative value of positive phase-sequence resistance
R1 [mΩ]	Positive phase-sequence resistance

Sn [kVA]	Nominal apparent power
ukr [%]	Short-circuit voltage
Un [V]	Nominal voltage
Uprim [kV]	Primary voltage
Usec [V]	Secondary voltage
X0 N [mΩ]	Zero phase-sequence reactance phase-neutral conductor
X0 PE(N) [mΩ]	Zero phase-sequence reactance phase-PE(N) conductor
X0/X1	Reactance relation positive / zero phase-sequence system
X1 [mΩ]	Positive phase-sequence reactance
xd" [%]	Subtransient reactance
Z1 max	Maximum impedance in positive phase-sequence system
Z1 min	Minimum impedance in positive phase-sequence system
Zs	Faulted circuit impedance
Zs max	Maximum faulted circuit impedance
Zs min	Minimum faulted circuit impedance
u [%] / Δu [%] / ∑ Δu [%]	Relative nominal voltage / voltage drop between beginning and end of a section / cumulated voltage drop from the transformer primary/ secondary clamps to the specified point
θΔu [°C] / θIkmax [°C] / θIkmin [°C]	Conductor temperature of MV cable / Conductor temperature of LV cable for voltage drop / on beginning of short circuit / for disconnection
η	Efficiency
φ [°]	Phase angle
φ1 min/max [°]	Phase angle at Ik1 min/max
φ3 min/max [°]	Phase angle at Ik3 min/max

Standards for computation:

Title	IEC	HD	EN	DIN VDE
Low-voltage electrical installations *	60364-1…6	384		0100 – 100...710
Short-circuit currents in three-phase a.c. systems – Calculation of currents	60909		60909	0102
Short-circuit currents – calculation of effects Definitions and calculation methods	60865		60865	0103
Low-voltage switchgear and controlgear – Circuit-breakers	60947-2		60947-2	0660 – 101
Low-voltage switchgear and controlgear assemblies	61439		61439	0660 – 600
A method of temperature-rise assessment by extrapolation for partially type-tested assemblies (PTTA) of low-voltage switchgear and controlgear	60890+C	528 S2		0660 – 507
Electrical installations of buildings – Part 5-52: Selection and erection of electrical equipment – Wiring systems	60364-5-52	384		0298 – 4
Low-voltage electrical installations – Selection and erection of electrical equipment – Part 520: Wiring systems – Supplement 3: Current-carrying capacity of cables in three-phase distribution circuits at load currents with harmonic content				0100-520 Supplement 3
Electrical accessories – Circuit-breakers for overcurrent protection for household and similar installations – Circuit-breakers for a.c. operation	60898-1		60898-1	0641 – 11
High-voltage switchgear and controlgear – Alternating Current switch-fuse combinations	62271		62271	0671 – 105
Electrical installations of buildings – Selection and erection of electrical equipment – Isolation, switching and control	60364-5-53	60364-5-534		0100-534
Low-voltage electrical installations – Protection for safety – Protection against voltage disturbances and electromagnetic disturbances	60364-4-44	60364-4-443		0100-443
Protection against lightning – Part 1…4	62305-1…4			0185 – 1…4
Low-voltage surge protective devices - Surge protective devices connected to low-voltage power systems; Requirements and tests	61643-11			0675-6-11
Tests for electric cables under fire conditions – Circuit integrity	60331-11, 21		50200	0472-814 0482-200
Fire behaviour of building materials and building components — Part 12: Circuit integrity maintenance of electric cable systems, requirements and testing				4102-12 : 1998-11
Electrical equipment of electric road vehicles - Electric vehicles conductive charging system	61851		61851	

*) Special national conditions and deviations from IEC 60364-4-41: 2005 are not implemented and need to be considered!

Selectivity evaluation

created with

SIMARIS design

Version: 24.1.0 (2024-05-07)
Subrevision: 1218

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Master data

Project name:	Shell Crosswind Offshore
Project description:	BESS FQ 1MW 5MWh
Editor:	Freqcon_DG
Planning office:	Freqcon GmbH
Created at:	Wednesday, 4. September 2024
Changed at:	Tuesday, 8. October 2024

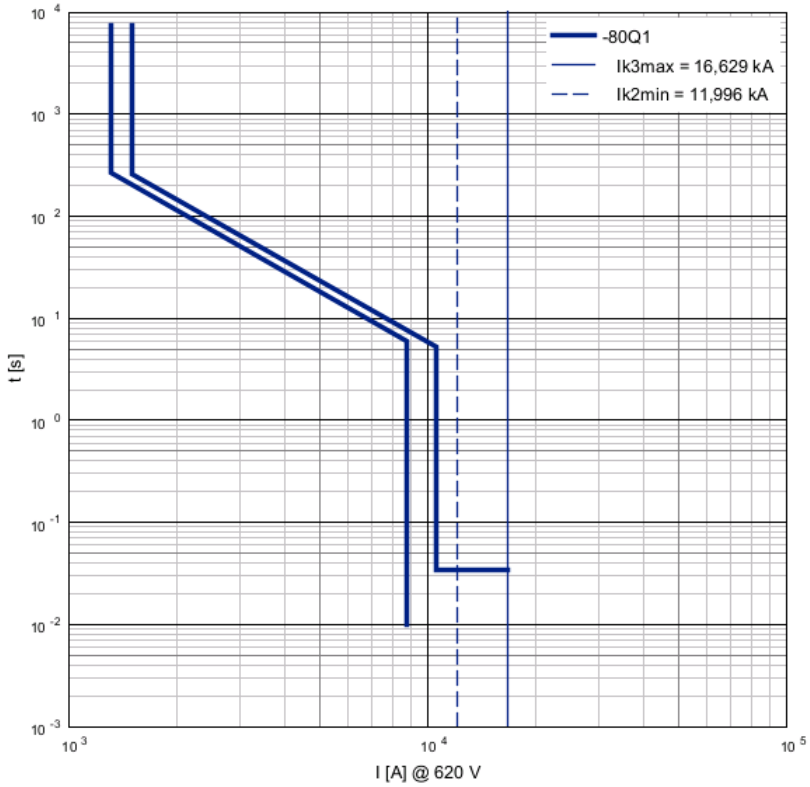
Customer data

City:	
Customer:	Statron AG

Comment:

Converter Container

Circuit name: **CONV**
Designation: **-80Q1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -80Q1

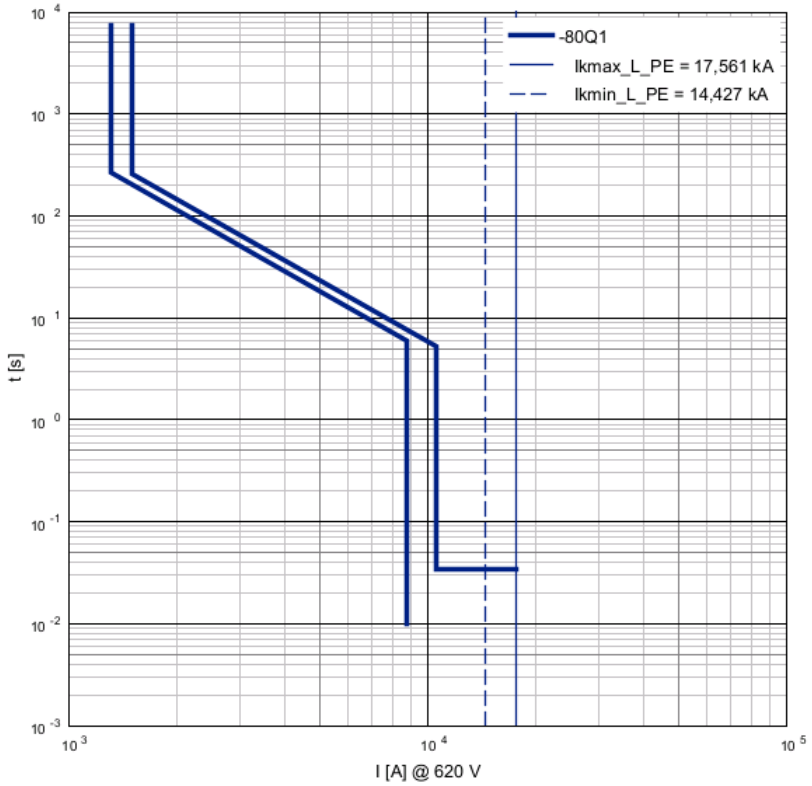
3WL11122BB611AA2

In 1,250 A

L Protection: On
Ir 1 x In corresp. 1,250 A
tr 10 s

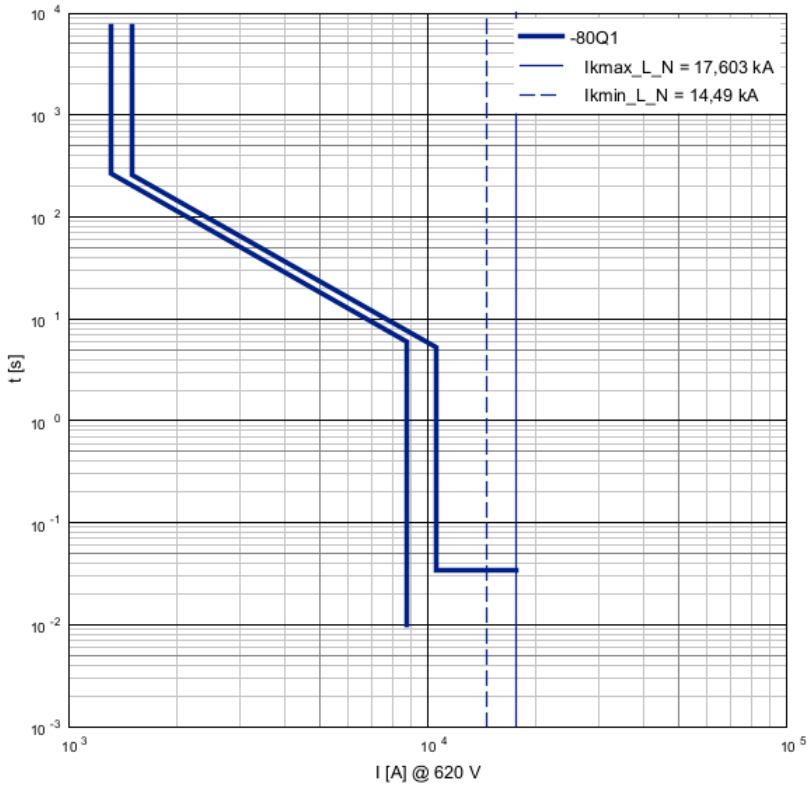
I Protection: On
Ii 7 x In corresp. 8,750 A

Short cut current: **Ik1-PE**
Selectivity evaluation:


-80Q1
Ikmax_L_PE = 17,561 kA
Ikmin_L_PE = 14,427 kA
t [s]
I [A] @ 620 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Selectivity evaluation

created with

SIMARIS design

Version: 24.1.0 (2024-05-07)
Subrevision: 1218

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http://www.siemens.com/simaris

Master data

Project name:	Shell Crosswind Offshore
Project description:	BESS FQ 1MW 5MWh
Editor:	Freqcon_DG
Planning office:	Freqcon GmbH
Created at:	Wednesday, 4. September 2024
Changed at:	Wednesday, 30. October 2024

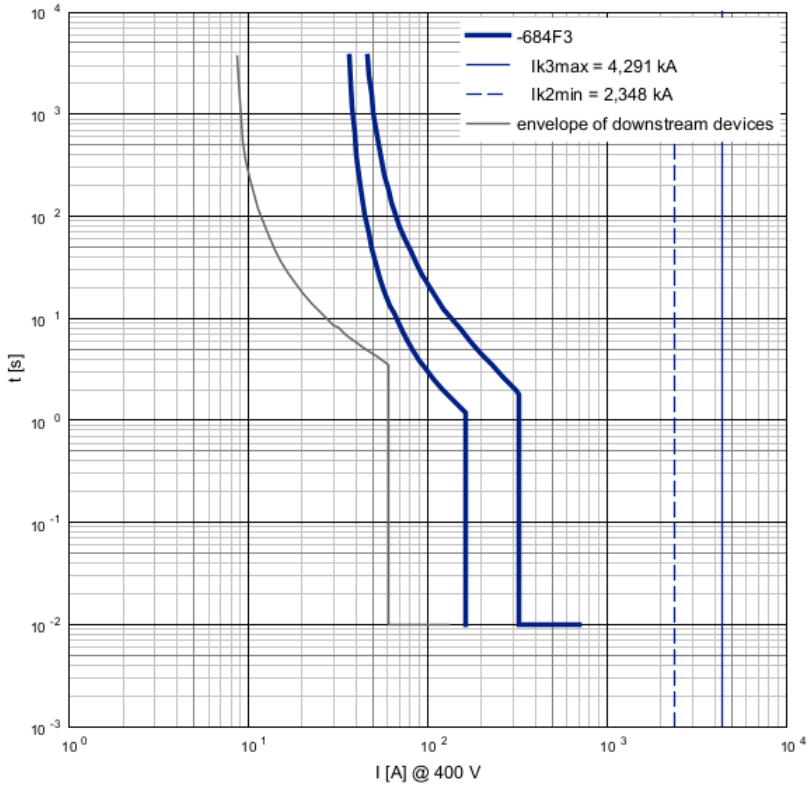
Customer data

City:	
Customer:	Statron AG

Comment:

Battery Container

Circuit name: **LVSD 4.1**
Designation: **-684F3**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -684F3

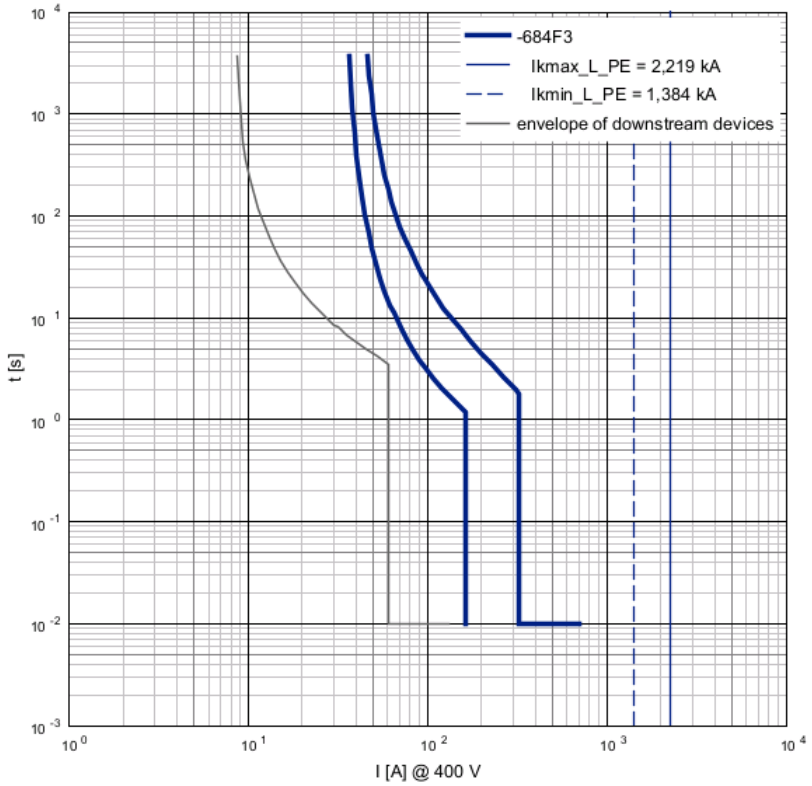
5SY43327

In 32 A

L Protection: On
Ir - corresp. 32 A

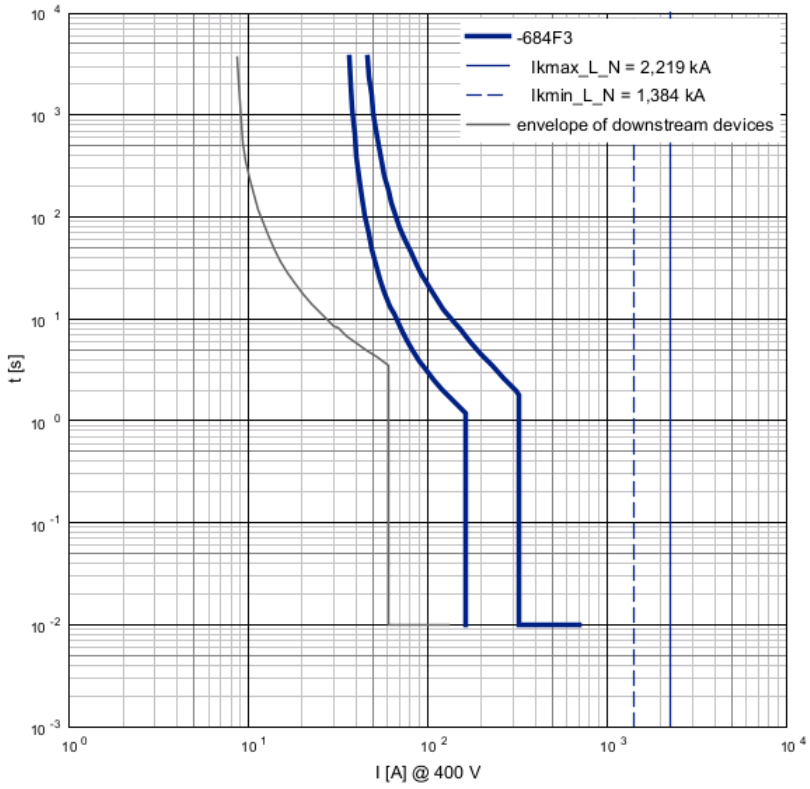
I Protection: On
Ii - corresp. 160 A

Short cut current: **Ik1-PE**
Selectivity evaluation:

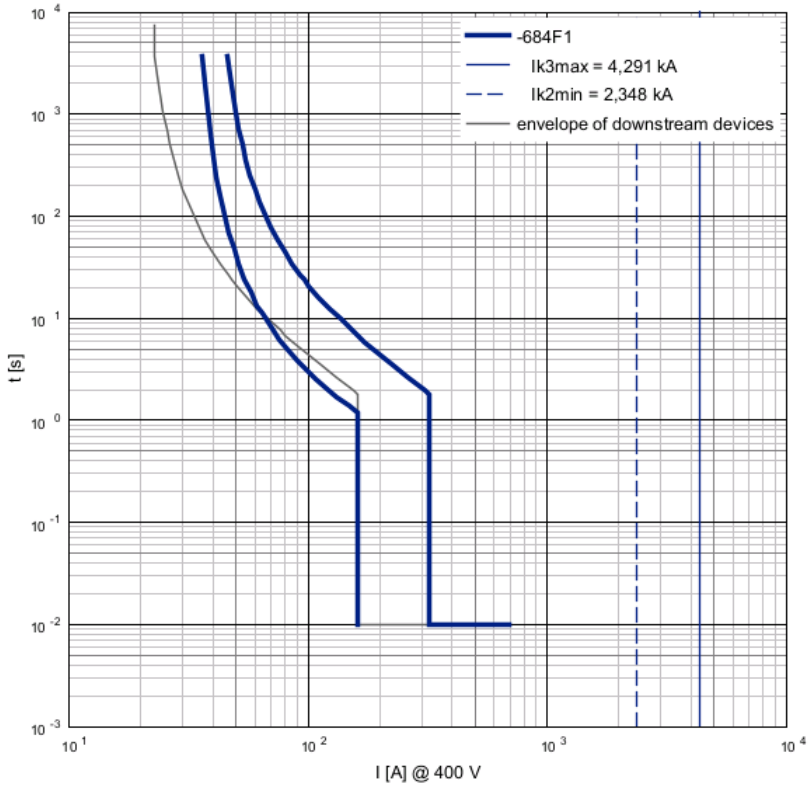

-684F3
Ikmax_L_PE = 2,219 kA
Ikmin_L_PE = 1,384 kA
envelope of downstream devices
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Circuit name: **LVSD 5.1**
Designation: **-684F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -684F1

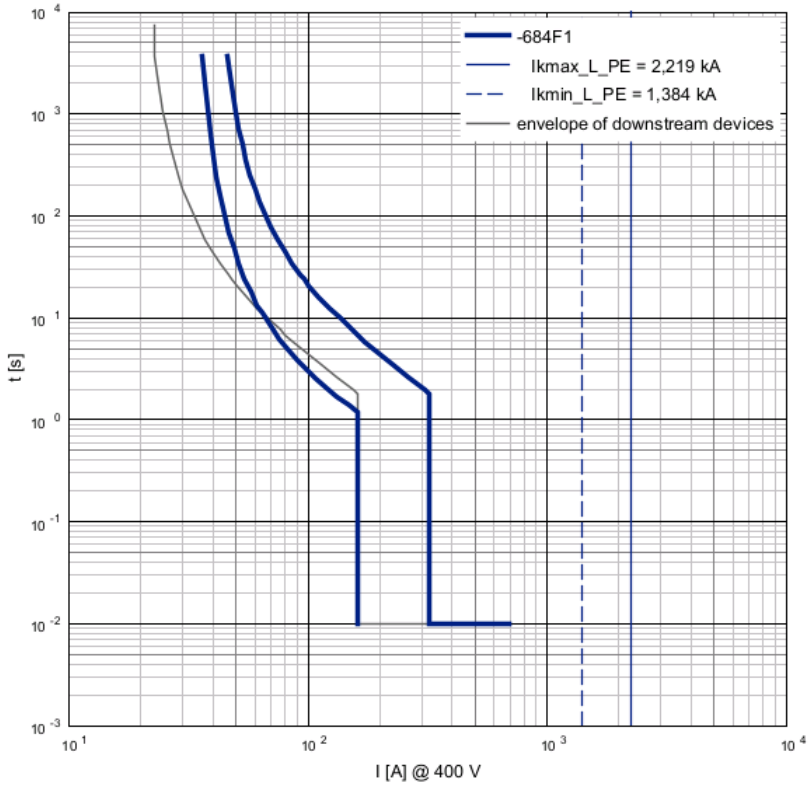
5SY43327

In 32 A

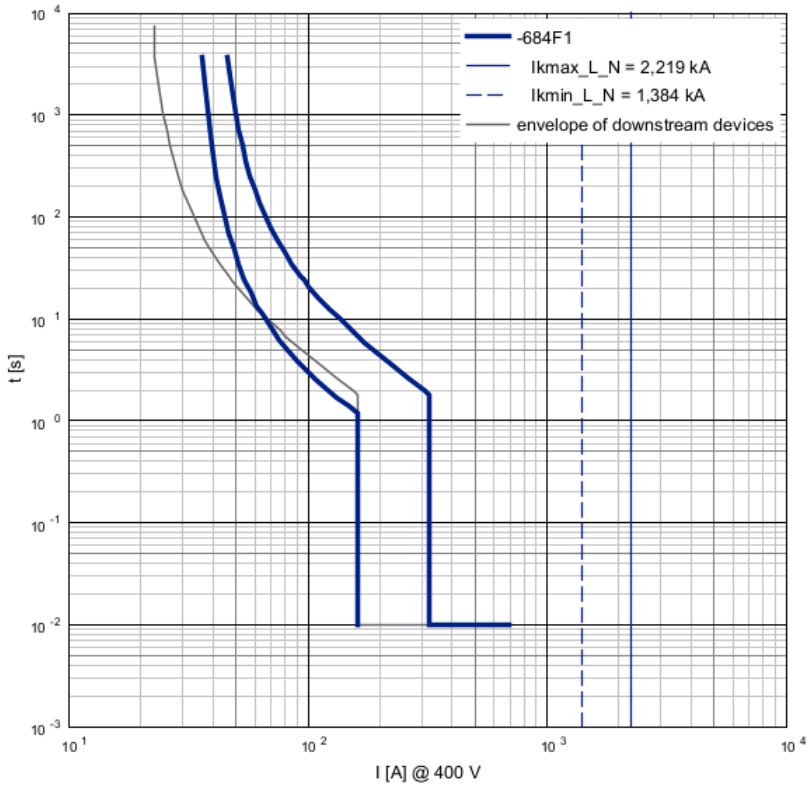
L Protection: On
Ir - corresp. 32 A

I Protection: On
Ii - corresp. 160 A

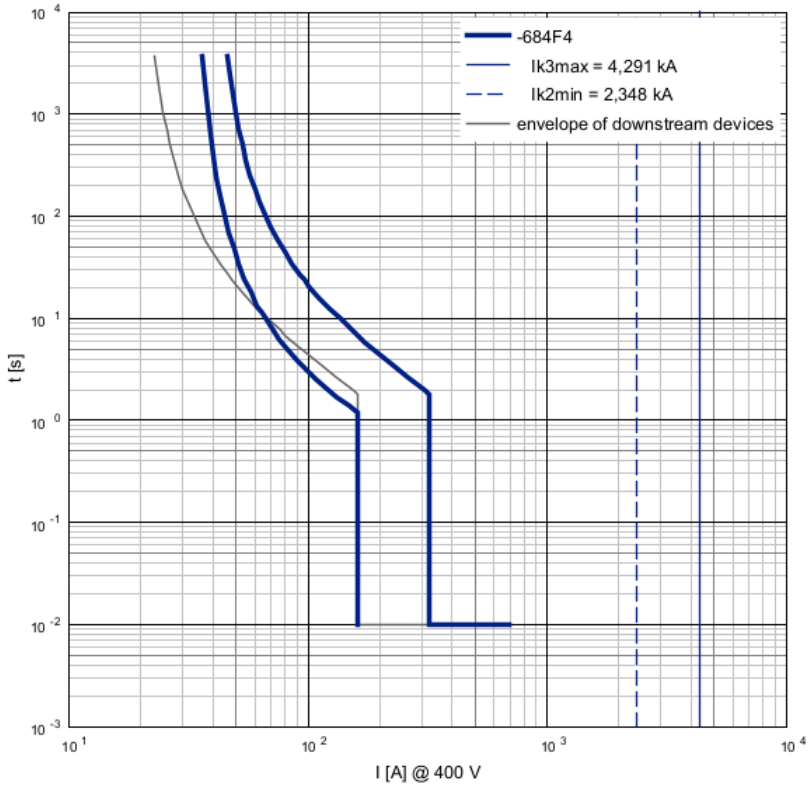
Short cut current: **Ik1-PE**
Selectivity evaluation:


-684F1
Ikmax_L_PE = 2,219 kA
Ikmin_L_PE = 1,384 kA
envelope of downstream devices
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**
Selectivity evaluation:



Circuit name: **NSUV 3.1**
Designation: **-684F4**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -684F4

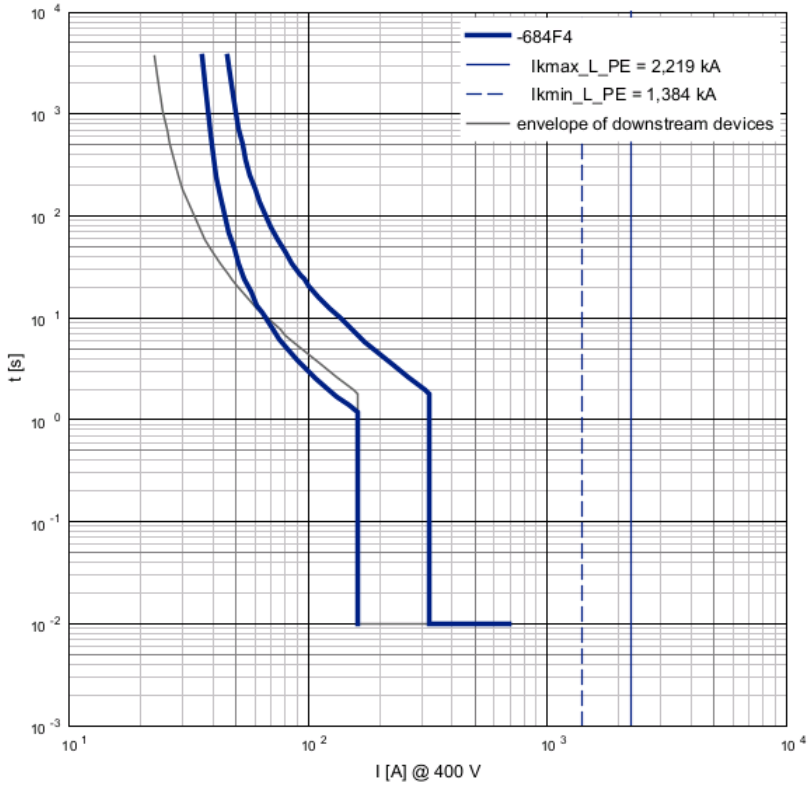
5SY43327

In 32 A

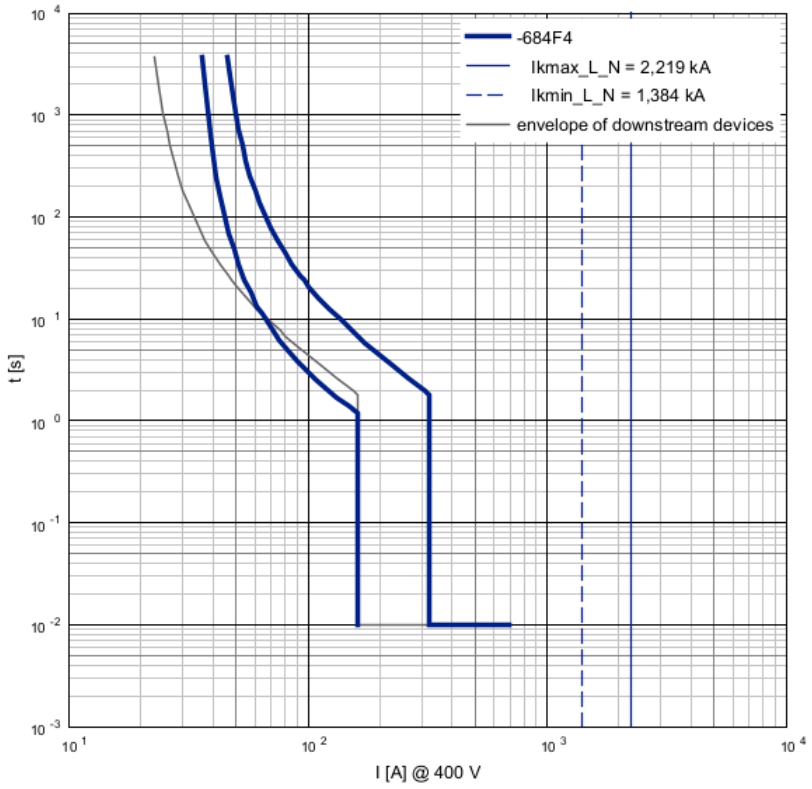
L Protection: On
Ir - corresp. 32 A

I Protection: On
Ii - corresp. 160 A

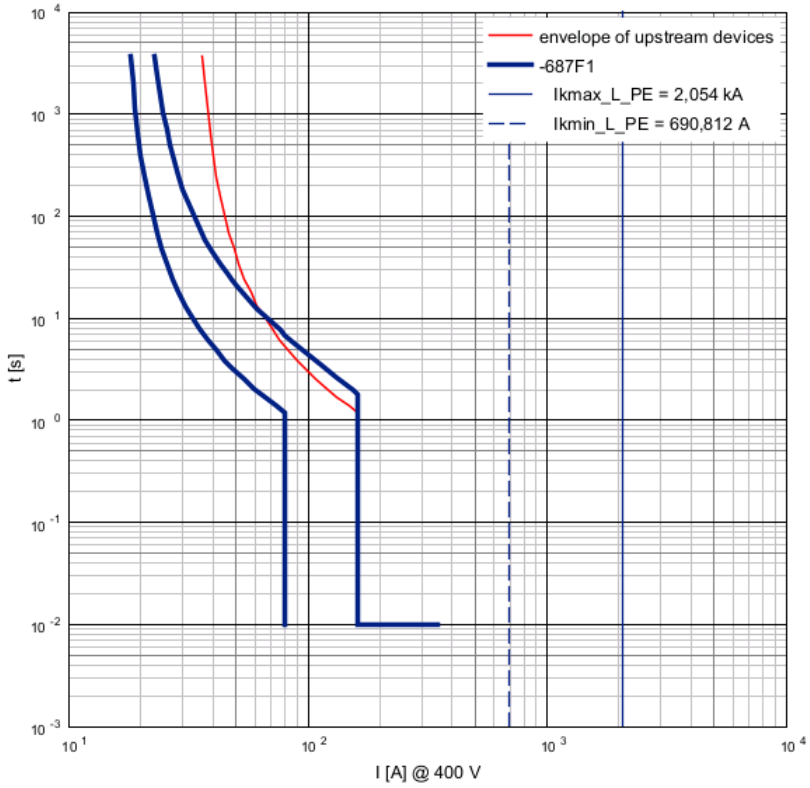
Short cut current: **Ik1-PE**
Selectivity evaluation:


-684F4
Ikmax_L_PE = 2,219 kA
Ikmin_L_PE = 1,384 kA
envelope of downstream devices
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**
Selectivity evaluation:



Circuit name: **230V Bat Cabinet 1**
Designation: **-687F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -687F1

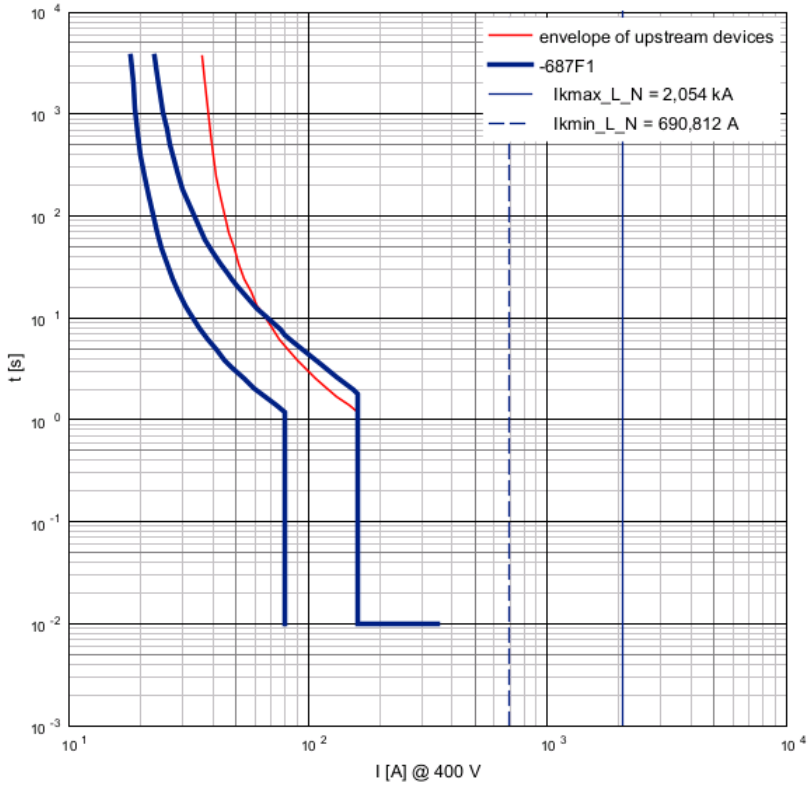
5SY41167

In 16 A

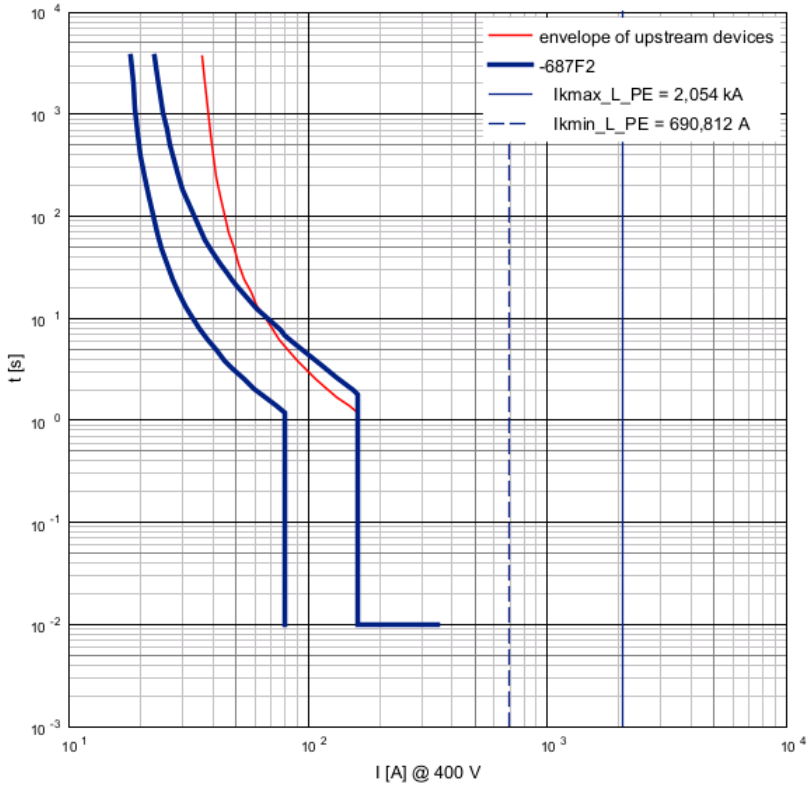
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-687F1
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 2**
Designation: **-687F2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -687F2

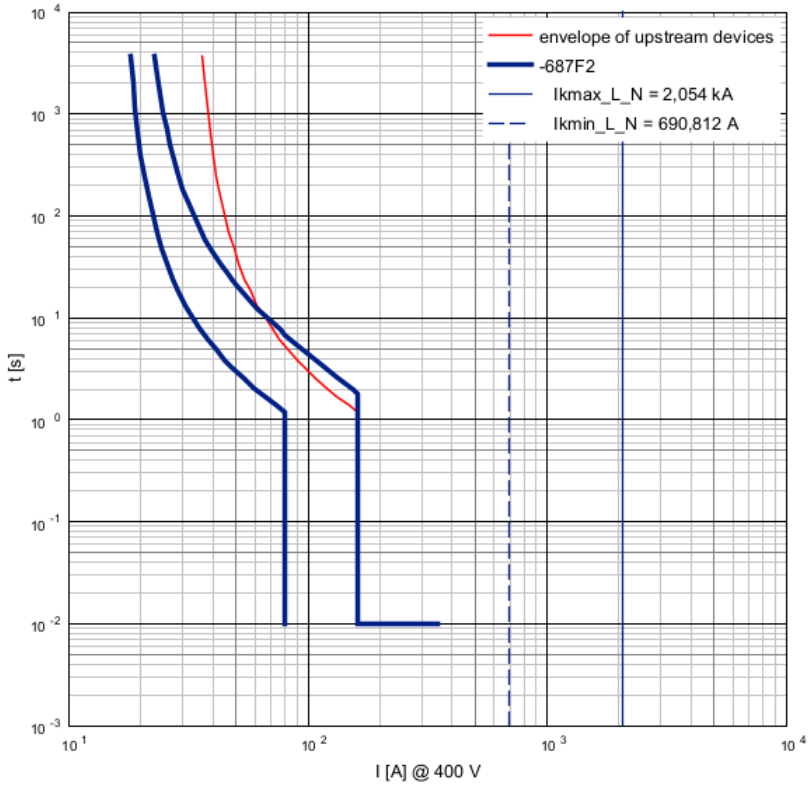
5SY41167

In 16 A

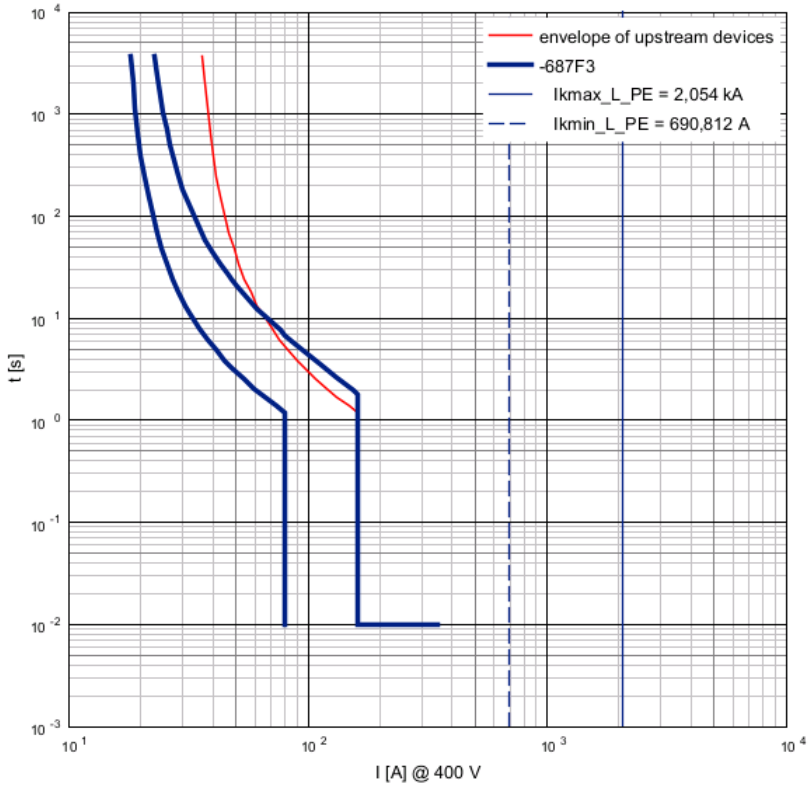
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-687F2
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 3**
Designation: **-687F3**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -687F3

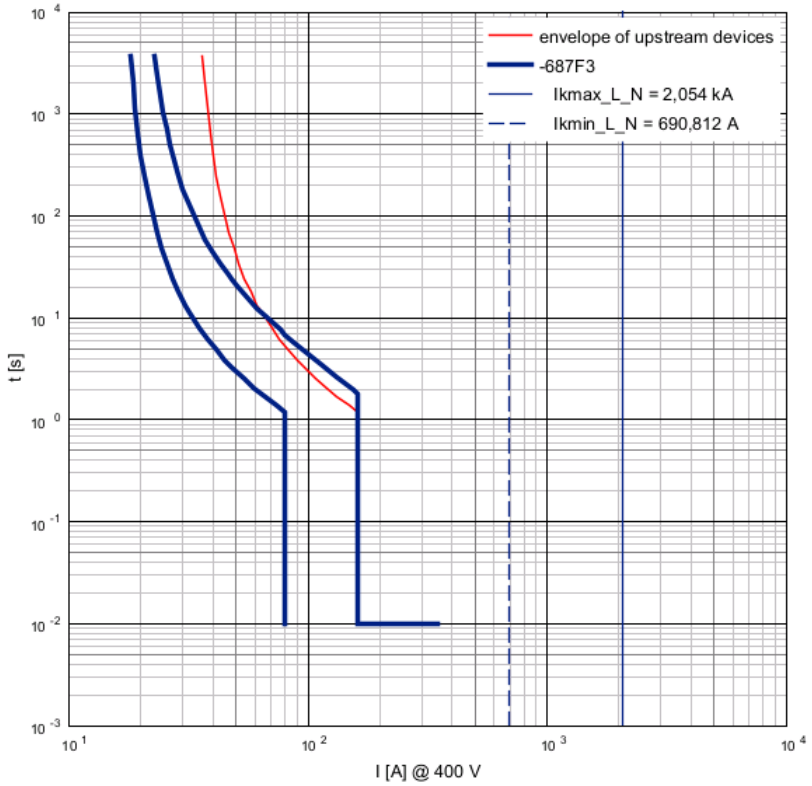
5SY41167

In 16 A

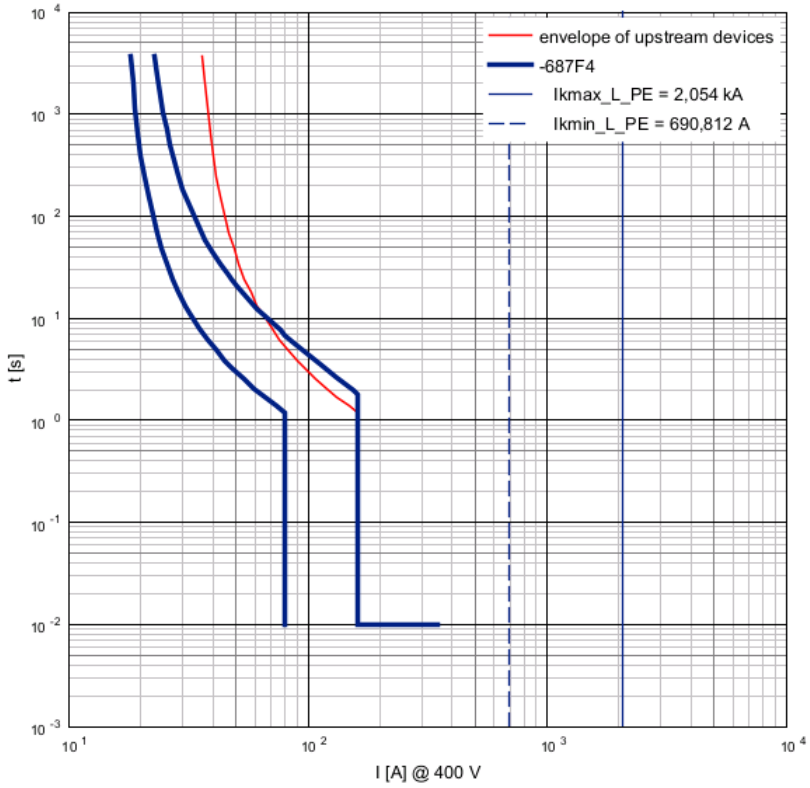
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-687F3
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 4**
Designation: **-687F4**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -687F4

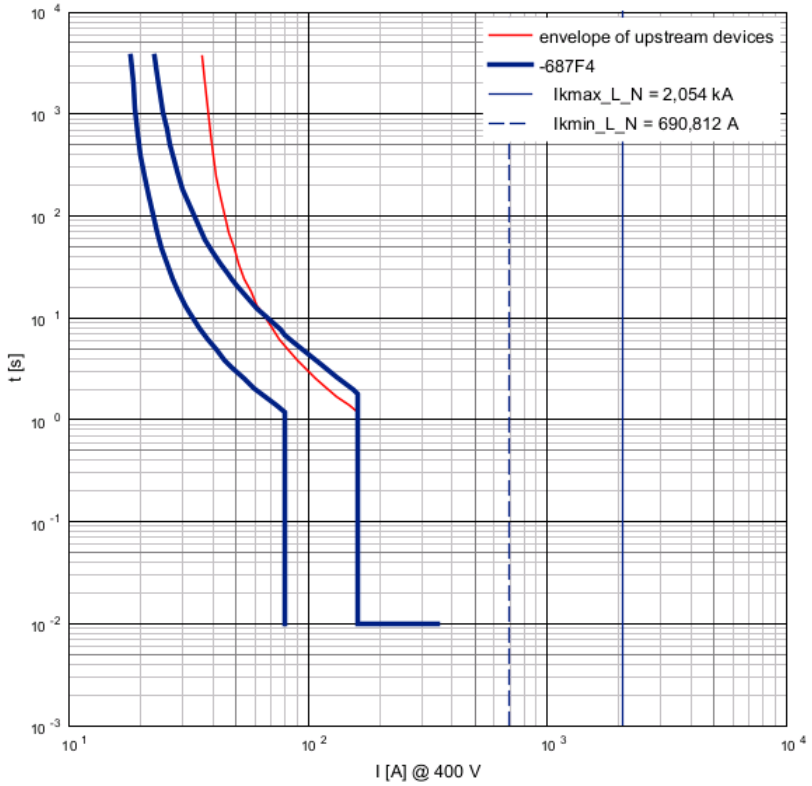
5SY41167

In 16 A

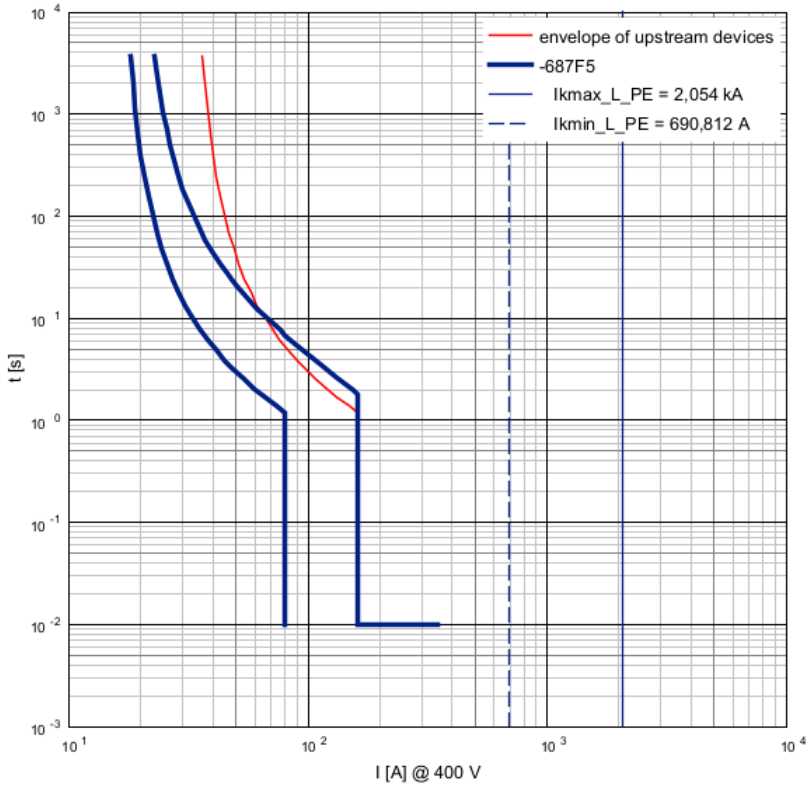
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-687F4
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 5**
Designation: **-687F5**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -687F5

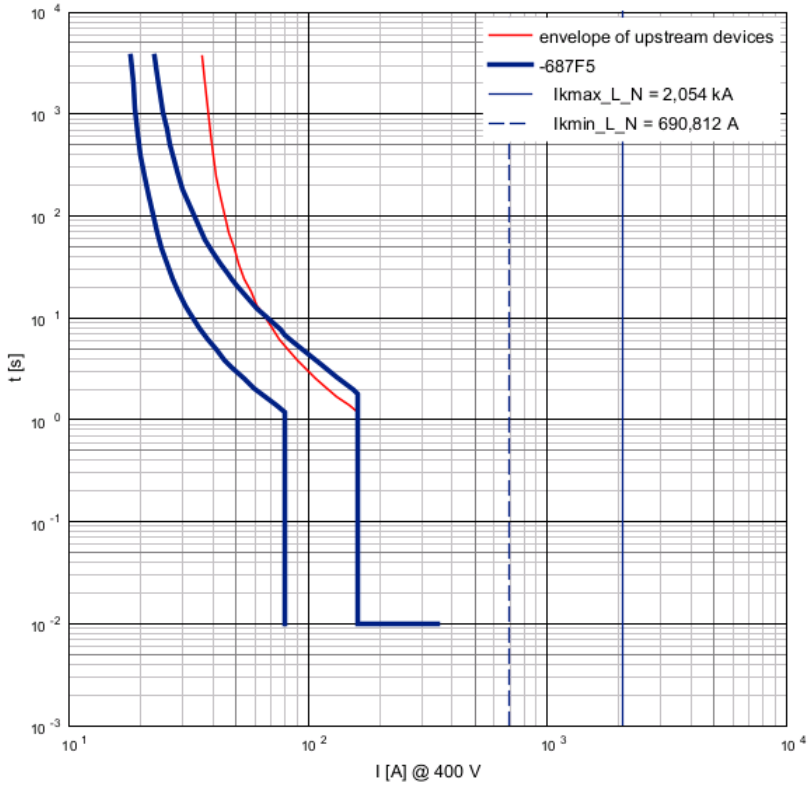
5SY41167

In 16 A

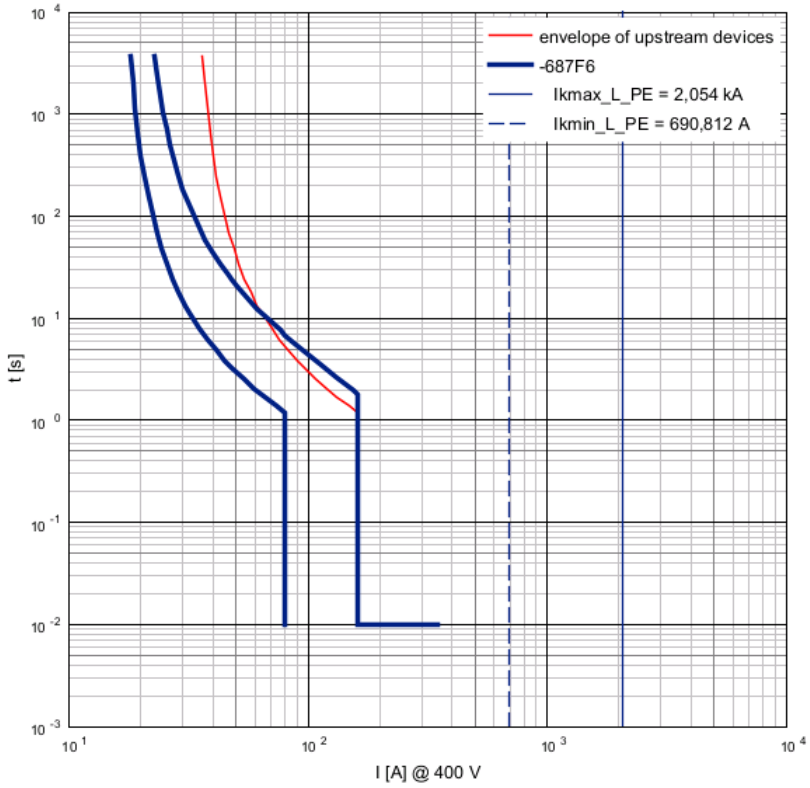
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-687F5
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 6**
Designation: **-687F6**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -687F6

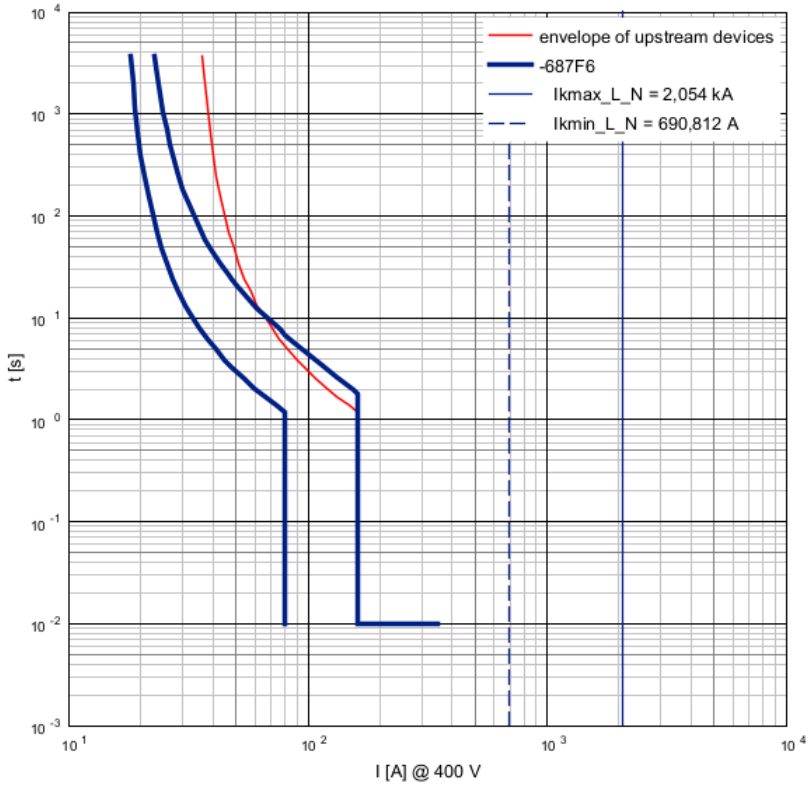
5SY41167

In 16 A

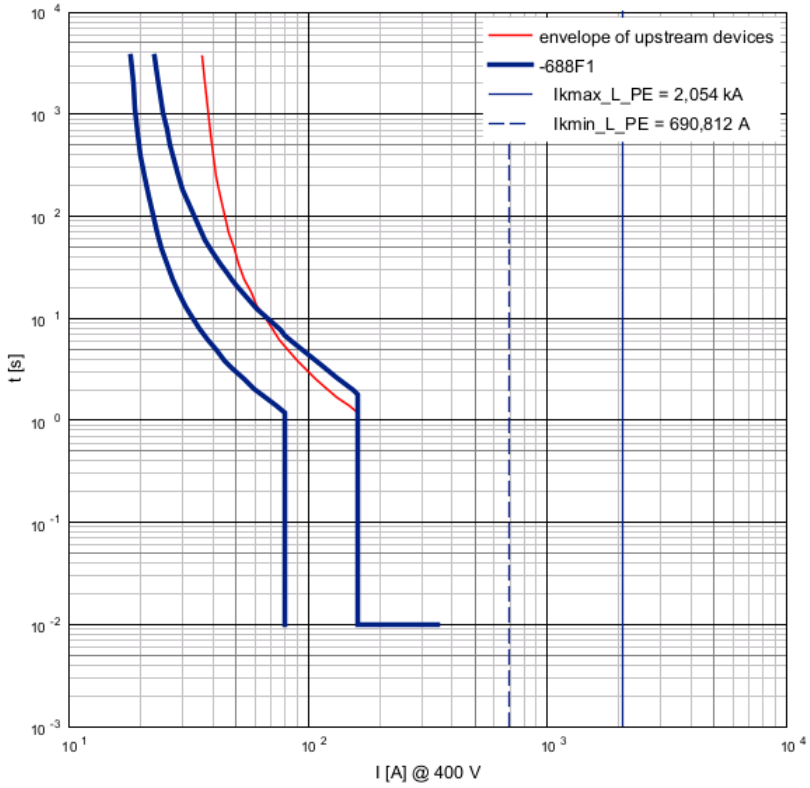
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-687F6
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 7**
Designation: **-688F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -688F1

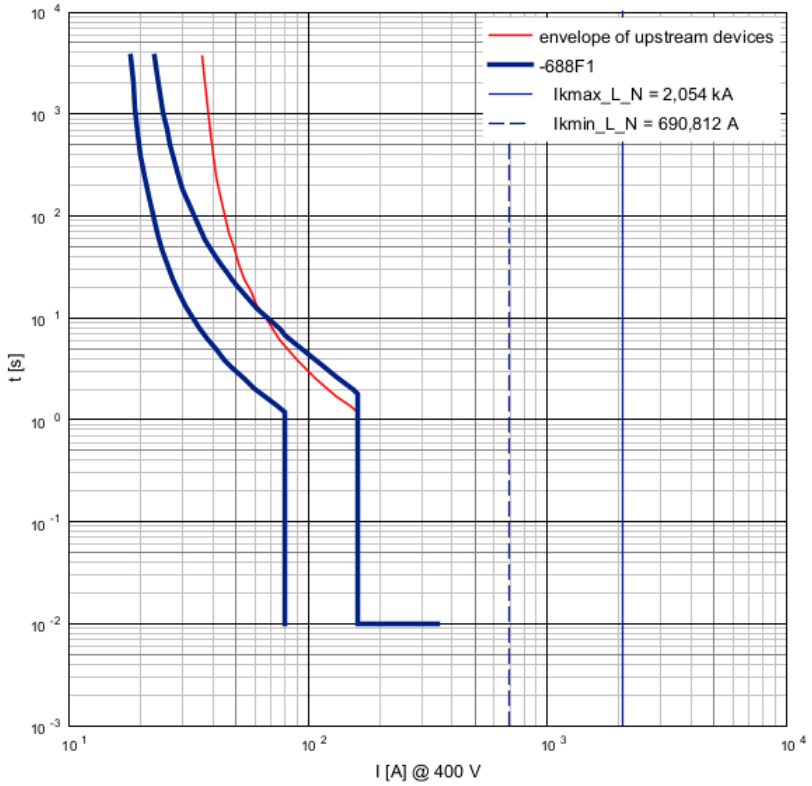
5SY41167

In 16 A

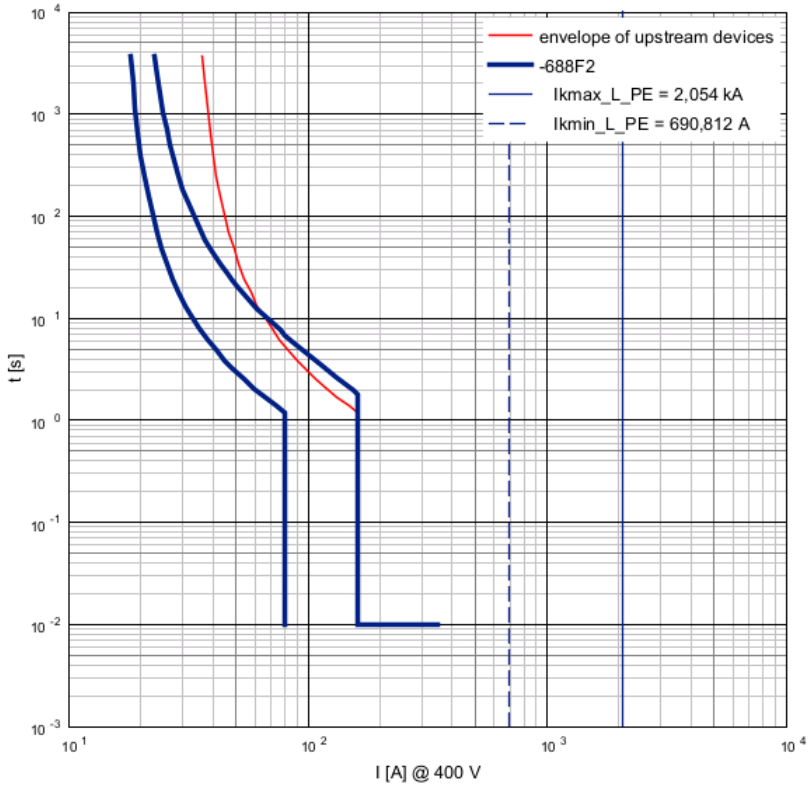
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-688F1
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 8**
Designation: **-688F2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -688F2

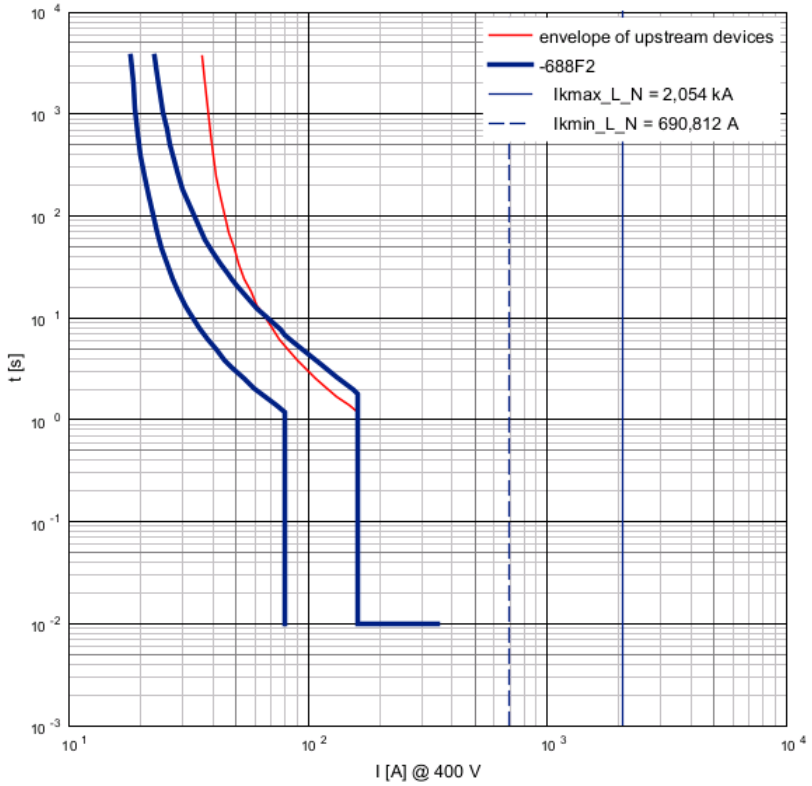
5SY41167

In 16 A

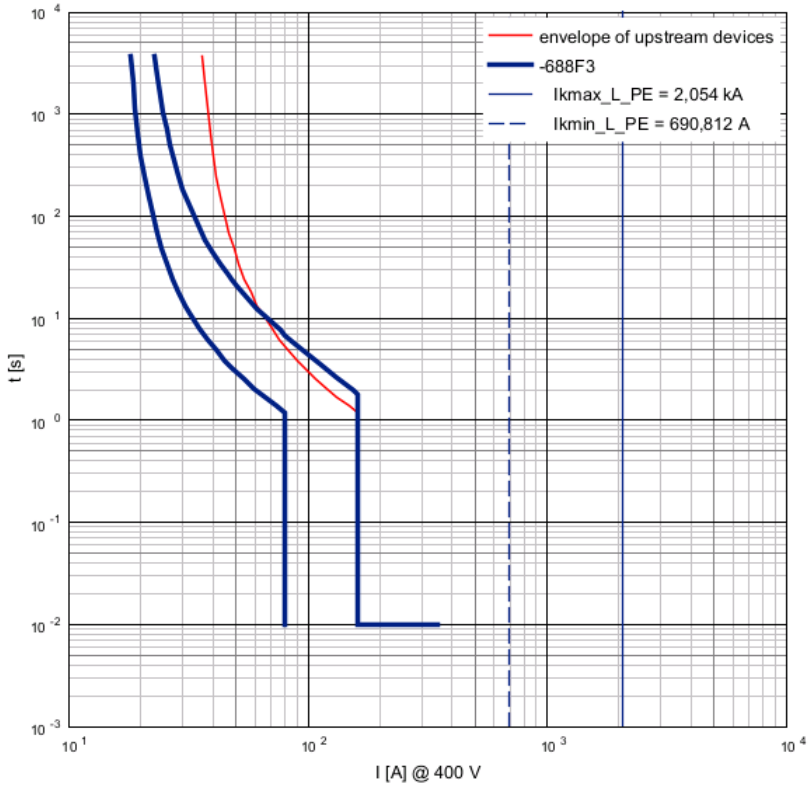
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-688F2
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 9**
Designation: **-688F3**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -688F3

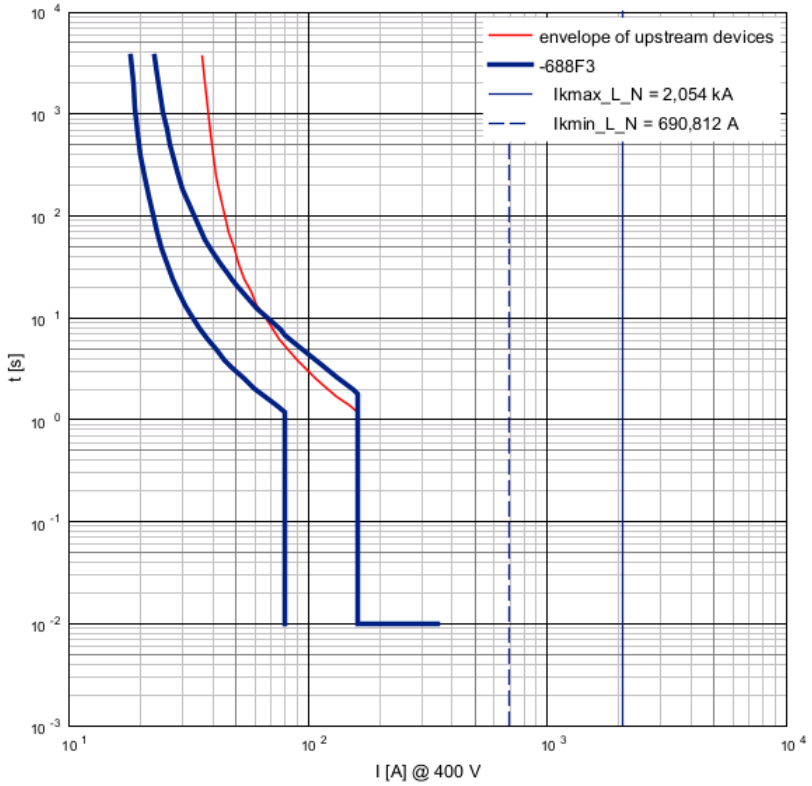
5SY41167

In 16 A

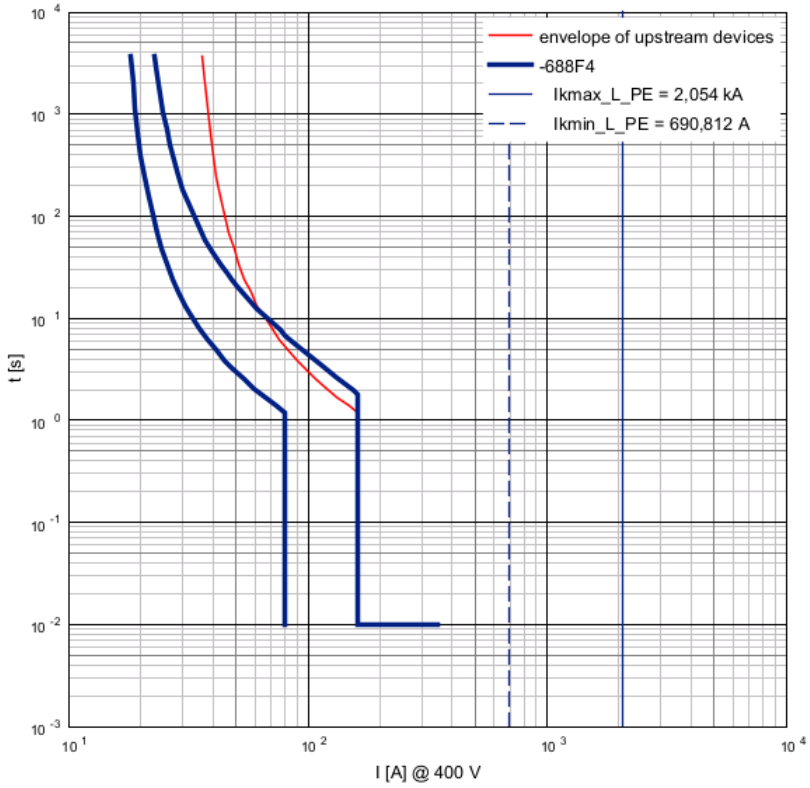
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-688F3
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 10**
Designation: **-688F4**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -688F4

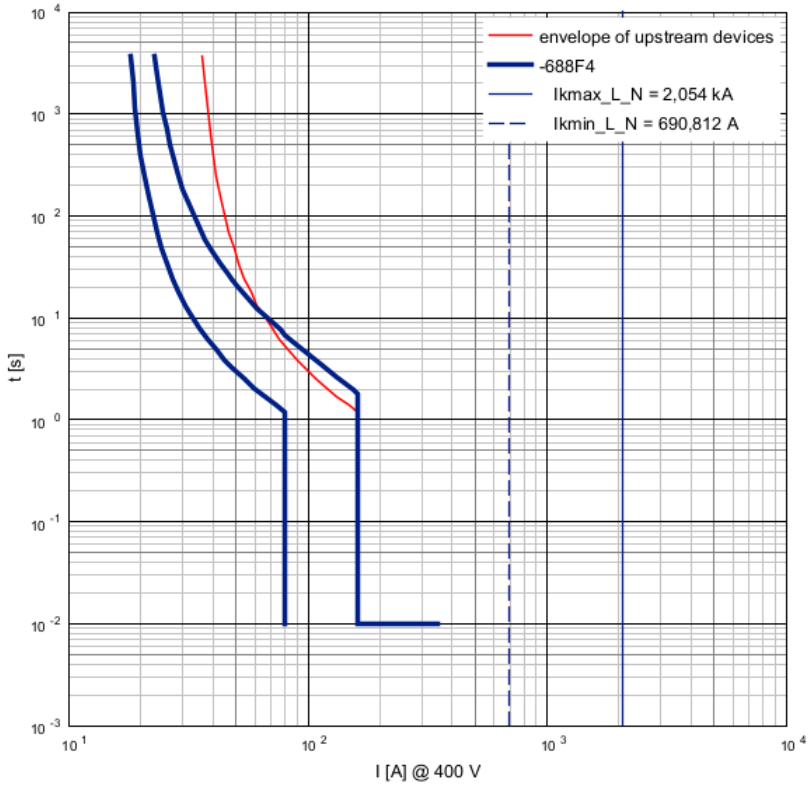
5SY41167

In 16 A

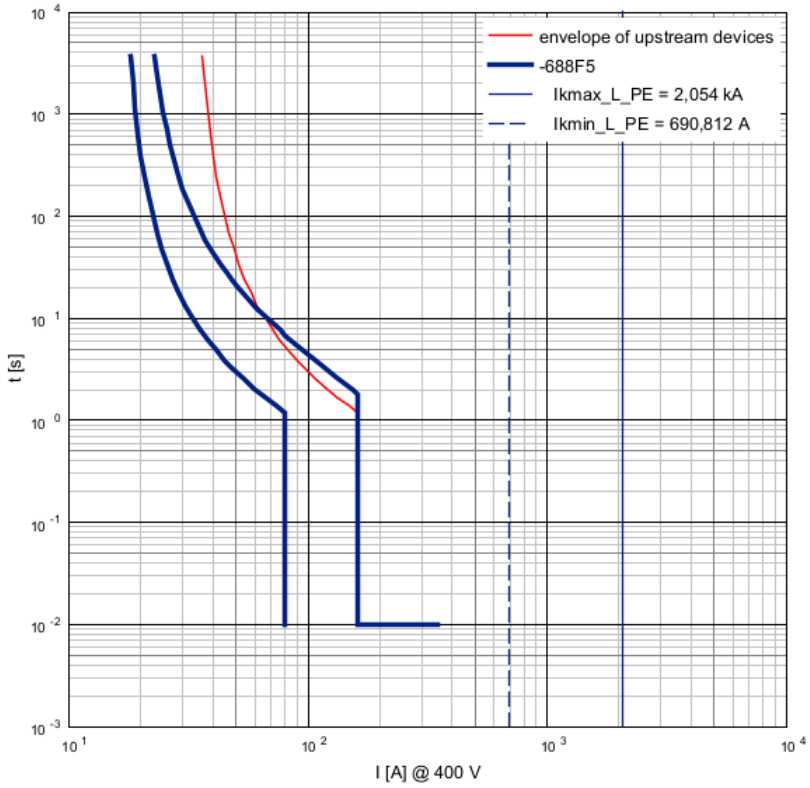
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-688F4
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **230V Bat Cabinet 11**
Designation: **-688F5**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -688F5

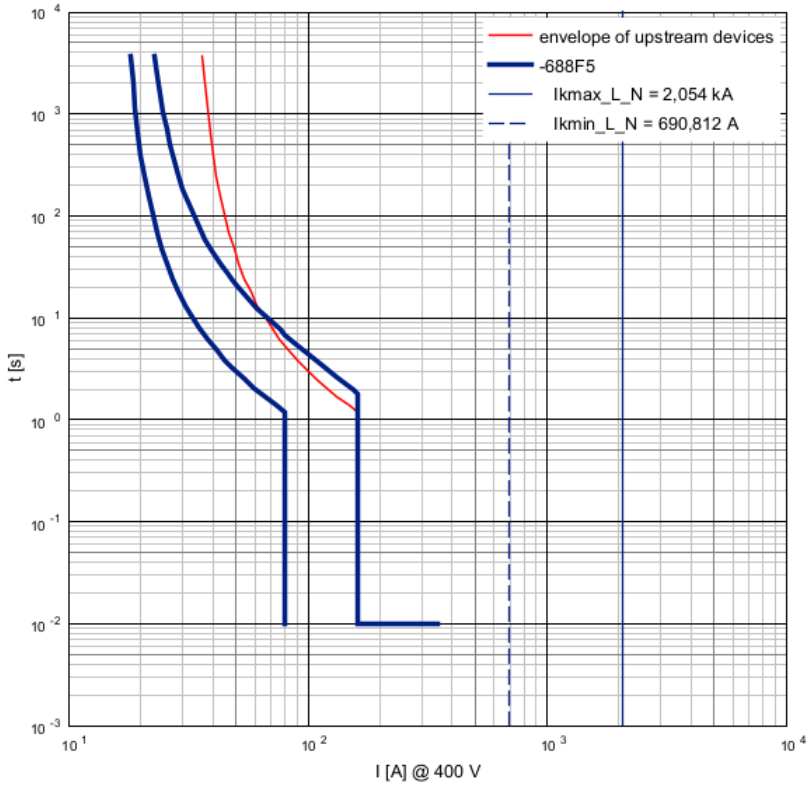
5SY41167

In 16 A

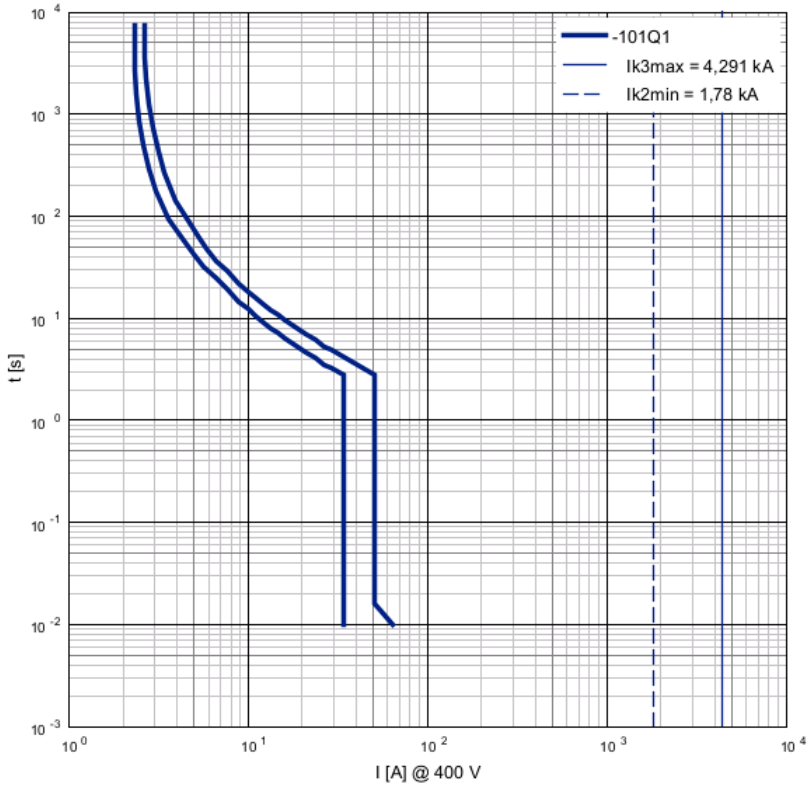
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-688F5
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **400V/230V Power Supply**
Designation: **-101Q1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -101Q1

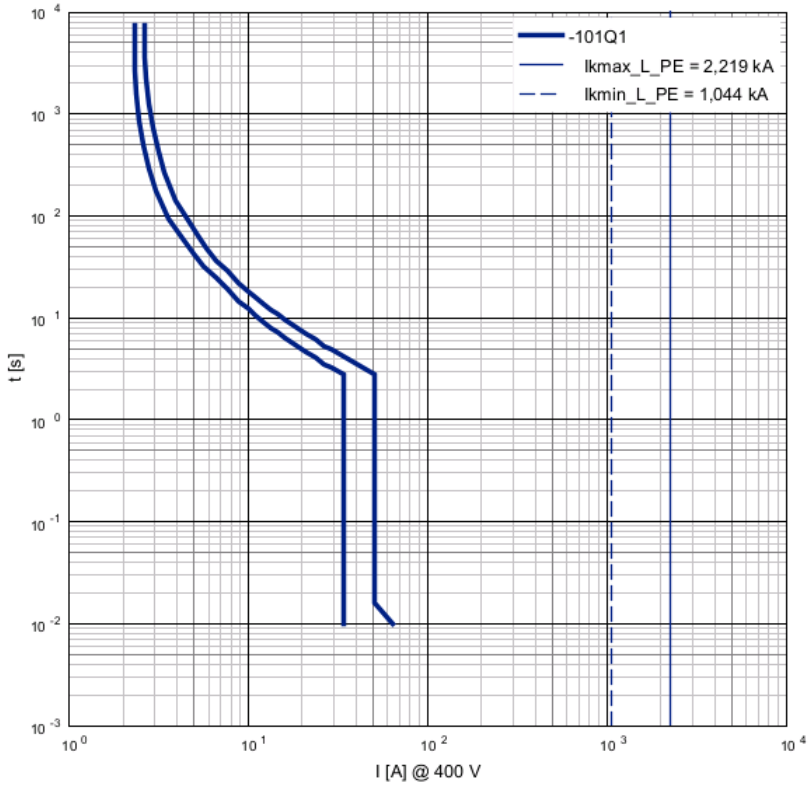
3RV20111DA25

In 3.2 A

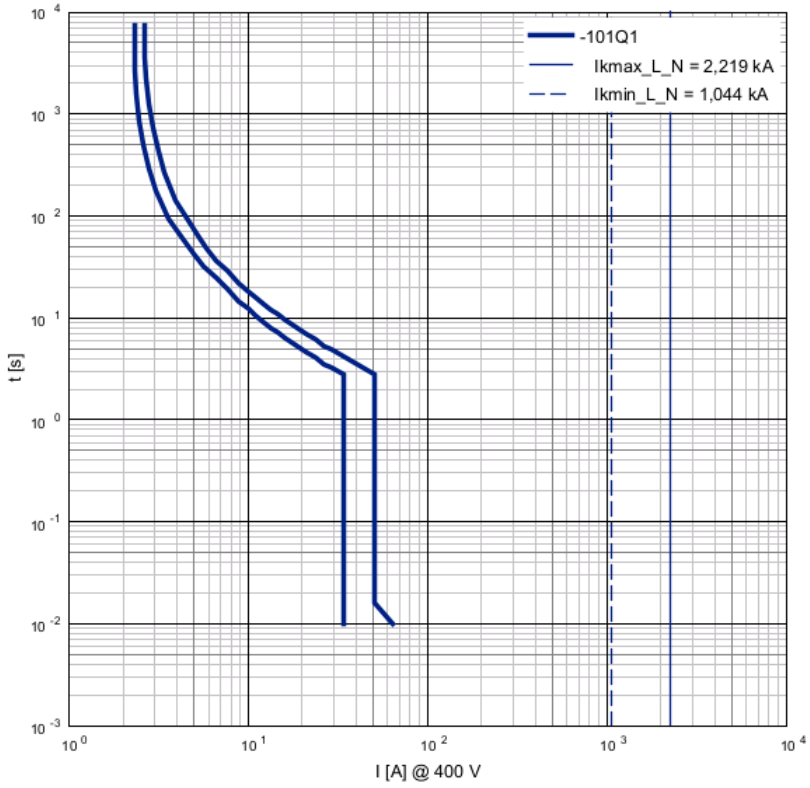
L Protection: On
Ir - corresp. 2.2 A
tr 10 s

I Protection: On
Ii - corresp. 42 A

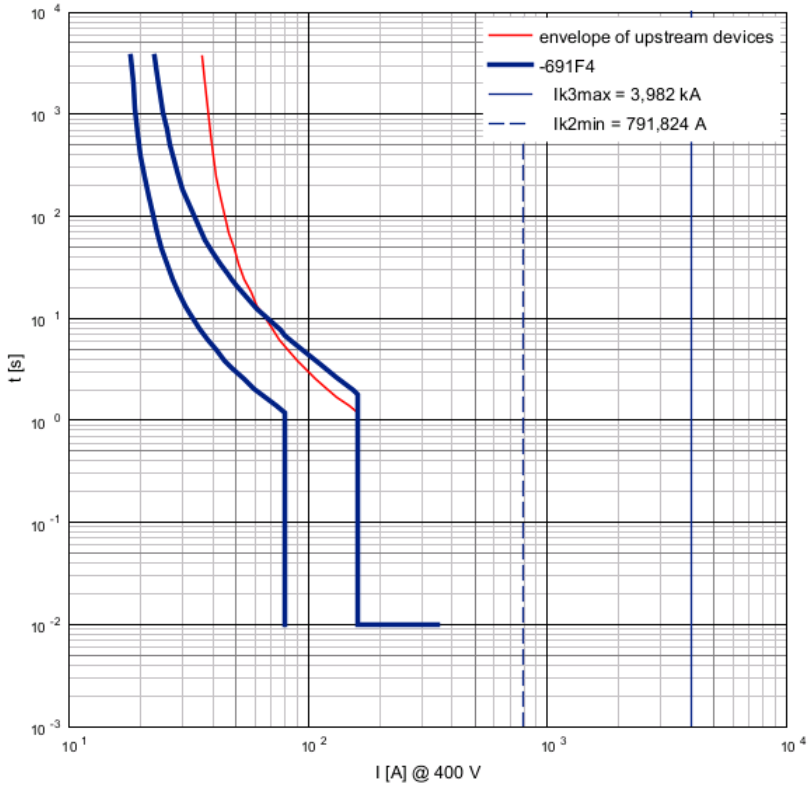
Short cut current: **Ik1-PE**
Selectivity evaluation:


-101Q1
Ikmax_L_PE = 2,219 kA
Ikmin_L_PE = 1,044 kA
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**
Selectivity evaluation:



Circuit name: **Clima**
Designation: **-691F4**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -691F4

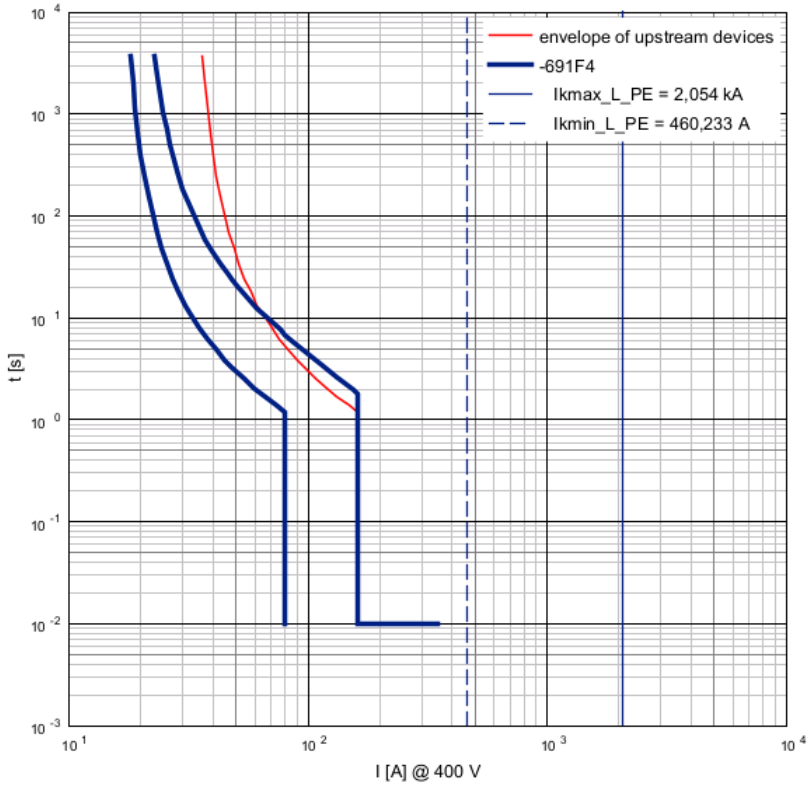
5SY43167

In 16 A

L Protection: On
Ir - corresp. 16 A

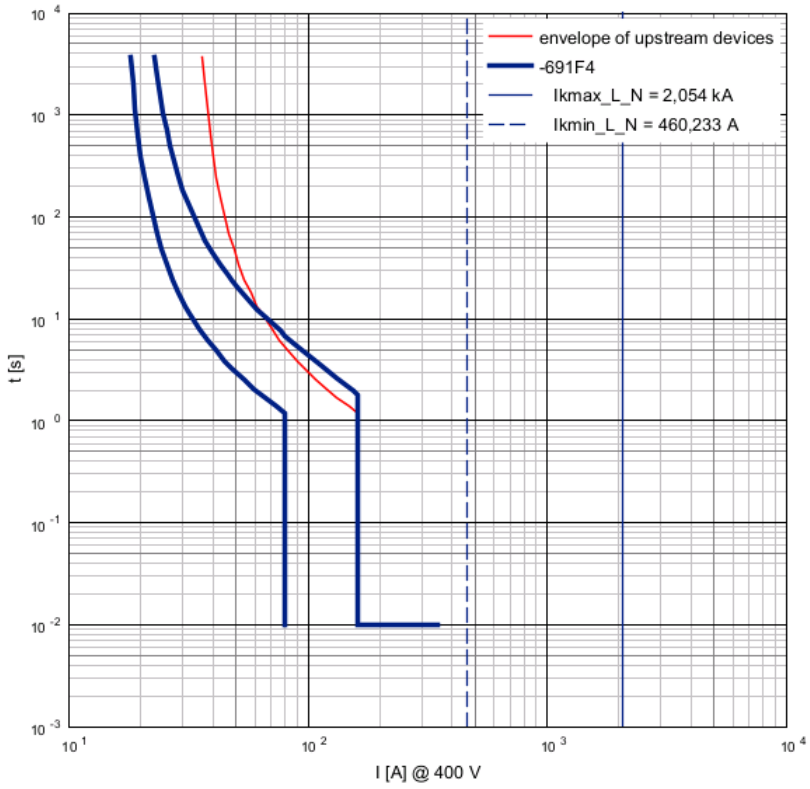
I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-PE**
Selectivity evaluation:

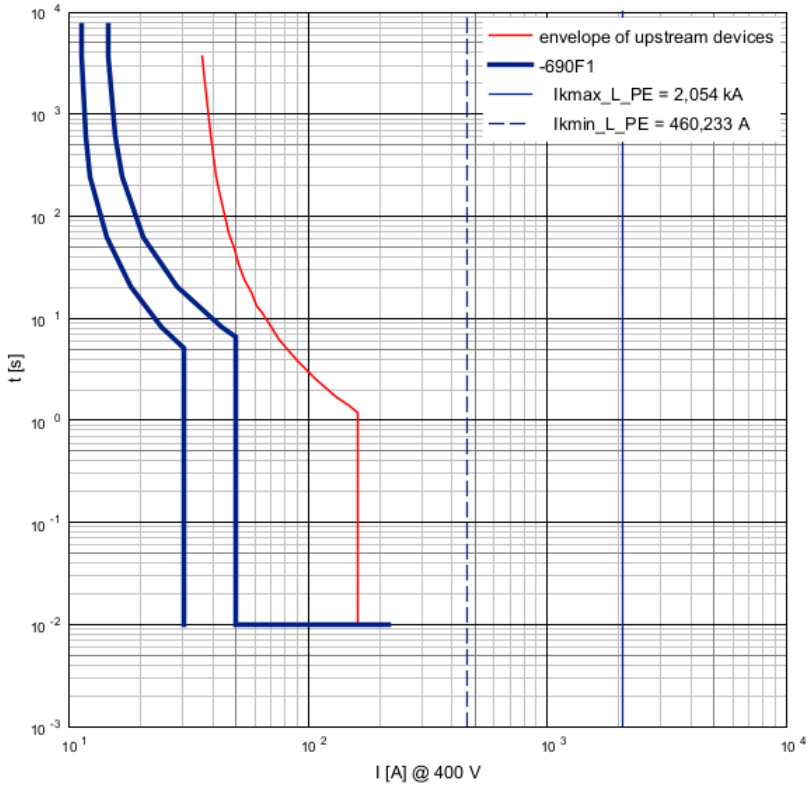

envelope of upstream devices
-691F4
Ikmax_L_PE = 2,054 kA
Ikmin_L_PE = 460,233 A
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Circuit name: **Container Light**
Designation: **-690F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -690F1

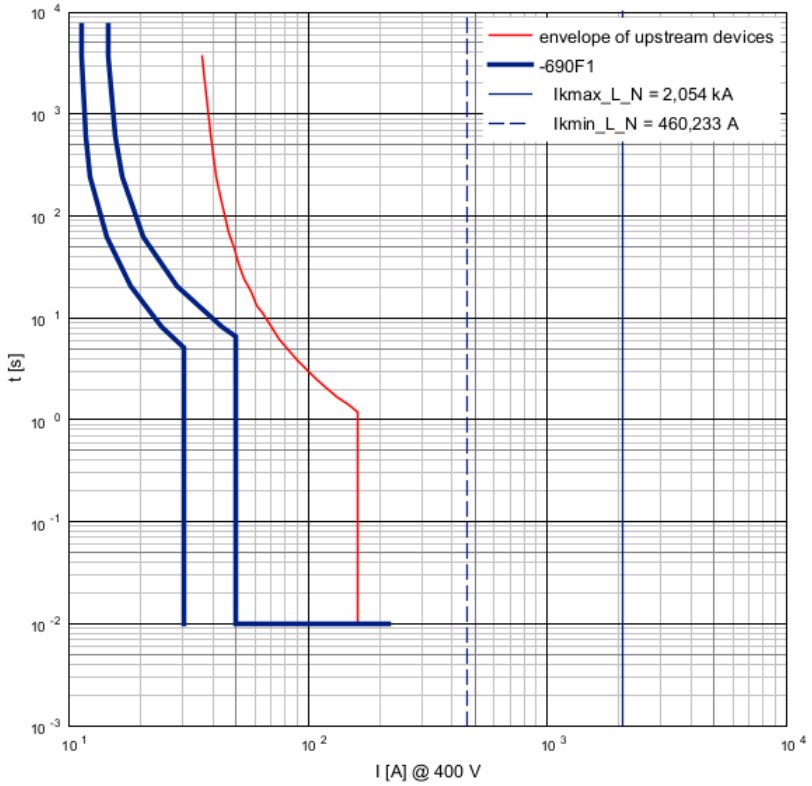
5SU13546KK10

In 10 A

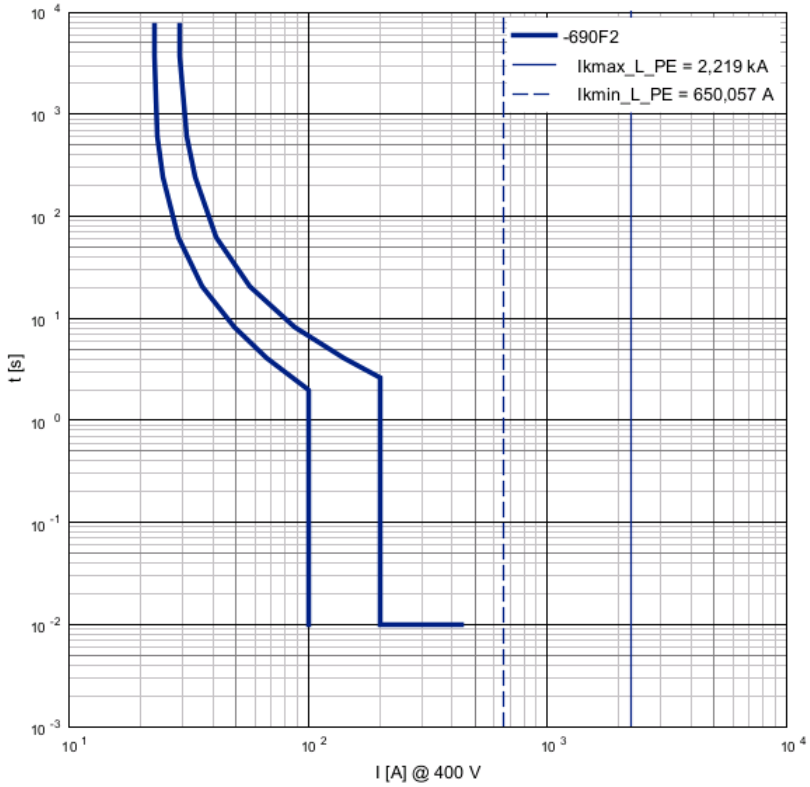
L Protection: On
Ir - corresp. 10 A

I Protection: On
Ii - corresp. 30 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-690F1
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 460,233 A
t [s]
I [A] @ 400 V

Circuit name: **Container Sockets**
Designation: **-690F2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -690F2

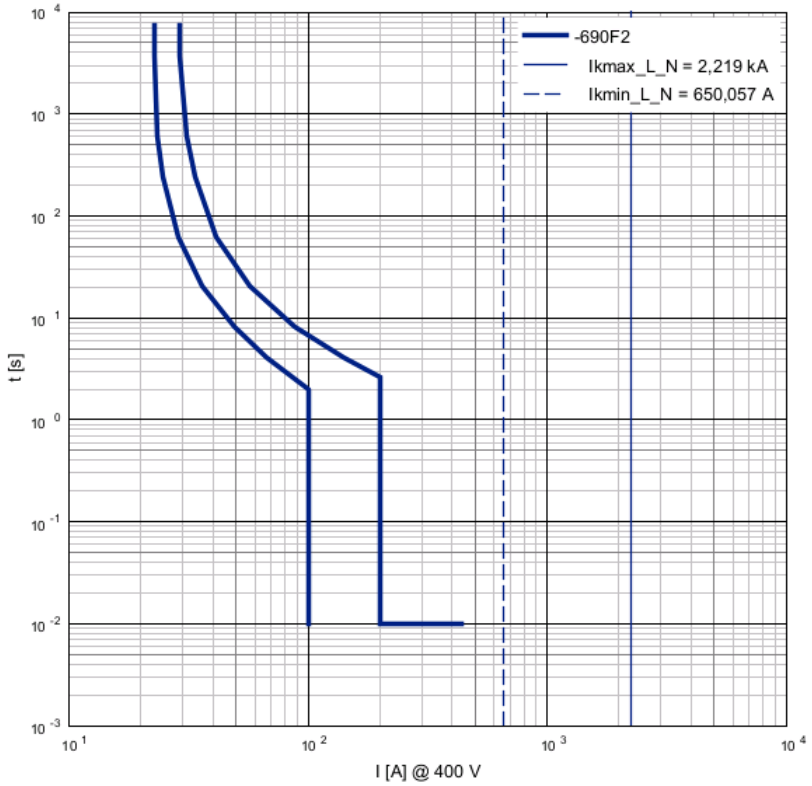
5SU13547KK20

In 20 A

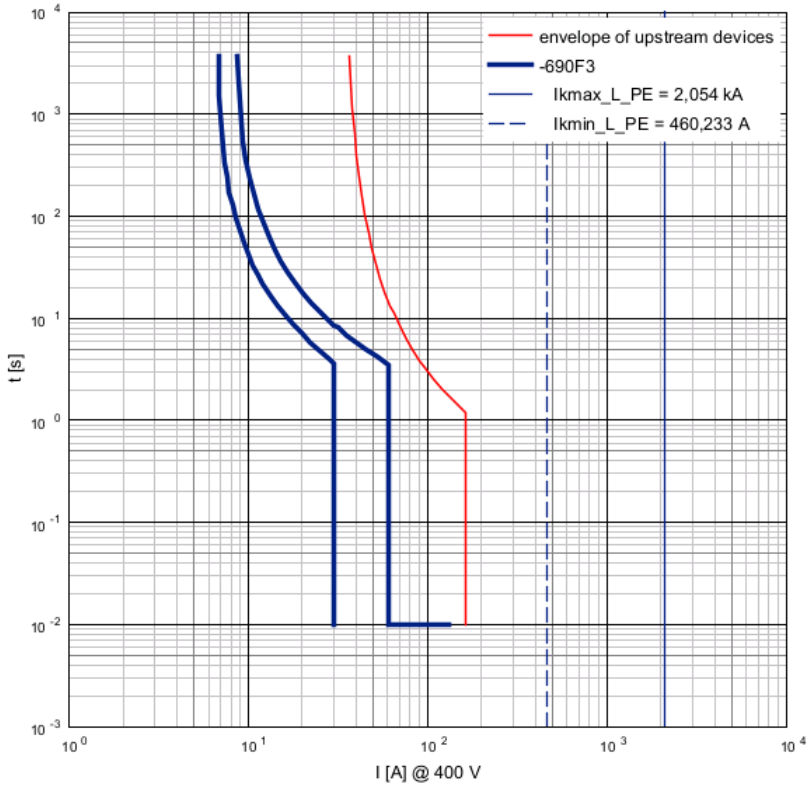
L Protection: On
Ir - corresp. 20 A

I Protection: On
Ii - corresp. 100 A

Short cut current: **Ik1-N**
Selectivity evaluation:


-690F2
Ikmax_L_N = 2,219 kA
Ikmin_L_N = 650,057 A
t [s]
I [A] @ 400 V

Circuit name: **Crane 1**
Designation: **-690F3**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -690F3

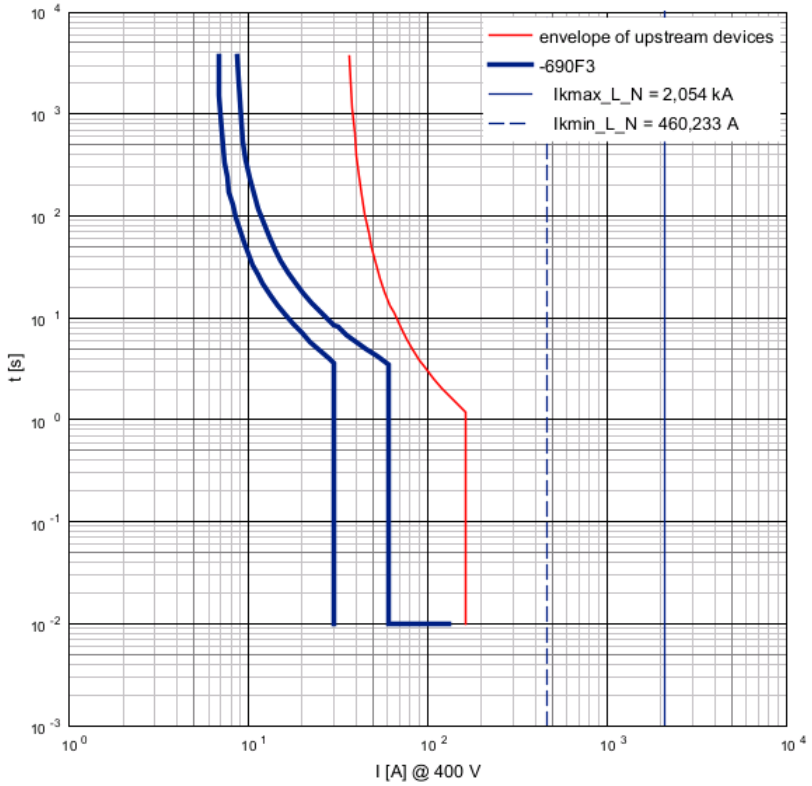
5SY41067

In 6 A

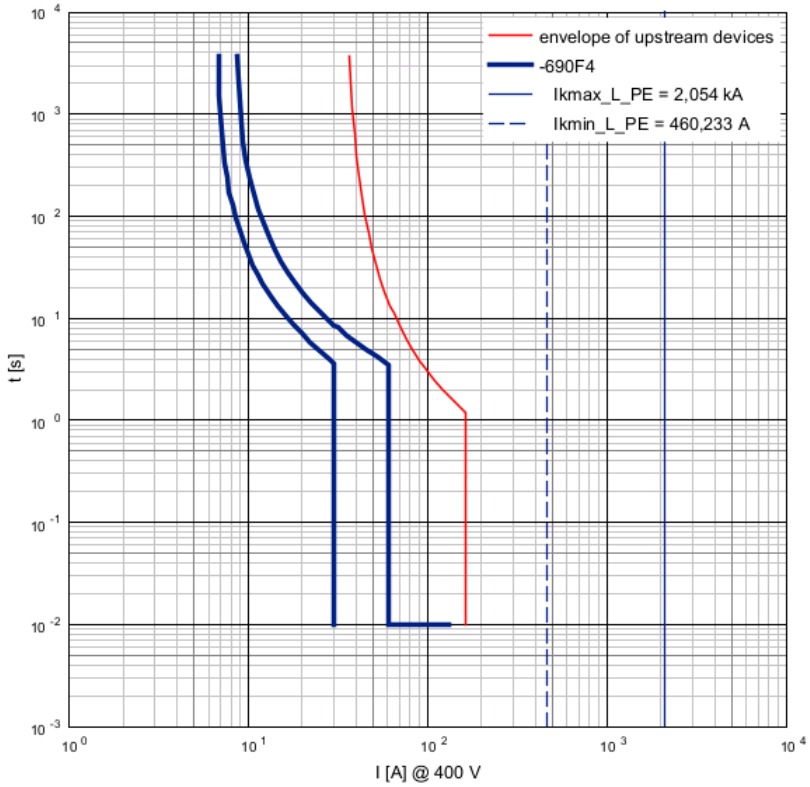
L Protection: On
Ir - corresp. 6 A

I Protection: On
Ii - corresp. 30 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-690F3
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 460,233 A
t [s]
I [A] @ 400 V

Circuit name: **Crane 2**
Designation: **-690F4**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -690F4

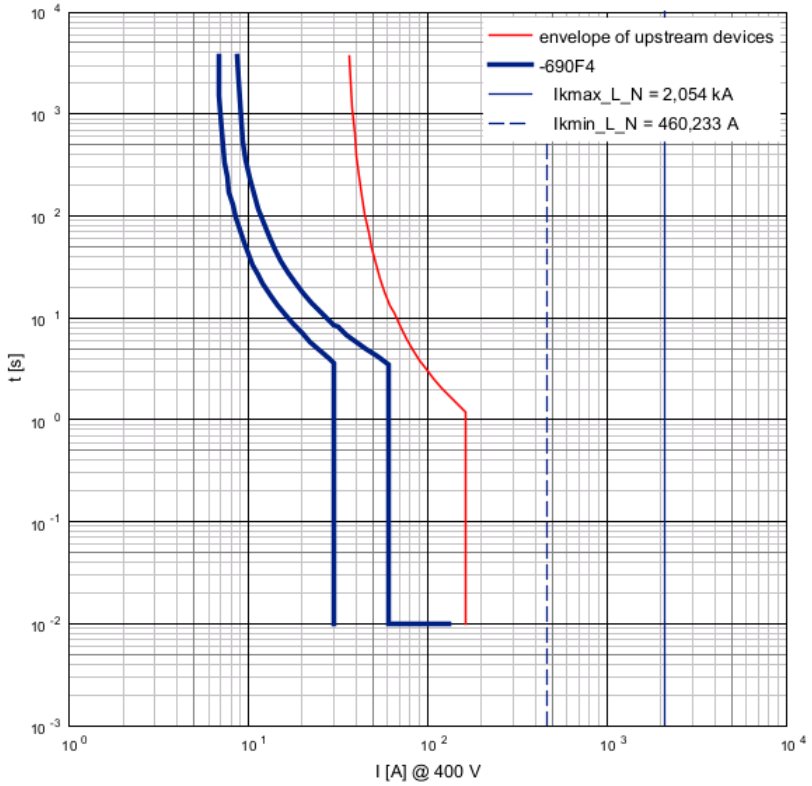
5SY41067

In 6 A

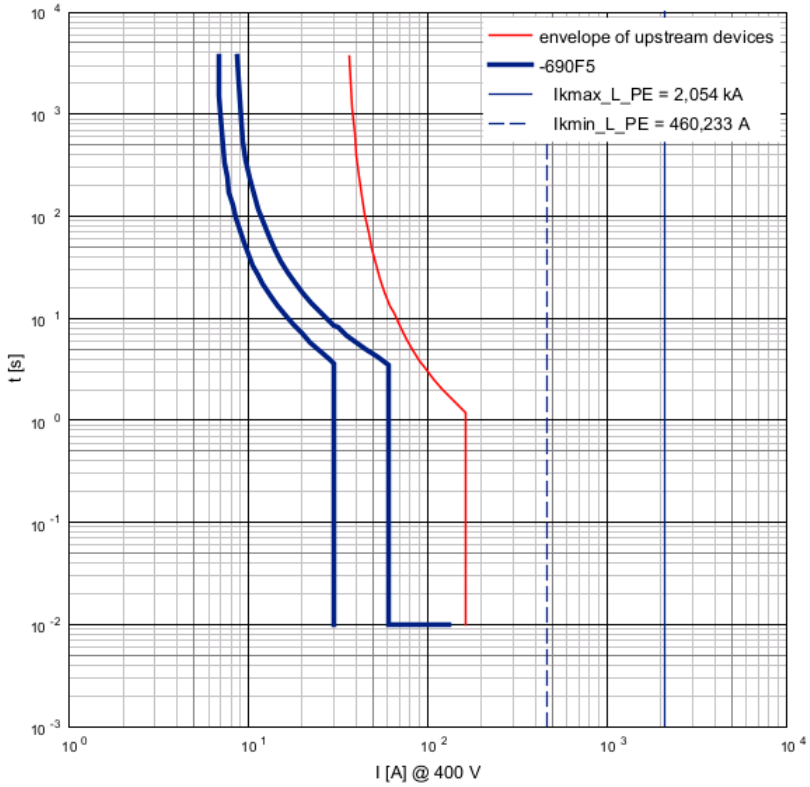
L Protection: On
Ir - corresp. 6 A

I Protection: On
Ii - corresp. 30 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-690F4
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 460,233 A
t [s]
I [A] @ 400 V

Circuit name: **Crane 3**
Designation: **-690F5**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -690F5

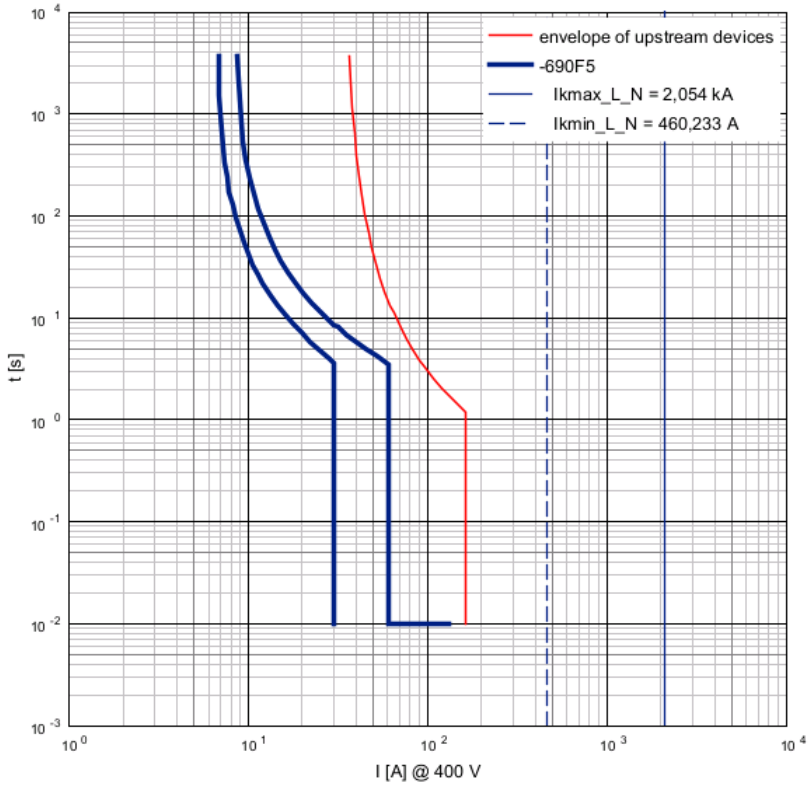
5SY41067

In 6 A

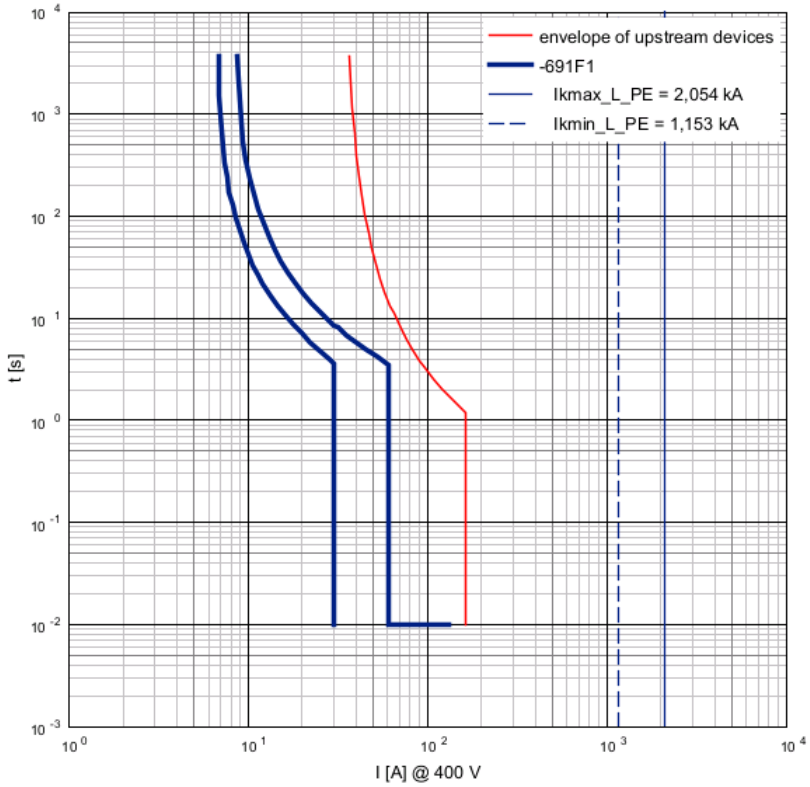
L Protection: On
Ir - corresp. 6 A

I Protection: On
Ii - corresp. 30 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-690F5
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 460,233 A
t [s]
I [A] @ 400 V

Circuit name: **Exhaust Unit / shut-off flap**
Designation: **-691F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -691F1

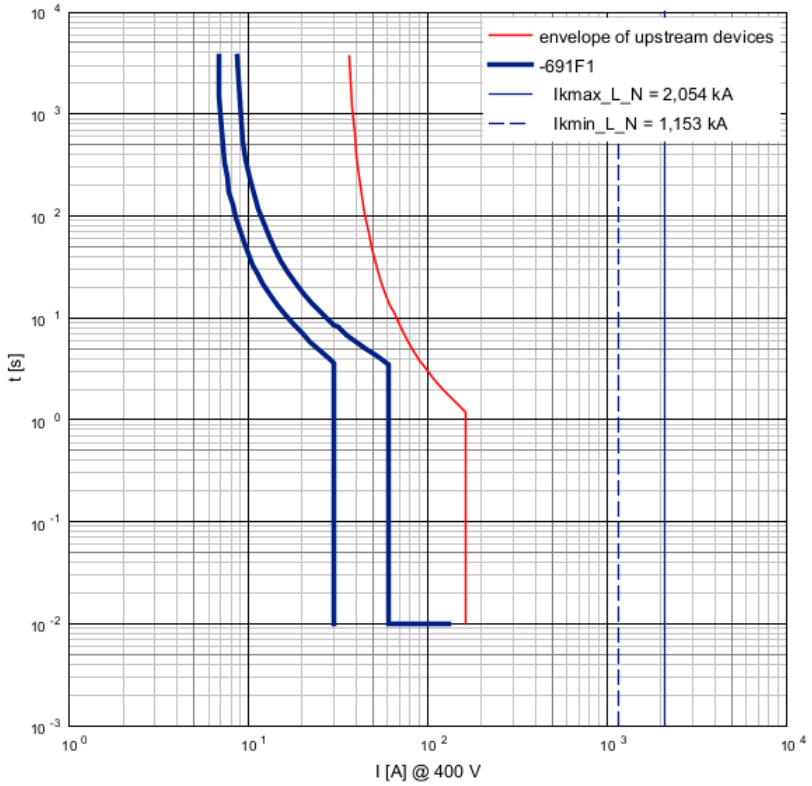
5SY41067

In 6 A

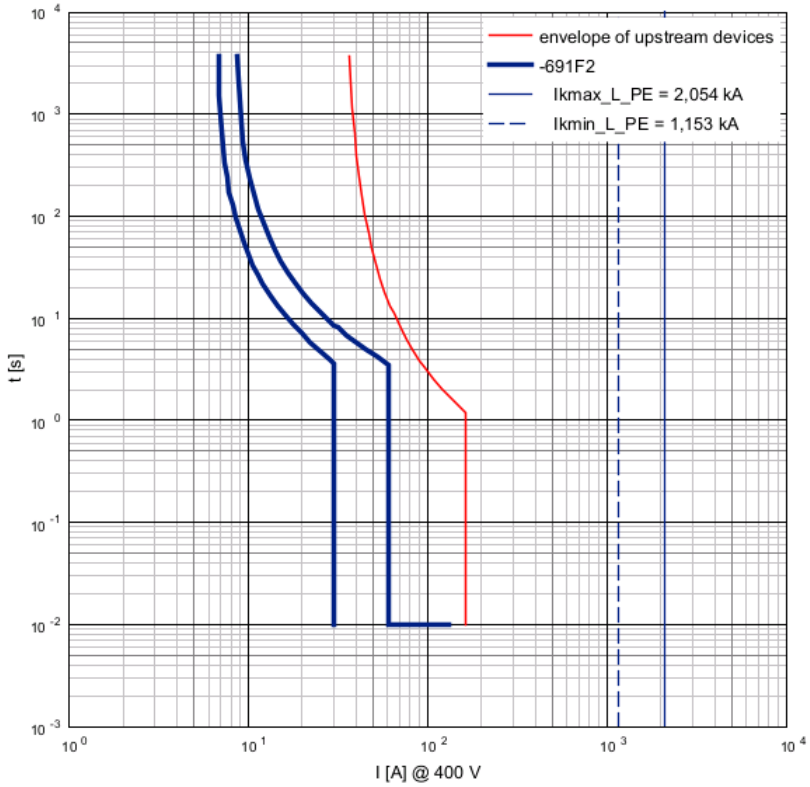
L Protection: On
Ir - corresp. 6 A

I Protection: On
Ii - corresp. 30 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-691F1
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 1,153 kA
t [s]
I [A] @ 400 V

Circuit name: **Exhaust Unit / shut-off flap**
Designation: **-691F2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -691F2

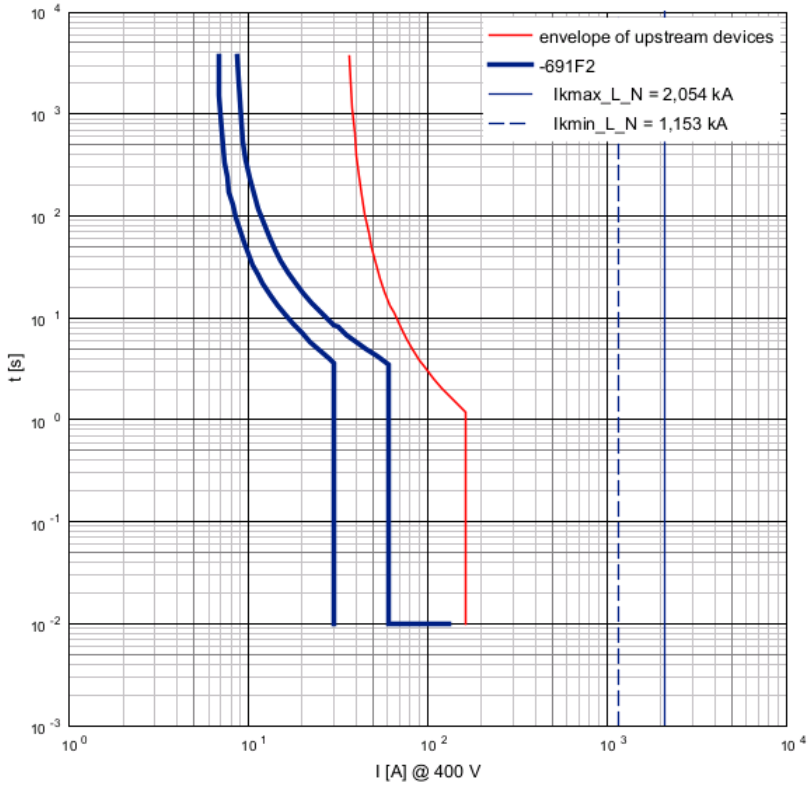
5SY41067

In 6 A

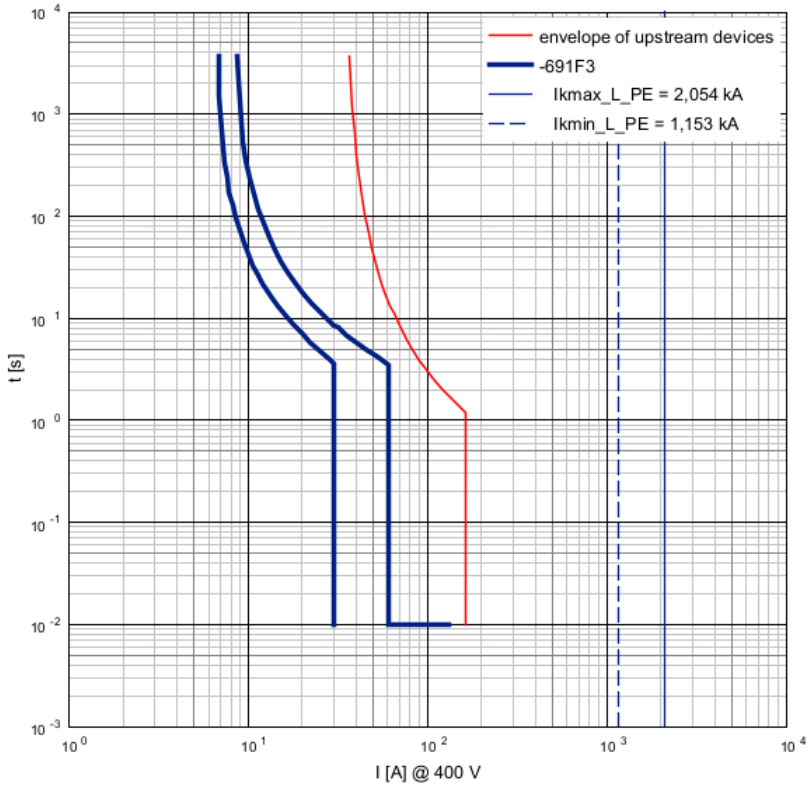
L Protection: On
Ir - corresp. 6 A

I Protection: On
Ii - corresp. 30 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-691F2
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 1,153 kA
t [s]
I [A] @ 400 V

Circuit name: **Exhaust Unit / shut-off flap**
Designation: **-691F3**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -691F3

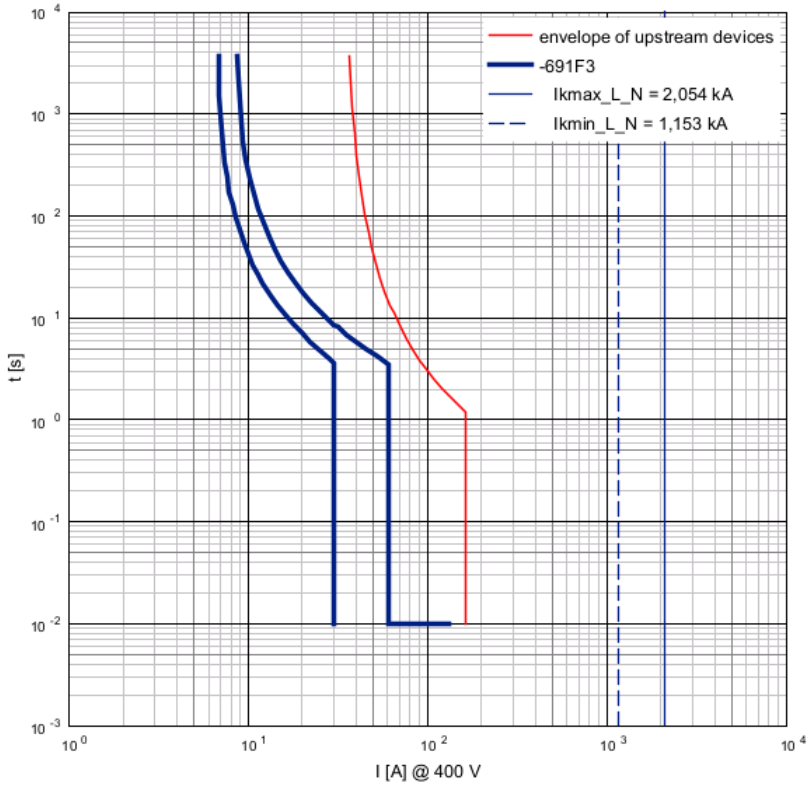
5SY41067

In 6 A

L Protection: On
Ir - corresp. 6 A

I Protection: On
Ii - corresp. 30 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-691F3
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 1,153 kA
t [s]
I [A] @ 400 V

Selectivity evaluation

created with

SIMARIS design

Version: 24.1.0 (2024-05-07)
Subrevision: 1218

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Master data

Project name:	Shell Crosswind Offshore
Project description:	BESS FQ 1MW 5MWh
Editor:	Freqcon_DG
Planning office:	Freqcon GmbH
Created at:	Wednesday, 4. September 2024
Changed at:	Tuesday, 8. October 2024

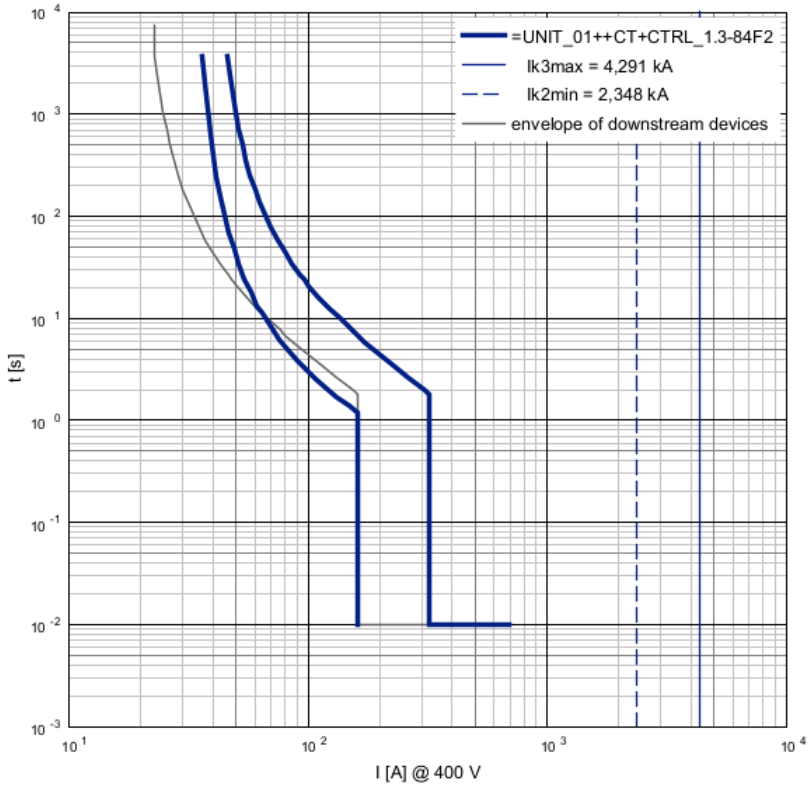
Customer data

City:	
Customer:	Statron AG

Comment:

Converter Container

Circuit name: **NSUV 3.1**
Designation: **=UNIT_01++CT+CTRL_1.3-84F2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: =UNIT_01++CT+CTRL_1.3-84F2

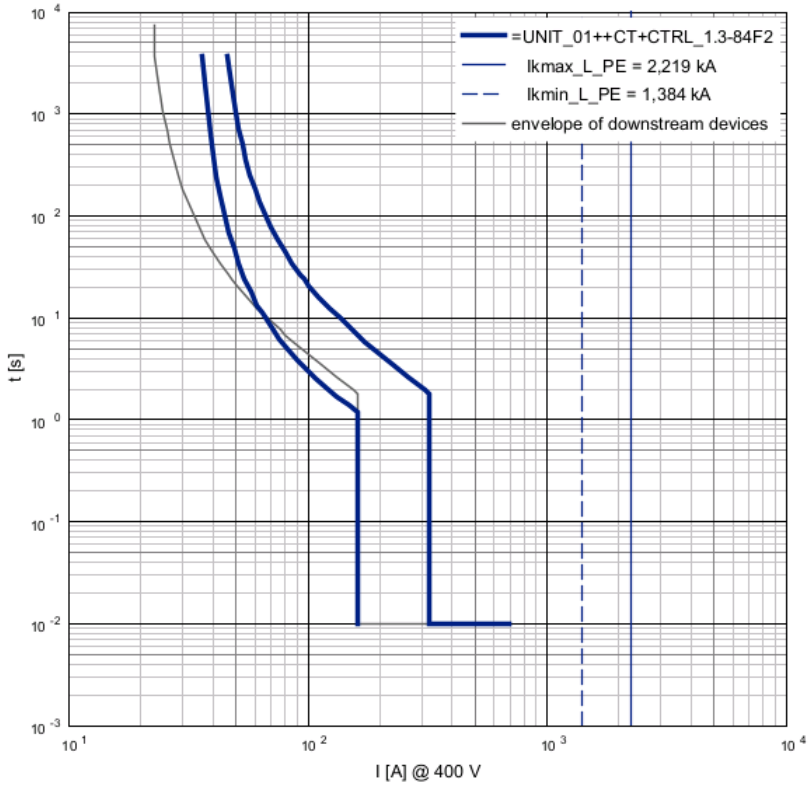
5SY43327

In 32 A

L Protection: On
Ir - corresp. 32 A

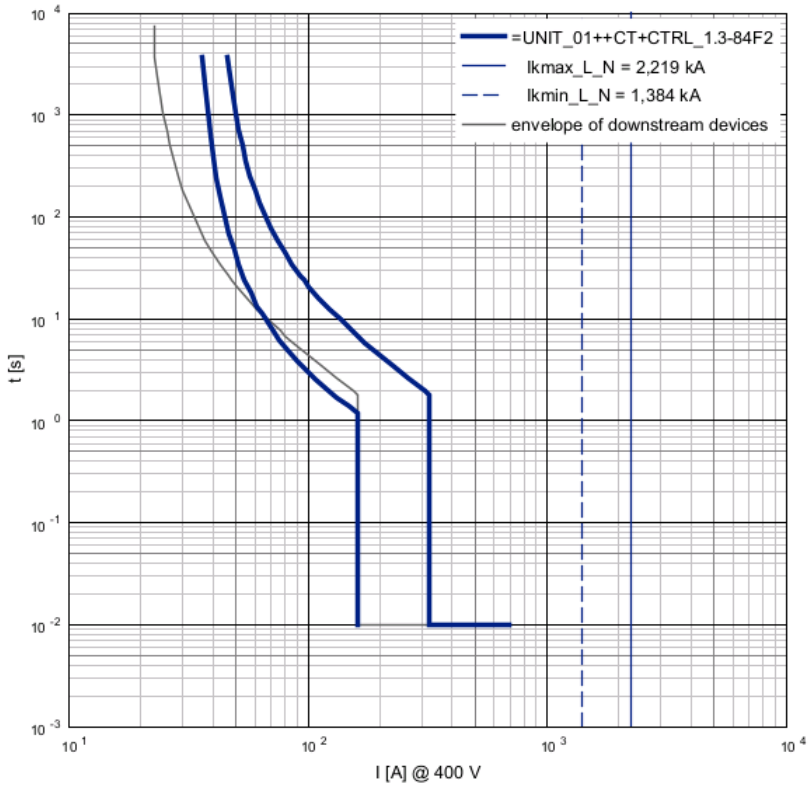
I Protection: On
Ii - corresp. 160 A

Short cut current: **Ik1-PE**
Selectivity evaluation:

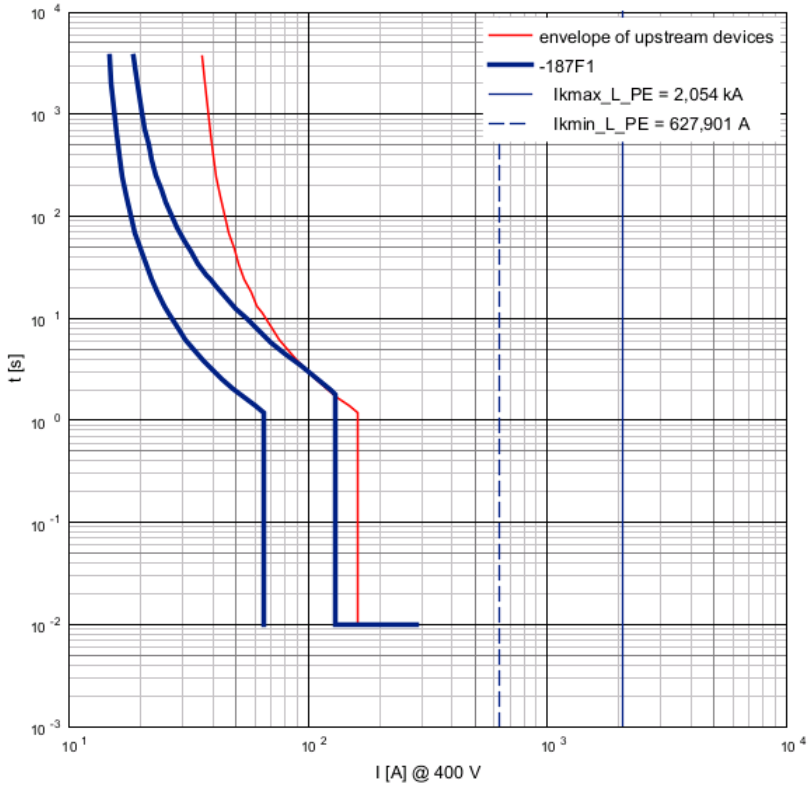

=UNIT_01++CT+CTRL_1.3-84F2
Ikmax_L_PE = 2,219 kA
Ikmin_L_PE = 1,384 kA
envelope of downstream devices
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Circuit name: **230V 3WL**
Designation: **-187F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -187F1

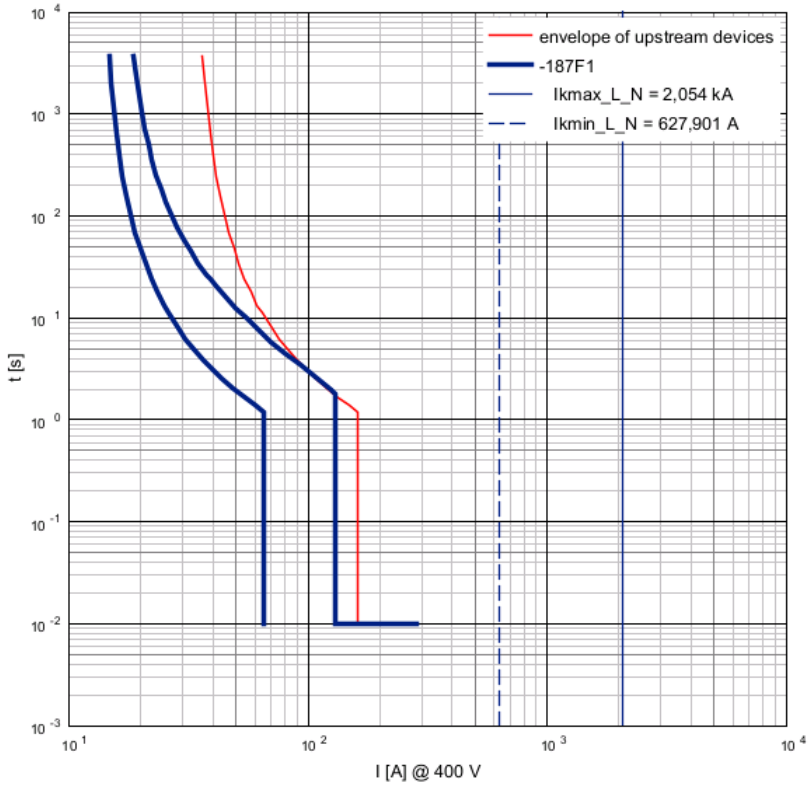
5SY41137

In 13 A

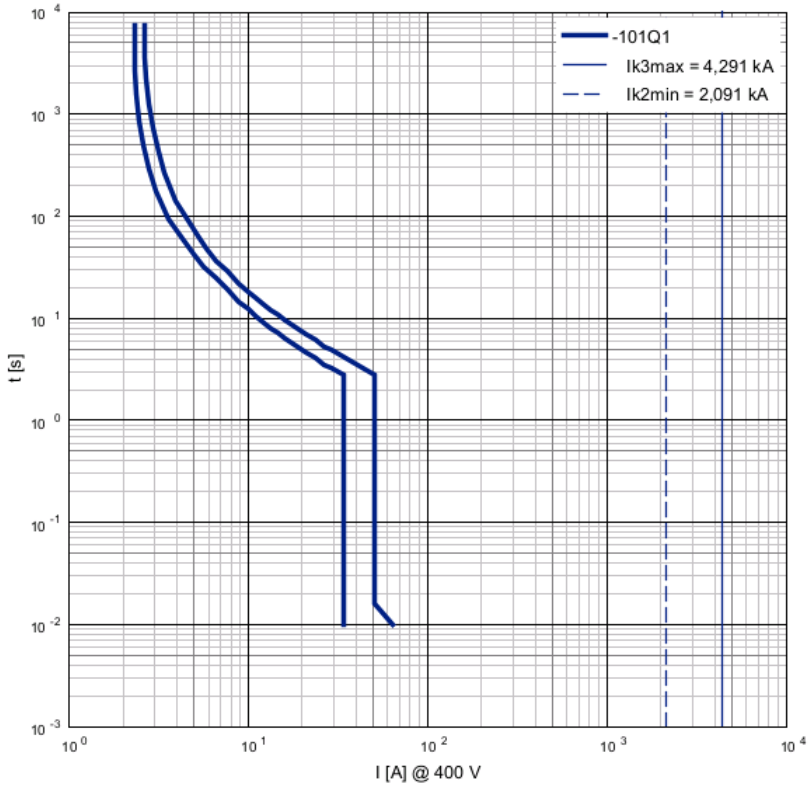
L Protection: On
Ir - corresp. 13 A

I Protection: On
Ii - corresp. 65 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-187F1
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 627,901 A
t [s]
I [A] @ 400 V

Circuit name: **400V/24V Power Supply**
Designation: **-101Q1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -101Q1

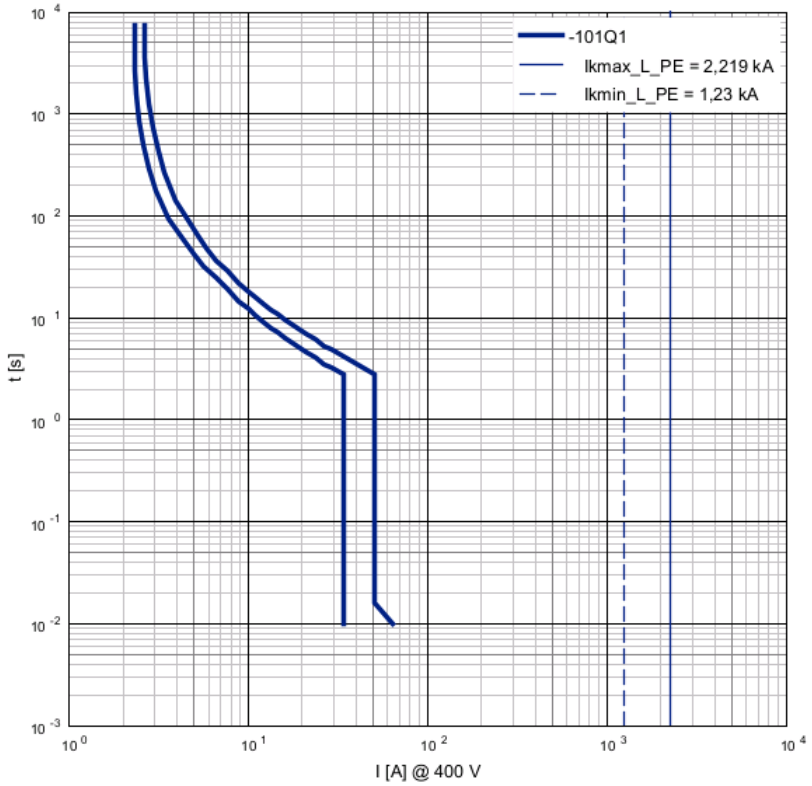
3RV20111DA25

In 3.2 A

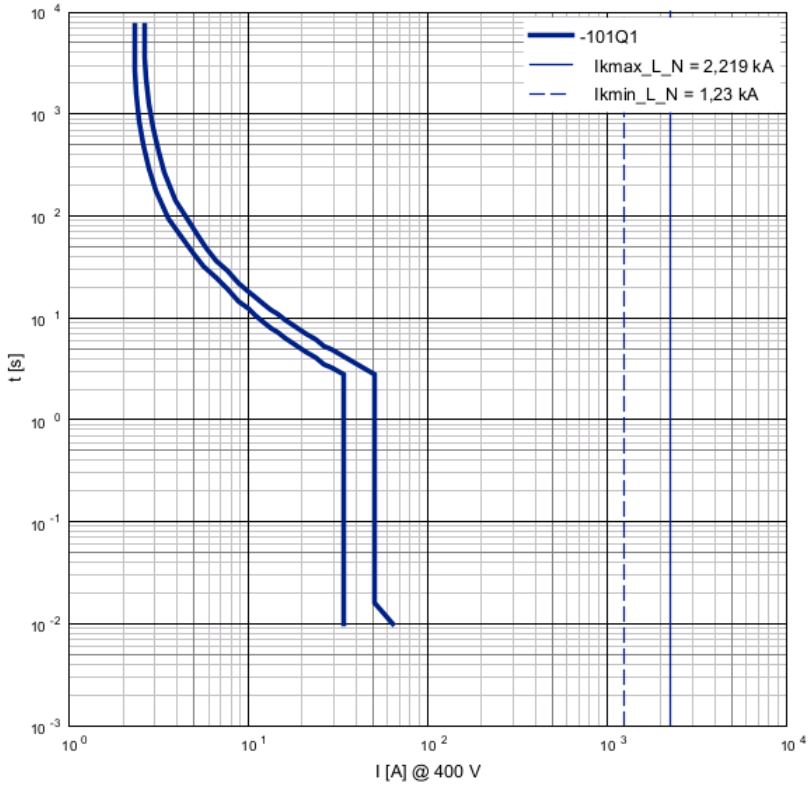
L Protection: On
Ir - corresp. 2.2 A
tr 10 s

I Protection: On
Ii - corresp. 42 A

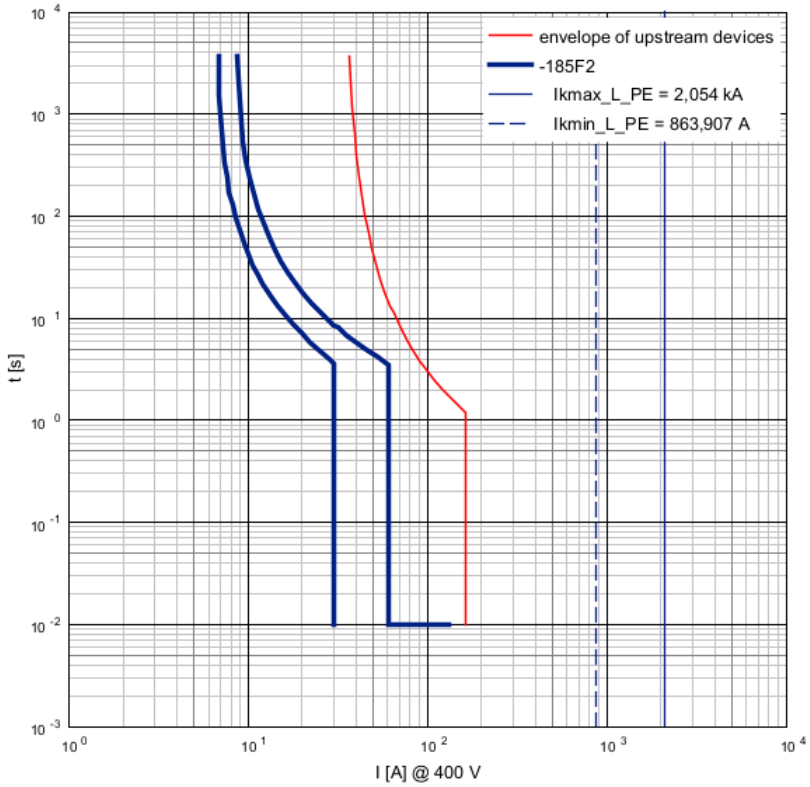
Short cut current: **Ik1-PE**
Selectivity evaluation:


-101Q1
Ikmax_L_PE = 2,219 kA
Ikmin_L_PE = 1,23 kA
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**
Selectivity evaluation:



Circuit name: **Cabinet Heating**
Designation: **-185F2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -185F2

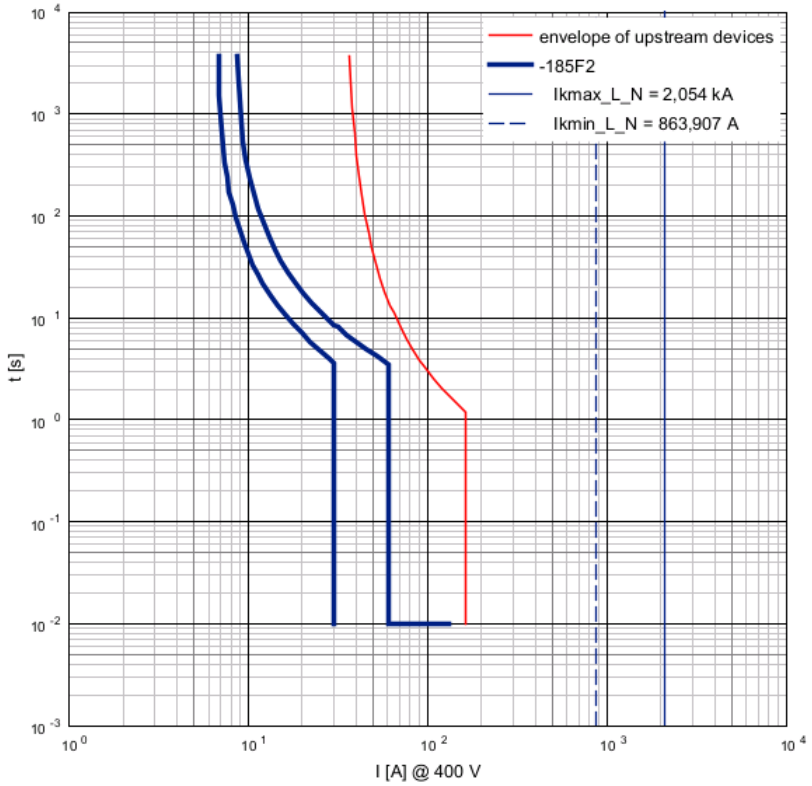
5SY41067

In 6 A

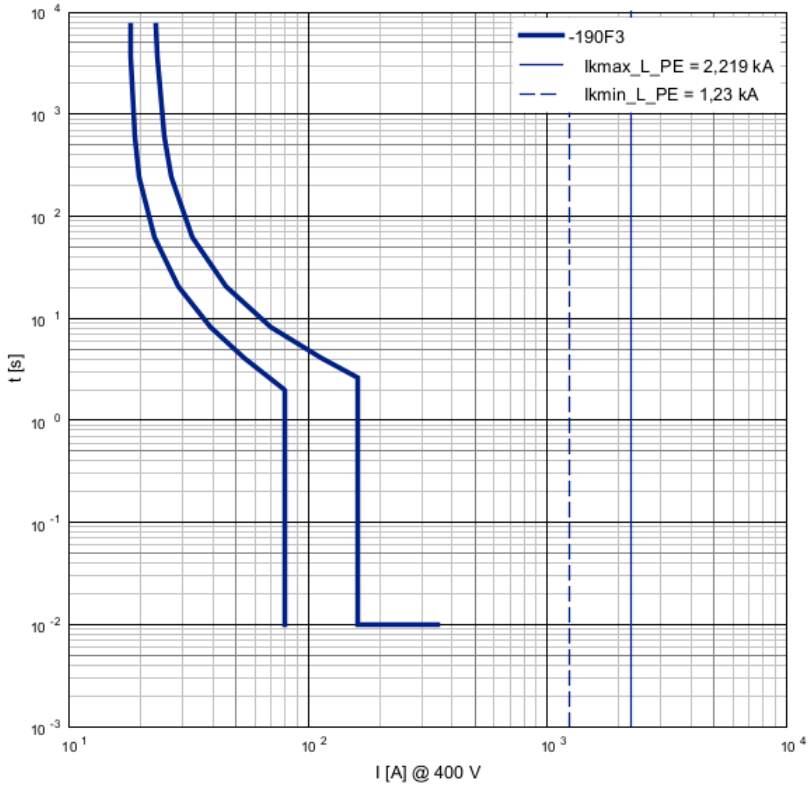
L Protection: On
Ir - corresp. 6 A

I Protection: On
Ii - corresp. 30 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-185F2
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 863,907 A
t [s]
I [A] @ 400 V

Circuit name: **Cabinet Light / Socket**
Designation: **-190F3**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -190F3

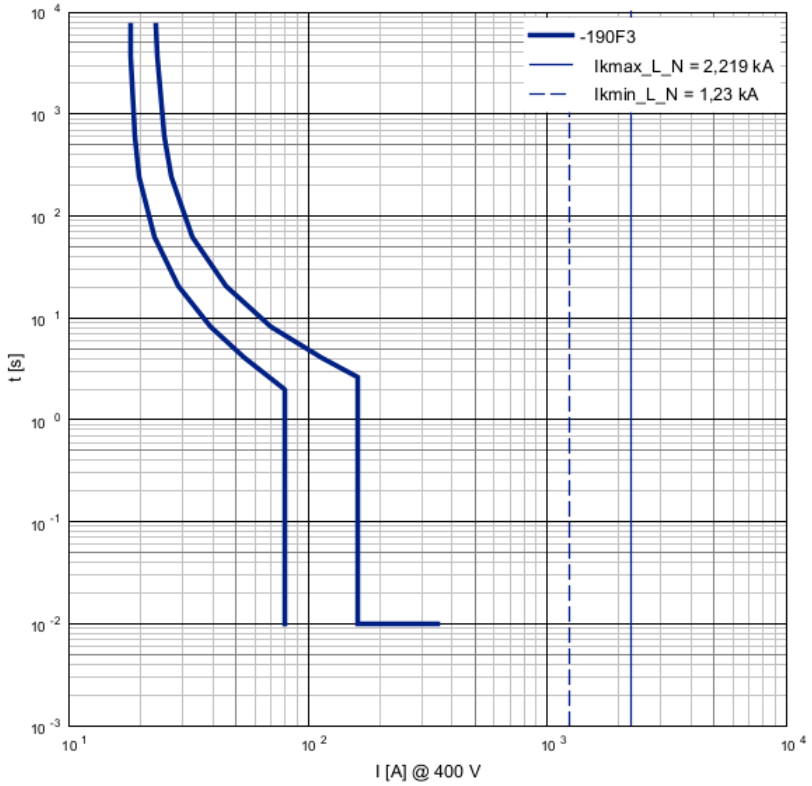
5SU13547KK16

In 16 A

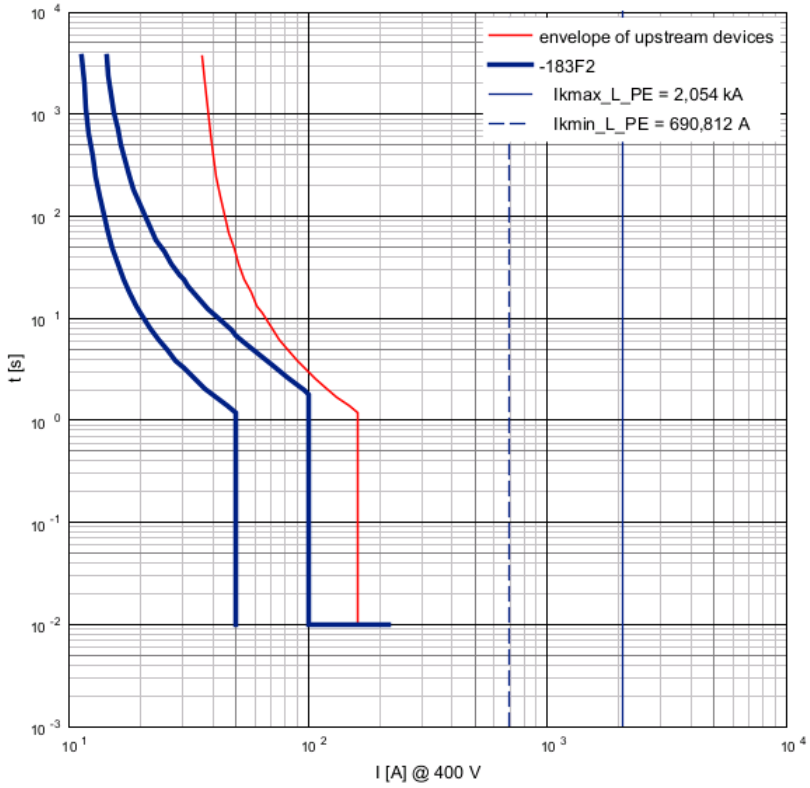
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


-190F3
Ikmax_L_N = 2,219 kA
Ikmin_L_N = 1,23 kA
t [s]
I [A] @ 400 V

Circuit name: **CIR Cabinet Fans**
Designation: **-183F2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -183F2

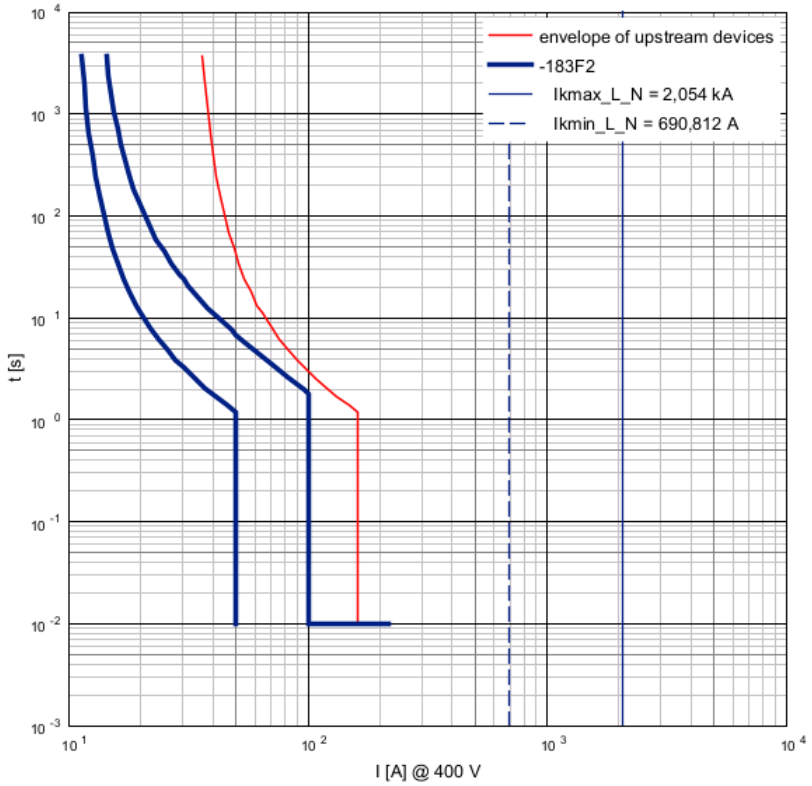
5SY41107

In 10 A

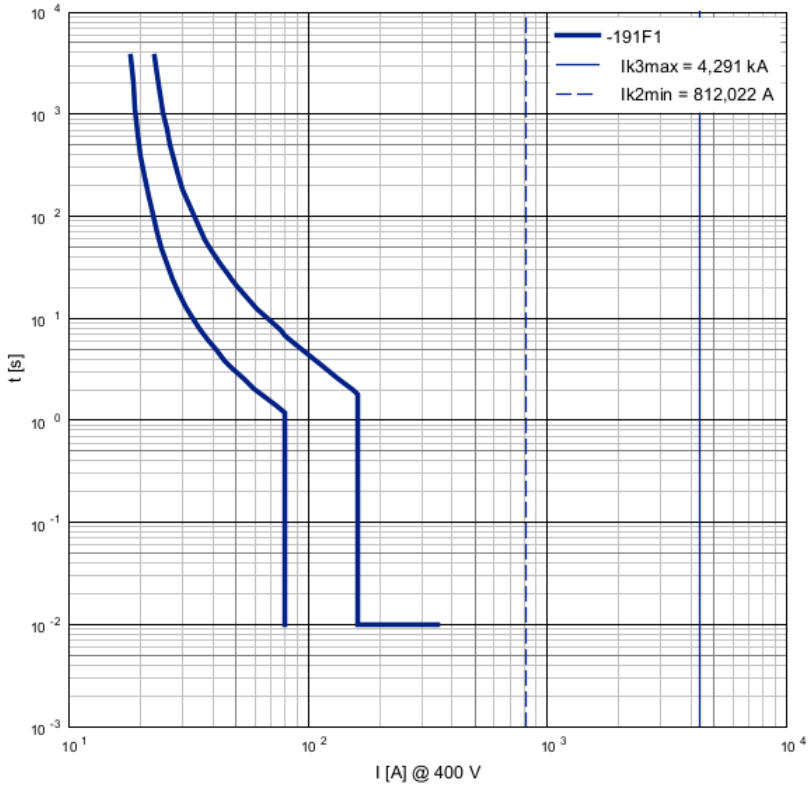
L Protection: On
Ir - corresp. 10 A

I Protection: On
Ii - corresp. 50 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-183F2
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **Clima 1**
Designation: **-191F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -191F1

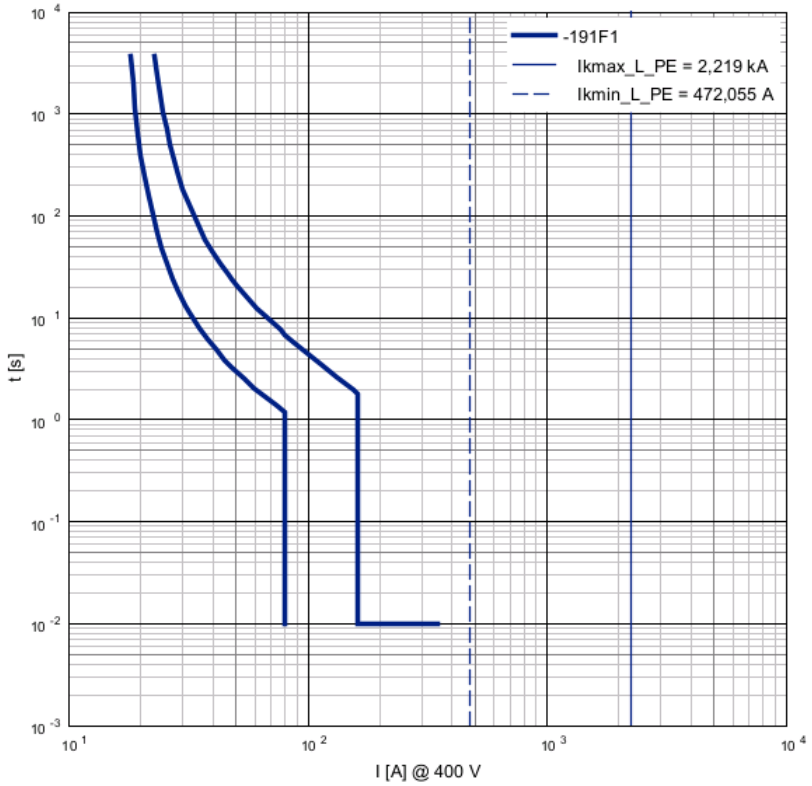
5SY43167

In 16 A

L Protection: On
Ir - corresp. 16 A

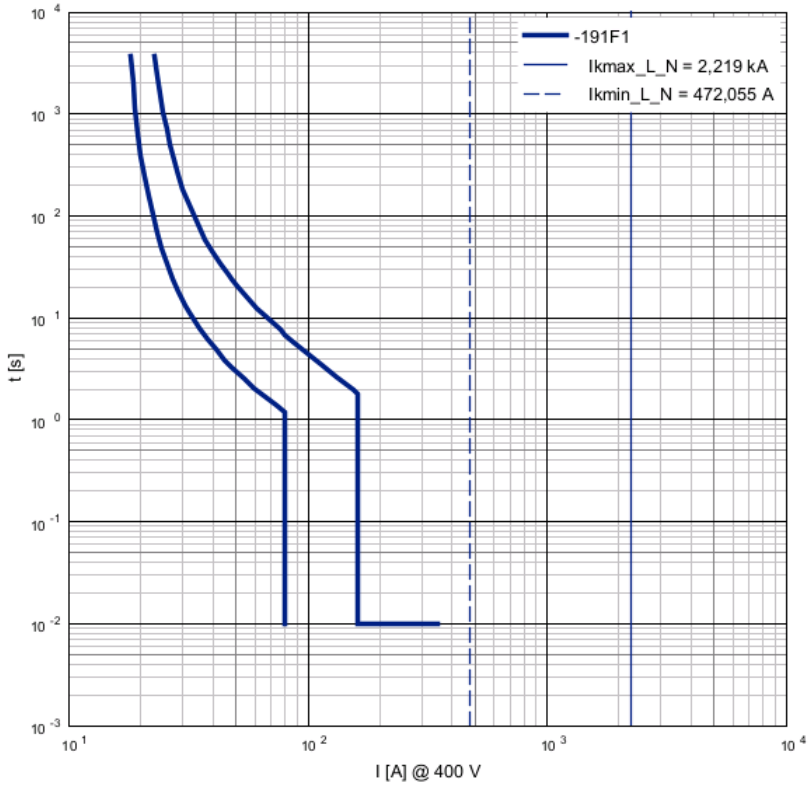
I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-PE**
Selectivity evaluation:

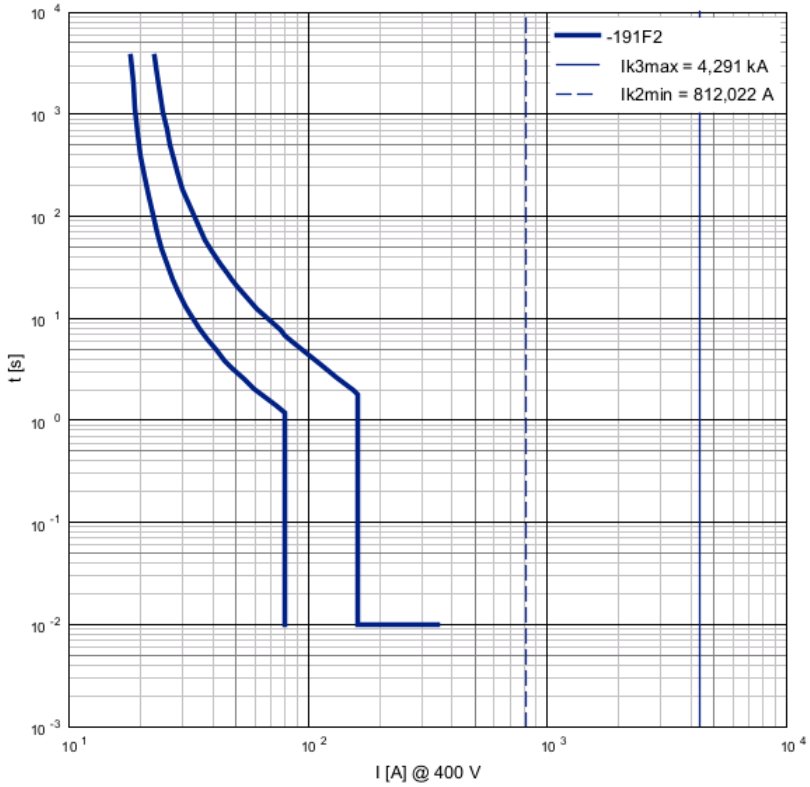

-191F1
Ikmax_L_PE = 2,219 kA
Ikmin_L_PE = 472,055 A
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Circuit name: **Clima 2**
Designation: **-191F2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -191F2

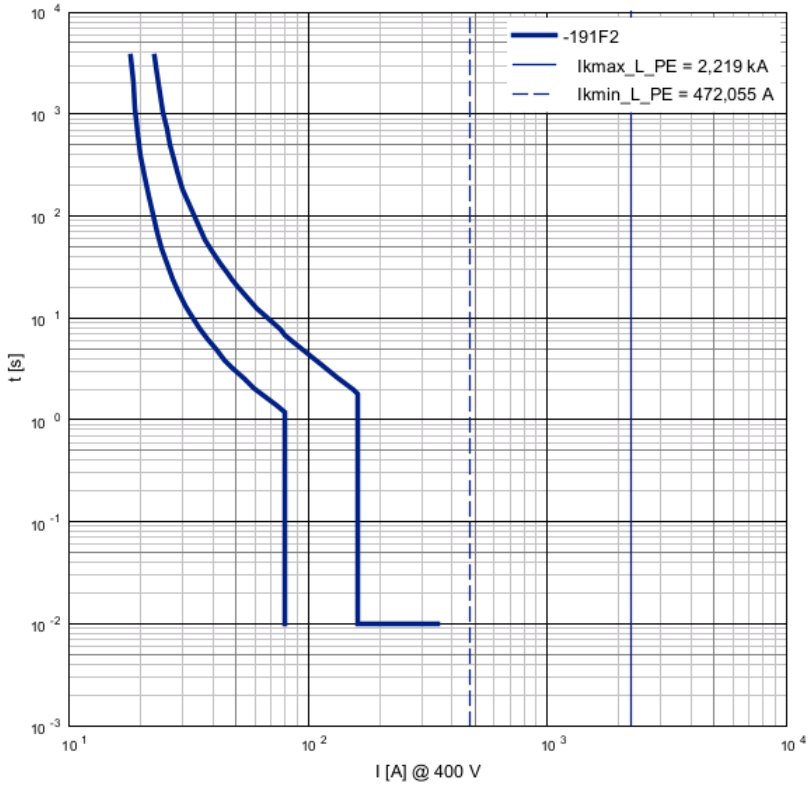
5SY43167

In 16 A

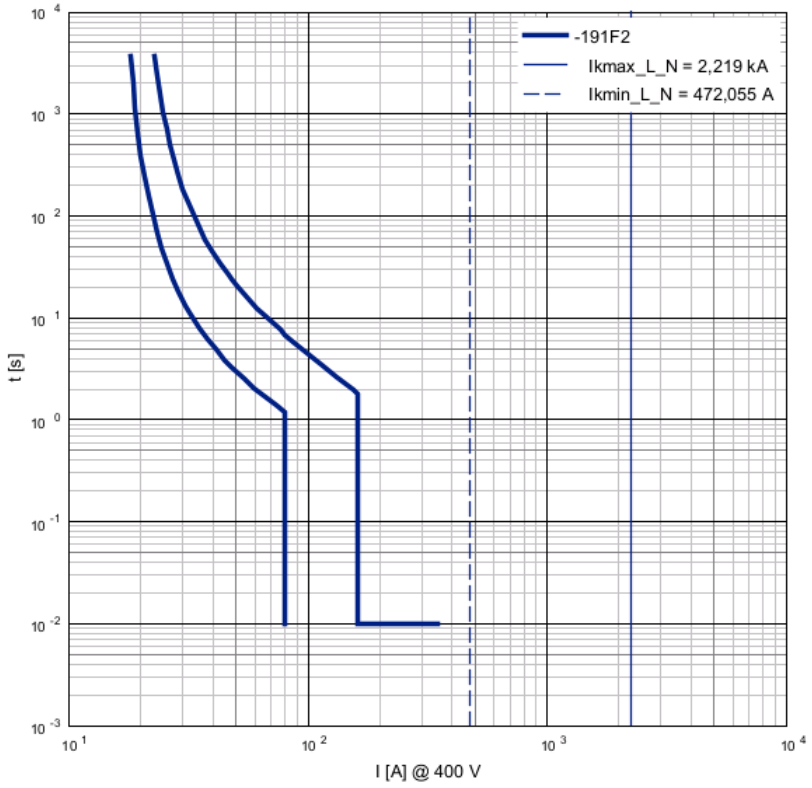
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

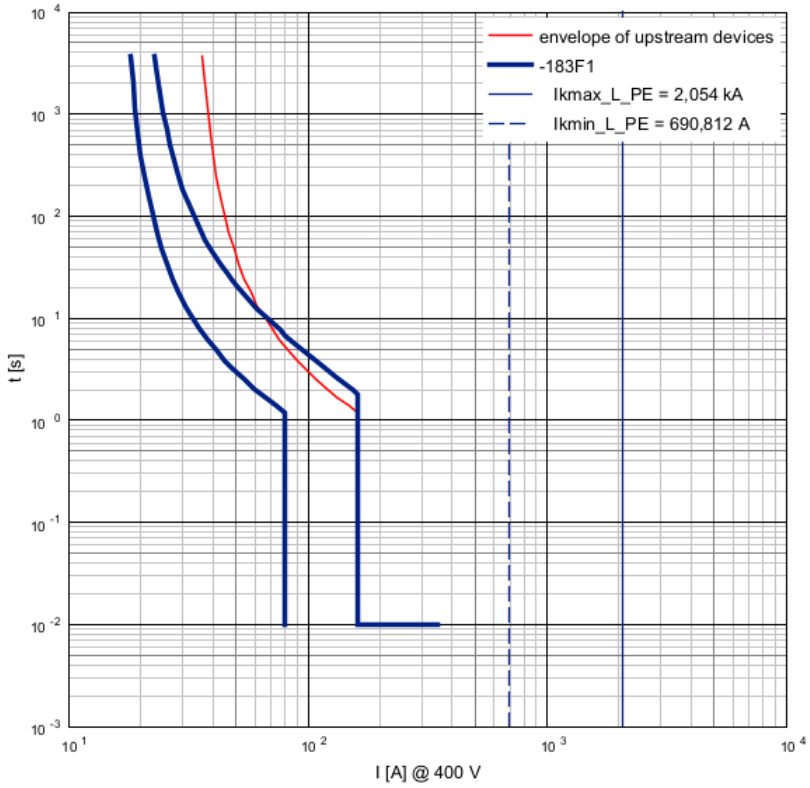
Short cut current: **Ik1-PE**
Selectivity evaluation:


-191F2
Ikmax_L_PE = 2,219 kA
Ikmin_L_PE = 472,055 A
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**
Selectivity evaluation:



Circuit name: **CON Cabinet Fans**
Designation: **-183F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -183F1

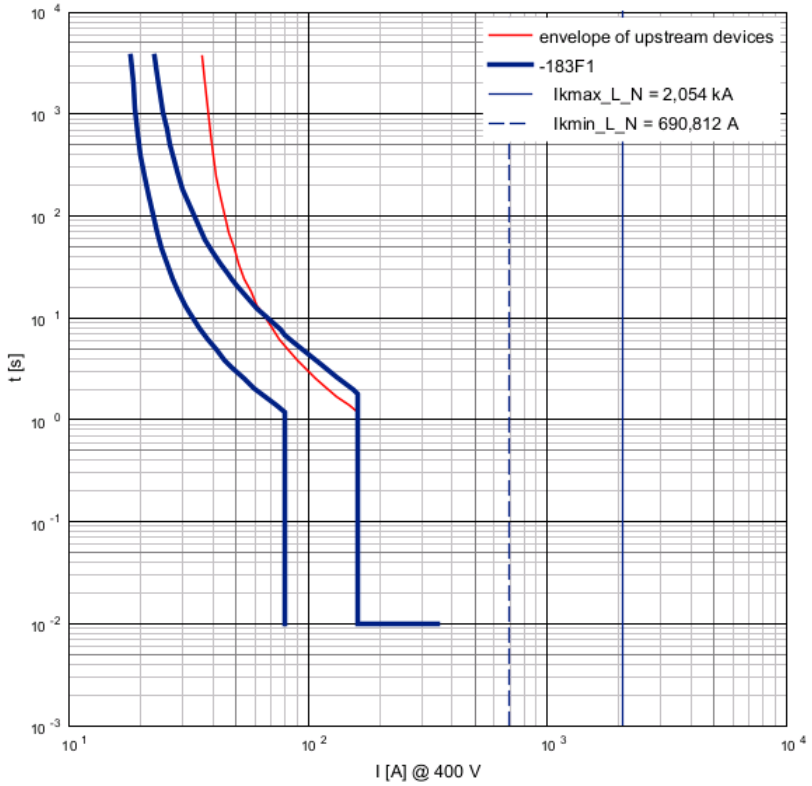
5SY41167

In 16 A

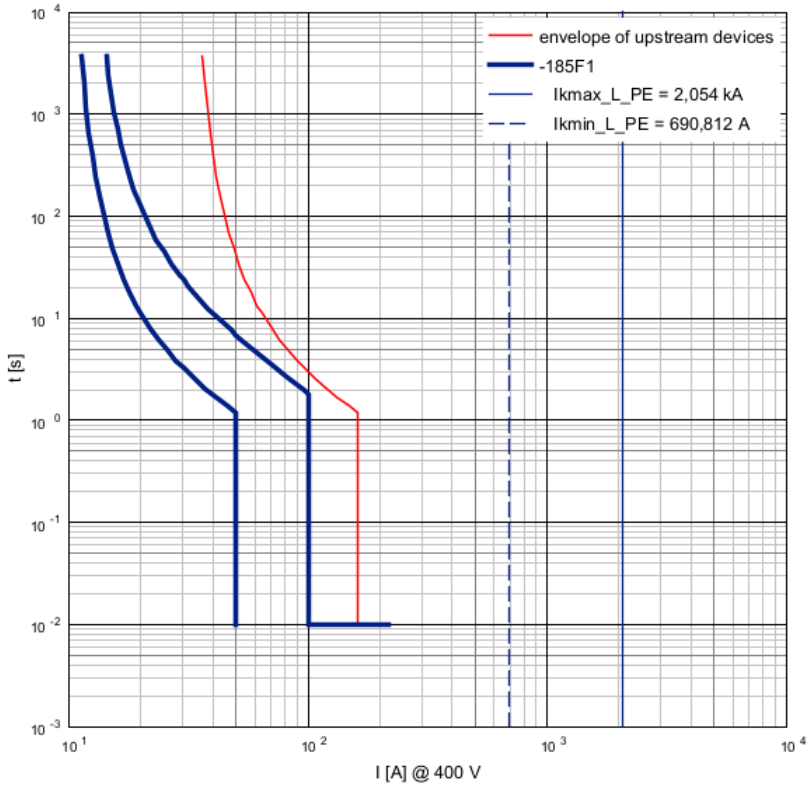
L Protection: On
Ir - corresp. 16 A

I Protection: On
Ii - corresp. 80 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-183F1
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **CTRL Cabinet Fan**
Designation: **-185F1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik1-PE**
Selectivity evaluation:



Switch settings:

Designation: -185F1

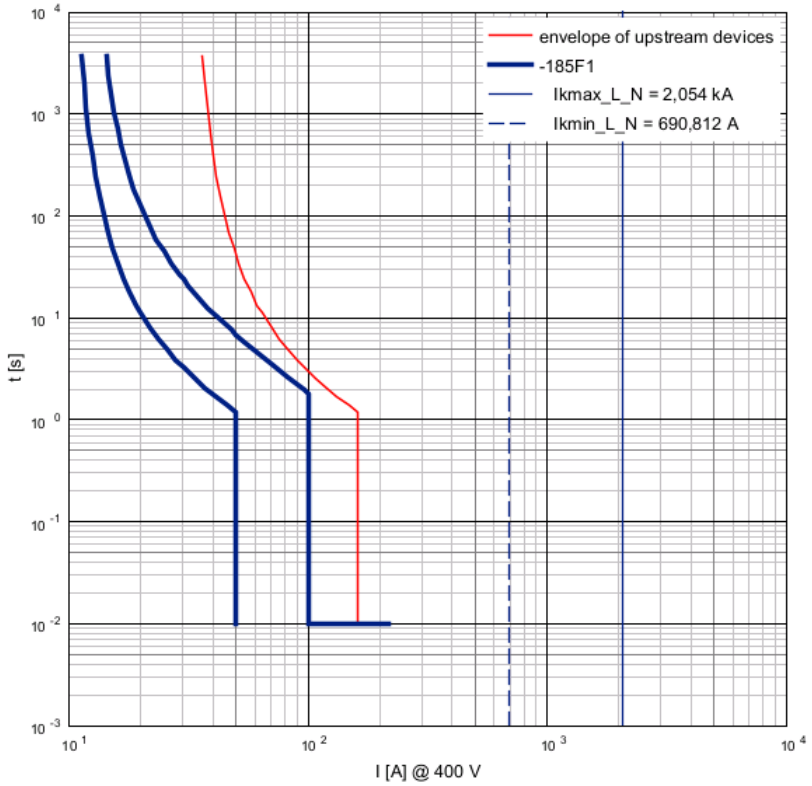
5SY41107

In 10 A

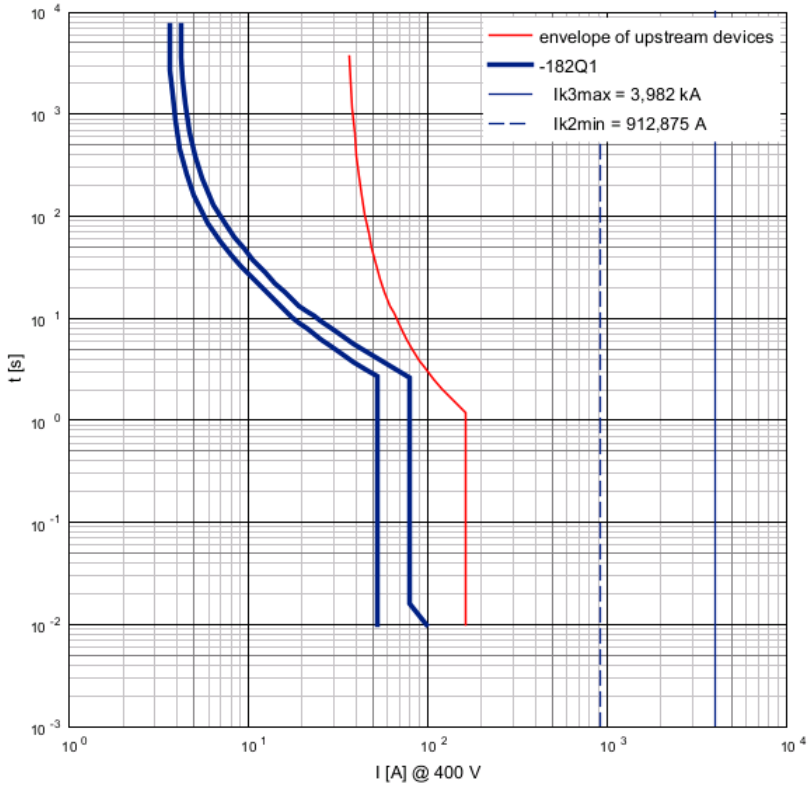
L Protection: On
Ir - corresp. 10 A

I Protection: On
Ii - corresp. 50 A

Short cut current: **Ik1-N**
Selectivity evaluation:


envelope of upstream devices
-185F1
Ikmax_L_N = 2,054 kA
Ikmin_L_N = 690,812 A
t [s]
I [A] @ 400 V

Circuit name: **Fan Heat Exchanger**
Designation: **-182Q1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -182Q1

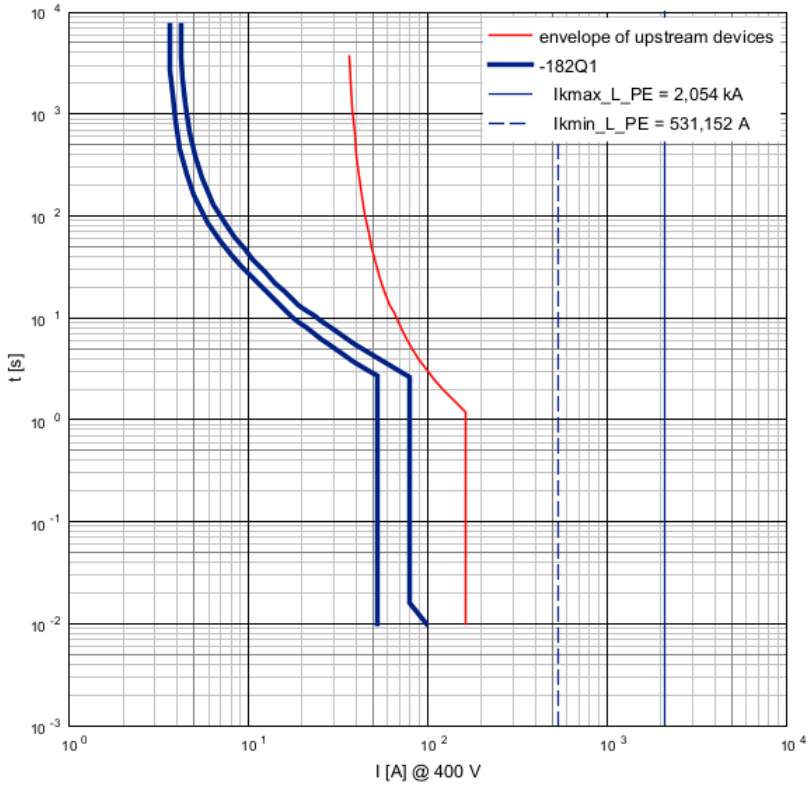
3RV20111FA25

In 5 A

L Protection: On
Ir - corresp. 3.5 A
tr 10 s

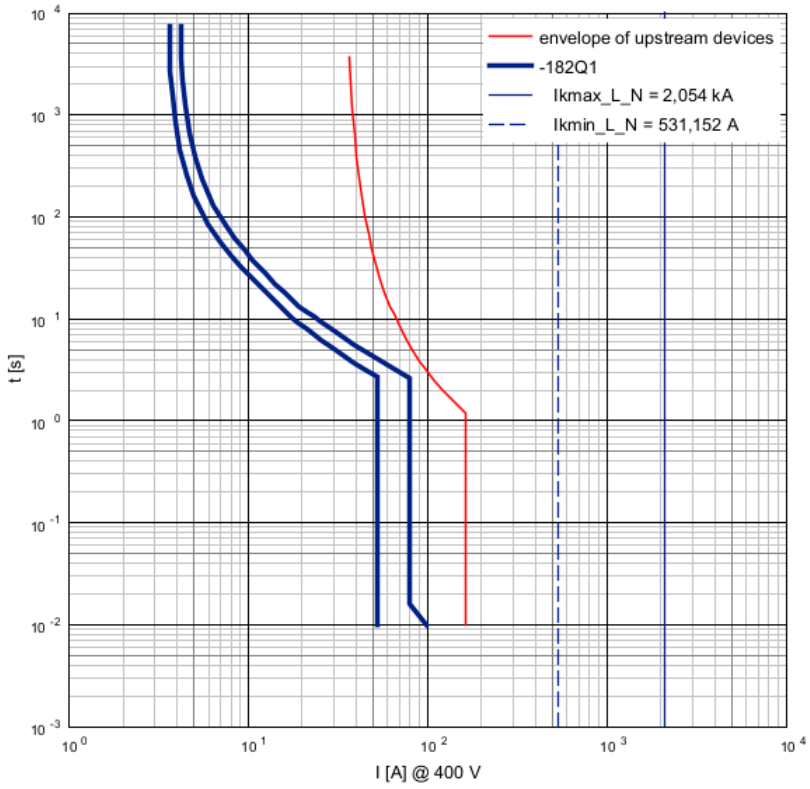
I Protection: On
Ii - corresp. 65 A

Short cut current: **Ik1-PE**
Selectivity evaluation:

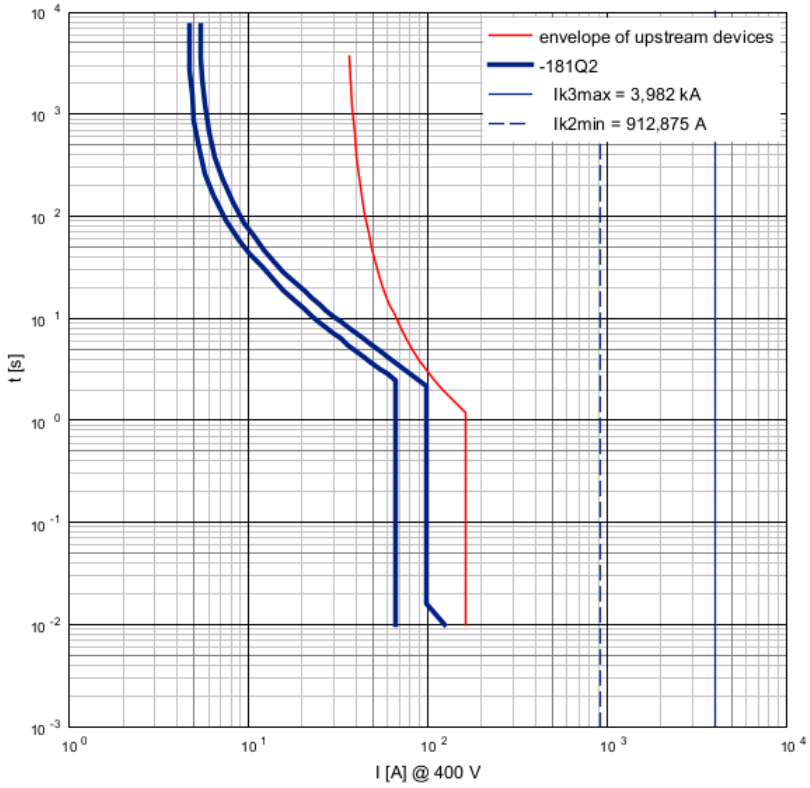

envelope of upstream devices
-182Q1
Ikmax_L_PE = 2,054 kA
Ikmin_L_PE = 531,152 A
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Circuit name: **Water Heating**
Designation: **-181Q2**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -181Q2

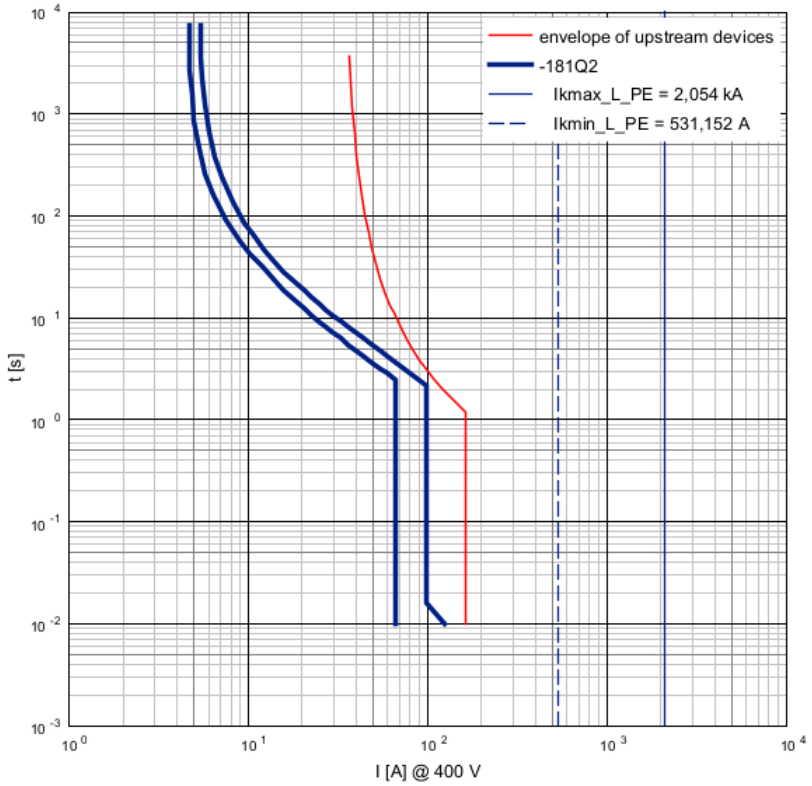
3RV20111GA25

In 6.3 A

L Protection: On
Ir - corresp. 4.5 A
tr 10 s

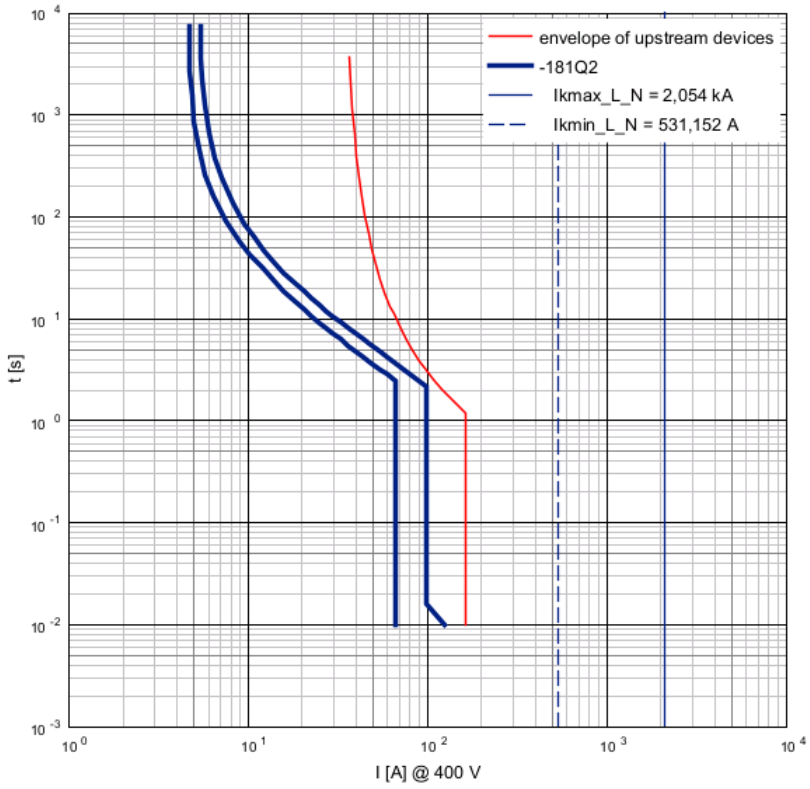
I Protection: On
Ii - corresp. 82 A

Short cut current: **Ik1-PE**
Selectivity evaluation:

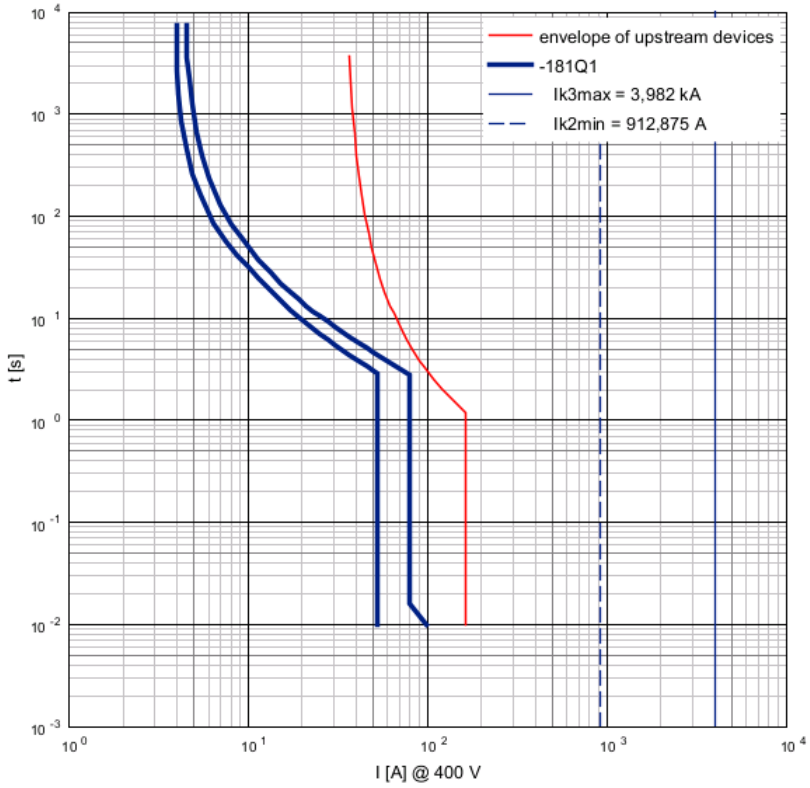

envelope of upstream devices
-181Q2
Ikmax_L_PE = 2,054 kA
Ikmin_L_PE = 531,152 A
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**

Selectivity evaluation:



Circuit name: **Water Pump**
Designation: **-181Q1**
Main operating mode: **Betriebsart 1**
Short cut current: **Ik3 / Ik2**
Selectivity evaluation:



Switch settings:

Designation: -181Q1

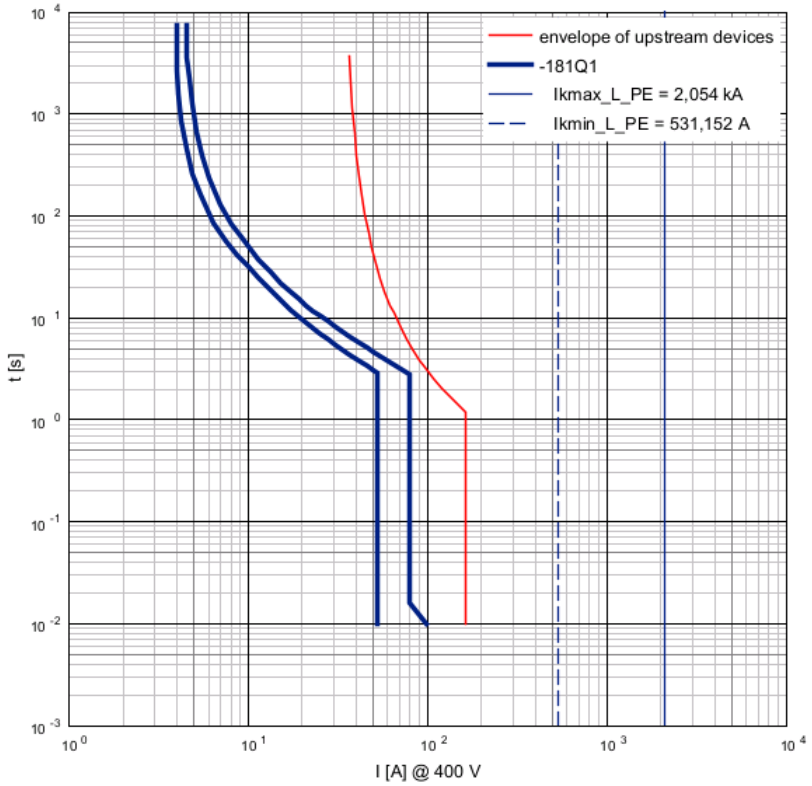
3RV20111FA25

In 5 A

L Protection: On
Ir - corresp. 3.8 A
tr 10 s

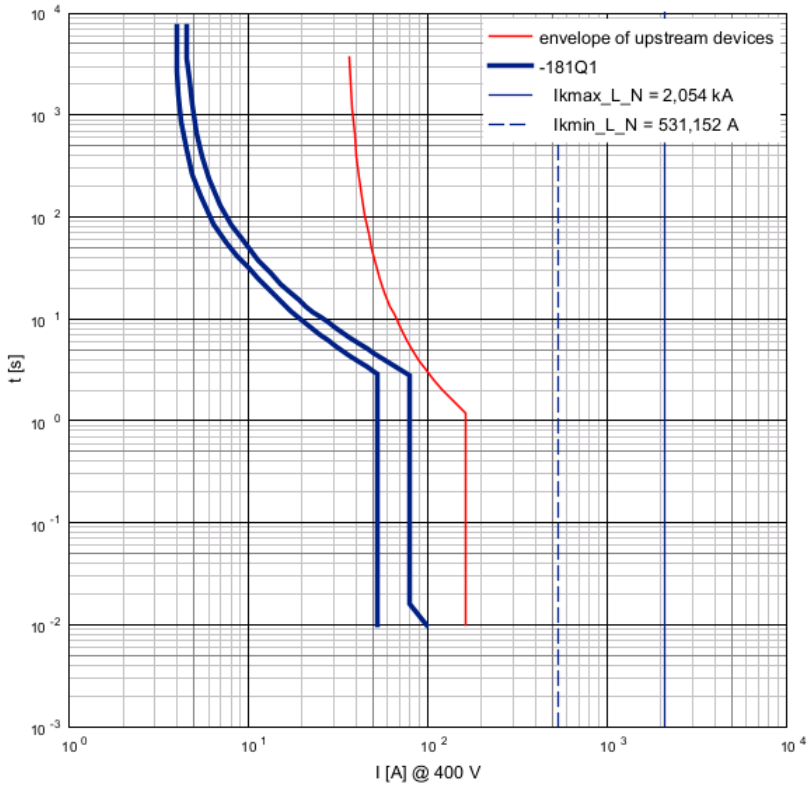
I Protection: On
Ii - corresp. 65 A

Short cut current: **Ik1-PE**
Selectivity evaluation:


envelope of upstream devices
-181Q1
Ikmax_L_PE = 2,054 kA
Ikmin_L_PE = 531,152 A
t [s]
I [A] @ 400 V

Short cut current: **Ik1-N**

Selectivity evaluation:



SIEMENS

SIMOTION

SIMOTION P320-4 E / P320-4 S

Commissioning and Hardware Installation Manual

Valid as of version V5.2

03/2018
A5E36004966B

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Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER
indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING
indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION
indicates that minor personal injury can result if proper precautions are not taken.

NOTICE
indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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GERMANY

A5E36004966B
℗ 02/2018 Subject to change

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Preface

Preface

This document is part of the **SIMOTION P documentation package**.

This documentation describes the SIMOTION P320-4 hardware platform which can be delivered in the SIMOTION P320-4 E and SIMOTION P320-4 S hardware versions:

- SIMOTION P320-4 E with the Windows Embedded Standard 7 32-bit operating system and real-time expansion for SIMOTION.
  Successor to SIMOTION P320-3.
- SIMOTION P320-4 S with the Windows 7 Ultimate 32-bit operating system and real-time expansion for SIMOTION.
  Successor to SIMOTION P350-3.

References

The following documents contain the descriptions for the SIMOTION P hardware platform:

- SIMOTION P320-4 E / P320-4 S, Manual, Edition 10/2016
- SIMOTION P320-4 E / P320-4 S, Commissioning and Hardware Installation Manual, Edition 10/2016

Validity range

This Commissioning and Hardware Installation Manual is valid for the SIMOTION P320-4 E and SIMOTION P320-4 S devices as of product level SIMOTION V4.5.

Standards

The SIMOTION system has been developed in accordance with ISO 9001 quality guidelines.

Sections in this documentation

The following sections describe the purpose and the use of this documentation:

- Safety instructions
  This section contains fundamental safety instructions for SIMOTION and specific safety instructions for the SIMOTION P320-4.
- Industrial Security
  You can find important information on industrial security here. What is industrial security? Which specific measures can be taken to protect your system from threats.
- Description
  System overview and product description for the SIMOTION P320-4.
  The communication versions are displayed.

- Application planning
  Points to note in advance:
  Upon delivery, the permitted installation positions, environmental and ambient conditions and electromagnetic compatibility.
  You will find this information in the manual SIMOTION P320-4 E / P320-4 S.
- Installation
  Description of the installation, mounting and assembly of the SIMOTION P320-4.
- Connection
  This section describes the requirements for connecting and the connection overview for the SIMOTION P320-4, and information on the connection of PROFINET, PROFIBUS and Ethernet.
- Power on and software installation
  Information on the first power-up of the SIMOTION P320-4 and additional software for HMI.
- Operation (hardware)
  Detailed description of the SIMOTION P State application.
- Parameter assignment / addressing
  This section contains the requirements for parameter assignment / addressing and an overview of the factory settings.
  One section describes the SIMOTION P Control Manager.
  Communication with Ethernet and PC internal is described.
  References are supplied for the PROFINET and PROFIBUS communication.
- Commissioning (software)
  This section contains information, notes and requirements for the commissioning and a recommended sequence for the first commissioning of the SIMOTION P320-4.
  The topics data backup, data storage concept and SIMOTION P general reset are described.
- Service and maintenance
  Information on the recording of diagnostics data, restoring factory settings, installing and removing the backup battery.
  Description of special power-up situations.
- Alarm, fault, and system messages
  Information on diagnostics via LED displays.
  Description of possible alarm and fault messages.
- Troubleshooting/FAQs
  List of possible errors and their remedies.
- Appendix
  The appendices contain information on standards and approvals, on the ESD guideline as well as a list of abbreviations.
- Index
  Alphabetical directory for locating information.

SIMOTION Documentation

An overview of the SIMOTION documentation can be found in the SIMOTION Documentation Overview document.

This documentation is included as electronic documentation in the scope of delivery of SIMOTION SCOUT. It comprises ten documentation packages.

The following documentation packages are available for SIMOTION product version V5.2:

- SIMOTION Engineering System Handling
- SIMOTION System and Function Descriptions
- SIMOTION Service and Diagnostics
- SIMOTION IT
- SIMOTION Programming
- SIMOTION Programming - References
- SIMOTION C
- SIMOTION P
- SIMOTION D
- SIMOTION Supplementary Documentation

Hotline and Internet addresses

SIMOTION at a glance

We have compiled an overview page from our range of information about SIMOTION with the most important information on frequently asked topics - which can be opened with only one click.

Whether beginner or experienced SIMOTION user – the most important downloads, manuals, tutorials, FAQs, application examples, etc. can be found at

https://support.industry.siemens.com/cs/ww/en/view/109480700

Additional information

Click the following link to find information on the following topics:

- Documentation overview
- Additional links to download documents
- Using documentation online (find and search manuals/information)

https://support.industry.siemens.com/cs/ww/en/view/109479653

My Documentation Manager

Click the following link for information on how to compile documentation individually on the basis of Siemens content and how to adapt it for the purpose of your own machine documentation:

https://support.industry.siemens.com/My/ww/en/documentation

Training

Click the following link for information on SITRAIN - Siemens training courses for automation products, systems and solutions:

http://www.siemens.com/sitrain

FAQs

Frequently Asked Questions can be found in SIMOTION Utilities & Applications, which are included in the scope of delivery of SIMOTION SCOUT, and in the Service&Support pages in **Product Support**:

https://support.industry.siemens.com/cs/de/en/ps/14505/faq

Technical support

Country-specific telephone numbers for technical support are provided on the Internet under **Contact**:

https://support.industry.siemens.com/cs/ww/en/sc/2090

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Safety notes

1

1.1 Fundamental safety instructions

1.1.1 General safety instructions



⚠ DANGER

Danger to life due to live parts and other energy sources

Death or serious injury can result when live parts are touched.

- Only work on electrical devices when you are qualified for this job.
- Always observe the country-specific safety rules.

Generally, six steps apply when establishing safety:

1. Prepare for shutdown and notify all those who will be affected by the procedure.
2. Disconnect the machine from the supply.
   - Switch off the machine.
   - Wait until the discharge time specified on the warning labels has elapsed.
   - Check that it really is in a no-voltage condition, from phase conductor to phase conductor and phase conductor to protective conductor.
   - Check whether the existing auxiliary supply circuits are de-energized.
   - Ensure that the motors cannot move.
3. Identify all other dangerous energy sources, e.g. compressed air, hydraulic systems, or water.
4. Isolate or neutralize all hazardous energy sources by closing switches, grounding or short-circuiting or closing valves, for example.
5. Secure the energy sources against switching on again.
6. Ensure that the correct machine is completely interlocked.

After you have completed the work, restore the operational readiness in the inverse sequence.



⚠ WARNING

Danger to life from hazardous voltage when connecting an unsuitable power supply

Touching live components can result in death or severe injury.

- Only use power supplies that provide SELV (Safety Extra Low Voltage) or PELV (Protective Extra Low Voltage) output voltages for all connections and terminals of the electronics modules.



⚠ WARNING

Danger to life from touching live parts on damaged devices

Improper handling of devices can result in damage.

For damaged devices, hazardous voltages can be present at the enclosure or at exposed components; if touched, this can result in death or severe injury.

- Observe the limit values specified in the technical specifications during transport, storage, and operation.
- Do not use damaged devices.



⚠ WARNING

Danger to life through electric shock due to unconnected cable shields

Hazardous touch voltages can occur through capacitive cross-coupling due to unconnected cable shields.

- As a minimum, connect cable shields and the cores of power cables that are not used (e.g. brake cores) at one end at the grounded housing potential.



⚠ WARNING

Danger to life due to electric shock when not grounded

For missing or incorrectly implemented protective conductor connection for devices with protection class I, high voltages can be present at open, exposed parts, which when touched, can result in death or severe injury.

- Ground the device in compliance with the applicable regulations.

⚠ WARNING

Danger to life due to fire spreading if housing is inadequate

Fire and smoke development can cause severe personal injury or material damage.

- Install devices without a protective housing in a metal control cabinet (or protect the device by another equivalent measure) in such a way that contact with fire inside and outside the device is prevented.
- Ensure that smoke can only escape via controlled and monitored paths.

⚠ WARNING

Danger to life from unexpected movement of machines when using mobile wireless devices or mobile phones

Using mobile radios or mobile phones with a transmit power > 1 W closer than approx. 2 m to the components may cause the devices to malfunction, influence the functional safety of machines therefore putting people at risk or causing material damage.

- Switch off wireless devices or mobile phones in the immediate vicinity of the components.

⚠ WARNING

Danger to life due to fire if overheating occurs because of insufficient ventilation clearances

Inadequate ventilation clearances can cause overheating of components followed by fire and smoke development. This can cause death or serious injury. This can also result in increased downtime and reduced service life for devices/systems.

- Ensure compliance with the specified minimum clearance as ventilation clearance for the respective component.

⚠ WARNING

Danger of an accident occurring due to missing or illegible warning labels

Missing or illegible warning labels can result in accidents involving death or serious injury.

- Check that the warning labels are complete based on the documentation.
- Attach any missing warning labels to the components, in the national language if necessary.
- Replace illegible warning labels.

⚠ WARNING

Danger to life when safety functions are inactive

Safety functions that are inactive or that have not been adjusted accordingly can cause operational faults on machines that could lead to serious injury or death.

- Observe the information in the appropriate product documentation before commissioning.
- Carry out a safety inspection for functions relevant to safety on the entire system, including all safety-related components.
- Ensure that the safety functions used in your drives and automation tasks are adjusted and activated through appropriate parameterizing.
- Perform a function test.
- Only put your plant into live operation once you have guaranteed that the functions relevant to safety are running correctly.

Note

Important safety notices for safety functions

If you want to use safety functions, you must observe the safety notices in the safety manuals.

1.1.2 Safety instructions for electromagnetic fields (EMF)



⚠ WARNING

Danger to life from electromagnetic fields

Electromagnetic fields (EMF) are generated by the operation of electrical power equipment such as transformers, converters or motors.

People with pacemakers or implants are at a special risk in the immediate vicinity of these devices/systems.

- Ensure that the persons involved are the necessary distance away (minimum 2 m).

1.1.3 Handling electrostatic sensitive devices (ESD)

Electrostatic sensitive devices (ESD) are individual components, integrated circuits, modules or devices that may be damaged by either electric fields or electrostatic discharge.



NOTICE

Damage through electric fields or electrostatic discharge

Electric fields or electrostatic discharge can cause malfunctions through damaged individual components, integrated circuits, modules or devices.

- Only pack, store, transport and send electronic components, modules or devices in their original packaging or in other suitable materials, e.g conductive foam rubber of aluminum foil.
- Only touch components, modules and devices when you are grounded by one of the following methods:
  - Wearing an ESD wrist strap
  - Wearing ESD shoes or ESD grounding straps in ESD areas with conductive flooring
- Only place electronic components, modules or devices on conductive surfaces (table with ESD surface, conductive ESD foam, ESD packaging, ESD transport container).

1.1.4 Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit (https://www.siemens.com/industrialsecurity).

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customers' exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under (https://www.siemens.com/industrialsecurity).

1.1.5 Danger to life due to software manipulation when using removable storage media

⚠ WARNING

Danger to life due to software manipulation when using removable storage media

The storage of files on removable storage media involves a high risk of infection, e.g. via viruses or malware. Incorrect parameter assignment can cause machines to malfunction, which can lead to injuries or death.

- Protect the files on removable storage media against harmful software through appropriate protective measures, e.g. virus scanners.

1.1.6 Residual risks of power drive systems

When performing the risk assessment for a machine or plant in accordance with the respective local regulations (e.g. EC Machinery Directive), the machine manufacturer or plant constructor must take into account the following residual risks associated with the control and drive components of a drive system:

1. Unintentional movements of driven machine or system components during commissioning, operation, maintenance and repairs caused by, for example:
   - Hardware and/or software errors in the sensors, control system, actuators, and cables and connections
   - Response times of the control system and of the drive
   - Operation and/or environmental conditions outside the specification
   - Condensation/conductive contamination
   - Parameterization, programming, cabling, and installation errors
   - Use of wireless devices / mobile phones in the immediate vicinity of electronic components
   - External influences/damage
   - X-rays, ionizing radiation and cosmic radiation
2. Unusually high temperatures, including open flames, as well as emissions of light, noise, particles, gases, etc., can occur inside and outside the components under fault conditions caused by, for example:
   - Component failure
   - Software errors
   - Operation and/or environmental conditions outside the specification
   - External influences/damage
3. Hazardous shock voltages caused by, for example:
   - Component failure
   - Influence during electrostatic charging
   - Induction of voltages in moving motors
   - Operation and/or environmental conditions outside the specification
   - Condensation/conductive contamination
   - External influences/damage
4. Electrical, magnetic and electromagnetic fields generated in operation that can pose a risk to people with a pacemaker, implants or metal replacement joints, etc., if they are too close
5. Release of environmental pollutants or emissions as a result of improper operation of the system and/or failure to dispose of components safely and correctly

For more information about the residual risks of the drive system components, see the relevant sections in the technical user documentation.

1.2 Specific safety instructions for SIMOTION P320-4

1.2.1 General safety instructions for the SIMOTION P320-4

⚠ WARNING

Life-threatening voltages are present with an open control cabinet

When you install the device in a control cabinet, some areas or components in the open control cabinet may be carrying life-threatening voltages.

If you touch these areas or components, you may be killed by electric shock.

Switch off the power supply to the cabinet before opening it.

System expansions

NOTICE

Damage through system expansions

Device and system expansions may be faulty and can affect the entire machine or plant.

The installation of expansions can damage the device, machine or plant.

Device and system expansions may violate safety rules and regulations regarding radio interference suppression.

If you install or exchange system expansions and damage your device, the warranty becomes void.

Note the following for system expansions:

- Only install system expansion devices designed for this device. Contact your technical support team or where you purchased your PC to find out which system expansion devices may safely be installed.
- Observe the information on electromagnetic compatibility (Page 227).

NOTICE

"Open Type" UL508

Note that the device is classified as "Open Type" for use in the area of Industrial Control Equipment (UL508). Installation of the device in an enclosure according to UL508 is conditional for approval or operation according to UL508.

Battery and rechargeable battery

⚠ WARNING

Risk of explosion and release of harmful substances

Improper handling of lithium batteries can result in an explosion of the batteries.

Explosion of the batteries and the released pollutants can cause severe physical injury. Worn batteries jeopardize the function of the device.

Note the following when handling lithium batteries:

- Replace used batteries in good time, see the section "Replacing the backup battery" in the Commissioning and Hardware Installation Manual.
- Replace the lithium battery only with an identical battery or types recommended by the manufacturer (Article No.: A5E30314053).
- Do not throw lithium batteries into fire, do not solder on the cell body, do not recharge, do not open, do not short-circuit, do not reverse polarity, do not heat above 100°C and protect from direct sunlight, moisture and condensation.

High frequency radiation

NOTICE

Unintentional operating situations

High frequency radiation, e g. from a cellular phone, interferes with device functions and can result in malfunctioning of the device.

Persons are injured and the plant is damaged.

Avoid high-frequency radiation:

- Remove radiation sources from the environment of the device.
- Switch off radiating devices.
- Reduce the radio output of radiating devices.
- Observe the information on electromagnetic compatibility (Page 227).

ESD Guideline

Electrostatic sensitive devices can be labeled with an appropriate symbol.



NOTICE

Electrostatic sensitive devices (ESD)

When you touch electrostatic sensitive components, you can destroy them through voltages that are far below the human perception threshold.

If you work with components that can be destroyed by electrostatic discharge, observe the ESD Guideline.

Further information

You can find more detailed information about the **EGB Guideline** in Annex B in the section with the same name.

1.2.2 Notes on use

⚠ WARNING

Hazards on an unprotected machine or plant

According to the results of a risk analysis, hazards can occur on an unprotected machine. The hazards can result in personal injury.

According to the risk analysis, the risk of personal injury can be avoided with the following measures:

- Additional protective devices on the machine or plant. With this, especially the programming, configuration and wiring of the inserted I/O modules have to be executed, in accordance with the necessary risk analysis identified safety performance (SIL, PL or Cat.).
- The correct use of the device has to be verified with a function test on the system. This test can detect programming, configuration and wiring errors.
- Documentation of the test results that you can enter in the relevant safety records when required.

NOTICE

Ambient conditions

Ambient conditions for which the device is not suitable can cause faults or damage the device.

Note the following:

- Operate the device only in closed rooms. Failure to comply nullifies the warranty.
- Operate the device only in accordance with the ambient conditions specified in the technical specifications.
- Protect the device against dust, moisture and heat.
- Do not expose the device to direct sunlight or other strong sources of light.
- Without additional measures, such as a supply of clean air, the device may not be used in locations with harsh operating conditions caused by acidic vapors or gases.
- Observe the permissible mounting positions of the device.
- Do not obstruct the venting slots of the device.

Note

Use in an industrial environment without additional protective measures

This device was designed for use in a normal industrial environment according to IEC 60721-3-3.

Industrial security

2

2.1 Security concept for SIMOTION P320-4

2.1.1 Security

Note

Observe the general security information in this documentation for Industrial security.

Regular change of the Windows password

Note

Changing the Windows password

For security reasons, the Windows password should be changed regularly.

It is essential that the AutoLogin is also adapted for this purpose.

You can find instructions in the following sections:

- Changing the Windows user password (Page 36)
- AutoLogin for SIMOTION P (Page 40).

Unlocking Windows

Note

Windows locked

Windows may be accidentally locked, e.g. through shortcut key Windows + L.

If you do not know the password for the SIMOTION P320-4, please contact the Siemens Industry Online Support (https://support.industry.siemens.com).

Windows firewall

Note

Windows firewall

To allow the Windows IP to be accessed externally, this must be set as an exception in the Windows firewall **File and Printer Sharing**. Otherwise, there is only limited access to Windows from outside.

Security and networks

Note

You will find information on the security of networks in Section General security measures (Page 28).

Remote desktop connection

Note that for the SIMOTION P320-4 with Headless operation, you require a user name and password for a remote desktop connection. Per default, the remote desktop connection is already set up.

Note

Deactivating the remote desktop connection

If you do **not** use the remote desktop connection, it must be deactivated for security reasons.

See Section Deactivating the remote desktop connection (Page 47)

SIMOTION IT

Note

Security concept

Note the security concept of HTTP/S, FTP and Telnet access on the Web server when working with SIMOTION IT.

You will find information in the SIMOTION IT Diagnostics and Configuration Diagnostics Manual or the SIMOTION online help in Section Security concept.

Note

User administration

Note the information on the user administration when working with SIMOTION IT.

You will find information in the SIMOTION IT Diagnostics and Configuration Diagnostics Manual or the SIMOTION online help in Section User administration.

Information on industrial security

The following sections are taken from the Motion Control Industrial Security Configuration Manual:

- Why is industrial security so important? (Page 26)
- General security measures (Page 28)
- Product-specific measures (virus scanners) (Page 35)

You can view the entire document in the Industry Online Support (https://support.industry.siemens.com/cs/ww/en/view/108862708).

2.2 Why is industrial security so important?

The topic of data security and access protection (security) is becoming more and more important in industrial environments. The progressive networking of entire industrial plants, the vertical integration and networking of the individual levels of a company, and new technologies, such as remote maintenance and remote access, are leading to increased requirements for protecting industrial plants.

The threats are diverse and the consequences far-reaching.

Possible threats:

- Espionage of data, recipes, etc.
- Sabotage of production plants
- System stoppage, e.g. due to virus infection and malware
- Manipulation of data or application software
- Unauthorized use of system functions

Possible effects of a security incident

- Loss of intellectual property
- Loss of production or reduced product quality
- Company image and economic damage
- Catastrophic environmental influences
- Danger to persons and machines

2.2.1 Trends in the IT sector

Overview

There are many new trends which affect industrial security:

- Cloud computing in general
  The number of network connections across the world is constantly increasing. This enables innovations such as cloud computing and the applications that go hand in hand with it. In conjunction with cloud computing, there has been a massive increase in the number of mobile devices, such as mobile phones and tablet PCs.
- Wireless technology
  On the other hand, the increasing use of mobile devices has only become possible thanks to the ubiquitous availability of mobile networks. Wireless LAN is also becoming increasingly available.
- Smart Grid
  Networking is not only limited to data networks, it also influences our energy infrastructure.

- Worldwide remote access to plants, machines and mobile applications
- The "Internet of things"
  Millions of electronic devices are becoming network-capable and are communicating via the Internet, such as onboard computers in cars, which send warranty information to dealers, or water meter sensors that transmit water consumption data to municipal water suppliers via radio.

However, in order for everything from cloud computing to sensors to work without service disruptions, you need reliable network infrastructures that are well protected against attacks from malware and hackers.

2.2.2 Possible corporate security holes

Possible security holes or weak points

The security chain of a company is only as strong as its weakest link. Security holes can exist at numerous points. The following list gives only a few examples:

- Employees
- Production plants
- Network infrastructure
- Data centers
- PC workstations
- Laptops
- Tablet PCs
- Printers
- Smartphones
- Portable storage media
- Guidelines and regulations

For this reason, a holistic approach is required to deal with the issue of security. Coordinated guidelines and regulations are required that cover all areas: Devices, systems, processes and employees.

2.3 General security measures

2.3.1 Overview

In the following section you will learn about the general security measures you can take in order to protect your system from threats. All of the measures are recommended.

Additional specific security measures for SINUMERIK, SIMOTION and SINAMICS products can be found in Section Product-specific security measures (Page 35).

Basically, the measures should be coordinated with one another and correspond to the ring-shaped principle of the "Defense in Depth" strategy. The measures are structured according to the "onion" principle and each measure forms an additional protective layer around the core: the production plant.



Figure 2-1 Defense in depth strategy

- **Plant security**
  Plant security represents the outermost protective ring. Plant security includes comprehensive physical security measures, e.g. entry checks, which should be closely coordinated with protective measures for IT security.
- **Network security**
  The measures, grouped under the keyword "Network security", form the core of the protective measures. This refers to the segmentation of the plant network with limited and secure communication between subnetworks ("secure islands") and the interface check with the use of firewalls.
- **System integrity**
  "System integrity" represents the combination two major measures. PC-based systems and the control level must be protected against attacks. Steps include the following measures:
  - User authentication for machine or plant operators with individual authorization levels
  - Integrated access protection mechanisms in the automation components to prevent unauthorized changes via the engineering system or during maintenance
  - The use of antivirus and whitelisting software to protect PC systems against malware
  - Maintenance and update processes to keep the automation systems up-to-date (e.g. patch management, firmware updates, etc.)

2.3.2 Plant security

2.3.2.1 Physical protection of critical production areas

Unauthorized persons may be able to enter the production site/building and damage or alter production equipment as a result of gaps in a company's physical security. Confidential information can also be lost. This can be prevented if both the company's site and the production areas are protected accordingly.

Company security

The company's physical security can be ensured via the following measures:

- Closed off and monitored company premises
- Entry control, keys / card readers and/or security personnel
- Escorting of external personnel by company employees

Physical production security

The physical security of a production location can also be ensured via the following measures:

- Separate access control for production areas.
- Installation of critical components in securely lockable cabinets / switching rooms including monitoring and alarm signaling options
- Prohibited production areas with restricted access rights

- Configuration of the radio field to restrict the WLAN range so that it is not available outside the defined areas (e.g. factory building).
- Guidelines that prevent the use of third-party data storage media (e.g. USB sticks) and IT devices (e.g. notebooks) classified as insecure on the control.

Further information

Further information on integrated security solutions can be found on the Surveillance page (http://www.buildingtechnologies.siemens.com/bt/global/en/security-solution/Pages/security-solution.aspx).

2.3.3 Network security

2.3.3.1 Network segmentation

Separation between production and office networks

One important protective measure for your control is the strict separation of the production networks and the other company networks. This separation creates protection zones for your production networks.

Note

The products – drives, controllers, commissioning tools (e.g. STARTER or Startdrive) – described in this manual must only be operated in protection zones.

Separation by means of a firewall system

In the simplest scenario, separation is achieved by means of an individual firewall system which controls and regulates communication between networks.

Separation via a DMZ network

In the more secure version, the coupling is established via a separate DMZ network. In this case, direct communication between the production network and the company network is completely prevented by firewalls and only takes place indirectly via servers in the DMZ network.

Note

The production networks should also be divided into separate automation cells in order to protect critical communication mechanisms.

General security measures

Observe the general security measures even within protection zones, for example:

- Virus scanners (Page 33)
- Reduction of attack points (Page 33)

Network segmentation with SCALANCE S

Siemens provides SCALANCE S security modules to meet network protection and network segmentation requirements.

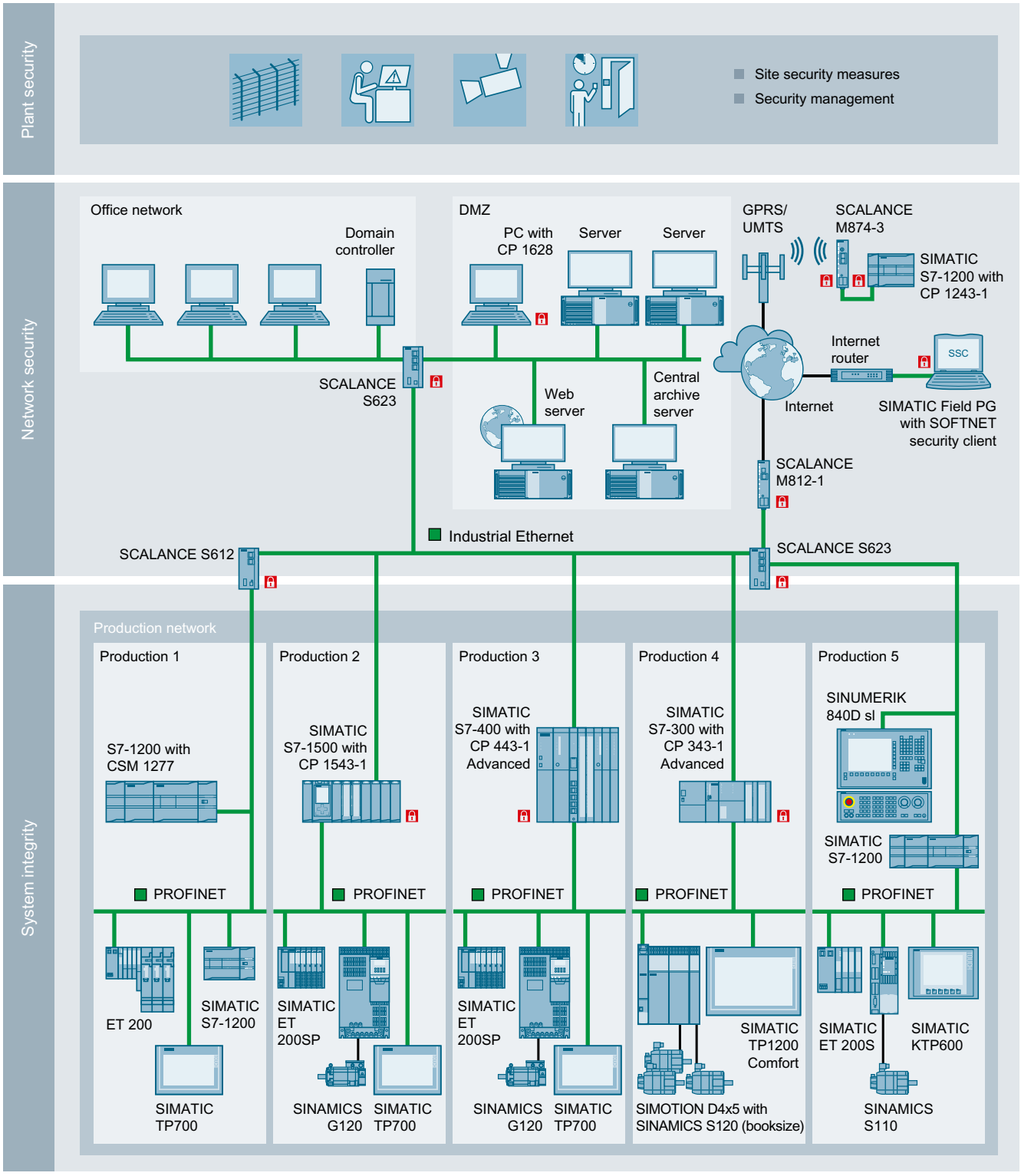
SCALANCE S security modules

SCALANCE S security modules with Security Integrated provide:

- Stateful inspection firewall
  In order to implement user-specific control and logging, firewall rules can also be specified that only apply to certain users.
- VPN via IPsec (data encryption and authentication)
  This establishes a secure tunnel between authenticated users whose data cannot be intercepted or manipulated. The most important aspect is the protection against external access via the Internet.
- NAT/NATP (address translation)
- Router functionality (PPPoE, DDNS) for broadband Internet access (DSL, cable)
- S623 with additional VPN port (DMZ) enables the secure connection of an additional network for service and remote maintenance purposes. S623 also permits the secure, redundant connection of subordinate networks by means of routers and firewall redundancy.

Principle

This application example shows cell segmentation by several SCALANCE S modules, each of which is upstream of the automation cell. The data traffic to and from the devices within automation cells can be filtered and controlled with the SCALANCE S firewall. If required, the traffic between the cells can be encrypted and authenticated. Secure channels and client access from the PCs to the cells can be established via SOFTNET Security Client, VPN client software for PCs.


Plant security
Site security measures
Security management
Network security
Office network
Domain controller
DMZ
PC with CP 1628
Server
Server
GPRS/ UMTS
SCALANCE M874-3
SIMATIC S7-1200 with CP 1243-1
Internet router
SSC
Internet
SIMATIC Field PG with SOFTNET security client
SCALANCE S623
Web server
Central archive server
SCALANCE M812-1
Industrial Ethernet
SCALANCE S612
SCALANCE S623
System integrity
Production network
Production 1
S7-1200 with CSM 1277
PROFINET
ET 200
SIMATIC S7-1200
SIMATIC TP700
Production 2
SIMATIC S7-1500 with CP 1543-1
PROFINET
SIMATIC ET 200SP
SINAMICS G120
SIMATIC TP700
Production 3
SIMATIC S7-400 with CP 443-1 Advanced
PROFINET
SIMATIC ET 200SP
SINAMICS G120
SIMATIC TP700
Production 4
SIMATIC S7-300 with CP 343-1 Advanced
PROFINET
SIMATIC TP1200 Comfort
SIMOTION D4x5 with SINAMICS S120 (booksize)
Production 5
SINUMERIK 840D sl
SIMATIC S7-1200
PROFINET
SIMATIC ET 200S
SIMATIC KTP600
SINAMICS S110

2.3.4 System integrity

2.3.4.1 System hardening

Reduction of attack points

Network services and ports

Activated services represent a risk. To minimize the risk, only the necessary services for all of the automation components should be activated. Ensure that all activated services are taken into account (especially web servers, FTP, remote maintenance, etc.) in the security concept.

A description of the ports used can be found in the Manuals and Function Manuals of the respective products.

User accounts

Any active user account allows access to the system is thus a potential risk. Therefore, take the following security measures:

- Reduction of configured/activated user accounts to the actually needed minimum
- Use of secure access data for existing accounts
- Regular checks, especially of the locally configured user accounts
- Regular change of passwords

Passwords

NOTICE
Changing default passwords The misuse of passwords can also represent a considerable security risk. We recommend that default passwords be changed during the commissioning and changed at regularly defined intervals as required.

Virus scanner

The use of a virus scanner must not impact the production operations of a plant. As the last consequence, this will lead to even a virus-infected computer not being permitted to immediately shut down if this would cause the control of the production process to be lost.

In order to be used on industrial control components, a virus scanner should therefore meet the following requirements:

Virus scanner requirements

- If a local firewall that has been adapted to the production operations is used, it must be possible to install the virus scanner without its own firewall.
- The virus scan clients can be divided into (product- and task-specific) groups and configured separately.
- It must be possible to deactivate the automatic distribution of the virus signatures and other updates.
- It must be possible to carry out the distribution of the virus signatures and updates manually and in groups.
- It must be possible to conduct a file scan and system scan manually and in groups.
- For the virus detection scenario, a message can be configured without a file action such as "Delete", "Clean", etc. being automatically carried out.
- It must be possible to log all of the messages on the virus scan server.
- On a virus scan client, it must be possible to suppress the local message window because it could obscure important messages from the production process.

Note

Installation of software

The installation of software is often a process which represents a serious and complicated change to the respective system. The storage location of the files to be installed must always be free of viruses (e.g. a file server with its own virus scanner or DVD checked for viruses).

Patch management

Microsoft security updates

The **WSUS** (Windows Server Update Service) system functionality provided by Microsoft is available for current Windows systems. WSUS supports administrators by providing Microsoft updates in large local networks. WSUS automatically downloads update packages from the Internet (Microsoft Update) and offers them to the Windows clients for installation.

The fully automatic update process ensures that Microsoft security updates are always available on Siemens clients.

2.4 Product-specific measures

2.4.1 Virus scanners, Windows security patches, SIMOTION P

General information on virus scanners

Once an industrial PC system is connected to the Internet, either directly or via an internal company network, there is a danger that it can become infected with a virus. However, malicious software is not only able to reach the system via the Intranet/Internet, but also, for example, via a removable storage device (such as a USB memory stick) attached to the system for backing up data.

SIMOTION P320-4 virus scanners

A virus scanner that runs on Microsoft Windows, as used in office or home computers, has a deep impact on a system's processes. There are, for example, processes such as real-time scans or regular system scans. Such interventions can cause performance issues for the system, and as a result, for the SIMOTION Runtime software. Although the SIMOTION Runtime software runs in a real-time environment, it still depends on the available system resources.

Note

Because of the resulting performance impairments, the installation and use of a standard virus scanner on a SIMOTION P320-4 during system runtime does not make sense and is not permitted.

Using a virus scanner

As a standard virus scanner cannot be used for SIMOTION P320-4, an alternative procedure is followed. The virus scanner is installed to a separately bootable Windows PE operating system. It is started, for example, from a CD or a USB storage device and then performs a virus scan.

Note

FAQ in Industry Online Support

More information on using a virus scanner on a SIMOTION P320-4 can be found in the FAQ "How can a virus scanner be used on a SIMOTION P320-4?" (https://support.industry.siemens.com/cs/ww/en/view/59381507), which is available as a download from the Industry Online Support portal.

Windows security patches

A brief test is performed when a new SIMOTION version is released. During this brief test, a check is performed to establish whether the installation of the security update has affected any basic functions.

2.4.2 Changing the Windows user password

Permitting the Windows password to be changed

Before the Windows password can be changed, it must be permitted for the user.

If the following procedure is not observed, an error message is issued and the Windows password cannot be changed.

Note the following procedure:

1. Select the entry point **Control Panel > All Control Panel Items > Administrative Tools > Computer Management**.
   Double-click **Computer Management**.

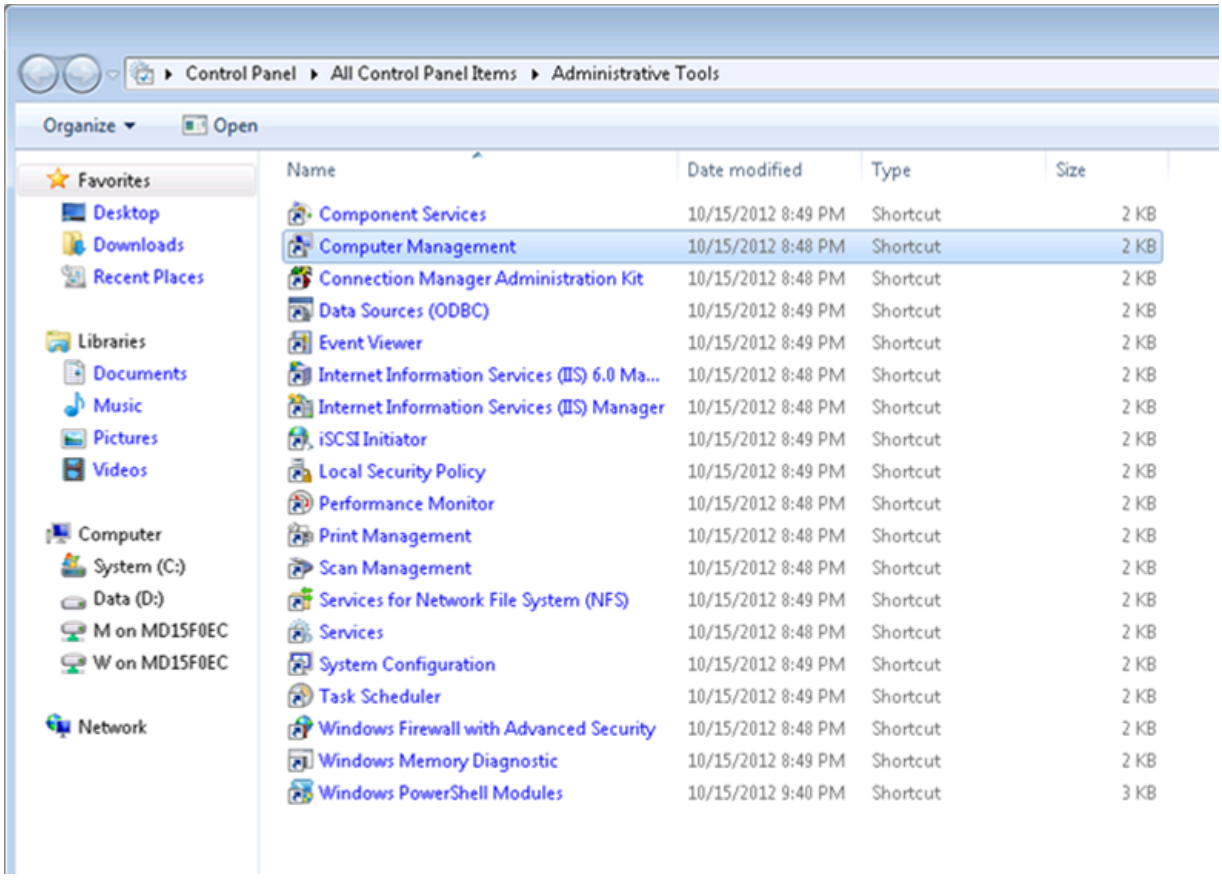


Figure 2-2 Homepage:

2. The **Users** folder is displayed at **Local Users and Groups** in the **Computer Management** window.
   Click the **Users** folder. The available user groups are displayed.

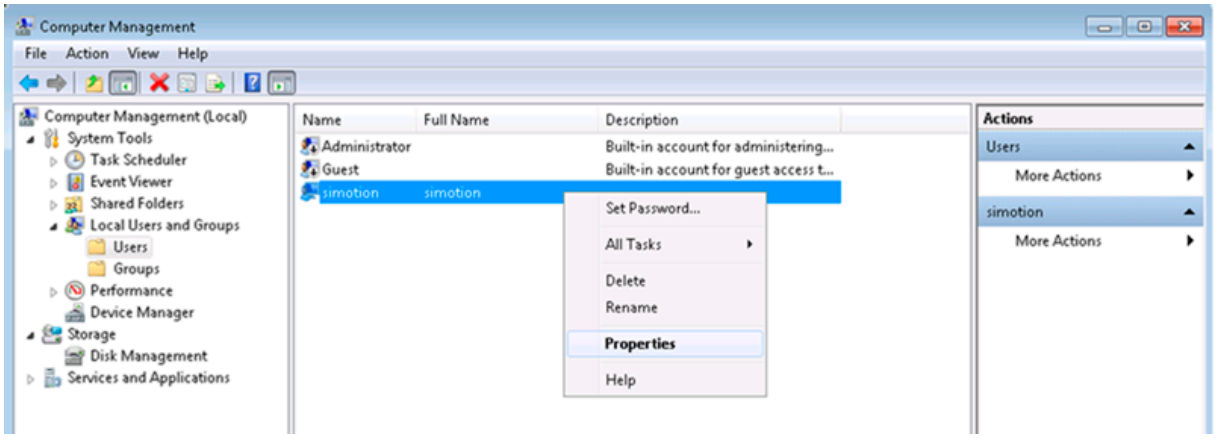


Figure 2-3 Computer management

3. With the selection of **Users simotion**, you can display the properties via **Properties**.
4. Deactivate the "**User cannot change password**" checkbox in the **General** tab on the **simotion Properties** dialog box.
   This checkbox must be deactivated for the user to change the Windows password.

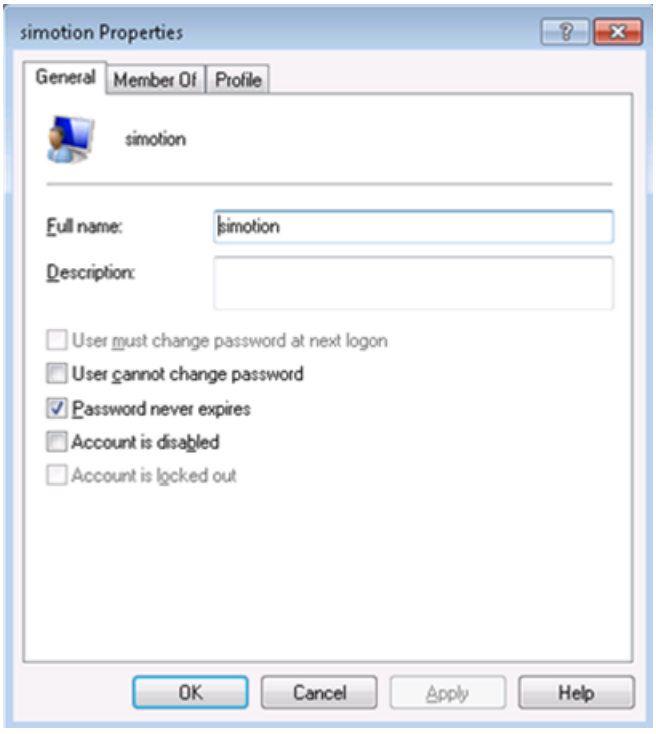


Figure 2-4 SIMOTION properties

Changing the Windows password

You can find general information on the Windows password on the website at Microsoft - Changing des Windows-password (http://windows.microsoft.com/en-us/windows/change-windows-password#change-windows-password=windows-7).

To change the Windows password, proceed as follows:

1. Press Ctrl+Alt+Del. The following Windows window opens.

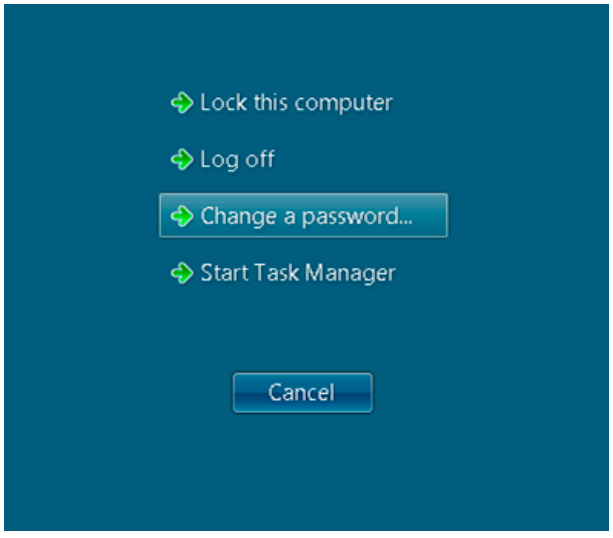


Figure 2-5 Changing the Windows password

2. After you have confirmed **Change a password...** , the Windows window to change the Windows password opens.
   First enter your current password and then the new Windows password. You must enter the new Windows password a second time for confirmation.

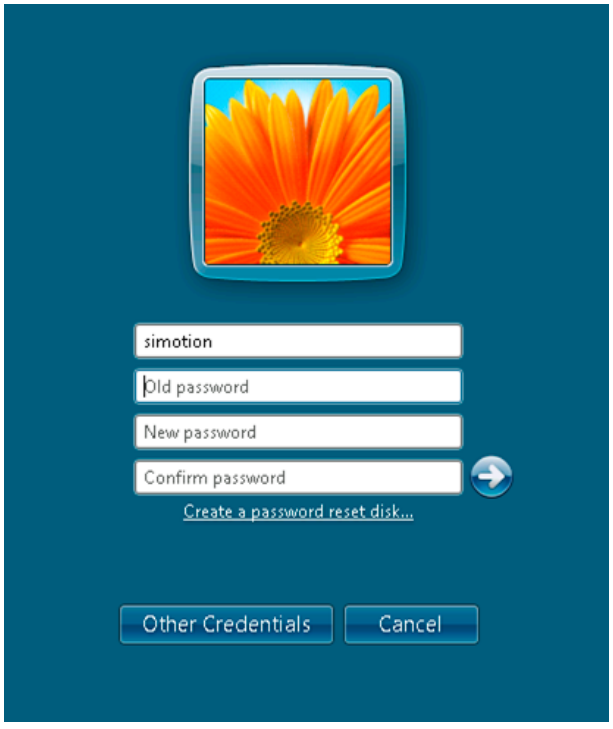


Figure 2-6 Entering the new Windows password

3. The password was changed successfully.

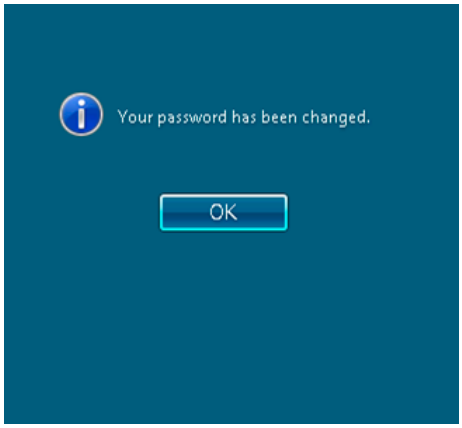


Figure 2-7 Confirmation of change

4. In the event of an error when the "User cannot change password" checkbox is activated, the following error message is displayed.
The Windows password has not been changed.

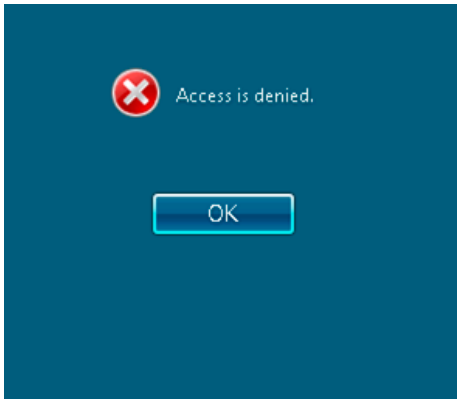


Figure 2-8 Error message when changing the Windows password has not been permitted.

2.4.3 Changing the AutoLogin

2.4.3.1 SIMOTION P AutoLogin

The password for the AutoLogin must be changed when the user has changed the Windows password.

The Windows user password is changed in the normal way, e.g. "Change Password" screen.
See also Section Changing the Windows user password (Page 36).

Automatically Log On

SIMOTION P320-4 is preset so that the user does not have to enter the user name and the password to log on.

Preparation for changing the AutoLogin

In order that an AutoLogin still functions after changing the Windows password, the password for the AutoLogin must be changed.

The required procedure is shown in the following so that the change of the AutoLogin for SIMOTION P320-4 can be prepared:

1. Open the **Computer Management** window via **Control Panel > All Control Panel Items > Administrative Tools** .

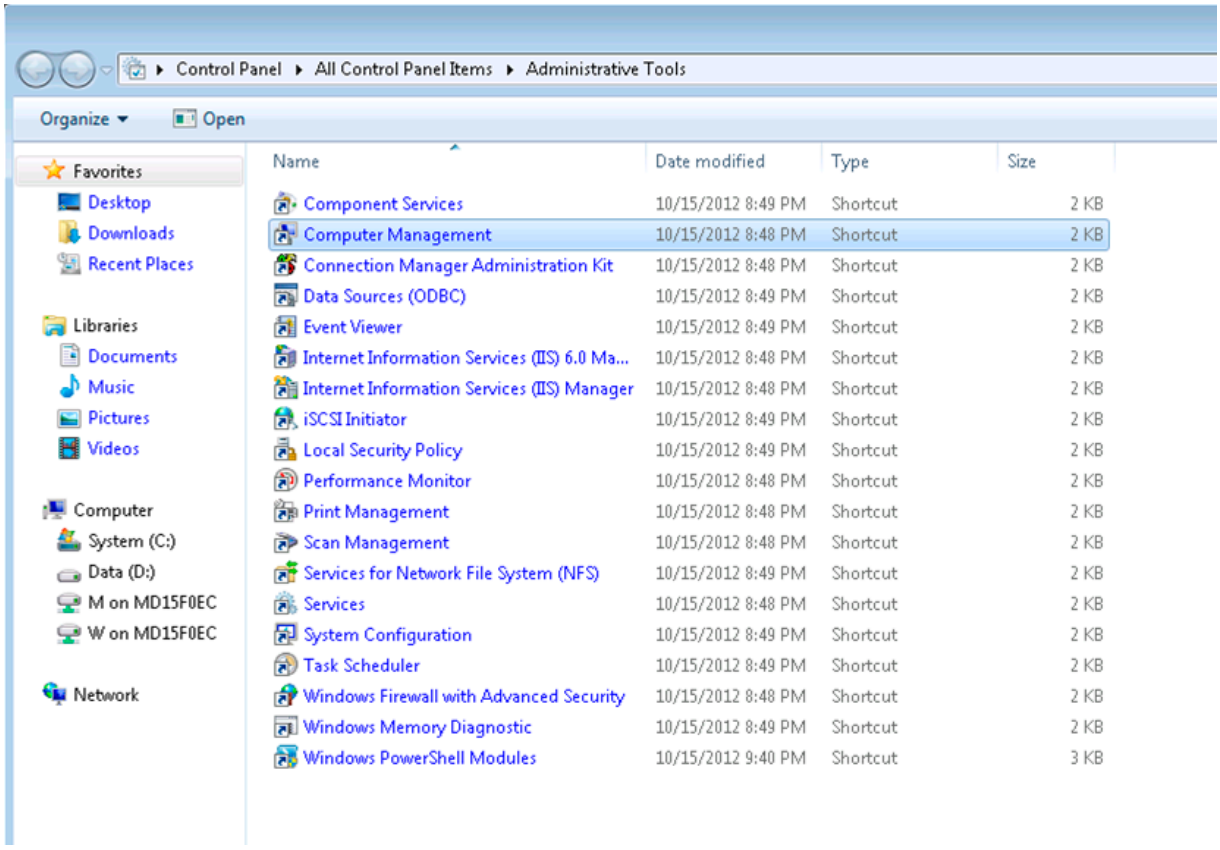


Figure 2-9 Computer Management entry point

2. The **Users** folder is displayed at **Local Users and Groups** in the **Computer Management** window.
   Click the **Users** folder. The available user groups are displayed.

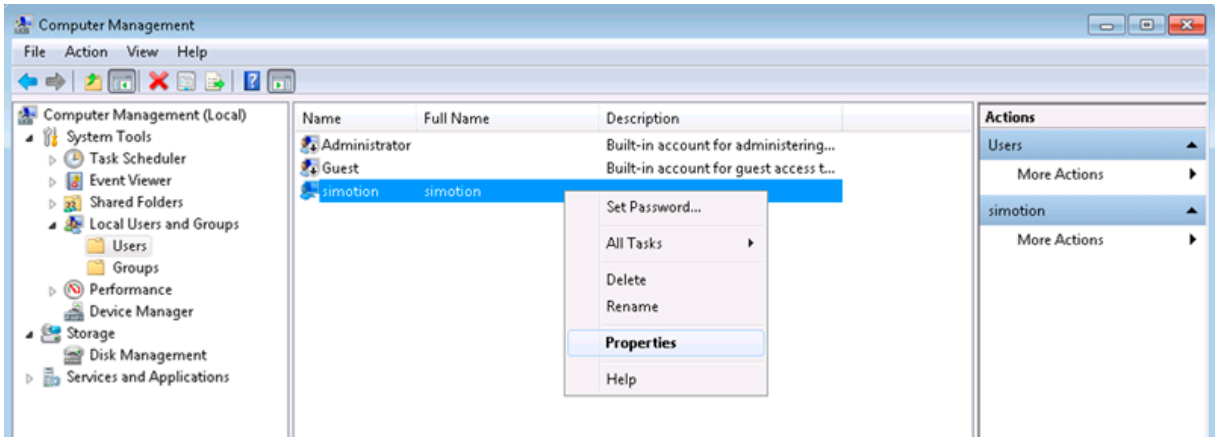


Figure 2-10 Computer Management - Users

3. With the selection of **Users> simotion**, you can display the properties via **Properties**.

4. Deactivate the **User cannot change password** checkbox in the **simotion Properties** dialog box.

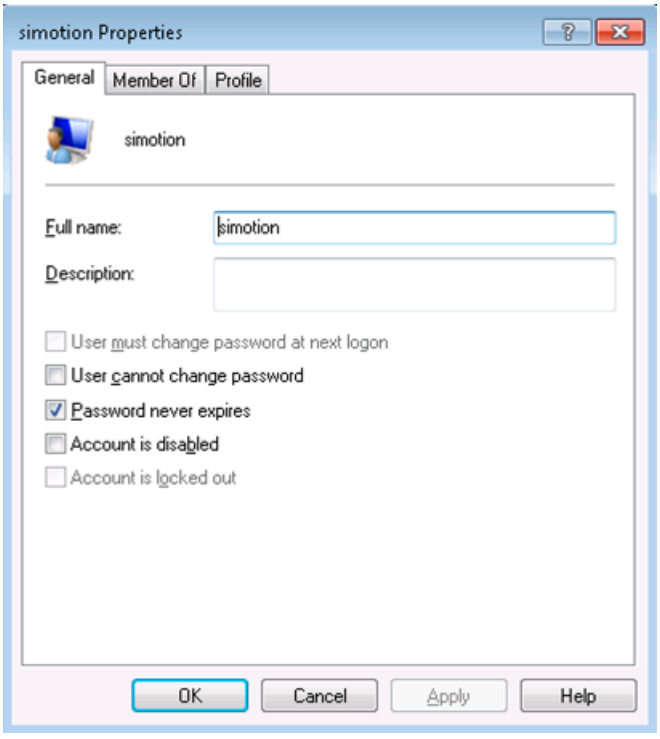


Figure 2-11 simotion Properties - General dialog box

5. Confirm with **OK.**

Changing the password for AutoLogin

To change the password for the AutoLogin, proceed as follows:

1. Open the search via **Windows-Start** and enter: **netplwiz**

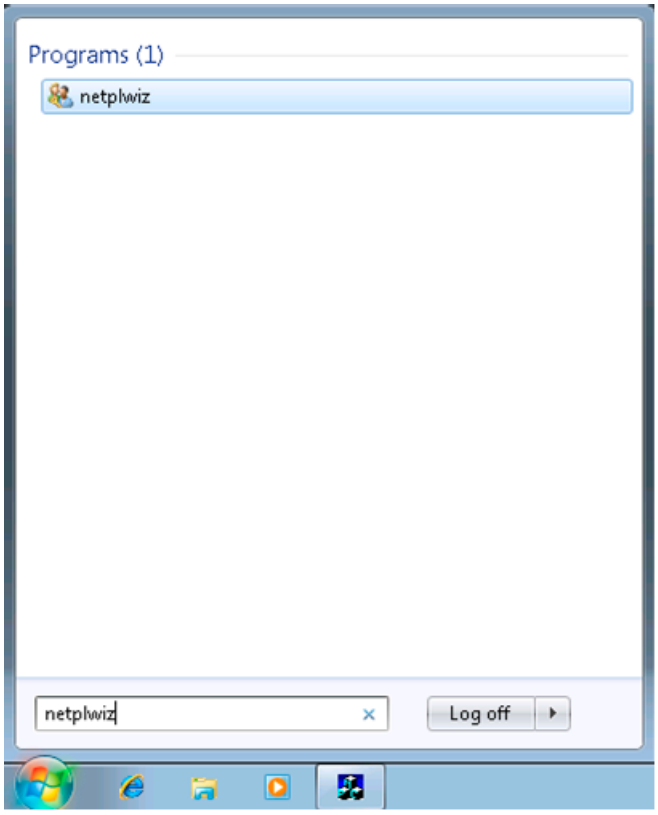


Figure 2-12 Programs netplwiz

2. The following **User Accounts** dialog box opens.

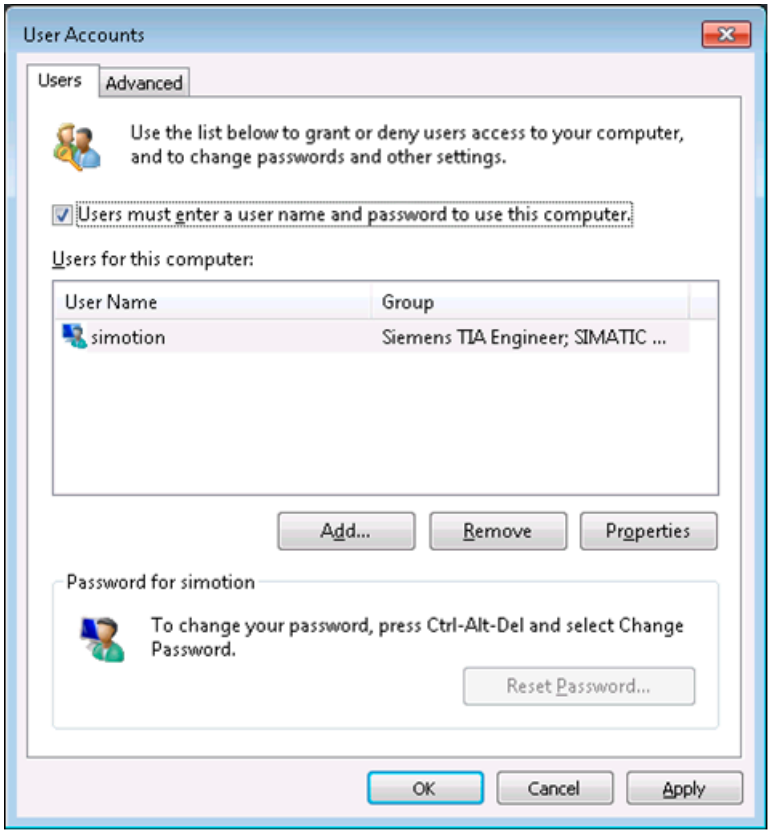


Figure 2-13 User Accounts

3. In the **Users** tab, activate the **Users must enter a user name and password to use this computer** checkbox.
   The **Apply** button is now active. Deactivate the checkbox and accept the changes now with the **OK** or **Apply** button.
   This is necessary so that the **Automatically Log On** dialog box is subsequently displayed.

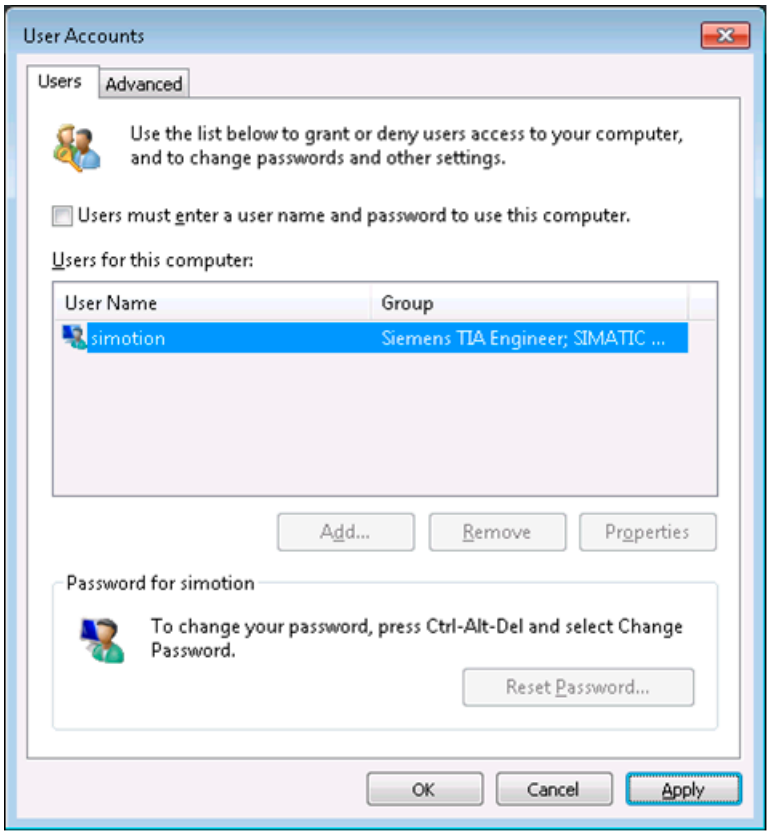


Figure 2-14 User accounts

4. Enter your changed Windows user password in the **Automatically Log On** dialog box and confirm it by entering it a second time.

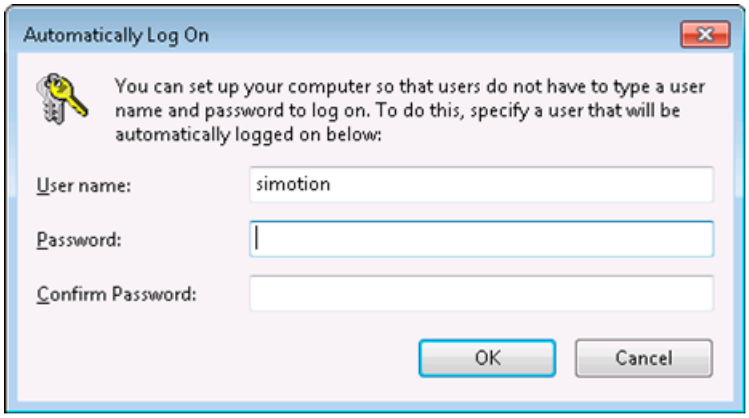


Figure 2-15 Automatically Log On dialog box

5. Confirm the password with **OK**.

2.4.4 Deactivating the remote desktop connection

Deactivating the remote desktop connection

If you do not use the headless mode and do not require a remote desktop connection, we recommend that you explicitly disable the remote desktop connection.

NOTICE
Deactivating the remote desktop connection To ensure that the remote desktop connection is not used, it must be explicitly deactivated.

Procedure for deactivating the remote desktop connection

1. Using the Control Panel, select **System** > **Remote settings**.

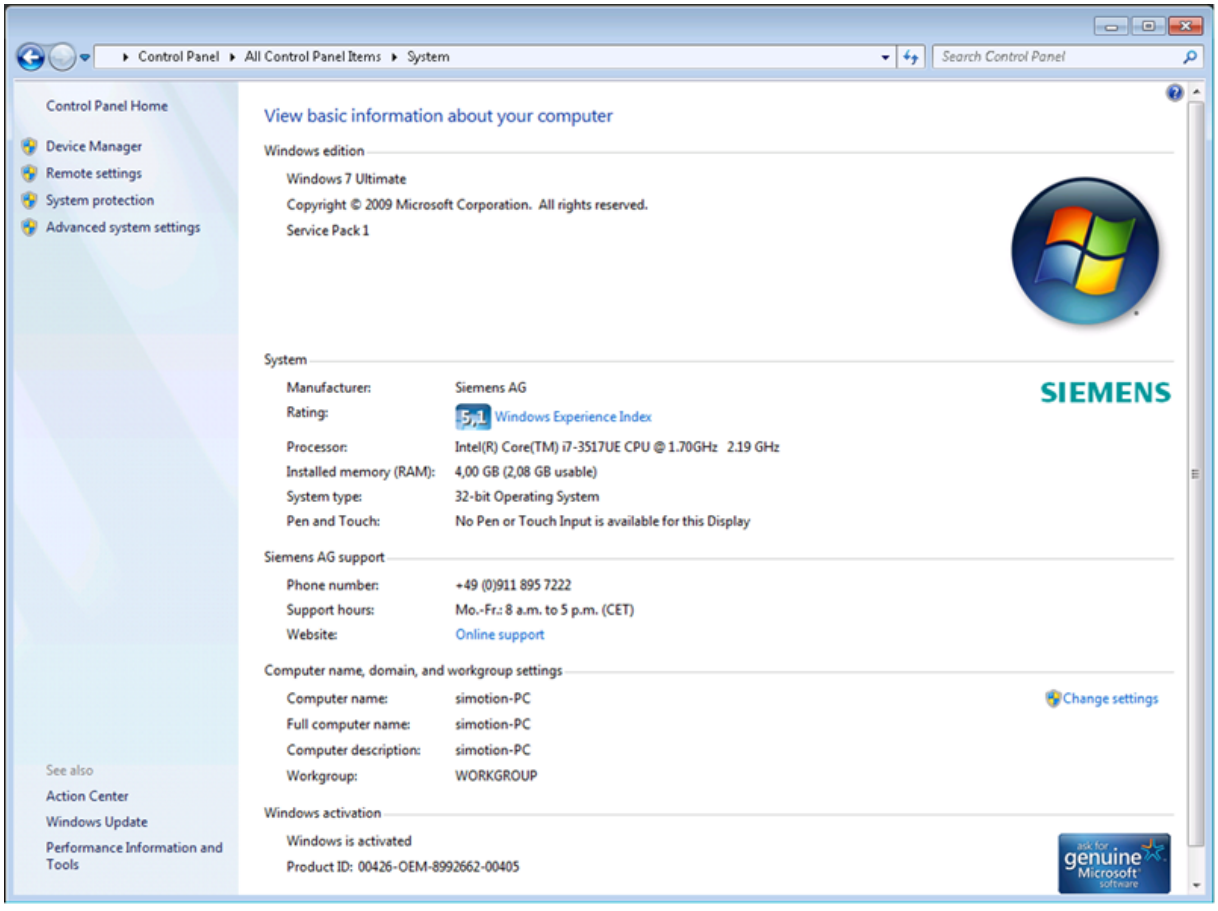


Figure 2-16 Remote settings

2. Select the **Remote** tab in the **System Properties** dialog box.

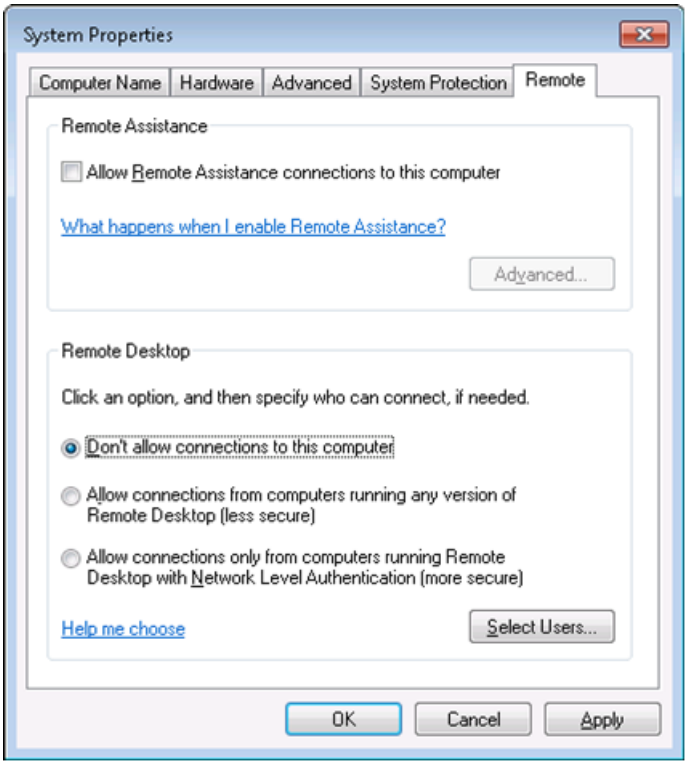


Figure 2-17 System Properties dialog box

3. Select the **Don't allow connections to this computer** option at **Remote Desktop**.
4. Confirm with **OK**.

Any remote desktop access is deactivated with this operation.

Description 3

3.1 System overview

Overview

SIMOTION P is a PC-based, open Motion Control System from SIMOTION.
Control, motion control, and HMI functions are executed together with standard PC applications on the SIMOTION P hardware platform. SIMOTION P combines the compatibility of the Windows operating system with real-time capability of SIMOTION P Runtime.

The fully independent SIMOTION P Runtime runs in parallel to Windows on SIMOTION P. This real-time expansion makes it possible to implement demanding motion control applications with high performance requirements on platforms of the SIMOTION P range. The hardware consists of a computing unit with innovative Intel technology, which is ready for operation at the time of delivery.

The drives and I/O devices are connected either via PROFINET onboard or IsoPROFIBUS board (optional).

The SIMATIC Flat Panel IFP1500, IFP1900 and IFP2200 can be used for the operation of the SIMOTION P320-4 hardware platform in a distributed configuration.

SIMOTION P320-4 versions

The SIMOTION P320-4 can control various I/O systems and HMI components via PROFINET onboard or the optional IsoPROFIBUS board.
If required, a USB DVD drive can be connected, for example.

The following versions of the SIMOTION P320-4 are available:

- SIMOTION P320-4 E
  with the Windows Embedded Standard 7 32-bit operating system and real-time expansion for SIMOTION.
- SIMOTION P320-4 S
  with the Windows 7 Ultimate 32-bit operating system and real-time expansion for SIMOTION.

Application

The SIMOTION P320-4 applications are directed at machines that require a high level of integration of PLC, motion control and technology functions on account of the increasing use of servo drives:

- Packaging machines
- Plastic and rubber processing machines
- Presses, wire-drawing machines
- Textile machines

- Printing machines
- Machines for processing wood, glass, ceramics, and stone
- Production lines in the renewable energy sector, e.g. solar technology, wind power installations

3.2 SIMOTION P320-4 product description

3.2.1 SIMOTION P320-4 overview

The SIMOTION P320-4 provides high-level industrial performance. It features:

- Compact design
- Maintenance-free operation
- High degree of ruggedness
- Long-term availability

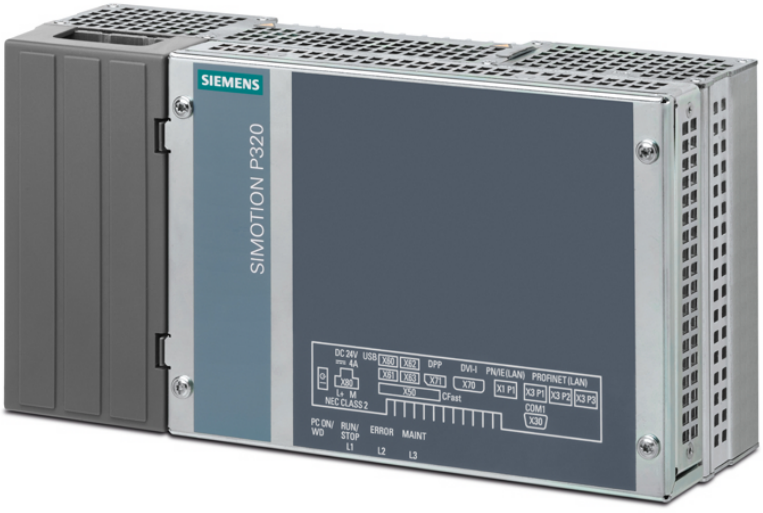


Figure 3-1 SIMOTION P320-4 view



Figure 3-2 SIMOTION P320-4 (open perspective) with plugged-in optional IsoPROFIBUS board

3.2.2 Features

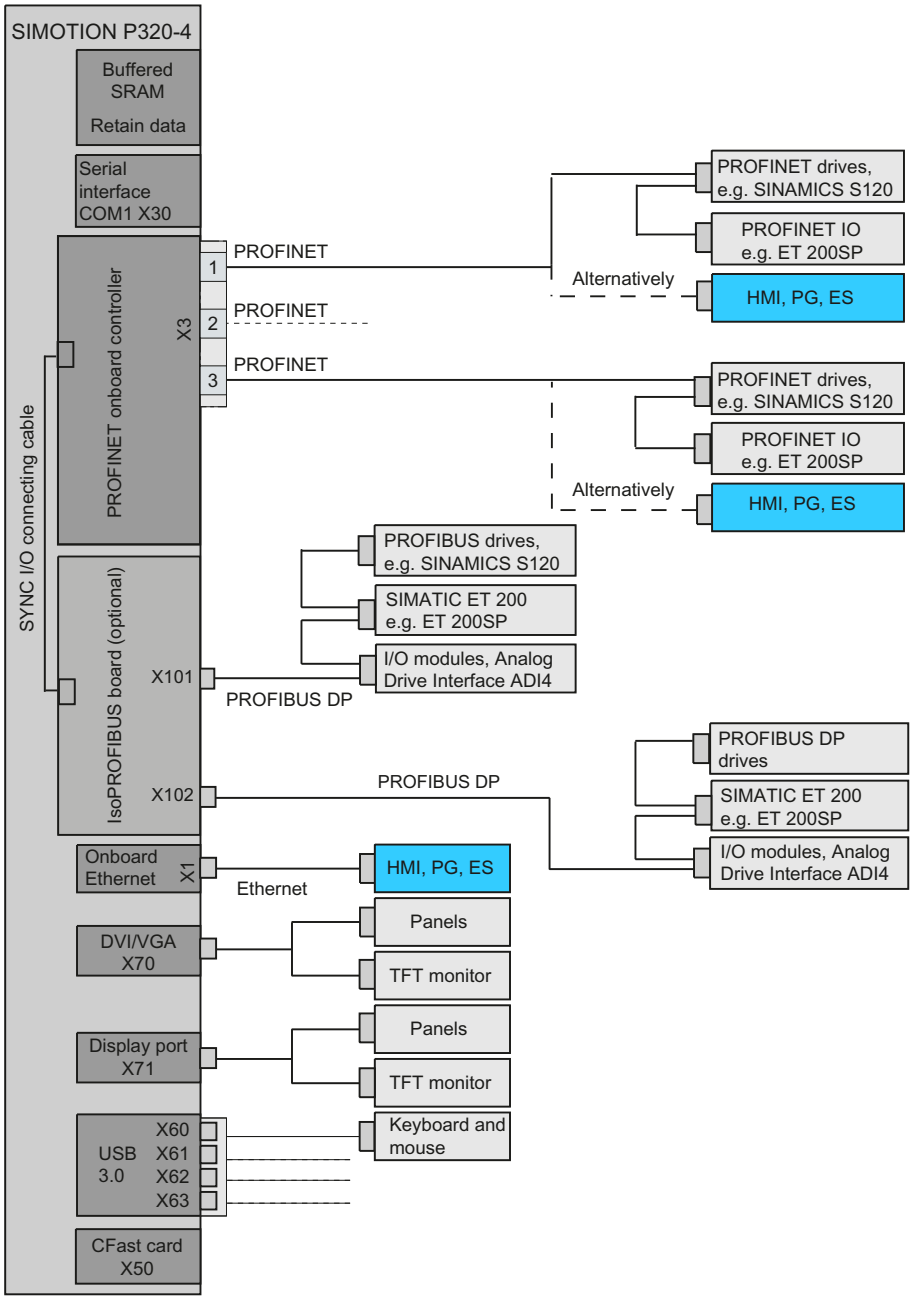
Basic data	
Installation	• Standard rail mounting • Vertical mounting
Processor	
P320-4 E **P320-4 S**	Intel Core i3-3217UE, 2 x 1.6 GHz, 3 MB cache Intel Core i7-3517UE, 2 x 1.7 GHz, 4 MB cache
Main memory	4 GB DDR3 RAM
Optional IsoPROFIBUS board (PROFIBUS DP)	2 x SUB-D socket with configurable baud rates (9.6 Kbit/s - 12 Mbps)
Graphics	• Integrated Intel HD2000 or HD4000 • DVI resolution of 640 × 480 pixels up to 1920 × 1200 pixels • Display port resolution max. 1920 × 1200 pixels • Graphics memory is occupied in the main memory (dynamic UMA)
Power supply	24 VDC (-20%/+20%) max. 4 A
Operating conditions	Operation without fan
Drives and storage media	
CFast card or SSD (Solid State Disk)	Depending on the hardware version of the SIMOTION P320-4

Basic data	
P320-4 E	**2 x CFast card** Internal interface: CFast External interface: CFast
P320-4 S	**SSD (Solid State Disk)** Internal interface: SSD **CFast card** External interface: CFast
USB stick	External, can be connected via USB interface
Interfaces	
Serial	COM (RS 232)
Graphics	DVI-I: Suitable for use as DVI or VGA DPP++: Display port, DVI via DPP-to-DVI adapter
USB	4 × USB 3.0, simultaneous operation of high current, backward compatible with USB 2.0/1.1
Ethernet	1 × RJ45 (10/100/1000 Mbps)
PROFINET I/O	3 × RJ45 (100 Mbps)
Keyboard, mouse	Can be connected via USB interface

Software	
Operating systems	
P320-4 E	Windows Embedded Standard 7 32-bit
P320-4 S	Windows 7 Ultimate 32-bit

3.2.3 SIMOTION P320-4 (hardware) structure

The following figure shows the integration of the SIMOTION P320-4 with integrated PROFINET onboard and optional IsoPROFIBUS board in a target system.

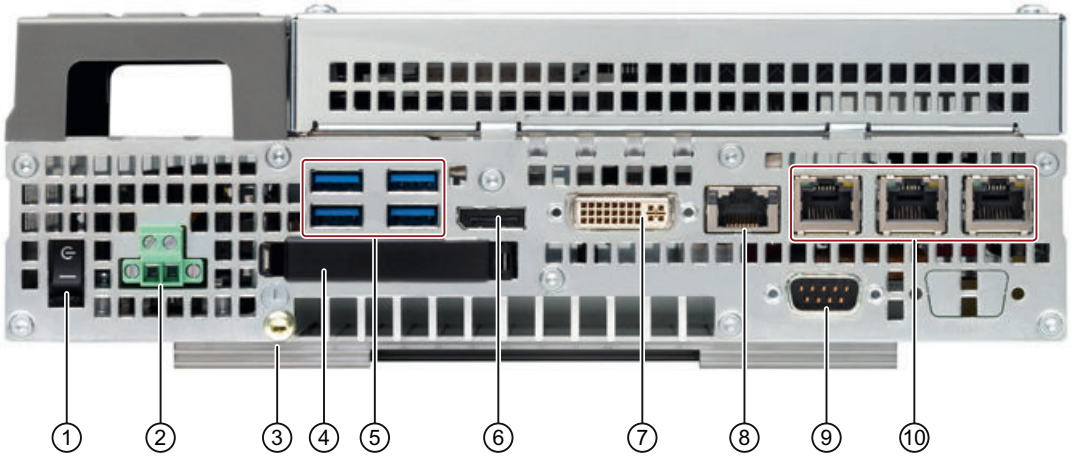


HMI Human Machine Interface
PG Programming device
ES Engineering system

Figure 3-3 SIMOTION P320-4 system overview

3.2.4 Interfaces and operating elements

SIMOTION P320-4



①	On/off switch	Position **OFF** is the delivery state. The on/off switch does not isolate the device from the power supply.
②	24 V DC	Power supply connection
③	Protective conductor	Protective conductor terminal
④	Memory card slot	Cover for the CFast card
⑤	4 × USB 3.0	USB 3.0 high current, backward compatible with USB 2.0/1.1
⑥	Display port	Display port connection for digital monitor
⑦	DVI-I	DVI connector for CRT or LCD monitor with DVI interface
⑧	Ethernet	RJ45 Ethernet connection for 10/100/1000 Mbps
⑨	COM1	Serial interface
⑩	3 × PROFINET	PROFINET ports with three RJ45 sockets

3.2.5 SIMOTION P Runtime (software) structure

SIMOTION P Runtime contains the SIMOTION P Kernel which performs the motion control and interface control.

A SIMOTION project is planned, configured, assigned parameters, commissioned and programmed via the SIMOTION SCOUT engineering system (ES).

The user data can be stored on the data media of the SIMOTION P320-4 .

Siemens WinCC flexible software can be used to visualize operational sequences or to operate the machine. Third-party systems can be linked via the OPC interface.

SIMOTION P Runtime

With the SIMOTION P320-4, the PLC and motion control functionality (starting from position controller upwards) is located centrally in a strictly deterministic task outside the Windows operating system.

Its main field of application is centralized motion control and control tasks requiring close coordination between multiple axes and/or input/output modules.

Functionality ranges from simple positioning to high-performance synchronous operation.

SIMOTION SCOUT

The SIMOTION SCOUT engineering system can be installed on the SIMOTION P320-4 S or connected via the interfaces integrated in SIMOTION P320-4 .

SIMOTION SCOUT TIA

As of version V4.5, the SIMOTION SCOUT TIA engineering system no longer supports the Windows 7 32-bit operating system and therefore cannot be installed.

HMI software

HMI/Runtime software can be operated on the same PC, e.g. the Siemens WinCC flexible software. Other software packages can be linked by means of the OPC interface.

The **HMI software** is used as the general term in the following.

Internal communication

A locally installed HMI can use the local communication to access the following:

- Variables in SIMOTION RT
- Drives on PROFINET IO or PROFIBUS DP
- Other SIMOTION devices on PROFINET IO or PROFIBUS DP

Scope of delivery

The system software supplied with the SIMOTION P320-4 is either already installed on the SIMOTION P320-4 storage medium or is ready to be installed:

- SIMOTION P Kernel
- SIMOTION IT
- SIMOTION IT VM Virtuell Machine (subject to license)

3.2.6 Components

The most important components of the SIMOTION P320-4 and their functions are listed below.

Distributed I/O systems (PROFINET)

Table 3-1 Components for distributed I/O

Component	Function
SIMATIC ET 200M	Modular I/O system for cabinet installation and high channel densities.
SIMATIC ET 200S	Finely modular I/O system for cabinet installation including motor starters, safety technology, and individual grouping of the load groups.
SIMATIC ET 200SP	Finely scalable I/O system for cabinet installation; SIMATIC ET 200SP features a single-cable and multi-cable connection with push-in terminals, compact dimensions, high performance, and low part variety.
SIMATIC ET 200MP	Modular I/O system for cabinet installation and high channel densities in the SIMATIC S7-1500 packaging system. SIMATIC ET 200MP permits the shortest bus cycle times and fastest response time even with large volumes of data.
SIMATIC ET 200eco	I/O system with IP67 degree of protection for machine-related, cabinet-free applications, featuring a flexible and fast connection system in ECOFAST or M12.
SIMATIC ET 200pro	Modular I/O system with IP65/67 degree of protection for machine-related, cabinet-free applications, including motor starters.

Note

Note that not all modules of the above-mentioned I/Os or I/O systems have been released for SIMOTION.

There may also be system-dependent functional differences with regard to the use on SIMOTION and on SIMATIC.
For example, special process-control functions (e.g. HART modules, etc.) are not supported by SIMOTION for the ET 200M distributed I/O system.

For a detailed and routinely updated list of I/O modules enabled with SIMOTION as well as application information, visit us online at:

SIEMENS Industry Online Support - Product support - Supplementary system components (https://support.industry.siemens.com/cs/de/en/view/11886029)

Further modules are integrated via the GSD file of the device's manufacturer.

Note

Note that in individual cases, additional supplementary conditions must be fulfilled.

Drive systems (via PROFINET IO)

Table 3-2 List of typically connected drive systems

Component	Function
SINAMICS S120	Servo drives, innovative single-axis and multi-axis solution

Optional components

Table 3-3 Optional components

Centralized I/O	Function
IsoPROFIBUS board	PROFIBUS connection
UPS	Uninterruptible Power Supply The drivers for the UPS are not pre-installed on the PC. Install the current drivers that are supplied with the UPS.

Note

An IsoPROFIBUS board may be inserted in addition to the PROFINET onboard.

3.3 HMI and SIMOTION SCOUT

3.3.1 HMI and SIMOTION SCOUT Overview

The operational sequences on the SIMOTION P320-4 are either monitored via the HMI system (Human Machine Interface) or the SIMOTION SCOUT engineering system.

The HMI or ES software can be connected using the following versions:

- Local (Page 61)
- via PROFINET (Page 74)
- via Ethernet (Page 75)
- via IsoPROFIBUS (optional) (Page 76)

Local communication of the HMI/ES

If HMI or ES is installed locally on the SIMOTION P320-4, **PC internal** can establish a connection to the local **SIMOTION P Runtime** . Only a local connection is permitted.

See section Local HMI or ES on SIMOTION P320-4 (Page 61)

Communication of the HMI / ES via PROFINET / Ethernet / PROFIBUS

By using one of these communication versions, you can control and monitor several SIMOTION devices.

3.3.2 Local HMI or ES on SIMOTION P320-4

The model described below is used for the communication of the SIMOTION P320-4 with a local HMI or ES. The SIMOTION SCOUT engineering system or the HMI system can be installed directly on the **SIMOTION P320-4 S**.

For this model, you must set the communication (access point) to **TCP/IP** .

The SIMOTION P320-4 is already configured for this communication version at the time of delivery.

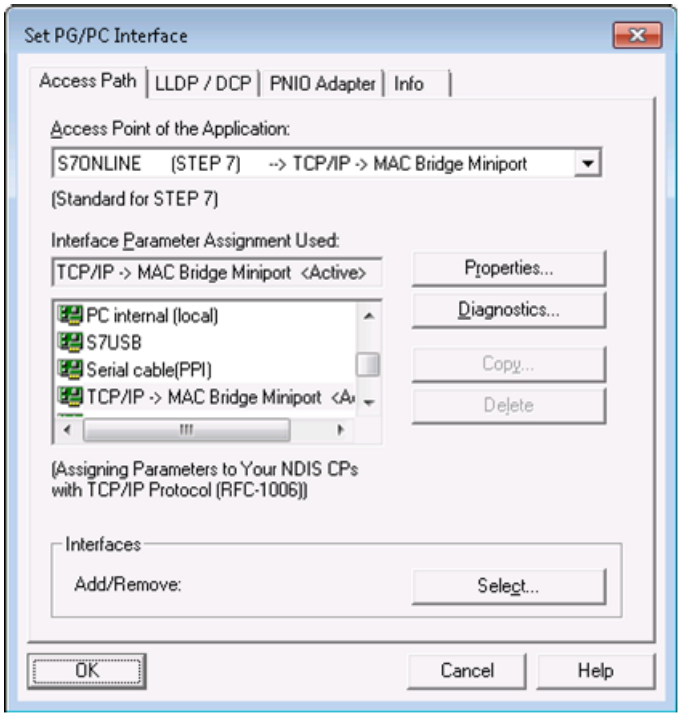


Figure 3-4 Set PG/PC Interface - TCP/IP -> MAC Bridge Miniport dialog box

Note

Local communication via Ethernet (TCP/IP)

For the communication via Ethernet (TCP/IP) to function locally, a link must be available to the Ethernet interface or a LAN cable must be connected **or** the MAC bridge set up.

Note

Setting up the MAC bridge miniport

See also Section Setting up a network bridge - MAC bridge miniport (Page 63)

Note

Only HMI-Runtime can be installed on the **SIMOTION P320-4 E** version.

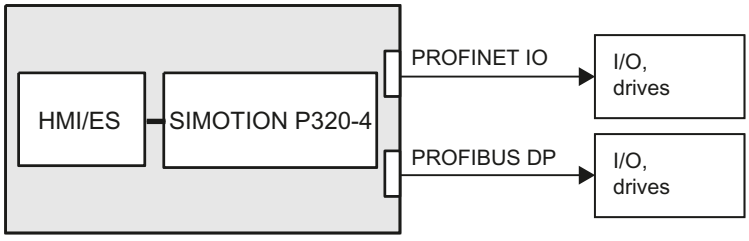


Figure 3-5 Model: Local HMI or ES

Alternatively to TCP/IP , SIMOTION SCOUT can also communicate locally via PC internal (local) .

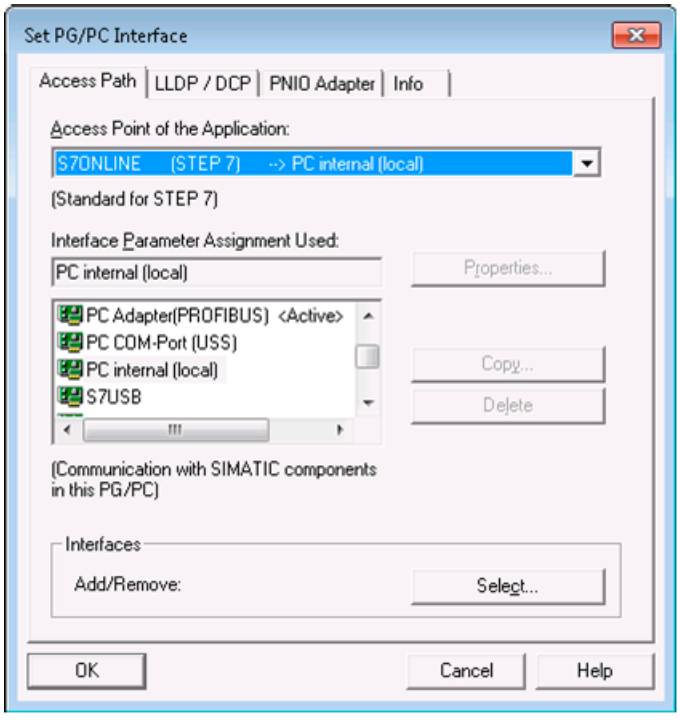


Figure 3-6 Set PG/PC Interface - PC internal (local) dialog box

3.3.2.1 Setting up a network bridge - MAC bridge miniport

Note

If you are working with SIMOTION P320-4 version V4.5, the Network Bridge is already preset.

The network bridge must be preset, configured via script and set up as described in the following. Note that the MAC address of the network bridge is different to the MAC address of the Ethernet adapter.

The following is a step-by-step description of how the network bridge **MAC Bridge Miniport** is set up.

Network connections initial situation

Open the **Network and Internet** via the Control Panel.

- Select **Control Panel > All Control Panel Items > Network and Sharing Center > Change adapter settings**.
- Open the **Network and Internet > Network Connections** dialog box.
  The network connections of your PC are shown here.

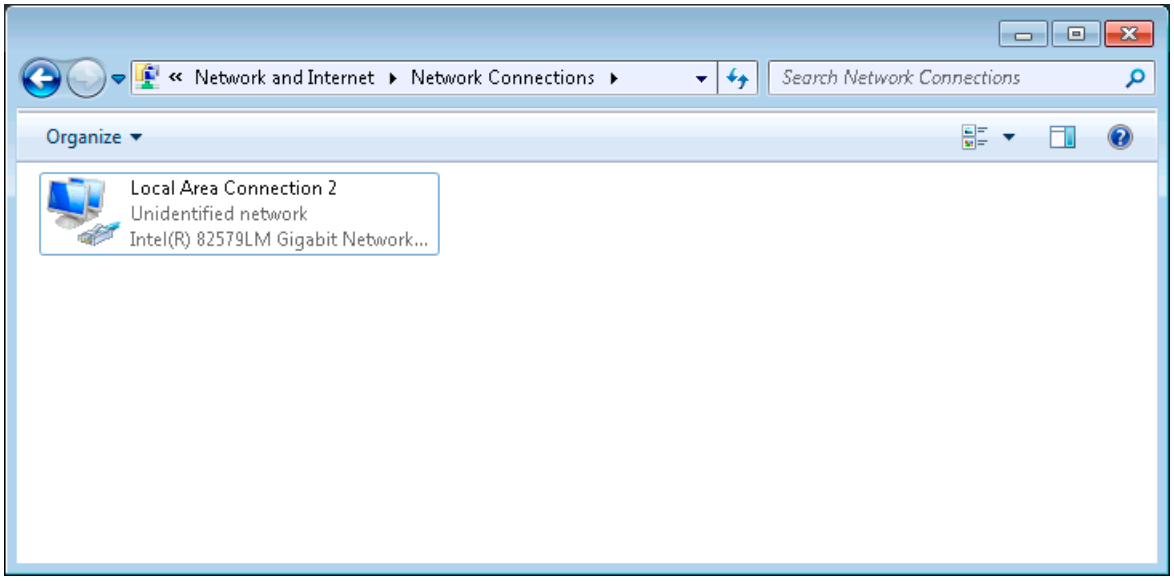


Figure 3-7 Initial situation - Network connections

Device Manager

Open the Device Manager via the Control Panel:

Control Panel > All Control Panel Items > System > Device Manager.

1. Select the **Network adapters** in the dialog box below the "SIMOTION PC".
   The available network connections are shown here.

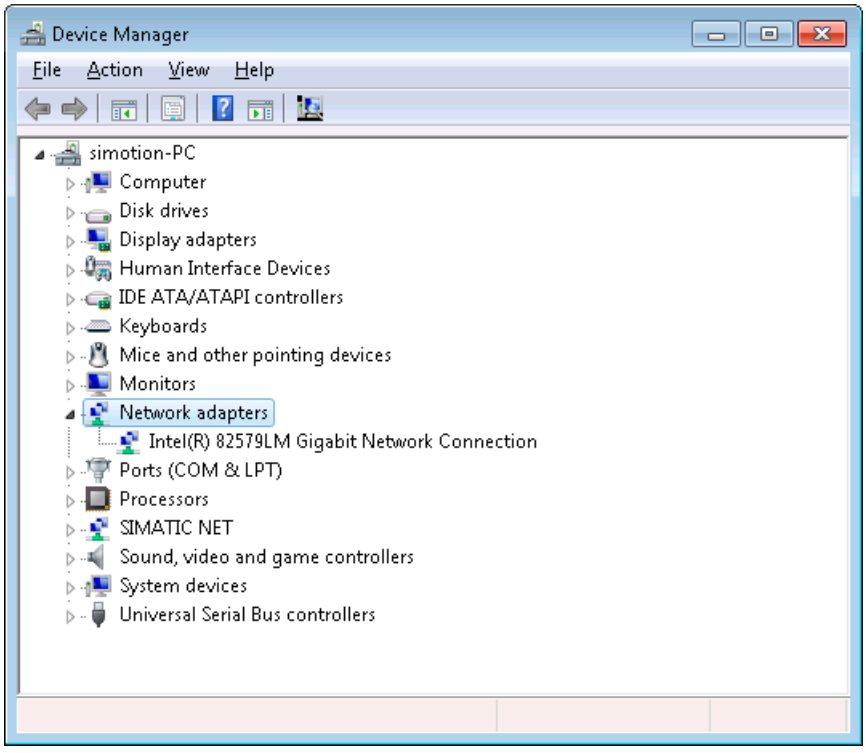


Figure 3-8 Opening the Device Manager

2. Install the **Microsoft Loopback Adapter** via the Device Manager.
3. To do this, select the menu **Action > Add legacy hardware**.
   The **Add Hardware Wizard** then opens.

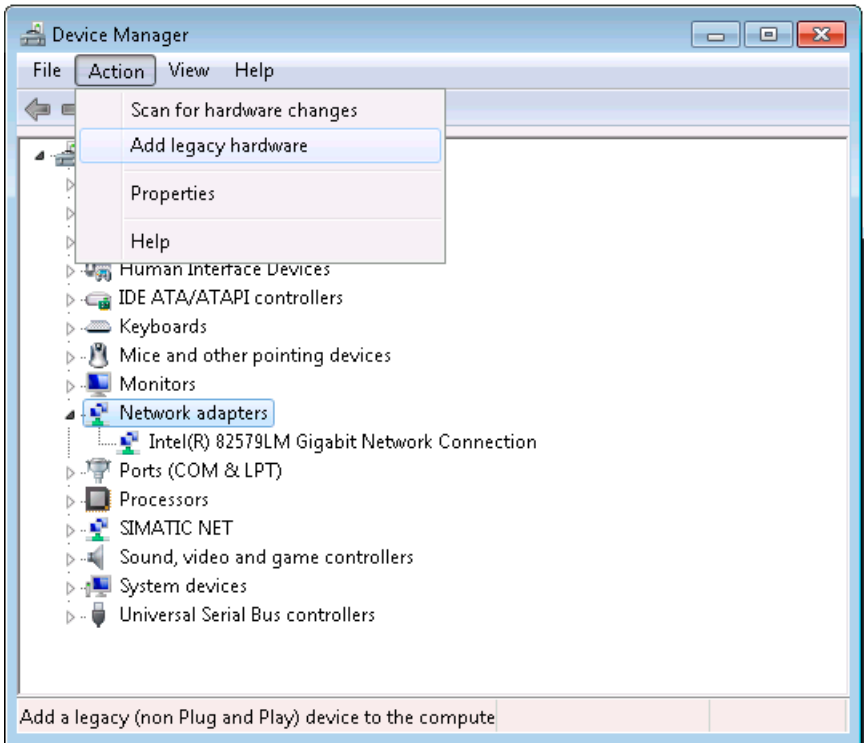


Figure 3-9 Device Manager - Action menu

Add Hardware Wizard

Use the **Add Hardware Wizard** to install the network bridge.

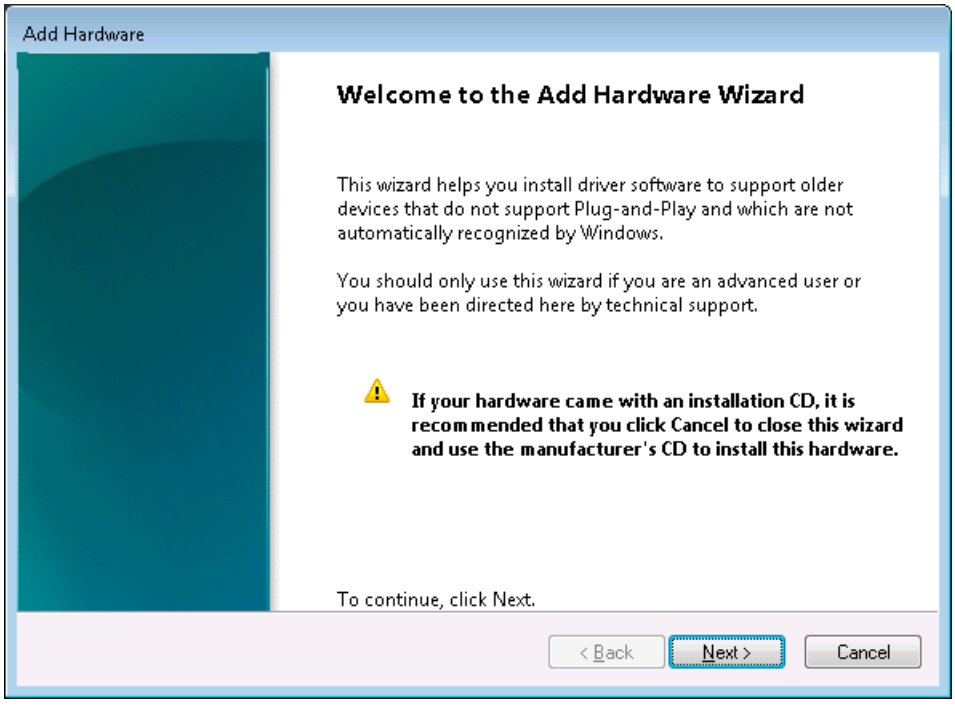


Figure 3-10 Add Hardware - Starting the wizard

1. Click **Next** to start the software wizard.
2. Select the option: **Install the hardware that I manually select from a list (Advanced)** and continue in the wizard with **Next**.

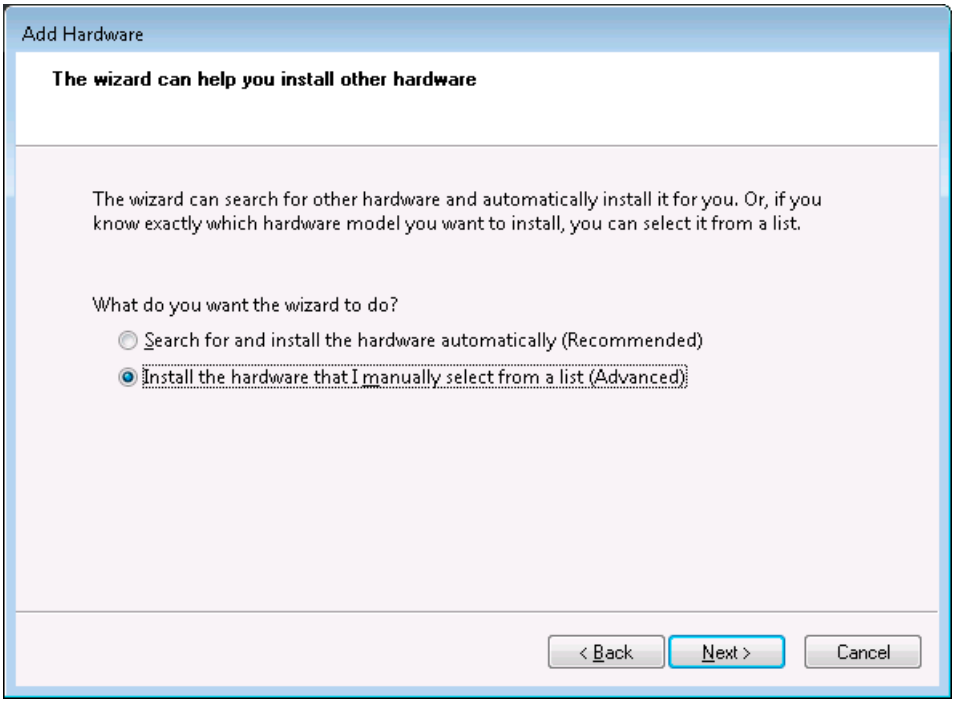


Figure 3-11 Add Hardware - Manual selection from a list

3. Select **Network adapters** in the dialog box now open and continue in the wizard with **Next**.

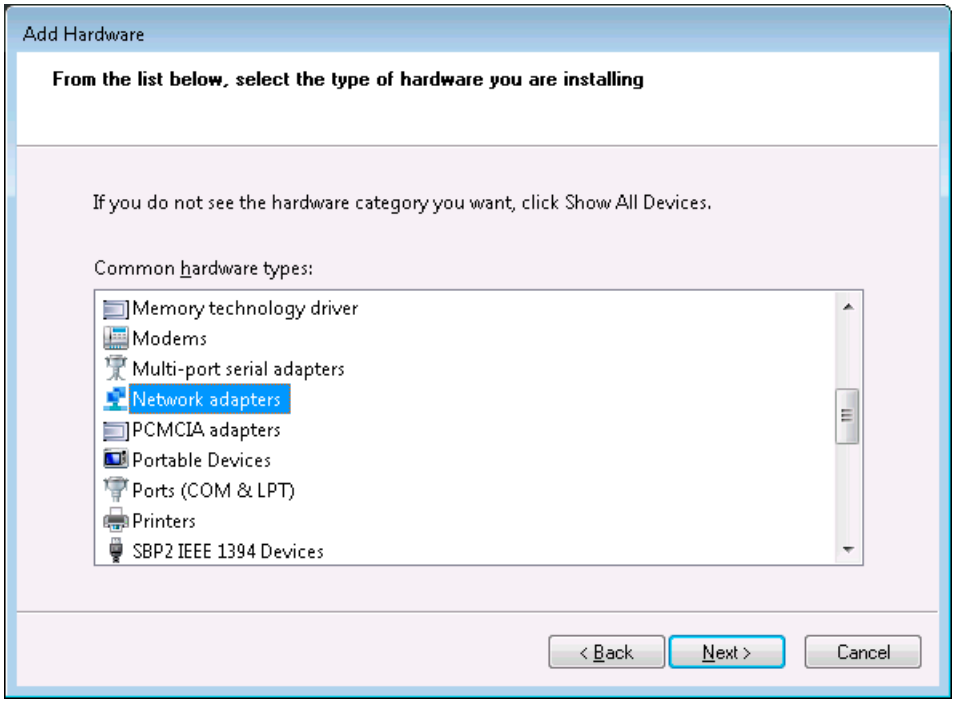


Figure 3-12 Select Add Hardware - Network adapters

4. In the following dialog box, select the **Microsoft Loopback Adapter**.
5. To do this, select Microsoft at **Manufacturer** and the Microsoft Loopback Adapter at **Network Adapter**.

6. Continue in the wizard with **Next**.

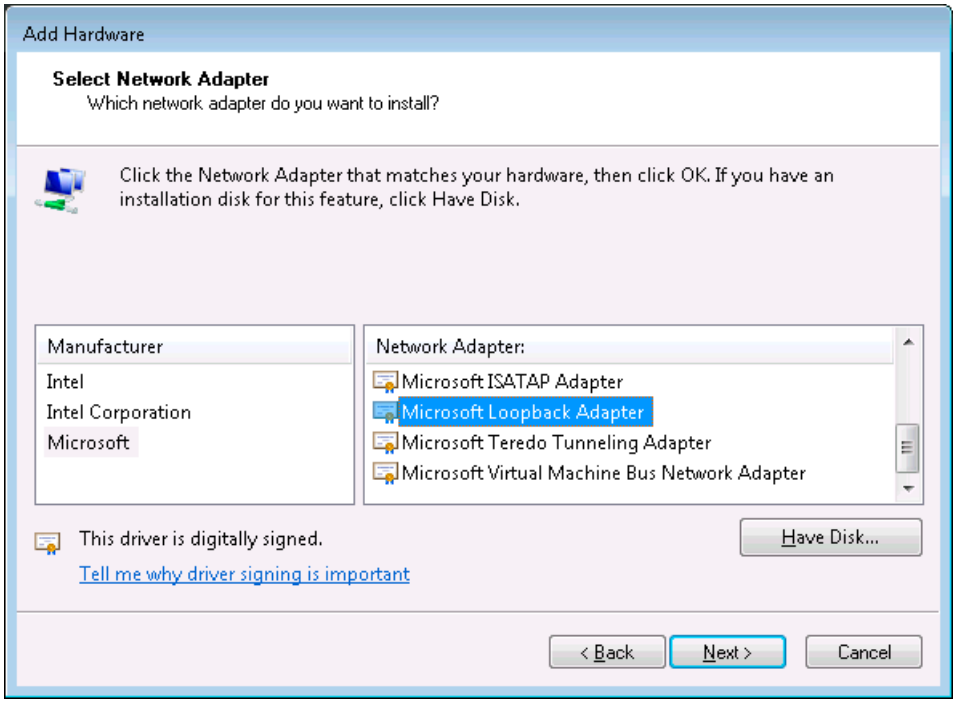


Figure 3-13 Add Hardware - Selecting the desired Network Adapter

7. The selected Network Adapter is shown in the following dialog box.
   Click **Next** to confirm and install.

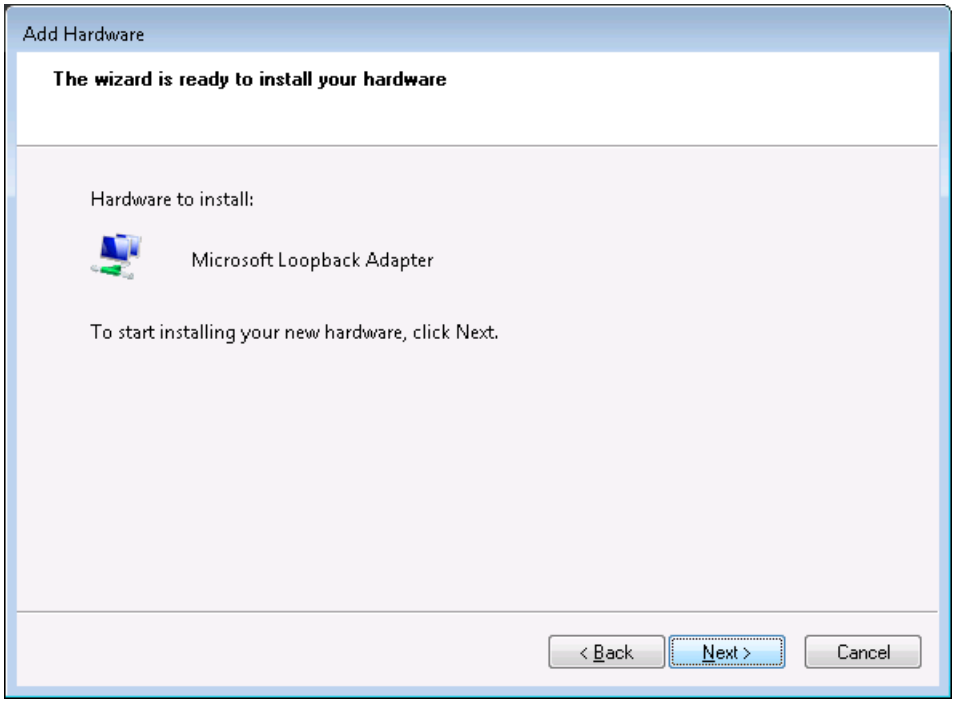


Figure 3-14 Add Hardware - Selected Network Adapter can be installed

8. After finishing the installation, the following dialog box is displayed.
   Exit the wizard with **Finish**.

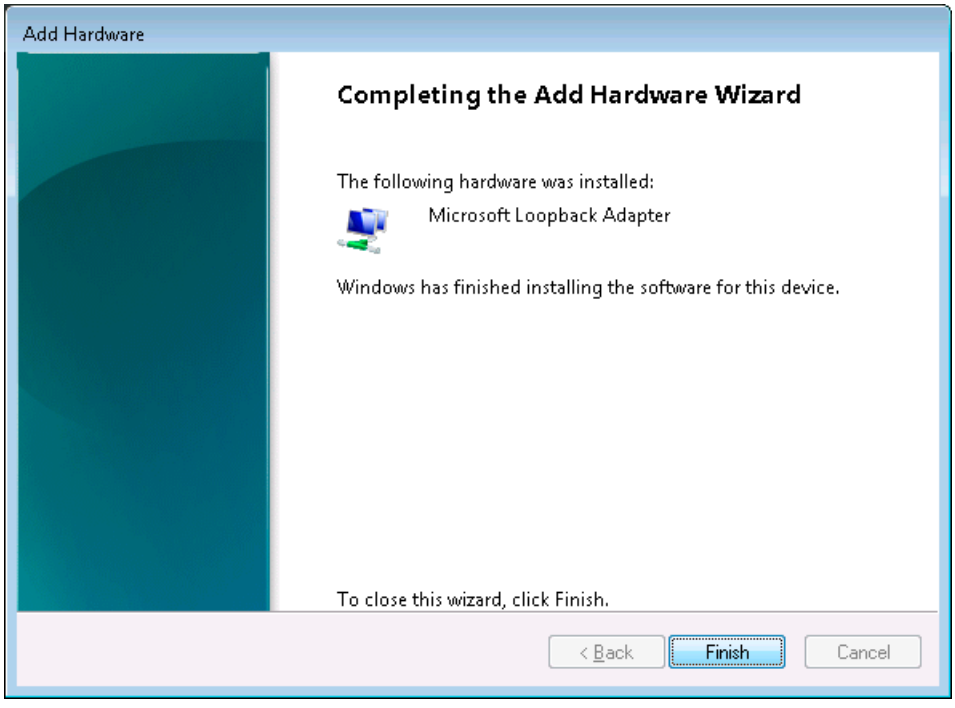


Figure 3-15 Add Hardware - Installation of the Microsoft Loopback Adapter is finished

Checking the installation of the network adapter

You can check the successful installation of the **Microsoft Loopback Adapters** in the

- Device Manager
- Internet connections

Device Manager

The Microsoft Loopback Adapter is displayed at **Network adapters** in the Device Manager.

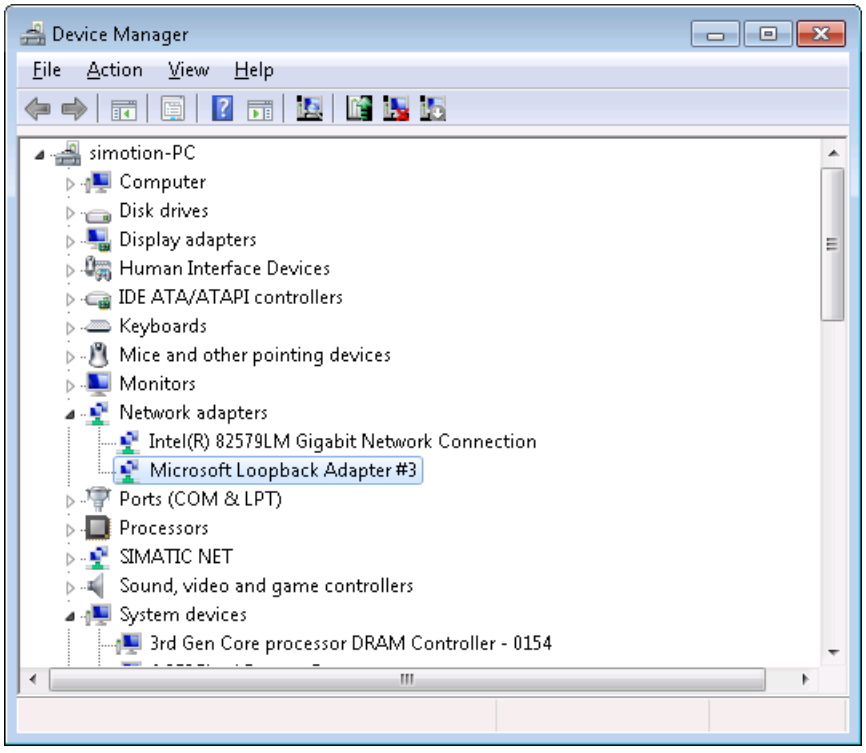


Figure 3-16 Device Manager - Microsoft loopback adapter

Network connections

The newly installed Microsoft Loopback Adapter is also displayed at **Network Connections**.

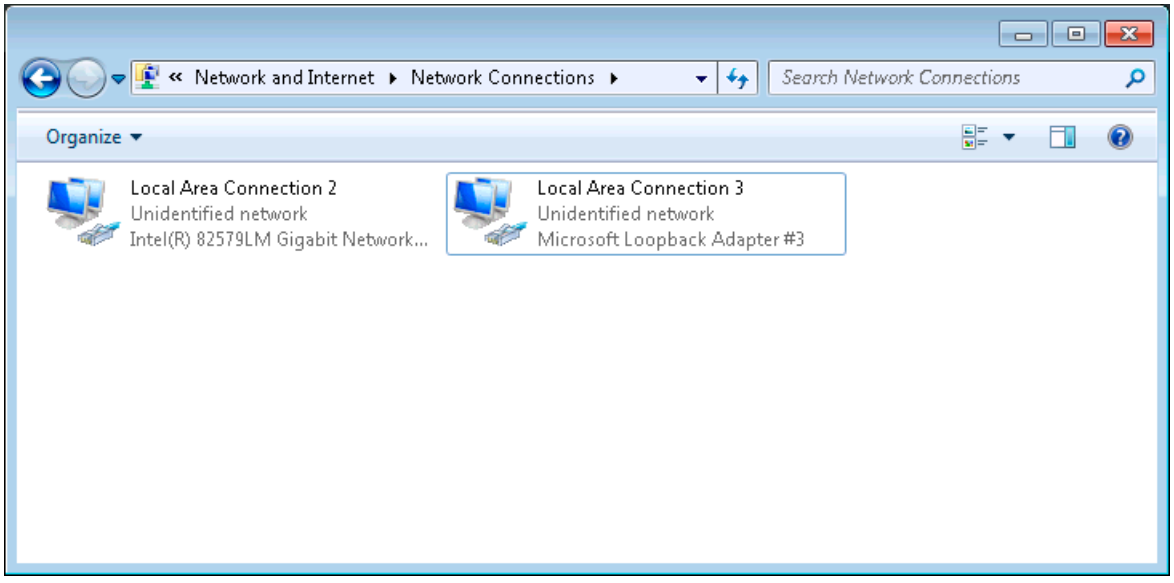


Figure 3-17 Network connections - Display of the newly installed Microsoft loopback adapter

Creating the network bridge

To activate the network bridge, proceed as follows:

1. Select both adapters at Network Connections
2. Select Bridge Connections via the context menu.

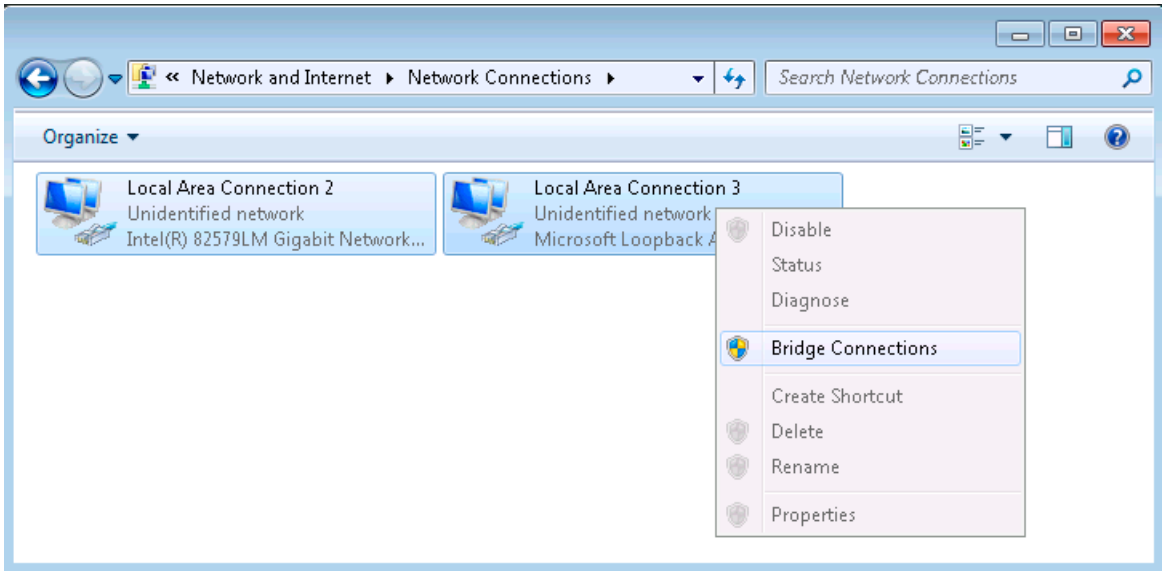


Figure 3-18 Network Connections - Setting the Bridge Connection

3. The Network Bridge MAC Bridge Miniport is displayed.

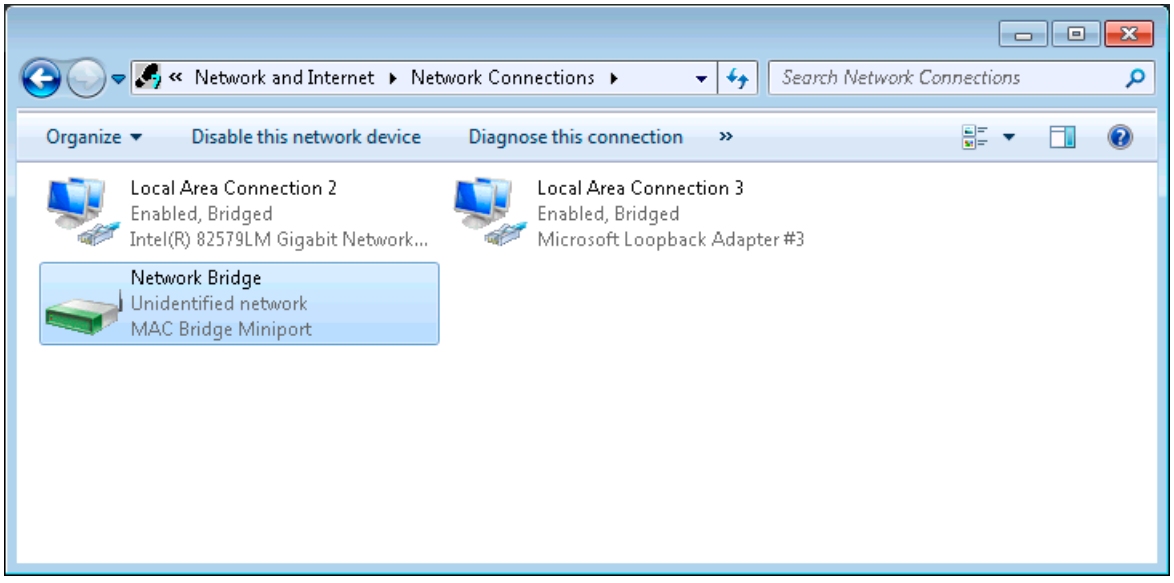


Figure 3-19 Network Connections - Display of the Network Bridge MAC Bridge Miniport

4. To initialize the network bridge, execute the **sp_bridge.cmd** Windows command script.
   The additional script can be found at C:\SiMotion\tools\sp_bridge.cmd
   After executing the batch file, the network bridge has been set up.

Setting "Set PG/PC interface"

Now open the PG/PC interface to complete the setting for the **Network Bridge** .

1. Open the **Set PG/PC Interface** dialog box via the **Control Panel** entry point.
2. Deactivate the **MAC Bridge Miniport DCP** checkbox in the **LLDP / DCP** tab.
   If you do not deactivate the MAC Bridge Miniport DCP, the SIMOTION P320-4 may not be found via Accessible nodes.

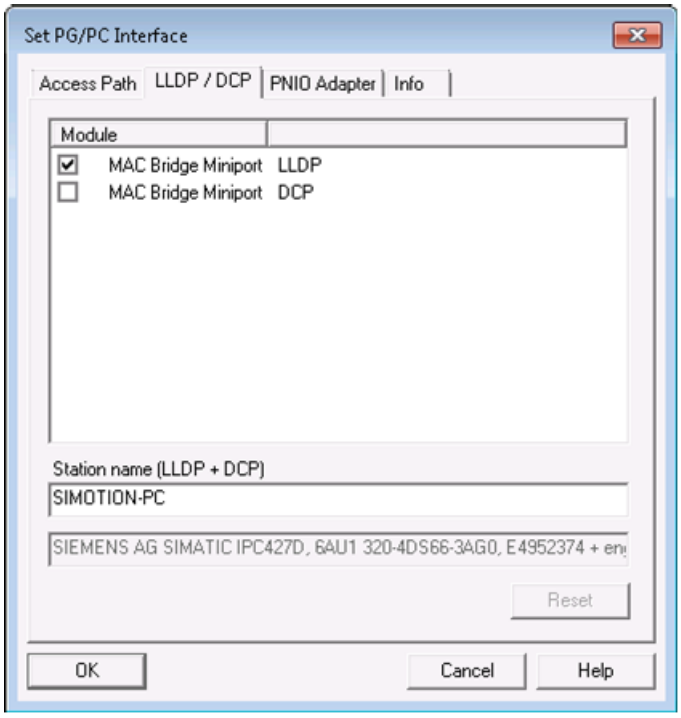


Figure 3-20 Set PG/PC interface

The settings for the network bridge have now been completed.

3.3.3 HMI or ES via PROFINET

Networking via PROFINET

PROFINET is the innovative and open Industrial Ethernet standard (EN 61158) for industrial automation. With PROFINET, devices can be linked up from the field level through to the management level.

With PROFINET, an external HMI or ES can also be integrated into the network and data can be exchanged directly with the SIMOTION P320-4 device.

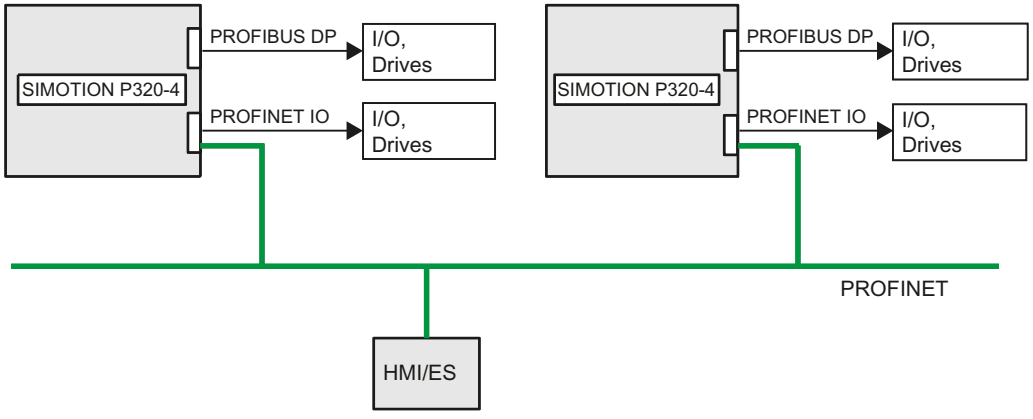


Figure 3-21 Model: Networking via PROFINET

References

You can find further information on the HMI in the documentation:

- SIMOTION Runtime Basic Functions, Section HMI (Human Machine Interface) coupling.
- SIMOTION SCOUT, Configuration Manual
- SIMOTION SCOUT TIA, Configuration Manual
- SIMOTION SCOUT TIA Device Proxy, Configuration Manual

3.3.4 HMI or ES via Ethernet

Networking via Ethernet

A complex interconnection with several HMIs or ESs is only possible using an Ethernet communication. This allows both an external HMI or ES to access several SIMOTION devices or one SIMOTION device to access another one, for example, to display the production data.

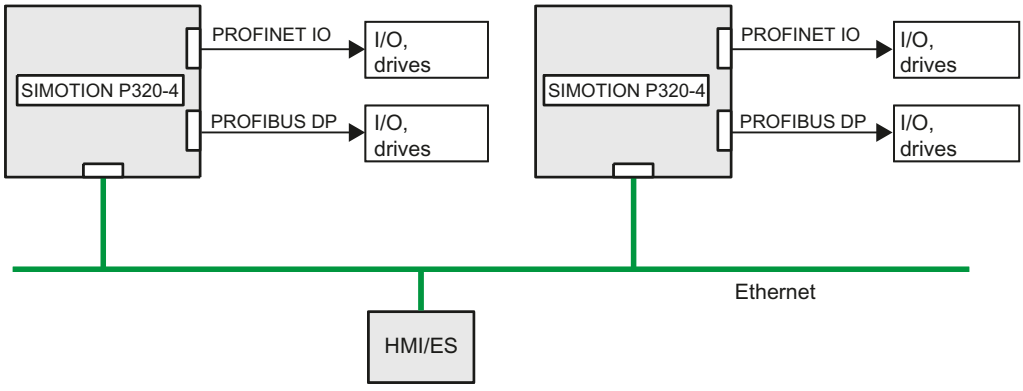


Figure 3-22 Model: Networking via Ethernet

The following services are possible on a SIMOTION device via Ethernet:

- HMI software
  WinCC flexible or the OPC server can use Ethernet to access one or more SIMOTION devices.
- SIMOTION SCOUT Engineering System
  SIMOTION SCOUT can also use Ethernet to access one or more SIMOTION devices.
- SIMOTION IT
  SIMOTION P320-4 offers communication with standard IT protocols (HTTP) over the integrated Ethernet interface.
  This makes it possible to access data or diagnostic information in the SIMOTION P320-4 from any location via intranet or the Internet.
- HTTP (browser, OPC XML)
  Setting in WebCFG.xml - default 80

- HTTPS (browser, OPC XML)
  Setting in WebCfg.xml - default 443
- FTP 21
- Telnet

References

You can find further information in the documentation for SIMOTION IT:

- SIMOTION IT Diagnostics and Configuration
- SIMOTION IT Programming and Web Services
- SIMOTION IT Virtual Machine and Servlets

3.3.5 HMI or ES via IsoPROFIBUS (optional)

Networking via PROFIBUS DP

If you connect a central HMI via PROFIBUS DP, the X101 and X102 interfaces of the IsoPROFIBUS board are available.

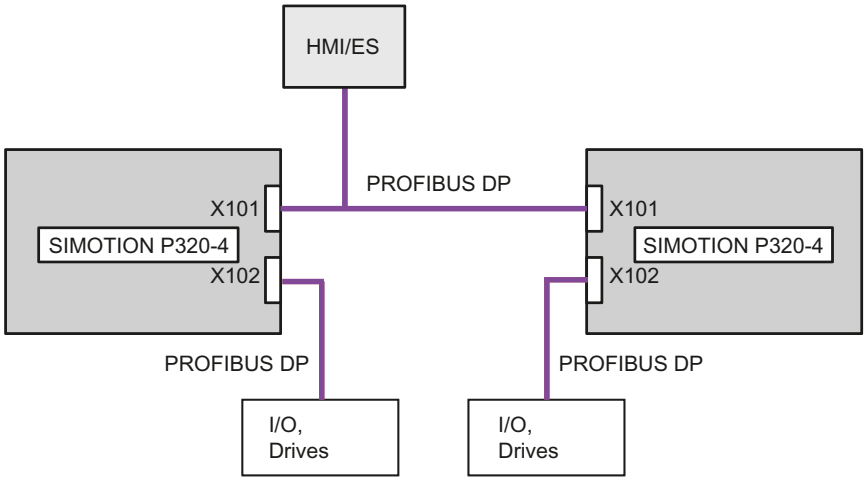


Figure 3-23 Model: Networking via PROFIBUS DP

References

You can find further information on the HMI in the documentation:

- SIMOTION Runtime Basic Functions, section HMI (Human Machine Interface) coupling.

Use planning

4

The use planning is described in the SIMOTION P320-4 E / P320-4 S manual.
There you receive the following information:

- Unpacking and checking the delivery
- Device identification data
- Information about the permitted mounting positions
- Environmental conditions
- Electromagnetic compatibility
  Link to further information about relevant standards for electromagnetic compatibility (EMC).

Mounting

5

5.1 Installation overview

The SIMOTION P320-4 is installed in a cabinet or in a controller housing.

Unlocking Windows

Note

Windows locked

Windows may be accidentally locked, e.g. through shortcut key Ctrl+L. If you do not know the password for the SIMOTION P320-4, please contact the Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/).

Operating mode

Two operating modes are available for the installation of a SIMOTION P320-4:

- SIMOTION P320-4 - Headless operation (Page 80)
- Distributed configuration of the SIMOTION P320-4 with a remote panel (Page 83)

5.2 Headless operation

5.2.1 SIMOTION P320-4 - Headless operation

The SIMOTION P320-4 is operated without a screen, e.g. SIMATIC panel, SIMOTION P320-4 is installed in a cabinet.

The maintenance and configuration is performed via a computer that accesses the SIMOTION P320-4 by means of remote desktop.

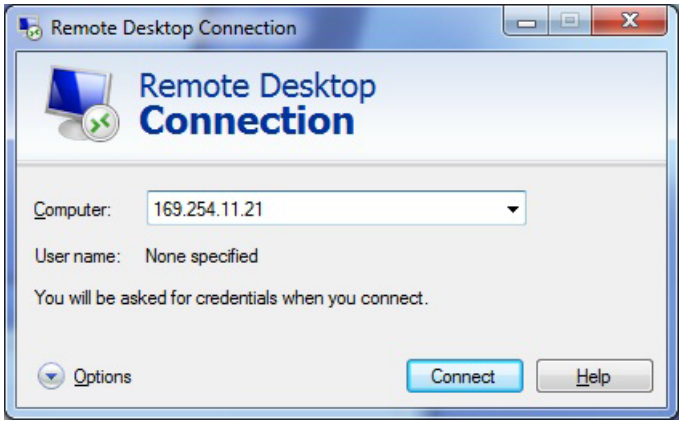


Figure 5-1 Headless to be accessed by means of remote desktop connection

Note

Headless operation or remote desktop connection

To log in via a remote desktop connection, you require a user name and a password.

If you do not have a password, please contact the hotline.

Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/)

5.2.2 Deactivating the remote desktop connection

Deactivating the remote desktop connection

If you do not use the headless mode and do not require a remote desktop connection, we recommend that you explicitly disable the remote desktop connection.

NOTICE
Deactivating the remote desktop connection
To ensure that the remote desktop connection is not used, it must be explicitly deactivated.

Procedure for deactivating the remote desktop connection

1. Using the Control Panel, select **System** > **Remote settings**.

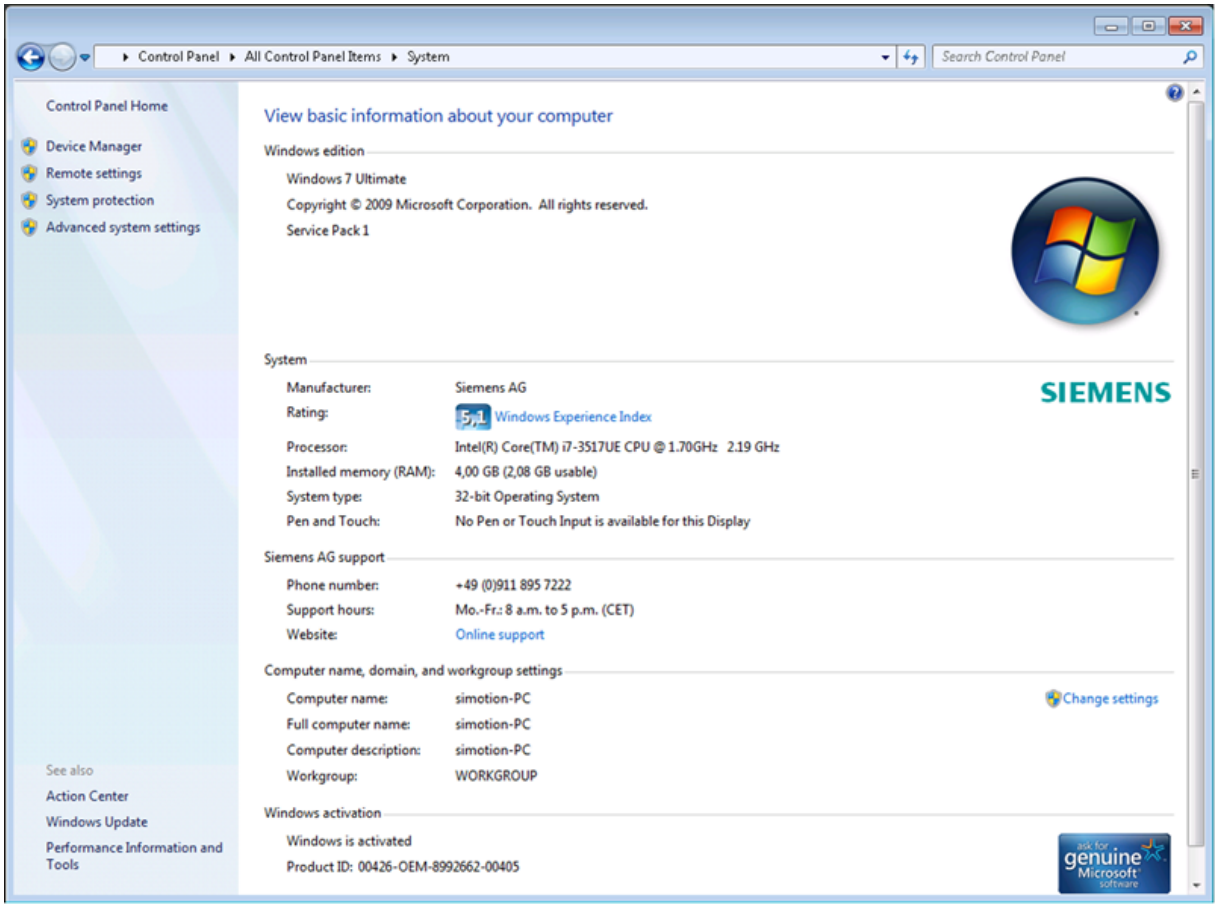


Figure 5-2 Remote settings

2. Select the **Remote** tab in the **System Properties** dialog box.

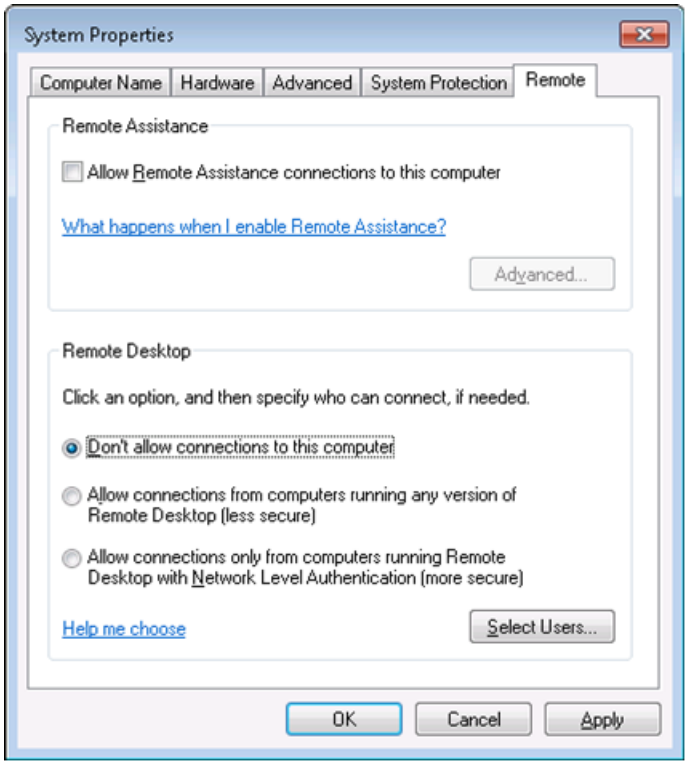


Figure 5-3 System Properties dialog box

3. Select the **Don't allow connections to this computer** option at **Remote Desktop**.
4. Confirm with **OK**.

Any remote desktop access is deactivated with this operation.

5.3 Decentralized structure

Distributed configuration of the SIMOTION P320-4 with a remote panel

The distributed configuration provides greater flexibility in terms of location and enables the SIMOTION P320-4 to be positioned in non-critical areas of the plant (e.g. cabinet).

The distributed configuration of a panel with the SIMOTION P320-4 can be performed via the DisplayPort or DVI connection. Please note the cable lengths that are supported for the panel.

5.4 Important information about installation

When installing the unit in an enclosed housing, make sure that sufficient space is available for air circulation.

Ensure that the clearance to other components or the sides of cabinets is at least 50 mm above and 100 mm below the device.

The maximum ambient temperature of the SIMOTION P320-4 depends on the mounting position:

- Horizontal (preferred position): Maximum +55° C (in RAL)
- Vertical (power supply at the top): Maximum +45° C
- Suspended: Maximum +40° C
- Vertical mounting: Maximum +45° C

RAL = Restricted Access Location (installation of device in operating facilities with restricted access, for example, a locked control cabinet)

Further information can be found in the SIMOTION P320-4 E / P320-4 S Manual.

5.5 Withdrawing/inserting the CFast card

SIMOTION P320-4 has an external slot for a CFast card on the interface side. Always use SIMATIC IPC CFast cards for industrial applications.

The CFast card is mandatory for operation of the SIMOTION P320-4. The CFast card is supplied with the SIMOTION P320-4.

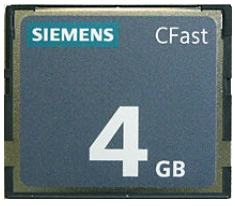
NOTICE
Damage to the device The CFast and CompactFlash connections are not compatible. The device will be damaged. Use the slot described in this section only for a CFast card.

Note

Note the version of the CFast card

Note the following:

- **Always** insert a CFast card as of production version 02.
- Always replace a CFast card with a CFast card of the same or higher production version.
- The production version can be found on the CFast card (see marking).





CFast card - ordering data			
Designation	**Article number**	**Further information**	
CFast	6ES7648-2BF10-0XG0	4 GB	INDUSTRIAL GRADE

Note

Only use the CFast card specified with the article number above for the external interface.

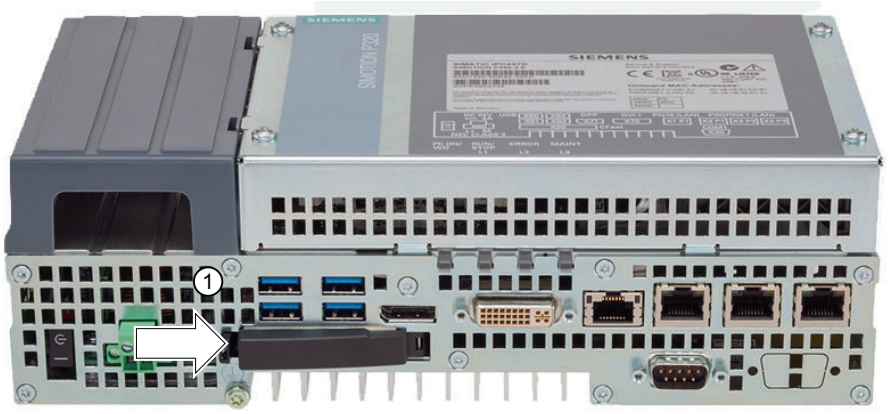
Requirement

- The device is switched off.
- SIMATIC IPC CFast card approved for industrial applications.

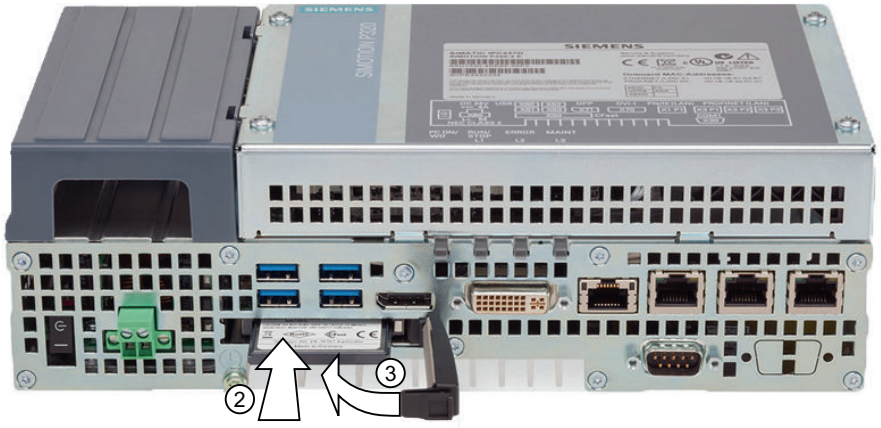
Withdrawing the CFast card

To withdraw the CFast card, proceed as follows:

1. Release the lock of the cover. Push against the cover in the direction indicated.
   Open the cover completely.



2. Remove the CFast card from the memory card slot by pushing it in until it is ejected by about 5 mm (ball-point pen mechanism).
   Then withdraw the CFast card from the memory card slot.



3. After removing the CFast card, close and lock the cover.

Inserting the CFast card

NOTICE
Inserting the CFast card If you insert a CFast card into a built-in SIMOTION P320-4 in a system, observe the safety regulations for working with electrical systems. Insert the CFast card carefully into the slot, and without applying excess force.

To insert the CFast card into the memory card slot again:

Push the CFast card into the memory card slot until it locks into place (ball-point pen mechanism).

5.5.1 Automatic restart for SIMOTION P Runtime

Note

Not a Windows restart

Note that this is not a Windows restart!

Starting the SIMOTION P320-4 with withdrawn CFast card

Power-up of the SIMOTION P Runtime is **not** possible without the CFast card. A prompt referring to the missing CFast card is displayed. The prompt is displayed until the CFast card is inserted. The power-up is then continued and the prompt closed automatically.

The automatic restart of the SIMOTION P Runtime is performed when the **Enabled** checkbox is activated in the **SIMOTION P Control Manager** in the **Administration** tab at **Automatic Restart By Plug-In External Memory Card**.

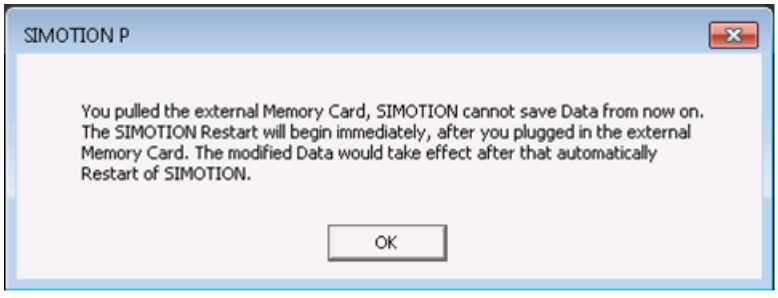


Figure 5-4 Prompt about the missing CFast card - automatic restart Enabled

Note

The prompt does not close automatically after inserting the CFast card.

If the prompt shown above is not automatically closed after inserting the CFast card and there is no automatic restart of the SIMOTION P Runtime, check the BIOS settings.

See Section Hotplug Enabled BIOS settings (Page 221).

If the **Disabled** status has been selected in the SIMOTION P Control Manager, there is no automatic restart of the SIMOTION P Runtime after the CFast card has been inserted. In this case, the following prompt is displayed.

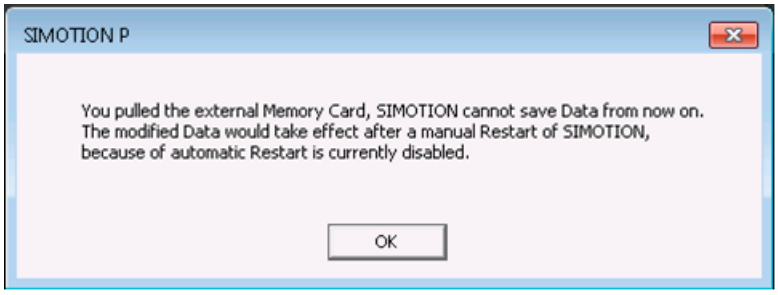


Figure 5-5 Prompt about the missing CFast card - automatic restart Disabled

CFast card withdrawn during operation

If the CFast card is withdrawn during normal operation, the SIMOTION P Runtime goes into the **General reset request** state.

This state can be exited through MRES (general reset) on the mode selector or a restart via SIMOTION P State.

In addition to the general reset request, a prompt is also displayed informing about the withdrawn CFast card and whether an automatic restart of the SIMOTION P Runtime will be performed.

Note

Automatic restart for SIMOTION P Runtime setting

The automatic restart settings are made in the SIMOTION P Control Manager.

The default setting in the Administration tab at Start SIMOTION P is Enabled.

Further information can be found in Section **SIMOTION P Control Manager > Administration tab >** Automatic Restart By Plug-In External Memory Card (Page 141).

5.6 Installing the SIMOTION P320-4 in the control cabinet

5.6.1 Notes on installation

Requirement

Before you install the device, observe the following installation notes:

NOTICE
Observe the DIN/VDE requirements Adhere to the relevant DIN/VDE requirements or the country-specific regulations when installing in cabinets.

NOTICE
Observe UL508 For use in the area of **Industrial Control Equipment** (**UL508**), remember that SIMOTION P320-4 is classified as **Open type**. Installation of the device in an enclosure according to **UL508** is conditional for approval or operation according to **UL508**.

Types of installation

The following SIMOTION P320-4 installation types are permitted and described in the following sections:

- Standard rail mounting (Page 89)
- Vertical mounting (Page 92)

5.6.2 Standard rail mounting

Mounting the SIMOTION P320-4 on a standard rail

Note

Use of Siemens 35 mm standard mounting rail is recommended.

Mounting the standard mounting rail clip

Before you can install the device on a standard mounting rail, you will need to attach the standard mounting rail clip included in the scope of delivery.

The fasteners and screws required are supplied with the device for mounting depending on the order number.

Requirement

- 1 standard mounting rail clip
- 2 screws
- 1 T20 screwdriver

Use the two screws to mount the standard mounting rail clip on the SIMOTION P320-4 enclosure.

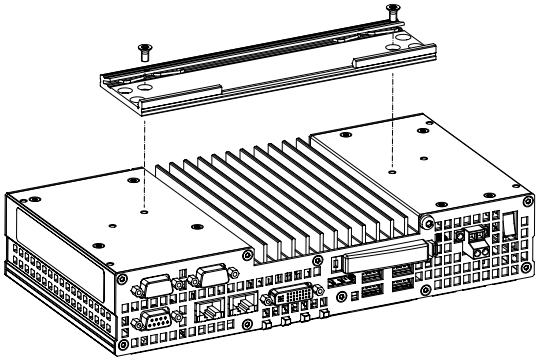


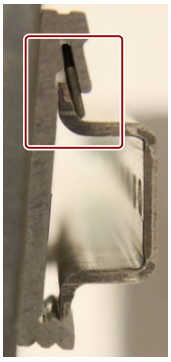
Figure 5-6 Mounting the standard mounting rail clip

Standard rail mounting

Steps for mounting on standard rail

Proceed as follows:

1. First place the SIMOTION P320-4, which is equipped with rail clips, at an angle on the upper rail guide.



2. Press the SIMOTION P320-4 slightly downward.
3. Swivel the SIMOTION P320-4 completely onto the rail until both clamps lock completely into place.
   Ensure that the locking into place of the SIMOTION P320-4 is audible.



Note

To ensure secure vertical mounting on standard rails, a standard rail ground terminal should be mounted beneath the device.

Mounting/installing the device

Examples of mounting types		
Material	**Bore diameter**	**Fixing**
Concrete	8 mm diameter 60 mm depth	Wall plug: 8 mm diameter 50 mm length Screws: 4 mm diameter 50 mm length
Plasterboard (min. 13 mm thick)	14 mm diameter	Cavity fixings: 4 mm diameter 50 mm length
Metal (min. 2 mm thick)	5 mm diameter	Metal screws M 4: 4 mm diameter 15 mm length

NOTICE

Observe the total weight of the SIMOTION P320-4

Ensure that the wall can hold four times the total weight of the device (including mounting rail and additional expansion modules).

Removing the device from the mounting rails

- Push the device down until the bottom clamp releases the device.
- Swing the device away from the rails.

Additional references

Further information on standard rail and vertical mounting can be found in the SIMOTION P320-4 E / P320-4 S Manual.

5.6.3 Vertical mounting

The optionally available vertical mounting front kit allows a space-saving installation.

Note

Vertical mounting front kit - SIMOTION P320-4

Only use the mounting kit that is specified for SIMOTION P320-4.

Mounting kits for previous versions cannot be used.

Fixing the vertical mounting bracket to the device

Note

Information on installation and operation is available in the supplement of the accessories.

Spare parts and accessories			
Parts for the SIMOTION P320-4	**Article number**	**Scope of delivery**	**Accessories**
Vertical mounting front kit	6ES7648-1AA20-0YP0	-	x

You can order the vertical mounting front kit via the Siemens Industry Mall (https://mall.industry.siemens.com).

Additional references

Further information on standard rail mounting and vertical mounting can be found in the SIMOTION P320-4 E / P320-4 S Manual.

5.7 SIMOTION P AutoLogin

The password for the AutoLogin must be changed when the user has changed the Windows password.

The Windows user password is changed in the normal way, e.g. "Change Password" screen. See also Section Changing the Windows user password (Page 36).

Automatically Log On

SIMOTION P320-4 is preset so that the user does not have to enter the user name and the password to log on.

Preparation for changing the AutoLogin

In order that an AutoLogin still functions after changing the Windows password, the password for the AutoLogin must be changed.

The required procedure is shown in the following so that the change of the AutoLogin for SIMOTION P320-4 can be prepared:

1. Open the **Computer Management** window via **Control Panel > All Control Panel Items > Administrative Tools** .

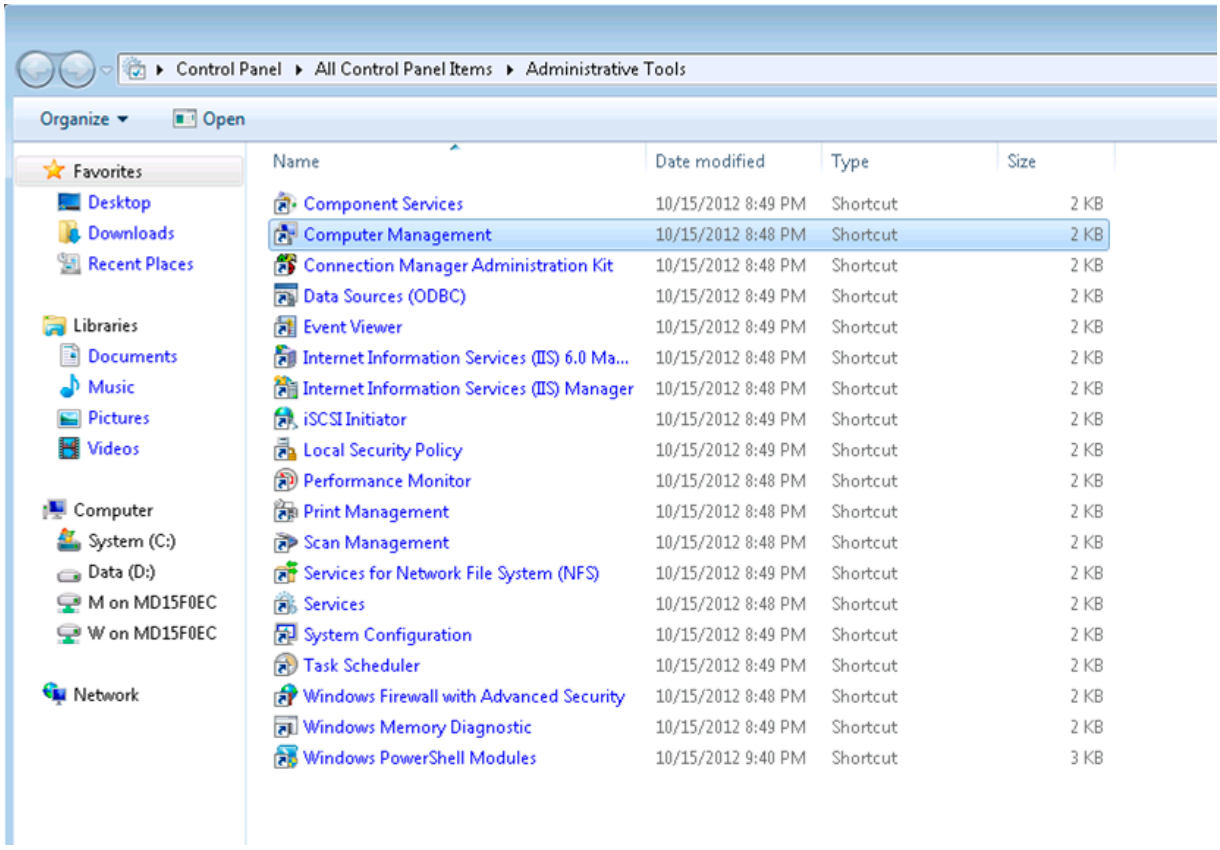


Figure 5-7 Computer Management entry point

2. The **Users** folder is displayed at **Local Users and Groups** in the **Computer Management** window.
   Click the **Users** folder. The available user groups are displayed.

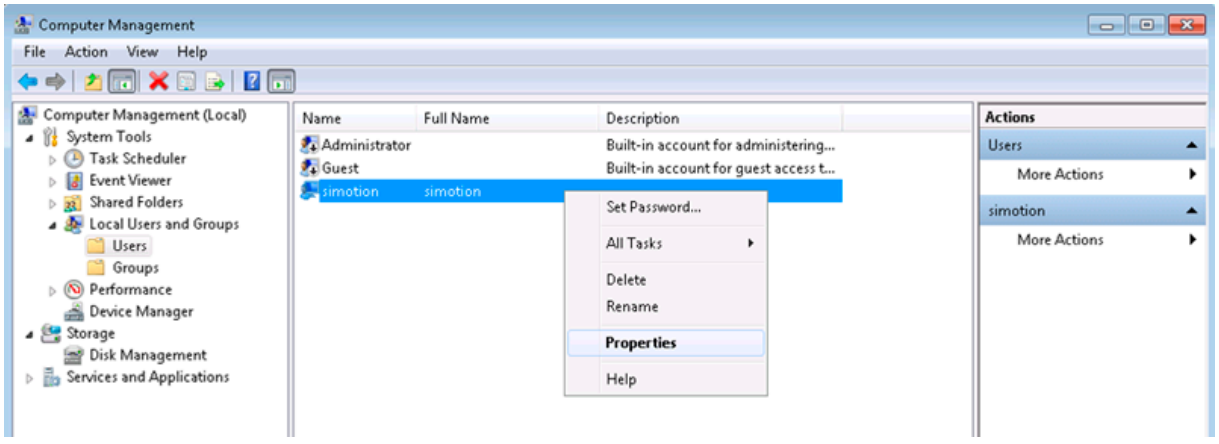


Figure 5-8 Computer Management - Users

3. With the selection of **Users> simotion**, you can display the properties via **Properties**.

4. Deactivate the **User cannot change password** checkbox in the **simotion Properties** dialog box.

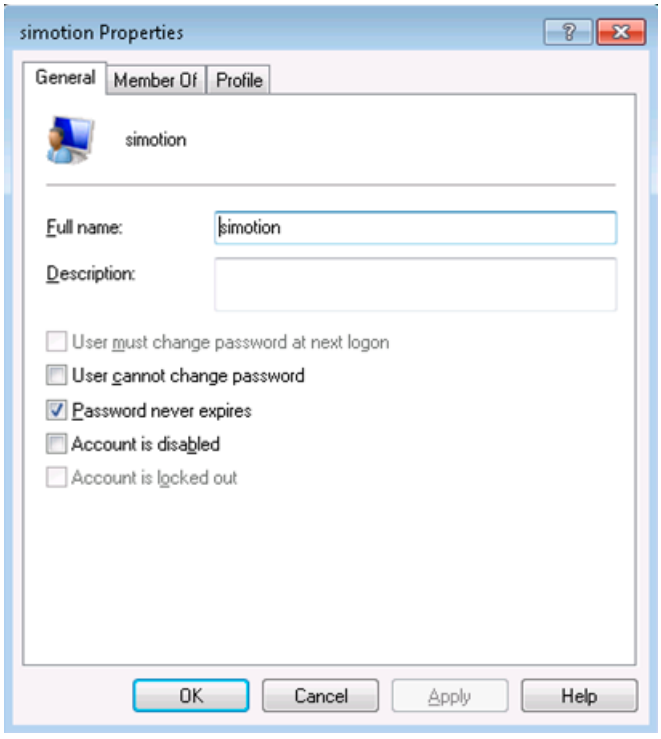


Figure 5-9 simotion Properties - General dialog box

5. Confirm with **OK.**

Changing the password for AutoLogin

To change the password for the AutoLogin, proceed as follows:

1. Open the search via **Windows-Start** and enter: **netplwiz**

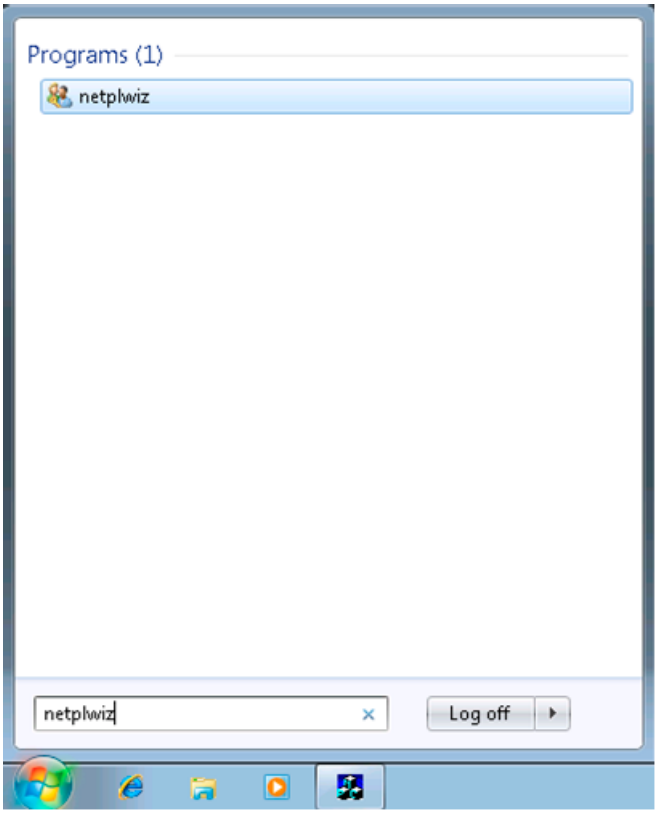


Figure 5-10 Programs netplwiz

2. The following **User Accounts** dialog box opens.

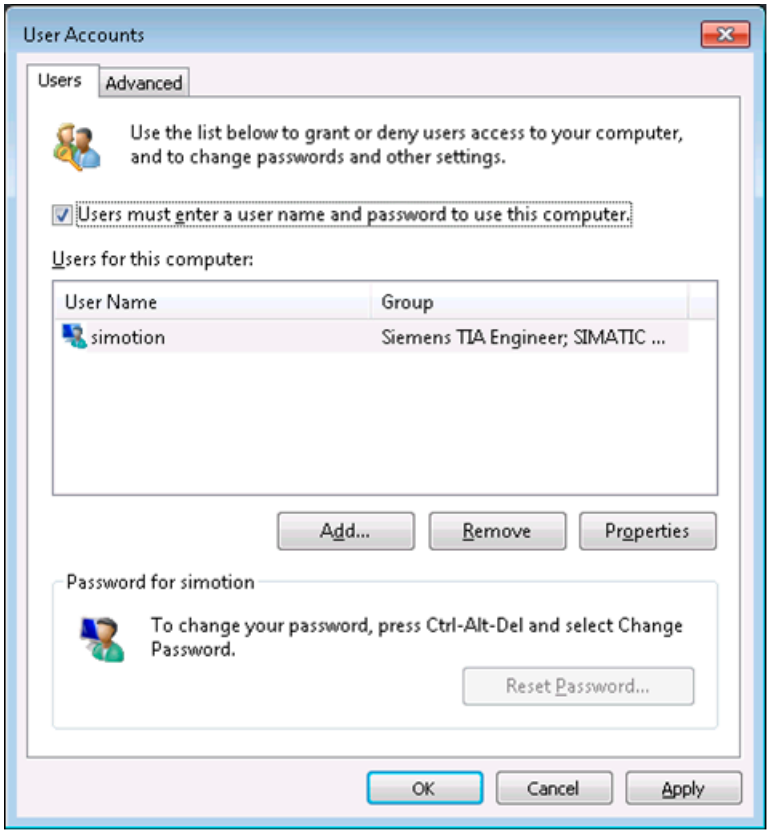


Figure 5-11 User Accounts

3. In the **Users** tab, activate the **Users must enter a user name and password to use this computer** checkbox.
   The **Apply** button is now active. Deactivate the checkbox and accept the changes now with the **OK** or **Apply** button.
   This is necessary so that the **Automatically Log On** dialog box is subsequently displayed.

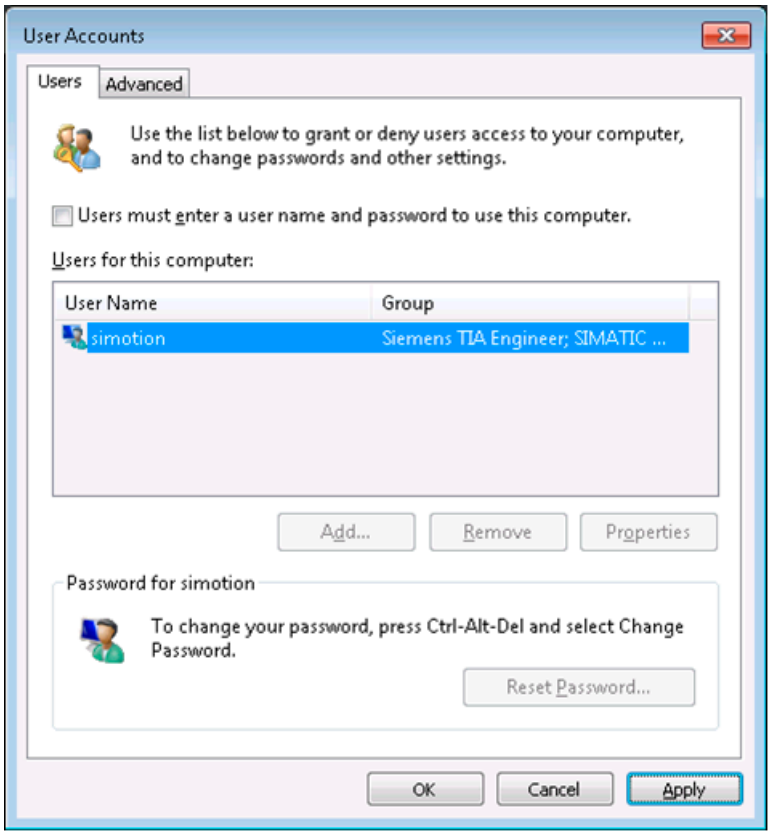


Figure 5-12 User accounts

4. Enter your changed Windows user password in the **Automatically Log On** dialog box and confirm it by entering it a second time.

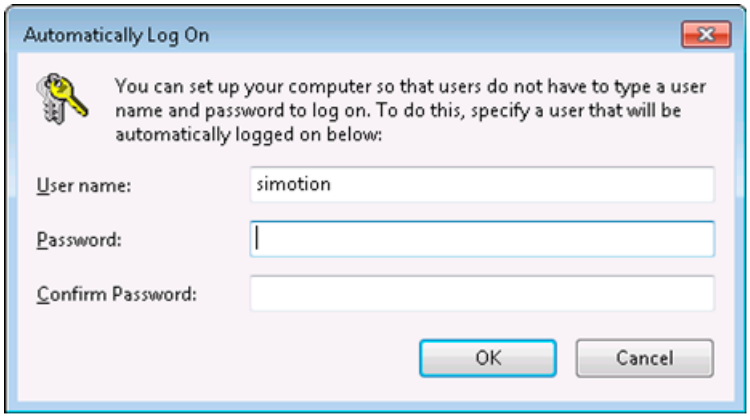


Figure 5-13 Automatically Log On dialog box

5. Confirm the password with **OK**.

Connection

6

6.1 Connection requirements

In this section it is described how the components of SIMOTION P320-4 are connected and the elements for communication prepared.

During the installation of SIMOTION modules, you must pay attention to the electrical configuration design.

You obtain information on wiring and networking a complete SIMOTION system.

Requirement

The SIMOTION P320-4 is already installed in a cabinet or in a controller housing.

Open equipment

These modules are open equipment. Therefore, only install modules in housings, cabinets, or in electrical equipment rooms that can only be entered or accessed with a key or tool. Only instructed or authorized personnel have access.

Observe the following points during installation:

- The device may only be connected to 24 VDC power supplies that meet the requirements in accordance with SELV. The cable cross-section must be chosen large enough to ensure that no damage can result from cable overheating in the event of a short-circuit in the SIMOTION P320-4.
- Protect the device against dust, moisture, heat and severe vibration.
- Do not subject the SIMOTION P320-4 to direct sunlight.
- Install the device in such a way that it cannot present a hazard (e.g. by toppling).
- Ensure that the clearance to other components or the sides of cabinets is at least 50 mm above and 100 mm below the device.

6.2 Overview of connections

Below the SIMOTION P320-4 interfaces to which the I/O devices can be connected are shown.

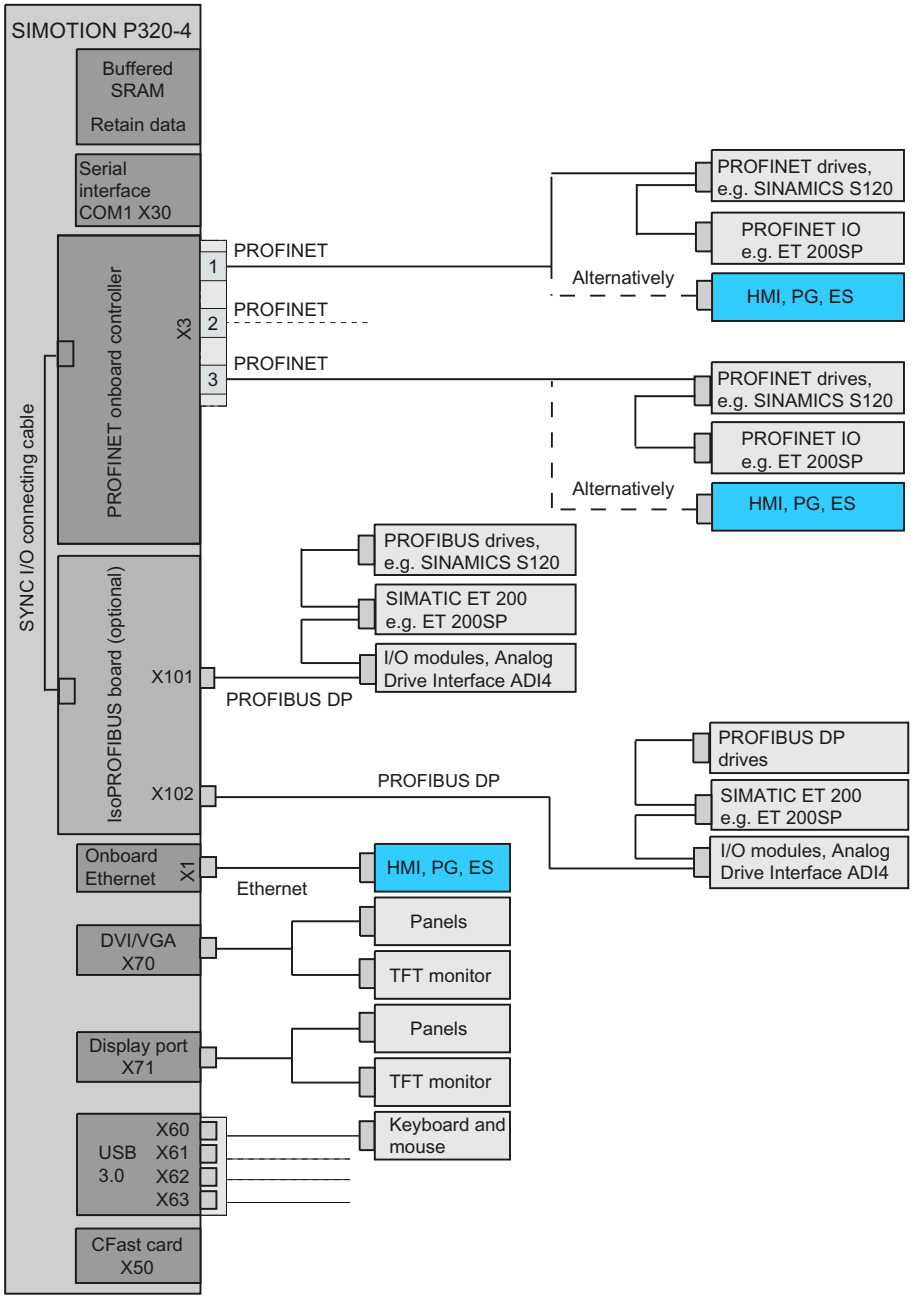


Figure 6-1 System overview SIMOTION P320-4 (hardware)

The cabling for all elements and components of the complete system must only be carried out when disconnected from the mains.
It does not matter in which order connection takes place.

The connection of the individual elements is described in the following sections:

- Connecting PROFINET (Page 104)
- Inserting IsoPROFIBUS (Page 108)
- Connecting Ethernet (Page 117)
- Connecting keyboard/mouse (Page 118)
- Connecting the power supply (Page 119)

6.3 Connecting PROFINET

6.3.1 PROFINET onboard

The system is connected to the Real-time Ethernet (PROFINET IO with RT and IRT) using the permanently integrated PROFINET interface. The device has a PROFINET interface with 3 ports.

The PROFINET IO with IRT allows IT services to be performed in parallel to the real-time communication on an Ethernet cable, where the PROFINET IO with IRT has a reserved area that provides a decoupling from the standard communication.

Note

PROFINET onboard is not a plug-in board. Instead, it is integrated in the SIMOTION P320-4.

6.3.2 Connection

Connection example

The figure shows a connection example of a PROFINET application with SIMOTION P320-4, SINAMICS S120 (CU320-2) and ET 200 PN.

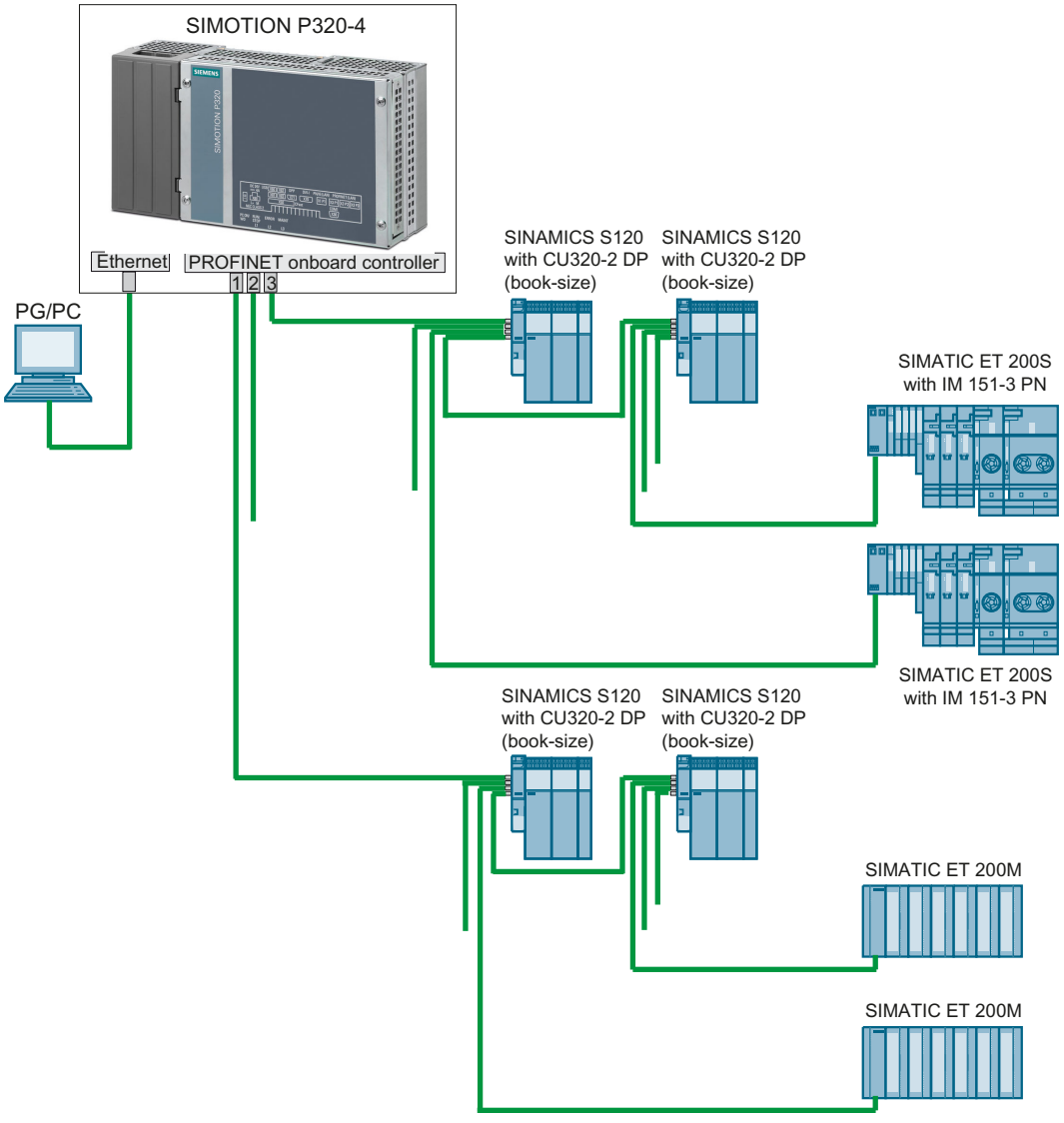


Figure 6-2 Example for a PROFINET application

Note

If the integrated ports of SIMOTION P320-4 and SINAMICS are not sufficient, an external SCALANCE switch can be used.
If PROFINET IO with IRT communication is to be enabled downstream of the switch, then a suitable switch (which supports IRT) must be used.

Cable

4-wire, shielded installation cables are used as PROFINET cables for IE FC RJ45.

Connector

RJ45 PN connectors with straight or angled exit can be used. Standard RJ45 connectors cannot be used.

Strain relief

When inserted, a PROFINET cable will cause unwanted forces to be exerted on the sockets of the PROFINET onboard (strain, lateral pressure). In order to prevent the sockets being subjected to these forces, you must install the strain-relief bracket and attach the cable tie supplied in the accessory kit.

For further information see Mounting a strain relief (Page 107).

Additional references

You can find further information on the website www.siemens.com/simotion (www.siemens.com/simotion):

- Drives and I/O modules that are released for SIMOTION
- You will also find current brochures and catalogs

6.4 Mounting a strain relief

A strain relief for SIMOTION P320-4 is included in the scope of delivery.

The strain relief is designed to prevent the lines connected to the device from being accidentally pulled out.

Note

One cable tie is required for each interface. The cable ties are not included in the scope of delivery and must be ordered separately.

Requirement

- 1 strain relief
- 2 screws
- 1 T10 screwdriver

Procedure

Proceed as follows to secure the strain relief:

1. Remove the marked countersunk screws of the SIMOTION P320-4.

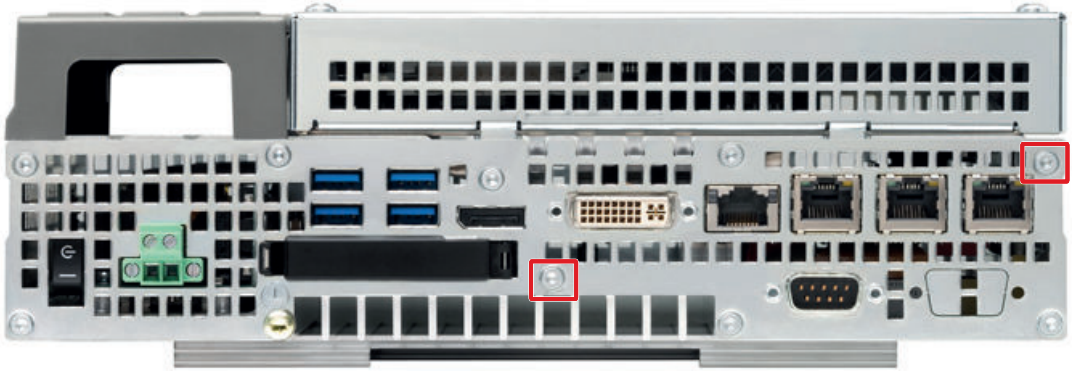


Figure 6-3 Strain relief - marking of the screws

2. Secure the strain relief at the marked points.
   Only use the enclosed lens head screws for securing the strain relief.

6.5 Connecting PROFIBUS

6.5.1 Requirement

- SIMOTION P320-4 is switched off and disconnected from the mains
- IsoPROFIBUS board (Article No. 6AU1390-0AA00-0AA1)

6.5.2 SYNC I/O connecting cable / Plugging in the IsoPROFIBUS board

To be able to plug in the IsoPROFIBUS board, the device must be opened and the SYNC I/O connecting cable must be rerouted:

1. Remove the screws of the upper cover plate and open the SIMOTION P320-4.
   At the factory, the SYNC I/O connecting cable is secured in the device using an adhesive tape.

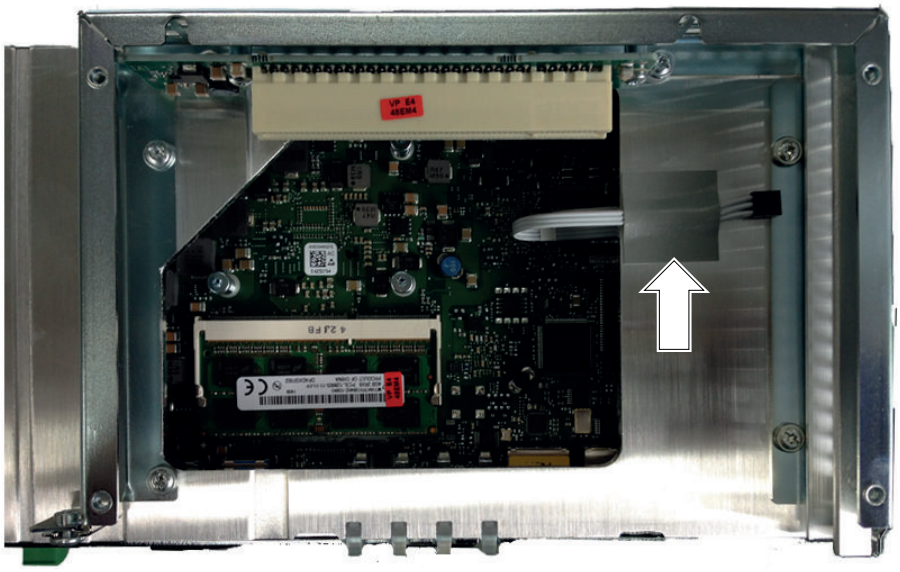


Figure 6-4 Opened SIMOTION P320-4 with SYNC I/O connecting cable as delivered ex works

2. Remove the adhesive tape and change the position of the SYNC I/O connecting cable as follows:
   the SYNC I/O connecting cable is routed to the interface side of the device and secured there again.



Figure 6-5 SIMOTION P320-4 with changed position of the SYNC I/O connecting cable

3. Remove the slot plate on the left side to expose the cutout for the interfaces of the IsoPROFIBUS board.
4. The IsoPROFIBUS board is inserted in the next step:
   Slide the IsoPROFIBUS board on the left into the guide rail of the previously removed slot plate and push it backward guided by the rail.

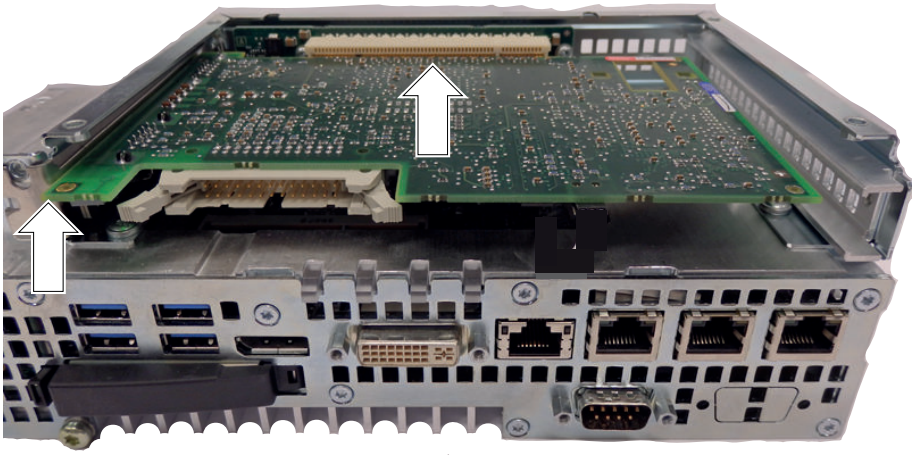


Figure 6-6 Inserting the IsoPROFIBUS board

5. The IsoPROFIBUS board is inserted into the rear PCI slot by applying slight pressure.

6. Then the SYNC I/O connecting cable is connected to the IsoPROFIBUS board.
   The cable is plugged directly into the 3-pole socket on the IsoPROFIBUS board for this purpose.

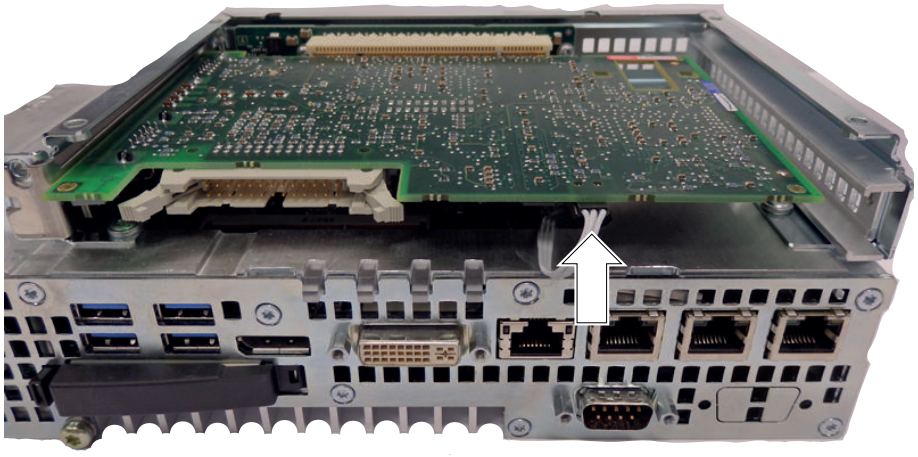


Figure 6-7 Plugging in the SYNC I/O connecting cable

7. Close the cover plate of the SIMOTION P320-4 and fasten the screws.

6.5.3 Connecting the IsoPROFIBUS board

The interface for the optional IsoPROFIBUS board is protected by a cover. There are two holes in the cover for wiring.

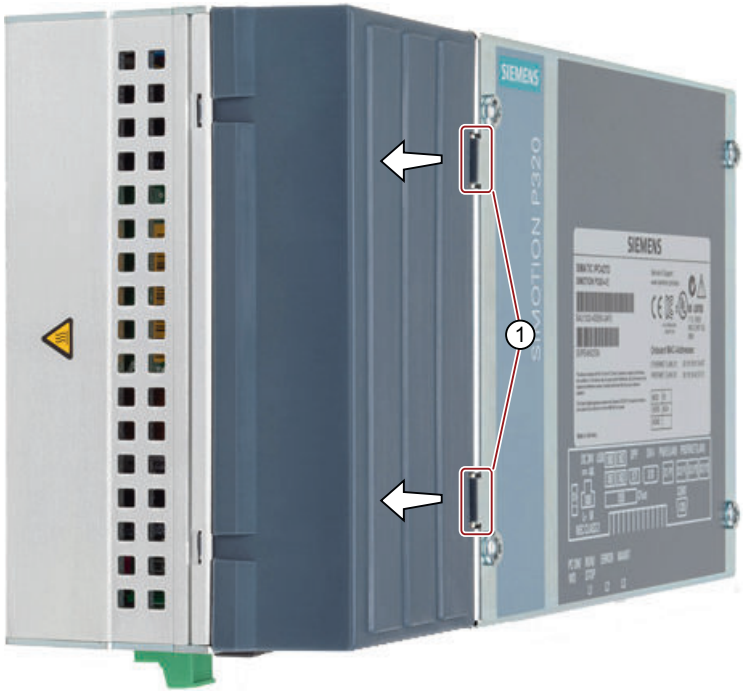
Requirement

The device is switched off.

Procedure

To connect the IsoPROFIBUS board, proceed as follows:

1. Unlock the cover by pushing the latches in the direction of the arrow;
   swivel the released cover in the direction of the arrow and remove it. The interfaces for the optional IsoPROFIBUS board are then free.



2. Connect the IsoPROFIBUS board to the slots shown.



3. Place the cover on the positions shown and close it.
   Make sure that the latches engage to secure the cover in its position.

6.5.4 IsoPROFIBUS board and PROFIBUS DP

PROFIBUS DP connection example

Both interfaces of the IsoPROFIBUS board can be used as PROFIBUS DP interfaces. The following screen shows an example of a PROFIBUS application.

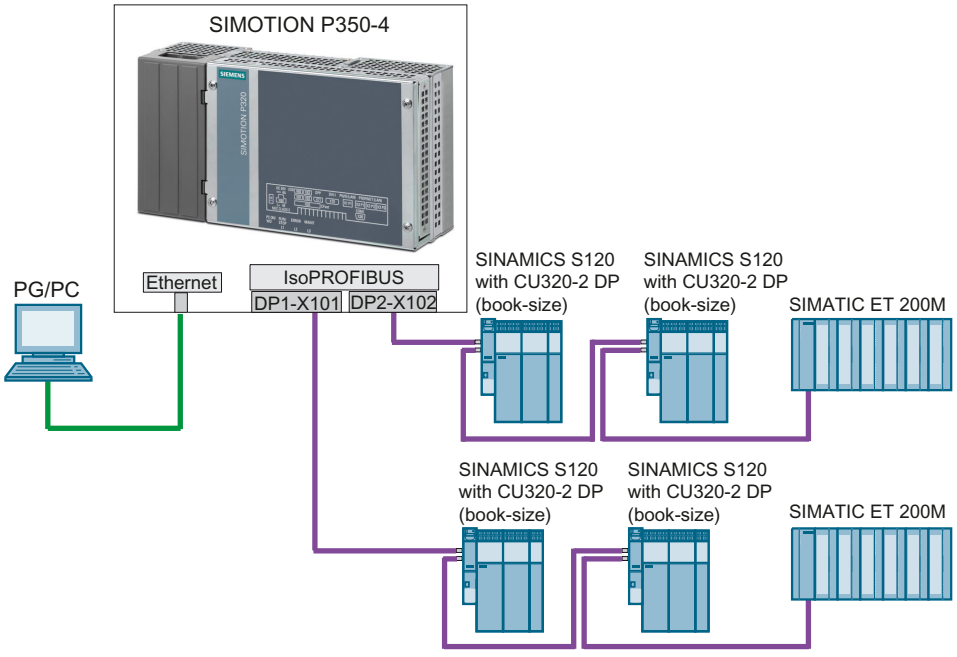


Figure 6-8 Example for a PROFIBUS application

6.5.5 Connecting the bus connectors for the X101 and X102 interfaces (IsoPROFIBUS)

The bus connector is used to connect the PROFIBUS cable to the IsoPROFIBUS interface (X101, X102). thus establishing a connection to additional stations.

Connecting the bus connector

Proceed as follows to connect the bus connector:

1. Plug the bus connector into the IsoPROFIBUS interface on the module.
2. Screw the bus connector onto the interface.
3. If the bus connector is located at the start or end of a segment, you must connect the terminating resistor (switch position "ON").

Terminating resistor connected 

Terminating resistor not connected 

Figure 6-9 Bus connector: Terminating resistor switched on and off

⚠ WARNING

Data exchange on the bus can be interrupted!

A bus segment must always be terminated with the terminating resistor at both ends. This is not the case, for example, if the last node with a bus connector is de-energized. Because the bus connector takes its voltage from the station, this terminating resistor is ineffective.

Make sure that the stations at which the terminating resistor is connected are always energized.

6.5.6 PROFIBUS cable

Properties of the PROFIBUS cable

The PROFIBUS cable is a two-stranded, twisted, and shielded cable.

Table 6-1 Properties of the PROFIBUS cable

Features	Values
Surge impedance	Approximately 135 to 160 Ω (f = 3 to 20 MHz)
Loop resistance	≤ 115 Ω/km
Operating capacity	30 nF/km
Attenuation	0.9 dB/100 m (f = 200 kHz)
Permitted strand cross-section	0.3 mm^2 to 0.5 mm^2
Permissible cable diameter	8 mm ± 0.5 mm

Rules for laying

When you install a PROFIBUS cable, you must not:

- Twist
- Stretch
- Or compress it.

When installing the indoor bus cable, you should also remember the following boundary conditions (d_A = outer diameter of the cable):

Table 6-2 Boundary conditions for indoor routing of bus cable

Features	General conditions
Bending radius for a single bend	≥ 80 mm (10 × d_A)
Bend radius for multiple bends	≥160 mm (20 × d_A)
Permissible temperature range for installation	- 5° C to + 50° C
Temperature range for storage and stationary operation	- 30° C to + 65° C

Note

The length codes for the pre-assembled cables can be found on the website www.siemens.com/simotion (www.siemens.com/simotion).

6.6 Connecting Ethernet

Procedure

Plug the LAN cable into the Ethernet interface of the SIMOTION P320-4. You must hear the connection engage properly.

Cables

Standard shielded twisted pair cables are used for the networking in this case.

The following connection cables are recommended:

- SIMATIC NET, ind. Ethernet TP XP CORD RJ45/RJ45, TP CORD assembled with 2 RJ45 connectors, send and receive cables crossed (cross-over)
  Order no.: 6XV1850-2H*)
- SIMATIC NET, ind. Ethernet TP CORD RJ45/RJ45, TP CORD assembled with 2 RJ45 connectors
  Order no.: 6XV1850-2G*)

*) Length code		Dimensions
	E50	0.5 m
	H10	1 m
	H20	2 m
	H60	6 m
	N10	10 m

Note

Further information on the use of these cables can be found in the SIMATIC NET Twisted-Pair and Fiber-Optic Networks Manual (https://support.industry.siemens.com/cs/ww/en/view/8763736).

6.7 Connecting the keyboard and mouse

USB interfaces

You can connect the keyboard and the mouse to the USB interfaces of the SIMOTION P320-4.

6.8 Connecting the power supply

6.8.1 Safety rules

Basic rules

Only the basic rules for electrical installation can be described in this section on account of the diverse applications possible. At a minimum, you must comply with these basic rules to ensure problem-free operation.

Rules for safe operation

In order to ensure safe operation of your equipment, implement the following measures, adapting them to suit your conditions:

- An EMERGENCY OFF concept in accordance with the generally accepted rules of current engineering practice (e.g. European standards EN 60204, EN 418, and similar).
- Additional measures for limiting the end position of axes (e.g. hardware limit switches).
- Equipment and measures for protection of motors and power electronics in accordance with the SIMOTION installation guidelines.
  In order to identify hazards, we also recommend that a risk analysis be conducted on the entire system in accordance with the basic safety requirements set out in Appendix 1 of EU machinery directive.

Additional references

- Guidelines on Handling Electrostatic Sensitive Devices (ESD), see Appendix ESD Guidelines (Page 229).
- For installing a system with SIMATIC ET 200 I/O (e.g. ET 200S, ET 200M, etc.), refer to the documentation for the relevant ET 200 I/O systems.

6.8.2 Standards and Regulations

VDE guideline compliance

During wiring, you must observe the appropriate VDE guidelines, in particular VDE 0100 and VDE 0113 for tripping devices and short-circuit and overload protection.

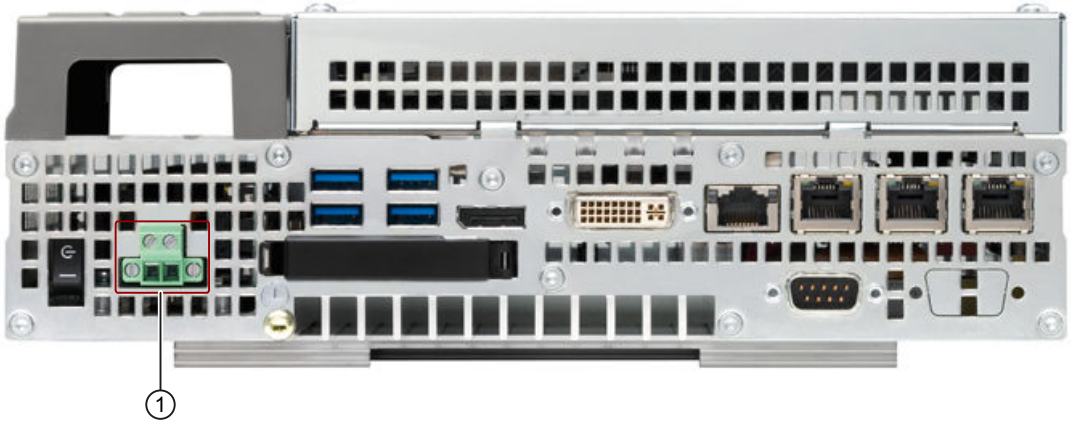
System start-up after specific events

The following list identifies considerations required for startup of a system following certain events.

- If the system starts up again following a voltage drop or power failure, all hazardous operating states must be prevented from occurring. If necessary, force an EMERGENCY OFF.
- If the system starts up again after the EMERGENCY OFF apparatus is released, the startup must not be unchecked or undefined.

6.8.3 Connecting the power supply

Connect your power supply (e.g. SITOP smart 24 V / 10 A) directly to the power-supply socket of the SIMOTION P320-4.



① 24 VDC power supply

Figure 6-10 Power supply connection

⚠ WARNING
On/Off switch
The On/Off switch does not disconnect the device from the power supply system.
To remove power from the device, the power supply plug must be removed.

6.8.4 Protective conductor connection and potential equalization

Connect the equipotential bonding strip on the SIMOTION P320-4 (large surface, large-area contact) with the central grounding point of the cabinet or system in which the devices are installed.
The protective conductor must not have less than a minimum core cross-section of 2.5 mm^2.



① Protective conductor connection / potential equalization

Power on and software installation

7

7.1 Power-up

SIMOTION P320-4 is supplied with pre-installed software modules. After activation, Windows with SIMOTION P is powered up automatically.

The SIMOTION P320-4 issues the following message after successful power-up:



Figure 7-1 SIMOTION P320-4 after power-up

The SIMOTION P320-4 responds in this way to every subsequent power-up.

7.2 Additional software for HMI

Note

Action before installing additional software

Before installing additional software, make sure that you terminate the runtime of the SIMOTION P.

You terminate SIMOTION P in the application SIMOTION P State using the button **Terminate SIMOTION P**.

If required, the following software can be installed directly on the SIMOTION P320-4:

- WinCC flexible Runtime
- WinCC flexible engineering system for P320-4 S
- OPC client from other manufacturers
- Utilities of the OEMs
- SIMATIC NET

This software must be purchased separately and is not contained in the SIMOTION P320-4 scope of delivery.

Please refer to the documentation supplied with the software for details regarding the procedure for installing the respective software.

7.3 Customer-specific software

To ensure high-quality and reliable working of the device, SIMOTION P320-4 is fully configured and ready for operation at the time of delivery.

For this purpose, the system components used are subject to a certification procedure with Siemens as the system manufacturer. The certification process establishes and documents the real-time features of the complete system.

NOTICE
Changes or expansions of PC components (hardware or software) by a third party If PC components (hardware or software) are modified or expanded by a third party, compliance with product features cannot be guaranteed. The OEM or user involved must assume sole responsibility for such components. Compliance with product features can only be guaranteed by SIEMENS.

Operator Control (hardware)

8

8.1 SIMOTION P state application

8.1.1 SIMOTION P State application overview

The LEDs, mode selector, and CF card handling indicators, which are implemented as hardware on other SIMOTION platforms, are visualized on the screen for SIMOTION P320-4.

The display is performed by the **SIMOTION P State** application. The following figures show SIMOTION P State in the started state with/without inserted IsoPROFIBUS board.

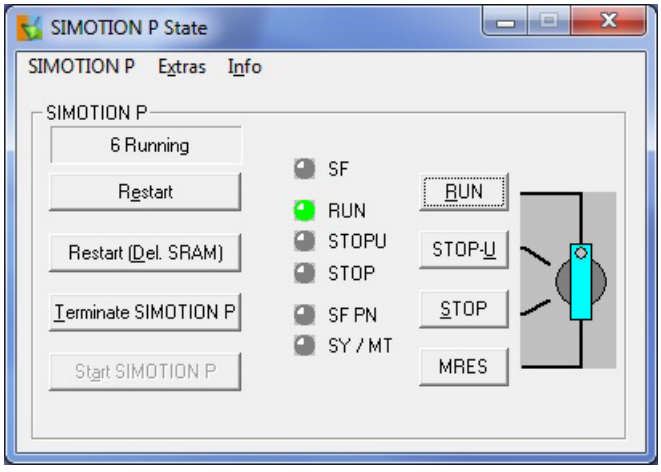


Figure 8-1 SIMOTION P State - PROFINET onboard

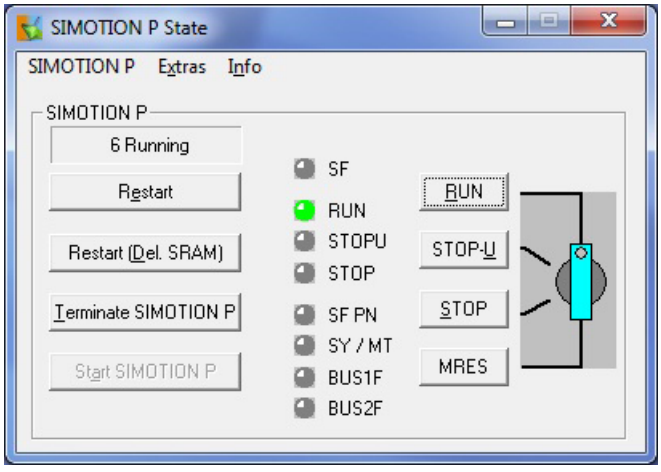


Figure 8-2 SIMOTION P State - PROFINET onboard and additionally with optional IsoPROFIBUS board

Note

The SIMOTION P State application is in English.

Generally, only English is supported on the SIMOTION P320-4, this also applies for the Win7 operating system.

8.1.2 LED display

Meaning of LEDs

The meaning of the LEDs and their colors is described in the table below.

LED display		Meaning	Description
SF	Red	Fault	The fault state of the SIMOTION P320-4 is displayed.
RUN	Green	SIMOTION P320-4 in RUN mode	The user program is running.
STOPU	Yellow	SIMOTION P320-4 in the STOP User Program	The technology packages (e.g. synchronous operation, cam) are active. Test and commissioning functions can be executed without a user program. The user program is not active.
STOP	Yellow	SIMOTION P320-4 in STOP mode	There is no user program running. The technology packages are not active.
SF PN	Red	PROFINET bus fault	A fault state is displayed on the PROFINET interface (X3).
SY/MT	Yellow	Sync of the PROFINET interface	It is displayed whether the PROFINET interface has been synchronized.
BUS1F	Red	Group fault	A fault state is displayed on the IsoPROFIBUS interface (X101).
BUS2F	Red	Group fault	A fault state is displayed on the IsoPROFIBUS interface (X102).

Note

LEDs for IsoPROFIBUS board

The LEDs BUS1F and BUS2F are **only** shown if an IsoPROFIBUS board is connected.

Additional references/information

You can find additional information at:

- Diagnostics via LED displays (Page 207) (for a more accurate diagnosis of an LED state)
- Operating displays (SIMOTION P320-4 E / P320-4 S Manual: Information on display modes, of the SF PROFINET LEDs only displayed on the hardware side, in the operating displays section)
- PROFINET bus error occurs (Page 215)

8.1.3 Mode selector

Mode selector in SIMOTION P State

Use the mode selector to set the SIMOTION P320-4 to different states. The controller can be switched in **RUN** or **STOP** / **STOPU** mode and perform an overall reset.

The change of the operating state with the mode selector has **priority** over a state selected via SIMOTION SCOUT.

Note

Setting the operating state via the mode selector

The **STOP**/**STOPU** switch position cannot be set to **RUN** via the SIMOTION SCOUT.

To change the operating state, use the mode selector.

Further information

Further information can be found in Section Overall reset with the mode selector (on the screen) (Page 186).

8.1.4 Current operating status

The current state of the SIMOTION P320-4 is displayed in the upper left area of the **SIMOTION P State** application.

Table 8-1 The following state displays are possible:

Not started	SIMOTION P320-4 is not started.
0 … 5	The progress of the SIMOTION P320-4 power-up is displayed.
6 Running	SIMOTION P320-4 has completed power up and the cyclic tasks are activated.
Disabled	SIMOTION P320-4 is deactivated.

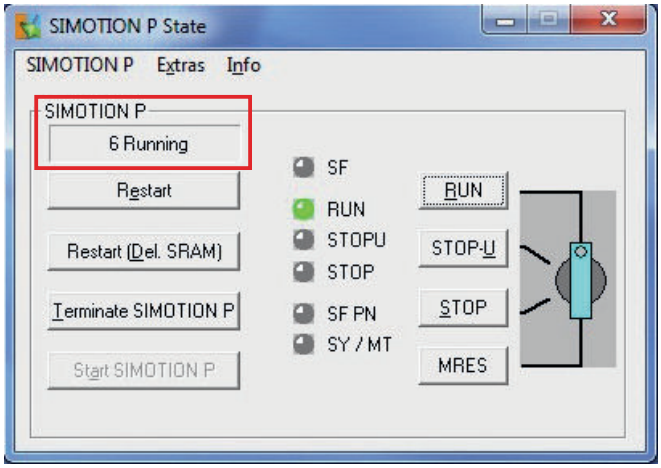


Figure 8-3 SIMOTION P State - state display

The status LEDs and the current operating state are also displayed in the Windows task bar:



RUN state: Green



STOP state: Yellow



NOT STARTED state: Gray

Note

FAQs can be found in Section Troubleshooting/FAQs (Page 219).

8.1.5 Function elements

Functions of the buttons

Below the current SIMOTION P320-4 status display, you will find a selection of buttons which can only be operated with administrator rights.

Description of the button functions:

Table 8-2 Function of the buttons in SIMOTION P State

Button	Function
Restart	Restarting SIMOTION P320-4. The information in the SRAM is retained. If RamToRom is called beforehand, the project backup is restored. **Note** This is only possible if SIMOTION P320-4 has been powered up (status not "0" to "5", "not started").
Restart (Del. SRAM)	Restarts SIMOTION P320-4 and deletes the information in the SRAM. If RamToRom is called beforehand, the project backup is restored. **Note** This is only possible if SIMOTION P320-4 has been powered up (status not "0" to "5", "not started").
Terminate SIMOTION P	Stop SIMOTION P320-4. **Note** This is possible only if SIMOTION P320-4 has powered up.
Start SIMOTION P	Start SIMOTION P320-4. **Note** This is possible only if SIMOTION P320-4 has not been started

Resetting to the delivery condition

SIMOTION P320-4 can be reset to the default settings at the time of delivery (Page 195) via SIMOTION P State.

8.1.6 SIMOTION P State - menus

The menus of the SIMOTION P State application are described below:

- SIMOTION P
- Options
- Info

SIMOTION P menu

SIMOTION P	Description
Temperature	Display of the temperatures in the device, monitoring of the threshold value. An alarm (Page 211) is issued when a threshold value is reached or exceeded.
Set Diagnostic Switch	Diagnostic switch for recording diagnostic data and backing up the non-volatile SIMOTION data on the external CFast card. Diagnostics data can be recorded during power-up and during operation for the error diagnostics. The diagnostics switch is automatically reset after writing the data. **See also the following sections**: Recording diagnostic data (Page 193). Backing up non-volatile SIMOTION data (retain data) (Page 179)
Webserver	Access to the SIMOTION IT Web server is protected by a multi-level security concept. Upon delivery, the security level is low to allow configuration of the device. The security state of the Web server can be set here. The following selection options are available: • Security Level: normal • Security Level: low

Temperature specifications

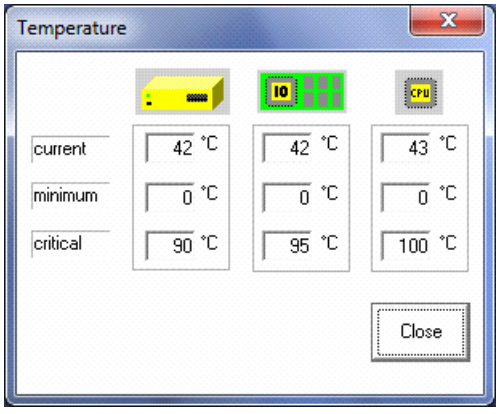


Figure 8-4 Dialog Temperature

The temperature specifications for the SIMOTION P320-4 can be found at **SIMOTION P > Temperature**.

The current, the minimum and the critical temperature are determined at the housing, mainboard and CPU measuring points and displayed in this dialog box.

Options menu

Options	Description
Reset to factory default	Restore the factory default. This will delete the following data: • The non-volatile SIMOTION data (retain data) in the SIMOTION device • The backup of the non-volatile SIMOTION data on the external CFast card (PMEMORY.XML/PMEMORY.BAK) • The user data from the "Volatile SIMOTION data" area (RAM) and on the external CFast card (ROM) • The communication configuration (IP and DP parameters) on the external CFast card is set to the factory settings. The licenses on the CFast card are retained.

Note

Station Configurator settings

Settings made with the Station Configurator are reset to the default values at the time of delivery as well.

Further information

can be found in Section Defined states > Restore the factory settings using SIMOTION P State (Page 182)

Info menu

Info	Description
Hardware Version	Display of the hardware information.
Software Version	Display of the software versions.
Info about SIMOTION P State	Display of the SIMOTION P version.

Note

The versions in the **Info** menu only become visible after the Windows power-up after the SIMOTION P320-4 has been started once.

Parameter assignment/addressing 9

9.1 Parameter assignment / addressing requirements

The following actions should be completed before you start parameterizing or addressing:

- The SIMOTION P320-4 and the other hardware are installed.
- The devices are connected.
- The required software is installed.
- The SIMOTION P320-4 has been switched on.

The actual state should be saved after the parameterization.

9.2 Factory settings

9.2.1 Factory settings overview

Requirement

You have obtained information about the various communications models. Further information can be found under HMI and SIMOTION SCOUT (Page 61).

You are familiar with the Windows Control Panel.

Resetting the factory settings

It is possible to reset SIMOTION P320-4 to the factory settings (see section Resetting the SIMOTION P to the initial state (Page 196)).

9.2.2 Ethernet - TCP/IP local

SIMOTION P320-4 delivery state

Local communication in the SIMOTION P320-4 between Windows programs such as HMI and the SIMOTION P Runtime software is handled via the preset **TCP/IP** Ethernet communication.

As an alternative to TCP/IP, the **PC internal (local)** communication can also be used. Further information on how to check the settings in the Windows Control Panel can be found in Section Check PC internal settings (Page 146).

9.3 SIMOTION P control manager

9.3.1 Requirement

NOTICE
SIMOTION P Control Manager Because the settings made via the SIMOTION P Control Manager change the factory default parameters, they should only be made by authorized persons.

9.3.2 SIMOTION P Control Manager overview

The SIMOTION P Control Manager is used to configure the SIMOTION P software.

Call

The SIMOTION P Control Manager is only used by the **administrator**. Only the administrator is authorized to make changes.

The **SIMOTION P Control Manager application** is called by means of the operating system's Control Panel.

Properties

SIMOTION P Control Manager has the following features:

- The following settings take effect immediately after a change:
  - Start SIMOTION P
  - Automatic Restart By Plug-In External Memory Card
  - Ethernet-IP address
- The values to be set are generally required only by the administrator.
  These are:
  - License handling
  - IP addresses

9.3.3 Calling SIMOTION P Control Manager from the control panel

You can call the SIMOTION P Control Manager in the Windows Control Panel (Start > Control Panel).

The call can only be made as administrator. If you are not logged on as administrator, a prompt will appear notifying you of this fact.

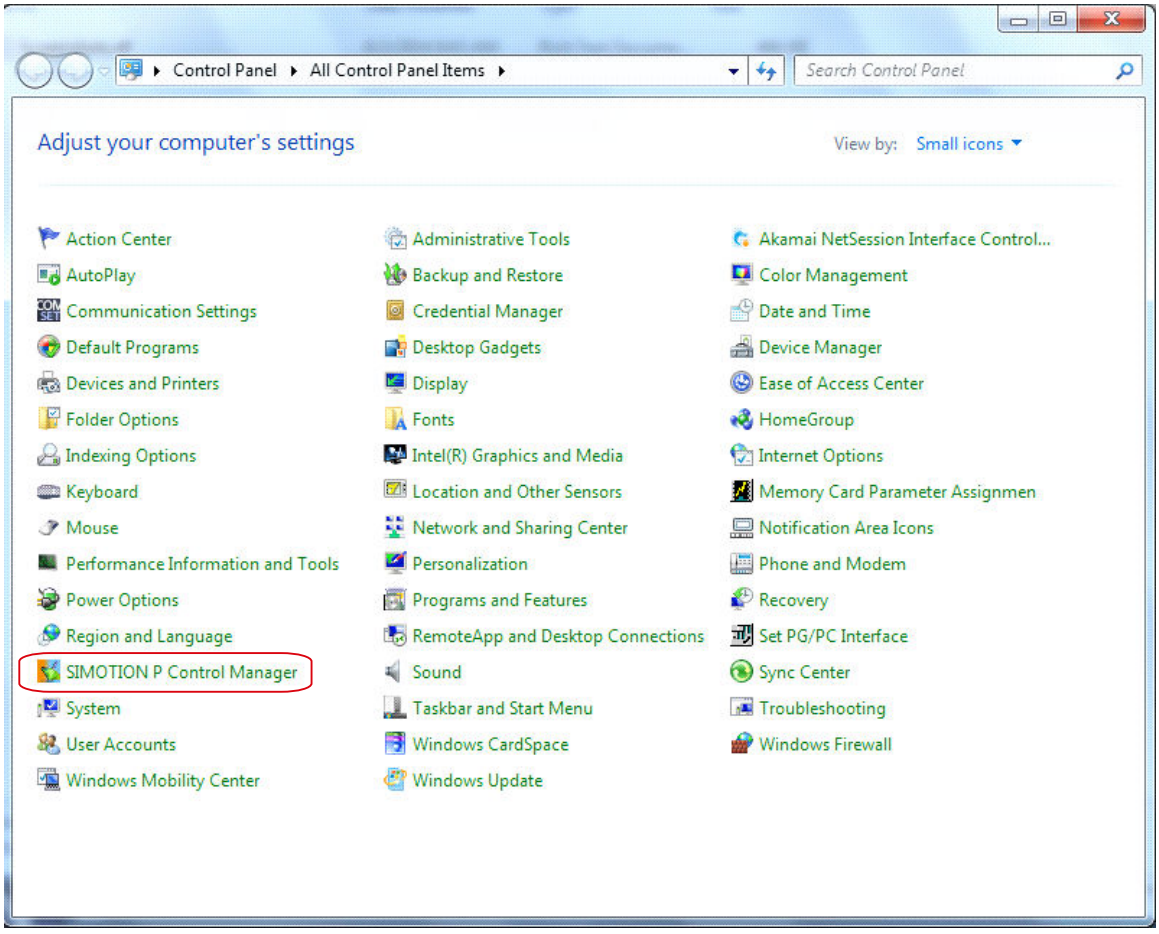


Figure 9-1 Calling the SIMOTION P Control Manager

If the call was successful, the **SIMOTION P Control Manager** dialog, **Administration** tab, is displayed.

The SIMOTION P Control Manager application is in English.

9.3.4 Administration tab

The **Administration** tab contains:

- Start SIMOTION P (Page 140)
- Automatic Restart By Plug-In External Memory Card (Page 141)
- Runtime Network Connections (Page 142)

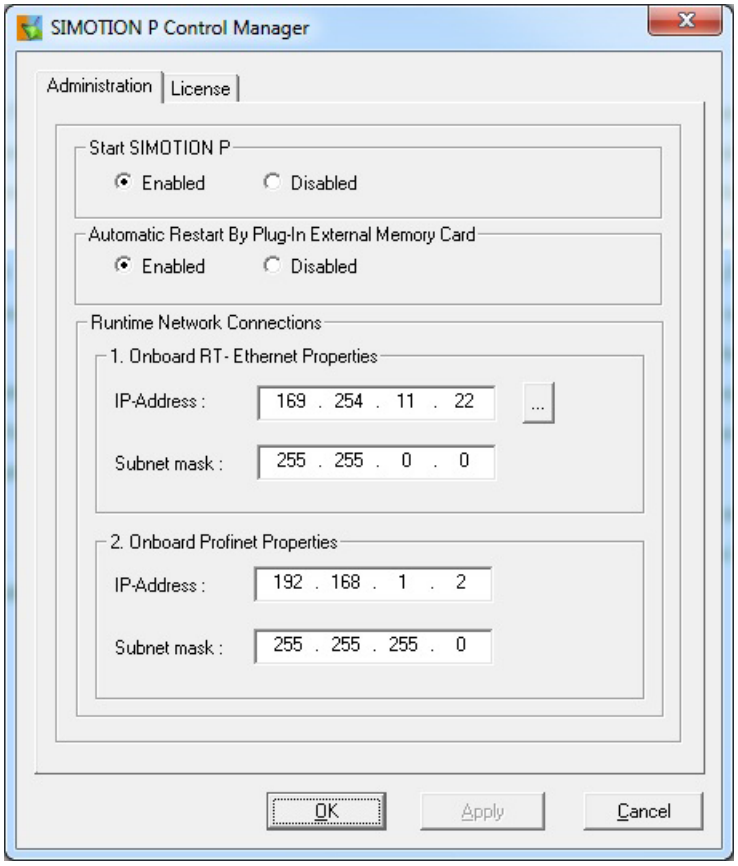


Figure 9-2 SIMOTION P Control Manager - Administration tab

9.3.4.1 Start SIMOTION P

The following settings are possible:

- **Enabled**
  Immediately cancels the lock set with **Disabled**. The SIMOTION P320-4 must be booted to automatically start SIMOTION P.
  SIMOTION P can also be started by means of the SIMOTION P State application using the **Start SIMOTION P** button.
- **Disabled**
  Prevents the automatic starting of SIMOTION P while the Windows system is booting up. SIMOTION P cannot be started until this lock is canceled.

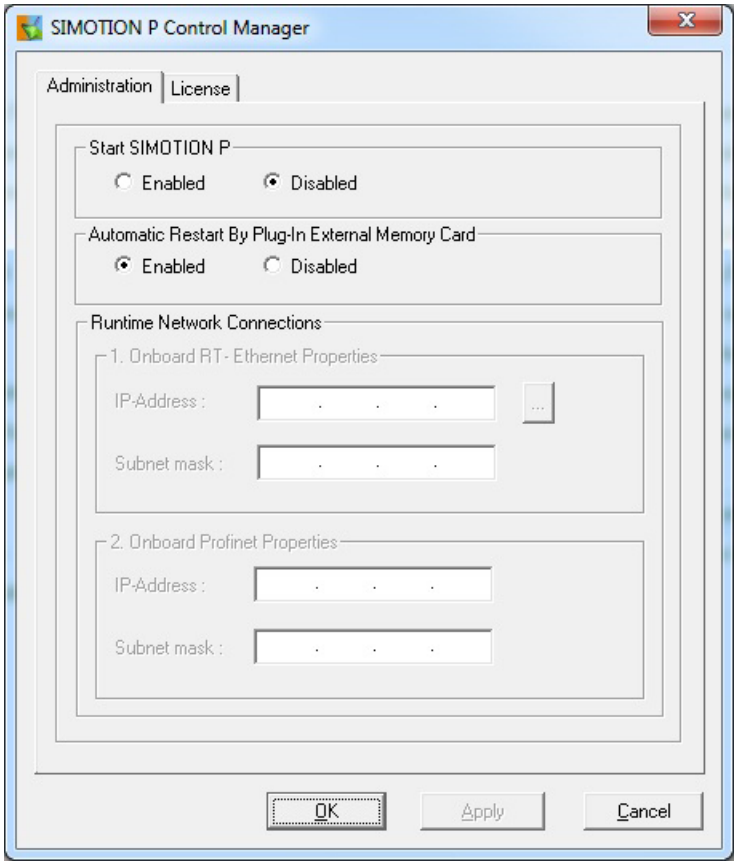


Figure 9-3 Start SIMOTION P - Disabled

SIMOTION P State display

If "Disabled" is selected in the **Administration** tab at **Start SIMOTION P**, the "Disabled" status is also displayed at **SIMOTION P State** .

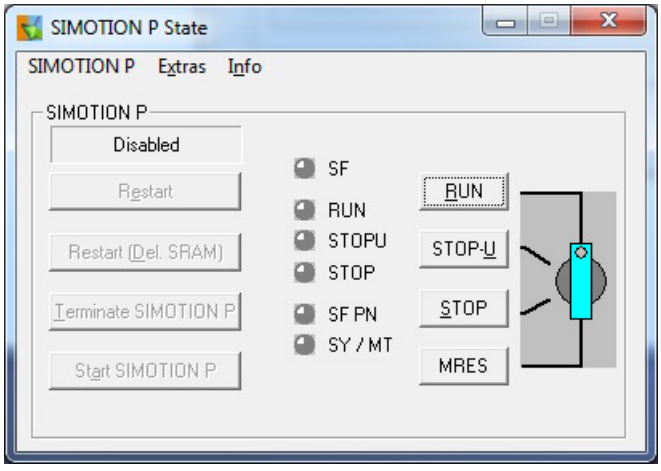


Figure 9-4 SIMOTION P State - Disabled status

9.3.4.2 Automatic Restart By Plug-In External Memory Card

Note

Not a Windows restart

Note that this is not a Windows restart!

The following settings are possible:

- **Enabled**
  An automatic restart of the SIMOTION P Runtime is performed at the start of the SIMOTION P320-4 with withdrawn CFast card or for a CFast card withdrawn during operation.
  The automatic restart of the SIMOTION P Runtime for the Enabled default setting is performed when the CFast card is inserted.

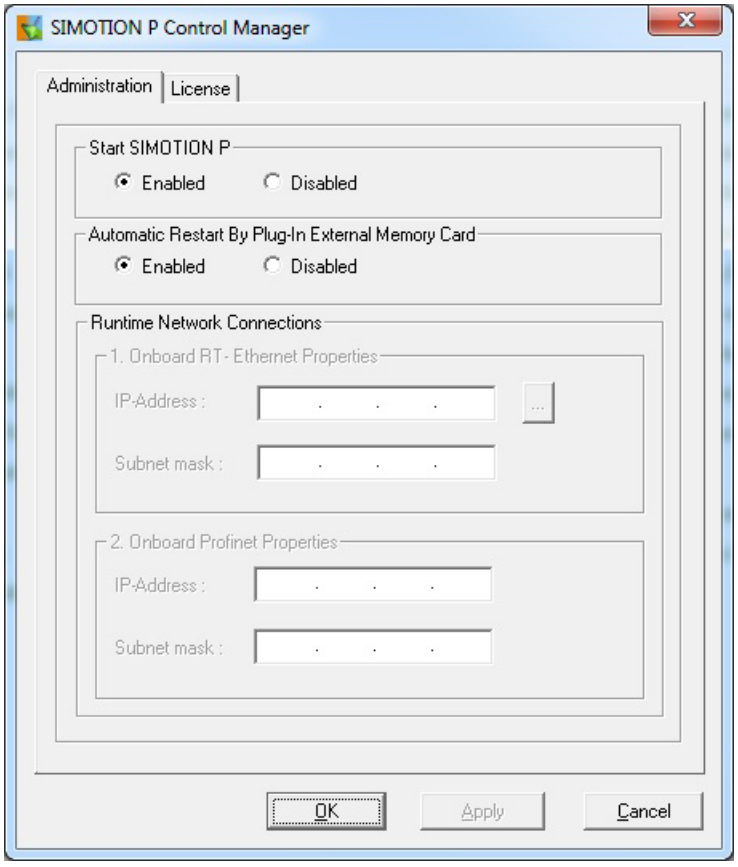


Figure 9-5 Administration tab - Automatic Restart By Plug-In External Memory Card

- **Disabled**
  The automatic restart of the SIMOTION P Runtime is prevented after inserting the CFast card.

Note

Behavior with withdrawn CFast card

Further information on the behavior of the SIMOTION P320-4 with withdrawn CFast card can be found in Section Automatic restart of the SIMOTION P Runtime (Page 87).

9.3.4.3 Runtime Network Connections

The Ethernet interface of the SIMOTION P320-4 is displayed here. It can be addressed via the SIMOTION P Runtime.

The IP address can be set here, however, it is not permanent.

The IP address set here loses its validity when the following actions are carried out:

- Booting of the SIMOTION P320-4
- Downloading a project to the SIMOTION P320-4
- Exiting the SIMOTION P Runtime (Terminate SIMOTION P)
- Restarting SIMOTION P Runtime (Restart)

The IP address in SIMOTION SCOUT can be changed permanently using the HW Config or user program.

Changing the IP address

You can change the IP settings after selecting the button, the **Onboard RT - Ethernet Properties** dialog box opens.

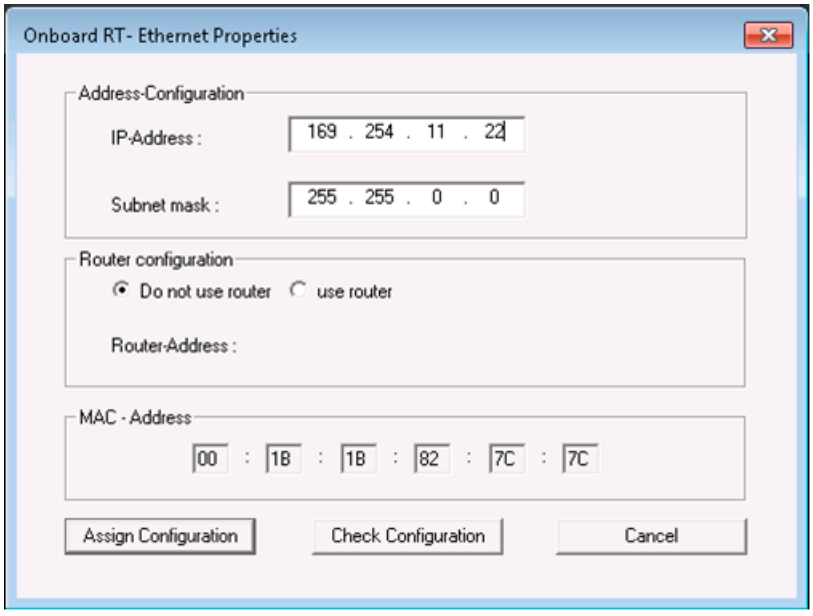


Figure 9-6 Onboard RT - Ethernet Properties

Click **Check Configuration** to validate the settings of the Runtime Ethernet configuration and check for agreement with the Windows Ethernet interface.
You can find further information about this in Section Ethernet communication overview (Page 150).

Click **Assign Configuration** to also check the settings and accept them.

Note

The IP data is only displayed when the SIMOTION P320-4 is started.

9.3.5 License tab

The **License** tab can be used

- To view currently installed licenses
- To enter new License Keys.

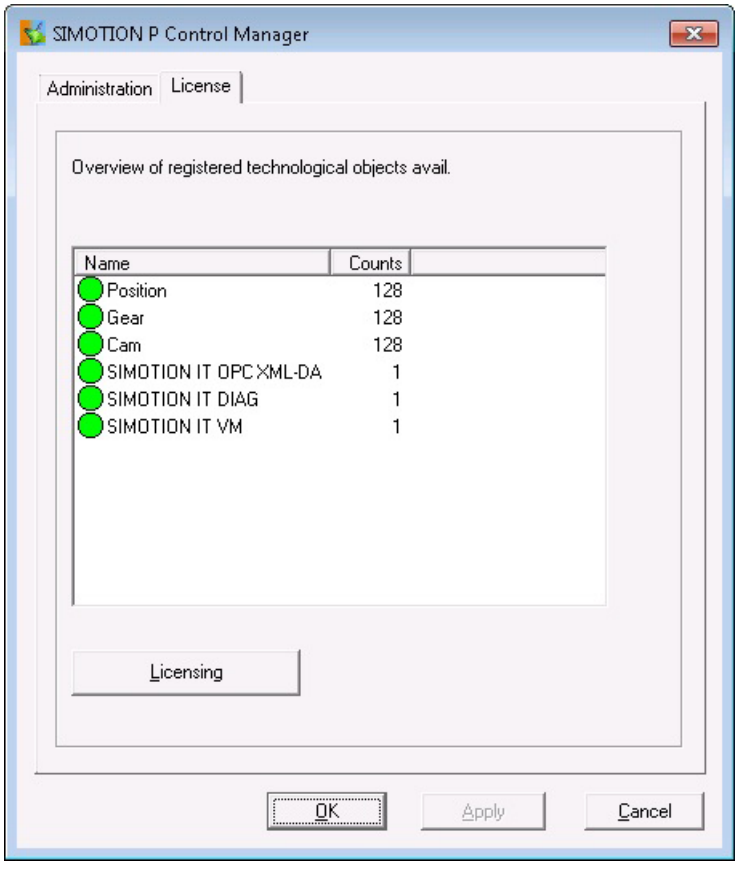


Figure 9-7 License tab

This tab displays the licenses currently installed on this hardware. If you wish to modify the licensing of this hardware, click the **Licensing** button.

The **License Manager** dialog box is displayed; here you enter a new **License Key**.

License Manager

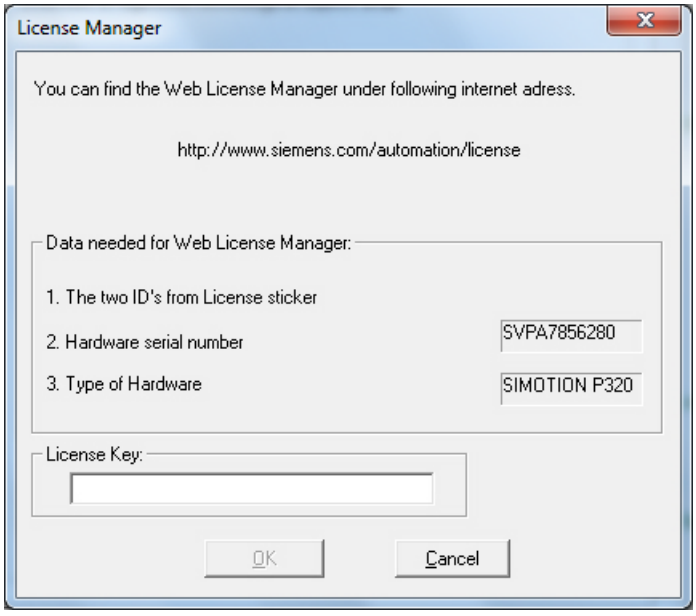


Figure 9-8 Dialog License Manager

Impact of hardware replacement on licensing:

The replacement of the SIMOTION P320-4 means that the License Keys which were generated for the previous SIMOTION P320-4 must be regenerated and transferred to the new SIMOTION device.

In this case, contact the hotline: http://support.automation.siemens.com

Note

You must restart the SIMOTION P320-4 after licensing. To do this, in SIMOTION P State press

- either the **Restart** button
- or the "**Terminate SIMOTION P**" button and then **Start SIMOTION P**.

Note

For more information on licensing, see the SIMOTION SCOUT Configuration Manual.

9.4 Local communication via PC internal

9.4.1 Local communication (PC-internal) overview

Local communication in the SIMOTION P320-4 between Windows programs such as HMI and the SIMOTION P runtime software is handled by the PC's internal communications mechanisms.

9.4.2 Checking the PC-internal settings

Configuration in the Windows Control Panel of the SIMOTION P320-4

To enable local communication the following settings must have been made:

You can access the settings via the Control Panel of Windows:

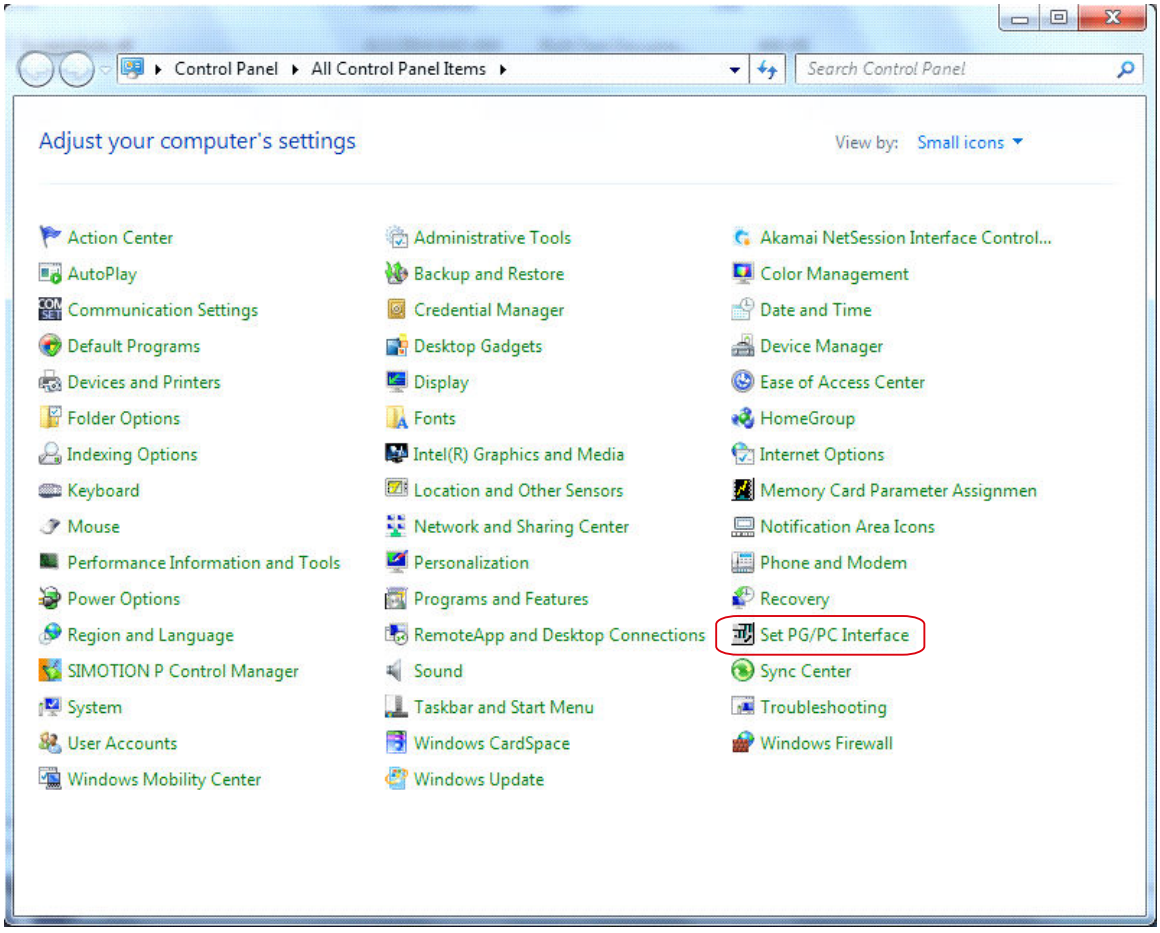
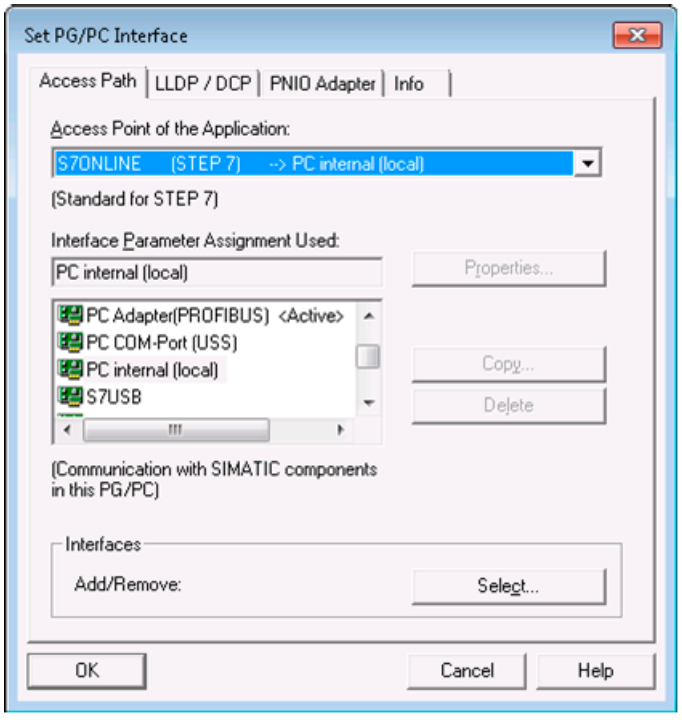


Figure 9-9 Control Panel - Set PG/PC Interface

Procedure

Proceed as follows to set the local communication to "PC internal (local)":

1. Call **Set PG/PC Interface**.
2. In the **Access Path** tab, set the field **Interface Parameter Assignment Used** to **PC internal (local)**.



3. Confirm with **OK**.

Note

SIMOTION P320-4 delivery condition

The preset communication version for the SIMOTION P320-4 is TCP/IP.

Further information can be found in Section Local HMI or ES on SIMOTION P320-4 (Page 61).

9.4.3 Station Configurator

The **Station Configurator** is required to configure the communication paths for the HMI software.

The Station Configurator is provided directly as desktop icon of the SIMOTION P320-4.



Figure 9-10 SIMOTION desktop with Station Configurator

Note

Changes via Station Configurator

If you want to make changes via the **Station Configurator** , it is essential that you terminate SIMOTION P before calling the function (with **Terminate SIMOTION P** in the SIMOTION P State application).

Observe uniform configuration

Check if the offline configuration set via SIMOTION SCOUT (HW Config) corresponds exactly to the online configuration set in the Station Configurator :

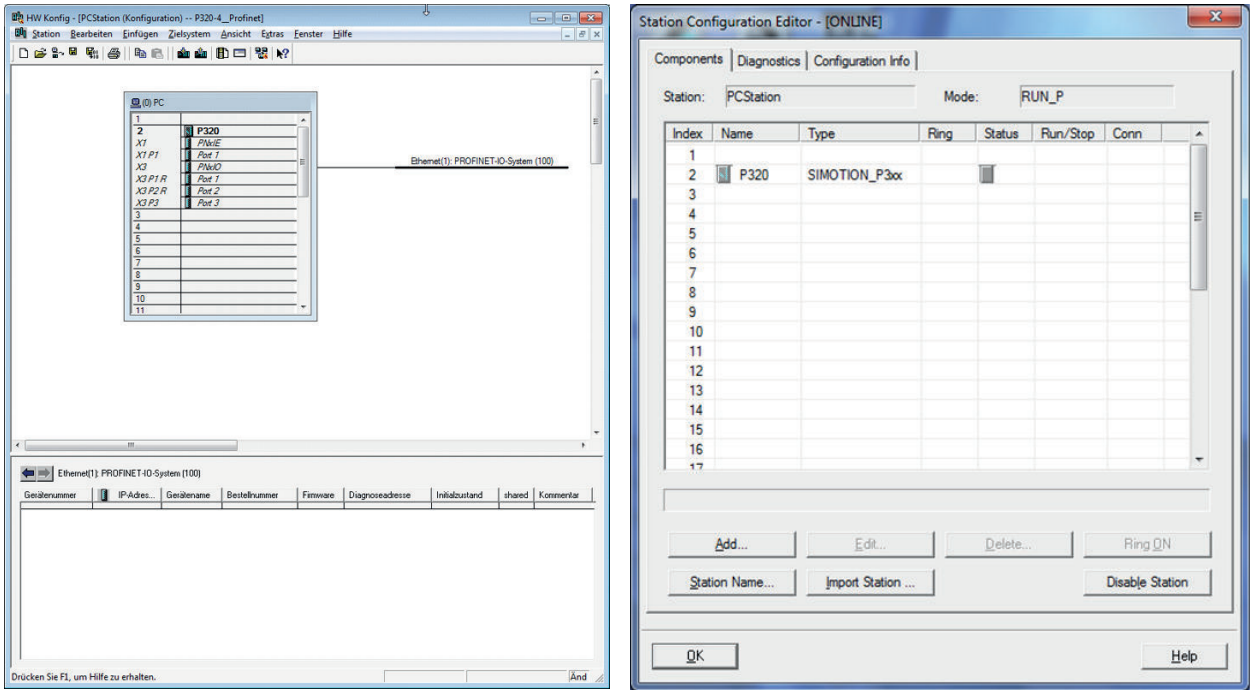


Figure 9-11 Illustration of the offline HW Config (left) - online Station Configurator (right)

9.5 Ethernet communication

9.5.1 Ethernet communication overview

SIMOTION P320-4 has one onboard Ethernet interface.

NOTICE
SIMOTION P Runtime During SIMOTION P Runtime, the onboard Ethernet interface must be **activated** under Windows. The onboard Ethernet interface must not be deactivated or activated during operation.

You can connect Industrial Ethernet to the Ethernet interface X1.

Industrial Ethernet is a communication network with a transmission rate of 10/100/1000 Mbps.

Note

Operating Ethernet locally

The SIMOTION P320-4 is configured for the **TCP/IP** communication version in the delivery condition.

See also Local HMI or ES on SIMOTION P320-4 (Page 61).

9.5.2 Ethernet interface

SIMOTION P320-4 has an onboard Ethernet interface.

An Ethernet interface can always have two IP addresses, one for Windows and one for the access from SIMOTION.

Table 9-1 Ethernet ports overview

Ethernet ports	Access to/from the SIMOTION P Runtime	Access to/from Windows
Onboard Ethernet 1	X	X
PROFINET onboard	X	-

The IP addresses have been set to the default values.

- Onboard Ethernet interface X1 reserved for Windows/SIMOTION (see section Default IP addresses for Windows and SIMOTION P (Page 153))
  - Windows setting: Default address
  - SIMOTION P Runtime: Default address

If the Windows IP address is taken from a DHCP server, the assignment of the runtime IP address and runtime subnet mask must also be selected in accordance with the default setting of the DHCP server.

The following applies (see Section Communication via an Ethernet interface (Page 153)):

- Windows IP address ≠ runtime IP address
- Windows IP address and runtime IP address must be in the same subnet

Ethernet interface for SIMOTION P Runtime

The IP address of the **Ethernet interface for SIMOTION P Runtime** can be:

- Displayed and changed via SIMOTION SCOUT
- Displayed in the **Administration** tab via the SIMOTION P Control Manager application. Here, however, the IP address can only be changed temporarily.
  Its validity ends with:
  - Booting, downloading, as well as terminating or restarting of SIMOTION P Runtime.
    Further information can be found in Section Administration tab (Page 138).

Ethernet interface for Windows

The IP address of the **Ethernet interface for Windows** can **only** be modified via the Windows Control Panel > Network and Sharing Center.

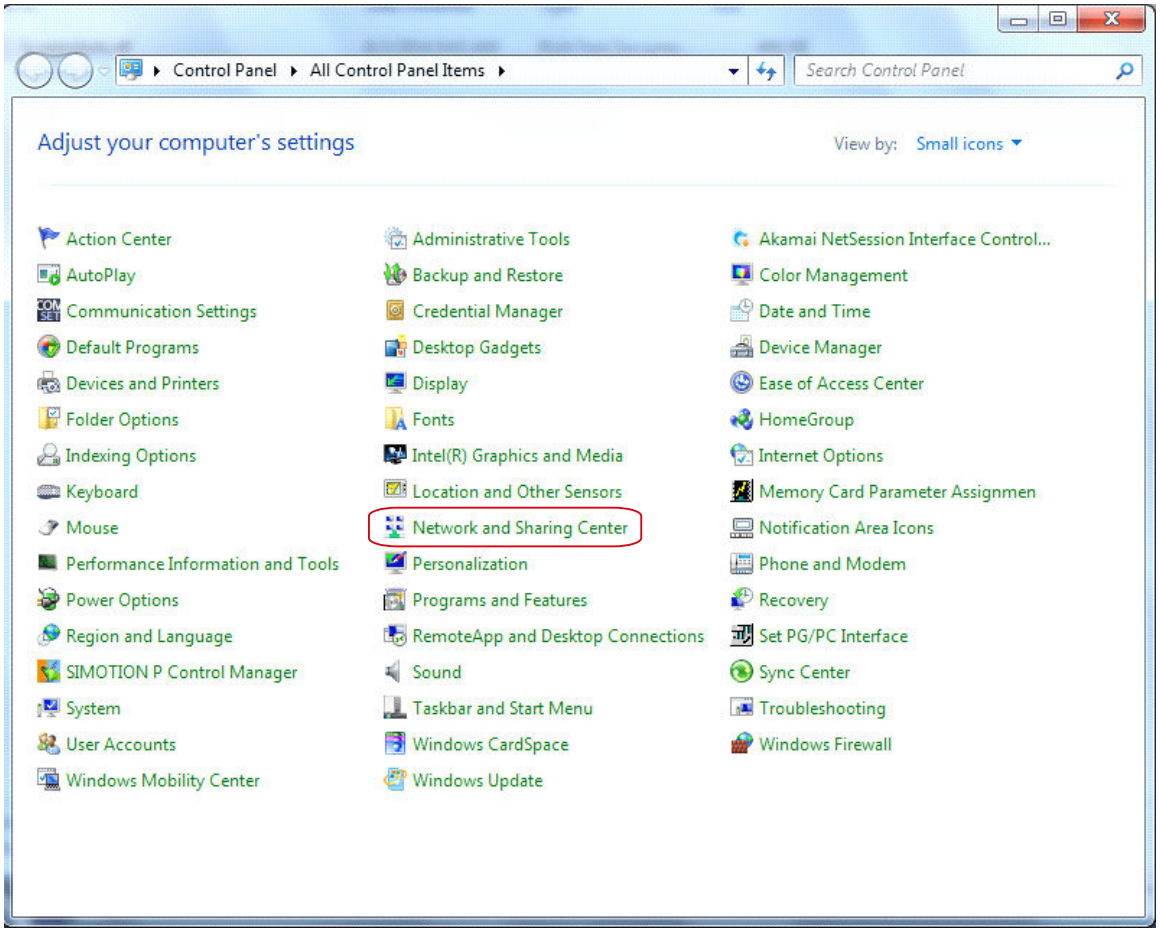


Figure 9-12 Windows Control Panel-Network and Sharing Center

Note

Windows Firewall

To allow the Windows IP to be accessed externally, this must be set as an exception in the Windows firewall **File and Printer Sharing**. Otherwise, there is only limited access to Windows from outside.

9.5.3 Default IP addresses for Windows and SIMOTION P Runtime

Default Ethernet addresses for use from Windows and SIMOTION P are preset.

Table 9-2 Default Ethernet address for Windows and SIMOTION P Runtime

Ethernet interface	Windows	SIMOTION P Runtime
Onboard Ethernet 1	169.254.11.21	169.254.11.22

The default IP address for Windows can result in IP addresses being assigned twice, e.g. during series commissioning (see Troubleshooting/FAQs (Page 219)).

If DHCP is set under Windows, the IP addresses for Windows are determined automatically.

9.5.4 Communication via an Ethernet interface

If both Windows and SIMOTION use the onboard Ethernet interface X1, the following configuration is present:

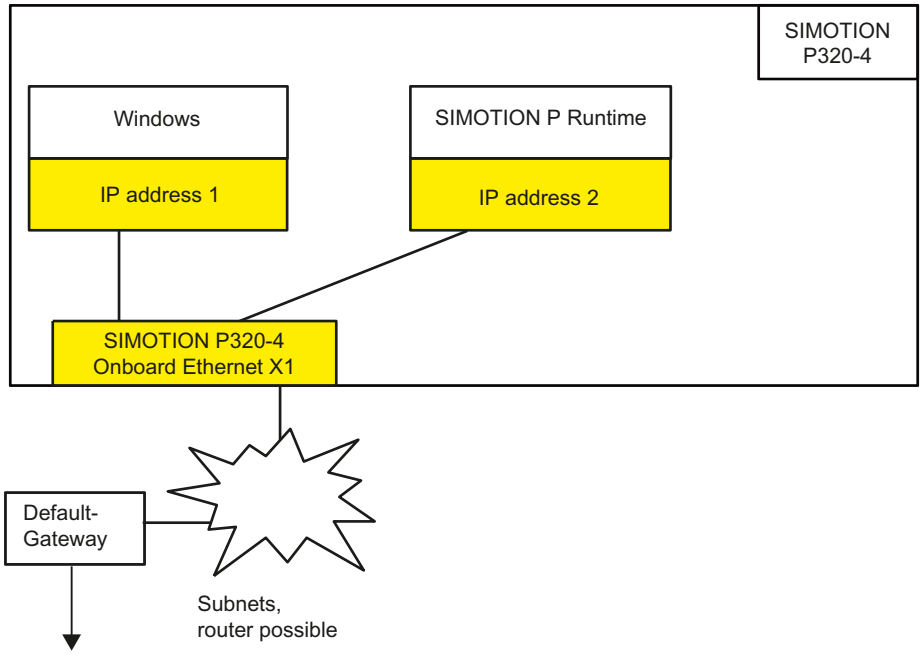


Figure 9-13 Distribution of the IP addresses for Windows and SIMOTION P Runtime

Note

If no change of the default IP addresses is desired, all conditions with the default IP addresses are fulfilled and no change is required.

The following conditions apply:

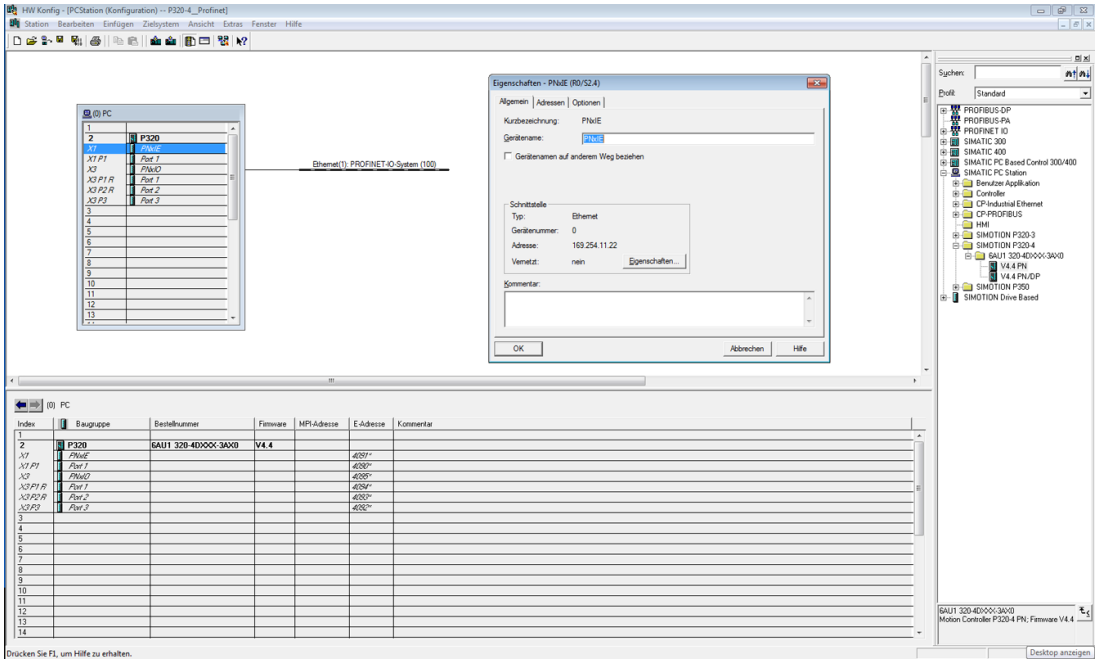
- IP address 1 ≠ IP address 2
- IP address 1 is in the same subnet as IP address 2
- IP address 1 is configured as of Windows 7 under > Control Panel > Network and Sharing Center.

Note

The setting for the default gateway must be identical for the IP addresses 1 and 2.

Procedure in HW Config to change the default IP addresses

1. Double-click **PNxIE** of the PC station. The following dialog box is opened.



2. Click the **Properties...** button of the Properties - PNxIE dialog box.

3. Enter the **IP address** for SIMOTION in the entry field (the default IP address is shown here).

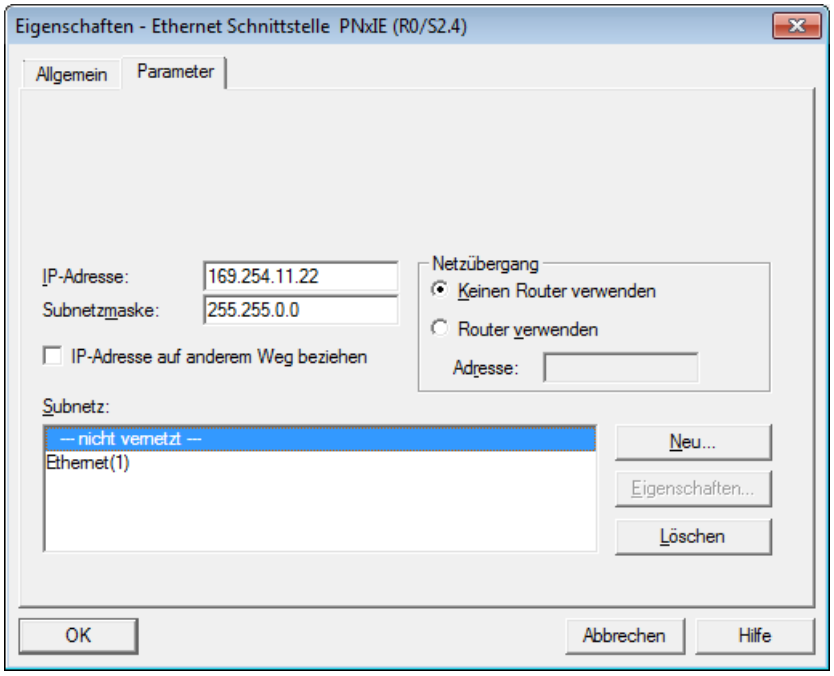


Figure 9-14 Changing the RT address for onboard Ethernet (1) - Properties dialog box

4. Enter the desired subnet mask in the **Subnet mask** entry field and, if required, a router that is to be used as default gateway.
5. Confirm with **OK**.

Activation state of the onboard Ethernet interfaces

The onboard Ethernet interface must be activated for the SIMOTION P Runtime (default setting = activated).

You can check the activation via the **Administration** tab of the **SIMOTION P Control Manager** (accessible via the Windows Control Panel with Start > Control Panel).

The **Activate Device** checkbox is displayed after selecting the button for **Onboard RT - Ethernet Properties**.

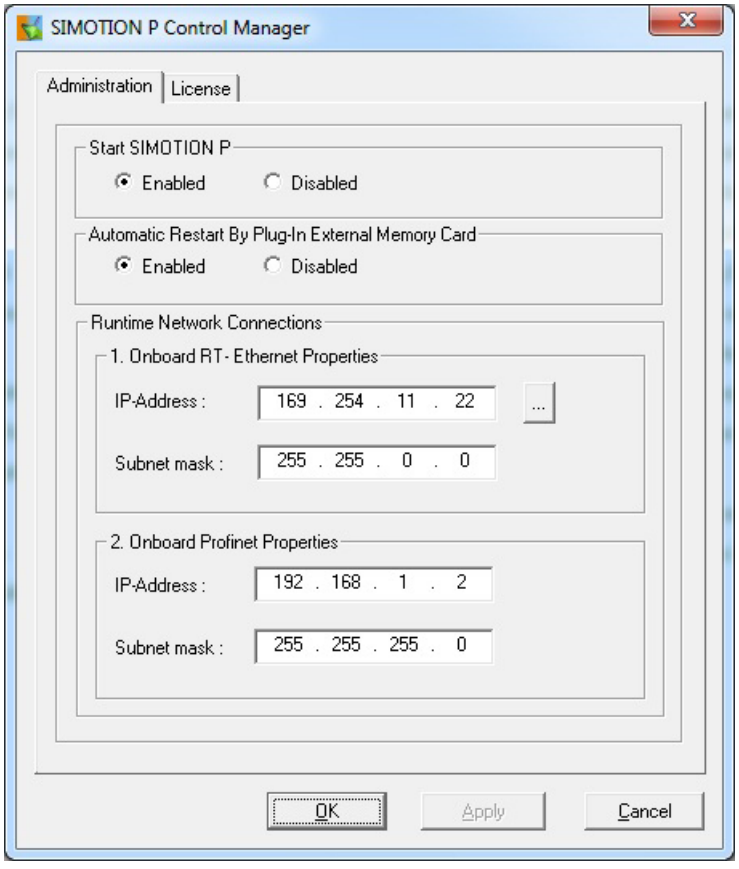
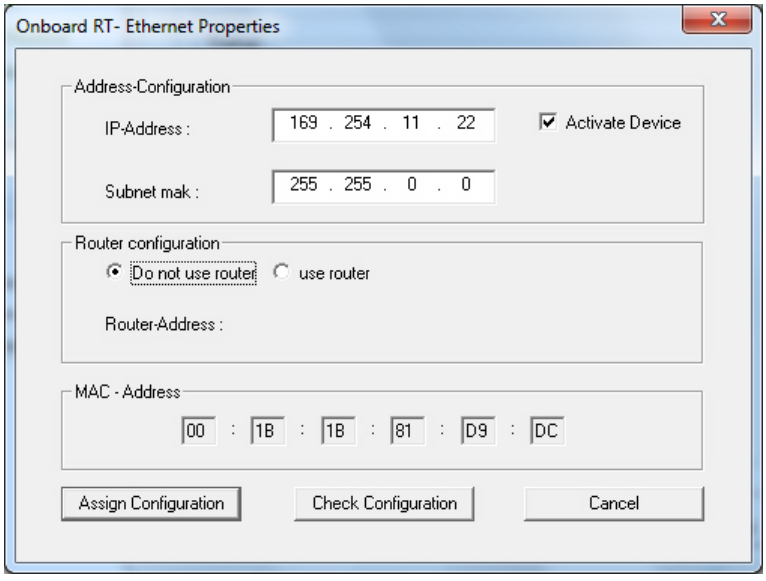


Figure 9-15 SIMOTION P Control Manager - Administration



NOTICE
SIMOTION P Runtime During the runtime of SIMOTION P, the Windows settings must be **activated** for the onboard Ethernet interface. The onboard Ethernet interface must not be deactivated or activated during operation.

9.5.5 Establishing the active flag for an external PG/PC

Requirement

A PG/PC is required to create projects and download them to the target device.
SIMOTION SCOUT can only be installed on the SIMOTION P320-4 S.

Note

Observe the online access point for SIMOTION P320-4 S

For SIMOTION P320-4 S, use **S7ONLINE** as access point to avoid inconsistencies.

Procedure

Proceed as follows to open NetPro and assign an interface in the PG/PC:

1. Open the project in SIMOTION SCOUT.
2. Click the button **Open NetPro**.
   NETPRO is accessed, and the configured network is graphically displayed. The PG/PC connection to the configured network is shown not bold and in a color **other than** yellow.
3. Double-click on the PG/PC that you would like to configure.
   The **Properties - PG/PC** dialog box is displayed with the **Assignment** tab in the foreground.
4. In the field **Assigned:** select the interface and activate S7ONLINE access by clicking the corresponding checkbox.
5. Accept the settings by clicking **OK**.
   The PG/PC connection to the configured network is now displayed in **bold** and **yellow**.
6. Save the changes via **Network > Save and compile** and upload them to SIMOTION P320-4.

Result

Now you can go online via the PG/PC.

9.6 PROFINET communication

9.6.1 Documentation

Description of PROFINET communication

A detailed description of PROFINET communication can be found in:

- SIMOTION Communication System Manual or
- SIMOTION SCOUT Online Help under **Basics** > **Communication** > **PROFINET IO**.

9.7 PROFIBUS communication

9.7.1 Documentation

Description of PROFIBUS communication

A detailed description of PROFIBUS communication can be found in:

- SIMOTION Communication System Manual or
- SIMOTION SCOUT Online Help under **Basics** > **Communication** > **PROFIBUS DP**.

9.8 Project download

Requirement

The **P320-4 PN** and **P320-4 PN/DP** modules have the same article number. For this reason, there is no distinction between the device during a download.

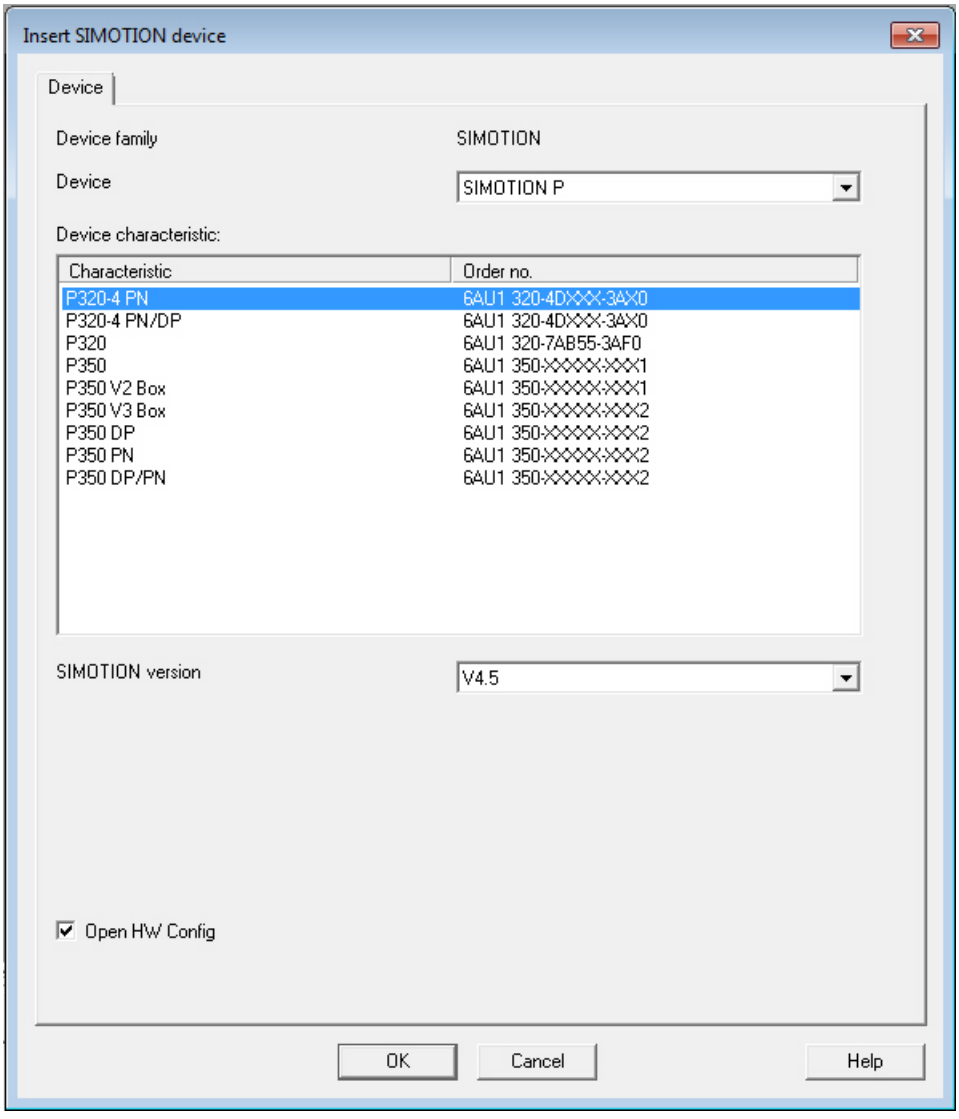


Figure 9-16 Inserting a SIMOTION device - selecting the device version

Behavior of the P320-4 PN device with the P320-4 PN/DP module

- If a **P320-4 PN** device with created PN line is loaded to a **P320-4 PN/DP module**, the project runs exactly as on a **P320-4 PN module**.

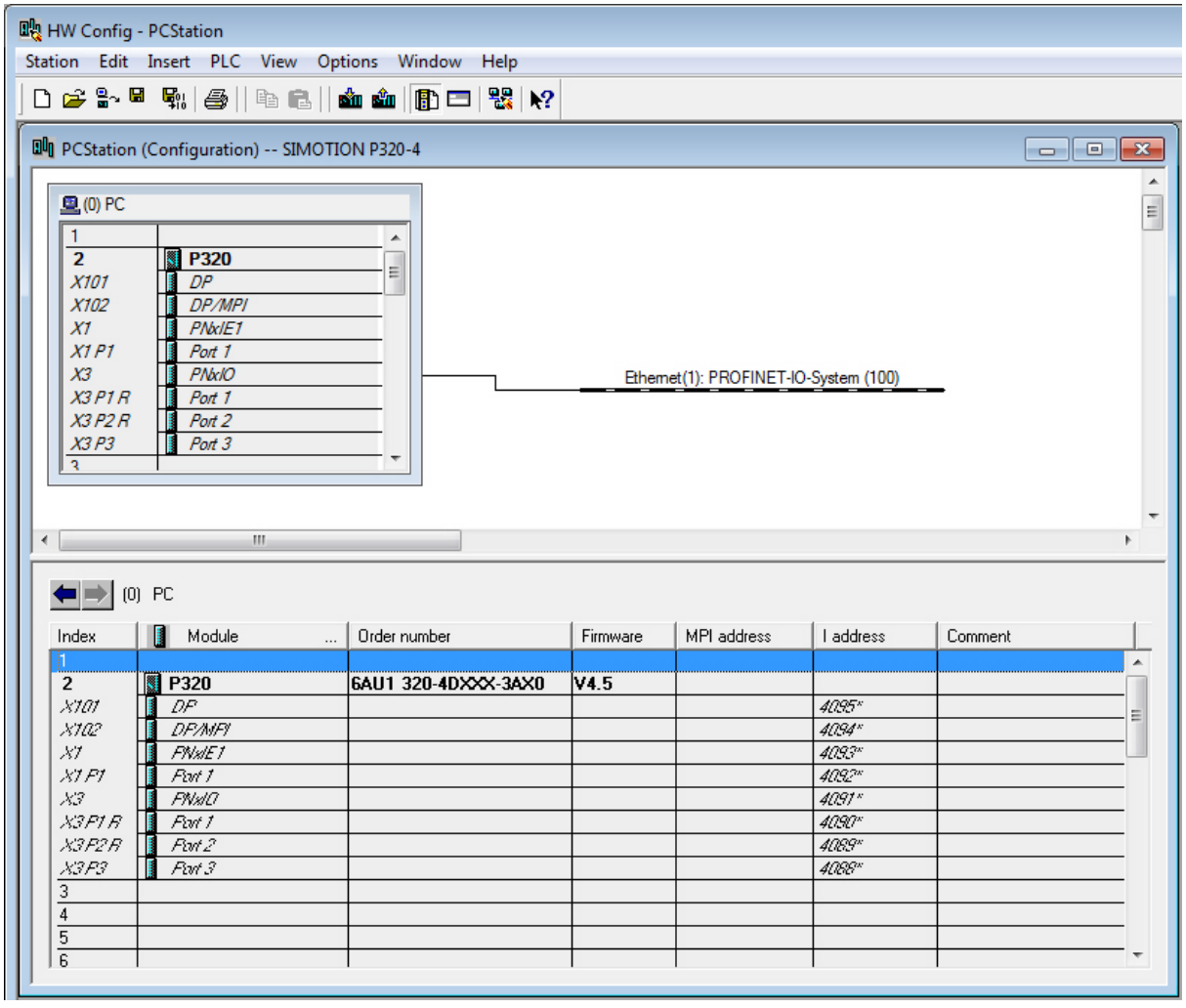


Figure 9-17 P320-4 PN/DP with created PN line (PROFINET-IO system)

- If a **P320-4 PN** device without created PN line is loaded to a **P320-4 PN/DP module**, there is no guarantee that the module runs with the configured base cycle clock.

Behavior of the P320-4 PN/DP device with the P320-4 PN module

Note

A **P320-4 PN/DP** device generally does not run on a **P320-4 PN module**.

The following message is displayed in the diagnostic buffer:

"Source 0 could not be loaded (inconsistency)".

The loaded configuration is not suitable.

9.9 Battery monitoring

The installed buffer battery has a service life of at least 5 years. The status can be checked with two-tier battery monitoring.

When the first warning level is reached, the remaining service life of the battery for buffering CMOS data and buffered SRAM is at least 1 month.

You will find further information on the battery warning at: Two-stage battery monitoring (Page 199)

Lithium battery - ordering data		
Designation	**Article number**	**Further information**
Lithium battery	A5E30314053	Spare part

Commissioning (software) 10

10.1 Note before commissioning

Delivery condition

SIMOTION P320-4 is delivered with:

- Windows operating system
- SIMOTION P Runtime application

NOTICE
Risk of damage to the SIMOTION P320-4
If condensation has developed, wait at least 12 hours before commissioning the device.

10.2 Basic commissioning - initial startup

Requirement

The following requirements must be met before initial commissioning:

- The device is connected to the 24 VDC power supply.
- Equipotential bonding is connected.

10.3 Commissioning requirements

Prior activities

You have already performed the following actions:

- Your system has been installed and wired.
- The installation and parameterization has been completed.
- When networking via PROFINET, the PROFINET addresses of the bus nodes with which the SIMOTION P320-4 communicates are set.

See also

Connection requirements (Page 101)

Parameter assignment / addressing requirements (Page 135)

10.4 Notes on commissioning

Starting up communications

The following components must be commissioned:

- SIMOTION P320-4
- PROFINET component

Commissioning is performed either via the programming device or by installing the software required for commissioning on the SIMOTION P320-4.

If a panel is used, it must be connected.

Commissioning the components

Please refer to the relevant documentation for the commissioning of the components used with SIMOTION P320-4:

- ET 200 PN I/O
- PROFINET IO drives,

10.5 Recommended order for first commissioning

The individual steps for first commissioning are listed below in the recommended order.

1. The complete system is connected mechanically and electrically, and has been verified.
   - SIMOTION P320-4
   - Drives
   - Motors
   - SIMATIC S7 I/O components
   - HMI user interfaces
2. The article numbers of the drives and SIMATIC S7 I/O components should be available. You need these order numbers when setting up a SIMOTION project to verify that the components selected from the hardware catalog in the **HW Config** application correspond to the ones used in the system.
3. Prepare the drives for communication on the PROFINET IO.
4. Commission the drives via PROFINET IO.
   Literature: Function description of the associated drives
5. Carry out a test run for all axes.
6. Perform the optimization of the drives.
7. Switch on and power up the SIMOTION P320-4; all the basic settings are made automatically.

See also

License tab (Page 144)

10.6 Data backup

10.6.1 Memory media

The storage media of the SIMOTION P320-4 are divided into internal and external memories on drives C: and D:.

The SIMOTION P Kernel and Windows system software are located on the internal storage medium on drive C:.

Media

The following figure shows the partitioning of the storage medium in the delivery state, depending on the version of the SIMOTION P320-4.

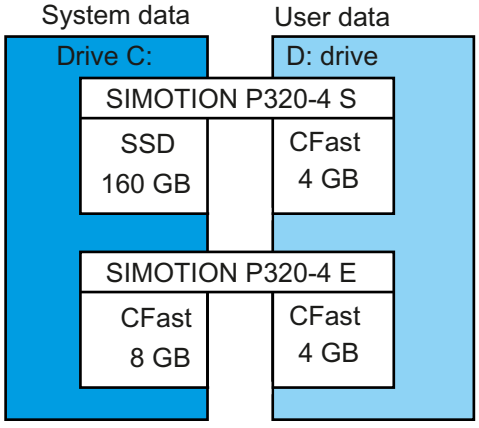


Figure 10-1 Storage media of the SIMOTION P320-4

Drive C:

Drive C: reserved for the Windows system software, SIMOTION P kernel, etc.

NOTICE
Compression for drive C: Not permissible Compression must not be activated for files and folders on drive C: for correct operation of the SIMOTION P320-4.

Drive D:

Drive D: contains the **user data**, e.g. programs, configuration data, parameter assignments of SIMOTION P Runtime.

Note

Storage of user data

It is recommended that only the user data be saved on drive D:.

10.6.2 SIMATIC data backup

Data backup under Windows Embedded Standard 7 32-bit / Windows 7 Ultimate 32-bit

For backing up data under Windows Embedded Standard 7 32-bit and Windows 7 Ultimate 32-bit, we recommend the software tool **SIMATIC IPC Image & Partition Creator** (as of V3.3.1). This tool allows the easy backing up and quick restoration of entire memory cards.

The SIMATIC IPC Image & Partition Creator only supports the burning of DVD media.

This software is available via the online ordering system Siemens Industry Mall (http://www.siemens.com/industrymall). You can find more accurate information about the tool in the associated product documentation.

10.6.3 Restore DVD

SIMOTION P320-4 is supplied with pre-installed hardware and software and is therefore ready for connection and operation.

The delivery kit includes a restore DVD. Using the restore DVD, you can restore the delivery state of the SIMOTION P320-4, e.g. in case of a problem when installing additional software packages such as HMI software.

It is recommended that you create a data backup after commissioning by the OEM. Save the data backup on an external hard disk or a USB flash drive.

The fundamentals of the data storage concept and the various types of data back-ups of the SIMOTION P320-4 are described in the section on the Data storage concept (Page 171).

Note

SIMOTION licenses

SIMOTION Runtime licenses are retained (e.g. axis licenses) when the SIMOTION P320-4 is restored to its delivery state.

Only the licenses of the **Automation License Manager** are deleted (e.g. for the SIMOTION SCOUT engineering system).

10.7 Power-up of the SIMOTION P Kernel

The SIMOTION P Kernel is started by default when Windows is booting. It is therefore available after each power-up of the SIMOTION P320-4. The startup process is triggered by an installed service, the **SIMOTION P Startup Service**. This service ensures that the SIMOTION P Kernel starts automatically during the Windows power-up.

SIMOTION P320-4 is started with the project last saved from RAM to ROM and starts running immediately if the operating state was set to RUN when the system was switched off.

If you want to explicitly terminate the SIMOTION P320-4 without exiting Windows, use the **SIMOTION P State** application.

To do this, you must be logged on with administrator privileges. Only the administrator is offered the button for the **Terminate SIMOTION P** function.

After explicitly terminating the SIMOTION P Kernel via the SIMOTION P State application, the SIMOTION P Kernel can be restarted via this application (Start SIMOTION P button). A restart of Windows also results in a restart of the SIMOTION P Kernel.

You can find more detailed information about SIMOTION P State in Section SIMOTION P State application (Page 127).

10.8 Data storage concept

10.8.1 Data storage concept overview

Overview

The backup possibilities described in the following section can be used to backup and restore the complete SIMOTION P320-4 installation with the current configuration and customization.

The SIMOTION version on the target device does not need to match the version of the device on which the backup was created.
Under certain preconditions, e.g. identical hardware for storage medium image, series commissioning can also be carried out using these backup and restoration mechanisms.

Storage medium image

With a storage medium image, the entire storage medium can be backed up and restored. This allows series commissioning to be performed (requirement: identical hardware!).

A storage medium image must be created both for the internal storage medium (Drive C) and for the external CFast card (Drive D). When creating the image with the **SIMATIC IPC Image Creator**, an image can be created jointly for one internal and one external storage medium.

When loading an image, be aware that the images for the internal and external storage media must be loaded separately and that the wizard must therefore be run twice. It is not possible to load the image onto both drives in a single process.

The restore DVD contains a storage medium image of the plant with which the delivery state of the SIMOTION P320-4 can be restored.

Various mechanisms are available for backing up and restoring data for the SIMOTION P320-4.

These mechanisms are described in the following sections, starting with the largest possible scope of a backup to the backing up of variables.

Although the backup/restore of data in many cases is initiated by the user, it is sometimes also performed automatically or started by the user program.

In addition to restoring defined states and updating/reloading a project in the target device, data backups are also needed to prevent data loss resulting from a hardware defect or failure of the backup battery.

Project update

The Project update (Page 173) section describes options for updating/retransferring or backing up a SIMOTION project.

Application

- Transfer of a project to the newly installed SIMOTION P320-4
- Series commissioning

Advantage

Series commissioning is also possible without a programming device or using remote maintenance.

Disadvantages

The SIMOTION version on the target device must exactly match the version of the device on which the backup was created.

Single backups

The Single backups (Page 177) section describes the options for backing up and restoring retain variables, retain TOs, unit variables, and global device variables.

Application

- Data backup when replacing the SIMOTION P320-4
- Restore the SRAM after a failed consistency check (battery failure,…)
- Backup the data for Unit variables and device-global variables from the RAM
- Backup values (variables) from the RAM
- Restore a defined state of the machine

Advantages

- The user program can use system functions to perform a backup
- Version-independent restoration of the retain data (non-volatile SIMOTION data)

Disadvantages

No complete backup

Defined states

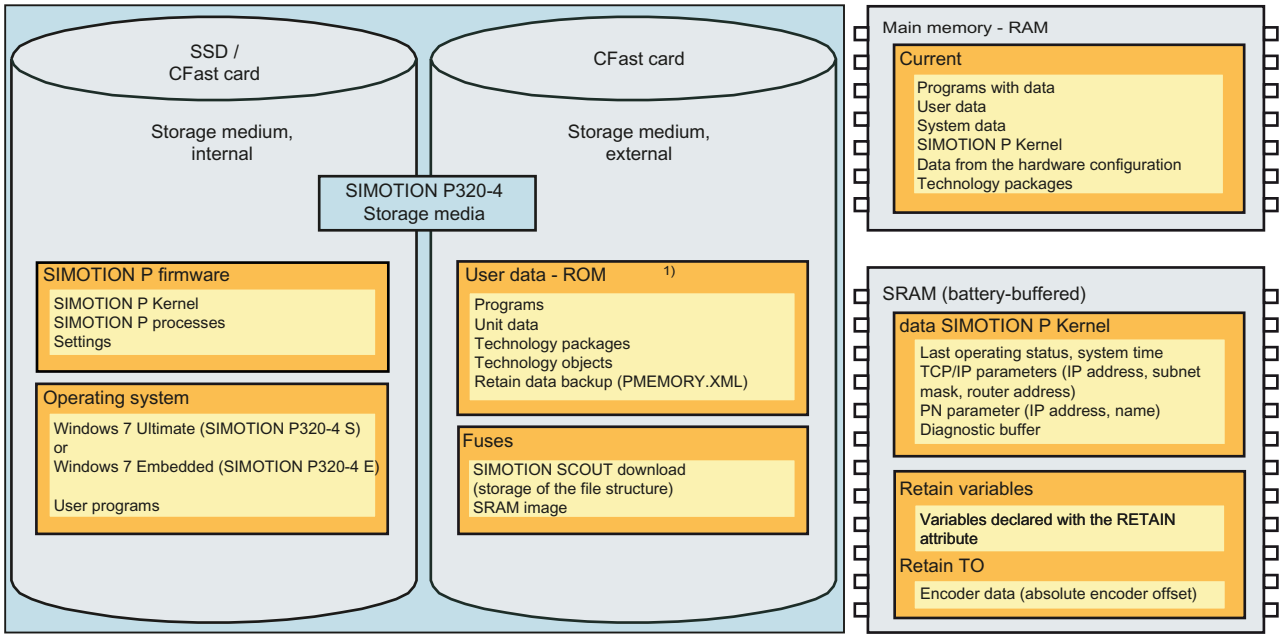
The Defined states (Page 181) section describes the options for restoring a defined state / initial state.

Application

- System defect
- Windows defect
- Restore a defined initial state, for example, during commissioning

10.8.2 Memory model

The following figure shows which data memories are used by SIMOTION P320-4 and which data is saved in them.



1) The user data must not be written by Windows during runtime (SIMOTION P State = RUN).
User data can be written from the Explorer or other applications in the **Terminate SIMOTION P** state.

Figure 10-2 SIMOTION P320-4 memory model

10.8.3 Project update

10.8.3.1 Overview

The backup possibilities described in the following section can be used to update, retransmit or back up a SIMOTION project.

The **download of project data** (file structure or ZIP file) via **SIMOTION SCOUT** can be used to perform series commissioning of a SIMOTION project.

SIMOTION IT allows series commissioning using remote maintenance via a web browser. Supported web browsers are, for example, Internet Explorer or Mozilla Firefox.

Detailed information about the backup options for the project update can be found at:

- SIMOTION Project Download online (Page 174)
- SIMOTION SCOUT - download of the project data (file structure) (Page 174)
- SIMOTION SCOUT - download of the project data with SIMOTION IT (ZIP file) (Page 175)
- Backing up and restoring project data (file structure) (Page 177)

10.8.3.2 SIMOTION Project Download online

The project data is loaded from a programming device with engineering system to the work memory (RAM) and selected parameters (e.g. TCP/IP) to the SRAM or exchanged between SRAM and work memory (RAM).

The explicit import of user data into the external CFast card is initiated by SIMOTION SCOUT (**Copy RAM to ROM**).

Note

Identical names in SIMOTION SCOUT / Station Configurator are essential

It is essential for the download that the name of the station is identical in the engineering system (SIMOTION SCOUT) and in the Station Configurator of the SIMOTION P320-4.

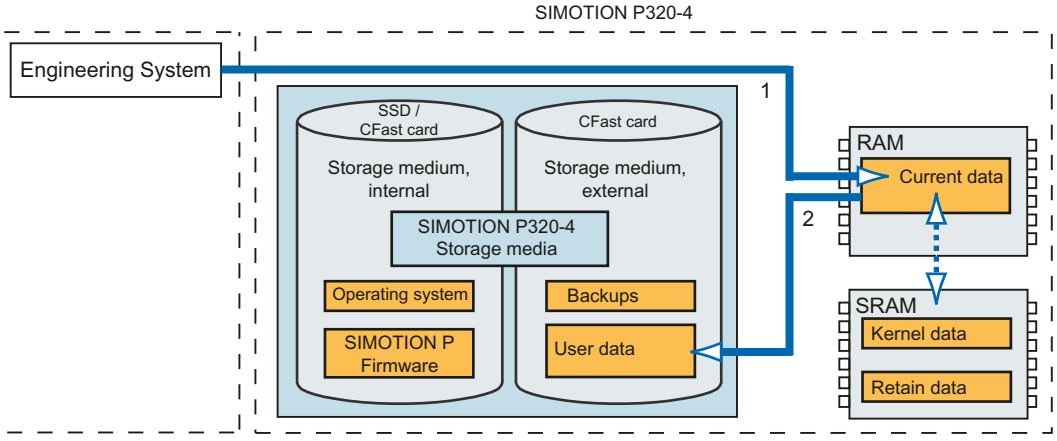


Figure 10-3 SIMOTION SCOUT download from the engineering system

SCOUT project download online process

1. Load the project data via **SIMOTION SCOUT**, menu **Target system > Load > Load project into target system...**, into the working memory of the SIMOTION P320-4.
2. To transfer the data to the external storage medium, use the menu **Target system > Copy RAM to ROM** in SIMOTION SCOUT.

The project data is transferred to the controller.

10.8.3.3 SIMOTION SCOUT - download of the project data (file structure)

The project data is saved by SIMOTION SCOUT in the form of the file structure in a file system (e.g. a programming device with an engineering system).
The user copies this file structure to the external CFast card of the SIMOTION P320-4.

This permits a series commissioning of SIMOTION programs.

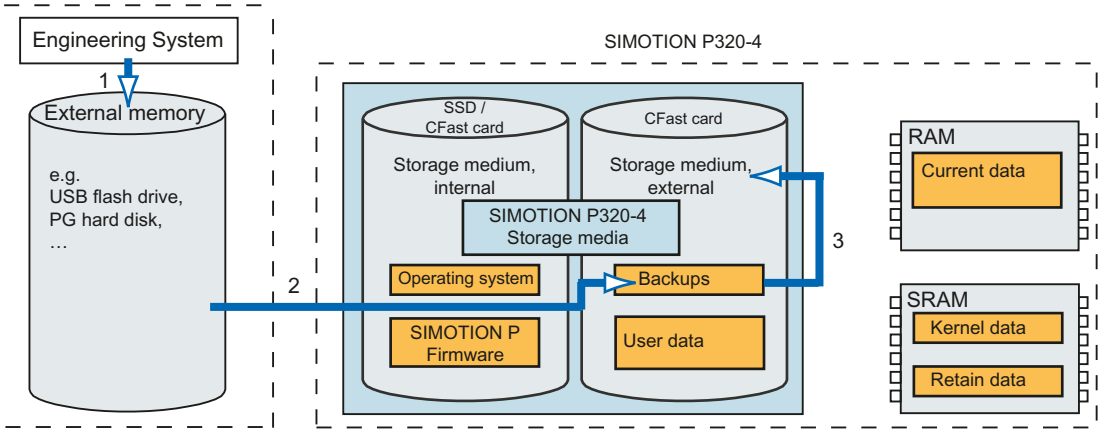


Figure 10-4 SCOUT download (file structure)

Download of the project data process (file structure)

1. Save the data via SIMOTION SCOUT, menu **Edit > Load to file system ...** (option **Save normally**), on the file system of your programming device.
2. Copy this data (file structure) to the external CFast card (drive D) of SIMOTION P320-4 (e.g. with USB memory stick and Windows Explorer).
   SIMOTION P must be in the **terminated** state for this.

Note

Note the SIMOTION version

The SIMOTION version on the target device must exactly match the version of the device on which the backup was created.

10.8.3.4 SIMOTION SCOUT - download of the project data with SIMOTION IT (ZIP file)

SIMOTION SCOUT stores the project data in the form of a ZIP file to a file system (e.g. a programming device with engineering system). This ZIP file can be transferred by the user to the SIMOTION IT web server with the web browser and it is then automatically imported into the user data.

This permits a project download using remote maintenance or series commissioning.

Note

Note the SIMOTION version

The SIMOTION version on the target device must exactly match the version of the device on which the backup was created.

After the upload of a SIMOTION project into the SIMOTION P320-4 (SIMOTION device update), the time stamps in the user data and the SIMOTION SCOUT project are different. The project is shown as inconsistent in SIMOTION SCOUT.
The consistency can be established via a project download or a download of the HW Config in the SIMOTION SCOUT.

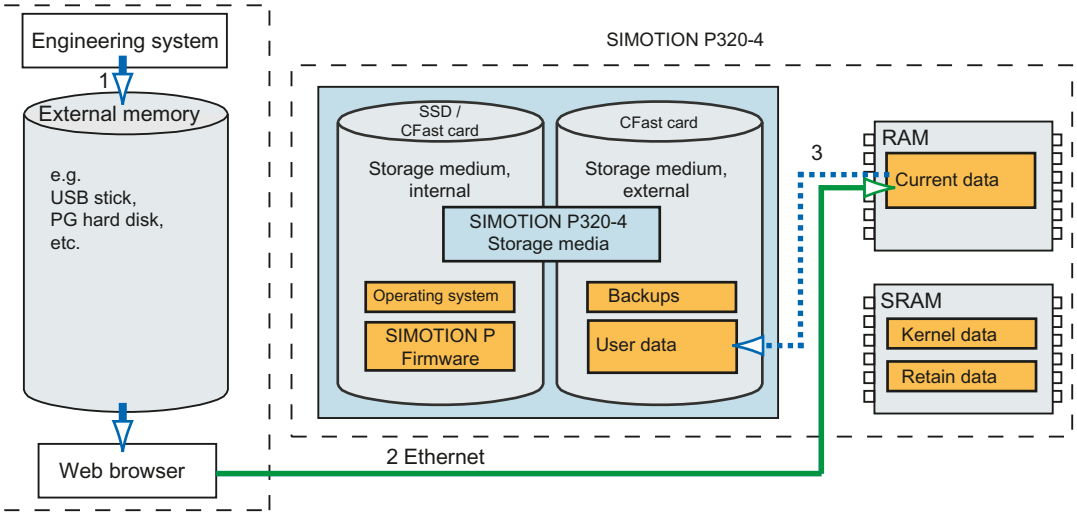


Figure 10-5 SIMOTION SCOUT download (ZIP file)

Download of the project data process (ZIP file)

1. Save the data via SIMOTION SCOUT, menu **Edit > Load to file system ...** (option Save compressed), on the file system of your programming device.
2. Transfer the ZIP file via the web browser and the project download of SIMOTION IT: **Manage Config** > [Login dialog] > **Device Update** > **Send new update data (*.ZIP)**
3. The unpacking and the import of the data into the user data on the external CFast card is performed automatically.

Note

SIMOTION IT

You can find further information about SIMOTION IT in the following documentation:

- SIMOTION IT Diagnostics and Configuration Diagnostics Manual
- SIMOTION IT Programming and Web Services Programming Manual
- SIMOTION IT Virtual Machine and Servlets Programming Manual

10.8.3.5 Backing up and restoring project data (file structure)

The project data (file structure) is located in the **USER** directory on the **external CFast card** (drive D) of the SIMOTION P320-4.

1. To save the project data, copy the USER directory from the external CFast card, e.g. to a storage medium of the SIMOTION P320-4 or to a USB flash drive.
2. To restore the project data, copy the USER directory, e.g. from a storage medium of the SIMOTION P320-4 or a USB flash drive, to the external CFast card and replace the existing directory.

This also enables series commissioning without a programming device or SIMOTION SCOUT.

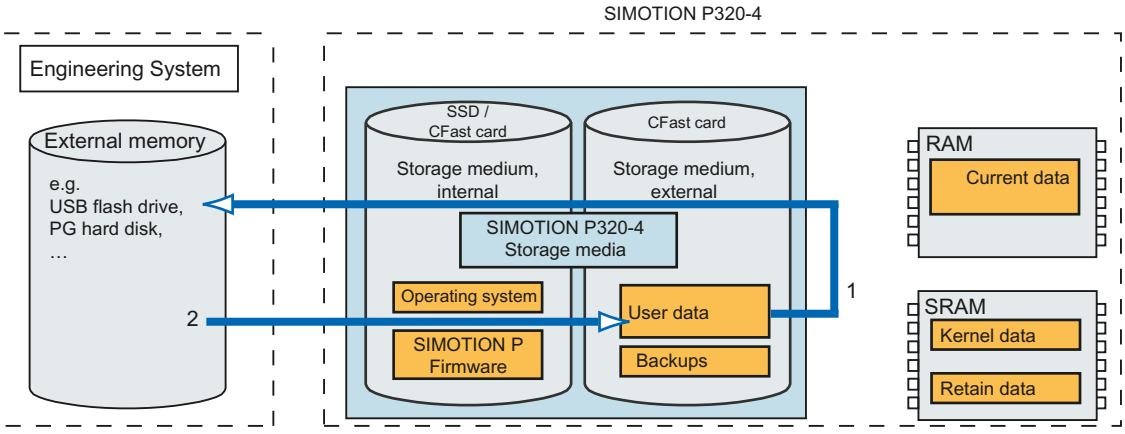


Figure 10-6 Backing up and restoring a file system

Sequence of a series commissioning

Copy the **USER** directory from a storage medium to the external CFast card (Drive D) of the SIMOTION P320-4 to be newly commissioned.

SIMOTION P320-4 must be in the **terminated** state for this.

10.8.4 Single backups

10.8.4.1 Overview

The backup options described in the following section can be used to back up and restore retain variables, retain TOs, unit variables and global device variables.

If the consistency check results in an SRAM error (because of a power failure if the battery has fallen below the threshold value) or the SIMOTION P320-4 is replaced, the backup can be used to restore the contents of the SRAM.

A user program can use system functions to initiate a backup.

Unit variables and global device variables can be backed up from the RAM to allow them to be recovered in the event of a power failure, for example.

This allows the initial state of the machine (reference points, sensor values, …) to be restored.

Detailed information about the individual backup options can be found under:

- Backup/restore SRAM (Page 178)
- Backing up non-volatile SIMOTION data (retain data) (Page 179)
- Restoring non-volatile SIMOTION data (retain data) (Page 180)
- Backing up unit variables and global device variables (Page 181)

10.8.4.2 Back up/restore SRAM

The correct shutdown of Windows automatically initiates **Terminate SIMOTION P** (SIMOTION P State). This automatically saves the retain data from the SRAM to the external CFast card.

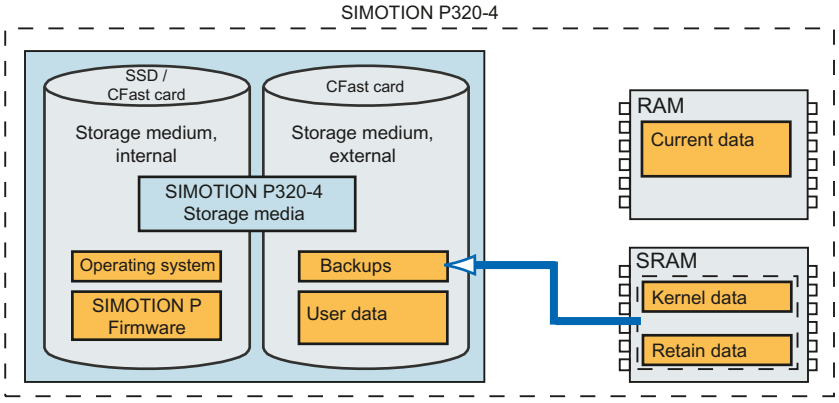


Figure 10-7 Saving SRAM with Terminate SIMOTION P

A consistency check of the SRAM is performed at each SIMOTION power-up. If an error is detected here, the SRAM data will be restored from the backup.

If, for example, the SIMOTION P320-4 needs to be replaced, this backup/restore mechanism allows the data to be transferred to the SIMOTION P320-4.

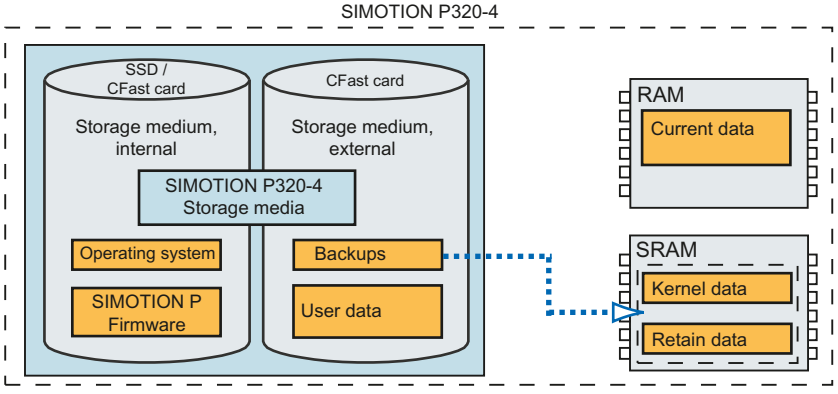


Figure 10-8 SRAM restore at startup

Further information

can be found in the section Non-volatile data and SRAM handling (Page 203).

10.8.4.3 Backing up non-volatile SIMOTION data (retain data)

The non-volatile SIMOTION data (retain data) can be backed up from the user program and via SIMOTION SCOUT.

You can use the backup to restore the retain data independent of the version after an update or a hardware replacement (SIMOTION P320-4) or to create a current backup to use in the event of an inadvertent deletion.

You can save the retain data as follows:

- From the user program with the **_savePersistentMemoryData()** system function
  The contents are saved to the "PMEMORY.XML" backup file in the "USER\SIMOTION" directory.
  The data is saved in the PMEMORY.XML file on the external CFast card.
- To back up the retain data via SIMOTION SCOUT , go online and in the context menu of a created source, execute **Save variables...**.
  The data is saved in the **unitdata.xml** file on the computer with SIMOTION SCOUT .
- Alternatively, the retain data is saved via the **SIMOTION P State** application, via the **SIMOTION P > Set Diagnostic Switch** menu.
  The contents are saved to the "PMEMORY.XML" backup file in the "USER\SIMOTION\HMI\SYSLOG\DIAG" directory.
- To restore the retain data via SIMOTION SCOUT, go online and execute **Restore variables...** in the menu.
  Restores the saved variables, also over different versions.

On the system side, the **_savePersistentMemoryData()** system function ensures that a consistent overall image of the non-volatile SIMOTION data is always available the next time the device is switched on, even if there is a power failure during backup.

An already existing backup file is renamed to "PMEMORY.BAK" before a new backup file is generated. If the save operation to the new backup file fails (e.g. because the capacity of the external CFast card is insufficient), this backup copy of the backup file is used the next time an attempt is made to restore the non-volatile SIMOTION data content. If the new file is successfully created, the backup copy of the backup file is deleted.

NOTICE
Loss of data due to failure to make backup copies Back up the non-volatile SIMOTION data on the CFast card. Non-backed-up non-volatile SIMOTION data can be lost on hardware replacement (module defect). For example, failing to back up the current values of the retain variables will result in them being lost and reset to their initial values.

NOTICE
Homing required again after absolute encoder overflow If an absolute encoder overflow occurs after _savePersistentMemoryData, the actual position value is no longer correct after the non-volatile data is restored. In this case, homing (absolute encoder adjustment) must be repeated.

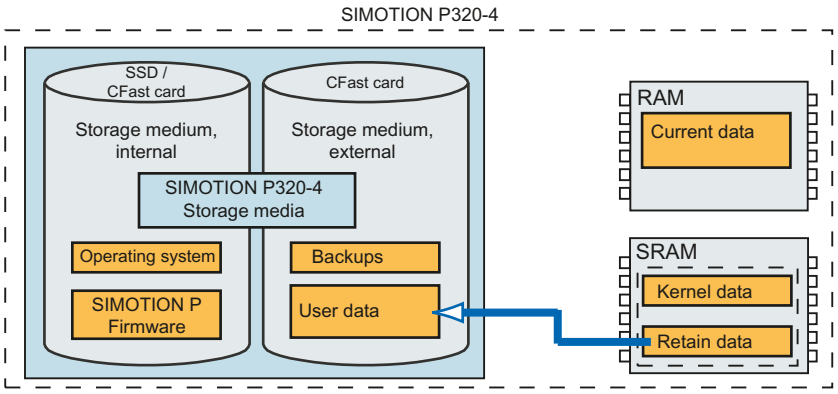


Figure 10-9 Save retain data

10.8.4.4 Restoring non-volatile SIMOTION data (retain data)

The backup of the non-volatile SIMOTION data (variables declared as retain) is restored in the memory if a data inconsistency is detected after a power failure (the backup battery has fallen below a threshold value) or a general reset has been performed on the CPU. This means that the user can perform a general reset to force the data to be reloaded.

Condition for restoring is that the **PMEMORY.XML** file is present on the external CFast card and the content of this backup file matches the project on the external CFast card.

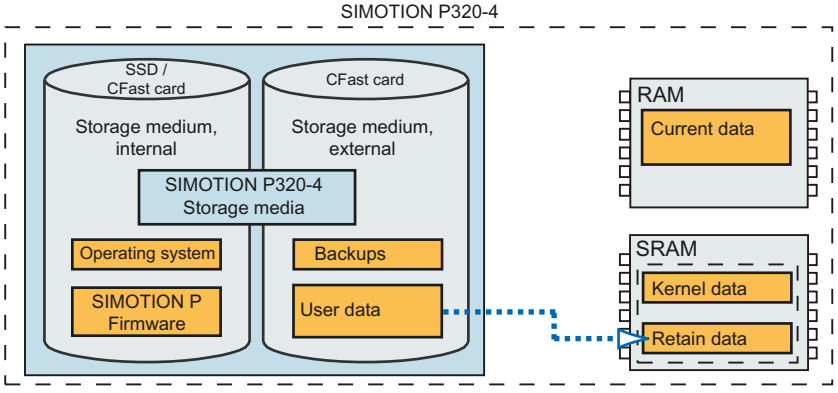


Figure 10-10 Restore retain data

Note

In the event of a power failure of the SIMOTION P320-4, the retain data in PMEMORY.XML will **not** be restored automatically.

Note

If a data inconsistency exists in the event of a power failure because the backup battery has fallen below a threshold value, the data backup from PMEMORY.XML will be written back into the SRAM.

10.8.4.5 Save unit variables and global device variables

Unit variables and global device variables are never retentive; the data will be lost in the event of a power failure.

If the unit variables and global device variables which have not been declared as retain variables are to be recovered after a power failure, the user program can use system functions to save this data to data sets (files on the external CFast card).

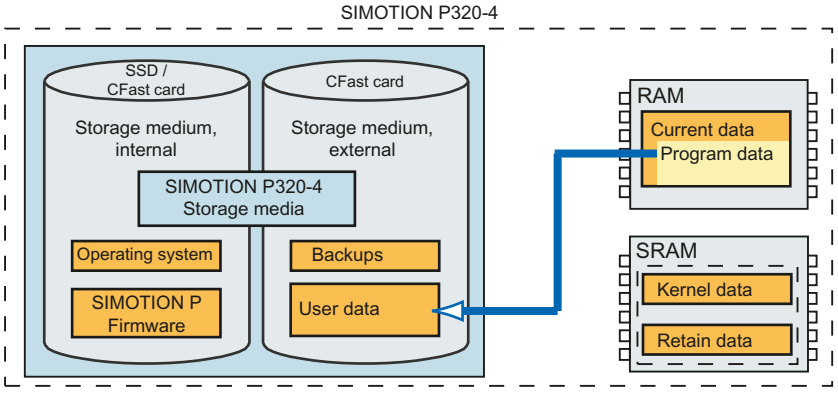


Figure 10-11 Saving unit variables and global device variables

System functions for backing up / restoring unit variables and global device variables:

- _loadUnitDataset()
- _saveUnitDataset()
- _importUnitDataset()
- _exportUnitDataset()

With unit variables, however, generally only unit variables of the interface section can be saved. In addition, all variables of the unit declared as retain variables will be saved.

Save variables… SIMOTION SCOUT function:

- The data is saved in the unitdata.xml file on the SIMOTION SCOUT computer.

Restore variables… SIMOTION SCOUT function:

- Restores the saved retain variables, also across different versions.

10.8.5 Defined states

10.8.5.1 Overview

An initial state can be restored by loading data backups, as described in the section Project update (Page 173), or via the reset functions of the **SIMOTION P State** application.

Transfer backup from the file system

Download backups that were stored on the file system using the backup mechanisms described previously.

For further information see Single backups (Page 177).

Detailed information about the backup options for detailed states can be found at:

- Restore the factory setting using SIMOTION P State (Page 182)
- Overall reset using SIMOTION P State - operating mode switch setting MRES (Page 183)
- Delete SRAM via SIMOTION P State - button Restart (Del. SRAM) (Page 183)

10.8.5.2 Restore the factory setting using SIMOTION P State

The condition on delivery is restored via the menu item **Extras > Reset to factory default**.

Note

The SRAM and the PMEMORY.XML file will also be deleted.

The controller is restarted automatically.

Any licenses on the card will not be deleted.

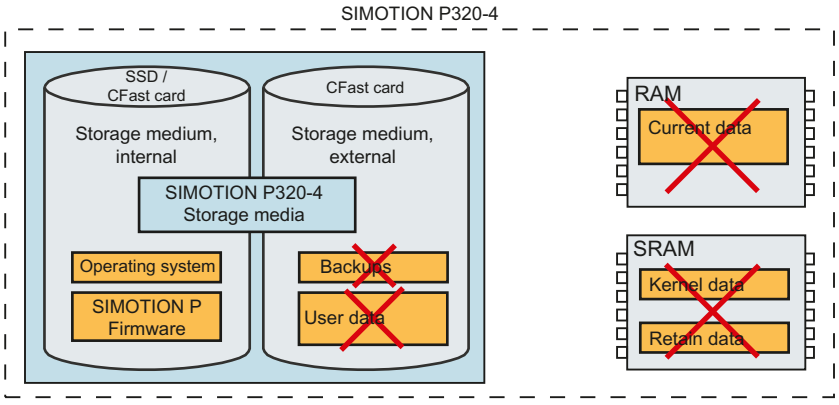


Figure 10-12 Restoring factory settings

Further information

on the SIMOTION P State - menus (Page 131)

10.8.5.3 Overall reset using SIMOTION P State - operating mode switch setting MRES

A general reset deletes the non-volatile SIMOTION data and retain data.

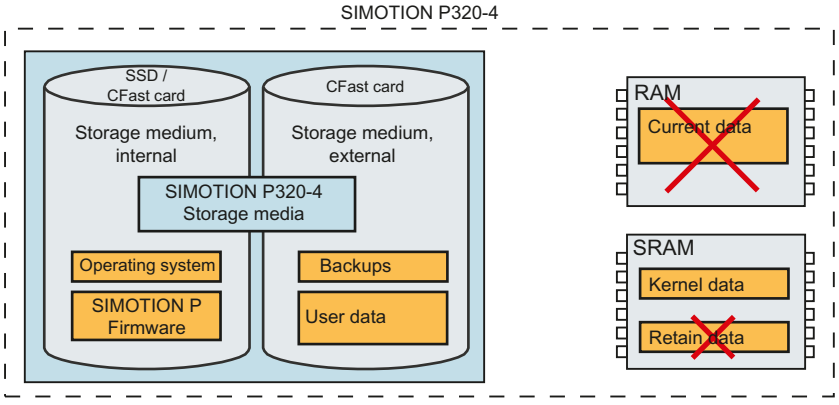


Figure 10-13 General reset

If a backup of the retain data (PMEMORY.XML) exists, this data will be accepted after the general reset. Thus, the user can perform a general reset to force the saved retain data to be restored.

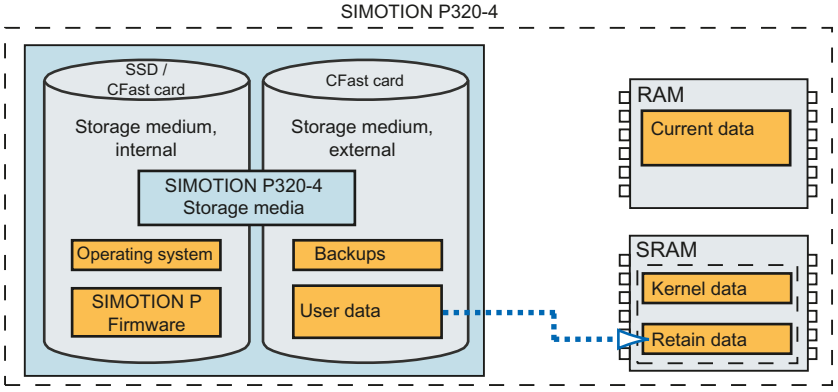


Figure 10-14 Restore retain data

10.8.5.4 Delete SRAM via SIMOTION P State - button Restart (Del. SRAM)

SIMOTION P320-4 will be restarted and the data in the SRAM will also be deleted.

The loading of a backup allows the SIMOTION P320-4 to be returned to a defined initial state. The backed up program variables and retain variables and thus the encoder values, homing data will be restored.

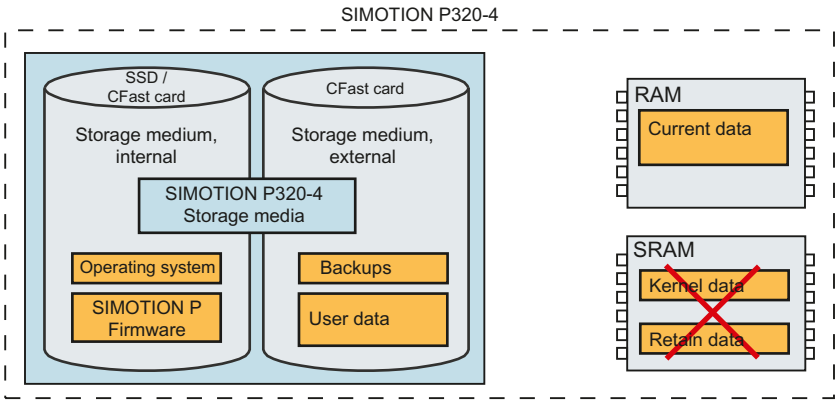


Figure 10-15 Delete SRAM - Restart (Del. SRAM)

If the SIMOTION SCOUT function **Target system > Copy RAM to ROM** was called previously, the saved project will be reloaded.

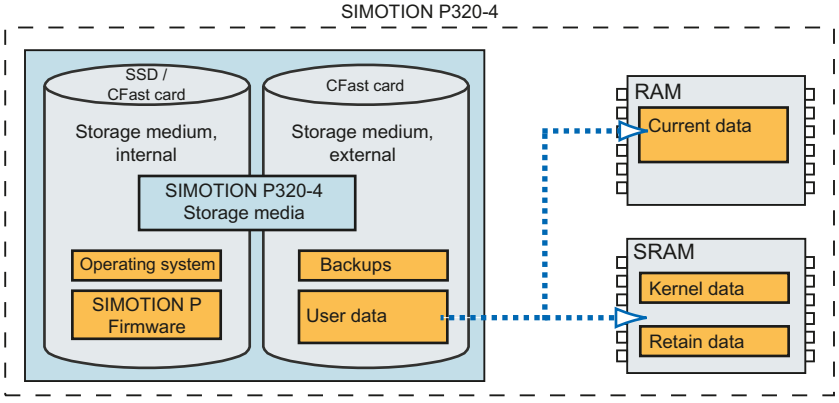


Figure 10-16 Load project after Restart (Del. SRAM)

Further information

on the SIMOTION P State buttons can be found in the Function elements (Page 130) section.

10.9 SIMOTION P overall reset

10.9.1 SIMOTION P overall reset overview

Introduction

When a general reset is performed, the RAM on the SIMOTION P320-4 will be cleared along with any non-volatile data in the SRAM - with the exception of the communication configuration (e.g. baud rates and network addresses). For further information see Non-volatile data and SRAM handling (Page 203).

Below is a list of the data that is either capable or not capable of withstanding a general reset. Data on the external CFast card is retained.

When must a general reset be performed on SIMOTION P320-4?

If you wish to undo changes in your user data (programs, configuration data, parameter assignments) in the **volatile data** area of the SIMOTION P320-4.

NOTICE
Differences when performing a general reset in connection with the RAM to ROM function
The following generally applies:
If **no** RAM to ROM was executed before the general reset, all programs and parameter assignments are considered as **data deleted on general reset**.
If data was backed up **with** RAM to ROM before the general reset, this data is considered as **data not deleted on general reset**.

Data deleted on general reset

The following data is deleted on the SIMOTION P320-4:

- Configuration data
- Programs
- Parameter assignments
- Technology packages
- Data from absolute encoders (absolute encoder adjustment, cyclic range overflows)

  Note

  Absolute encoder data is deleted during a general reset operation and must, therefore, be readjusted after the general reset.

- Retain variables
  Retain variables are variables that are defined as **non-volatile data** in the user program by the key word **Retain**.

Data not deleted on general reset

The following data is retained:

- Baud rate
- PROFINET IP address / name of the SIMOTION P320-4
- IP addresses
- Contents of the diagnostics buffer
- Data that was saved with the _savePersistentMemoryData(), _saveUnitDataSet(), _exportUnitDataSet() commands and with RAM to ROM.
  If the retain data is backed up (with _savePersistentMemoryData()), this data is backed up again to the non-volatile data after the general reset. Thus, the user can perform a general reset to force the saved retain data to be restored.
- Licenses

The technology packages and user data (configuration data, programs, parameter assignments) previously backed up to an external CFast card by means of the **Copy RAM to ROM** menu command are transferred to the **volatile data** area of the SIMOTION P320-4 after the general reset.
Thus, an existing configuration on the external CFast card is loaded to the SIMOTION device following the general reset.

Further information

Data storage concept overview (Page 171)

10.9.2 Overall reset using the mode selector (on screen)

For SIMOTION P320-4, the overall reset using a simulated mode selector is performed using the SIMOTION P State application.

Note

MRES mode switch position

If you set **MRES** via the SIMOTION P State application, the SIMOTION P320-4 automatically goes into the **STOP** operating state.

Proceed as follows to initiate an overall reset:

1. Turn the mode selector to **MRES** and keep **MRES** pressed until the **STOP** LED stops flashing.
   When the LED permanently lights up yellow, the **STOP** operating state has been reached.

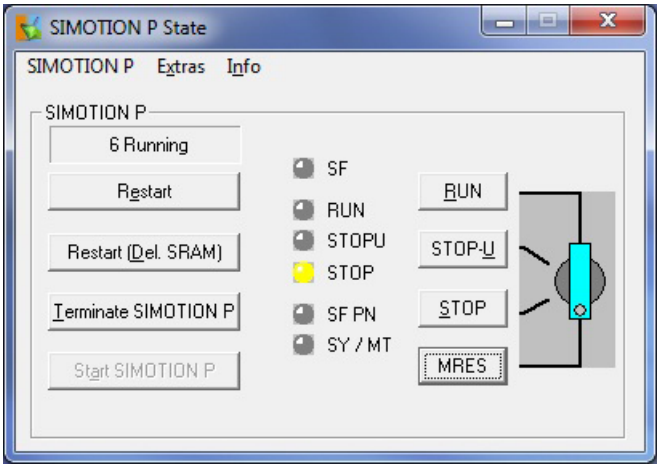


Figure 10-17 SIMOTION P State - STOP operating state

2. When you release **MRES**, the mode selector points to the **STOP** position again.

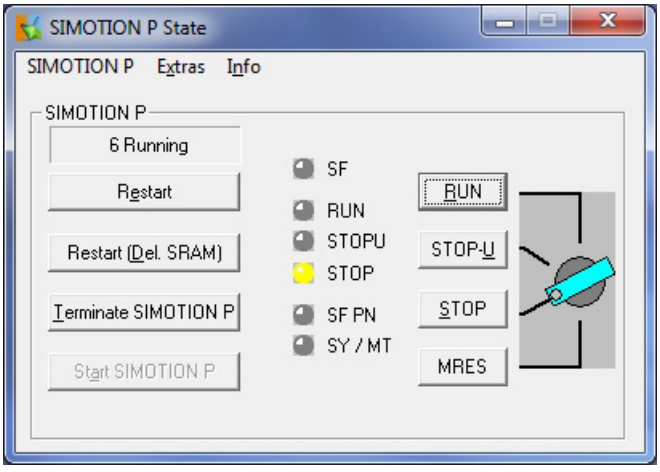


Figure 10-18 SIMOTION P State - Mode selector from position MRES to STOP

3. You must turn the switch back to the **MRES** position within three seconds.
   MRES is then displayed in the status.

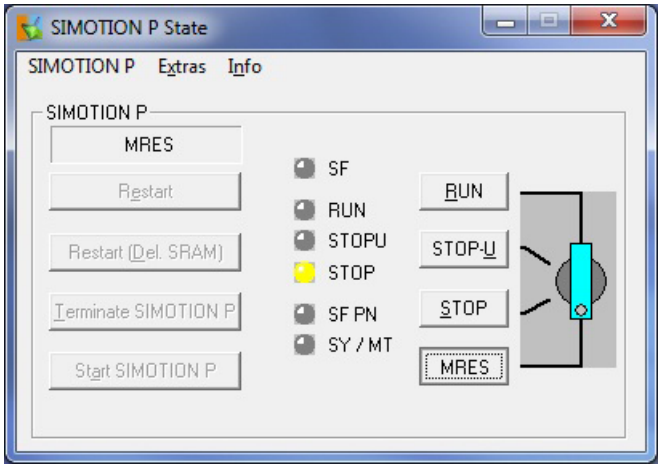


Figure 10-19 SIMOTION P State - status MRES

The mode selector then goes into the **STOP** position.

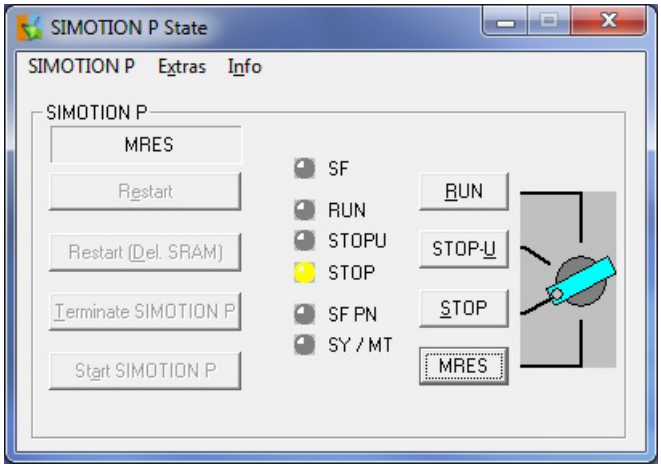


Figure 10-20 SIMOTION P State - status MRES, mode selector STOP

4. The SIMOTION P320-4 then restarts automatically.

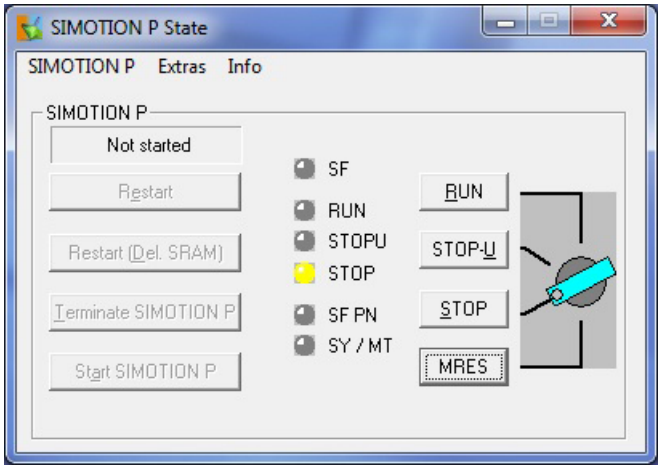


Figure 10-21 SIMOTION P State - status before the automatic restart

10.10 Deleting user data on the CFast card

Requirement

You can delete the user data with SIMOTION SCOUT. The SIMOTION P320-4 must be online. The user data in the RAM, the persistent data in the SRAM (except for the communication configuration), and the user data on the CFast card are deleted. You can thus continue to access the SIMOTION P320-4 with your PG/PC.

Procedure

To delete the user data:

1. In SIMOTION SCOUT, open the project you want to edit.
2. Go online with SIMOTION P320-4.
3. Select **Target system > Delete user data on card...**.

The data is deleted.

10.11 Switching off

Windows

To ensure the safe operation of the SIMOTION P320-4, Windows must be properly shut down before the SIMOTION P320-4 is switched off.

Note

Use the Windows start menu to correctly shut down the Windows system: **Start > Shut down**

If Windows is not shut down properly, the Windows installation may become damaged to the extent that it may no longer be possible to run the SIMOTION P320-4.

Note

Only applies to the SIMOTION P320-4 E

SIMOTION P320-4 E is delivered with deactivated EWF (Enhanced Write Filter).

After commissioning the SIMOTION P320-4 E, activate the EWF for drive C:, which ensures:

- An extended service life for the **internal** CFast card
- No data loss on the **internal** CFast card when switching the device off via the line side switch or through disconnection from the power supply

NOTICE
Do not protect external CFast cards with EWF
Drive D: - the **external** CFast card - must not be protected with EWF as otherwise the functionality of SIMOTION cannot be assured.

NOTICE
Threat of data loss
Always shut down SIMOTION correctly as otherwise there is a threat of data loss.

SIMOTION P320-4

If Windows is shut down properly, the SIMOTION P320-4 will also be shut down properly.

If the SIMOTION P320-4 is switched off before Windows is shut down correctly, the POWER FAIL functionality causes the following events to occur.

- SIMOTION P320-4 is stopped correctly
- The SIMOTION P retain variables are saved in the non-volatile memory of the SIMOTION P320-4.

When SIMOTION P320-4 powers up again, the backed-up user data will be available once more.

This means that the SIMOTION P320-4 is ready to run immediately without loss of data, provided that the Windows installation was not damaged by the switch-off.

Behavior with Shut down, Logoff or Restart

If a Windows Shutdown, Logoff or Restart is initiated although the SIMOTION P320-4 is still in the **Running** state, the SIMOTION P320-4 is terminated automatically.

With large projects, a black screen may be displayed in Windows with the message **Waiting for SIMOTION P – Please wait - SIMOTION P is terminating**.

The termination of the SIMOTION P Runtime can vary depending on the size of the project.

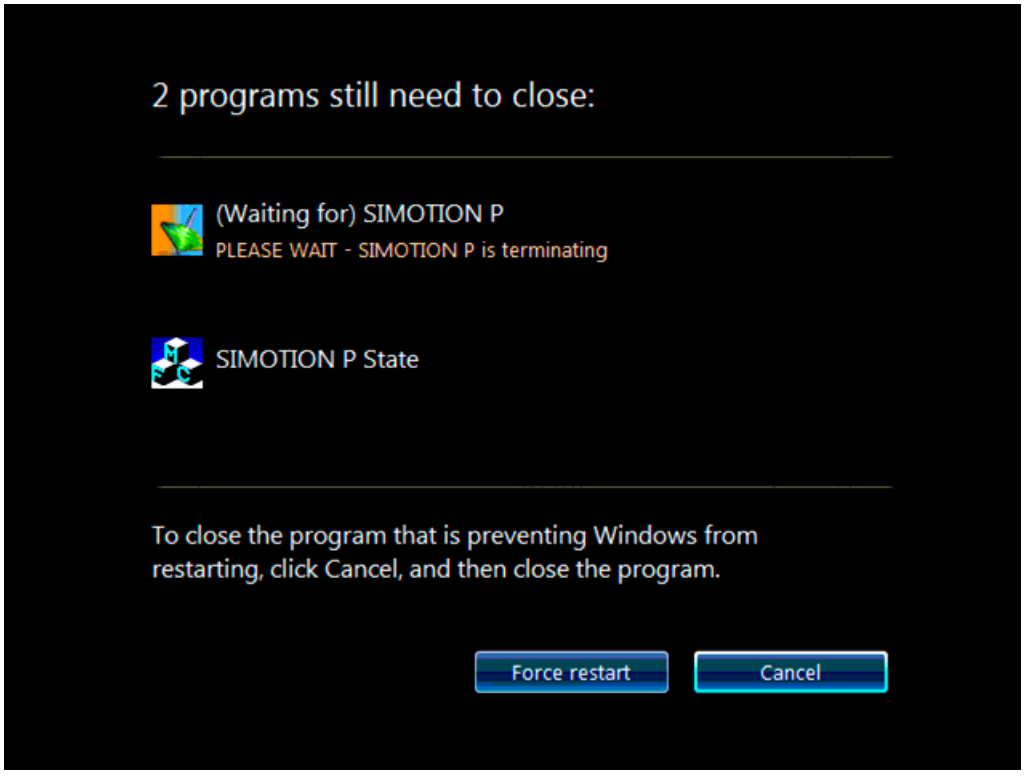


Figure 10-22 Black screen

Service and maintenance 11

11.1 Recording diagnostic data

Diagnostics data can be recorded during power-up and operation for the diagnostics and error analysis.

Saving diagnostic data during power-up

1. Terminate the SIMOTION P320-4 via the **Terminate SIMOTION P** button of the **SIMOTION P State** application.
2. Activate the diagnostics switch via the following option:
   SIMOTION P State, menu item **SIMOTION P > Set Diagnostic Switch**.
   The diagnostic data is recorded during power-up and the **SIMOTION P > Set Diagnostic Switch** switch automatically reset after writing the data.
3. After writing the diagnostic data, **SIMOTION P** must be terminated (RUN LED flashes continuously green).

Saving diagnostic data during operation

1. Make sure that the SIMOTION P320-4 has been started and powered up, e.g. with SIMOTION P State.
2. Activate the diagnostics switch via the following option:
   SIMOTION P State, menu item **SIMOTION P > Set Diagnostic Switch**

The diagnostic data is recorded during operation and the **SIMOTION P > Set Diagnostic Switch** switch automatically reset after writing the data.

Backing up diagnostic data

Following a fault on a SIMOTION device, diagnostic data (e.g. diagnostic buffer content, current content of website, etc.) can provide important information on the cause of the fault. The diagnostic data can be recorded during power-up or operation and backed up on the external CFast card by means of a simple operation as described below.

External CFast card

You can copy the backed-up data from the external CFast card.

Path: D:\USER\SIMOTION\HMI\SYSLOG\DIAG

SIMOTION IT / FTP

You can load the backed-up diagnostic data by means of SIMOTION IT or FTP:

You can find more detailed information at:

- SIMOTION IT Diagnostics and Configuration Diagnostics Manual
- SIMOTION online help

Evaluating diagnostic data

You can also use the diagnostic data for diagnostic purposes or forward it to Technical Support for evaluation purposes.

Further information

SIMOTION P State - menus (Page 131)

Diagnostics via LED displays (Page 207)

Single backups (Page 177)

11.2 Restoring factory settings

11.2.1 Overview of restoring the factory settings

Note

When the factory settings are reset/restored, licenses are retained.

11.2.2 Resetting the SIMOTION P320-4 to the delivery status

The **SIMOTION P State** application is used for this function.

Procedure

Proceed as follows to restore the delivery status of SIMOTION P320-4:

1. First, terminate SIMOTION P320-4 via the **Terminate SIMOTION P** button of the SIMOTION P State application.
2. Then select **Extras > Reset to factory default** in the menu.

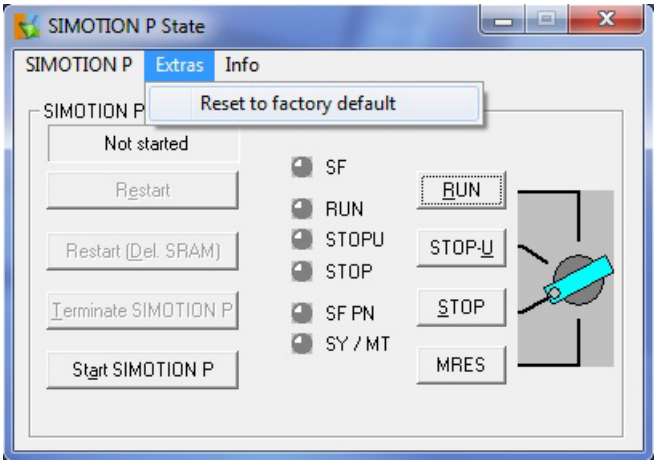


Figure 11-1 Restoring the delivery status

NOTICE
Note the consequences of user changes!
All data and settings for SIMOTION P320-4 changed by the user will be deleted!
The settings made using the **Station Configurator** will also be reset to the delivery status.

11.2.3 Reset SIMOTION P320-4 to the initial state

If an error occurred during parameter assignment, download, or when other settings were configured or if you are not sure whether you have specified all the information correctly, it may be useful or necessary to reset the SIMOTION P320-4 to its state prior to parameter assignment.

Requirements

You have saved an image of the memory medium on a remote computer/remote medium.

You can now use this image to reset the SIMOTION P320-4 to the factory settings. Note that the changes made on the SIMOTION P320-4 will be lost in the process.

NOTICE
Retain data Once the image has been loaded, the user may have to delete the retain data.

Procedure

Use the **Restart (Del. SRAM)** function from the SIMOTION P State application to reset.

Further information

Function elements (SIMOTION P State) (Page 130)

11.3 Upgrading runtime and firmware

As of the SIMOTION P320-4 Box, the current software version is always supplied. The previous version is available on the included restore DVD.

The upgrade to the latest hotfix (HF) can be performed via a setup.

Procedure

Possible types of upgrade:

- Upgrade with external DVD drive.
  First, the upgrade software must be copied to an external DVD or USB memory stick.
- Upgrade using a remote computer in the network (connect the SIMOTION P320-4 to the drive of the remote computer via the network)

Start the upgrade by calling the **Setup.exe** file.

See also

Further information on upgrading can be found in the following documentation:

- Updating SIMOTION devices
- SIMOTION online help

11.4 Installing/removing the back-up battery of the SIMOTION P320-4

11.4.1 Preventive maintenance

To maintain high system availability, we recommend the preventative exchange of those PC components that are subject to wear. The table below indicates the intervals for this exchange.

Component	Exchange interval:
CMOS backup battery	4 years

11.4.2 Replacing the backup battery

Note

The service life of the backup battery is approximately 5 - 8 years, depending on the environmental conditions.

To be noted before you replace the battery

NOTICE

Risk of damage!

The lithium battery may only be replaced with an identical battery or with a type recommended by the manufacturer (article number: A5E30314053)

⚠ WARNING

Risk of explosion and release of harmful substances!

Therefore, do not throw lithium batteries into an open fire, do not solder or open the cell body, do not short-circuit or reverse the polarity, do not heat to above 100° C, dispose of them in accordance with regulations, and protect them from direct exposure to sunlight, humidity, and condensation.

Note

A backup battery maintains the contents of the SRAM data on the SIMOTION P320-4 after the supply power is switched off.

Battery monitoring

The 3 V lithium battery to back up the SRAM and the clock module is monitored in two stages:

Table 11-1 Two-stage battery monitoring

Battery voltage	Message
2.7 V ± 0.1 V	Diagnostic buffer entry: Battery warning Battery warning threshold reached
2.25 V ± 0.25 V	Diagnostic buffer entry: Battery error Voltage below limit

In order to prevent data being lost, the battery should be replaced once the **Battery warning** entry appears in the diagnostics buffer or, at the very latest, the first time the **Battery error** entry appears in the diagnostics buffer.

Disposal

NOTICE
Dispose of batteries properly Batteries must be disposed of in accordance with local regulations.

Preparation

Note

The configuration data and contents of the SRAM in the device are buffered for at least 30 seconds when the battery is replaced.

Preparation – make a note of the BIOS settings

Note

Note specific BIOS setup settings if changes have been made.

Preparation – save SRAM data

As a result of replacing the battery (SRAM not backed up during this time), data loss may occur in the SRAM of the SIMOTION P320-4 if the battery replacement takes longer than 30 seconds.

1. To avoid a lengthy repeat of the commissioning procedure, ensure that a backup of the non-volatile data is available before changing the battery. This is performed, for example, automatically when Windows is shutdown correctly.
2. Shut down the SIMOTION PP320-4 or Windows correctly via:
   Windows taskbar: **Start > Shut down**
3. Isolate the device from the power supply and disconnect all connecting cables.

Note

If Windows was not shut down properly before backup battery replacement, loss of bit values in SRAM memory cells during battery replacement cannot be detected reliably.

SIMOTION P320-4 must then undergo an overall reset.

Tools

You will need a T10 screwdriver to open the battery compartment.

Replacing the battery

NOTICE
Switch off the device before replacing the battery The battery can also be exchanged when the device is operating. However, we recommend switching off the device beforehand.

NOTICE
Time setting is lost If the battery change takes longer than 30 seconds, the time setting is deleted. The time on the device is no longer synchronized. Time-controlled programs no longer run or they run at the wrong time. This can damage the system. Set the device time again.

Procedure

Steps for replacing the battery:

1. Open the battery compartment.



2. Remove the battery holder.
3. Unplug the battery connector.



4. Connect the battery plug to the new battery.
5. Remove the old battery from the holder.
6. Secure the new battery in the holder.
7. Close the battery compartment.

Reconfiguring the BIOS Setup

The battery change does not take longer than 30 seconds with the device switched off, the BIOS settings are retained.

The SRAM and CMOS data of the SIMOTION P320-4 is certainly deleted only when the battery is disconnected for a longer period of time (more than 15 minutes) and in the switched-off state.

The BIOS Setup must be performed again if the data has been cleared. The CMOS data must be restored to the default values; the date, time, and any special settings must be set again.

Note

Exception:

If the CMOS data has been saved previously with a USER profile, only the date and the time may be set again. All other settings will be made automatically. This means that the default values may **not** be loaded in this special case.

11.5 Special power-up situations

11.5.1 Special startup situations overview

The special power-up situations are described in the following:

- Non-volatile data and SRAM handling (Page 203)
- After new installation / update of the SIMOTION P Kernel (Page 205)
- After importing a backup copy (Page 205)
- After a power failure/POWER FAIL (Page 205)

Requirements

You are familiar with the user storage concept of the non-volatile data on the SIMOTION P320-4.

11.5.2 Non-volatile data and SRAM handling

Non-volatile data, also called retain data, is retained when SIMOTION P320-4 suffers a power failure. The data is buffered with the battery in the static memory area (SRAM) on the SIMOTION P320-4.

SRAM handling

If the serial number of the SIMOTION P320-4 is known:

The serial number of the SIMOTION P320-4 corresponds to the one that was last saved on the SIMOTION P320-4.

SRAM image (storage medium) or SRAM backup (storage medium) is **OK**, if:

- The SIMOTION software release of the SRAM image/backup matches the installed software release.
- Windows has been shut down properly (the POWER FAIL mechanism of SIMOTION P does not suffice here).
- The checksum test on the SRAM image/backup was successful.
- The battery status was good when the SRAM image was backed up.

Table 11-2 SRAM handling if the serial number is known

SRAM "OK"?	SRAM image (storage medium) "OK"?	SRAM backup (storage medium) "OK"?	User data used	Note
Yes	Not applicable	Not applicable	Board [1)]	Normal statup
No	Yes	Not applicable	IMAGE [2)]	No message box or alarms

SRAM "OK"?	SRAM image (storage medium) "OK"?	SRAM backup (storage medium) "OK"?	User data used	Note
No	No	Yes	BACKUP [3]	No message box or alarms
No	No	No	Overall reset	Required

[1] The user data backed up in the SRAM of the SIMOTION P320-4 is used.

[2] The user data backed up in the SRAM image on the storage medium of the SIMOTION P320-4 is used.

[3] The user data backed up in the SRAM backup on the storage medium of the SIMOTION P320-4 is used.

If the serial number of the SIMOTION P320-4 is not known:

The serial number of the SIMOTION P320-4 does not correspond to the one that was last saved on the SIMOTION P320-4, for example, after the replacement of the SIMOTION P320-4.

SRAM image (storage medium) or SRAM backup (storage medium) is **OK**, if:

- The SIMOTION software release of the SRAM image/backup matches the installed software release.
- Windows has been shut down properly (the POWER FAIL mechanism of SIMOTION P does not suffice here).
- The checksum test on the SRAM image/backup was successful.
- The battery status was good when the SRAM image was backed up.

Table 11-3 SRAM handling if the serial number is unknown

SRAM "OK"?	SRAM image (storage medium) "OK"?	SRAM backup (storage medium) "OK"?	User data used	Note
Yes	Yes	Not applicable	Board [1] or IMAGE [2]	Query made
Yes	No	Yes	Board [1] or BACK-UP [3]	Query made
Yes	No	No	Board [1]	No message box
No	Yes	Not applicable	IMAGE [2]	No message box
No	No	Yes	BACKUP [3]	No message box or alarms
No	No	No	Overall reset	Required

[1] The user data backed up in the SRAM of the SIMOTION P320-4 is used.

[2] The user data backed up in the SRAM image on the storage medium of the SIMOTION P320-4 is used.

[3] The user data backed up in the SRAM backup on the storage medium of the SIMOTION P320-4 is used.

11.5.3 After new installation / update of the SIMOTION P Kernel

If a compatible SIMOTION P Kernel is installed on an already commissioned SIMOTION P320-4, the user data backed up in the SRAM is retained.

However, the current software version of the SIMOTION PP320-4 must be identical to the software version with which the backed-up user data of the SRAM was created.

Now SIMOTION P320-4 is immediately ready to run again.

Note

If you do not want the backed up user data to be used again, you will have to recommission the SIMOTION P320-4.

Note

Restart of SIMOTION P320-4 required

After a new installation or update of the SIMOTION P Kernel, a restart of the SIMOTION P320-4 is generally required.

If the device is not restarted, the new SIMOTION P Kernel is not activated and you continue to work with the old firmware.

11.5.4 After restoring a backup copy

If a backup copy (storage medium image) of a commissioned SIMOTION P320-4 is reloaded, the backed-up user data stored in the SRAM of the SIMOTION P320-4 is used.

Now SIMOTION P320-4 is immediately ready to run again.

11.5.5 After a power failure/POWER FAIL

Case 1: SRAM saved

In the event of a power failure, the POWER FAIL detection feature integrated in the SIMOTION P320-4 will automatically cause the SIMOTION P firmware to save the user data in the SRAM of the SIMOTION P320-4. An SRAM image, however, cannot be created any more in this case.

When the power supply returns or when the system is booted again, the data is available again.

Now SIMOTION P320-4 is immediately ready to run again.

Note

Backup of the user data in the SRAM of the SIMOTION P320-4 in case of power failure is only guaranteed if the SIMOTION P320-4 is operated within its defined specifications.

Case 2: SRAM not saved

If the hardware of the SIMOTION P320-4 was operated outside of the defined specifications, the user data might not have been backed up in the SRAM of the SIMOTION P320-4 under certain circumstances.

Alarm, error and system messages

12

12.1 Diagnosis using the LEDs

Each LED can assume various states, such as ON, OFF, flashing. The status of the respective LED indicates the current status of the device.

Table 12-1 Diagnostics LEDs of the SIMOTION P320-4

LED display		Meaning	Meaning
SF	Red	**System fault**	This LED indicates that a fault has occurred on SIMOTION P320-4.
LED	On		An interrupt which can be acknowledged is present (alarm, message, note). (See Diagnostics Guide)
LED flashing	0.5 Hz		No license exists for technology/optional objects under license. Licensing must be performed to correct the fault, see License tab.
	5 Hz		FAULT state SIMOTION software does not run in the FAULT state (all LEDs flash simultaneously).
LED	Off		SIMOTION P320-4 works error-free.
RUN	Green	**SIMOTION P in RUN mode**	This LED indicates the state of the user program.
LED	On		The user program is running.
LED flashing	2 Hz		When the **RUN** operating state is selected, the LED will flash until the operating state is actually attained.
	5 Hz		FAULT state SIMOTION software does not run in the FAULT state (all LEDs flash simultaneously).
STOPU	Yellow	**SIMOTION P in the STOP user program**	This LED indicates that the technology packages are active. No user program is being executed.
LED flashing	2 Hz		When the **STOPU** operating state is selected, the LED will flash until the operating state is actually attained.
	5 Hz		FAULT state SIMOTION software does not run in the FAULT state (all LEDs flash simultaneously).
STOP	Yellow	**SIMOTION P in STOP mode**	This LED indicates that no user program is running.
LED	On		The technology packages are not active.
LED flashing	0.5 Hz		An overall reset request is indicated by slow flashing, see Overall reset with the mode selector (on the screen) (Page 186).
	2 Hz		When the **STOP** operating state is selected, the LED will flash until the operating state is actually attained.
	5 Hz		FAULT state SIMOTION software does not run in the FAULT state (all LEDs flash simultaneously).

LED display		Meaning	Meaning
SF PN		**PROFINET bus error**	
LED	Red		This LED indicates a fault at the PROFINET interface.
LED	Off		PROFINET onboard interface is operating without error; the data exchange to all configured I/O devices is running.
LED	On		Bus fault
LED flashes	2 Hz		Failure of a connected I/O device. At least one of the assigned I/O devices cannot be addressed. Configuring error.
	5 Hz		FAULT state SIMOTION software does not run in the FAULT state (all LEDs flash simultaneously).
SY/MT		**Sync of PROFINET interface**	
LED	Yellow		This LED indicates whether the PROFINET interface has been synchronized.
LED	Off		The PROFINET interface has not yet synchronized with the send cycle clock of PROFINET IO with IRT, or PROFINET IO with IRT has not been configured.
LED	On		The PROFINET interface has synchronized to the send cycle clock of PROFINET IO with IRT.
LED flashes	2 Hz		A PROFINET firmware download is in progress.
	5 Hz		FAULT state SIMOTION software does not run in the FAULT state (all LEDs flash simultaneously).
BUS1F **BUS2F**	X101 X102	**Status of IsoPROFIBUS interface**	
LED	Red		If this LED is red, it indicates a fault at the IsoPROFIBUS interface.
LED	On		Bus fault Parameter assignment error
LED	Green		If this LED is green, it indicates the bus status of the IsoPROFIBUS interface.
LED	On		Cyclic data exchange
LED flashes	2 Hz		Bus status "Clear"
	5 Hz		FAULT state SIMOTION software does not run in the FAULT state (all LEDs flash simultaneously).
LED	Off		No fault or no interface configured.

LED combinations

STOP

When the user program reaches a breakpoint, SIMOTION P320-4 then assumes the **HALT** state.
A LED display indicates this state. The **HALT** state is also left when the breakpoint is left.

Table 12-2 LED combinations

LED	SF	RUN	STOPU	STOP	SF PN	SY/MT	BUSF1	BUSF2
STOP	x	0.5	1	1	x	x	x	x

x Not applicable
0.5 Flashes with a frequency of 0.5 Hz.
1 ON

DCP flashing

The DCP flashing function checks the correct assignment of a module and its interfaces.

The DCP flashing function is accessed via:

- Accessible nodes
- HW Config
- NetPro

Start the **Accessible nodes** function in SIMOTION SCOUT . Select a device and "Flashing" or "Stop flashing" is selected via the context menu.

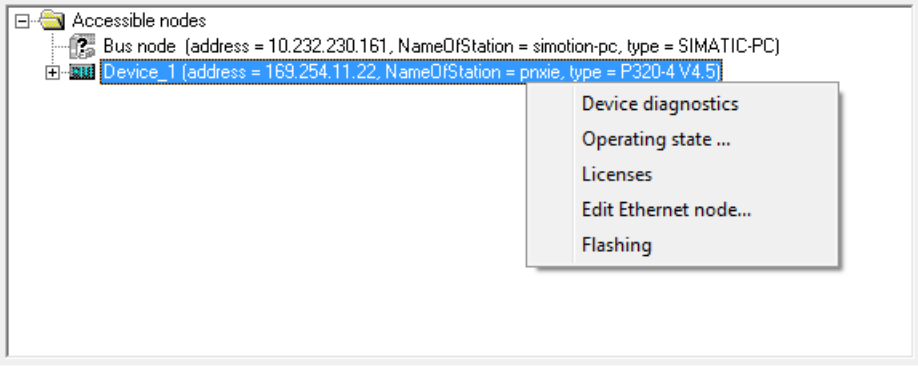


Figure 12-1 Accessible nodes

Alternatively, you can also activate the DCP flashing function in **HW Config** or in **NetPro** under the following path:

Target system > Ethernet > Edit Ethernet node... via the **Browse...** button, in the **Search Network** dialog box via the **Flashing** button of STEP 7.

The LED combination flashes as long as the dialog box is open and the **Flashing** function has not been deactivated.

If the dialog box is closed without deactivating the **Flashing** function, the previous state of the LED becomes active again.

Table 12-3 LED combinations

LED	SF	RUN	STOPU	STOP	SF PN	SY/MT	BUSF1	BUSF2
DCP flashing	x	2 (green/yel-low)	x	x	x	x	x	x

x Not applicable
1 ON
2 Flashes with a frequency of 2 Hz.

Note

You can carry out a detailed diagnosis using a PG/PC and the Engineering System.

FAULT

A fault has occurred to which the user program cannot respond.

The following actions may be required to rectify the fault:

- Power OFF/ON
- Recommissioning

Table 12-4 LED combinations

LED	SF	RUN	STOPU	STOP	SF PN	SY/MT	BUSF1	BUSF2
FAULT	5 (red)	5 (red)	5 (red)	5 (red)	5 (red)	5 (red)	5 (red)	5 (red)

5 Flashes with a frequency of 5 Hz.

12.2 Temperature alarm

For SIMOTION P320-4, two different temperatures are monitored in the device as regard to whether they reach their respective threshold value.

System variables

_cpudata.temperature

_cpudata.moduletemperature

Error response

An I/O alarm is activated.

Cause of error / troubleshooting

One of the two monitored temperatures has reached or exceeded its threshold.
The temperature must fall below the threshold value before the alarm is reset.

If the temperature alarm is issued, the user and/or the machine manufacturer (user program) must decide whether or not processing should be interrupted and SIMOTION P320-4 exited and switched off.

The user can program a customized response to this and allow the program to continue, if appropriate.

The default response is for the operating mode to switch to **STOP**.

Note

Further information on programming alarm responses can be found in the SIMOTION Runtime Basic Functions Function Manual.

12.3 Battery alarm

When the critical battery status is reached, the battery must be replaced as quickly as possible. Because the SIMOTION P320-4 often cannot be shut down at short notice during operation, it is important to perform a programmable response to this battery state.

For this case, the system variable

- persistentdatapowermonitoring.warningbatteryvoltagelevel1

can be used to catch the complete loss of the retain data if the battery cannot be replaced fast enough.

Users should periodically save their retain data (e.g. with the _savePersistentMemoryData function). This ensures that the operating state established after the next start up represents the most current status of the retain data possible.

⚠ WARNING

System variable persistentDataPowerMonitoring

If no response to this system variable has been programmed, there is the danger of the complete loss of retain data if a power failure occurs before the battery can be replaced.

In this case, only the retain data for the last back up, normally the last shut down of the SIMOTION P320-4, is available after the next power-up.

12.4 Power failure / POWER FAIL

In the event of a power failure, the consequences described below must be considered separately.

SIMOTION P Runtime

If a power failure occurs, the POWER FAIL functionality of the SIMOTION P Runtime will perform the following steps:

- SIMOTION P Runtime is shut down correctly
- The user data marked as retain is saved in the non-volatile memory of the SIMOTION P320-4

The backed-up user data is available again at the next power-up of the SIMOTION P Runtime. SIMOTION P Runtime is therefore ready for operation again without any data loss.

Note

Backup of the user data in the SRAM of the SIMOTION P320-4 in case of power failure is only guaranteed if the SIMOTION P320-4 is operated within its defined specifications.

The message **POWER FAIL** is displayed if the supply voltage for SIMOTION P320-4 falls below 20.4 V. In this case, check the voltages in the external power supply:

1. Check if the input voltage (mains voltage) for the external power supply has the rated value.
2. If so, check the output voltage of the external power supply. If the voltage is not within the limits for the supply voltage of the SIMOTION P320-4 (19.2 … 28.8 VDC), then change the external power supply.

Windows

If the SIMOTION P320-4 is shut down during operation, the Windows installation may be damaged.

The consistency of Windows applications cannot be guaranteed during a power failure.

In these cases, we strongly recommend use of an EWF or a UPS system.

NOTICE
Do not protect external CFast cards with EWF Drive D: - the **external** CFast card - must not be protected with EWF as otherwise the functionality of SIMOTION cannot be assured.

Note

Only applies to the SIMOTION P320-4 E

SIMOTION P320-E is delivered with deactivated EWF (Enhanced Write Filter).

After the device is commissioned, activate the EWF for drive C: because this ensures:

- An extended service life for the **internal** CFast card
- No data loss on the **internal** CFast card when switching the device off via the line side switch or through disconnection from the power supply

NOTICE

Data loss on the external CFast card

Always shut down SIMOTION correctly as otherwise there is a threat of data loss on the **external** CFast card.

See also Section: Switching off (Page 191).

12.5 PROFINET bus error occurs

The flashing red **SF PN** LED on the SIMOTION P320-4 indicates a problem of an I/O device on the bus or a configuring error.

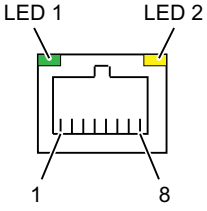
Information about further display modes of the LED can be found under SIMOTION P State application > LED display (Page 128).

Error causes with flashing

- Failure of a connected I/O device
- At least one of the assigned I/O devices cannot be addressed
- Incorrect or no configuration.

PROFINET (LAN) X3 Port P1, P2, P3

The two LEDs on the respective PROFINET ports also provide information on the current connection status:

PROFINET interface		
		
LED 1	On	Lights up green: Link
	Off	No physical connection available. Troubleshooting: Check for loose connector, defective cable, etc.
LED 2	On	Lights up yellow: Activity
	Off	No logical connection, i.e. no Ethernet telegrams are exchanged. Troubleshooting: Check IP configurations, parameterize required router, etc.

12.6 Under-licensing

Error

The red system error LED (**SF**) flashes at 0.5 Hz.

Cause

No license exists for technology/optional objects under license.

Licensing must be performed to correct the error.

Note

Further information for the licensing of technology/option objects can be found in the SIMOTION SCOUT Configuration Manual.

12.7 Boot error messages

During power-up (the boot process), the BIOS first performs a **P**ower **O**n **S**elf **T**est (POST) and checks as to whether certain functional units of the PC are operating correctly. The boot sequence is immediately interrupted if critical errors occur.

If the POST does not return an error, the BIOS initializes and tests further functional units. In this startup phase, the graphics controller is initialized and any error messages are output to the screen.

The following lists the error messages from the system BIOS. For information on error messages output by the operating system or programs, refer to the corresponding manuals.

Error messages on the screen

Error message on the screen	Meaning / suggestions
Operating system not found	Possible causes: • No operating system present • Incorrect active boot partition • Wrong drive settings in SETUP

Troubleshooting/FAQs

13

13.1 Error correction

This section provides you with tips on how to locate and troubleshoot common problems.

FAQs / error correction	Possible cause	Possible remedy
The device is not operational.	There is no power supply to the device.	• Check whether the 24 VDC power supply is connected. See SIMOTION P320-4 E / P320-4 S Manual, Section Connecting the power supply (24 VDC). • Check whether the line side switch is activated. See SIMOTION P320-4 E / P320-4 S Manual, Section Operator controls.
SIMOTION P does not start after connecting the CFast card.	BIOS settings are not set to Hotplug Enabled.	You can find out how to check and correct the BIOS settings in Section Hotplug Enabled BIOS settings (Page 221).
SIMOTION P does not start after a reboot.	The user is not logged in automatically.	Set the password for the AutoLogin (Automatically Log On). See Section SIMOTION P AutoLogin (Page 94).
The monitor remains dark.	The monitor is switched off.	Switch on the monitor.
	The monitor is in "power-save" mode.	Press any key on the connected keyboard.
	The brightness button has been set to dark.	Set the monitor brightness button to obtain more light. For detailed information, refer to the monitor operating instructions.
	The power cord or the monitor cable is not connected.	• Check whether the power cord has been properly connected to the monitor and to the system unit or to the grounded shockproof outlet. • Check whether the monitor cable has been properly connected to the system unit and to the monitor.
		If the monitor screen still remains dark after you have performed these checks, please contact your technical support team.
The mouse pointer does not appear on the screen.	The mouse driver is not loaded.	Check whether the mouse driver is properly installed and present when you start the application program. For more detailed information on the mouse driver, refer to the documentation for the mouse or application programs.
	The mouse is not connected.	Check whether the mouse is properly connected to the system unit. If you use an adapter or extension on the mouse cable, also check the connectors.
		If the cursor still does not appear on the screen after you have performed these checks and measures, please contact your technical support team.

FAQs / error correction	Possible cause	Possible remedy
Error message on the screen: Operating system not found	• No operating system present. • Incorrect active boot partition. • Incorrect drive entries in the SETUP.	Check whether one of the specified causes is present:
Wrong time and/or date on the PC.	-	• Press <ESC> during the boot sequence to open BIOS Setup. Detailed information on the BIOS setup can be found in the section Starting Bios settings Hotplug Enabled - BIOS Setup (Page 221). • Set the time and date in the setup menu.
Although the BIOS setting is OK, the time and date are still wrong.	The backup battery is empty.	Replace the backup battery. See Section Service and maintenances > Replacing the back-up battery (Page 198). If the problem cannot be resolved by replacing the battery, then contact your technical support team.
UPS does not function.	The operating system does not have a suitable driver for the UPS.	Install a suitable driver; the correct driver can often be downloaded from the homepage of the device's manufacturer. See also Section Customer-specific software (Page 125).
IP address assigned twice (e.g. through series commissioning).	Default IP address for Windows See Default IP addresses for Windows and SIMOTION P (Page 153).	Assign a new IP address for Windows. The IP address must be different to the previous specified IP address and must not have been assigned already in the network.
The display in the BIOS for the PROFINET MAC address is incorrect (00:00:00:00:00:00).	-	The correct MAC addresses can be taken from the rating plate on the housing. See also Manual SIMOTION P320-4 E / P320-4 S Manual, Section Device identification data, MAC addresses.

13.2 Hotplug Enabled BIOS settings

Starting the BIOS setup

Proceed as follows:

1. Reset the SIMOTION P320-4 (warm or cold restart).
   Depending on the device version, the default settings may differ from the following figures.
2. After completing the startup test, you can start the program setup with BIOS.
   The following message is shown on the display:



Figure 13-1 SIEMENS Press Esc boot options

Press **Esc**.

3. After booting, the BIOS selection menu is displayed:



Figure 13-2 BIOS selection menu

4. The following buttons are available in the BIOS selection menu:

Button	Function
Continue	Exit BIOS menu, continue with the startup process
Boot Manager	Selection of the boot drive
Boot From File	Starting from a .EFI file
SCU	Device configurator (Setup Configuration Utility)
BIOS Update	BIOS update from USB stick
MEBx	Start the Intel Management Engine BIOS Extension

5. Select the **SCU** device configurator.

6. In the BIOS window, select the **Advanced** tab using the arrow keys and then select **IDE Configuration**.
   Press Enter to confirm the selection.

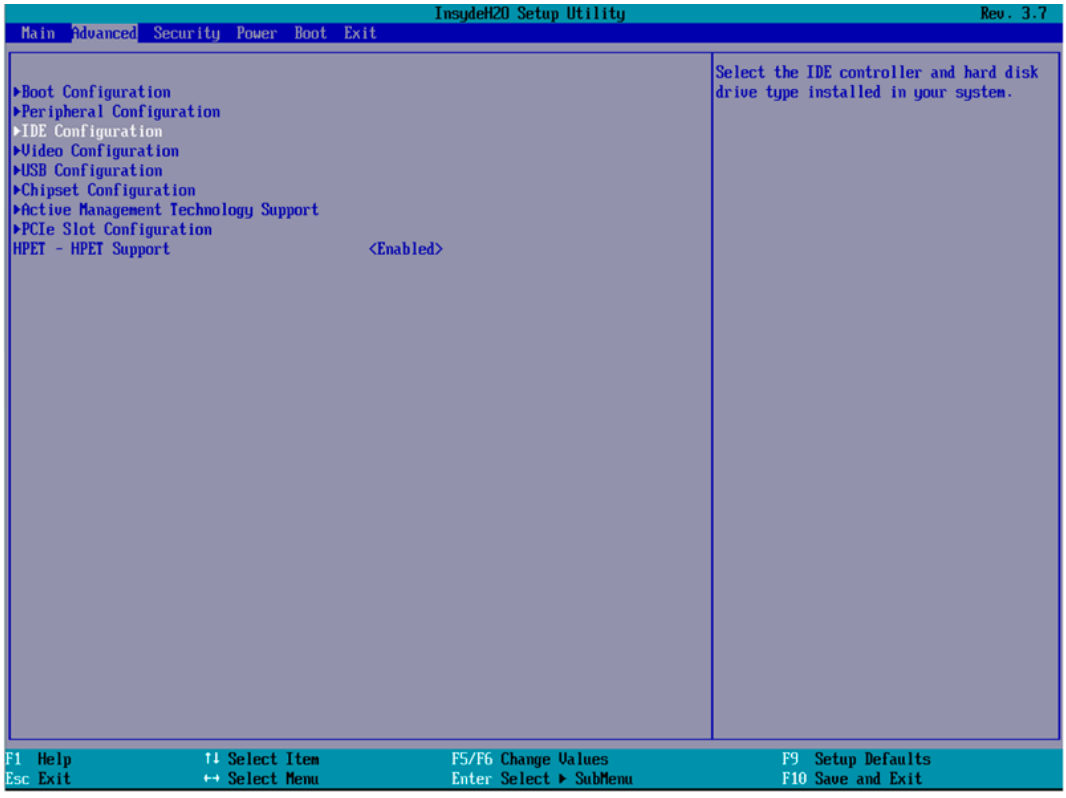


Figure 13-3 Advanced > IDE configuration

7. In the **IDE Configuration** window, select **SATA Port 2 HotPlug**.

8. Change the **Disabled** selection shown here to **Enabled**.

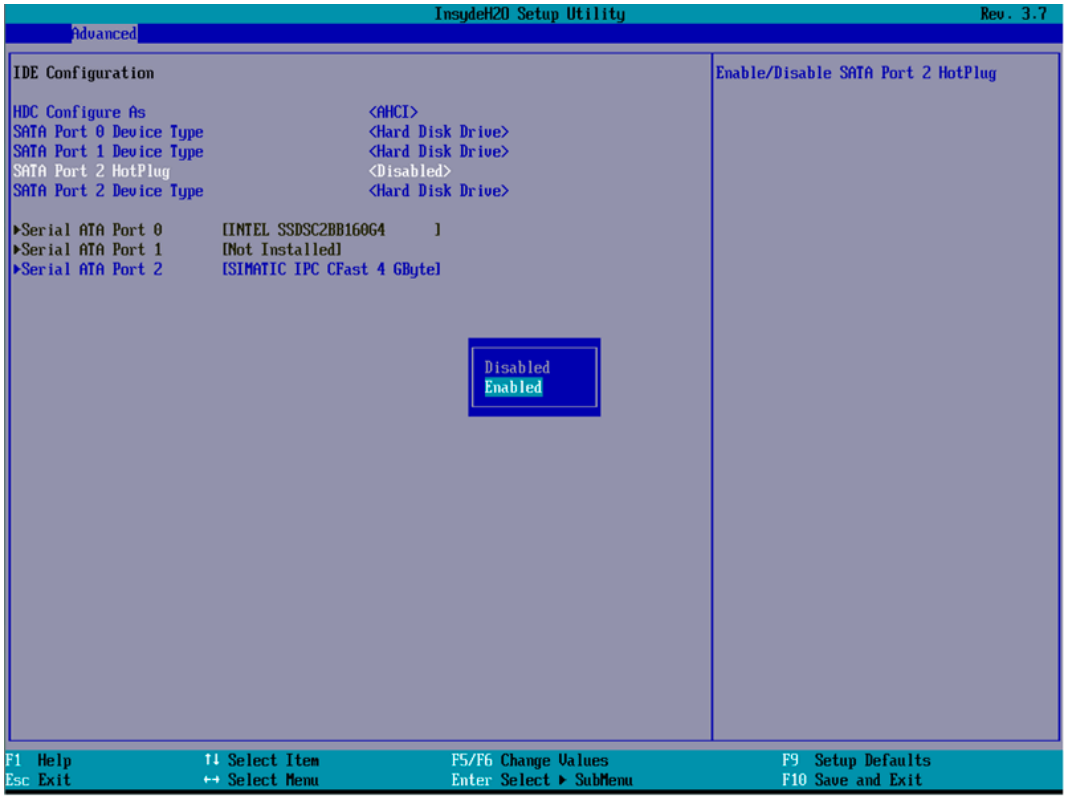


Figure 13-4 IDE Configuration > SATA Port 2 HotPlug

9. Press **F10** Save and Exit. The new entries are accepted.
10. Confirm the subsequent prompt to save the settings and exit the BIOS setup with **Yes**.

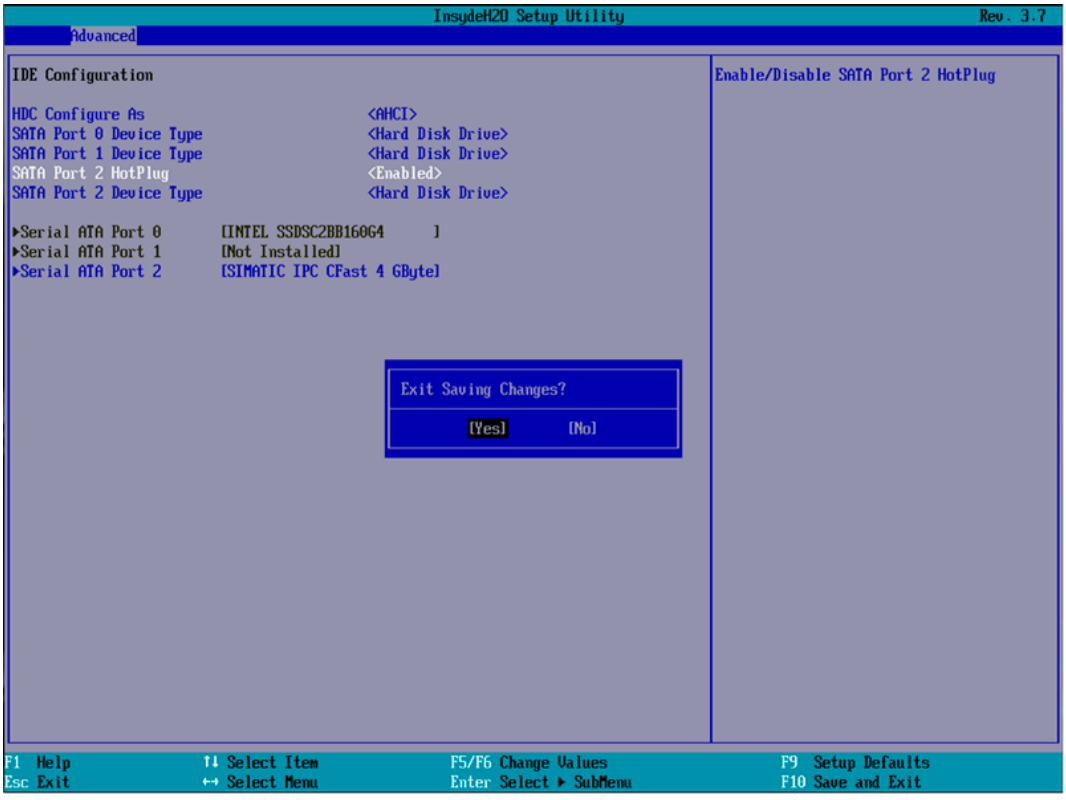


Figure 13-5 Confirming SATA Port 2 HotPlug > Enabled

Standards and approvals

A

A.1 General rules

CE marking

CE	Our products satisfy the requirements and protection objectives of the EC Directives and comply with the harmonized European standards (EN).

Electromagnetic compatibility

Standards for EMC are satisfied if the EMC Installation Guideline is observed.

SIMOTION products are designed for industrial use in accordance with product standard DIN EN 61800-3, Category C2.

cULus approval

c UL us	Listed component mark for United States and the Canada Underwriters Laboratories (UL) according to Standard UL 508, File E164110, File E115352, File E85972.

You can find further information on the respective device on the Internet at http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm Enter the first seven characters of the article number at **Keyword**. Then click **Search**.

Korea certification

KC	KC registration number: KCC-REM-S49-SIMOTION Note that this device complies with limit class A with regard to the emission of radio frequency interference. This device can be used in all areas except residential areas. 이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

Declaration of conformity

The current Declaration of conformity is available on the Internet at Declaration of conformity (http://support.automation.siemens.com/WW/view/en/10805446/134200).

ESD guidelines

B

B.1 ESD definition

What does ESD mean?

Electrostatic sensitive devices (ESDs) are individual components, integrated circuits, modules or devices that may be damaged by either electrostatic fields or electrostatic discharge.



NOTICE

Damage caused by electric fields or electrostatic discharge

Electric fields or electrostatic discharge can result in malfunctions as a result of damaged individual parts, integrated circuits, modules or devices.

- Only pack, store, transport and send electronic components, modules or devices in their original packaging or in other suitable materials, e.g conductive foam rubber or aluminum foil.
- Only touch components, modules and devices if you are first grounded by applying one of the following measures:
  - Wearing an ESD wrist strap
  - Wearing ESD shoes or ESD grounding straps in ESD areas with conductive flooring
- Only place electronic components, modules or devices on conductive surfaces (table with ESD surface, conductive ESD foam, ESD packaging, ESD transport container).

B.2 Electrostatic charging of individuals

Any person who is not conductively connected to the electrical potential of the environment can accumulate an electrostatic charge.

This figure indicates the maximum electrostatic charges that can accumulate on an operator when he comes into contact with the indicated materials. These values comply with the specifications in IEC 801-2.

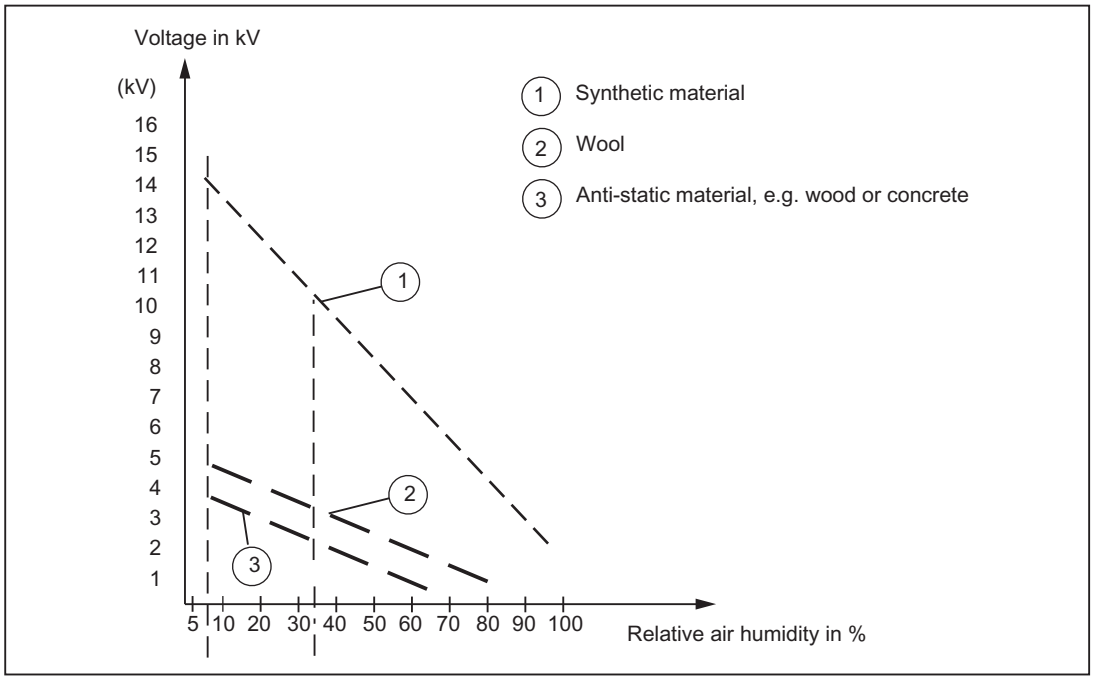


Figure B-1 Electrostatic voltage that can accumulate on operating personnel

B.3 Basic measures for protection against discharge of static electricity

Ensure sufficient grounding

When working with electrostatic sensitive devices, make sure that the you, your workstation, and the packaging are properly grounded. This prevents the accumulation of static electricity.

Avoid direct contact

You should only touch ESD components if unavoidable (for example, during maintenance work). When you touch modules, make sure that you do not touch either the pins on the modules or the printed conductors. If you follow these instructions, electrostatic discharge cannot reach or damage sensitive components.

If you have to take measurements on a module, make sure that you first discharge any static that may have accumulated in your body. To do this, touch a grounded metal object. Only use grounded measuring instruments.

List of abbreviations

C

C.1 Commissioning Manual, Abbreviations

Abbreviation	Term	Meaning
CE	Communauté Européenne (CE-Symbol)	The product is in conformance with all applicable EC directives.
CMOS	Complementary Metal Oxide Semiconductor	Complementary metal oxide semiconductors
COM	Communications Port	Term for the serial interface
CPU	Central Processing Unit	CPU
CRT	Cathode Ray Tube	-
CSA	Canadian Standards Association	Canadian organization for tests and certifications according to own or binational standards (with UL / USA) standards
CTS	Clear To Send	Clear to send
DRAM	Dynamic Random Access Memory	Dynamic RAM
DC	Direct Current	DC current
DMA	Direct Memory Access	Direct memory access
DP	Distributed I/O	-
DQS	Deutsche Gesellschaft zur Zertifizierung von Management-Systemen	-
DSR	Data Set Ready	Ready for operation
DTR	Data Terminal Ready	Data terminal is ready
DVI-I	Digital Visual Interface	Digital display interface with digital and VGA signals
ESD	Components sensitive to electrostatic charge	-
EN	European standard	-
EWF	Enhanced Write Filter	Configurable write filter (SIMOTION P320-4 E)
FAQ	Frequently Asked Questions	FAQs
GND	Ground	Chassis ground
HMI	Human Machine Interface	User interface
HW	Hardware	-
I/O	Input/Output	Data input/output on computers
IEC	International Electronical Commission	-
IP	Ingress Protection	Degree of protection
IRQ	Interrupt Request	Interrupt request
LAN	Local Area Network	Computer network that is limited to a local area.
LCD	Liquid Crystal Display	Liquid crystal display
LED	Light Emmitting Diode	Light emitting diode
MUI	Multilanguage User Interface	Language localization in Windows
NC	Not Connected	Not connected
OPC	OLE for Process Control	Standardized interface for industrial processes

Abbreviation	Term	Meaning
PC	Personal Computer	-
PCI	Peripheral Component Interconnect	High-speed expansion bus
PE	Protective Earth	Protective conductor
PG	Programming device	-
POST	Power On Self Test	-
RAL	Restricted Access Location	Installation of device in operating facilities with restricted access, for example, a locked switchgear cabinet
RAM	Random Access Memory	RAM
ROM	Read-Only Memory	-
RTS	Reliable Transfer Service	Request to send
RxD	Receive Data	Data transfer signal
SDRAM	Synchronous DRAM	-
SELV	Safety Extra Low Voltage	Safety extra low voltage
SRAM	Static Random Access Memory	Static RAM
SVP	Serial No. of the device	-
SW	Software	-
TFT	Thin-Film-Transistor	Type of LCD flat-screen
TxD	Transmit Data	Data transfer signal
UL	Underwriters Laboratories Inc.	US organization for tests and certifications according to own or binational standards (with CSA / Canada) standards
UMA	Unified Memory Architecture	Video memory
USB	Universal Serial Bus	-
UPS	Uninterruptible power supply	-
VCC	-	Positive supply voltage of integrated circuits
VDE	Verein deutscher Elektrotechniker (Union of German Electrical Engineers)	-
VGA	Video Graphics Array	Video adapter which meets industrial standard
WD	Watchdog	Program monitoring with error detection and alarming.

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SIEMENS

SIMOTION

SIMOTION P320-4 E / P320-4 S

Manual

Valid as of version V4.5

11/2016

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Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER
indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING
indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION
indicates that minor personal injury can result if proper precautions are not taken.

NOTICE
indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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℗ 10/2016 Subject to change

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Preface

Preface

This document is part of the **SIMOTION P documentation package**.

This documentation describes the SIMOTION P320-4 hardware platform which can be delivered in the SIMOTION P320-4 E and SIMOTION P320-4 S hardware versions:

- SIMOTION P320-4 E with the Windows Embedded Standard 7 32-bit operating system and real-time expansion for SIMOTION.
  Successor to SIMOTION P320-3.
- SIMOTION P320-4 E with the Windows 7 Ultimate 32-bit operating system and real-time expansion for SIMOTION.
  Successor to SIMOTION P350-3.

References

The following documents contain the descriptions for the SIMOTION P hardware platform:

- SIMOTION P320-4 E / P320-4 S, Manual, Edition 11/2016
- SIMOTION P320-4 E / P320-4 S, Commissioning and Hardware Installation Manual, Edition 11/2016

Validity range

This manual applies to the SIMOTION P320-4 E and SIMOTION P320-4 S devices as of product level SIMOTION V4.5.

Standards

The SIMOTION system was developed in accordance with ISO 9001 quality guidelines.

Chapters in this documentation

The following sections describe the purpose and the use of this documentation:

- Safety instructions
  Contains fundamental safety instructions for SIMOTION and specific safety instructions for SIMOTION P320-4.
- Description
  System overview and product description for SIMOTION P320-4. The communication versions are also described.
- Use planning
  Points to note in advance: upon delivery, the permitted installation positions, environmental and ambient conditions and electromagnetic compatibility.

- Interfaces
  Description of the interfaces and operator control and display elements for SIMOTION P320-4.
- Installation/mounting
  An overview of the installation of the SIMOTION P320-4 taking into account the mounting positions.
- Connecting
  This section provides general information and important notes that you must observe when connecting the SIMOTION P320-4.
- Troubleshooting/FAQs
  List of possible errors and their remedies.
- Technical specifications
  This section contains an overview of the technical data, which is listed in detail for the individual components.
- Dimension drawings
  In this section you can find dimension drawings and dimensions of the SIMOTION P320-4.
- Spare parts
  You can find information about the spare parts for the SIMOTION P320-4 here.
- Appendix
  In addition to the safety information, the annexes also contain information about the standards, approvals and EGB guideline.
- Index
  Alphabetical directory for locating information.

SIMOTION Documentation

An overview of the SIMOTION documentation can be found in the SIMOTION Documentation Overview document.

This documentation is included as electronic documentation in the scope of delivery of SIMOTION SCOUT. It comprises ten documentation packages.

The following documentation packages are available for SIMOTION V4.5:

- SIMOTION Engineering System Handling
- SIMOTION System and Function Descriptions
- SIMOTION Service and Diagnostics
- SIMOTION IT
- SIMOTION Programming
- SIMOTION Programming - References
- SIMOTION C
- SIMOTION P

- SIMOTION D
- SIMOTION Supplementary Documentation

Hotline and Internet addresses

SIMOTION at a glance

We have compiled an overview page from our range of information about SIMOTION with the most important information on frequently asked topics - which can be opened with only one click.

Whether beginner or experienced SIMOTION user – the most important downloads, manuals, tutorials, FAQs, application examples, etc. can be found at

https://support.industry.siemens.com/cs/ww/en/view/109480700

Additional information

Click the following link to find information on the following topics:

- Documentation overview
- Additional links to download documents
- Using documentation online (find and search manuals/information)

https://support.industry.siemens.com/cs/ww/en/view/109479653

My Documentation Manager

Click the following link for information on how to compile documentation individually on the basis of Siemens content and how to adapt it for the purpose of your own machine documentation:

https://support.industry.siemens.com/My/ww/en/documentation

Training

Click the following link for information on SITRAIN - Siemens training courses for automation products, systems and solutions:

http://www.siemens.com/sitrain

FAQs

Frequently Asked Questions can be found in SIMOTION Utilities & Applications, which are included in the scope of delivery of SIMOTION SCOUT, and in the Service&Support pages in **Product Support**:

https://support.industry.siemens.com/cs/de/en/ps/14505/faq

Technical support

Country-specific telephone numbers for technical support are provided on the Internet under **Contact**:

https://support.industry.siemens.com/cs/ww/en/sc/2090

Disposal and recycling of the device

The disposal of the products described in this manual must be performed in compliance with the valid national regulations.

To a great extent, the products can be recycled owing to their low pollutant content. To recycle and dispose of your old device in an environmentally friendly way, please contact a waste disposal service certified for electronic waste.

If you have any further questions about disposal and recycling, please contact your local Siemens contact person. Contact details can be found in our contacts database on the Internet at: http://www.automation.siemens.com/partner/index.asp

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Safety instructions

1

1.1 Fundamental safety instructions

1.1.1 General safety instructions



⚠ DANGER

Danger to life due to live parts and other energy sources

Death or serious injury can result when live parts are touched.

- Only work on electrical devices when you are qualified for this job.
- Always observe the country-specific safety rules.

Generally, six steps apply when establishing safety:

1. Prepare for shutdown and notify all those who will be affected by the procedure.
2. Disconnect the machine from the supply.
   - Switch off the machine.
   - Wait until the discharge time specified on the warning labels has elapsed.
   - Check that it really is in a no-voltage condition, from phase conductor to phase conductor and phase conductor to protective conductor.
   - Check whether the existing auxiliary supply circuits are de-energized.
   - Ensure that the motors cannot move.
3. Identify all other dangerous energy sources, e.g. compressed air, hydraulic systems, or water.
4. Isolate or neutralize all hazardous energy sources by closing switches, grounding or short-circuiting or closing valves, for example.
5. Secure the energy sources against switching on again.
6. Ensure that the correct machine is completely interlocked.

After you have completed the work, restore the operational readiness in the inverse sequence.



⚠ WARNING

Danger to life from hazardous voltage when connecting an unsuitable power supply

Touching live components can result in death or severe injury.

- Only use power supplies that provide SELV (Safety Extra Low Voltage) or PELV (Protective Extra Low Voltage) output voltages for all connections and terminals of the electronics modules.



⚠ WARNING

Danger to life from touching live parts on damaged devices

Improper handling of devices can result in damage.

For damaged devices, hazardous voltages can be present at the enclosure or at exposed components; if touched, this can result in death or severe injury.

- Observe the limit values specified in the technical specifications during transport, storage, and operation.
- Do not use damaged devices.



⚠ WARNING

Danger to life through electric shock due to unconnected cable shields

Hazardous touch voltages can occur through capacitive cross-coupling due to unconnected cable shields.

- As a minimum, connect cable shields and the cores of power cables that are not used (e.g. brake cores) at one end at the grounded housing potential.



⚠ WARNING

Danger to life due to electric shock when not grounded

For missing or incorrectly implemented protective conductor connection for devices with protection class I, high voltages can be present at open, exposed parts, which when touched, can result in death or severe injury.

- Ground the device in compliance with the applicable regulations.

⚠ WARNING

Danger to life due to fire spreading if housing is inadequate

Fire and smoke development can cause severe personal injury or material damage.

- Install devices without a protective housing in a metal control cabinet (or protect the device by another equivalent measure) in such a way that contact with fire inside and outside the device is prevented.
- Ensure that smoke can only escape via controlled and monitored paths.

⚠ WARNING

Danger to life from unexpected movement of machines when using mobile wireless devices or mobile phones

Using mobile radios or mobile phones with a transmit power > 1 W closer than approx. 2 m to the components may cause the devices to malfunction, influence the functional safety of machines therefore putting people at risk or causing material damage.

- Switch off wireless devices or mobile phones in the immediate vicinity of the components.

⚠ WARNING

Danger to life due to fire if overheating occurs because of insufficient ventilation clearances

Inadequate ventilation clearances can cause overheating of components followed by fire and smoke development. This can cause death or serious injury. This can also result in increased downtime and reduced service life for devices/systems.

- Ensure compliance with the specified minimum clearance as ventilation clearance for the respective component.

⚠ WARNING

Danger of an accident occurring due to missing or illegible warning labels

Missing or illegible warning labels can result in accidents involving death or serious injury.

- Check that the warning labels are complete based on the documentation.
- Attach any missing warning labels to the components, in the national language if necessary.
- Replace illegible warning labels.

⚠ WARNING

Danger to life when safety functions are inactive

Safety functions that are inactive or that have not been adjusted accordingly can cause operational faults on machines that could lead to serious injury or death.

- Observe the information in the appropriate product documentation before commissioning.
- Carry out a safety inspection for functions relevant to safety on the entire system, including all safety-related components.
- Ensure that the safety functions used in your drives and automation tasks are adjusted and activated through appropriate parameterizing.
- Perform a function test.
- Only put your plant into live operation once you have guaranteed that the functions relevant to safety are running correctly.

Note

Important safety notices for safety functions

If you want to use safety functions, you must observe the safety notices in the safety manuals.

1.1.2 Safety instructions for electromagnetic fields (EMF)



⚠ WARNING

Danger to life from electromagnetic fields

Electromagnetic fields (EMF) are generated by the operation of electrical power equipment such as transformers, converters or motors.

People with pacemakers or implants are at a special risk in the immediate vicinity of these devices/systems.

- Ensure that the persons involved are the necessary distance away (minimum 2 m).

1.1.3 Handling electrostatic sensitive devices (ESD)

Electrostatic sensitive devices (ESD) are individual components, integrated circuits, modules or devices that may be damaged by either electric fields or electrostatic discharge.



NOTICE

Damage through electric fields or electrostatic discharge

Electric fields or electrostatic discharge can cause malfunctions through damaged individual components, integrated circuits, modules or devices.

- Only pack, store, transport and send electronic components, modules or devices in their original packaging or in other suitable materials, e.g conductive foam rubber of aluminum foil.
- Only touch components, modules and devices when you are grounded by one of the following methods:
  - Wearing an ESD wrist strap
  - Wearing ESD shoes or ESD grounding straps in ESD areas with conductive flooring
- Only place electronic components, modules or devices on conductive surfaces (table with ESD surface, conductive ESD foam, ESD packaging, ESD transport container).

1.1.4 Industrial security

Note

Industrial security

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions only form one element of such a concept.

Customer is responsible to prevent unauthorized access to its plants, systems, machines and networks. Systems, machines and components should only be connected to the enterprise network or the internet if and to the extent necessary and with appropriate security measures (e.g. use of firewalls and network segmentation) in place.

Additionally, Siemens' guidance on appropriate security measures should be taken into account. For more information about industrial security, please visit http://www.siemens.com/industrialsecurity.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends to apply product updates as soon as available and to always use the latest product versions. Use of product versions that are no longer supported, and failure to apply latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under http://www.siemens.com/industrialsecurity..

⚠ WARNING

Danger as a result of unsafe operating states resulting from software manipulation

Software manipulation (e.g. by viruses, Trojan horses, malware, worms) can cause unsafe operating states to develop in your installation which can lead to death, severe injuries and/or material damage.

- Keep the software up to date.
  Information and newsletters can be found at:
  http://support.automation.siemens.com
- Incorporate the automation and drive components into a state-of-the-art, integrated industrial security concept for the installation or machine.
  For more detailed information, go to:
  http://www.siemens.com/industrialsecurity
- Make sure that you include all installed products into the integrated industrial security concept.

1.1.5 Danger to life due to software manipulation when using removable storage media

⚠ WARNING

Danger to life due to software manipulation when using removable storage media

The storage of files on removable storage media involves a high risk of infection, e.g. via viruses or malware. Incorrect parameter assignment can cause machines to malfunction, which can lead to injuries or death.

- Protect the files on removable storage media against harmful software through appropriate protective measures, e.g. virus scanners.

1.1.6 Residual risks of power drive systems

When performing the risk assessment for a machine or plant in accordance with the respective local regulations (e.g. EC Machinery Directive), the machine manufacturer or plant constructor must take into account the following residual risks associated with the control and drive components of a drive system:

1. Unintentional movements of driven machine or system components during commissioning, operation, maintenance and repairs caused by, for example:
   - Hardware and/or software errors in the sensors, control system, actuators, and cables and connections
   - Response times of the control system and of the drive
   - Operation and/or environmental conditions outside the specification
   - Condensation/conductive contamination
   - Parameterization, programming, cabling, and installation errors
   - Use of wireless devices / mobile phones in the immediate vicinity of electronic components
   - External influences/damage
   - X-rays, ionizing radiation and cosmic radiation
2. Unusually high temperatures, including open flames, as well as emissions of light, noise, particles, gases, etc., can occur inside and outside the components under fault conditions caused by, for example:
   - Component failure
   - Software errors
   - Operation and/or environmental conditions outside the specification
   - External influences/damage

3. Hazardous shock voltages caused by, for example:
   - Component failure
   - Influence during electrostatic charging
   - Induction of voltages in moving motors
   - Operation and/or environmental conditions outside the specification
   - Condensation/conductive contamination
   - External influences/damage
4. Electrical, magnetic and electromagnetic fields generated in operation that can pose a risk to people with a pacemaker, implants or metal replacement joints, etc., if they are too close
5. Release of environmental pollutants or emissions as a result of improper operation of the system and/or failure to dispose of components safely and correctly

For more information about the residual risks of the drive system components, see the relevant sections in the technical user documentation.

1.2 Specific safety instructions for the SIMOTION P320-4

1.2.1 General safety instructions for the SIMOTION P320-4

⚠ WARNING

Life-threatening voltages are present with an open control cabinet

When you install the device in a control cabinet, some areas or components in the open control cabinet may be carrying life-threatening voltages.

If you touch these areas or components, you may be killed by electric shock.

Switch off the power supply to the cabinet before opening it.

System expansions

NOTICE

Damage through system expansions

Device and system expansions may be faulty and can affect the entire machine or plant.

The installation of expansions can damage the device, machine or plant.

Device and system expansions may violate safety rules and regulations regarding radio interference suppression.

If you install or exchange system expansions and damage your device, the warranty becomes void.

Note the following for system expansions:

- Only install system expansion devices designed for this device. Contact your technical support team or where you purchased your PC to find out which system expansion devices may safely be installed.
- Observe the information on electromagnetic compatibility (Page 139).

NOTICE

"Open Type" UL508

Note that the device is classified as "Open Type" for use in the area of Industrial Control Equipment (UL508). Installation of the device in an enclosure according to UL508 is conditional for approval or operation according to UL508.

Battery and rechargeable battery

⚠ WARNING

Risk of explosion and release of harmful substances

Improper handling of lithium batteries can result in an explosion of the batteries.

Explosion of the batteries and the released pollutants can cause severe physical injury. Worn batteries jeopardize the function of the device.

Note the following when handling lithium batteries:

- Replace used batteries in good time, see the section "Replacing the backup battery" in the Commissioning and Hardware Installation Manual.
- Replace the lithium battery only with an identical battery or types recommended by the manufacturer (Article No.: A5E30314053).
- Do not throw lithium batteries into fire, do not solder on the cell body, do not recharge, do not open, do not short-circuit, do not reverse polarity, do not heat above 100°C and protect from direct sunlight, moisture and condensation.

High frequency radiation

NOTICE

Unintentional operating situations

High frequency radiation, e g. from a cellular phone, interferes with device functions and can result in malfunctioning of the device.

Persons are injured and the plant is damaged.

Avoid high-frequency radiation:

- Remove radiation sources from the environment of the device.
- Switch off radiating devices.
- Reduce the radio output of radiating devices.
- Observe the information on electromagnetic compatibility (Page 139).

ESD Guideline

Electrostatic sensitive devices can be labeled with an appropriate symbol.



NOTICE

Electrostatic sensitive devices (ESD)

When you touch electrostatic sensitive components, you can destroy them through voltages that are far below the human perception threshold.

If you work with components that can be destroyed by electrostatic discharge, observe the ESD Guideline.

Further information

You can find more detailed information about the **EGB Guideline** in Annex B in the section with the same name.

1.2.2 Notes on use

⚠ WARNING

Hazards on an unprotected machine or plant

According to the results of a risk analysis, hazards can occur on an unprotected machine. The hazards can result in personal injury.

According to the risk analysis, the risk of personal injury can be avoided with the following measures:

- Additional protective devices on the machine or plant. With this, especially the programming, configuration and wiring of the inserted I/O modules have to be executed, in accordance with the necessary risk analysis identified safety performance (SIL, PL or Cat.).
- The correct use of the device has to be verified with a function test on the system. This test can detect programming, configuration and wiring errors.
- Documentation of the test results that you can enter in the relevant safety records when required.

NOTICE

Ambient conditions

Ambient conditions for which the device is not suitable can cause faults or damage the device.

Note the following:

- Operate the device only in closed rooms. Failure to comply nullifies the warranty.
- Operate the device only in accordance with the ambient conditions specified in the technical specifications.
- Protect the device against dust, moisture and heat.
- Do not expose the device to direct sunlight or other strong sources of light.
- Without additional measures, such as a supply of clean air, the device may not be used in locations with harsh operating conditions caused by acidic vapors or gases.
- Observe the permissible mounting positions of the device.
- Do not obstruct the venting slots of the device.

Note

Use in an industrial environment without additional protective measures

This device was designed for use in a normal industrial environment according to IEC 60721-3-3.

Industrial security

2

2.1 Security concept for SIMOTION P320-4

2.1.1 Security

Note

Observe the general security information in this documentation for Industrial security (Page 15).

Regular change of the Windows password

Note

For security reasons, the Windows password should be changed regularly.

It is essential that the AutoLogin is also adapted for this purpose.

You can find instructions in the following sections:

- Changing the Windows user password (Page 34)
- AutoLogin for SIMOTION P (Page 38).

Unlocking Windows

Note

Windows locked

Windows may be accidentally locked, e.g. through shortcut key Windows + L.

If you do not know the password for the SIMOTION P320-4, please contact the Siemens Industry Online Support (https://support.industry.siemens.com/cs/?lc=en-DE).

Windows firewall

Note

Windows firewall

To allows the Windows IP to be accessed externally, this must be set as an exception in the Windows firewall **File and Printer Sharing**. Otherwise, there is only limited access to Windows from outside.

Security and networks

Note

You will find information on the security of networks in Section General security measures (Page 25).

Remote desktop connection

Note that for the SIMOTION P320-4 with Headless operation, you require a user name and password for a remote desktop connection. Per default, the remote desktop connection is already set up.

Note

Deactivating the remote desktop connection

If you do **not** use the remote desktop connection, it must be deactivated for security reasons.

See Section Deactivating the remote desktop connection (Page 45)

SIMOTION IT

Note

Security concept

Note the security concept of HTTP/S, FTP and Telnet access on the Web server when working with SIMOTION IT.

You will find information in the SIMOTION IT Diagnostics and Configuration Diagnostics Manual or the SIMOTION online help in Section Security concept.

Note

User administration

Note the information on the user administration when working with SIMOTION IT.

You will find information in the SIMOTION IT Diagnostics and Configuration Diagnostics Manual or the SIMOTION online help in Section User administration.

Information on industrial security

The following sections are taken from the Motion Control Industrial Security Configuration Manual:

- Why is industrial security so important? (Page 23)
- General security measures (Page 25)
- Product-specific measures (virus scanners) (Page 33)

You can view the entire document in the Industry Online Support (https://support.industry.siemens.com/cs/ww/en/view/108862708).

2.2 Why is industrial security so important?

The topic of data security and access protection (security) is becoming more and more important in industrial environments. The progressive networking of entire industrial plants, the vertical integration and networking of the individual levels of a company, and new technologies, such as remote maintenance and remote access, are leading to increased requirements for protecting industrial plants.

The threats are diverse and the consequences far-reaching.

Possible threats:

- Espionage of data, recipes, etc.
- Sabotage of production plants
- System stoppage, e.g. due to virus infection and malware
- Manipulation of data or application software
- Unauthorized use of system functions

Possible effects of a security incident

- Loss of intellectual property
- Loss of production or reduced product quality
- Company image and economic damage

- Catastrophic environmental influences
- Danger to persons and machines

2.2.1 Trends in the IT sector

Overview

There are many new trends which affect industrial security:

- Cloud computing in general
  The number of network connections across the world is constantly increasing. This enables innovations such as cloud computing and the applications that go hand in hand with it. In conjunction with cloud computing, there has been a massive increase in the number of mobile devices, such as mobile phones and tablet PCs.
- Wireless technology
  On the other hand, the increasing use of mobile devices has only become possible thanks to the ubiquitous availability of mobile networks. Wireless LAN is also becoming increasingly available.
- Smart Grid
  Networking is not only limited to data networks, it also influences our energy infrastructure.
- Worldwide remote access to plants, machines and mobile applications
- The "Internet of things"
  Millions of electronic devices are becoming network-capable and are communicating via the Internet, such as onboard computers in cars, which send warranty information to dealers, or water meter sensors that transmit water consumption data to municipal water suppliers via radio.

However, in order for everything from cloud computing to sensors to work without service disruptions, you need reliable network infrastructures that are well protected against attacks from malware and hackers.

2.2.2 Possible corporate security holes

Possible security holes or weak points

The security chain of a company is only as strong as its weakest link. Security holes can exist at numerous points. The following list gives only a few examples:

- Employees
- Production plants
- Network infrastructure
- Data centers
- PC workstations

- Laptops
- Tablet PCs
- Printers
- Smartphones
- Portable storage media
- Guidelines and regulations

For this reason, a holistic approach is required to deal with the issue of security. Coordinated guidelines and regulations are required that cover all areas: Devices, systems, processes and employees.

2.3 General security measures

2.3.1 Overview

In the following section you will learn about the general security measures you can take in order to protect your system from threats. All of the measures are recommended.

Additional specific security measures for SINUMERIK, SIMOTION and SINAMICS products can be found in Section Product-specific security measures (Page 33).

Basically, the measures should be coordinated with one another and correspond to the ring-shaped principle of the "Defense in Depth" strategy. The measures are structured according to the "onion" principle and each measure forms an additional protective layer around the core: the production plant.



Figure 2-1 Defense in depth strategy

- **Plant security**
  Plant security represents the outermost protective ring. Plant security includes comprehensive physical security measures, e.g. entry checks, which should be closely coordinated with protective measures for IT security.
- **Network security**
  The measures, grouped under the keyword "Network security", form the core of the protective measures. This refers to the segmentation of the plant network with limited and secure communication between subnetworks ("secure islands") and the interface check with the use of firewalls.
- **System integrity**
  "System integrity" represents the combination two major measures. PC-based systems and the control level must be protected against attacks. Steps include the following measures:
  - User authentication for machine or plant operators with individual authorization levels
  - Integrated access protection mechanisms in the automation components to prevent unauthorized changes via the engineering system or during maintenance
  - The use of antivirus and whitelisting software to protect PC systems against malware
  - Maintenance and update processes to keep the automation systems up-to-date (e.g. patch management, firmware updates, etc.)

2.3.2 Plant security

2.3.2.1 Physical protection of critical production areas

Unauthorized persons may be able to enter the production site/building and damage or alter production equipment as a result of gaps in a company's physical security. Confidential information can also be lost. This can be prevented if both the company's site and the production areas are protected accordingly.

Company security

The company's physical security can be ensured via the following measures:

- Closed off and monitored company premises
- Entry control, keys / card readers and/or security personnel
- Escorting of external personnel by company employees

Physical production security

The physical security of a production location can also be ensured via the following measures:

- Separate access control for production areas.
- Installation of critical components in securely lockable cabinets / switching rooms including monitoring and alarm signaling options
- Prohibited production areas with restricted access rights
- Configuration of the radio field to restrict the WLAN range so that it is not available outside the defined areas (e.g. factory building).
- Guidelines that prevent the use of third-party data storage media (e.g. USB sticks) and IT devices (e.g. notebooks) classified as insecure on the control.

Further information

Further information on integrated security solutions can be found on the Surveillance page (http://www.buildingtechnologies.siemens.com/bt/global/en/security-solution/Pages/security-solution.aspx).

2.3.3 Network security

2.3.3.1 Network segmentation

Separation between production and office networks

One important protective measure for your control is the strict separation of the production networks and the other company networks. This separation creates protection zones for your production networks.

Note

The products – drives, controllers, commissioning tools (e.g. STARTER or Startdrive) – described in this manual must only be operated in protection zones.

Separation by means of a firewall system

In the simplest scenario, separation is achieved by means of an individual firewall system which controls and regulates communication between networks.

Separation via a DMZ network

In the more secure version, the coupling is established via a separate DMZ network. In this case, direct communication between the production network and the company network is completely prevented by firewalls and only takes place indirectly via servers in the DMZ network.

Note

The production networks should also be divided into separate automation cells in order to protect critical communication mechanisms.

General security measures

Observe the general security measures even within protection zones, for example:

- Virus scanners (Page 31)
- Reduction of attack points (Page 31)

Network segmentation with SCALANCE S

Siemens provides SCALANCE S security modules to meet network protection and network segmentation requirements.

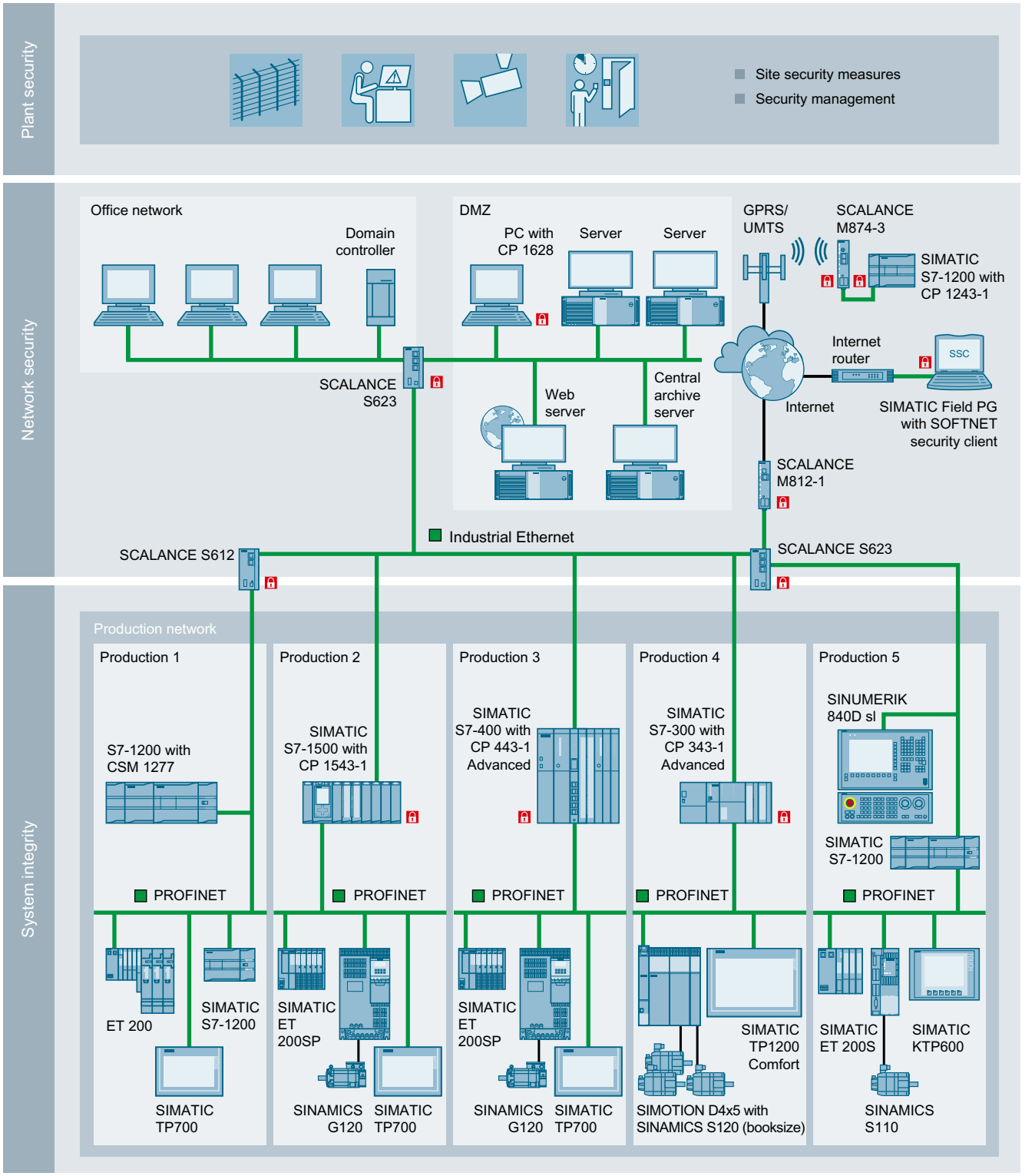
SCALANCE S security modules

SCALANCE S security modules with Security Integrated provide:

- Stateful inspection firewall
  In order to implement user-specific control and logging, firewall rules can also be specified that only apply to certain users.
- VPN via IPsec (data encryption and authentication)
  This establishes a secure tunnel between authenticated users whose data cannot be intercepted or manipulated. The most important aspect is the protection against external access via the Internet.
- NAT/NATP (address translation)
- Router functionality (PPPoE, DDNS) for broadband Internet access (DSL, cable)
- S623 with additional VPN port (DMZ) enables the secure connection of an additional network for service and remote maintenance purposes. S623 also permits the secure, redundant connection of subordinate networks by means of routers and firewall redundancy.

Principle

This application example shows cell segmentation by several SCALANCE S modules, each of which is upstream of the automation cell. The data traffic to and from the devices within automation cells can be filtered and controlled with the SCALANCE S firewall. If required, the traffic between the cells can be encrypted and authenticated. Secure channels and client access from the PCs to the cells can be established via SOFTNET Security Client, VPN client software for PCs.


Plant security
Site security measures
Security management
Network security
Office network
Domain controller
DMZ
PC with CP 1628
Server
Server
GPRS/ UMTS
SCALANCE M874-3
SIMATIC S7-1200 with CP 1243-1
Internet router
SSC
Internet
SIMATIC Field PG with SOFTNET security client
SCALANCE S623
Web server
Central archive server
SCALANCE M812-1
Industrial Ethernet
SCALANCE S612
SCALANCE S623
System integrity
Production network
Production 1
S7-1200 with CSM 1277
PROFINET
ET 200
SIMATIC S7-1200
SIMATIC TP700
Production 2
SIMATIC S7-1500 with CP 1543-1
PROFINET
SIMATIC ET 200SP
SINAMICS G120
SIMATIC TP700
Production 3
SIMATIC S7-400 with CP 443-1 Advanced
PROFINET
SIMATIC ET 200SP
SINAMICS G120
SIMATIC TP700
Production 4
SIMATIC S7-300 with CP 343-1 Advanced
PROFINET
SIMATIC TP1200 Comfort
SIMOTION D4x5 with SINAMICS S120 (booksize)
Production 5
SINUMERIK 840D sl
SIMATIC S7-1200
PROFINET
SIMATIC ET 200S
SIMATIC KTP600
SINAMICS S110

2.3.4 System integrity

2.3.4.1 System hardening

Reduction of attack points

Network services and ports

Activated services represent a risk. To minimize the risk, only the necessary services for all of the automation components should be activated. Ensure that all activated services are taken into account (especially web servers, FTP, remote maintenance, etc.) in the security concept.

A description of the ports used can be found in the Manuals and Function Manuals of the respective products.

User accounts

Any active user account allows access to the system is thus a potential risk. Therefore, take the following security measures:

- Reduction of configured/activated user accounts to the actually needed minimum
- Use of secure access data for existing accounts
- Regular checks, especially of the locally configured user accounts
- Regular change of passwords

Passwords

NOTICE
Changing default passwords The misuse of passwords can also represent a considerable security risk. We recommend that default passwords be changed during the commissioning and changed at regularly defined intervals as required.

Virus scanner

The use of a virus scanner must not impact the production operations of a plant. As the last consequence, this will lead to even a virus-infected computer not being permitted to immediately shut down if this would cause the control of the production process to be lost.

In order to be used on industrial control components, a virus scanner should therefore meet the following requirements:

Virus scanner requirements

- If a local firewall that has been adapted to the production operations is used, it must be possible to install the virus scanner without its own firewall.
- The virus scan clients can be divided into (product- and task-specific) groups and configured separately.
- It must be possible to deactivate the automatic distribution of the virus signatures and other updates.
- It must be possible to carry out the distribution of the virus signatures and updates manually and in groups.
- It must be possible to conduct a file scan and system scan manually and in groups.
- For the virus detection scenario, a message can be configured without a file action such as "Delete", "Clean", etc. being automatically carried out.
- It must be possible to log all of the messages on the virus scan server.
- On a virus scan client, it must be possible to suppress the local message window because it could obscure important messages from the production process.

Note

Installation of software

The installation of software is often a process which represents a serious and complicated change to the respective system. The storage location of the files to be installed must always be free of viruses (e.g. a file server with its own virus scanner or DVD checked for viruses).

2.3.4.2 Patch management

Microsoft security updates

The **WSUS** (Windows Server Update Service) system functionality provided by Microsoft is available for current Windows systems. WSUS supports administrators by providing Microsoft updates in large local networks. WSUS automatically downloads update packages from the Internet (Microsoft Update) and offers them to the Windows clients for installation.

The fully automatic update process ensures that Microsoft security updates are always available on Siemens clients.

2.4 Product-specific measures

2.4.1 Virus scanners, Windows security patches, SIMOTION P

General information on virus scanners

Once an industrial PC system is connected to the Internet, either directly or via an internal company network, there is a danger that it can become infected with a virus. However, malicious software is not only able to reach the system via the Intranet/Internet, but also, for example, via a removable storage device (such as a USB memory stick) attached to the system for backing up data.

SIMOTION P320-4 virus scanners

A virus scanner that runs on Microsoft Windows, as used in office or home computers, has a deep impact on a system's processes. There are, for example, processes such as real-time scans or regular system scans. Such interventions can cause performance issues for the system, and as a result, for the SIMOTION Runtime software. Although the SIMOTION Runtime software runs in a real-time environment, it still depends on the available system resources.

Note

Because of the resulting performance impairments, the installation and use of a standard virus scanner on a SIMOTION P320-4 during system runtime does not make sense and is not permitted.

Using a virus scanner

As a standard virus scanner cannot be used for SIMOTION P320-4, an alternative procedure is followed. The virus scanner is installed to a separately bootable Windows PE operating system. It is started, for example, from a CD or a USB storage device and then performs a virus scan.

Note

FAQ Service & Support portal

More information on using a virus scanner on a SIMOTION P320-4 can be found in the FAQ "How can a virus scanner be used on a SIMOTION P320-4?" (https://support.industry.siemens.com/cs/ww/en/view/59381507) which is available as a download from the Service & Support portal.

Windows security patches

A brief test is performed when a new SIMOTION version is released. During this brief test, a check is performed to establish whether the installation of the security update has affected any basic functions.

2.4.2 Changing the Windows user password

Permitting the Windows password to be changed

Before the Windows password can be changed, it must be permitted for the user.

If the following procedure is not observed, an error message is issued and the Windows password cannot be changed.

Note the following procedure:

1. Select the entry point **Control Panel** > **All Control Panel Items** > **Administrative Tools** > **Computer Management**.
   Double-click **Computer Management**.

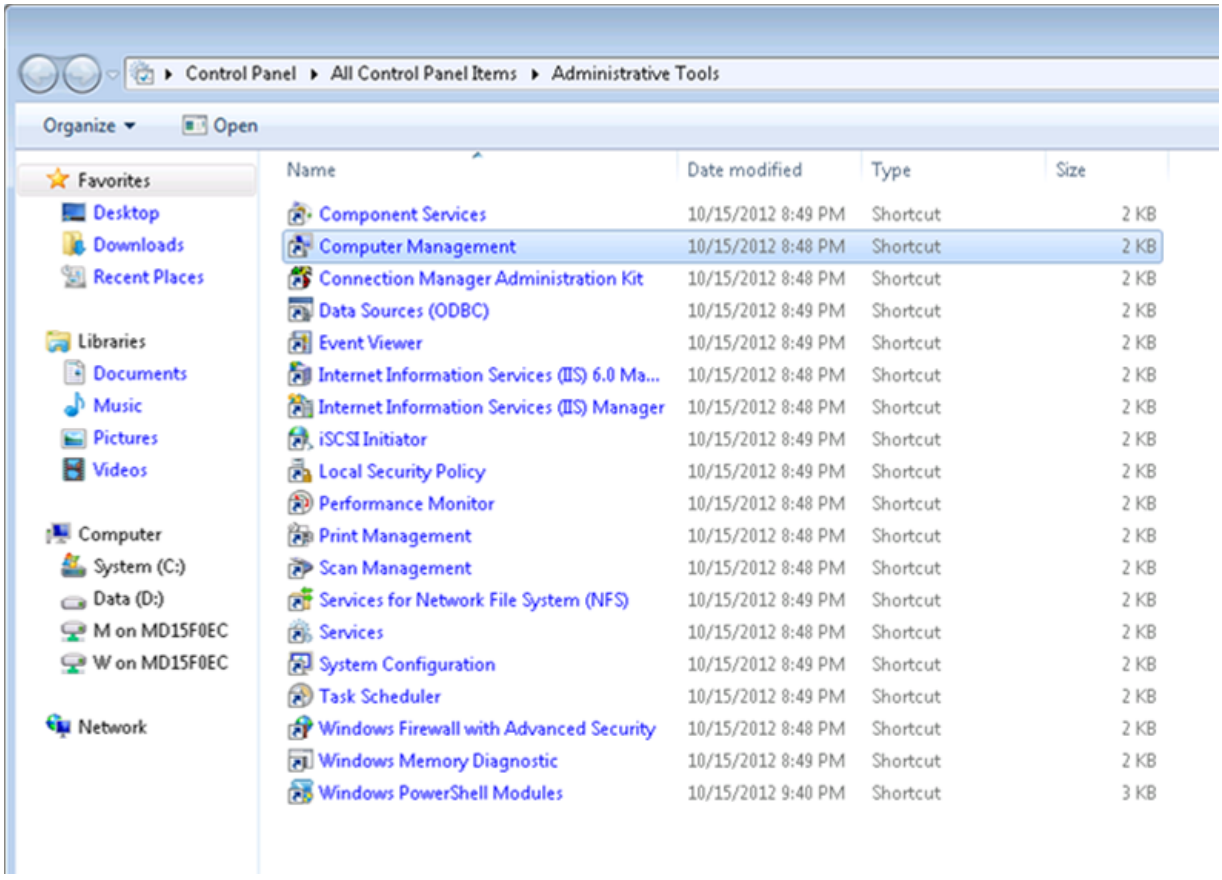


Figure 2-2 Homepage:

2. The **Users** folder is displayed at **Local Users and Groups** in the **Computer Management** window.
   Click the **Users** folder. The available user groups are displayed.

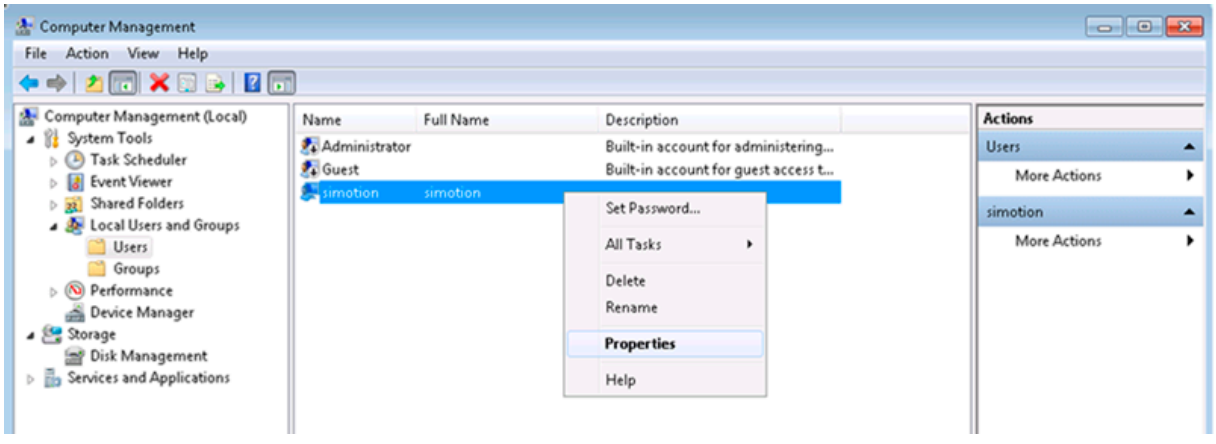


Figure 2-3 Computer management

3. With the selection of **Users simotion**, you can display the properties via **Properties**.
4. Deactivate the "**User cannot change password**" checkbox in the **General** tab on the **simotion Properties** dialog box.
   This checkbox must be deactivated for the user to change the Windows password.

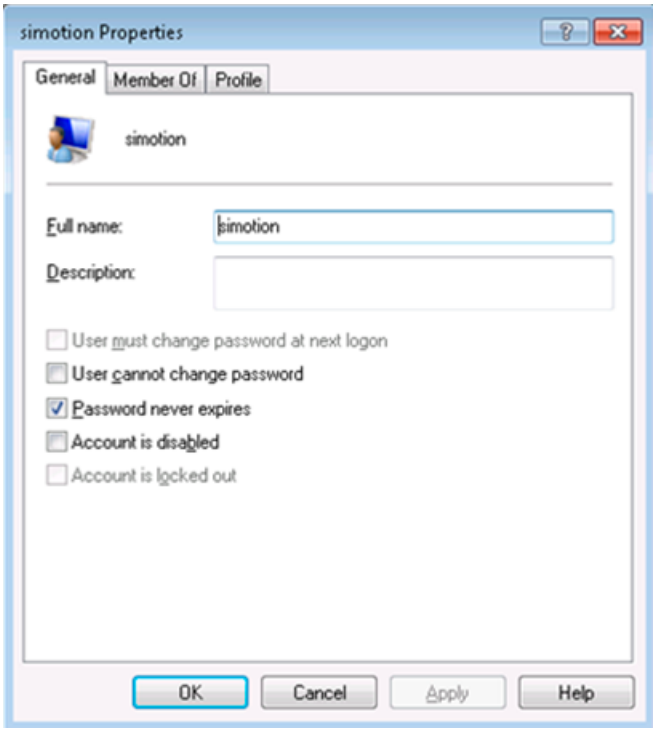


Figure 2-4 SIMOTION properties

Changing the Windows password

You can find general information on the Windows password on the website at Microsoft - Changing des Windows-password (http://windows.microsoft.com/en-us/windows/change-windows-password#change-windows-password=windows-7).

To change the Windows password, proceed as follows:

1. Press Ctrl+Alt+Del. The following Windows window opens.

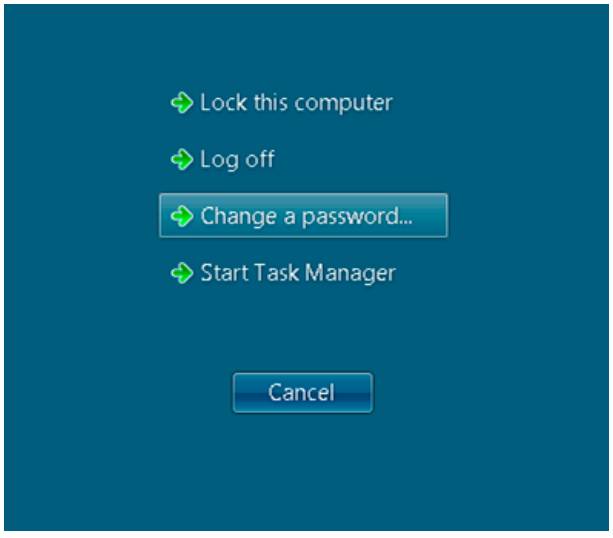


Figure 2-5 Changing the Windows password

2. After you have confirmed **Change a password...** , the Windows window to change the Windows password opens.
   First enter your current password and then the new Windows password. You must enter the new Windows password a second time for confirmation.

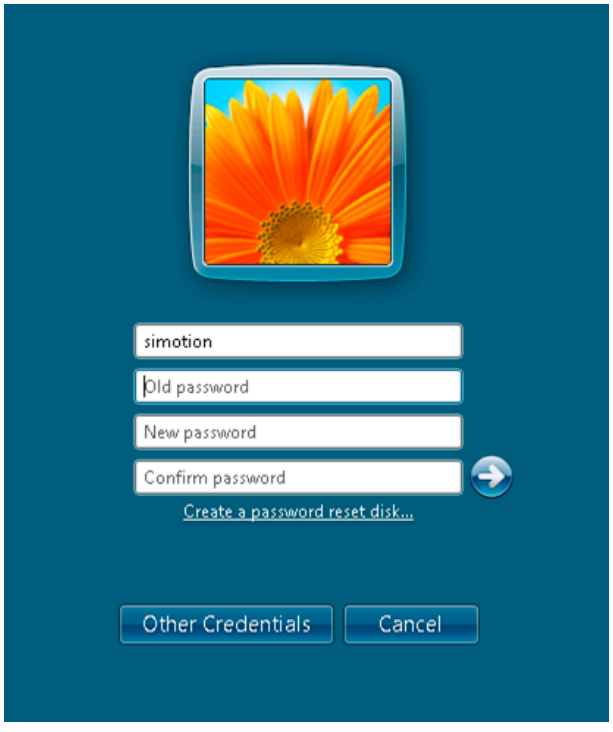


Figure 2-6 Entering the new Windows password

3. The password was changed successfully.

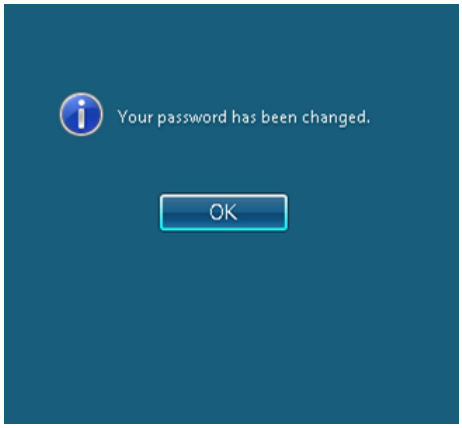


Figure 2-7 Confirmation of change

4. In the event of an error when the "User cannot change password" checkbox is activated, the following error message is displayed.
The Windows password has not been changed.

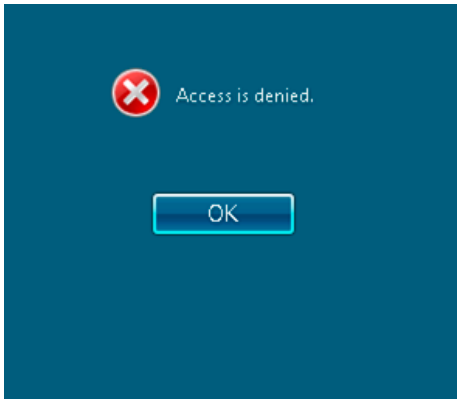


Figure 2-8 Error message when changing the Windows password has not been permitted.

2.4.3 Changing the AutoLogin

The password for the AutoLogin must be changed when the user has changed the Windows password.

The Windows user password is changed in the normal way, e.g. "Change Password" screen.
See also Section Changing the Windows user password (Page 34).

Automatically Log On

SIMOTION P320-4 is preset so that the user does not have to enter the user name and the password to log on.

Preparation for changing the AutoLogin

In order that an AutoLogin still functions after changing the Windows password, the password for the AutoLogin must be changed.

The required procedure is shown in the following so that the change of the AutoLogin for SIMOTION P320-4 can be prepared:

1. Open the **Computer Management** window via **Control Panel > All Control Panel Items > Administrative Tools** .

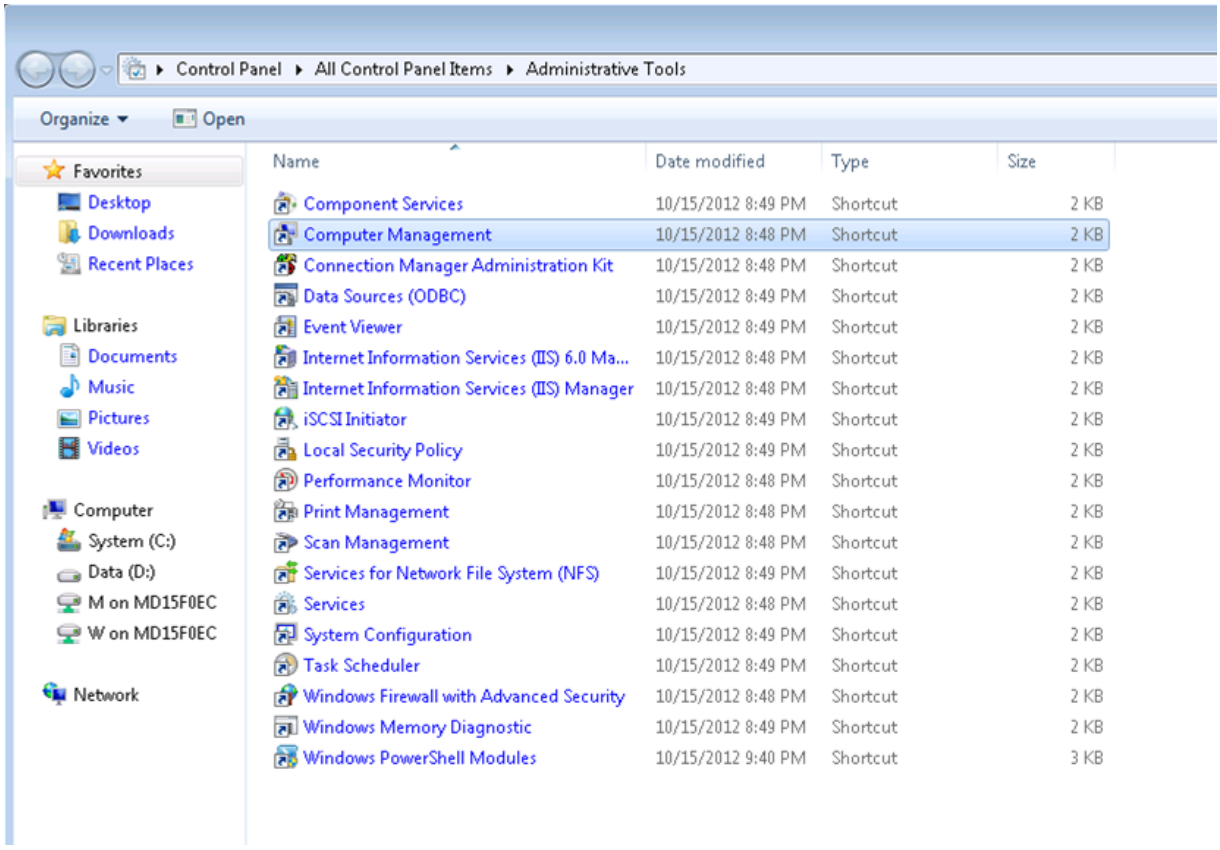


Figure 2-9 Computer Management entry point

2. The **Users** folder is displayed at **Local Users and Groups** in the **Computer Management** window.
   Click the **Users** folder. The available user groups are displayed.

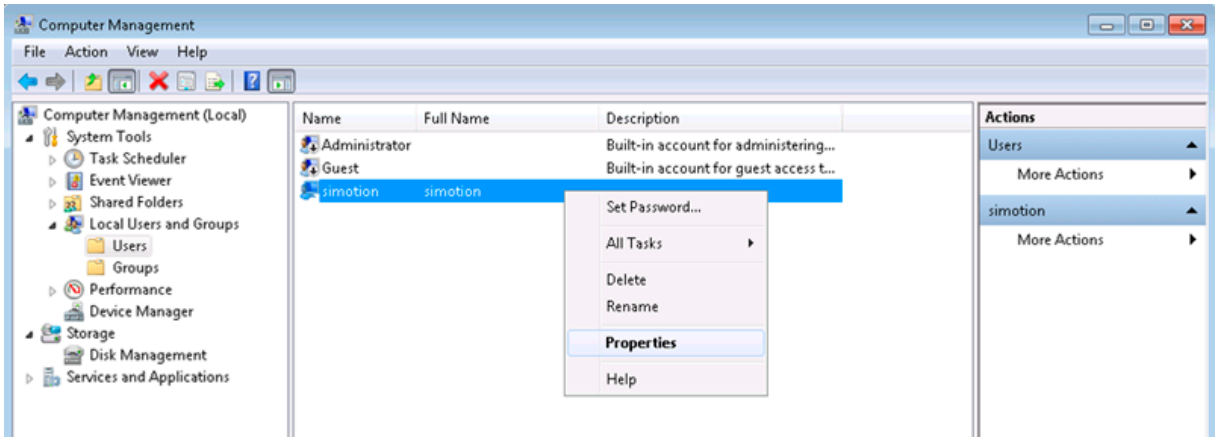


Figure 2-10 Computer Management - Users

3. With the selection of **Users> simotion**, you can display the properties via **Properties**.
4. Deactivate the **User cannot change password** checkbox in the **simotion Properties** dialog box.

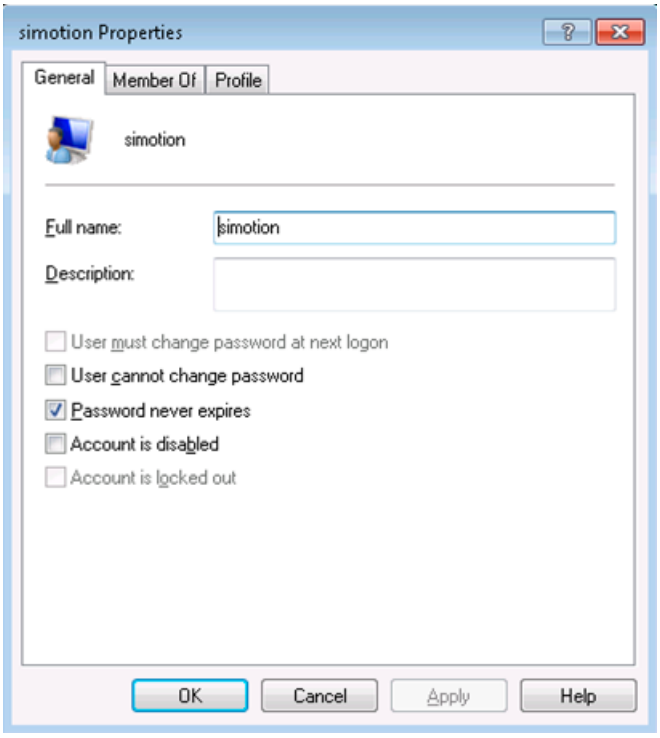


Figure 2-11 simotion Properties - General dialog box

5. Confirm with **OK.**

Changing the password for AutoLogin

To change the password for the AutoLogin, proceed as follows:

1. Open the search via **Windows-Start** and enter: **netplwiz**

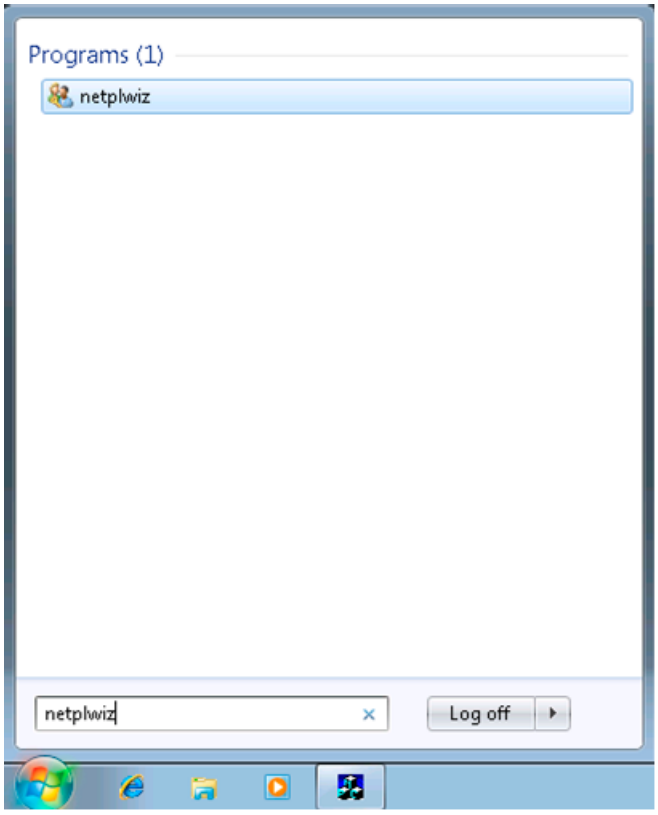


Figure 2-12 Programs netplwiz

2. The following **User Accounts** dialog box opens.

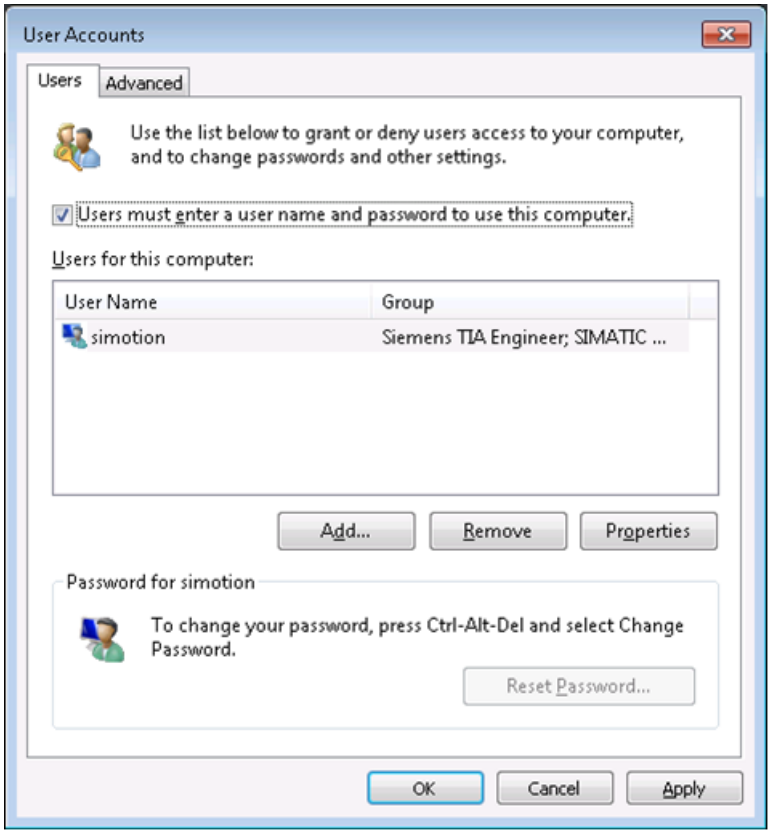


Figure 2-13 User Accounts

3. In the **Users** tab, activate the **Users must enter a user name and password to use this computer** checkbox.
   The **Apply** button is now active. Deactivate the checkbox and accept the changes now with the **OK** or **Apply** button.
   This is necessary so that the **Automatically Log On** dialog box is subsequently displayed.

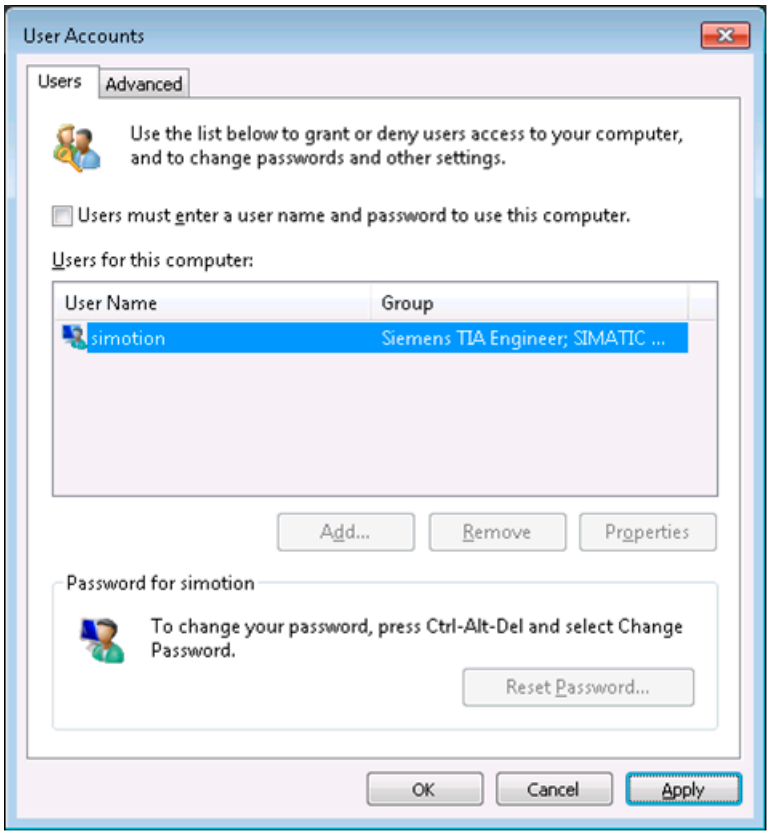


Figure 2-14 User accounts

4. Enter your changed Windows user password in the **Automatically Log On** dialog box and confirm it by entering it a second time.

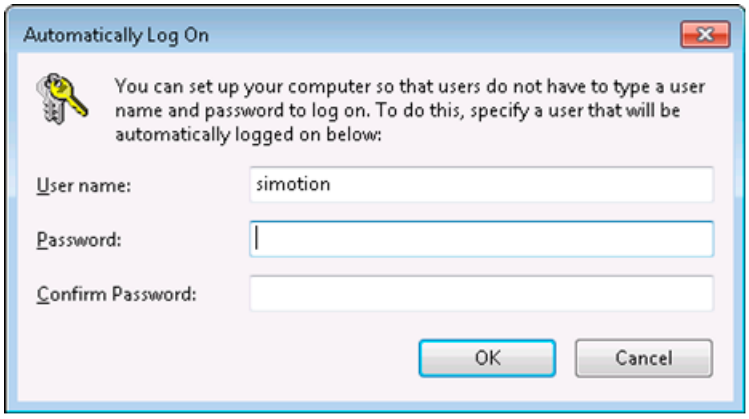


Figure 2-15 Automatically Log On dialog box

5. Confirm the password with **OK**.

2.4.4 Deactivating the remote desktop connection

Deactivating the remote desktop connection

NOTICE
Deactivating the remote desktop connection
To ensure that the remote desktop connection is not used, it must be explicitly deactivated.

Procedure for deactivating the remote desktop connection

1. Using the Control Panel, select **System** > **Remote settings**.

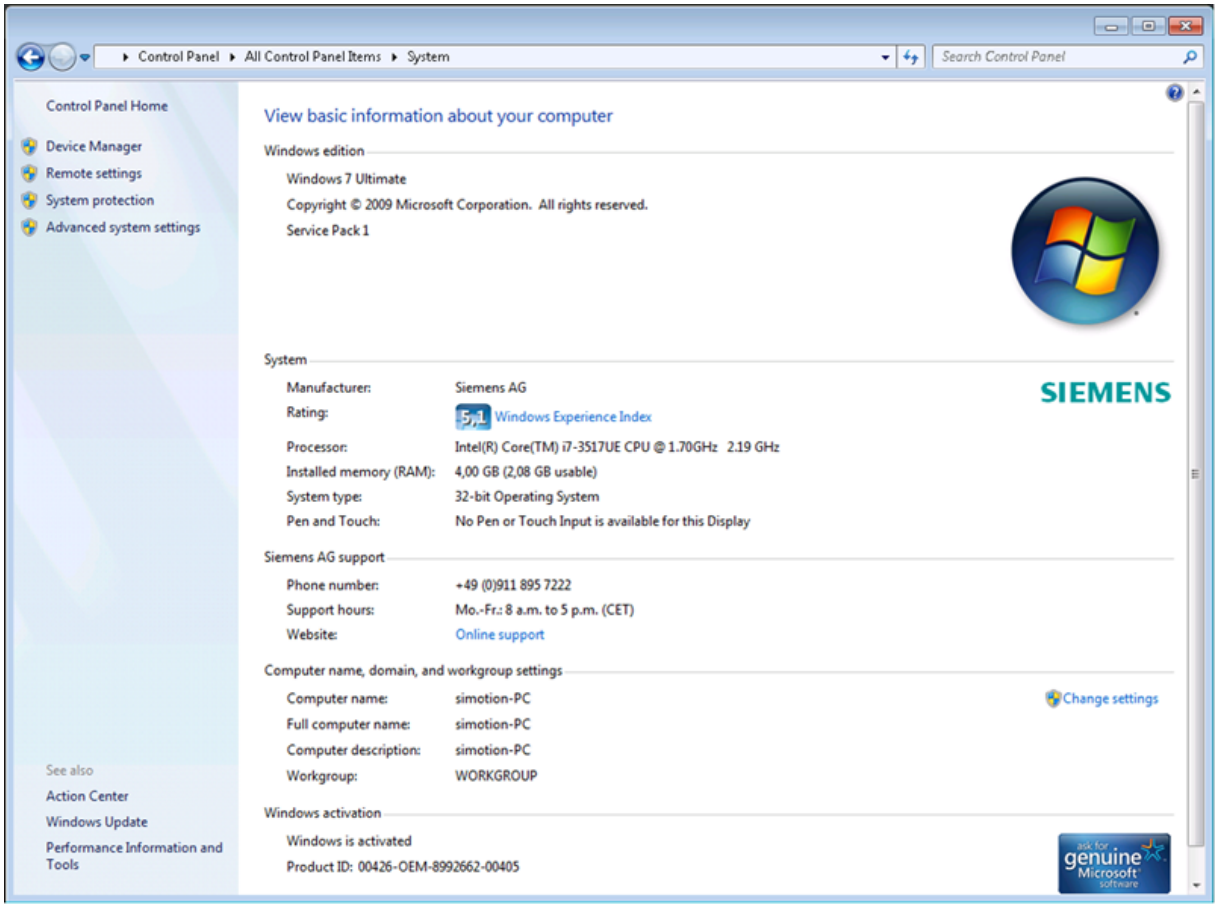


Figure 2-16 Remote settings

2. Select the **Remote** tab in the **System Properties** dialog box.

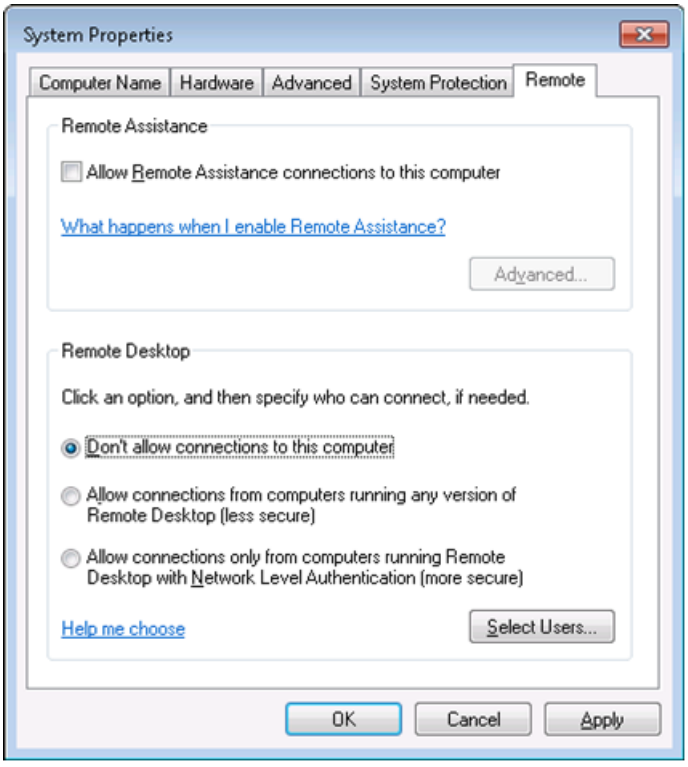


Figure 2-17 System Properties dialog box

3. Select the **Don't allow connections to this computer** option at **Remote Desktop**.
4. Confirm with **OK**.

Any remote desktop access is deactivated with this operation.

Description

3

3.1 System overview

Overview

SIMOTION P is a PC-based, open Motion Control System from SIMOTION.
Control, motion control, and HMI functions are executed together with standard PC applications on the SIMOTION P hardware platform. SIMOTION P combines the compatibility of the Windows operating system with real-time capability of SIMOTION P Runtime.

The fully independent SIMOTION P Runtime runs in parallel to Windows on SIMOTION P. This real-time expansion makes it possible to implement demanding motion control applications with high performance requirements on platforms of the SIMOTION P range. The hardware consists of a computing unit with innovative Intel technology, which is ready for operation at the time of delivery.

The drives and I/O devices are connected either via PROFINET onboard or IsoPROFIBUS board (optional).

The SIMATIC Flat Panel IFP1500, IFP1900 and IFP2200 can be used for the operation of the SIMOTION P320-4 hardware platform in a distributed configuration.

SIMOTION P320-4 versions

The SIMOTION P320-4 can control various I/O systems and HMI components via PROFINET onboard or the optional IsoPROFIBUS board.
If required, a USB DVD drive can be connected, for example.

The following versions of the SIMOTION P320-4 are available:

- SIMOTION P320-4 E
  with the Windows Embedded Standard 7 32-bit operating system and real-time expansion for SIMOTION.
- SIMOTION P320-4 S
  with the Windows 7 Ultimate 32-bit operating system and real-time expansion for SIMOTION.

Application

The SIMOTION P320-4 applications are directed at machines that require a high level of integration of PLC, motion control and technology functions on account of the increasing use of servo drives:

- Packaging machines
- Plastic and rubber processing machines
- Presses, wire-drawing machines
- Textile machines

- Printing machines
- Machines for processing wood, glass, ceramics, and stone
- Production lines in the renewable energy sector, e.g. solar technology, wind power installations

3.2 SIMOTION P320-4 product description

3.2.1 SIMOTION P320-4 overview

The SIMOTION P320-4 provides high-level industrial performance. It features:

- Compact design
- Maintenance-free operation
- High degree of ruggedness
- Long-term availability

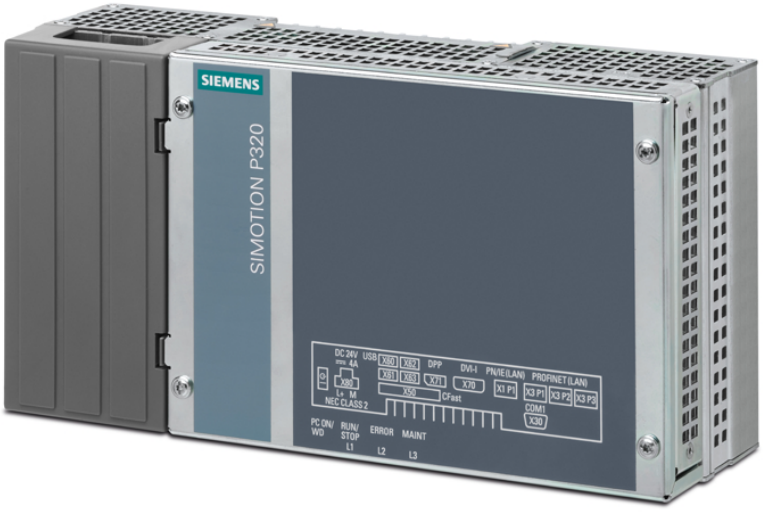


Figure 3-1 SIMOTION P320-4 view



Figure 3-2 SIMOTION P320-4 (open perspective) with plugged-in optional IsoPROFIBUS board

3.2.2 Features

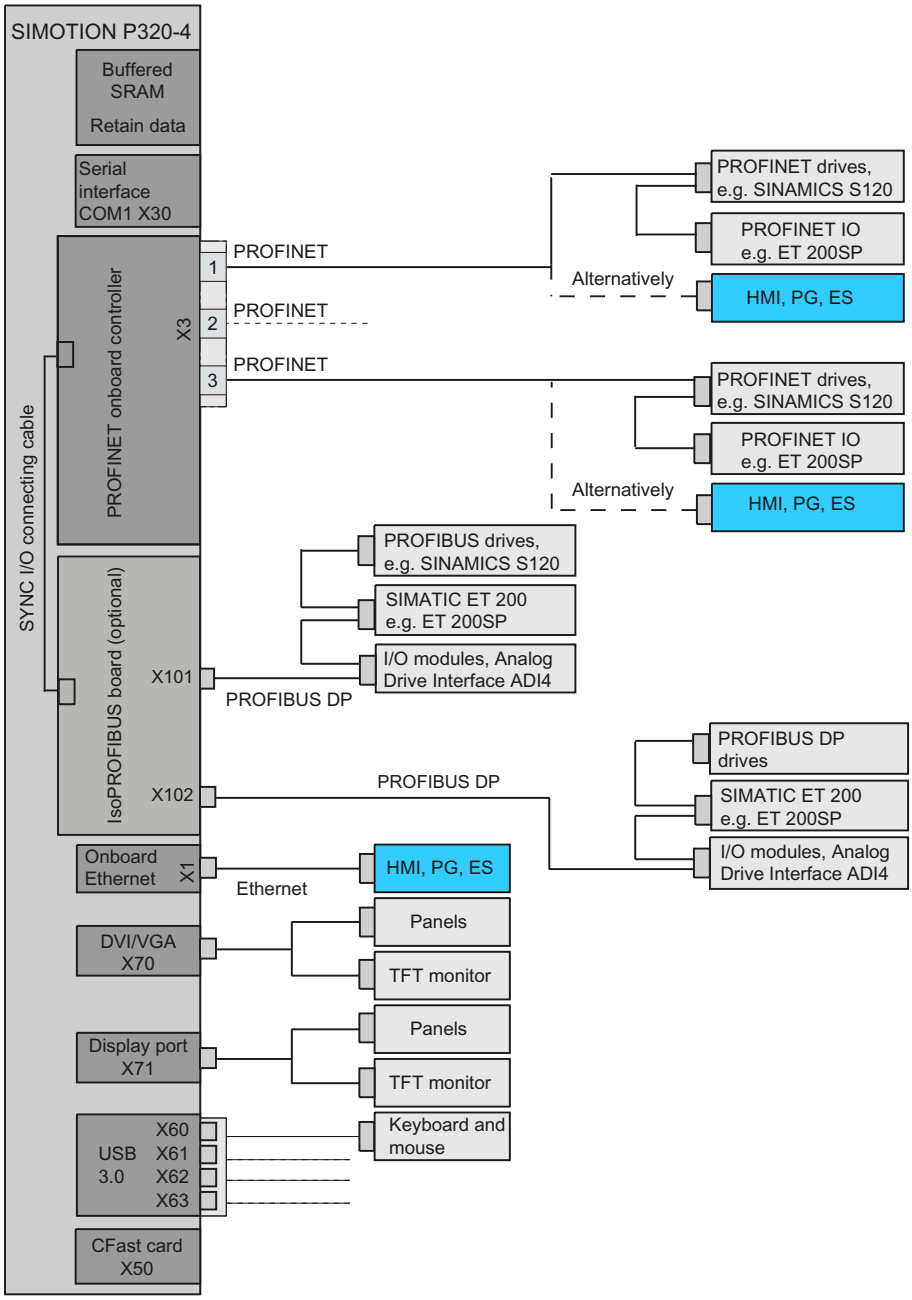
Basic data	
Installation	• Standard rail mounting • Vertical mounting
Processor	
P320-4 E **P320-4 S**	Intel Core i3-3217UE, 2 x 1.6 GHz, 3 MB cache Intel Core i7-3517UE, 2 x 1.7 GHz, 4 MB cache
Main memory	4 GB DDR3 RAM
Optional IsoPROFIBUS board (PROFIBUS DP)	2 x SUB-D socket with configurable baud rates (9.6 Kbit/s - 12 Mbps)
Graphics	• Integrated Intel HD2000 or HD4000 • DVI resolution of 640 × 480 pixels up to 1920 × 1200 pixels • Display port resolution max. 1920 × 1200 pixels • Graphics memory is occupied in the main memory (dynamic UMA)
Power supply	24 VDC (-20%/+20%) max. 4 A
Operating conditions	Operation without fan
Drives and storage media	
CFast card or SSD (Solid State Disk)	Depending on the hardware version of the SIMOTION P320-4

Basic data	
P320-4 E	**2 x CFast card** Internal interface: CFast External interface: CFast
P320-4 S	**SSD (Solid State Disk)** Internal interface: SSD **CFast card** External interface: CFast
USB stick	External, can be connected via USB interface
Interfaces	
Serial	COM (RS 232)
Graphics	DVI-I: Suitable for use as DVI or VGA DPP++: Display port, DVI via DPP-to-DVI adapter
USB	4 × USB 3.0, simultaneous operation of high current, backward compatible with USB 2.0/1.1
Ethernet	1 × RJ45 (10/100/1000 Mbps)
PROFINET I/O	3 × RJ45 (100 Mbps)
Keyboard, mouse	Can be connected via USB interface

Software	
Operating systems	
P320-4 E	Windows Embedded Standard 7 32-bit
P320-4 S	Windows 7 Ultimate 32-bit

3.2.3 SIMOTION P320-4 (hardware) structure

The following figure shows the integration of the SIMOTION P320-4 with integrated PROFINET onboard and optional IsoPROFIBUS board in a target system.

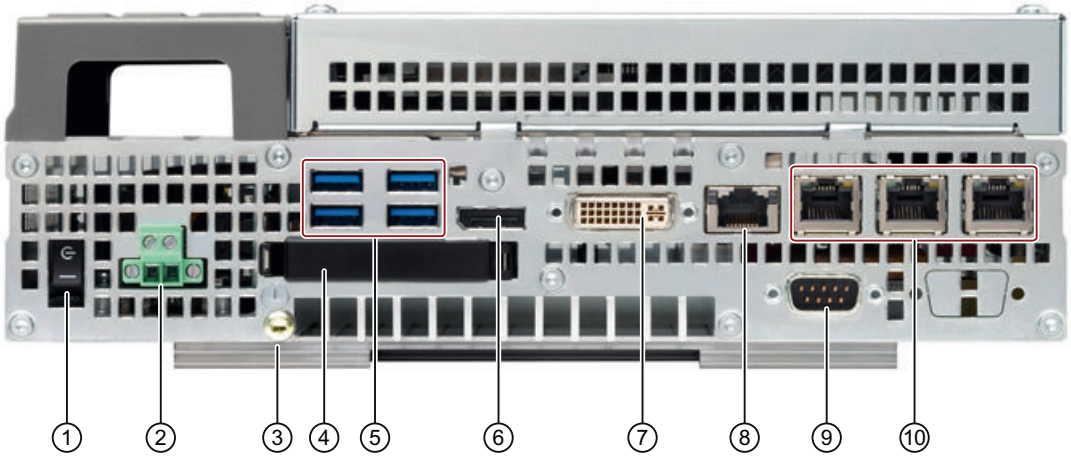


HMI Human Machine Interface
PG Programming device
ES Engineering system

Figure 3-3 SIMOTION P320-4 system overview

3.2.4 Interfaces and operating elements

SIMOTION P320-4



①	On/off switch	Position **OFF** is the delivery state. The on/off switch does not isolate the device from the power supply.
②	24 V DC	Power supply connection
③	Protective conductor	Protective conductor terminal
④	Memory card slot	Cover for the CFast card
⑤	4 × USB 3.0	USB 3.0 high current, backward compatible with USB 2.0/1.1
⑥	Display port	Display port connection for digital monitor
⑦	DVI-I	DVI connector for CRT or LCD monitor with DVI interface
⑧	Ethernet	RJ45 Ethernet connection for 10/100/1000 Mbps
⑨	COM1	Serial interface
⑩	3 × PROFINET	PROFINET ports with three RJ45 sockets

3.2.5 SIMOTION P Runtime (software) structure

SIMOTION P Runtime contains the SIMOTION P Kernel which performs the motion control and interface control.

A SIMOTION project is planned, configured, assigned parameters, commissioned and programmed via the SIMOTION SCOUT engineering system (ES).

The user data can be stored on the data media of the SIMOTION P320-4 .

Siemens WinCC flexible software can be used to visualize operational sequences or to operate the machine. Third-party systems can be linked via the OPC interface.

SIMOTION P Runtime

With the SIMOTION P320-4, the PLC and motion control functionality (starting from position controller upwards) is located centrally in a strictly deterministic task outside the Windows operating system.

Its main field of application is centralized motion control and control tasks requiring close coordination between multiple axes and/or input/output modules.

Functionality ranges from simple positioning to high-performance synchronous operation.

SIMOTION SCOUT

The SIMOTION SCOUT engineering system can be installed on the SIMOTION P320-4 S or connected via the interfaces integrated in SIMOTION P320-4 .

SIMOTION SCOUT TIA

As of version V4.5, the SIMOTION SCOUT TIA engineering system no longer supports the Windows 7 32-bit operating system and therefore cannot be installed.

HMI software

HMI/Runtime software can be operated on the same PC, e.g. the Siemens WinCC flexible software. Other software packages can be linked by means of the OPC interface.

The **HMI software** is used as the general term in the following.

Internal communication

A locally installed HMI can use the local communication to access the following:

- Variables in SIMOTION RT
- Drives on PROFINET IO or PROFIBUS DP
- Other SIMOTION devices on PROFINET IO or PROFIBUS DP

Scope of delivery

The system software supplied with the SIMOTION P320-4 is either already installed on the SIMOTION P320-4 storage medium or is ready to be installed:

- SIMOTION P Kernel
- SIMOTION IT
- SIMOTION IT VM Virtuell Machine (subject to license)

3.2.6 Components

The most important components of the SIMOTION P320-4 and their functions are listed below.

Distributed I/O systems (PROFINET)

Table 3-1 Components for distributed I/O

Component	Function
SIMATIC ET 200M	Modular I/O system for cabinet installation and high channel densities.
SIMATIC ET 200S	Finely modular I/O system for cabinet installation including motor starters, safety technology, and individual grouping of the load groups.
SIMATIC ET 200SP	Finely scalable I/O system for cabinet installation; SIMATIC ET 200SP features a single-cable and multi-cable connection with push-in terminals, compact dimensions, high performance, and low part variety.
SIMATIC ET 200MP	Modular I/O system for cabinet installation and high channel densities in the SIMATIC S7-1500 packaging system. SIMATIC ET 200MP permits the shortest bus cycle times and fastest response time even with large volumes of data.
SIMATIC ET 200eco	I/O system with IP67 degree of protection for machine-related, cabinet-free applications, featuring a flexible and fast connection system in ECOFAST or M12.
SIMATIC ET 200pro	Modular I/O system with IP65/67 degree of protection for machine-related, cabinet-free applications, including motor starters.

Note

Note that not all modules of the above-mentioned I/Os or I/O systems have been released for SIMOTION.

There may also be system-dependent functional differences with regard to the use on SIMOTION and on SIMATIC.
For example, special process-control functions (e.g. HART modules, etc.) are not supported by SIMOTION for the ET 200M distributed I/O system.

For a detailed and routinely updated list of I/O modules enabled with SIMOTION as well as application information, visit us online at:

SIEMENS Industry Online Support - Product support - Supplementary system components (https://support.industry.siemens.com/cs/de/en)

Further modules are integrated via the GSD file of the device's manufacturer.

Note

Note that in individual cases, additional supplementary conditions must be fulfilled.

Drive systems (via PROFINET IO)

Table 3-2 List of typically connected drive systems

Component	Function
SINAMICS S120	Servo drives, innovative single-axis and multi-axis solution

Optional components

Table 3-3 Optional components

Centralized I/O	Function
IsoPROFIBUS board	PROFIBUS connection
UPS	Uninterruptible Power Supply The drivers for the UPS are not pre-installed on the PC. Install the current drivers that are supplied with the UPS.

Note

An IsoPROFIBUS board may be inserted in addition to the PROFINET onboard.

3.3 HMI and SIMOTION SCOUT

3.3.1 HMI and SIMOTION SCOUT Overview

The operational sequences on the SIMOTION P320-4 are either monitored via the HMI system (Human Machine Interface) or the SIMOTION SCOUT engineering system.

The HMI or ES software can be connected using the following variants:

- Local (Page 58)
- via PROFINET (Page 70)
- via Ethernet (Page 71)
- via IsoPROFIBUS (optional) (Page 73)

Local communication of the HMI/ES

Only one local connection to the local SIMOTION Runtime is possible. If HMI or ES is also installed locally, **PC internal** can access other controllers/devices via PROFINET / PROFIBUS.

See Section Local HMI or ES on SIMOTION P320-4 (Page 58).

Communication of the HMI / ES via PROFINET / Ethernet / PROFIBUS

By using one of these communication variants, you can control and monitor several SIMOTION devices.

3.3.2 Local HMI or ES on SIMOTION P320-4

The model described below is used for the communication of the SIMOTION P320-4 with a local HMI or ES. The SIMOTION SCOUT engineering system or the HMI system can be installed directly on the **SIMOTION P320-4 S**.

For this model, you must set the communication (access point) to **TCP/IP** .

The SIMOTION P320-4 is already configured for this communication version at the time of delivery.

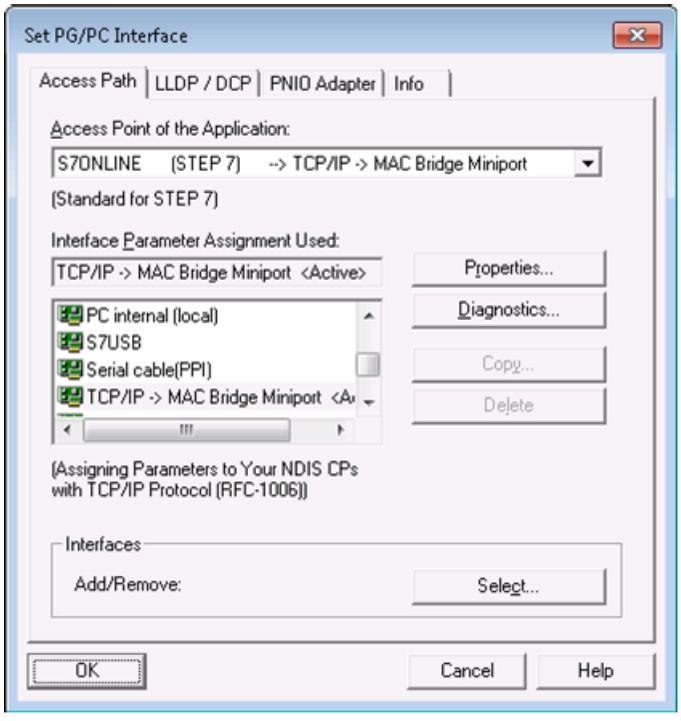


Figure 3-4 Set PG/PC Interface - TCP/IP -> MAC Bridge Miniport dialog box

Note

Local communication via Ethernet (TCP/IP)

For the communication via Ethernet (TCP/IP) to function locally, a link must be available to the Ethernet interface or a LAN cable must be connected **or** the MAC bridge set up.

Note

Setting up the MAC bridge miniport

See also Section Setting up a network bridge - MAC bridge miniport (Page 59)

Note

Only HMI-Runtime can be installed on the **SIMOTION P320-4 E** version.

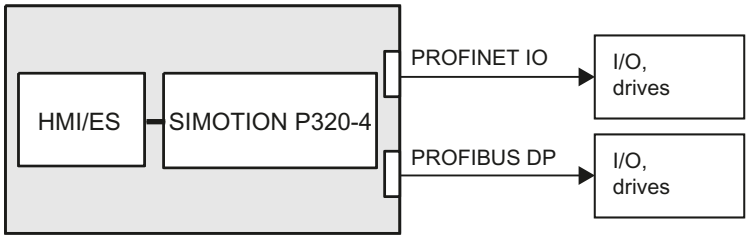


Figure 3-5 Model: Local HMI or ES

Alternatively to TCP/IP , SIMOTION SCOUT can also communicate locally via PC internal (local) .

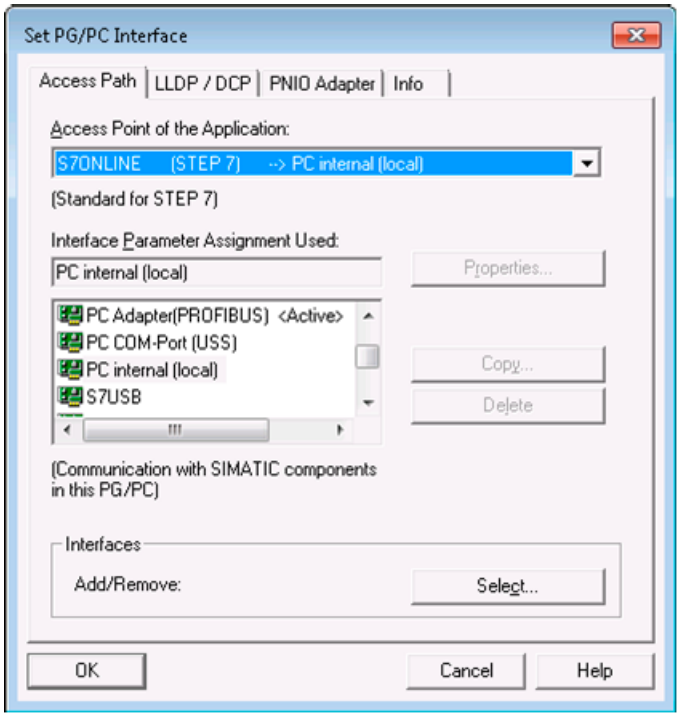


Figure 3-6 Set PG/PC Interface - PC internal (local) dialog box

3.3.2.1 Setting up a network bridge - MAC bridge miniport

Note

If you are working with SIMOTION P320-4 version V4.5, the Network Bridge is already preset.

The network bridge is not preset for version V4.4 and must be set up as described in the following.

The following is a step-by-step description of how the network bridge **MAC Bridge Miniport** is set up.

Network connections initial situation

Open the **Network and Internet** via the Control Panel.

- Select **Control Panel** > **All Control Panel Items** > **Network and Sharing Center** > **Change adapter settings**.
- Open the **Network and Internet** > **Network Connections** dialog box.
  The network connections of your PC are shown here.

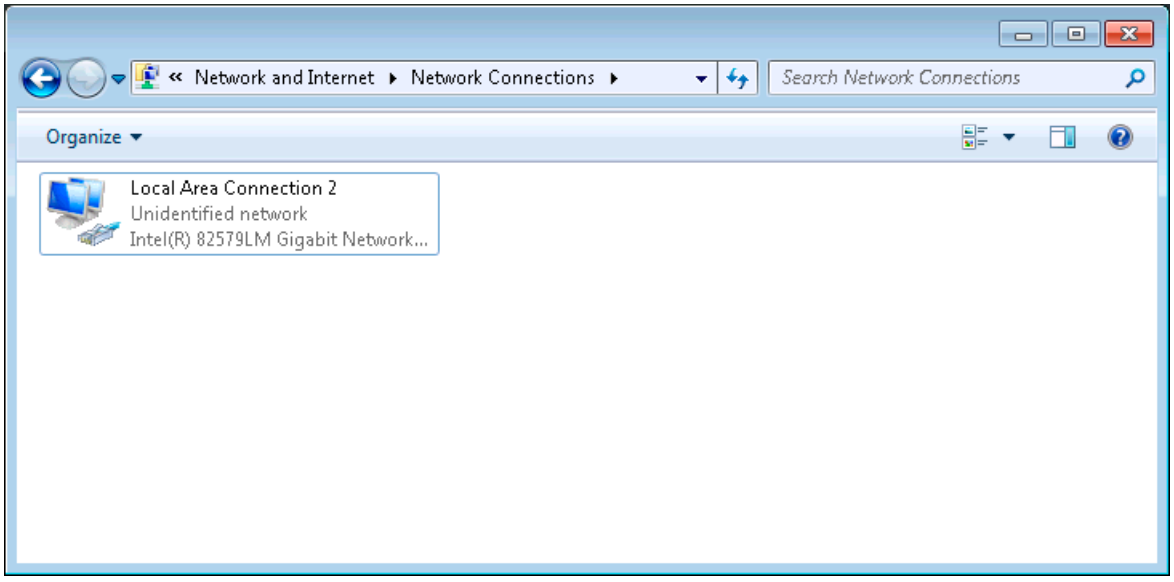


Figure 3-7 Initial situation - Network connections

Device Manager

Open the Device Manager via the Control Panel:

Control Panel > All Control Panel Items > System > Device Manager.

1. Select the **Network adapters** in the dialog box below the "SIMOTION PC".
   The available network connections are shown here.

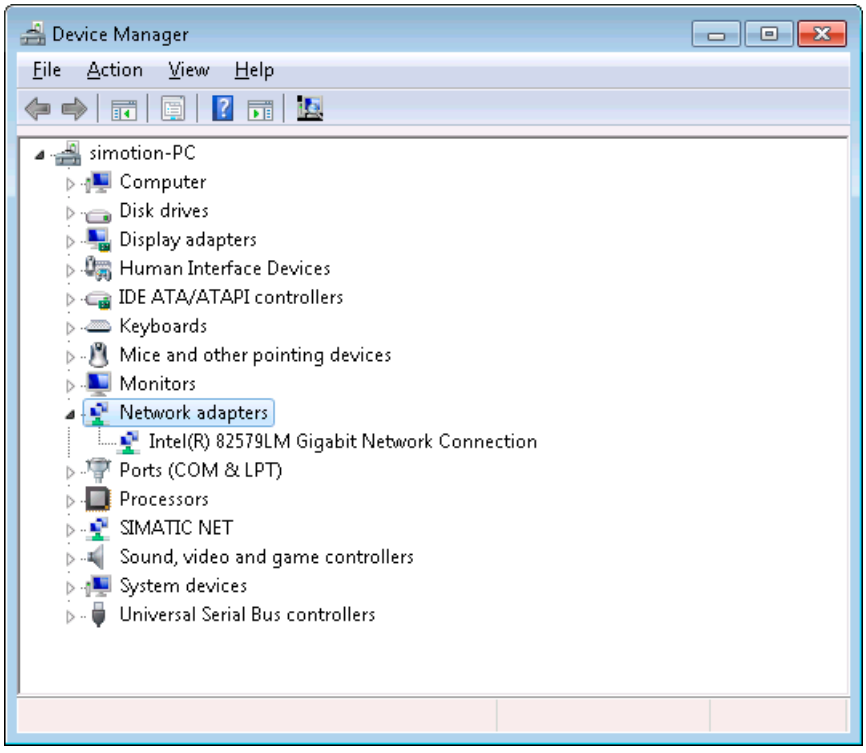


Figure 3-8 Opening the Device Manager

2. Install the **Microsoft Loopback Adapter** via the Device Manager.
3. To do this, select the menu **Action > Add legacy hardware**.
   The **Add Hardware Wizard** then opens.

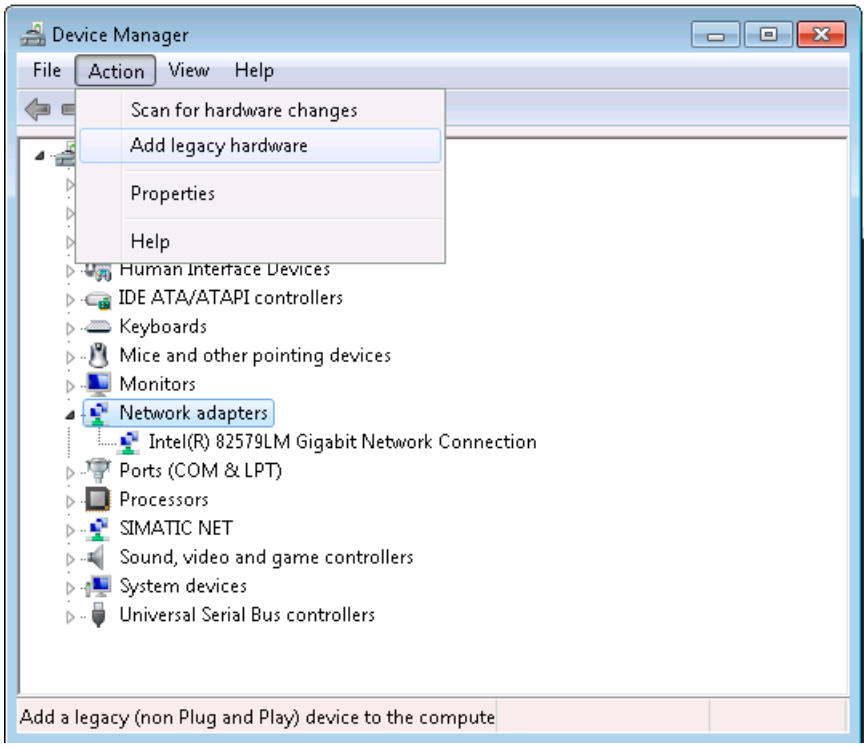


Figure 3-9 Device Manager - Action menu

Add Hardware Wizard

Use the **Add Hardware Wizard** to install the network bridge.

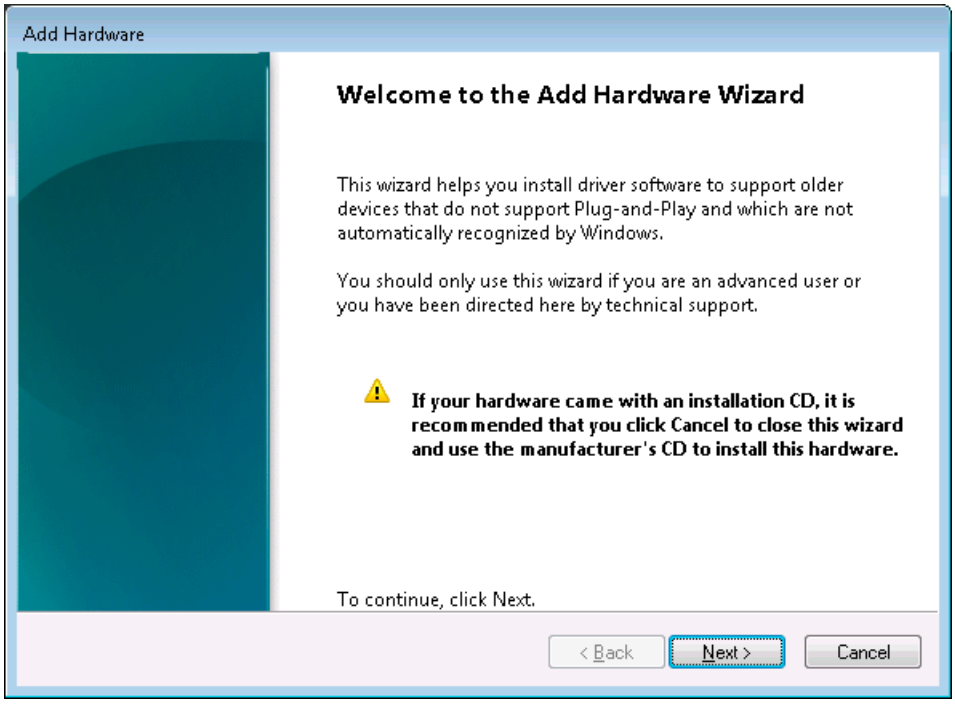


Figure 3-10 Add Hardware - Starting the wizard

1. Click **Next** to start the software wizard.
2. Select the option: **Install the hardware that I manually select from a list (Advanced)** and continue in the wizard with **Next**.

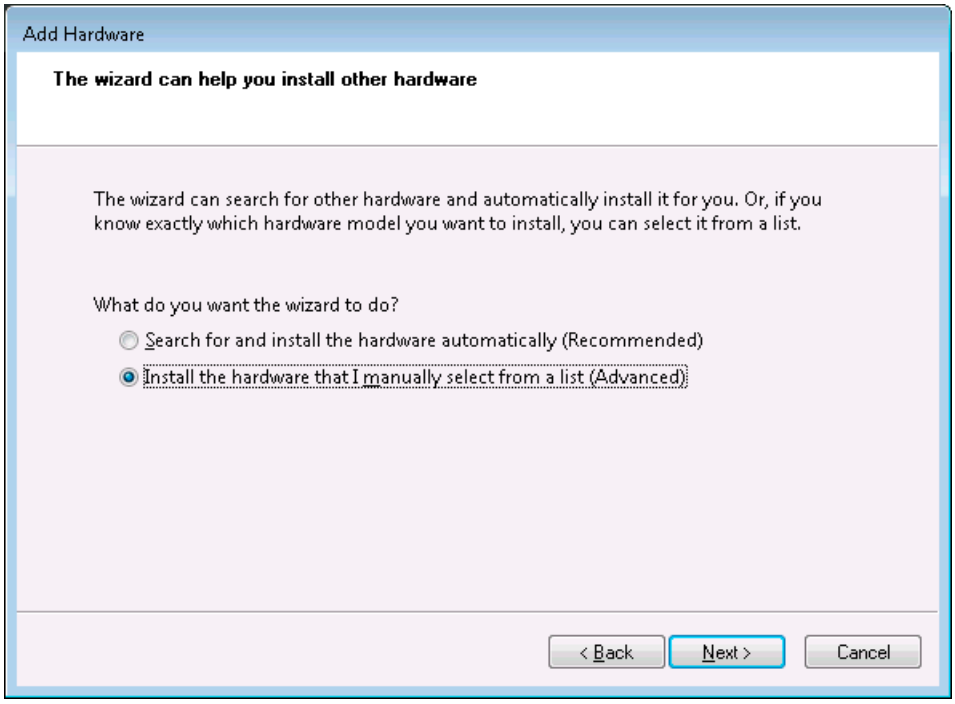


Figure 3-11 Add Hardware - Manual selection from a list

3. Select **Network adapters** in the dialog box now open and continue in the wizard with **Next**.

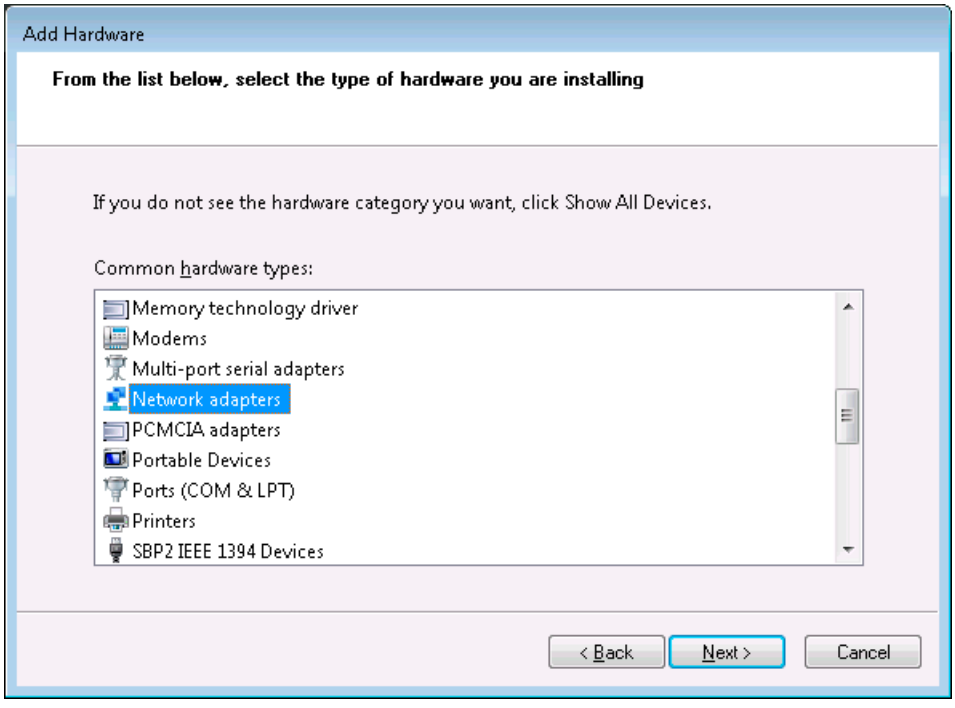


Figure 3-12 Select Add Hardware - Network adapters

4. In the following dialog box, select the **Microsoft Loopback Adapter**.
5. To do this, select Microsoft at **Manufacturer** and the Microsoft Loopback Adapter at **Network Adapter**.
6. Continue in the wizard with **Next**.

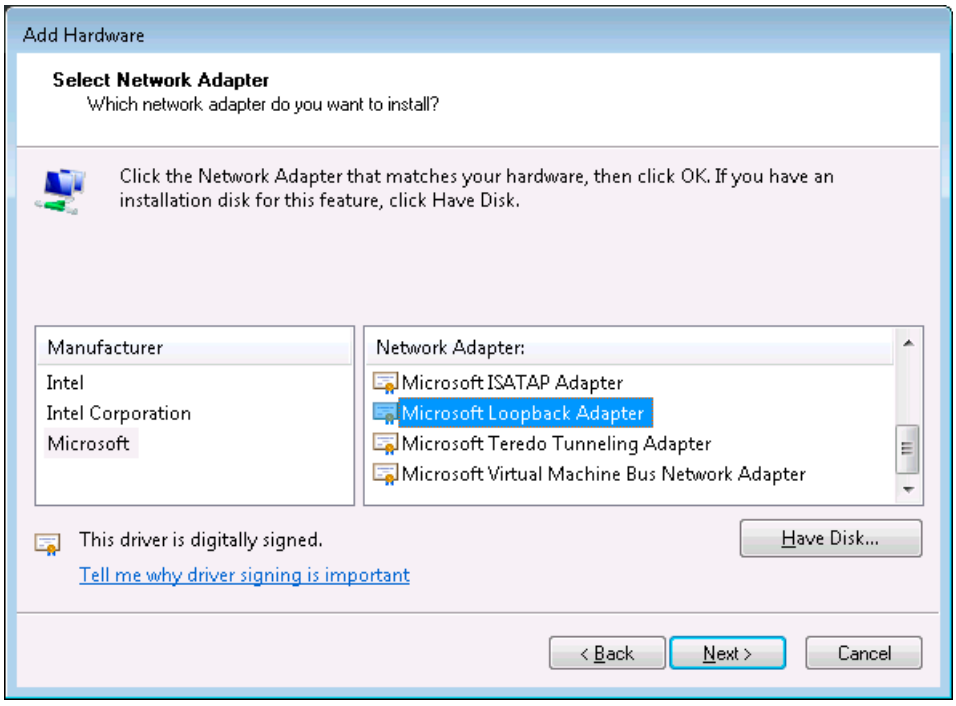


Figure 3-13 Add Hardware - Selecting the desired Network Adapter

7. The selected Network Adapter is shown in the following dialog box.
   Click **Next** to confirm and install.

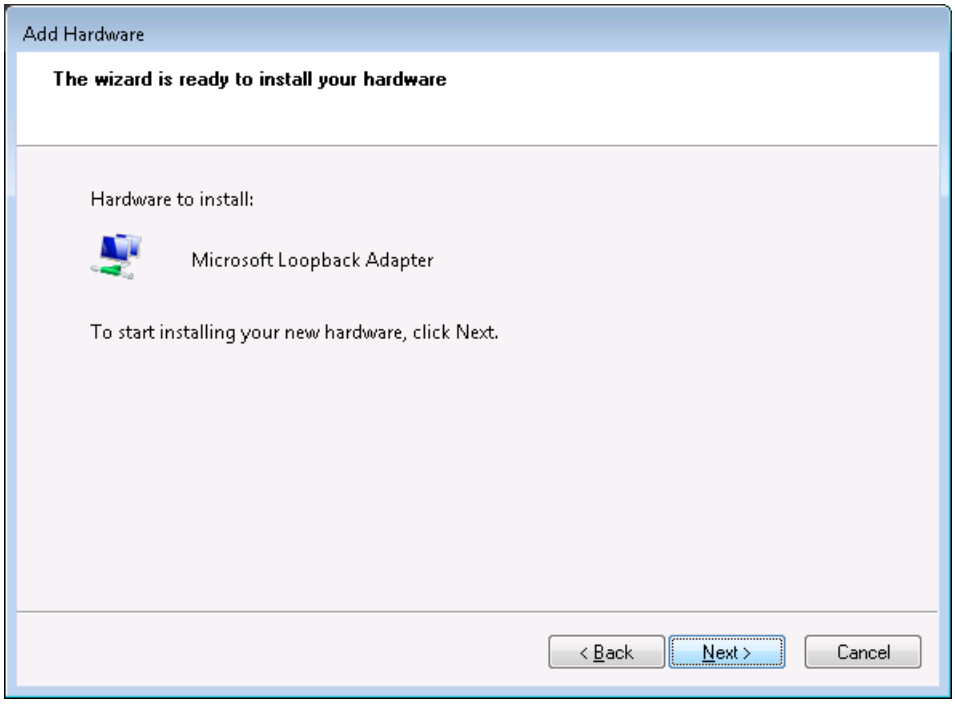


Figure 3-14 Add Hardware - Selected Network Adapter can be installed

8. After finishing the installation, the following dialog box is displayed.
   Exit the wizard with **Finish**.

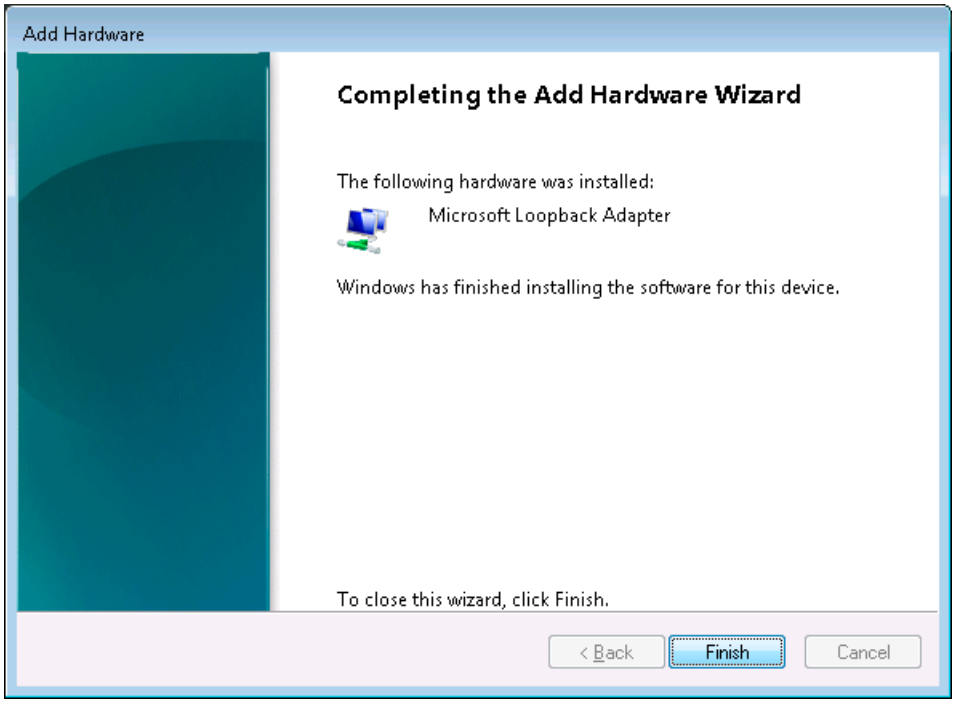


Figure 3-15 Add Hardware - Installation of the Microsoft Loopback Adapter is finished

Checking the installation of the network adapter

You can check the successful installation of the **Microsoft Loopback Adapters** in the

- Device Manager
- Internet connections

Device Manager

The Microsoft Loopback Adapter is displayed at **Network adapters** in the Device Manager.

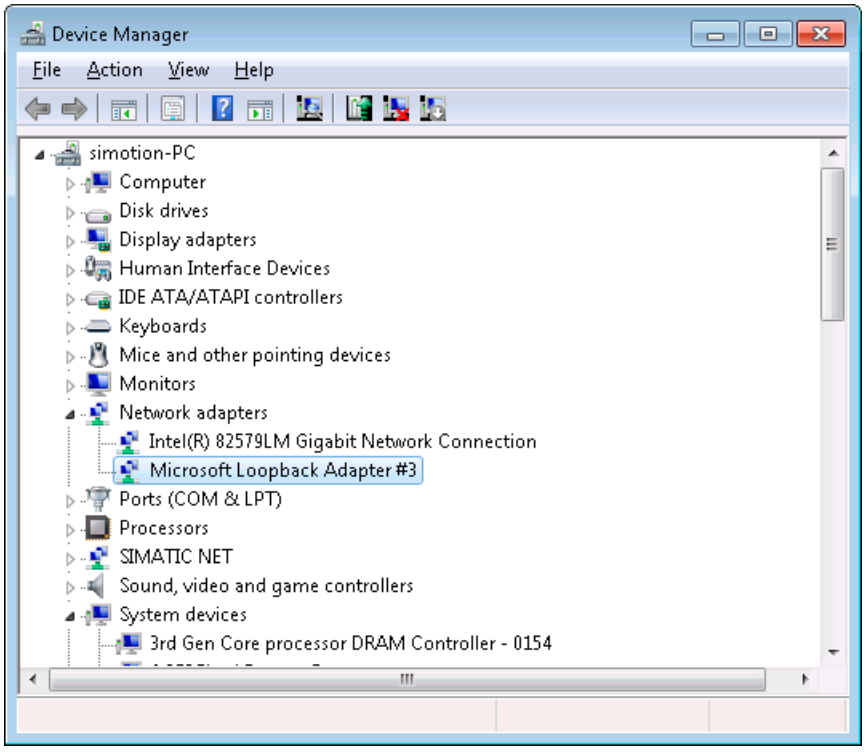


Figure 3-16 Device Manager - Microsoft loopback adapter

Network connections

The newly installed Microsoft Loopback Adapter is also displayed at **Network Connections**.

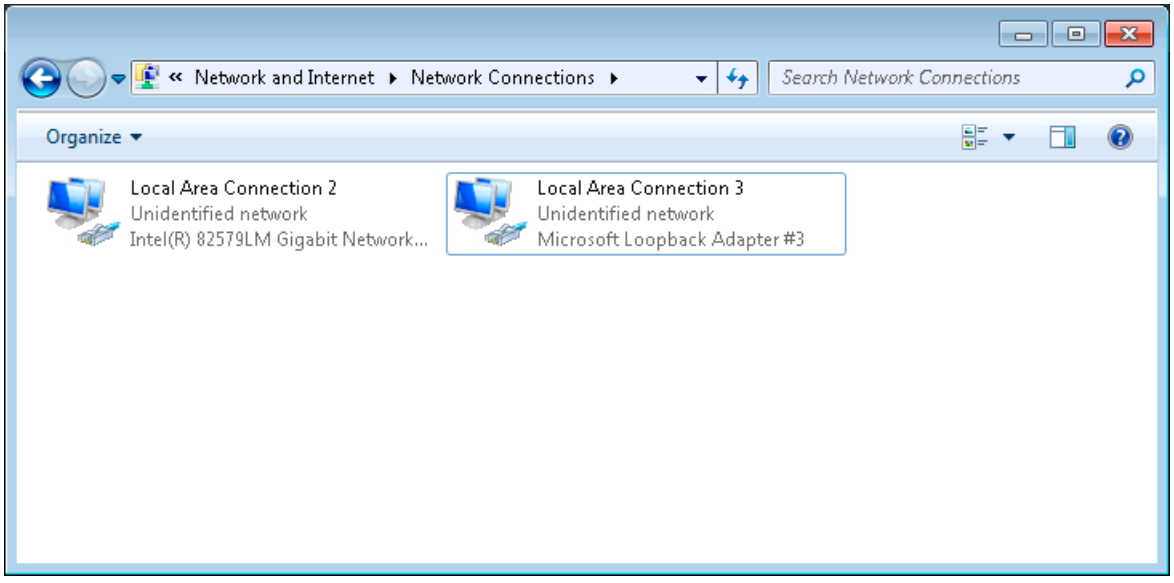


Figure 3-17 Network connections - Display of the newly installed Microsoft loopback adapter

Creating the network bridge

To activate the network bridge, proceed as follows:

1. Select both adapters at Network Connections
2. Select Bridge Connections via the context menu.

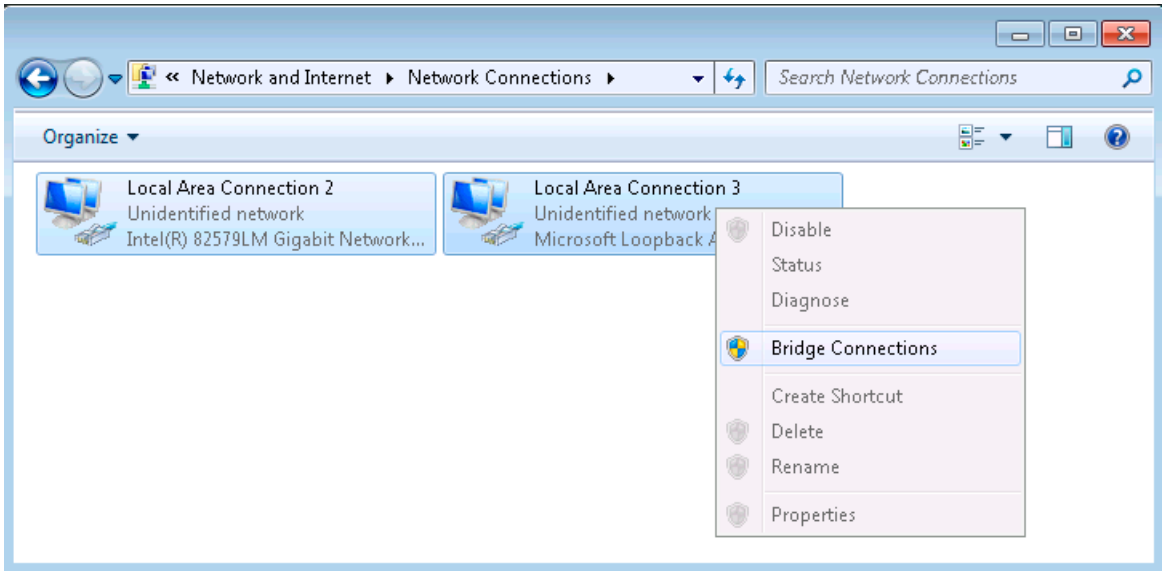


Figure 3-18 Network Connections - Setting the Bridge Connection

3. The Network Bridge MAC Bridge Miniport is displayed.

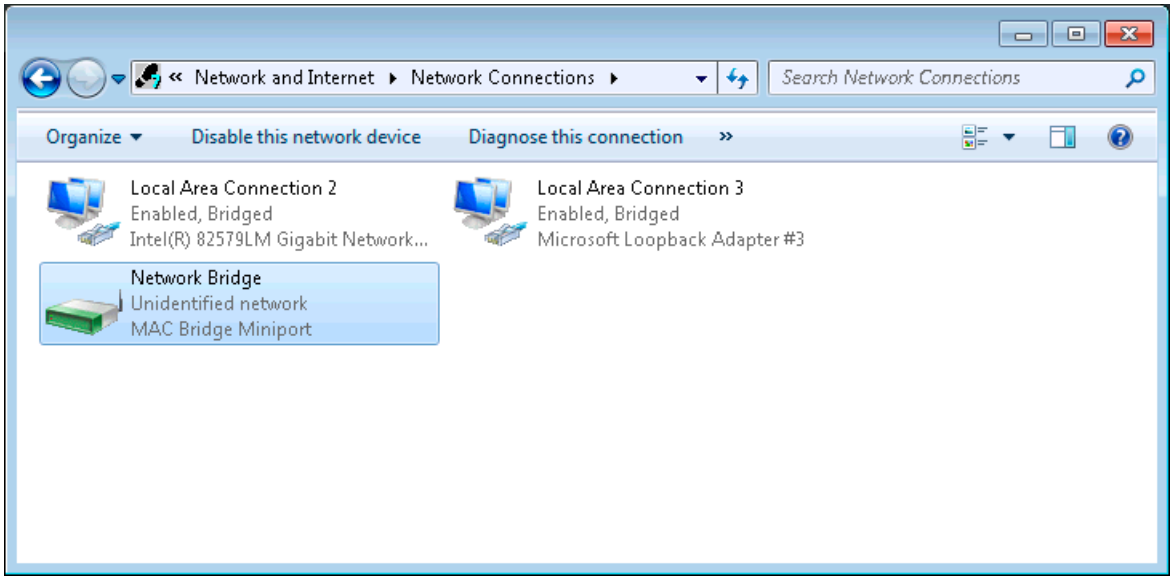


Figure 3-19 Network Connections - Display of the Network Bridge MAC Bridge Miniport

4. To initialize the network bridge, execute the **sp_bridge.cmd** Windows command script.
   The additional script can be found at C:\SiMotion\tools\sp_bridge.cmd
   After executing the batch file, the network bridge has been set up.

Setting "Set PG/PC interface"

Now open the PG/PC interface to complete the setting for the **Network Bridge** .

1. Open the **Set PG/PC Interface** dialog box via the **Control Panel** entry point.
2. Deactivate the **MAC Bridge Miniport DCP** checkbox in the **LLDP / DCP** tab.
   If you do not deactivate the MAC Bridge Miniport DCP, the SIMOTION P320-4 may not be found via Accessible nodes.

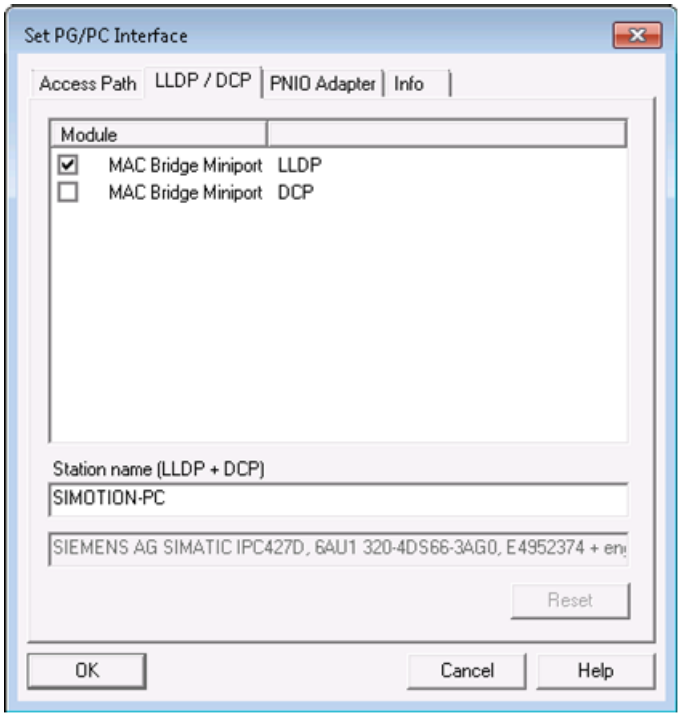


Figure 3-20 Set PG/PC interface

The settings for the network bridge have now been completed.

3.3.3 HMI or ES via PROFINET

Networking via PROFINET

PROFINET is the innovative and open Industrial Ethernet standard (EN 61158) for industrial automation. With PROFINET, devices can be linked up from the field level through to the management level.

With PROFINET, an external HMI or ES can also be integrated into the network and data can be exchanged directly with the SIMOTION P320-4 device.

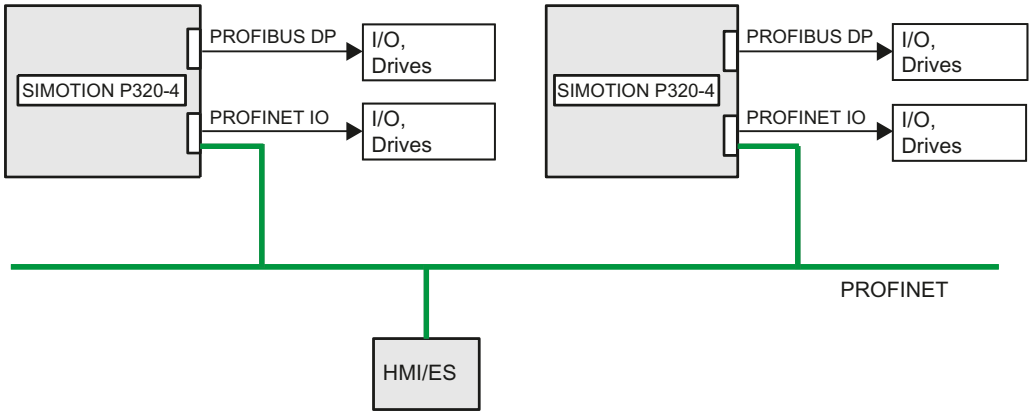


Figure 3-21 Model: Networking via PROFINET

References

You can find further information on the HMI in the documentation:

- SIMOTION Runtime Basic Functions, Section HMI (Human Machine Interface) coupling.
- SIMOTION SCOUT, Configuration Manual
- SIMOTION SCOUT TIA, Configuration Manual
- SIMOTION SCOUT TIA Device Proxy, Configuration Manual

3.3.4 HMI or ES via Ethernet

Networking via Ethernet

A complex interconnection with several HMIs or ESs is only possible using an Ethernet communication. This allows both an external HMI or ES to access several SIMOTION devices or one SIMOTION device to access another one, for example, to display the production data.

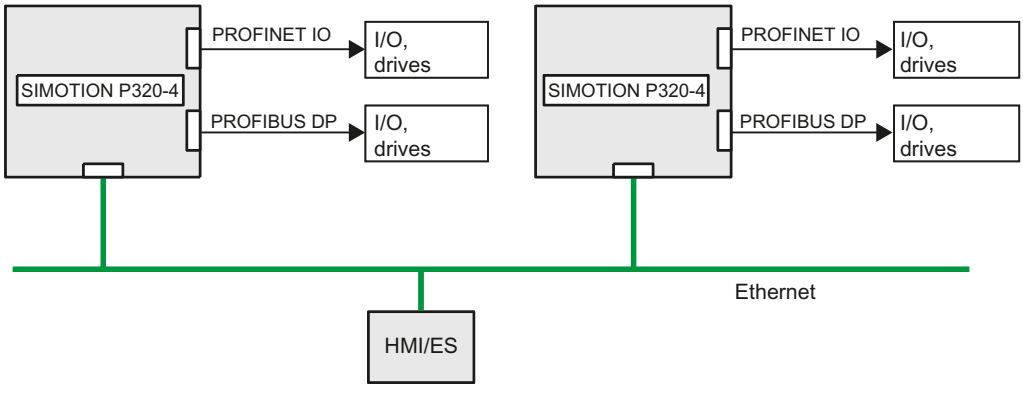


Figure 3-22 Model: Networking via Ethernet

The following services are possible on a SIMOTION device via Ethernet:

- HMI software
  WinCC flexible or the OPC server can use Ethernet to access one or more SIMOTION devices.
- SIMOTION SCOUT Engineering System
  SIMOTION SCOUT can also use Ethernet to access one or more SIMOTION devices.
- SIMOTION IT
  SIMOTION P320-4 offers communication with standard IT protocols (HTTP) over the integrated Ethernet interface.
  This makes it possible to access data or diagnostic information in the SIMOTION P320-4 from any location via intranet or the Internet.
- HTTP (browser, OPC XML)
  Setting in WebCFG.xml - default 80
- HTTPS (browser, OPC XML)
  Setting in WebCfg.xml - default 443
- FTP 21
- Telnet

Note

Information on the SIMOTION IT security concept

More detailed information on the SIMOTION IT security concept of HTTP/S, FTP and Telnet access on the Web server can be found in the following documentation:

- SIMOTION IT Diagnostics and Configuration, Diagnostics Manual, Section security concept

References

You can find further information in the documentation for SIMOTION IT:

- SIMOTION IT Diagnostics and Configuration
- SIMOTION IT Programming and Web Services
- SIMOTION IT Virtual Machine and Servlets

3.3.5 HMI or ES via IsoPROFIBUS (optional)

Networking via PROFIBUS DP

If you connect a central HMI via PROFIBUS DP, the X101 and X102 interfaces of the IsoPROFIBUS board are available.

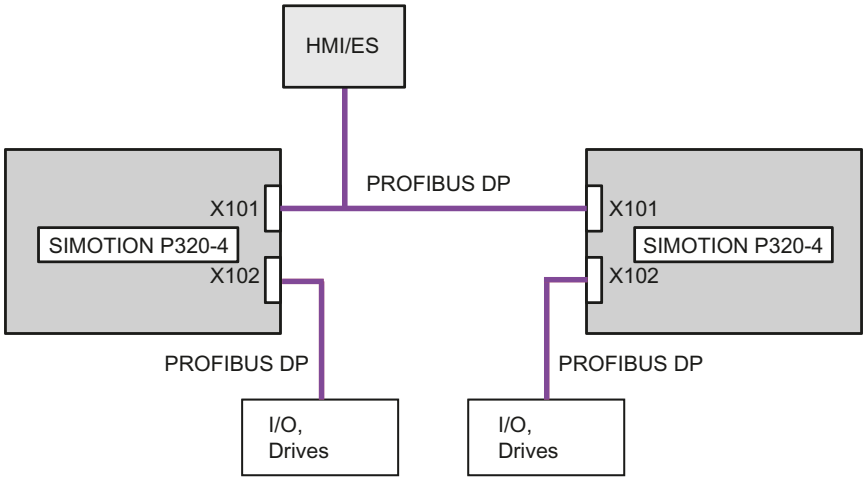


Figure 3-23 Model: Networking via PROFIBUS DP

References

You can find further information on the HMI in the documentation:

- SIMOTION Runtime Basic Functions, section HMI (Human Machine Interface) coupling.

Application planning

4

4.1 Unpacking and checking the delivery

Procedure

1. When accepting a delivery, please check the packaging for visible transport damage.
2. If any transport damage is present at the time of delivery, lodge a complaint at the shipping company in charge. Have the shipper confirm the transport damage immediately.
3. Unpack the device at its installation location.
4. Keep the **original packaging** in case you have to transport the device again.

   Note

   Damage to the device during transport and storage

   If a device is transported or stored without packaging, then shocks, vibrations, pressure and moisture may impact the unprotected device.
   A damaged packaging indicates that ambient conditions have already had a massive impact on the device.

   The device may be damaged.

   Do not dispose of the original packaging. Pack the device for transport and storage in the **original packaging**.

5. Check the contents of the packaging and any accessories you may have ordered for completeness and damage.

6. If the contents of the packaging are incomplete, damaged or do not match your order, inform the responsible delivery service **immediately**.

⚠ WARNING

Electric shock and fire hazard due to damaged device

A damaged device can be under hazardous voltage and trigger a fire in the machine or plant. A damaged device has unpredictable properties and states.

Death or serious injury could occur.

Make sure that the damaged device is not inadvertently installed and put into operation. Label the damaged device and keep it locked away. Send off the device for immediate repair.

NOTICE

Damage from condensation

If the device is subjected to low temperatures or extreme fluctuations in temperature during transportation, for example in cold weather, moisture could build up on or inside the HMI device.

Moisture can result in short-circuits in electrical circuits and damage the device.

In order to prevent damage to the device, proceed as follows:

- Store the device in a dry place.
- Bring the device to room temperature before starting it up.
- Do not expose the device to direct heat radiation from a heating device.
- If condensation develops, wait approximately 12 hours or until the device is completely dry before switching it on.

7. Please keep the enclosed documentation, it belongs to the device. You need the documentation when you commission the device for the first time.
8. Write down the identification data of the device.

4.2 Identification data of the device

Based on the identification data, the SIMOTION P320-4 device can be identified when service is required or in case of theft.

You also require the identification data in order to view further information on your SIMOTION P320-4 in the **Product Equipment Data** (PED) database.
All the important components of your SIMOTION P320-4 are stored in the PED. The entire history of the device is stored there, including the service reports.
To identify yourself in the PED database, enter the article number and the serial number of your device.

Link to the PED database

The Product Equipment Data database is available on the Internet via the following link (http://www.siemens.com/ped).

Identification data

Enter the identification data in the following table:

Identification data	Source	Value
Serial number	Rating plate	S VP ...
Article number of the device	Rating plate	6AU1320-...
Microsoft Windows Product Key Certificate of Authenticity (COA)	Rear of the device	Only devices with preinstalled Windows operating systems have COA labels
Ethernet address 1	BIOS setup, menu "Advanced", "Peripheral Configuration"	Input by the user.
PROFINET onboard MAC Address Layer 2		
PROFINET onboard MAC Address PROFINET		

SIMOTION P320-4 rating plate

Example of SIMOTION P320-4 S (standard)

You will find the following data on the rating plate of the SIMOTION P320-4:

- Device designation (here): SIMOTION P320-4 S
- Article number of the device (here): 6AU1320-4DS66-3AG0
- Serial number S VP<...>
  The computing unit is uniquely identifiable with the serial number at S VP <...>.
  <...> is an 8-digit character string.
- cULus Approval
- CE marking

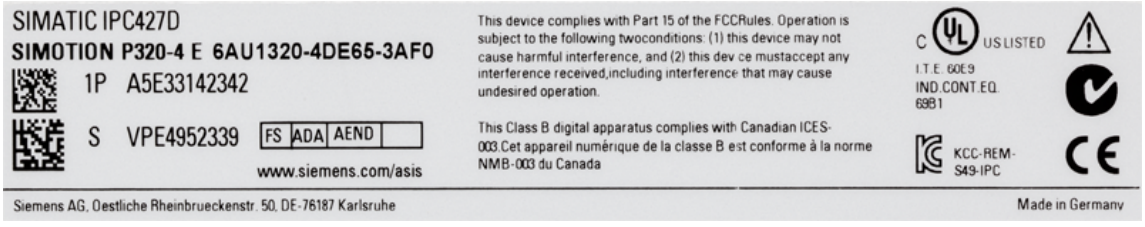


Figure 4-1 SIMOTION P320-4 rating plate

MAC addresses

Example of SIMOTION P320-4 S (standard)

In addition to the data that is found on the SIMOTION P320-4 rating plate, the MAC address plate also contains the **Onboard MAC addresses** for:

- ETHERNET (LAN) X1: VIPCTYSMAC1
- PROFINET (LAN) X3: VIPCTYSPROFINET

The data cited here is not real data.

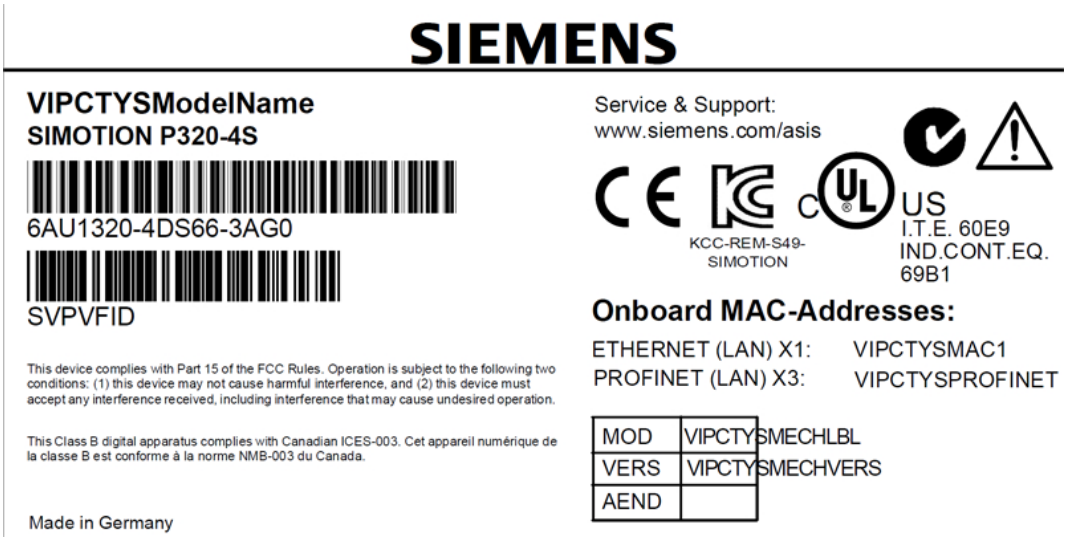


Figure 4-2 SIMOTION P320-4 S rating plate - MAC addresses

Example of a COA label

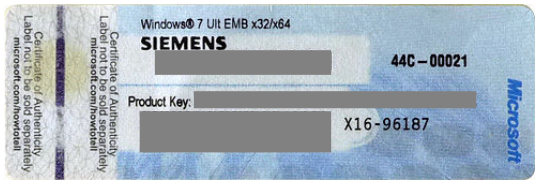
Microsoft Windows "Product Key" of the "Certificate of Authenticity" (COA):
The COA label is attached to the rear of all devices containing a Windows Embedded Standard 7 or Windows 7 operating system.

- COA label of a device with Windows Embedded Standard 7 32-bit operating system



Figure 4-3 ipc477d label coa 01

- COA label of a device with Windows 7 operating system



4.3 Permissible mounting positions

Information on the permissible mounting positions for the SIMOTION P320-4 can be found in the section Installation/mounting > Permissible mounting positions (Page 95).

4.4 Environmental conditions

Operating conditions

The SIMOTION P320-4 is designed for use in stationary, weather-protected locations.
The operating conditions exceed requirements according to EN 61131-2.

Observe the following points during installation:

- Note the climatic and mechanical environmental conditions specified in Section Technical specifications (Page 121).
- The device is designed for use in a normal industrial environment. Without additional protective measures (such as the provision of clean air), the SIMOTION P320-4 computing unit cannot be used in places with severe operating environments, for example, locations with corrosive vapors or gases.
- The clearance in the area of the ventilation slots must be at least 100 mm, so that the SIMOTION P320-4 receives sufficient ventilation.
- Do not cover the ventilation slots of the device.
- The DC power supply does not meet requirements according to EN 60950-1 in the area of the power unit connection. As such, SIMOTION P320-4 must be installed so that it is part of an operating area with restricted access (e.g. a locked control cabinet, console or server room).
- Always observe the mounting positions permitted for this device.
- The connected or installed I/O should not generate a reverse voltage greater than 0.5 V in the device.

⚠ WARNING

Invalidation of the approvals

Failure to adhere to these conditions when installing the system will invalidate approvals according to UL 60950-1, UL 508, and EN 60950-1!

Use prohibition

Without additional measures, the SIMOTION P320-4 should not be used in

- Locations with a high percentage of ionizing radiation
- Aggressive environments characterized, for example, by:
  - Dust accumulation
  - Corrosive vapors or gases
- at locations outside of the prescribed ambient conditions
- Installations requiring special monitoring such as:
  - Elevator installations
  - Electrical plants in particularly hazardous areas

An additional measure for using the SIMOTION P320-4 could be its installation in a cabinet.

Ambient conditions

For the mechanical and climatic environmental conditions, refer to the technical specifications in the section Ambient conditions (Page 124).

4.5 Electromagnetic compatibility

Definition

Standards for electromagnetic compatibility (EMC) are fulfilled if the EMC Installation Guideline is complied with.

See also:

Further information is provided in the Appendix, Section General regulations (Page 139).

Interfaces

5

5.1 Hardware components of the SIMOTION P320-4

Note

The article numbers of the components listed below can be obtained from the online catalog in the Siemens Industry Mall (http://www.siemens.com/industrymall).

SIMOTION P320-4 complete system

The SIMOTION P320-4 device is supplied with the integrated PROFINET onboard communication module.

An additional IsoPROFIBUS board can be inserted as required.

SIMOTION P320-4 spare parts

The SIMOTION P320-4 consists of the following hardware components:

- **SIMOTION P320-4** computing unit
- **Back-up battery** for the motherboard of the SIMOTION P320-4
- IsoPROFIBUS board (optional communication module for the SIMOTION P320-4)

Operation and display

The following hardware components for operation and display can be used:

- SIMATIC Industrial Flat Panel, in the variants IFP1500, IFP1900 or IFP2200.

Power supply of the SIMOTION P320-4

The power supply must satisfy the requirements as described in section Connecting the power supply (24 VDC) (Page 109). This can be ensured by using the following devices, for example:

- SITOP smart 24 V / 10 A
- 24 VDC UPS (optional)

Drives and I/O modules

The drives and I/O modules released for use with SIMOTION are specified on the website: www.siemens.com/simotion (www.siemens.com/simotion)

Note

Please note that not all modules of the I/O or I/O systems mentioned are approved for SIMOTION. Moreover, system-related functional differences can occur when these I/O or I/O systems are used on SIMOTION rather than SIMATIC. For example, special process-control functions (hot swapping, etc.) are not supported by SIMOTION for the ET 200M distributed I/O system.

A detailed and routinely updated list of I/O modules released for SIMOTION as well as instructions on their use is provided on the Internet at Siemens Product Support (https://support.industry.siemens.com/cs/ww/en/view/11886029).

In addition to the I/O modules approved for SIMOTION, all certified standard slaves can, in principle, be connected to SIMOTION provided that they support the following data traffic:

- Cyclic data traffic (DP V0)
- Acyclic data traffic (DP V1)
- Isochronous data traffic (DP V2)

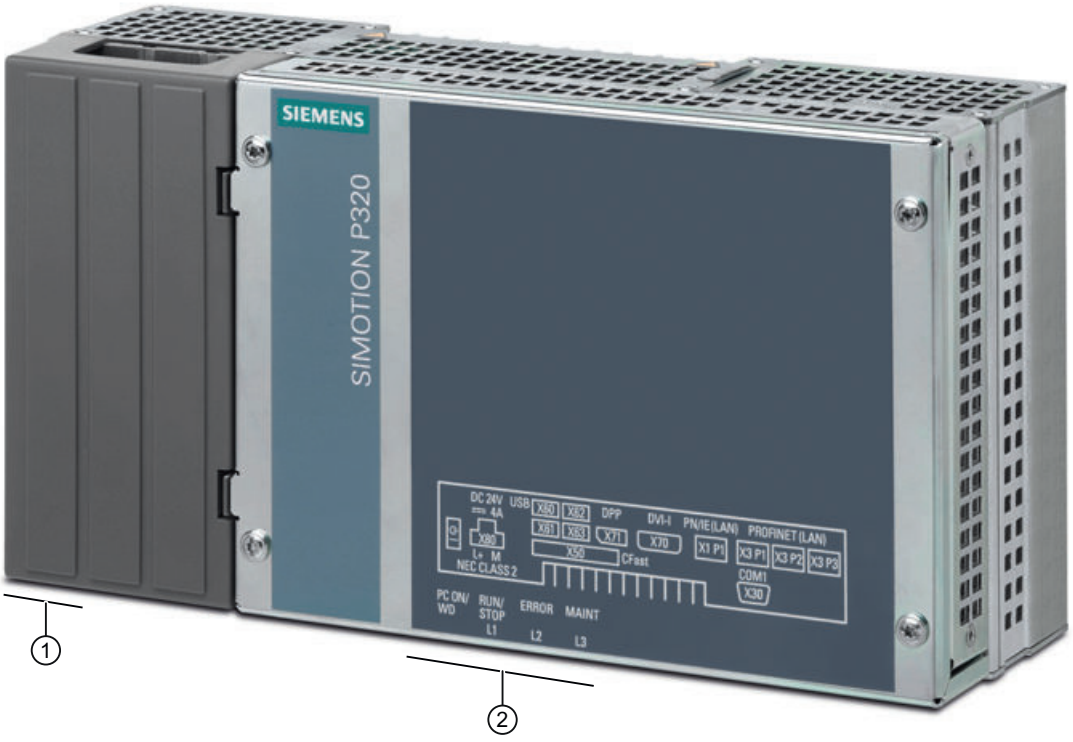
These modules are integrated via the GSD file of the device's manufacturer.

Note

Please note that in individual cases, additional boundary conditions must be fulfilled in order to integrate a standard slave into SIMOTION.

5.2 Overview of operator control and display elements

The following figure shows the arrangement of the indication and control elements of the SIMOTION P320-4.



① On/Off switch
② Operating displays (LEDs)

Figure 5-1 SIMOTION P320-4 control and display elements

5.3 Control elements

On/Off switch



① **Requirement**:
The BIOS setup entry **After Power Failure** is set to **Power on**.
The On/Off switch is used to switch the SIMOTION P320-4 on.

Figure 5-2 SIMOTION P320-4 - operator controls

⚠ WARNING

De-energize the SIMOTION P320-4!

The On/Off switch does not disconnect the device from the power supply system.
When the switch is in position **0** (Off), the device is still supplied with mains voltage.

To remove power from the device, the power supply plug must be removed.

NOTICE

Close down the operating system first

First close down the operating system before switching off the device with the on/off switch, otherwise data may get lost.

5.4 Status displays

The status indicators below the interfaces are described in the following table.

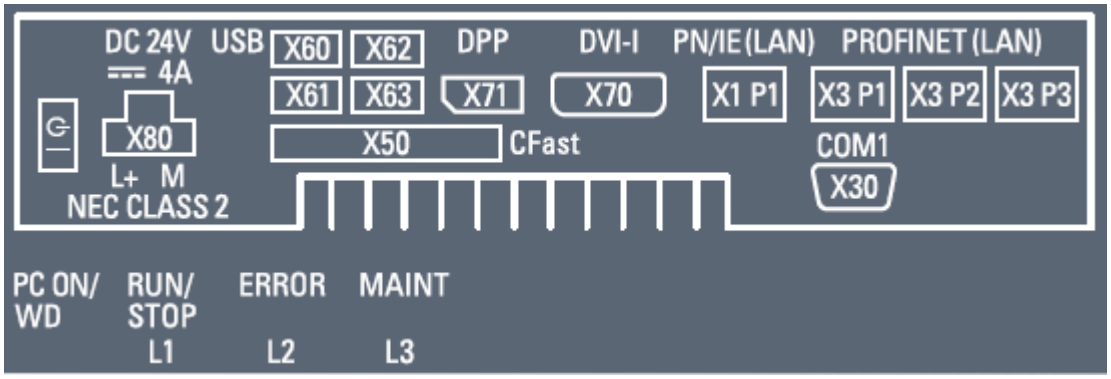


Figure 5-3 SIMOTION P320-4 status indicator

LED	Meaning	State	Description
PC ON/ WD	Power supply	Green	BIOS ready to boot. Indicates the correct supply voltage of 3.3 V, 5 V and 12 V from the integrated power unit.
		Off	Not relevant.
		Green/yellow flash-ing (1 Hz)	BIOS in POST, power switch on.
		Yellow	Idle state
RUN/STOP or L1	RUN STOP	Off	SIMOTION P Runtime is not running.
		Green	SIMOTION P320-4 in RUN.
		Yellow	SIMOTION P320-4 in STOP.
		Green/yellow: Flashes quickly (2 Hz)	DCP flashing
		Yellow: Flashes quickly (5 Hz)	FAULT state (only in combination with L2 and L3)

LED	Meaning	State	Description
ERROR or L2 (SF PROFINET LED)	-	Off	SIMOTION P320-4 is working error-free.
	Error	Red: Continuous light	Bus error at the PROFINET interface.
		Red: Flashes quickly (2 Hz)	Erroneous configuration.
		Red: Flashes quickly (5 Hz)	FAULT state (only in combination with L1 und L3)
	INIT	Red: Flashes slowly (0.5 Hz)	During the INIT process, the SF PROFINET LED is controlled by the boot loader. The precise flashing behavior therefore cannot be determined and displayed. In the INIT state, 0.5 Hz flashing is displayed in the SIMOTION P State. If no project has yet been loaded, 0.5 Hz flashing is also displayed for the INIT, which, in this case, is also retained in the Running state.
MAINT or L3 (SF LED)	-	Off	SIMOTION P320-4 works error-free.
	Error	Red	An event has occurred which needs to be acknowledged (alarm, message, notification). (See Diagnostics Guide)
		Red: Flashes slowly (0.5 Hz)	License missing for licensed technology objects. Carry out the licensing to correct the error. Further information on the licensing can be found in the SIMOTION P320-4 E / SIMOTION P320-4 S Commissioning and Hardware Installation Manual.
		Red: Flashes quickly (5 Hz)	FAULT state (only in combination with L1 and L2) A fault has occurred to which the user program cannot respond. The following actions may be required to rectify the fault: • Power OFF/ON • Recommissioning

5.5 Overview of the SIMOTION P320-4 interfaces

The following table provides an overview of the SIMOTION P320-4 interfaces.

Table 5-1 Overview of the interfaces

Interface	Description	Further information
PROFINET	Three PROFINET ports with RJ45 socket	PROFINET onboard interface (Page 87)
Ethernet	1 x 8-pole RJ45 interface	Ethernet RJ45 interface (Page 88)
DVI-I	26-pin socket for connection of a CRT or LCD monitor with DVI interface or VGA with DVI/VGA adapter	DVI-I interface (Page 88)

Interface	Description	Further information
Display port	20-pole DPP interface	Display port interface (Page 90)
USB 3.0	Lower USB channel 0, upper USB channel 1 Lower USB channel 2, upper USB channel 3	USB 3.0 interface (Page 90)
CFast card	Slot for CFast card 50-pin CF socket, types I/II	CFast card (Page 91)
COM1	Serial interface *V.24*	Serial interface COM1 (Page 92)
IsoPROFIBUS board (optional)	2 x 9-pin socket	IsoPROFIBUS board (optional) (Page 92)

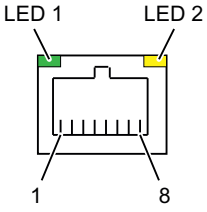
5.6 PROFINET onboard

Interface assignment

Designation: PROFINET LAN, X3, 3 ports: P1, P2, P3

Type: 8-pin RJ45 socket

PROFINET onboard LAN (X3) interface



Pin no.	Short description	Meaning	Input/output
1	RD+	Receive data [2]	Input
2	RD-	Receive data [2]	Input
3	TD+	Send data [2]	Output
4, 5 [1]	SYMR	Internal 75 Ohm terminating resistor	-
6	TD-	Receive data [2]	Output
7, 8 [1]	SYMT-	Internal 75 Ohm terminating resistor	-
S	-	Shield	-
-	LED 1	Lights up green: Link	-
-	LED 2	Lights up yellow: Activity	-

[1] Optional product feature

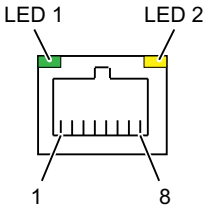
[2] Autonegotiation and autocrossover are supported.

5.7 Ethernet

Interface assignment

Designation: PN/IND. Ethernet (LAN), X1

Type: 8-pin RJ45 socket

Ethernet RJ45 interface			
			
Pin no.	**Short description**	**Meaning**	**Input/output**
1	BI_DA+	Bi-directional data A+	Input/output
2	BI_DA-	Bi-directional data A-	Input/output
3	BI_DB+	Bi-directional data B+	Input/output
4	BI_DC+	Bi-directional data C+	Input/output
5	BI_DC-	Bi-directional data C-	Input/output
6	BI_DB-	Bi-directional data B-	Input/output
7	BI_DD+	Bi-directional data D+	Input/output
8	BI_DD-	Bi-directional data D-	Input/output
S	–	Shield	–
	LED 1	Off: 10 Mbps Green light: 100 Mbps Orange light: 1000 Mbps	–
	LED 2	Lit: Active connection, e.g., to a hub Flashing: Activity	–

Note

The interfaces available on the device have been numbered for unique identification.

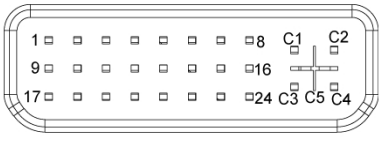
This numbering may deviate, however, from the numbering assigned by the operating system.

5.8 DVI-I

Interface assignment

Designation: DVI/VGA, X70

Type: 26-pin socket

DVI-I interface (standard socket)			
			
Pin no.	**Short description**	**Meaning**	**Input/output**

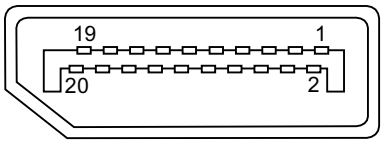
DVI-I interface (standard socket)			
1	TMDS Data2-	DVI data channel	Output
2	TMDS Data2+	DVI data channel	Output
3	TMDS Data2/4 shield	Cable shield	-
4	NC	-	-
5	NC	-	-
6	DDC clock (SCL)	Display Data Channel – Clock	Input/output
7	DDC data (SDA)	Display Data Channel – Data	Input/output
8	Analog vertical sync (VSYNC)	Analog Vertical Sync Signal	Output
9	TMDS Data1-	DVI data channel	Output
10	TMDS Data1+	DVI data channel	Output
11	TMDS Data1/3 shield	Cable shield	-
12	NC	-	-
13	NC	-	-
14	+5 V power (VCC)	+5 V power for DCC	Output
15	Ground (return for +5 V, Hsync and Vsync) (GND)	Analog ground	-
16	Hot Plug Detect	-	-
17	TMDS data 0-	DVI data channel	Output
18	TMDS data 0+	DVI data channel	Output
19	TMDS Data0/5 shield	Cable shield	-
20	NC	-	-
21	NC	-	-
22	TMDS clock shield	Cable shield	-
23	TMDS clock+	DVI clock channel	Output
24	TMDS clock-	DVI clock channel	Output
C1	Analog red (R)	Analog red signal	Output
C2	Analog green (G)	Analog green signal	Output
C3	Analog blue (B)	Analog blue signal	Output
C4	Analog horizontal sync (HSYNC)	Analog horizontal sSync signal	Output
C5	Analog ground (analog R, G, & return) (GND)	Analog ground	-

5.9 DisplayPort

Interface assignment

Designation: Display port interface, X71

Type: 20-pole DPP interface

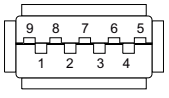
Display port interface			
			
Pin no.	**Short designation**	**Meaning**	**Input/output**
1	ML_Lane0+	DP data 0+	Output
2	GND	Ground	-
3	ML_Lane0-	DP data 0-	Output
4	ML_Lane1+	DP data 1+	Output
5	GND	Ground	-
6	ML_Lane1-	DP data 1-	Output
7	ML_Lane2+	DP data 2+	Output
8	GND	Ground	-
9	ML_Lane2-	DP data 2-	Output
10	ML_Lane3+	DP data 3+	Output
11	GND	Ground	-
12	ML_Lane3-	DP data 3-	Output
13	CONFIG1 CAD	Cable Adapter Detect	Input
14	CONFIG2	Ground (PullDown)	-
15	AUX_CH+	Auxiliary channel+	Bidirectional
16	GND	Ground	-
17	AUX_CH-	Auxiliary channel-	Bidirectional
18	HPD	Hot Plug Detect	Input
19	GND	Ground	-
20	DP_PWR	+3.3V (fused)	Output

5.10 USB 3.0

Interface assignment

Designation: USB X62, X61, X62, X63

Type: 9-channel *high current*

USB 3.0 interface			
			
Pin no.	**Short designation**	**Meaning**	**Input/output**
1	VBUS	+ 5 V (fused)	Output
2	D-	Data line	Input/output

USB 3.0 interface			
3	D+	Data line	Input/output
4	GND	Ground	–
5	RX-	Data line	Input
6	RX+	Data line	Input
7	GND	Ground	–
8	TX-	Data line	Output
9	TX+	Data line	Output

5.11 CFast card

Pin assignment of the interface

Designation: CFast X50

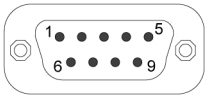
Pin no.	Short designation	Meaning
S1	SGND	Signal GND (ground for signal integrity)
S2	A+	SATA differential
S3	A-	SATA differential
S4	SGND	Signal GND (ground for signal integrity)
S5	B-	SATA differential
S6	B+	SATA differential
S7	SGND	Signal GND (ground for signal integrity)
PC1	CDI	Card Detect Out
PC2	GND	Device GND
PC3	TBD	TBD (not connected)
PC4	TBD	TBD (not connected)
PC5	TBD	TBD (not connected)
PC6	TBD	TBD (not connected)
PC7	GND	Device GND
PC8	LED1	LED Output (not connected)
PC9	LED2	LED Output (not connected)
PC10	IO1	Reserved Input/Output (not connected)
PC11	IO2	Reserved Input/Output (not connected)
PC12	IO3	Reserved Input/Output (not connected)
PC13	PWR	Device Power (3.3V)
PC14	PWR	Device Power (3.3V)
PC15	GND	Device GND
PC16	GND	Device GND
PC17	CDO	Card Detect In

5.12 COM1

Interface assignment

Designation: COM1, X30

Type: 9-pin (connector)

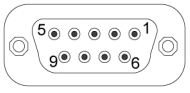
Serial interface COM1			
			
Pin no.	**Short designation**	**Meaning**	**Input/output**
1	DCD	Data carrier detect	Input
2	RxD	Receive data	Input
3	TxD	Transmit data	Output
4	DTR	Data terminal ready	Output
5	GND	Ground	-
6	DSR	Data set ready	Input
7	RTS	Request to send	Output
8	CTS	Clear to send	Input
9	RI	Incoming call	Input

5.13 IsoPROFIBUS board (optional)

Interface assignment

Designation: PROFIBUS, X101, X102

Type: 9-pin (socket)

PROFIBUS interface		
		
Pin no.	**Short designation**	**Meaning**
1-2	NC	Not connected
3	LTG_B	Data line (I/O)
4	RTS_AS	AS request to send (O)
5	GND	Ground electrically isolated
6	P5V_dp_fused	+5 V / max. 90 mA (fused) electrically isolated
7	NC	Not connected
8	LTG_A	Data line (I/O)
9	RTS_PG	PG request to send (O)

Installation/mounting 6

6.1 Installing the device

SIMOTION P320-4 is particularly suitable for installation in consoles, control cabinets and switchboards.

⚠ WARNING

Perform function test while installing the device in machines or plants

Following the results of a risk analysis, additional protection equipment on the machine or the system is necessary to avoid endangering persons. With this, especially the programming, configuration and wiring of the inserted I/O modules have to be executed, in accordance with the necessary risk analysis identified safety performance (SIL, PL or Cat.). The intended use of the device has to be secured.

The correct use of the device has to be verified with a function test on the system. This test can detect programming, configuration and wiring errors. The test results have to be documented and if necessary inserted into the relevant inputs.

6.2 Permissible mounting positions

Note

The SIMOTION P320-4 is approved for operation in closed rooms only.

Ensure the required minimum clearance to other components or enclosure panels:

- Below at least 100 mm
- Above at least 50 mm

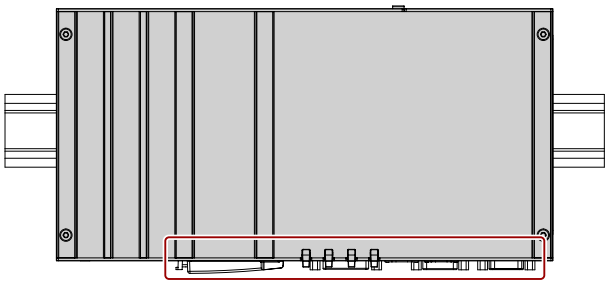
The permissible mounting positions for the SIMOTION P320-4 are standard rail mounting and vertical mounting.

Standard rail mounting

Horizontal mounting is the preferred position.

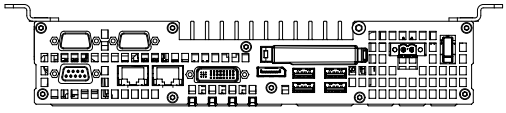
The following horizontal mounting option is permitted:

The interfaces are at the bottom.



The figure shows the interfaces on the front for representation purposes only.

For rail mounting, the interfaces always point downward.

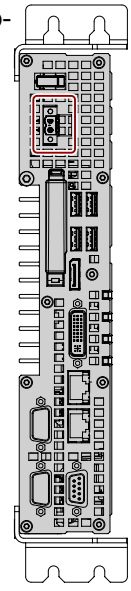


You can find mounting information under Standard rail mounting (Page 97).

Vertical mounting

The following vertical mounting option is permitted:

The interfaces are at the front. The power supply connection is at the top.



You can find information on mounting under Vertical mounting (Page 98).

Ambient conditions

Observe the permissible temperature range for operation in the respective mounting position as described in Section "Technical data > Ambient conditions (Page 124)".

6.2.1 Standard rail mounting and vertical mounting

6.2.1.1 Standard rail mounting

Requirement

- Standard mounting rail, 35 mm standard profile
  The standard mounting rail is installed at the installation site.
- The standard mounting rail clip is attached to the SIMOTION P320-4.

Note

Ensure that the wall or ceiling can hold four times the total weight of the SIMOTION P320-4 including the standard mounting rail and additional expansion cards. See section Notes on installation (Page 99).

Mounting the standard mounting rail clip

Before you can install the device on a standard mounting rail, you will need to attach the standard mounting rail clip included in the scope of delivery.

The fasteners and screws required are supplied with the device for mounting depending on the order number.

Requirement

- 1 standard mounting rail clip
- 2 screws
- 1 T20 screwdriver

Use the two screws to mount the standard mounting rail clip on the SIMOTION P320-4 enclosure.

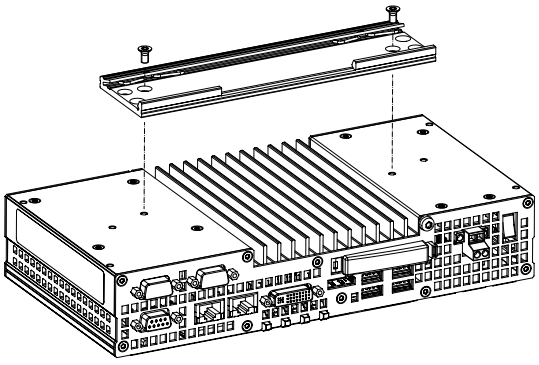
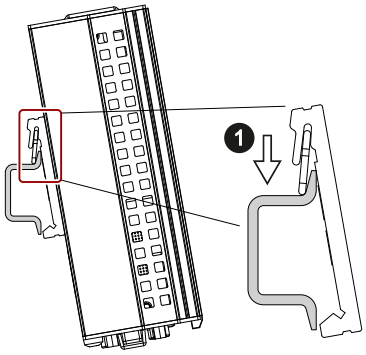


Figure 6-1 Mounting the standard mounting rail clip

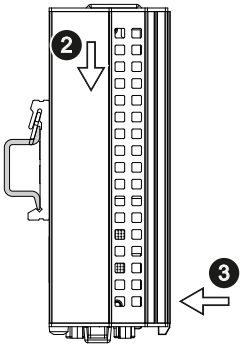
Mounting

1. Place the SIMOTION P320-4 and rail clip on the upper edge of the standard profile rail at the position shown.



2. Press the SIMOTION P320-4 slightly downward.
3. Once the rail clip slides over the bottom edge of the standard mounting rail, push the device onto the rail.

   Ensure that you hear the SIMOTION P320-4 snapping into place.



Note

To ensure secure vertical mounting on standard mounting rails, install a standard rail ground terminal beneath the device.

Removing

1. Press the SIMOTION P320-4 down until the rail clip releases the device.
2. Swing the SIMOTION P320-4 away from the standard mounting rail.
3. Lift the device up and off.

6.2.1.2 Vertical mounting

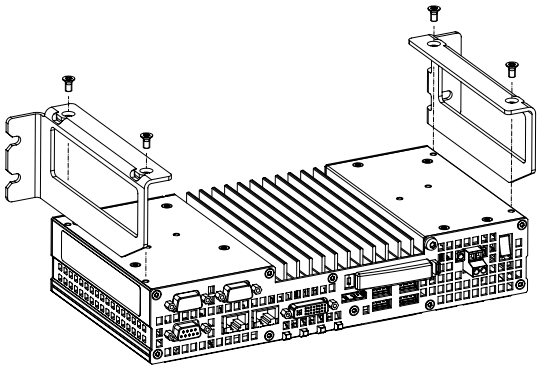
The fasteners and screws required are supplied with the device for the selected mounting option.

Requirement

- 2 mounting brackets
- 4 screws
- 1 T20 screwdriver

Procedure

1. Secure each mounting bracket with two screws.



6.3 Installation notes

Note the following:

- The SIMOTION P320-4 is approved for operation in closed rooms only.
- For installation in a control cabinet, observe the SIMATIC installation guidelines and applicable DIN/VDE requirements or other applicable country-specific regulations.
- When the device is used in the area of Industrial Control Equipment according to UL508, note that the device is classified as "Open Type". The installation of the device in a housing according to UL508 is therefore a mandatory requirement for approval or operation in according to UL508.

Securely fastening the SIMOTION P320-4

NOTICE
Insufficient load carrying capacity If the wall it is mounted on does not have a sufficient load-bearing capacity, the device may fall and be damaged. Ensure that the mounting surface on the wall can bear four times the total weight of the device, including fixing elements.

NOTICE
Incorrect fixing elements The device may not be securely fitted if you use dowels and screws other than those specified below for mounting. The device can fall and may be damaged. Use only the dowels and screws specified in the following table.

Connecting elements

The connecting elements for each mounting position are listed in the following:

- Standard rail mounting

Material	Bore diameter	Fastener
Metal, min. 2 mm thickness	5 mm	• 2 x M4 screws • 2 x M4 nuts
Concrete	6 mm, 40 mm depth	• 4 x dowels, ∅ 6 mm, 40 mm length • 4 x screws, ∅ 4 mm, 40 mm length
Plasterboard, min. 13 mm thickness	14 mm	4 x toggle bolts, ∅ 4 mm, 50 mm length

- Vertical mounting

Material	Bore diameter	Fastener
Concrete	6 mm, 40 mm depth	• 4 x dowels, ∅ 6 mm, 40 mm length • 4 x screws, ∅ 4 mm, 40 mm length
	8 mm, 40 mm depth	• Dowel, ∅ 8 mm, 40 mm length • Screw, ∅ 5 mm, 40 mm length
Plasterboard, min. 13 mm thickness	14 mm	Toggle bolt, ∅ 4 mm, 50 mm length

Mounting positions

The following mounting positions are permitted for the SIMOTION P320-4 and are described in detail in the following sections:

- Standard rail mounting (Page 95)
- Vertical mounting (Page 96)

6.4 Overview of operating modes for the SIMOTION P320-4

Overview

The following operating modes are available for mounting the SIMOTION P320-4.

The operating modes are:

- Decentralized structure
  The SIMOTION P320-4 is mounted separately from a panel in a decentralized structure.
- Headless operation
  The SIMOTION P320-4 is operated without panel.

Before mounting, the following must be noted:

Before you mount the SIMOTION P320-4 in a control cabinet or a rack, optional components are installed to expand the SIMOTION P320-4.

Example: installation of the optional IsoPROFIBUS board.

To do this, open the device and note the following procedure:

1. Open the cover of the SIMOTION P320-4.
2. Insert the optional IsoPROFIBUS board.
3. Plug in the SYNC I/O cable for synchronizing with PROFINET.
4. Close the cover.
5. Mount the SIMOTION P320-4.

Note

The installation and removal of components as well as the mounting of the SIMOTION P320-4 are described in detail in the SIMOTION P320-4 E / P320-4 S Commissioning and Hardware Installation Manual.

NOTICE
Avoid loss of warranty If you install or exchange system expansions and damage your device, the warranty becomes void.

6.5 Decentralized structure

Overview

The decentralized structure provides greater flexibility in terms of location and enables the SIMOTION P320-4 to be positioned in non-critical areas of the plant (e.g. control cabinet).

The decentralized structure of a panel with the SIMOTION P320-4 can be performed via the display port, USB or DVI connection. Please note the cable lengths that are supported for the panel.

For the use of an HMI system, the SIMATIC IFP, for example, can be connected by means of the described interfaces.

Connection

7

7.1 Requirements

General information

During the configuration of SIMOTION modules, you must pay attention to the "Electrical configuration design".

The following section provides information on wiring and networking the complete SIMOTION system.

Further information about the connection of the complete system and the individual components can be found in the SIMOTION P320-4 E / P320-4 S Commissioning and Hardware Installation Manual.

Open equipment

These modules are open equipment. This means they may only be installed in housings, cabinets, or in electrical equipment rooms that can only be entered or accessed with a key or tool. Housings, cabinets, or electrical equipment rooms may only be accessed by trained or authorized personnel. An external fire-protection housing is required.

Observe the following points during installation:

- The device should be connected only to **24 VDC** power supply networks that meet the requirements of **safety extra-low voltage** (**SELV**). The cable cross-section must be chosen large enough to ensure that no damage can result from cable overheating in the event of a short-circuit in the SIMOTION P320-4.
- Avoid extreme ambient conditions.
- Protect the device against dust, moisture, heat and severe vibration.
- Do not subject the SIMOTION P320-4 to direct sunlight.
- Install the device in such a way that it poses no danger, for example, by falling over.
- The clearance around the SIMOTION P320-4 must be at least 100 mm to ensure adequate ventilation.
- Do not cover the ventilation slots.

7.2 Overview of connections

The connection overview shows the SIMOTION P320-4 interfaces to which the appropriate I/O devices can be connected.

Note

The cabling for all elements and components of the complete system can only be carried out when disconnected from the mains.

It does not matter in which order connection takes place.

The connection of the individual components in the SIMOTION P320-4 E / P320-4 S Commissioning and Hardware Installation Manual.

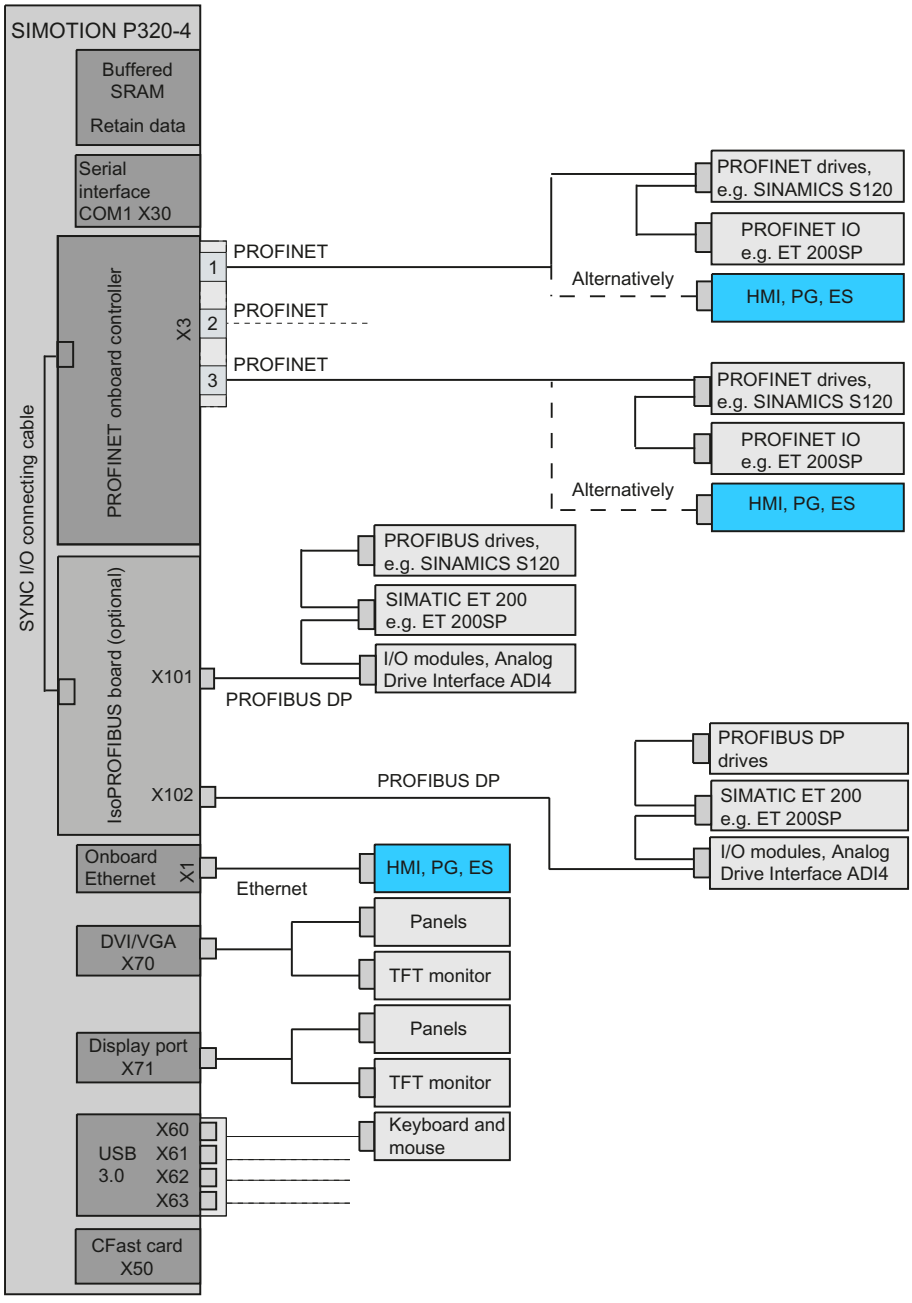


Figure 7-1 Hardware system overview - example with PROFINET onboard and optional IsoPROFIBUS board

7.3 Notes on connecting

⚠ WARNING

Risk of fire and electric shock

The On/Off switch does not isolate the device from the power supply. Risk of electric shock if the device is opened incorrectly or defective. There is also a risk of fire if the device or connecting lines are damaged.

You should therefore protect the device as follows:

- Always pull out the power plug when you are not using the device or if the device is defective. The power plug must be freely accessible.
- Connect the device to a protective conductor as instructed, see Section "Connecting the protective conductor".
- Use a central isolating switch in the case of cabinet installation.

⚠ WARNING

Risk of lightning strikes

A lightning strike may enter the mains cables and data transmission cables and reach to a person.

Death, serious injury and burns can be caused by lightning.

Take the following precautions:

- Disconnect the device from the power supply in good time when a thunderstorm is approaching.
- Do not touch mains cables and data transmission cables during a thunderstorm.
- Keep a sufficient distance from electric cables, distributors, systems, etc.

NOTICE

Fault caused by I/O devices

The connection of I/O devices can cause faults in the device.

The result may be personal injury and damage to the machine or plant.

Note the following when connecting I/O devices:

- Read the documentation of the I/O devices. Follow all instructions in the documentation.
- Only connect I/O devices which are approved for industrial applications in accordance with EN 61000-6-2 and IEC 61000-6-2.
- I/O devices that are not hotplug-capable may only be connected after the device has been disconnected from the power supply.

NOTICE

Damage through regenerative feedback

Regenerative feedback of voltage to ground by a connected or installed component can damage the device.

Connected or built-in I/Os, for example, a USB drive, are not permitted to supply any voltage to the device. Regenerative feedback is generally not permitted.

7.4 Protective conductor connection and potential equalization

The protective conductor connection is needed to protect the device and helps ensure that interference signals generated by power lines, signal lines or lines to I/O devices are safely discharged to earth.

The protective conductor connection on the device must be connected to the protective conductor of the control cabinet or system in which the device is installed.

⚠ WARNING

Electrical shock hazard and risk of fire

Internal components of a faulty device may carry dangerous voltages that pose the risk of fire or electrical shock. Risk of death and serious injury.

- Always connect the ground conductor before you commission the device.
- Never operate the device without protective conductor.
- Take a faulty device out of service immediately and mark it accordingly.

Requirement

- The device has been installed.
- 1 protective conductor, minimum cross section 2.5 mm^2
- 1 T20 screwdriver
- 1 x M4 cable lug

Procedure

1. Crimp the cable lug onto the protective conductor.
2. Screw the cable lug onto the protective conductor connection as shown.



① Protective conductor connection / potential equalization

3. Wire the protective conductor to the protective conductor connection of the control cabinet in which the device is installed.

7.5 Connecting peripheral equipment

Note

Observe suitability for industrial applications

Only connect I/O devices that are suitable for industrial applications in accordance with EN IEC 61000-6-2.

Note

I/O devices capable of hot-plugging (USB)

Hot-plug I/O devices (USB) may be connected while the PC is in operation.

NOTICE
Non-hot-plug I/O devices I/O devices that do not support hot-plugging may not be connected until the device is powered down. Strictly adhere to the specifications for peripheral equipment.

Note

Wait at least ten seconds before you reinsert USB devices.

Note that the EMC immunity of standard USB devices is designed only for office environments. These USB devices are appropriate for handling commissioning and service tasks. You may only use USB devices that are suitable for industrial applications. The USB devices are developed and marketed by the respective supplier. The respective product supplier provides support for the USB devices. The manufacturer's terms of liability shall apply.

Note

The connected or built-in I/Os, such as USB drives, should not introduce a counter EMF into the device.

Reverse voltages exceeding 0.5 V to ground that are generated by connected or installed components may prevent proper operation of the device or lead to its destruction.

7.6 Connecting the power supply (24 VDC)

Please note the following to ensure you operate the device safely and in accordance with regulations:

⚠ WARNING

Electrical shock hazard and risk of fire

Voltage exceeding SELV levels may cause fire or electric shock. Death or serious physical injury can result.

- Always wire the device to a 24 VDC power supply that is compliant with SELV requirements.
- You need a corresponding NEC Class 2 power source to comply with requirements to UL 50950-1 and UL 508 when operating the device on a wall, in an open frame, or at any other location.
- In all other cases (IEC / EN / DIN EN 60950-1), either a current source of limited output (LPS = Low Power Source), or a line-side fuse or a line-side circuit breaker is necessary. Current must be limited to 4.16 A. This requires a 4 A fuse max.

The device has reverse polarity protection.

Requirement

- The device has been installed.
- The protective conductor is connected.
- One wired terminal.
  The corresponding 24 VDC power supply is off.
- One 0.5 × 3 Philips screwdriver.

NOTICE
Damage to the device Do not turn the screws of the terminal when the terminal is inserted in the device. The device can be damaged through the pressure of the screwdriver on the terminal and consequently the connection socket. Only connect the wires to the terminal when it is unplugged.

Note

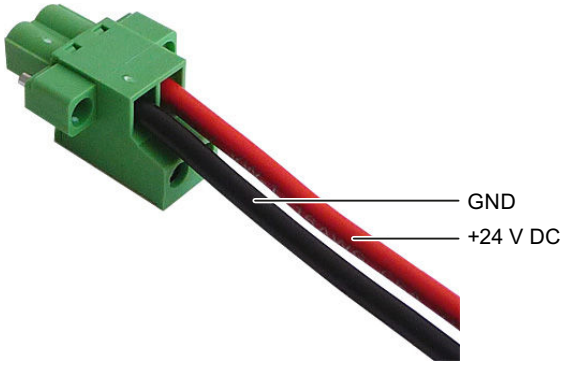
Make sure that the wires are not accidentally swapped over. Note the labeling for the contacts on the front cover of the device.

The terminal to connect the power supply is attached to the device. The terminal is designed for wires with a cross-section of 0.25 mm² to 2.5 mm². Only connect wires with a cross-section ≥ 0.5 mm².

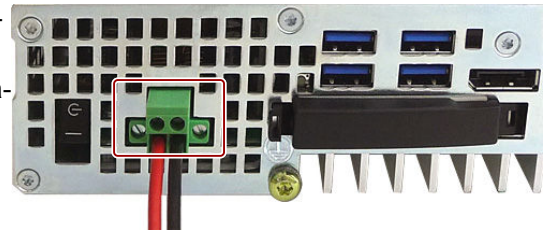
Solid or flexible cables can be used for the connection. Ferrules are not required.

Procedure

1. Connect the cables as shown.
   Note the position of the terminal.



2. Insert the terminal at the marked position.
3. Secure the terminal using the integrated screws.



7.7 Connecting the device to networks

Ethernet can be used for integrating the device into existing or planned networks.

Ethernet

The integrated Ethernet interface can be used for communication and for data exchange with automation devices such as SIMOTION SCOUT, SIMATIC S7.

Further information

Further information is available on the Internet at the Siemens Industry Mall (www.siemens.com/industrymall), the catalog and ordering system for automation and drives.

7.8 Installing the strain relief

Strain relief for the device is provided in the scope of delivery. The strain relief is designed to prevent the lines connected to the device from being accidentally pulled out.

Attaching PROFINET strain relief

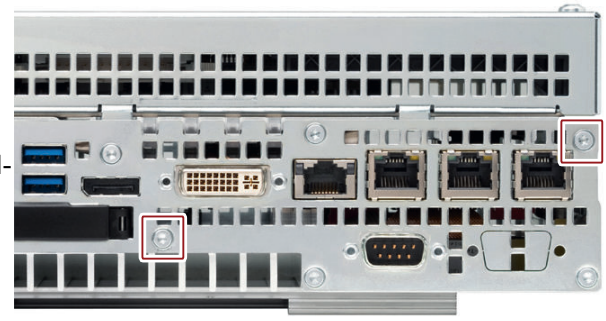
Requirement

- 1 strain relief
- 2 screws
- 1 T10 screwdriver

Mounting

1. Remove the marked countersunk screws.

2. Fasten the strain relief at the PROFINET interface(s).
   Use the oval head screws included with the strain relief.



Removing

Follow the mounting procedure in reverse to remove the strain relief.

Securing cables generally

Secure all cables connected to the device at the cable grip, each with a cable tie. The required cable ties are not part of the scope of delivery.

Requirement

- Maximum of 6 cable ties for USB, Ethernet, PROFIBUS
  Maximum cable tie width 3 mm.
- 1 cutting tool

Procedure

1. Place the cable tie around the attachment plate of the strain-relief assembly and secure the plugged-in cables.
2. Cut off the cable tie overhang.

Troubleshooting/FAQs

8

8.1 Error correction

This section provides you with tips on how to locate and troubleshoot common problems.

FAQs / error correction	Possible cause	Possible remedy
The device is not operational.	There is no power supply to the device.	• Check whether the 24 VDC power supply is connected. See Connecting the power supply (24 VDC) (Page 107). • Check whether the line side switch is activated. See Operator controls (Page 84).
SIMOTION P does not start after connecting the CFast card.	BIOS settings are not set to Hotplug Enabled.	You can find out how to check and correct the BIOS settings in Section Hotplug Enabled BIOS settings (Page 115).
SIMOTION P does not start after a reboot.	The user is not logged in automatically.	Set the password for the AutoLogin (Automatically Log On). See Section Changing the AutoLogin > SIMOTION P AutoLogin (Page 38).
The monitor remains dark.	The monitor is switched off.	Switch on the monitor.
	The monitor is in "power-save" mode.	Press any key on the connected keyboard.
	The brightness button has been set to dark.	Set the monitor brightness button to obtain more light. For detailed information, refer to the monitor operating instructions.
	The power cord or the monitor cable is not connected.	• Check whether the power cord has been properly connected to the monitor and to the system unit or to the grounded shockproof outlet. • Check whether the monitor cable has been properly connected to the system unit and to the monitor.
		If the monitor screen still remains dark after you have performed these checks, please contact your technical support team.
The mouse pointer does not appear on the screen.	The mouse driver is not loaded.	Check whether the mouse driver is properly installed and present when you start the application program. For more detailed information on the mouse driver, refer to the documentation for the mouse or application programs.
	The mouse is not connected.	Check whether the mouse is properly connected to the system unit. If you use an adapter or extension on the mouse cable, also check the connectors.
		If the cursor still does not appear on the screen after you have performed these checks and measures, please contact your technical support team.

FAQs / error correction	Possible cause	Possible remedy
Error message on the screen: Operating system not found	• No operating system present. • Incorrect active boot partition. • Incorrect drive entries in the SETUP.	Check whether one of the specified causes is present:
Wrong time and/or date on the PC.	-	• Press <ESC> during the boot sequence to open BIOS Setup. • Set the time and date in the setup menu.
Although the BIOS setting is OK, the time and date are still wrong.	The backup battery is empty.	Replace the backup battery. See SIMOTION P320-4 E / P320-4 S Commissioning and Hardware Installation Manual > Service and maintenances > Replacing the backup battery. If the problem cannot be resolved by replacing the battery, then contact your technical support team.
UPS does not function.	The operating system does not have a suitable driver for the UPS.	Install a suitable driver; the correct driver can often be downloaded from the homepage of the device's manufacturer. Note the SIMOTION P320-4 E / P320-4 S Commissioning and Hardware Installation Manual > Power on and software installation > Customer-specific software.
The display in the BIOS for the PROFINET MAC address is incorrect (00:00:00:00:00:00).	-	The correct MAC addresses can be taken from the rating plate on the housing. See also Device identification data (Page 76), Section MAC addresses.

8.2 Hotplug Enabled BIOS settings

Starting the BIOS setup

Proceed as follows:

1. Reset the SIMOTION P320-4 (warm or cold restart).
   Depending on the device version, the default settings may differ from the following figures.
2. After completing the startup test, you can start the program setup with BIOS.
   The following message is shown on the display:



Figure 8-1 SIEMENS Press Esc boot options

Press **Esc**.

3. After booting, the BIOS selection menu is displayed:



Figure 8-2 BIOS selection menu

4. The following buttons are available in the BIOS selection menu:

Button	Function
Continue	Exit BIOS menu, continue with the startup process
Boot Manager	Selection of the boot drive
Boot From File	Starting from a .EFI file
SCU	Device configurator (Setup Configuration Utility)
BIOS Update	BIOS update from USB stick
MEBx	Start the Intel Management Engine BIOS Extension

5. Select the **SCU** device configurator.

6. In the BIOS window, select the **Advanced** tab using the arrow keys and then select **IDE Configuration**.
   Press Enter to confirm the selection.

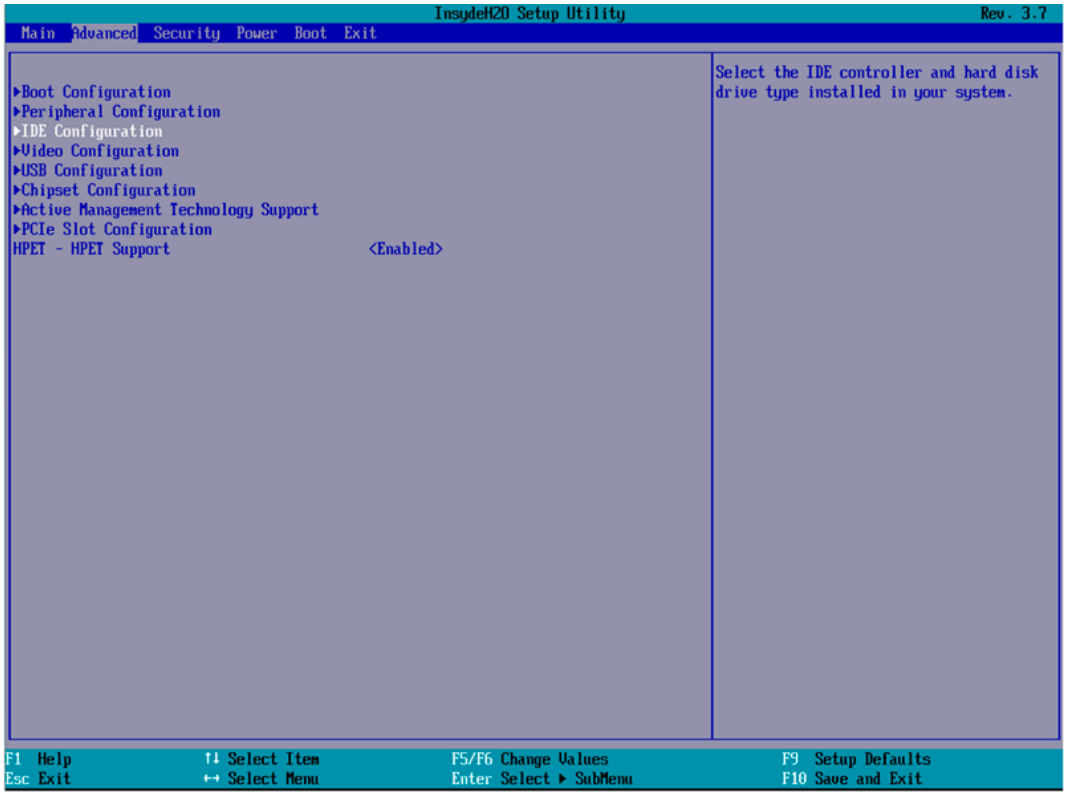


Figure 8-3 Advanced > IDE configuration

7. In the **IDE Configuration** window, select **SATA Port 2 HotPlug**.

8. Change the **Disabled** selection shown here to **Enabled**.

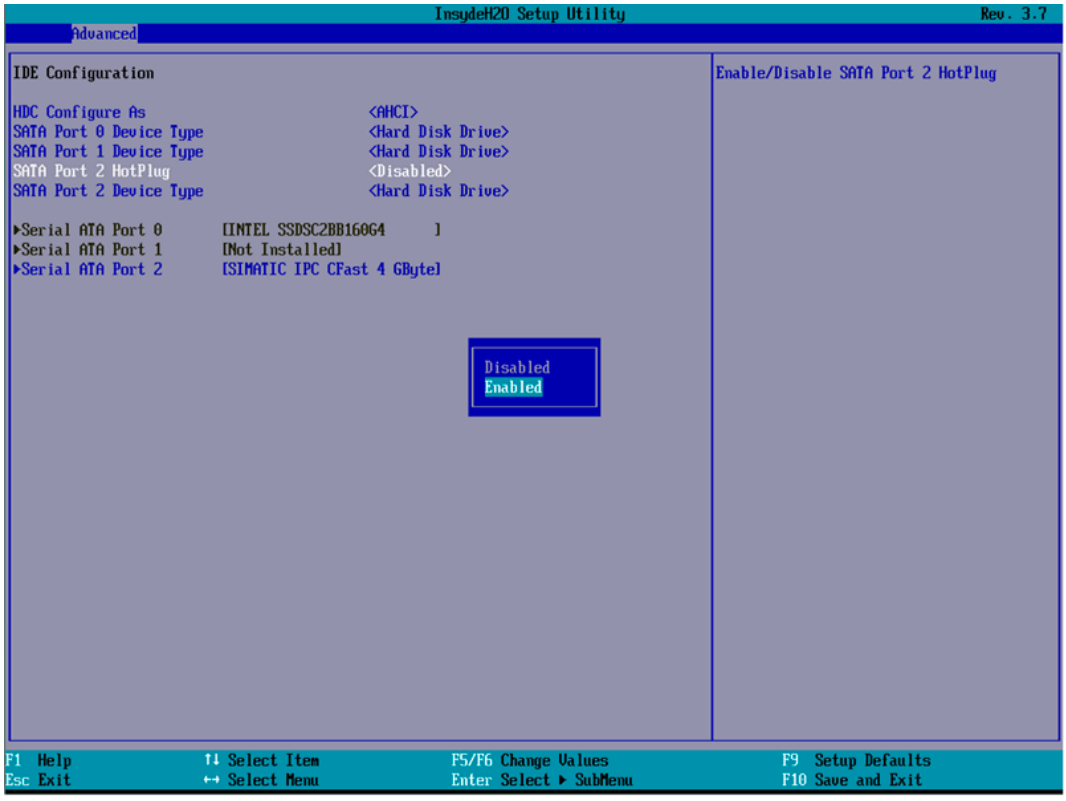


Figure 8-4 IDE Configuration > SATA Port 2 HotPlug

9. Press **F10** Save and Exit. The new entries are accepted.
10. Confirm the subsequent prompt to save the settings and exit the BIOS setup with **Yes**.

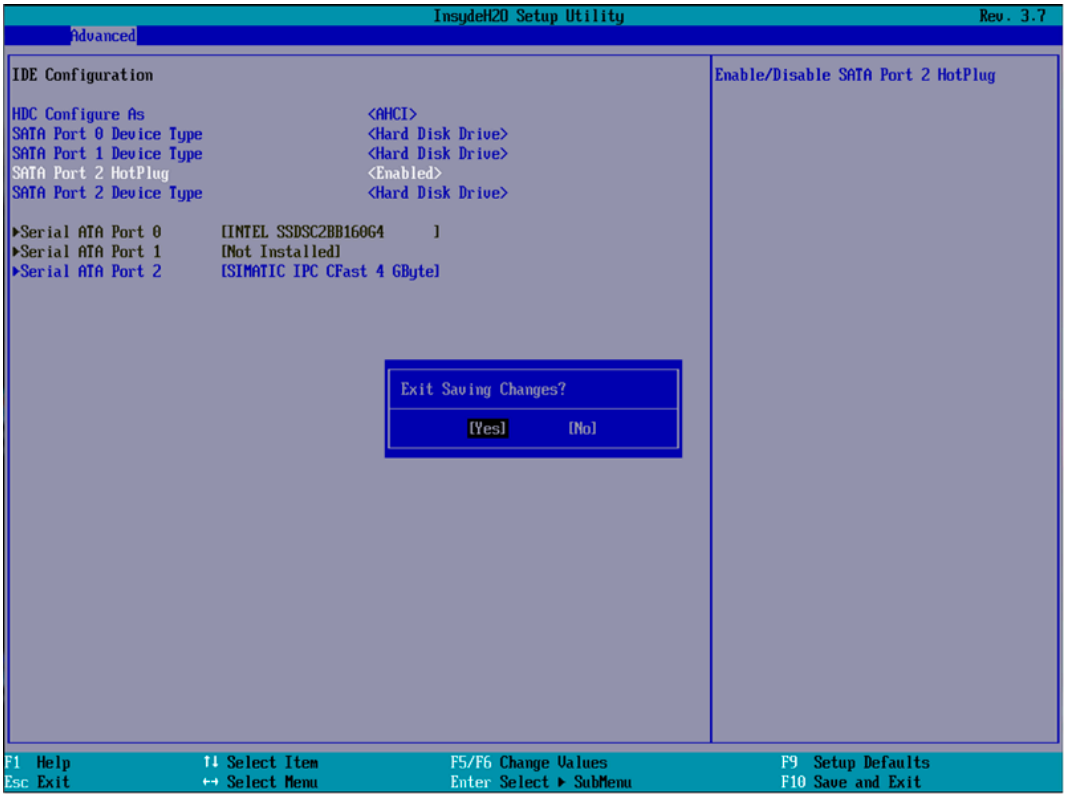


Figure 8-5 Confirming SATA Port 2 HotPlug > Enabled

Technical data

9

9.1 Overview of the technical specifications

Overview

The following technical specifications are available for SIMOTION P320-4 and the associated hardware components:

- General SIMOTION P320-4 technical specifications (Page 121)
- Ambient conditions (Page 124)
  - Climatic conditions
  - Mechanical conditions
- Technical specifications of the IsoPROFIBUS board (Page 125)
- Power requirement of the components (Page 126)
- Integrated DC voltage supply (Page 127)
- Technical specifications of the SITOP smart 24 V / 10 A (Page 127)
- Typical power consumption (Page 129)

9.2 General technical specifications

General technical specifications

General technical specifications for SIMOTION P320-4	
Article numbers	**SIMOTION P320-4 E** • 6AU1320-4DE65-3AF0 **SIMOTION P320-4 S** • 6AU1320-4DS66-3AG0
Dimensions	262 × 133 × 50.5 (W × H × D in mm)
Weight	Approximately 2 kg
Supply voltage (DC) [1]	24 VDC [1] (-20%/+20%)
Short-term voltage interruption in accordance with Namur	Min. 15 ms (at 20.4 V) Max. 10 events/h; recovery time min. 1 s
Max. power consumption	64.8 W (at 24 V)
Degree of protection	IP 20 according to IEC 60529
Protection class	Protection class I according to IEC 61140

General technical specifications for SIMOTION P320-4	
Safety regulations	EN 60950-1; UL 60950-1; UL 508;
Noise emission	<40dB (A) to DIN 45635-1
Quality assurance	In accordance with ISO 9001

[1] The upstream power supply must generate a safety extra-low voltage with safe electrical isolation according to IEC 60364-4-41 or an NEC Class 2 SELV and LPS according to IEC/ UL/EN/ DIN-EN 60950-1 (see the section "Connecting the power supply (24 V DC) (Page 107)").

Electromagnetic compatibility

Electromagnetic compatibility	
Interference emission	EN 61000-6-3, EN 61000-6-4, CISPR220 class B; FCC class A
Immunity with regard to conducted interference on the supply lines	± 2 kV according to IEC 61000-4-4; burst ± 1 kV according to IEC 61000-4-5; symmetrical surge ± 2 kV according to IEC 61000-4-5; asymmetrical surge
Noise immunity on signal lines	± 1 kV according to IEC 61000-4-4; burst; length < 3 m ± 2 kV according to IEC 61000-4-4; burst; length > 3 m ± 2 kV according to IEC 61000-4-5; surge; length > 30 m
Immunity to electrostatic discharge	± 6 kV contact discharge according to IEC 61000-4-2 ± 8 kV air discharge according to IEC 61000-4-2
Immunity to RF interference	10 V/m 80–1000 MHz and 1.4–2 GHz, 80% AM according to IEC 61000-4-3 1 V/m 2–2.7 GHz, 80% AM according to IEC 61000-4-3 10 V 10 kHz to 80 MHz, 80% AM according to IEC 61000-4-6
Immunity to magnetic fields	100 A/m, 50/60 Hz according to IEC 61000-4-8

Motherboard

Motherboard	
Processor	• Intel Core i3-3217UE 1.6 GHz, 3 MB SLC (SIMOTION P320-4 E) • Intel Core i7-3517UE 1.7 GHz, 4 MB SLC (SIMOTION P320-4 S)
Main memory	4 GB
Buffer memory	512 KB MRAM

Drive and memory media

Drive and memory media	
Solid State Disk (SSD)	≥ 80 GB Standard (SIMOTION P320-4 S)
CFast card	≥ 4 GB

Graphics

Graphics	
Graphics controller	Integrated Intel HD2000 or HD4000
Graphics memory	32 - 512 MB Shared Memory
Resolutions, frequencies, color depth	DVI-I: 640 × 480 to 1920 × 1200 / 60 Hz Display port: max. 1920 ×1200 / 60 Hz

Interfaces

Interfaces	
COM1	RS232, 115 kbps max., 9-pin SUB-D, male
DVI-I	Connection of display devices with DVI connector
Display port (DPP)	Connection of display devices with DPP connector
Keyboard	USB support
Mouse	USB support
USB	4 × USB 3.0
PROFINET	3 × RJ45 connector, onboard interface on ERTEC 400 basis, 100 Mbps electrically isolated
Ethernet	1 × Ethernet interface (RJ45) 10/100/1000 Mbps, electrically isolated, with teaming function

9.3 Ambient conditions

Climatic conditions

Temperature	Tested according to IEC 60068-2-1, IEC 60068-2-2, IEC 60068-2-14
- During operation	**Standard rail mounting (preferred mounting position)**:
	Operation with CFast card and/or SSD: • With max. 1 expansion card (max. load 10 W): 0 to +40° C • With max. 1 expansion card (max. load 10 W) in RAL [2]: 0 to +50° C [1] Operation with CFast card: • Without expansion cards in RAL [2]: 0 to +55° C [1]
	Vertical mounting:
	Operation with CFast card and/or SSD: • Without expansion cards: 0 to +40° C Operation with SSD: • With max. 1 expansion card (max. load 10 W) in RAL [2]: 0 to +45° C [1] Operation with CFast card: • Without expansion cards in RAL [2]: 0 to +50° C [1] • With max. 1 expansion card (max. load 10 W): 0 to +40° C • With max. 1 expansion card (max. load 10 W) in RAL [2]: 0 to +50° C [1]
- During storage/shipping	-40 °C to +70 °C (for devices with CFast or SSD)
- Gradient	Operating mode: Max. 10° C/h; Storage: 20° C/h; no condensation
Relative humidity	Tested according to IEC 60068-2-78, IEC 60068-2-30
- During operation	5% to 80% at 25° C (no condensation)
- During storage/shipping	5% to 95% at 25° C (no condensation)
Air pressure	
- During operation	1080 to 795 hPa (corresponds to an altitude of -1000 m to 2000 m)
- During storage/shipping	1080 to 660 hPa (corresponds to an altitude of -1000 m to 3500 m)

[1] For P320-4 S you must set "Turbo Mode Level" to "Temperature optimized" in the "Power" menu, selection "Advanced CPU Control", of the BIOS Setup; otherwise you have to reduce the maximum ambient temperature by 5 °C.

[2] RAL = Restricted Access Location
Installation of device in operating facilities with restricted access, for example, a locked control cabinet.

Mechanical conditions

Vibration	Tested according to DIN IEC 60068-2-6
- During operation	With CFast card or SSD: 5 to 9 Hz: 3.5 mm 9 to 500 Hz: 9.8 m/s2
- During storage/shipping	5 to 9 Hz: 3.5 mm 9 to 500 Hz: 9.8 m/s2
Resistance to shock	Tested according to DIN IEC 60068-2-27
- During storage/shipping	250 m/s^2, 6 ms

9.4 Technical data of the IsoPROFIBUS board

Technical specifications of the IsoPROFIBUS board (optional)

Table 9-1

IsoPROFIBUS board		
Power consumption for + 5 V PCI voltage		
Standard	2.5 W	
Maximum	3.5 W	
Permissible ambient conditions		
Heat dissipation	Open circuit ventilation	
Temperature	**Operation**	**Storage/transport**
• IsoPROFIBUS board in the SIMOTION P320-4	5° C to 45° C	-20° C to 60° C
Tested according to	EN 60068-2-1, EN 60068-2-2, EN 60068-2-14	
Relative atmospheric humidity	**Operation**	**Storage/transport**
• IsoPROFIBUS board in the SIMOTION P320-4	5 % … 80 %	5 % … 95 %
Tested according to	EN 60068-2-30	
Temperature change	Max. 10 K per hour in operation	
Moisture condensation and ice formation	Not permissible	
Design		
Module	Card (3.3 V/5 V, 32 bits)	
Dimensions (H x D) in mm	107 x 170	
Weight	150 g	
Space requirements	Short PCI slot	

Safety

Safety	
Degree of protection	IP20 in mounted state
Protection class	I complies with VDE 0106
Safety regulations	EN 60950
Approvals	CE, UL508, cULus

Quality assurance

Quality assurance complies with ISO 9001.

Note

The safety regulations, approvals, protection type and protection class specified are valid only if the module is inserted in a SIMOTION P320-4.

9.5 Power requirements of the components

Maximum power consumption of the auxiliary components

Auxiliary components		Maximum permitted power consumption			Max. total power
		+5 V	+3.3 V	+12 V	
USB device	High current	900 mA	-	-	10 W (for all USB devices)
Display port		-	500 mA	-	
DVI-I		500 mA	-	-	
PROFIBUS		500 mA	-	-	
PCI modules	Per slot	-	1.5 A	0.5 A	10 W (for entire device)
	Total	-	2 A	1 A	

[1] The total power of the PCI and USB cards may not exceed 15 W

Note

Device can overheat!

To avoid overheating, the power loss per PCI slot should not exceed 5 watts.

9.6 Integrated DC power supply

Technical specifications

DC power supply	
Input voltage	24 V DC (-20%/+20%)
Power consumption [1]	Max. 90 W
Power failure buffering	hold-up time = 20 ms at 20.4 V (DC_FAIL is active after > 5 ms)
Maximum continuous output power [1]	80 W
Degree of protection	IP 20
Protection class	Protection class I (a protective conductor must be connected to the device)

[1] The power specifications apply to the power supply component not to the device.

Note

Inrush current

The device requires an inrush current of at least 6.5 A for 50 ms.

The peak value of the startup current depends on the input voltage and the impedance of the 24 V power source. Peak currents greater than 6.5 A are possible. This will not have a negative impact on device functionality.

9.7 Technical data for the SITOP smart 24 V/10 A

Table 9-2 Technical specifications for the SITOP smart 24 V / 10 A

SITOP smart 24 V/10 A	
Input data	
Input voltage rated value	120/230 VAC
Input voltage range	85 to 132 VAC / 170 to 264 VAC
Power failure bridging	> 20 ms at V_{in} = 93/187 V
Mains frequency rated value	50/60 Hz
Mains frequency range	47 … 63 Hz
Input current rated value	4.1/2.4 A
Switch-on current (at +25° C)	< 65 A
Recommended miniature circuit breaker	10 A, Characteristic C
Output data	
Output voltage rated value	24 VDC
Output voltage tolerance	± 3 %
Residual ripple/spikes	< 150/240 mV_{pp}
Output voltage adjustment range	22.8 to 28 VDC

SITOP smart 24 V/10 A	
Output current rated value	10 A (12 A up to +45° C)
Efficiency	Typ. 90%
Electronic short-circuit protection	Yes; constant current approx. 1.3 × output current rated value; for 5 seconds extra power at 1.5 × output current rated value
Ambient conditions	
Ambient temperature during storage and transport	-40° … +85° C
Ambient temperature during operation	0° … +60° C
Humidity class	Climate class 3K3 according to EN 60721; relative atmospheric humidity 5 to 95%; no condensation
Degree of protection (EN 60529)	IP20
Radio suppression level (EN 55022)	Class B
Line harmonic limitation according to EN 61000-3-2	No
EMC immunity	EN 61000-6-2; EN 61000-4-2/-3/-4/-5/-6/-11
EMC interference emission	EN 61000-6-4
Safety	
Safety class (IEC 536; VDE 1006 T1)	Class I
Primary/secondary galvanic isolation	SELV output voltage according to EN 60950 and EN 50178; transformer according to EN 61558-2-17; overvoltage protection in the event of an internal error U_a < 60 V
Dimensions and weight	
Dimensions (W x H x D) in mm	70 x 125 x 125
Weight	Approximately. 0.75 kg
Certifications and approvals	
CE	CE conformity according to 98/336 EEC and 73/23 EEC
UL/CSA	UL 508 (Listed, File E197259); CSA C22.2 No 14, No 60950-1-03
Shipbuilding	Germanischer Lloyd
Directive 94/9/EC	Declaration of conformity according to EN 60079-15: ATEX94/9/EC Cat.3;Eex, nA, II, T4 U
C-Tick	AS/NZS 2064:1997
Article numbers	
	6EP1334-2AA01, 6EP1334-2BA01

9.8 Typical power consumption

Technical specifications

Typical current and power consumption of the device at a rated voltage of 24 V

Description	Current consumption	Power consumption
Device with core i3 or core i7 processor	950 mA	23 W
Fieldbus (PROFINET)	120 mA	3 W
USB expansion [1]	Max. 500 mA	Max. 12 W
PCI expansion [1]	Max. 500 mA	Max. 12 W

[1] The total power of the PCI and USB expansion may not exceed 15 W

Dimension drawings

10

10.1 Overview of the dimensional drawings

This section contains the dimension drawings for the SIMOTION P320-4:

- Standard rail mounting (Page 131)
- Vertical mounting (Page 133)
- SIMOTION P320-4 with an expansion card (Page 135)

10.2 Device dimension drawing for standard rail mounting

Various views of the standard rail mounting with dimensions are shown in the following:

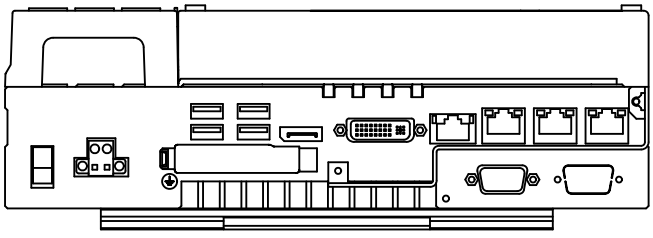


Figure 10-1 Standard rail mounting, bottom view

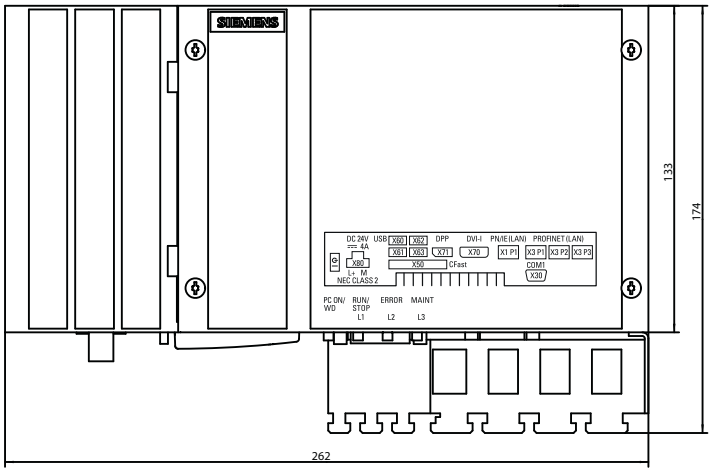


Figure 10-2 Standard rail mounting, front view

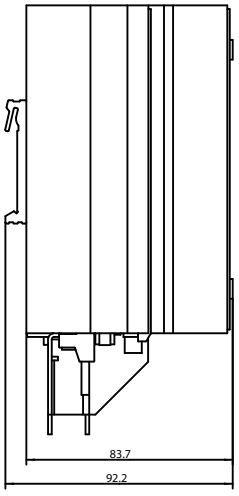


Figure 10-3 Standard rail mounting, side left view

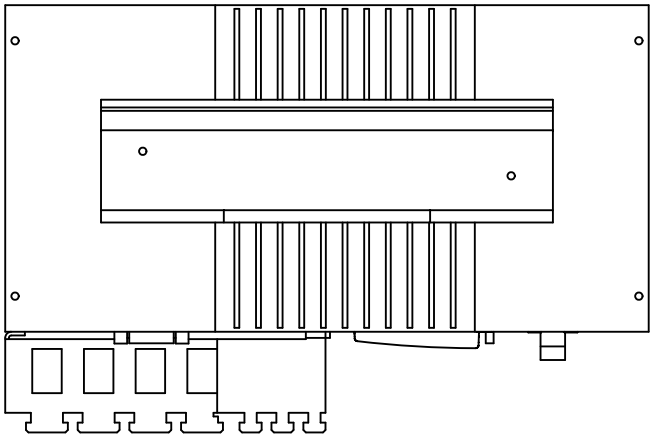


Figure 10-4 Standard rail mounting, rear view

All dimensions in mm.

10.3 Device dimension drawing for vertical mounting

Various views of the vertical mounting with dimensions are shown in the following:

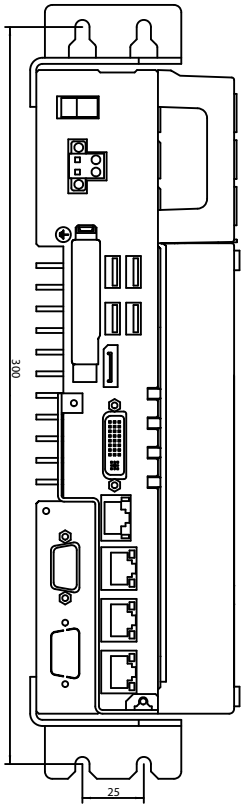


Figure 10-5 Vertical mounting, front view

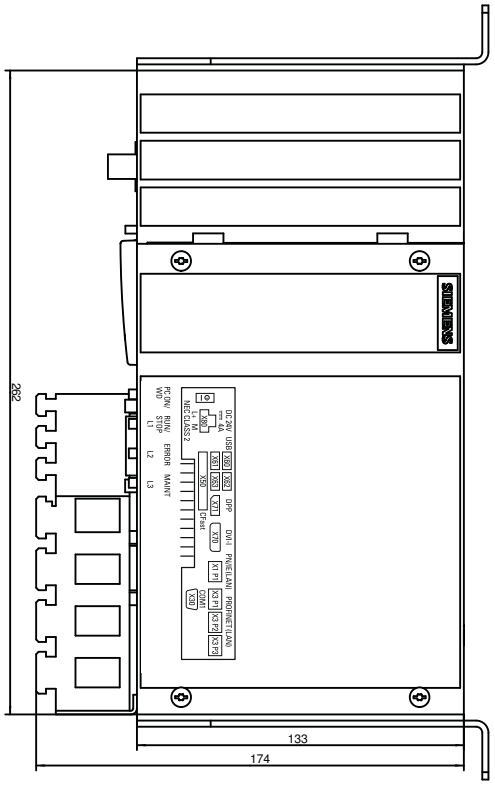


Figure 10-6 Vertical mounting, front side view

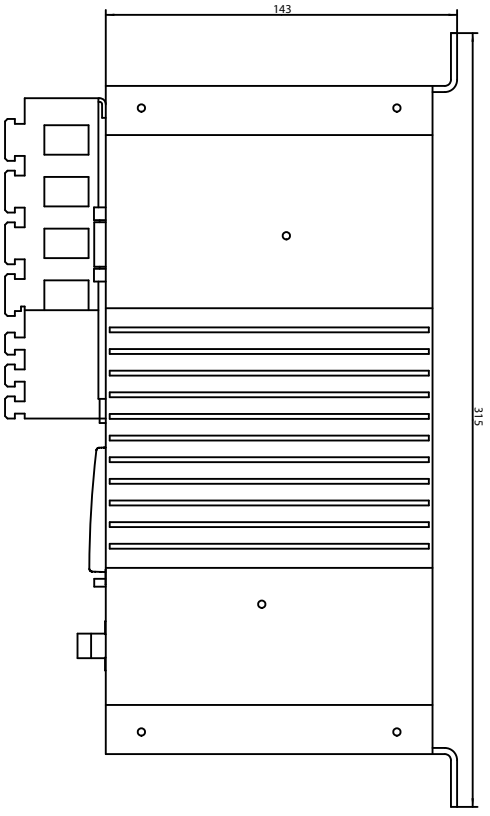


Figure 10-7 Vertical mounting, rear side view

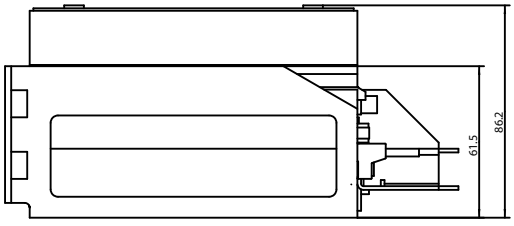


Figure 10-8 Vertical mounting, view from above

All dimensions in mm.

10.4 Dimension drawing of device with one expansion card

Device with one expansion card

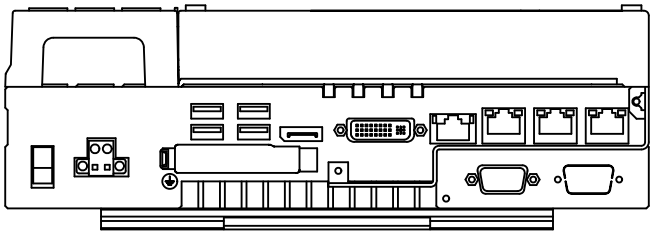
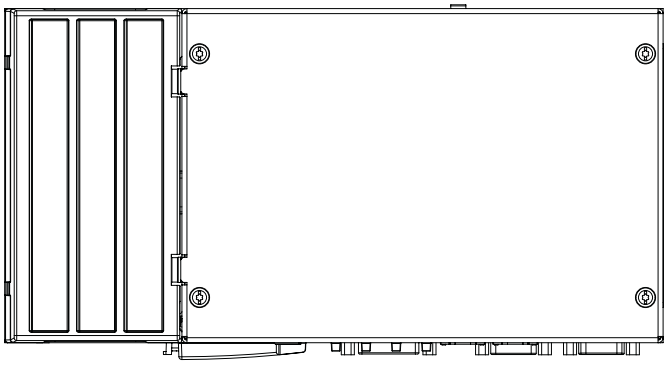
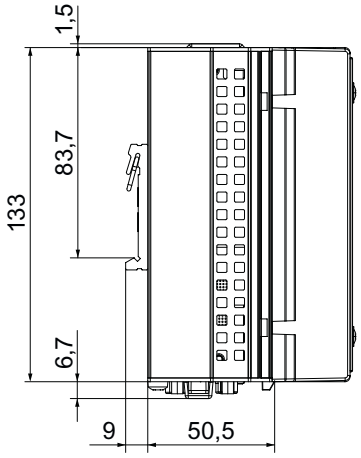


Figure 10-9 Standard rail mounting, bottom

SIMOTION P320-4 - Side views





Alle Angaben in mm

Spare parts

11

11.1 Available spare parts for SIMOTION P320-4

You can order the accessories via the Siemens Industry Mall (www.siemens.com/industrymall).

The following spare parts are available for SIMOTION P320-4:

Spare parts for SIMOTION P320-4			
Spare parts	**Article number**	**Scope of delivery**	**Accessories**
Lithium battery	A5E30314053	x	x
External CFast card The external CFast card contains user data. If a CFast card is used as a replacement for the external memory card, **no** Restore DVD or image is necessary.	6ES7648-2BF10-0XG0	x	x
IsoPROFIBUS board	6AU1390-0AA00-0AA1	-	x

Spares On Web

Spares On Web (http://support.automation.siemens.com/WW/view/en/16612315) is an information system that enables you to find out which spare parts are available for your device.

Standards and approvals

A

A.1 General rules

CE marking

CE	Our products satisfy the requirements and protection objectives of the EC Directives and comply with the harmonized European standards (EN).

Electromagnetic compatibility

Standards for EMC are satisfied if the EMC Installation Guideline is observed.

SIMOTION products are designed for industrial use in accordance with product standard DIN EN 61800-3, Category C2.

cULus approval

c UL us	Listed component mark for United States and the Canada Underwriters Laboratories (UL) according to Standard UL 508, File E164110, File E115352, File E85972.

You can find further information on the respective device on the Internet at http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm Enter the first seven characters of the article number at **Keyword**. Then click **Search**.

Korea certification

KC	KC registration number: KCC-REM-S49-SIMOTION Note that this device complies with limit class A with regard to the emission of radio frequency interference. This device can be used in all areas except residential areas. 이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

Declaration of conformity

The current Declaration of conformity is available on the Internet at Declaration of conformity (http://support.automation.siemens.com/WW/view/en/10805446/134200).

ESD Guideline

B

B.1 ESD definition

What does ESD mean?

Electrostatic sensitive devices (ESDs) are individual components, integrated circuits, modules or devices that may be damaged by either electrostatic fields or electrostatic discharge.



NOTICE

Damage caused by electric fields or electrostatic discharge

Electric fields or electrostatic discharge can result in malfunctions as a result of damaged individual parts, integrated circuits, modules or devices.

- Only pack, store, transport and send electronic components, modules or devices in their original packaging or in other suitable materials, e.g conductive foam rubber or aluminum foil.
- Only touch components, modules and devices if you are first grounded by applying one of the following measures:
  - Wearing an ESD wrist strap
  - Wearing ESD shoes or ESD grounding straps in ESD areas with conductive flooring
- Only place electronic components, modules or devices on conductive surfaces (table with ESD surface, conductive ESD foam, ESD packaging, ESD transport container).

B.2 Electrostatic charging of individuals

Any person who is not conductively connected to the electrical potential of the environment can accumulate an electrostatic charge.

This figure indicates the maximum electrostatic charges that can accumulate on an operator when he comes into contact with the indicated materials. These values comply with the specifications in IEC 801-2.

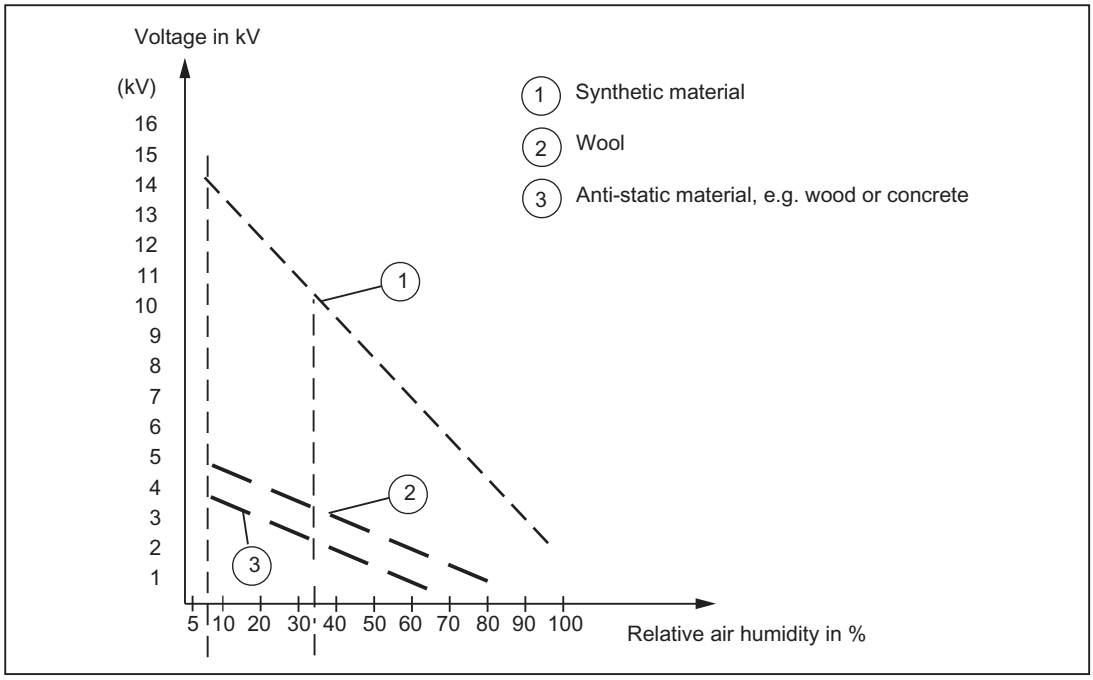


Figure B-1 Electrostatic voltage that can accumulate on operating personnel

B.3 Basic measures for protection against discharge of static electricity

Ensure sufficient grounding

When working with electrostatic sensitive devices, make sure that the you, your workstation, and the packaging are properly grounded. This prevents the accumulation of static electricity.

Avoid direct contact

You should only touch ESD components if unavoidable (for example, during maintenance work). When you touch modules, make sure that you do not touch either the pins on the modules or the printed conductors. If you follow these instructions, electrostatic discharge cannot reach or damage sensitive components.

If you have to take measurements on a module, make sure that you first discharge any static that may have accumulated in your body. To do this, touch a grounded metal object. Only use grounded measuring instruments.

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		Data *Date* 17/07/2024	Rev. *Rev. 0*
PROGETTO *Project* **Base Load Power Hub (BLPH)**	**CLIENTE** *Client* CROSSWIND	**COMMESSA** / *Job* ***123A90***	**COMMESSA FORNITORE** / *Job Vendor*
FORNITORE *Supplier:* Freqcon	**No. Ordine** *P.O. No.*	**OGGETTO** *Object* *Control Cabinets*	

DESCRIZIONE DEL MATERIALE / *Material Description*

POS. *Item*	**QUANTITA'** *Quantity*	**DESCRIZIONE** *Description*	**Nr. TAG** *TAG No.*	**TIPO DI ISPEZIONE** / *Kind of Inspection*	**ESITO** / *Result*
-	1	PCS Control Cabinet and Battery Cabinet (FAT)	CPS, BESS1 and BESS2	Visual & Functional test	**Satisfactory (SEE NOTES)**

DOCUMENTI APPLICABILI / *Applicable Documents*

TITOLO DOCUMENTO / *Document Title*	**NUMERO DOCUMENTO** / *Document Number*	**REVISIONE** / *Revision*	**STATO DOCUMENTO** / *Document Status*
Visual inspection + power up	23A2007_240706_FAT_20FT_PCS_Container_EN	02	Updated several sections
Visual inspection + power up	23A2007_240706_FAT_40FT_BESS_Container_1_EN	02	Updated several sections
Visual inspection + power up	23A2007_240706_FAT_40FT_BESS_Container_2_EN	02	Updated several sections
Visual inspection + power up	23A2007_240708_FAT_BESS_Converter_EN	02	Updated several sections

DISTRIBUZIONE A: / *Distribution to:*

☐ **GESTIONE FORNITURE** / *Supply Management Department*	☐ **CAPO COMMESSA** / *Project Manager*
☐ **PRODUZIONE** / *Production*	☐ **FORNITORE** / *Supplier*
☐ **PPLM** / *Project Procurement & Logistic Manager*	☐ **P.Q.M.**
☐ **MAGAZZINO** / *Warehouse*	☐ **P.E.M.**

ATTIVITA' ESEGUITE / *Activities Carried Out*

A - INTRODUZIONE / *Preliminary Introduction*

The present report refers to the inspection visit carried out on 17/07/2024 at Frequon, **27336 Rethem, Germany.**
The following inspection activities were witnessed by Rosetti Marino and they have performed:

Attendees the test:

Lambertini Andrea QC Insp (Rosetti Marino)

Area of concern
None

L' INCARICATO / *The person in charge*	**IL RAPP. DEL CLIENTE** / *Client's Representative*	**IL FORNITORE** / *Supplier*
ROSETTI MARINO *Supply Management dept*		C. PALENZUELA

QUESTO DOCUMENTO NON SOLLEVA IL FORNITORE DALLA RESPONSABILITA' DI EVENTUALI DIFETTI E/O MALFUNZIONAMENTI RILEVATI DURANTE L'USO /
This document does not relieve the Supplier of the responsibility of any possible defects and/or misfunctioning arising during the utilisation.

ROSETTI MARINO	INSPECTION REPORT	Report No. IR-FREQCON-01	SHEET 2 di 5
		Data *Date* 17/07/2024	Rev. *Rev. 0*
PROGETTO *Project* **Base Load Power Hub (BLPH)**	**CLIENTE** *Client* CROSSWIND	**COMMESSA** / *Job* ***123A90***	**COMMESSA FORNITORE** / *Job Vendor*
FORNITORE *Supplier:* Freqcon	**No. Ordine** *P.O. No.*	**OGGETTO** *Object* *Control Cabinets*	

B –SCOPO DELL'ISPEZIONE / *Scope of Inspection*

DESCRIZIONE DEI TEST PRESENZIATI / *Description of witnessed tests*	**ESITO** / *Result*
PCS CONTAINER VISUAL INSPECTION OF CONTROL CABINET 1 AND 2, CONVERTER CABINER AND CONVERTER COOLING SYSTEM	**Satisfactory**
BESS 1 CONTAINER VISUAL INSPECTION INTERNAL & EXTERNAL	**Satisfactory (SEE NOTES 1,2,3)**
BESS 2 CONTAINER VISUAL INSPECTION INTERNAL & EXTERNAL	**Satisfactory (SEE NOTES 1,2,3)**
BESS 1 CONTAINER VISUAL INSPECTION OF BATTERY CABINETS FUNCTION TEST	**Satisfactory SEE NOTE 4**
BESS 1 CONTAINER VISUAL INSPECTION OF BATTERY CABINETS FUNCTION TEST	**Satisfactory SEE NOTE 4**

C –DETTAGLIO DEGLI STRUMENTI UTILIZZATI PER TEST E ISPEZIONE / *Details of Inspection and Test Instruments used*

NOME DELLO STRUMENTO *Equipment name*	**PRODUTTORE** *Manufacturer*	**MODELLO** *Model*	**PROSSIMA TARATURA** *Next calibration*
N/A		N/A	N/A

D –ALLEGATI / *Attachments* (**CERTIFICATI E TEST REPORT** / *Certificates and Test Reports)*

NUMERO DOCUMENTO / *Document Number*	**DESCRIZIONE** / *Description*	**TIPO** / *Type*	**NR. PAGINE** / *No. Pages*
Calibration Certificates	----------	Procedure	
N/A	----------	N/A	

E – DETTAGLI ED ESITO DELL'ISPEZIONE / *Details and Results of Inspection*

POS. *Item*	**BREVE DESCRIZIONE MATERIALE** *Material brief description*	**Q.TA' ODA** *Order Q.ty*	**Q.TA' TESTATA** *Tested Q.ty*	**ACCETTATO** *Accepted*	**DATA ACCETTAZIONE** *Acceptance date*

L' INCARICATO / *The person in charge*	**IL RAPP. DEL CLIENTE** / *Client's Representative*	**IL FORNITORE** / *Supplier*
ROSETTI MARINO *Supply Management dept.*		

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ROSETTI MARINO	INSPECTION REPORT	Report No. IR-FREQCON-01	SHEET 3 di 5
		Data *Date* 17/07/2024	Rev. *Rev. 0*
PROGETTO *Project* **Base Load Power Hub (BLPH)**	**CLIENTE** *Client* CROSSWIND	**COMMESSA** / *Job* ***123A90***	**COMMESSA FORNITORE** / *Job Vendor*
FORNITORE *Supplier:* Freqcon	**No. Ordine** *P.O. No.*	**OGGETTO** *Object* *Control Cabinets*	

-	PCS CONTROL CABINET	1	1	Satisfactory	**17/07/2024**

F – CONCLUSIONI / *Conclusions*

FAT were witnessed by RM inspector as per applicable Job specification and relevant procedures and results are SATISFACTORY, as mentioned in the body of this report.

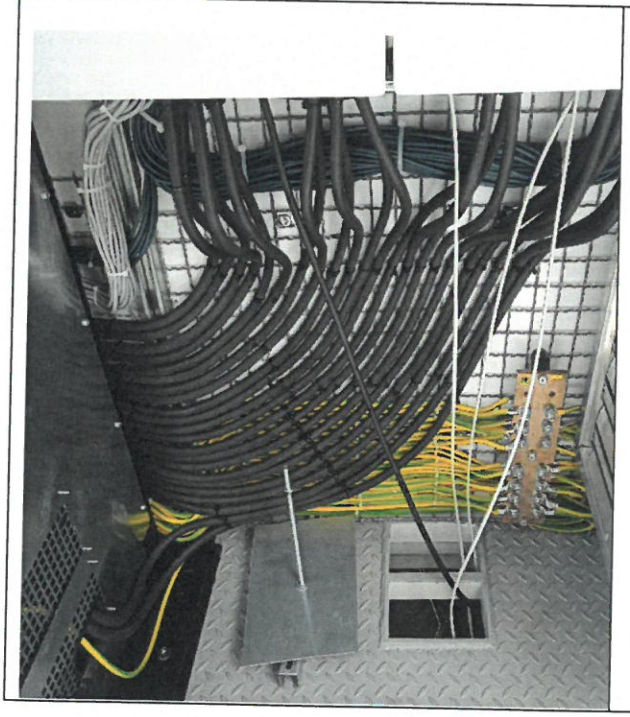
G – PUNTI IRRISOLTI / *Outstanding points*

NOTE 1: CABLE LABEL NOT INSTALLED.
NOTE 2: FERULES NOT INSTALLED.
NOTE 3: MCT NOT INSTALLED ON THE FLOOR FOR CABLES THAT CAMES FROM OUTSIDE.
NOTE 4: BATTERY WILL SHIP IN A SECOND TIME SO ARE NOT INSTALLED AND CONNECTED SO IT IS IMPOSSIBLE DO THE CHRAGE/DISCHARGE TESTS.

H – STATO PACKING LIST / *Packing List Status*	☐ **EMESSO** / *Issued*	☒ **NON EMESSO** / *Not Issued*	DD/MM/YYYY **ULTIMA DATA UTILE** / *Last Date*

PUNCH LIST REPORT: VEDI ALLEGATO N° / *Refer to Attachment n° NOT APPLICABLE*

REPORT FOTOGRAFICO (SE PRESENTE) / *Digital Pictures (if any)*

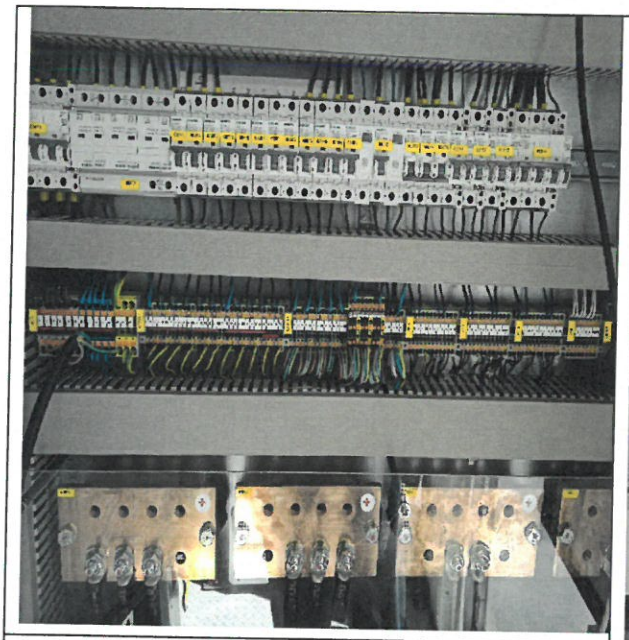


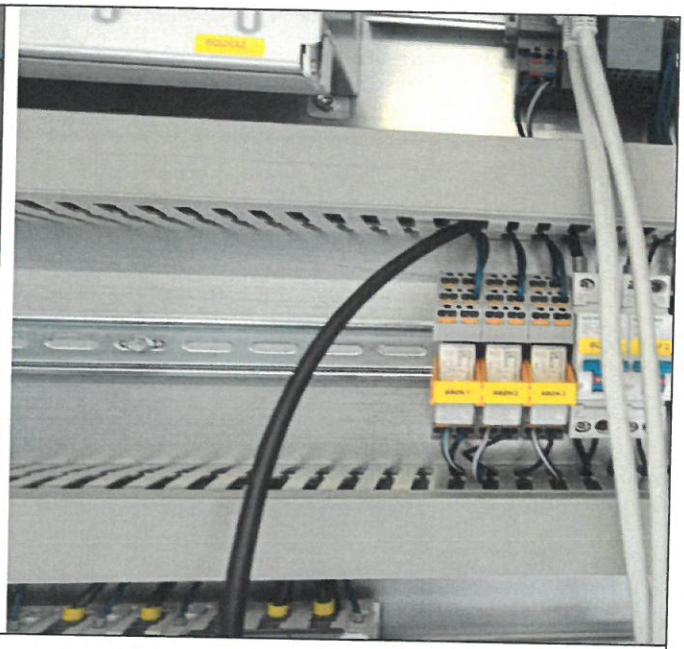


L' INCARICATO / *The person in charge*	**IL RAPP. DEL CLIENTE** / *Client's Representative*	**IL FORNITORE** / *Supplier*
ROSETTI MARINO *Supply Management dept.*		

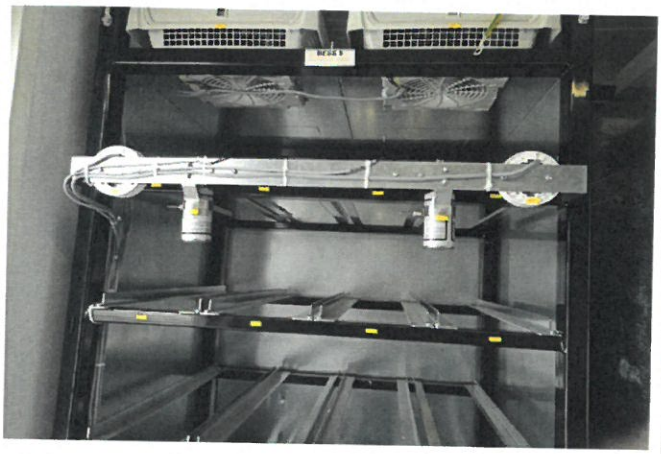
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ROSETTI MARINO	INSPECTION REPORT	Report No. IR-FREQCON-01	SHEET 4 di 5
		Data *Date* 17/07/2024	Rev. *Rev. 0*
PROGETTO *Project* **Base Load Power Hub (BLPH)**	**CLIENTE** *Client* CROSSWIND	**COMMESSA** / *Job* ***123A90***	**COMMESSA FORNITORE** / *Job Vendor*
FORNITORE *Supplier:* Freqcon	**No. Ordine** *P.O. No.*	**OGGETTO** *Object* *Control Cabinets*	









L' INCARICATO / *The person in charge*	**IL RAPP. DEL CLIENTE** / *Client's Representative*	**IL FORNITORE** / *Supplier*
ROSETTI MARINO *Supply Management dept.*		

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ROSETTI MARINO	INSPECTION REPORT	Report No. IR-FREQCON-01	SHEET 5 di 5
		Data *Date* 17/07/2024	Rev. *Rev. 0*
PROGETTO *Project* **Base Load Power Hub (BLPH)**	**CLIENTE** *Client* CROSSWIND	**COMMESSA** / *Job* ***123A90***	**COMMESSA FORNITORE** / *Job Vendor*
FORNITORE *Supplier:* Freqcon	**No. Ordine** *P.O. No.*	**OGGETTO** *Object* *Control Cabinets*	







NON VALIDO PER IL RILASCIO DELLA FORNITURA / *It is not valid for the supply's release*

L' INCARICATO / *The person in charge*	**IL RAPP. DEL CLIENTE** / *Client's Representative*	**IL FORNITORE** / *Supplier*
ROSETTI MARINO *Supply Management dept.*		

QUESTO DOCUMENTO NON SOLLEVA IL FORNITORE DALLA RESPONSABILITA' DI EVENTUALI DIFETTI E/O MALFUNZIONAMENTI RILEVATI DURANTE L'USO /
This document does not relieve the Supplier of the responsibility of any possible defects and/or misfunctioning arising during the utilisation.

FREQCON

SAT Protocol

Converter & BESS

(Site Acceptance Test)

Version	date	Name	Description of the
Draft	2024-03-26	J. Nitsch C. Palenzuela	First, preliminary version
1.0	2024-10-08	J. Nitsch C. Palenzuela	First, final version
1.1	2024-10-21	J. Nitsch C. Palenzuela	Updated tables
2.0	2024-10-30	M. Jahns C. Palenzuela	Updated document structure
2.1	2024-11-01	C. Palenzuela	Comments implementation and corrections
2.2	2024-11-21		Comments implementation and corrections

Table 1Version overview

	Date	Name
Created by	2024-03-26	J. Nitsch C. Palenzuela
Checked by	2024-03-26	J. Nitsch
Approved by	2024-03-26	C. Palenzuela

Table 2Authorisation overview

Imprint

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hardware@freqcon.de

Contact details

For further information, please contact us by phone or send us an e-mail to info@freqcon.com
You can also visit our website **at http://www.freqcon.com for** more information on our products and solutions.

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Identification

Product and type designation

Device type
BESS 1 MW / 5MWh

Document number
23A2007_241030_SAT_BESS_EN_v2.0

Name and Address of Manufacturer

Manufacturer of the product
FREQCON GmbH
Bürgerwiesenweg 5
D-27336 Rethem, Germany

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Original document

This document is an original document of FREQCON GmbH.

1 About this Document

The test report for site acceptance test (SAT) is intended to qualify whether the system fulfils the design requirements and the customer's requirements.

The site acceptance test (SAT) is carried out by specialised personnel after delivery of the system at customer site and the result is checked by the customer.

2 Responsibility

2.1 Responsibility of FREQCON GmbH

- Preparation and review of the acceptance report
- Carrying out the acceptance test (SAT), documentation of the results
- Elimination of identified deviations
- Preparation and review of the acceptance report

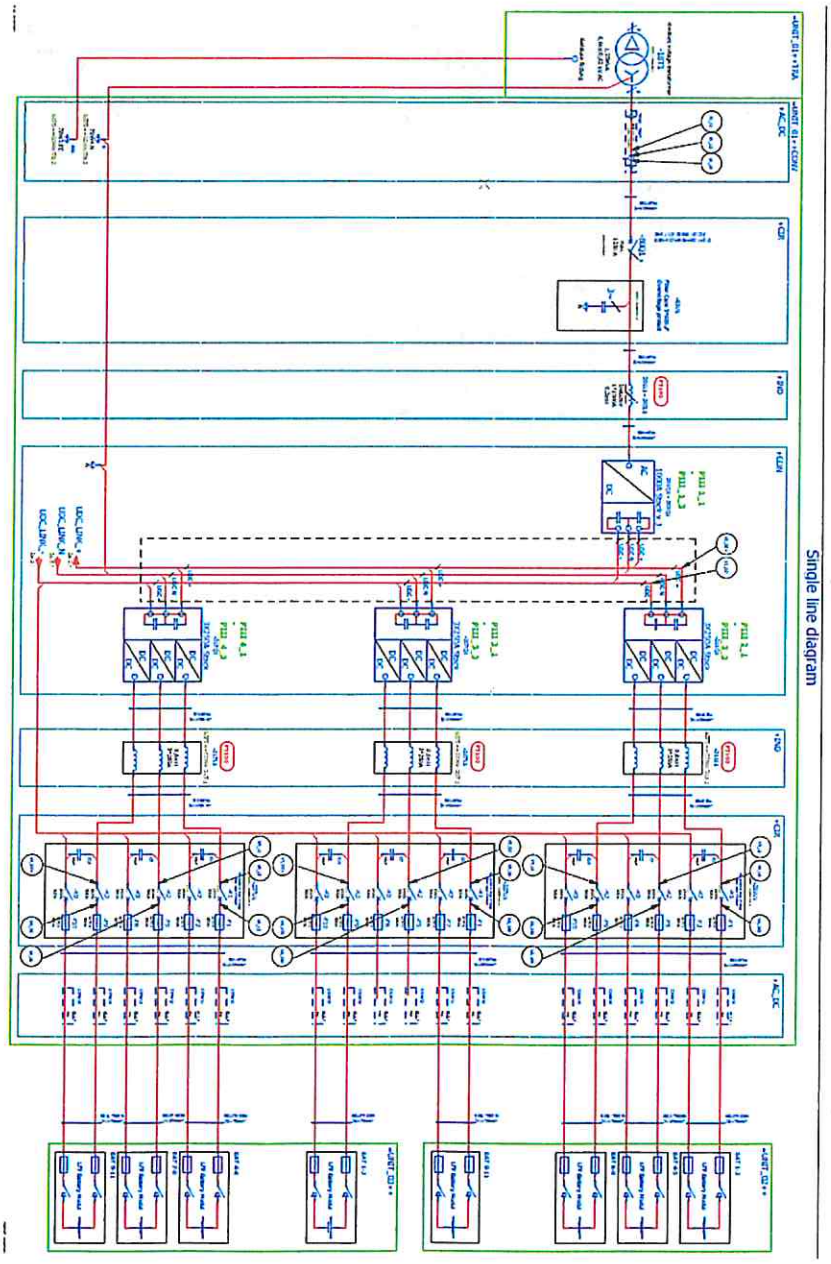
2.2 Responsibility of the customer

- Sending personnel to site, checking the test result and the data
- Approve the SAT protocol

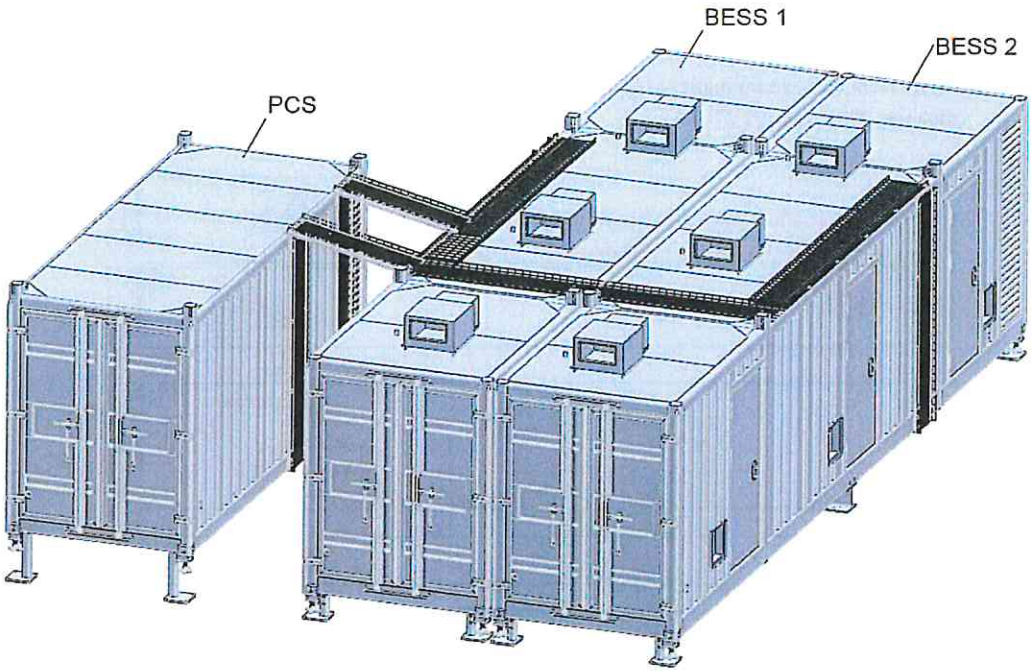
3 Device Description

3.1 Single Line Diagram

Extract from overall schematics "10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20241105_V1.2"



3.2 General Arrangement



4 PCS (Converter System)

4.1 Reference Documents

These documents are not physically included in this report but are externally available.

Document Title	Document Name
Overall Schematics (print out)	10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20241105_V1.2
GA drawing as build (print out)	23A2007 BLPH BESS complete system
Operating and maintenance manual (print out)	10354_23A2007_240911_Operating_Manual_BESS_1MW_5 MWh_6.6kV_EN_v0.87
FAT report (external)	23A2007_240708_FAT_BESS_Converter_EN_v2.0_Signed
Profinet interface list	23A2007_240628_PROFINET_Register BESS_V1_0_0_3
FAT punchlist tracker	20240828 - punchlist - FRQ comments v2.4

4.2 PCS Prerequisites

Carefully qualify that this SAT protocol has been approved and the equipment has been inspected by the quality control department. Ensure that all requirements for the SAT are met. And then record the qualification results in the TR01 test report.

The following documents must be available in electronic form or as a printout for the SAT:

1. Circuit diagram of the system
2. Manual in the current version
3. General arrangement overview
4. Interface documentation (if available)

No category A open punch list items are outstanding.

The following power sources are required to perform the activities listed in the following paragraphs. Please ensure the main power source is LOTO before starting operation and follow the correct procedures to power up any circuit.

- 400VAC aux PCS – *auxiliary load BESS B-200 <> 84W2*

Remarks:

4.3 Visual inspection of Control Cabinet 1

Check all system components, including external ones, to ensure that they are in perfect condition. Document the qualification results in the following table.

TR01	Test		Result
4.3.1	**Cleanliness**	**Test Layout:** Check covers and cabinet interior for cleanliness and rust. **Pass Fail Criteria:** Covers and interior are clean, without dirt or rust.	☒ OK ☐ Defects ☐ N/A
4.3.2	**Metal sheets**	**Test Layout:** Check metal sheets for sharp edges and damages **Pass Fail Criteria:** No sharp edges or recognisable damage present.	☒ OK ☐ Defects ☐ N/A
4.3.3	**Wires and cables**	**Test Layout:** Visually inspect cable connections and wires inside the converter cabinets for perfect condition and loose parts. **Pass Fail Criteria:** Cable connections are in perfect condition, no loose parts present.	☒ OK ☐ Defects ☐ N/A
4.3.4	**Compliance with circuit diagram**	**Test Layout:** • Check if main components of the control cabinet are installed in accordance with the circuit diagram. • Check if labelling of the components in the control cabinet corresponds to the circuit diagram (exemplary test of some components). **Pass Fail Criteria:** • Essential parts of the control cabinet are available in accordance with the circuit diagram. • Labelling of the components in the control cabinet corresponds to the circuit diagram. **Reference document:** 10354_23A2007_YYMMDD_Operating_Manual_ Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_EN_vx.x	☒ OK ☐ Defects ☐ N/A
4.3.5	**Touch panel**	**Test Layout:** Check if touch panel of HMI user interface is clean and without damage **Pass Fail Criteria:** The user interface of the touch panel is clean without damage	☒ OK ☐ Defects ☐ N/A
4.3.6	**Punch List Items Closed**	**Test Layout:** Review and confirm no category A open punch list items are outstanding. **Pass Fail Criteria:** No category A open punch list items are outstanding.	☒ OK ☐ Defects ☐ N/A
4.3.7	**LOTO**	**Apply LOTO as required.**	☒ OK ☐ Defects ☐ N/A

Completed by	Witnessed by	Date
ALESSANDRO SUTTO GERRY MCCAN FREDERIC HEIN	CARLOS PALENZUELA	23-11-2024

Remarks:

Missing lables on interface cable

13.03.25 - lables added

4.4 Visual inspection of Control Cabinet 2

Check all system components, including external ones, to ensure that they are in perfect condition. Document the qualification results in the following table.

TR02	Test		Result
4.4.1	**Cleanliness**	**Test Layout:** Check covers and cabinet interior for cleanliness and rust.	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: Covers and interior are clean, without dirt or rust.	
4.4.2	**Metal sheets**	**Test Layout:** Check metal sheets for sharp edges and damages	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: No sharp edges or recognisable damage present.	
4.4.3	**Wires and cables**	**Test Layout:** Visually inspect cable connections and wires inside the converter cabinets for perfect condition and loose parts.	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: Cable connections are in perfect condition, no loose parts present.	
4.4.4	**Compliance with circuit diagram**	**Test Layout:** • Check if main components of the control cabinet are installed in accordance with the circuit diagram. • Check if labelling of the components in the control cabinet corresponds to the circuit diagram (exemplary test of some components).	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: • Essential parts of the control cabinet are available in accordance with the circuit diagram. • Labelling of the components in the control cabinet corresponds to the circuit diagram. **Reference document:** 10354_23A2007_YYMMDD_Operating_Manual_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_EN_vx.x	
4.4.5	**Punch List Items Closed**	**Test Layout:** Review and confirm no category A open punch list items are outstanding.	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: No category A open punch list items are outstanding.	
4.4.6	**LOTO**	**Apply LOTO as required.**	☐ OK ☐ Defects ☒ N/A

Completed by	Witnessed by	Date
ALESSANDRO SUTO GERRY MCCAN FREDERIC KEIN	CARLOS PALENTUELA	28-11-2024

Remarks:

Naming labels on interface cables

13.03.25 – cables added

4.5 Visual inspection of Converter Cabinets

Check all system components, including external ones, to ensure that they are in perfect condition. Document the qualification results in the following table.

TR03	Test		Result
4.5.1	Cleanliness	Test Layout: Check covers and cabinet interior for cleanliness and rust. Pass Fail Criteria: Covers and interior are clean, without dirt or rust.	☒ OK ☐ Defects ☐ N/A
4.5.2	Metal sheets	Test Layout: Check metal sheets for sharp edges and damages Pass Fail Criteria: No sharp edges or recognisable damage present.	☒ OK ☐ Defects ☐ N/A
4.5.3	Wires and cables	Test Layout: Visually inspect cable connections and wires inside the converter cabinets for perfect condition and loose parts. Pass Fail Criteria: Cable connections are in perfect condition, no loose parts present.	☒ OK ☐ Defects ☐ N/A
4.5.4	Control elements description	Test Layout: Check if the operating elements are explained in the operating manual. Pass Fail Criteria: The operating elements are explained in the operating manual. Reference document: 10354_23A2007_YYMMDD_Operating_Manual_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_EN_vx.x	☒ OK ☐ Defects ☐ N/A
4.5.5	Punch List Items Closed	Test Layout: Review and confirm no category A open punch list items are outstanding. Pass Fail Criteria: No category A open punch list items are outstanding.	☒ OK ☐ Defects ☐ N/A
4.5.6	LOTO	Apply LOTO as required.	☒ OK ☐ Defects ☐ N/A

Completed by	Witnessed by	Date
ALESSANDRO SUTTO GERRY MCCAN FREDERIC HEIN	CARLOS PALENUELA	28-11-2024
Remarks:		

4.6 Visual Inspection of Converter Cooling System and Heat Exchanger

Check the correct installation and connection of the cooling system. Document the qualification results in the following table.

TR04	Test		Result
4.6.1	**Water drop check**	**Test Layout:** Check that no drops of water can be seen at the connection points of the coolant hoses.	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: No water on the connection points of coolant hoses.	
4.6.2	**Heat exchanger visual inspection**	**Test Layout:** Check the external heat exchanger for proper connection and mechanical stability.	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: Heat exchanger is properly mechanically installed	
4.6.3	**I/O check**	**Test Layout:** Check the electrical connection to the Heat exchanger unit	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: Heat exchanger is properly connected	

Completed by	Witnessed by	Date
~~ALEF~~ ADNAN AKCAM	ALESSANDRO TUTTO	14.3.2025
Remarks:		

4.7 Power On

Sequentially power on all the subsystems. Document the qualification results in the following table.

Please refer to the SLD on page 1a and 2a of the overall schematics for PCS:
10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20241105_V1.2

Note:
Prior to carrying out any work, the commissioning engineer to check the current version of the reference document is available.

TR05	Test		Result
4.7.1	**Check LOTO of subsystem**	**Test Layout:** Check that all breakers feeding subsystems are turned to OFF position and LOTO **Pass Fail Criteria:** LOTO confirmed	☑ OK ☐ Defects ☐ N/A
4.7.2	**Remove LOTO from main feeding source (RM board)**	**Test Layout:** Remove LOTO from main feeding source and measure voltage across incoming cable. **Pass Fail Criteria:** Voltage is read at incoming feeding terminals.	☒ OK ☐ Defects ☐ N/A
4.7.3	**Supply voltage control cabinet**	**Test Layout:** Switch on 190F3 **Pass Fail Criteria:** Cabinet lights and socket power up	☒ OK ☐ Defects ☐ N/A
4.7.4	**Supply voltage control cabinet**	**Test Layout:** Switch on 191F1 **Pass Fail Criteria:** Clima 1 power up	☒ OK ☐ Defects ☐ N/A
4.7.5	**Supply voltage control cabinet**	**Test Layout:** Switch on 191F2 **Pass Fail Criteria:** Clima 2 power up	☒ OK ☐ Defects ☐ N/A
4.7.6	**Supply voltage control cabinet**	**Test Layout:** Switch on 101Q1. The control unit starts up properly. **Pass Fail Criteria:** Pass: - Simotion turns on - HMI turns on properly and WebVisualization (WebVisu) access is active Access to Simotion WebVisu is established and "Run" state of Simotion can be confirmed	☒ OK ☐ Defects ☐ N/A
4.7.7	**Supply voltage control cabinet**	**Test Layout:** Remove LOTO and switch on 84F2 **Pass Fail Criteria:** Voltage read at feeding terminals	☒ OK ☐ Defects ☐ N/A
4.7.8	**Supply voltage control cabinet**	**Test Layout:** Switch on 183F1	

TR05	Test		Result
		Pass Fail Criteria: No breaker trip or issue and Relative circuit power up	☑ OK ☐ Defects ☐ N/A
4.7.9	**Supply voltage control cabinet**	**Test Layout:** Switch on 183F2	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: No breaker trip or issue and Relative circuit power up	
4.7.10	**Supply voltage control cabinet**	**Test Layout:** Switch on 185F1	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: No breaker trip or issue and Relative circuit power up	
4.7.11	**Supply voltage control cabinet**	**Test Layout:** switch on 185F2	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: No breaker trip or issue and Relative circuit power up	
4.7.12	**Supply voltage control cabinet**	**Test Layout:** Switch on 187F1	☑ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: No breaker trip or issue and Relative circuit power up	
4.7.13	**Supply voltage control cabinet**	**Test Layout:** Switch on 181Q1	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: No breaker trip or issue and Relative circuit power up	
4.7.14	**Supply voltage control cabinet**	**Test Layout:** Switch on 181Q2	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: No breaker trip or issue and Relative circuit power up	
4.7.15	**Supply voltage control cabinet**	**Test Layout:** Switch on 182Q1	☑ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: No breaker trip or issue and Relative circuit power up	

Completed by	Witnessed by	Date
GERRY MCCAN FREDERIC HEIN		21-11-2024
Remarks:		

4.8 Software and Function Tests

Check the following software functions. Document the qualification results in the following table.

TR06	Test		Result	Completed by	Witnessed by	Date
4.8.1	Leakage and connections check	**Test Layout:** Check the converter water cooling system for proper connection and leaks. Run cooling system and perform visual check of connections and check for leaks **Pass Fail Criteria:** All connections are properly connected and no leakage present.	☑ OK ☐ Defects ☐ N/A	A. SUTO A. AKCAM		14.3.25
4.8.2	Pressure check	**Test Layout:** Check whether the pressure of the cooling system is above 3 bar. Check on the manometer of the converter cooling system cabinet (COSY) and verify value on HMI/WebVisu. **Pass Fail Criteria:** Manometer and HMI/WebVisu indicate a pressure of 3 bar.	☑ OK ☐ Defects ☐ N/A	A. SUTO A. AKCAM		14.3.25
4.8.3	Check pre-heating 4.5 FAT	**Test Layout:** Connecting the converter via interface: • Check the pre-heating of the converter for proper functionality • Check the pre-charge and DC link control for proper functionality **Pass Fail Criteria:** - Heat exchanger switches on and off correctly (visual check) - Preheating status is correctly indicated by the HMI/WebVisu. - Pump is running (visual check) - Heater is heating up the coolant (check coolant temperature on HMI/WebVisu)	☑ OK ☐ Defects ☐ N/A	A. SUTO A. AKCAM		14.3.25
4.8.4	UPS 4.13 FAT	**Test Layout:** Checking the UPS functionality. If the auxiliary supply fails (e.g. by activating the fuse of the AC power supply unit), the control cabinet continues to be supplied by the UPS. **Pass Fail Criteria:** After the defined time, the control cabinet is switched off completely. When the voltage returns, the control unit starts up again and the UPS battery is charged.	☑ OK ☐ Defects ☐ N/A	A. SUTO A. AKCAM		14.3.25
4.8.5	Smoke detectors	**Test Layout:** Test the smoke detector in PCS CON-cabinet with test spray.				

TR06	Test		Result	Completed by	Witnessed by	Date
		Pass Fail Criteria: The smoke detectors trigger accordingly and an error (Error level 4) is generated.	☑ OK ☐ Defects ☐ N/A	A SUTTO A AKRAM		14.3.25
4.8.6	**Communication test interface signals FREQCON->Customers**	**Test Layout:** Connecting communication interface to customer higher level controller. Transferring status signals to customer via comm interface. Check all signals listed in the comm interface list. **Reference document:** 23A2007_240628_PROFINET_Register BESS_V1_0_0_3 **Pass Fail Criteria:** The transmitted signals received via Profinet interface is plausible and correct.	☑ OK ☐ Defects ☐ N/A	ALESSANDRO SUTTO ADNAN AKRAM	FABIO SIEGEN	14.3.25
4.8.7	**Communication test interface signals Customer->Freqcon** MODBUS	**Test Layout:** MODBUS Connecting ~~Profinet~~ interface to customer higher level controller. Transferring control signals from customer higher level controller to BESS main controller via ~~Profinet~~ MODBUS interface. Check all signals listed in the comm interface list. **Reference document:** 23A2007_240628_PROFINET_Register BESS_V1_0_0_3 **Pass Fail Criteria:** The transmitted signals received via ~~Profinet~~ interface are plausible and lead to foreseen behaviour.	☑ OK ☐ Defects ☐ N/A	A. SUTTO ADNAN AKRAM	FABIO SIEGEN	14.3.25

Remarks:

5 BESS 1 and 2

5.1 Reference Documents

These documents are not physically included in this report but are externally available.

Document Title	Document Name
Overall Schematics (print out)	10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20241105_V1.2
GA drawing as build (print out)	23A2007 BLPH BESS complete system
Operating and maintenance manual (print out)	10354_23A2007_240911_Operating_Manual_BESS_1MW_5 MWh_6.6kV_EN_v0.87
FAT report (external)	23A2007_240708_FAT_BESS_Converter_EN_v2.0_Signed
Profinet interface list	23A2007_240628_PROFINET_Register BESS_V1_0_0_3
FAT punchlist tracker	20240828 - punchlist - FRQ comments v2.4

5.2 BESS Prerequisites

Carefully qualify that this SAT protocol has been approved and the equipment has been inspected by the quality control department. Ensure that all requirements for the SAT are met. And then record the qualification results in the TR0x test report.

The following documents must be available in electronic form or as a printout for the SAT:

1. Circuit diagram of the system
2. Manual in the current version
3. General arrangement overview
4. Interface documentation (if available)

No category A open punch list items are outstanding. Any re-work on the electrical installation is completed.

- LOTO equipment
- Gas test spray equipment

The following power sources are required to perform the activities listed in the following paragraphs. Please ensure the main power source is LOTO before starting operation and follow the correct procedures to power up any circuit.

- 400 VAC Aux BESS – auxiliary load BESS B-200 <> 84W2
- Temporary 230 V AC Multiple socket outlet (e.g. to supply Laptop, temporary lights etc.)

Remarks:

5.3 Container Visual Inspection BESS 1

Check all system parts, including external and internal parts, to ensure that they are in perfect condition. Document the qualification results in the following table.

TR07	Examination		Result
5.3.1	Damage	The container is free of dents and unusual rust (minor rust spots, e.g. on crane eyes, are unavoidable)	☑ OK ☐ Defects ☐ N/A
5.3.2	Earthing connections	The earthing lugs are in the correct position (compare CAD) and are not painted	☑ OK ☐ Defects ☐ N/A
5.3.3	Warnings	The required warning signs are located on the personnel doors	☑ OK ☐ Defects ☐ N/A
5.3.4	Accessibility	The clearances in the container correspond to the CAD. All enclosure doors are in the correct position and accessible	☑ OK ☐ Defects ☐ N/A
5.3.5	Installation of components and cables in the container	All components such as switch cabinets, cable trays, air conditioning units, etc. are properly installed and cannot fall or tip over.	☑ OK ☐ Defects ☐ N/A
5.3.6	Cable bushings	All cable ducts are present (possibly not fitted) and comply with the client's specification. Covers, cable bushings or similar are available for all openings in the container	☑ OK ☐ Defects ☐ N/A
5.3.7	LOTO	Apply LOTO as required.	☑ OK ☐ Defects ☐ N/A

5.4 Container Visual Inspection BESS 2

Check all system parts, including external and internal parts, to ensure that they are in perfect condition. Document the qualification results in the following table.

TR08	Examination		Result
5.4.1	Damage	The container is free of dents and unusual rust (minor rust spots, e.g. on crane eyes, are unavoidable)	☒ OK ☐ Defects ☐ N/A
5.4.2	Earthing connections	The earthing lugs are in the correct position (compare CAD) and are not painted	☒ OK ☐ Defects ☐ N/A
5.4.3	Warnings	The required warning signs are located on the personnel doors	☒ OK ☐ Defects ☐ N/A
5.4.4	Accessibility	The clearances in the container correspond to the CAD. All enclosure doors are in the correct position and accessible	☒ OK ☐ Defects ☐ N/A
5.4.5	Installation of components and cables in the container	All components such as switch cabinets, cable trays, air conditioning units, etc. are properly installed and cannot fall or tip over.	☒ OK ☐ Defects ☐ N/A
5.4.6	Cable bushings	All cable ducts are present (possibly not fitted) and comply with the client's specification. Covers, cable bushings or similar are available for all openings in the container	☒ OK ☐ Defects ☐ N/A
5.4.7	LOTO	Apply LOTO as required.	☒ OK ☐ Defects ☐ N/A

Completed by	Witnessed by	Date
ALESSANDRO SUTO GENY MCLAN EDGENIC MEIN	CARLOS PALENUELA	28-11-2024
Remarks:		

5.5 Power On BESS 1

Sequentially power on all the subsystems. Document the qualification results in the following table.

Please refer to the SLD on page 1a and 2a of the overall schematics for battery container 1:
10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20241105_V1.2

Note:
Prior to carrying out any works, the commissioning engineer to check the current version of the reference document is available.

TR09	Test		Result
5.5.1	**Compliance with circuit diagram**	**Test Layout:** • Check if main components of the control cabinet are installed in accordance with the circuit diagram. Check if labelling of the components in the control cabinet corresponds to the circuit diagram (exemplary test of some components). **Pass Fail Criteria:** • Essential parts of the control cabinet are available in accordance with the circuit diagram. • Labelling of the components in the control cabinet corresponds to the circuit diagram. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20241105_V1.2	☐ OK ☒ Defects ☐ N/A
5.5.2	**Check LOTO of subsystem**	**Test Layout:** Check that all breakers feeding subsystems are turned to OFF position and LOTO **Pass Fail Criteria:** LOTO confirmed	☒ OK ☐ Defects ☐ N/A
5.5.3	**Remove LOTO from main feeding source (RM Board)**	**Test Layout:** Remove LOTO from main feeding source and measure voltage across incoming cable. **Pass Fail Criteria:** Voltage is read at incoming feeding terminals.	☒ OK ☐ Defects ☐ N/A
5.5.4	**Remove LOTO from main feeding source**	**Test Layout:** Remove LOTO and switch on 684F1. **Pass Fail Criteria:** Voltage read at downstream feeding terminals.	☒ OK ☐ Defects ☐ N/A
5.5.5	**Supply voltage**	**Test Layout:** Switch on 690F1 **Pass Fail Criteria:** No breaker trip or issue and Relative circuit power up (container lights)	☒ OK ☐ Defects ☐ N/A
5.5.6	**Supply voltage**	**Test Layout:** Switch on 690F2	

TR09	Test		Result
		Pass Fail Criteria: No breaker trip or issue and Relative circuit power up (sockets)	☒ OK ☐ Defects ☐ N/A
5.5.7	**Supply voltage**	**Test Layout:** Switch on 690F3, 690F4, 690F5	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: No breaker trip or issue and Relative circuit power up (cranes)	
5.5.8	**Supply voltage**	**Test Layout:** Switch on 101Q1. The control unit starts up properly.	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: No breaker trip or issue and Relative circuit power up (DC power supply)	
5.5.9	**Supply voltage**	**Test Layout:** Switch on 691F4	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: No breaker trip or issue and Relative circuit power up (cooling units)	
5.5.10	**Supply voltage**	**Test Layout:** Remove LOTO and switch on 684F3	☑ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: Voltage read at downstream feeding terminals	
5.5.11	**Supply voltage**	**Test Layout:** Switch on 691F1, 691F2, 691F3	☑ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: No breaker trip or issue and Relative circuit power up (emergency ventilation and louvers)	
5.5.12	**Supply voltage**	**Test Layout:** Remove LOTO and switch on 684F4	☑ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: Voltage read at downstream feeding terminals	
5.5.13	**Supply voltage**	**Test Layout:** Sequentially switch on 687F1, 687F2, 687F3, 687F4, 687F5, 687F6, 688F1, 688F2, 688F3, 688F4, 688F5	☑ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: No breaker trip or issue and Relative circuit power up	

Completed by	Witnessed by	Date
A SUTTO	F. HEIN	06-12-24

Remarks:

Panel needs further rework to bring it to AS-BUILT.
Planned work

13.03.25 – Rework completed - panel AS-BUILT

5.6 Power On BESS 2

Sequentially power on all the subsystem. Document the qualification results in the following table.

Please refer to the SLD on page 1a and 2a of the overall schematics for Battery Container 2:
10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20241105_V1.2

Note:
Prior to carrying out any works, the commissioning engineer to check the current version of the reference document is available.

TR10	Test		Result
5.6.1	**Compliance with circuit diagram**	**Test Layout:** • Check if main components of the control cabinet are installed in accordance with the circuit diagram. Check if labelling of the components in the control cabinet corresponds to the circuit diagram (exemplary test of some components).	☐ OK ☒ Defects ☐ N/A LABELS E panels
		Pass Fail Criteria: • Essential parts of the control cabinet are available in accordance with the circuit diagram. • Labelling of the components in the control cabinet corresponds to the circuit diagram. **Reference document:** 10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20241105_V1.2	
5.6.2	**Check LOTO of subsystem**	**Test Layout:** Check that all breakers feeding subsystems are turned to OFF position and LOTO	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: LOTO confirmed	
5.6.3	**Remove LOTO from main feeding source (RM Board)**	**Test Layout:** Remove LOTO from main feeding source and measure voltage across incoming cable.	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: Voltage is read at incoming feeding terminals.	
5.6.4	**Remove LOTO from main feeding source**	**Test Layout:** Remove LOTO and switch on 684F1.	☑ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: Voltage read at downstream feeding terminals.	
5.6.5	**Supply voltage**	**Test Layout:** Switch on 690F1	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: No breaker trip or issue and Relative circuit power up (container lights)	
5.6.6	**Supply voltage**	**Test Layout:** Switch on 690F2	

TR10	Test		Result
		Pass Fail Criteria: No breaker trip or issue and Relative circuit power up (sockets)	☒ OK ☐ Defects ☐ N/A
5.6.7	**Supply voltage**	**Test Layout:** Switch on 690F3, 690F4, 690F5	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: No breaker trip or issue and Relative circuit power up (cranes)	
5.6.8	**Supply voltage**	**Test Layout:** Switch on 101Q1. The control unit starts up properly.	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: No breaker trip or issue and Relative circuit power up (DC power supply)	
5.6.9	**Supply voltage**	**Test Layout:** Switch on 691F4	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: No breaker trip or issue and Relative circuit power up (cooling units)	
5.6.10	**Supply voltage**	**Test Layout:** Remove LOTO and switch on 684F3	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: Voltage read at downstream feeding terminals	
5.6.11	**Supply voltage**	**Test Layout:** Switch on 691F1, 691F2, 691F3	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: No breaker trip or issue and Relative circuit power up (emergency ventilation and louvers)	
5.6.12	**Supply voltage**	**Test Layout:** Remove LOTO and switch on 684F4	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: Voltage read at downstream feeding terminals	
5.6.13	**Supply voltage**	**Test Layout:** Sequentially switch on 687F1, 687F2, 687F3, 687F4, 687F5, 687F6, 688F1, 688F2, 688F3, 688F4, 688F5	☒ OK ☐ Defects ☐ N/A
		Pass Fail Criteria: No breaker trip or issue and Relative circuit power up	

Completed by	Witnessed by	Date
ALESSANDRO SUTO FABIAN HEIN	MARKUS JAHNS	02-12-2024

Remarks:

13.03.25 - All punches Solved

5.7 Function and Safety Critical Tests BESS 1, BESS 2 and PCS

Check system components of all battery cabinets (one cabinet in each container section) inside BESS 1 and 2 container and the following software functions. Document the qualification results in the following table.

TR11	Test		Result	Completed by	Witnessed by	Date
5.7.1	**Check smoke detectors BESS 1**	**Test Layout:** Use test spray to trigger the sensor. **Pass Fail Criteria:** TR/gas event was simulated and (-) All battery cabinets decoupled from PCS (-) 80Q1 (Main AC breaker) opened - Air dampers are working - All exhaust system units in container roofs are operating - TR successfully transmitted to higher level controller via hard wired signal	☒ OK ☐ Defects ☐ N/A	A SUTTO	M JAHNS F HEIN	06. 12. 24
5.7.2	**Check CO detectors BESS 1**	**Test Layout:** Use test spray to trigger the sensor. **Pass Fail Criteria:** TR/gas event was simulated and (-) All battery cabinets decoupled from PCS (-) 80Q1 (Main AC breaker) opened - Air dampers are working - All exhaust system units in container roofs are operating - TR successfully transmitted to higher level controller via hard wired signal	☒ OK ☐ Defects ☐ N/A	A SUTTO	M JAHNS F HEIN	06 12 24
5.7.3	**Check H2 BESS 1**	**Test Layout:** Check the correct functionality of the H2 exhaust system (detection and gas removal) in case of TR/gas event. Sample gas trigger. Check correct behaviour of the BESS: (-) All battery cabinets decouple from PCS DC side (-) 80Q1 (Main AC breaker) opens - ~~Air dampers are working~~ - ~~All exhaust system units in container roofs are operating~~ - Fire&Gas is transmitted to higher level controller via hard wired signal	☒ OK ☐ Defects ☐ N/A	A SUTTO	M JAHNS G. del MISSIER	06-12-24

TR11	Test		Result	Completed by	Witnessed by	Date
		Pass Fail Criteria: TR/gas event was simulated and - All battery cabinets decoupled from PCS - 80Q1 (Main AC breaker) opened - ~~Air dampers are working~~ - ~~All exhaust system units in container roofs are operating~~ - F&G successfully transmitted to higher level controller via hard wired signal				
5.7.4	**Check smoke detectors BESS 2**	**Test Layout:** Use test spray to trigger the sensor. **Pass Fail Criteria:** TR/gas event was simulated and - All battery cabinets decoupled from PCS - 80Q1 (Main AC breaker) opened - Air dampers are working - All exhaust system units in container roofs are operating - TR successfully transmitted to higher level controller via hard wired signal	☒ OK ☐ Defects ☐ N/A	A. SUTTO	M. JAHNS G. del MISSIER	21.11.24
5.7.5	**Check CO detectors BESS 2**	**Test Layout:** Use test spray to trigger the sensor. **Pass Fail Criteria:** TR/gas event was simulated and - All battery cabinets decoupled from PCS - 80Q1 (Main AC breaker) opened - Air dampers are working - All exhaust system units in container roofs are operating - TR successfully transmitted to higher level controller via hard wired signal	☒ OK ☐ Defects ☐ N/A	A SUTTO	M JAHNS G del MISSIER	21.11.24

TR11	Test		Result	Completed by	Witnessed by	Date
5.7.6	**Check H2 BESS 2**	**Test Layout:** Check the correct functionality of the H2 exhaust system (detection and gas removal) in case of TR/gas event. Sample gas trigger. Check correct behaviour of the BESS: - All battery cabinets decouple from PCS DC side - 80Q1 (Main AC breaker) opens - ~~Air dampers are working~~ - ~~All exhaust system units in container roofs are operating~~ - Fire&Gas is transmitted to higher level controller via hard wired signal	☒ OK ☐ Defects ☐ N/A	AUTO	MJAHNS G.del MISSIER	21-11-25
		Pass Fail Criteria: TR/gas event was simulated and - All battery cabinets decoupled from PCS - 80Q1 (Main AC breaker) opened - ~~Air dampers are working~~ - ~~All exhaust system units in container roofs are operating~~ - F&G successfully transmitted to higher level controller via hard wired signal				

NOTE: Check RE-SET mechanism of Smoke triggered alarms 2002

13.03.25 - Reset logic changed to 2002

6 Battery Modules

6.1 Reference Documents

These documents are not physically included in this report but are externally available.

Document Title	Document Name
Overall Schematics (print out)	10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20241105_V1.2
GA drawing as build (print out)	23A2007 BLPH BESS complete system
Operating and maintenance manual (print out)	10354_23A2007_240911_Operating_Manual_BESS_1MW_5 MWh_6.6kV_EN_v0.87
FAT report (external)	23A2007_240708_FAT_BESS_Converter_EN_v2.0_Signed
Profinet interface list	23A2007_240628_PROFINET_Register BESS_V1_0_0_3

6.2 Prerequisites

Carefully qualify that this SAT protocol has been approved and the equipment has been inspected by the quality control department. Ensure that all requirements for the SAT are met. And then record the qualification results in the TR12 test report.

The following documents must be available in electronic form or as a printout for the SAT:

1. Circuit diagram of the system
2. Manual in the current version
3. General arrangement overview
4. Interface documentation (if available)

No category A open punch list items are outstanding. Any re-work on the electrical installation is completed.

The following power sources are required to perform the activities listed in the following paragraphs. Please ensure the main power source is LOTO before starting operation and follow the correct procedures to power up any circuit.

- 400 VAC aux BESS – *auxiliary load BESS B-200 <> 84W2*

Note – the battery modules have been tested after assembly for quality assessment (reports available) and have been tested for functionality and capacity prior to shipping (reports available).

Remarks:

6.3 Installation Report

Check the correct installation and connection of the battery modules in the BESS 1 and BESS 2 containers. Document the qualification results in the following table.

TR12	Test		Result	Completed by	Witnessed by	Date
6.3.1	**Installation report for cabinets**	**Test Layout:** Report issued for the following racks: BESS 1 ☑ 1 ☑ 2 ☑ 3 ☑ 4 ☑ 5 ☑ 6 ☑ 7 ☑ 8 ☑ 9 ☑ 10 ☑ 11 BESS 2 ☑ 1 ☑ 2 ☑ 3 ☑ 4 ☑ 5 ☑ 6 ☑ 7 ☑ 8 ☑ 9 ☑ 10 ☑ 11	☑ OK ☐ Defects ☐ N/A	A. SUTO, ADNAN AKYOL		11.3.25
		Pass Fail Criteria: All cabinets have been checked and report is available				
6.3.2	**LOTO**	Check DC fused are disconnected.	☑ OK ☐ Defects ☐ N/A			

7 System Tests

7.1 Reference Documents

These documents are not physically included in this report but are externally available.

Document Title	Document Name
Overall Schematics (print out)	10354_23A2007_CAE_Statron_Shell Crosswind BESS FQ 1MW 5MWh Offshore_20241105_V1.2
GA drawing as build (print out)	23A2007 BLPH BESS complete system
Operating and maintenance manual (print out)	10354_23A2007_240911_Operating_Manual_BESS_1MW_5 MWh_6.6kV_EN_v0.87
FAT report (external)	23A2007_240708_FAT_BESS_Converter_EN_v2.0_Signed
Profinet interface list	23A2007_240628_PROFINET_Register BESS_V1_0_0_3

7.2 Prerequisites

Carefully qualify that this SAT protocol has been approved and the equipment has been inspected by the quality control department. Ensure that all requirements for the SAT are met. And then record the qualification results in the TR0x test report.

The following documents must be available in electronic form or as a printout for the SAT:

1. Circuit diagram of the system
2. Manual in the current version
3. General arrangement overview
4. Interface documentation (if available)

No category A open punch list items are outstanding. Any re-work on the electrical installation is completed.

The following power sources are required to perform the activities listed in the following paragraphs. Please ensure the main power source is LOTO before starting operation and follow the correct procedures to power up any circuit.

- 400VAC aux BESS – *auxiliary load BESS B-200 <> 84W2*
- 6.6 kV AC
- (FREQCON) power meter needs to be connected to AC busbars for voltage measurement before energization

Remarks:

7.1 Software and Function Tests

Check the following software functions. Document the qualification results in the following table.

Note – in the event that BLPH control system connections are not available at this time, consideration must be given to implement temporary safety measures e.g. use of local temporary pushbutton in lieu of no trip signal from BLPH control system. To be fully risk assessed at site prior to any implementation.

TR13	Test		Result	Completed by	Witnessed by	Date
7.1.1	**LOTO main connection and electro mechanical lock in place**	**Test Layout:** Confirm BESS AC connection is LOTO and captive key to earth the transformer is available before energizing the system. Confirm all system mains (80Q1) is open. **Pass Fail Criteria:** Transformer connections are correct. Captive key is retrieved, transformer is grounded. 80Q1 open.	☑ OK ☐ Defects ☐ N/A	A. AKRAM	A. SUTO	14.3.25
7.1.2	**Transformer inspection**	**Test Layout:** MV and LV connections are completed and according to as built electrical drawings. After visual inspection, lock the door and extract the captive key for energization. **Pass Fail Criteria:** Transformer connections are correct. Key is available for energization	☑ OK ☐ Defects ☐ N/A	A. AKRAM	A. SUTO	14.3.25
7.1.3	**Energize AC connection**	**Test Layout:** Energize main AC connection. - Transformer is energized - Turn on mains (80Q1). **Pass Fail Criteria:** Inverter units energized, no unexpected trips.	☑ OK ☐ Defects ☐ N/A	A. AKRAM	A. SUTO	14.3.25
7.1.4	**Check pre-charging and DC link control** 4.7 FAT	**Test Layout:** Connecting the converter via interface: • Check the pre-charge and DC link control for proper functionality **Pass Fail Criteria:** **Precharge:** - Precharging process is indicated by HMI/WebVisu. - After precharging process is done, the green "Ready for Operation" is indicated by HMI/WebVisu. **DC Link Control:** - Verify correct DC-link voltage level was successfully reached and held via HMI/WebVisu.	☑ OK ☐ Defects ☐ N/A	A. AKRAM	A. SUTO	14.3.25

TR13	Test		Result	Completed by	Witnessed by	Date
7.1.5	Check IGBTs	**Test Layout:** Check IGBT activation. **Pass Fail Criteria:** - IGBTs can be switched without any problems - Operating status is indicated by by HMI/WebVisu.	☑ OK ☐ Defects ☐ N/A	A AKKAM	A. SUTO	24.3.25
7.1.6	Check DC ports	**Duration: After reaching 250 A test duration is 10 min.** **Test Layout:** **<u>DC ports:</u>** Connection to customer AC mains is performed in order to work AC power. Each port will be charged with 250 kW which corresponds to a current of 250 A. DC ports connection Increase the DC current setpoint slowly to 250 A and keep this value for 10 minutes. **<u>Heat run:</u>** Check if temperatures of - IGBTs - Inductors - Coolant of converter cooling system are within the permissible ranges by verifying the temperature values displayed on the HMI/WebVisu. **Pass Fail Criteria:** **<u>DC Ports:</u>** DC current output of 250 A is displayed on the HMI/WebVisu according to setpoint. **<u>Heat Run:</u>** IGBT, inductor and converter cooling system coolant temperatures are below the temperature thresholds set in the control system.	☑ OK ☐ Defects ☐ N/A	A. AKKAM	A. SUTO	24.3.25

TR13	Test		Result	Completed by	Witnessed by	Date
7.1.7	**Check DC port current/offset control**	**Test Layout:** Check the DC port current control / offset control and check for oscillations. **Pass Fail Criteria:** Oscillations are within the permissible range of +/- 10% of 250A.	☑ OK ☐ Defects ☐ N/A	A. AKCAM	A. SUTO	14.3.25
7.1.8	**Check temperature values**	**Test Layout:** Check all temperature values displayed on the HMI/WebVisu for plausibility. **Pass Fail Criteria:** The temperature values indicated on the HMI/WebVisu are plausible. IGBTs: 30 ... 65 °C Inductors: 30 ... 120°C Cooling water: 27 ... 55 °C	☑ OK ☐ Defects ☐ N/A	A. AKCAM	A. SUTO	14.3.25
7.1.9	**Measurements** 4.11 FAT	**Test Layout:** Check if the measured values (voltages and currents) are properly collected by the Simotion (PCS main controller) and verify by using a multimeter or current clamp at DC and AC side. **Pass Fail Criteria:** Values measured with multimeter correspond +/-5% to the values displayed on the HMI/WebVisu.	☑ OK ☐ Defects ☐ N/A	A. AKCAM	A. SUTO	14.3.25
7.1.10	**Check temperature derating functionality**	**Test Layout:** Check the temperature derating for proper functionality. For this purpose, lower the temperature setpoints. **Pass Fail Criteria:** PCS lowers power according to the set derating thresholds.	☑ OK ☐ Defects ☐ N/A	A. AKCAM	A. SUTO	08.04.25
7.1.11	**Switching-off** 4.12 FAT	**Test Layout:** Switching off the inverter. The inverter is properly switched off by removing the control bits. **Pass Fail Criteria:** "OFF" state is indicated by the HMI/WebVisu.	☑ OK ☐ Defects ☐ N/A	A. AKCAM	A. SUTO	08.04.25

TR13	Test		Result	Completed by	Witnessed by	Date
7.1.12	Battery capacity test	**Test Layout:** Capacity test / load test as required. Check the temperature behavior of the converter system during the test. Make sure plots include: - Power AC - Power DC - Voltage DC - Cell voltage max and min - Cell temp max and min - Room temperatures - Filter temperature - SOC **Pass Fail Criteria:** Capacity was successfully reached without power derating and all temperatures in acceptable ranges.	☐ OK ☐ Defects ☒ N/A			
7.1.13	Performance Test AC output	**Test Layout:** **Duration: After reaching 1000 A duration test of 10 min.** **Test Layout:** Increase the AC current setpoint value slowly to 1000 A output and keep this value for 10 minutes. **Pass Fail Criteria:** AC current output of 1000 A is displayed correctly on the HMI/WebVisu according to setpoint.	☒ OK ☐ Defects ☐ N/A	A. AKCAM	A. SUTO	08.06.25

REMARK
7.1.12 test will be completed after installation at final location. It is not considered necessary currently as part of SAT

8 Employees Present

Identify each employee involved in the execution of this protocol. Document the employee 's name, signature, name abbreviation and date in the following table:

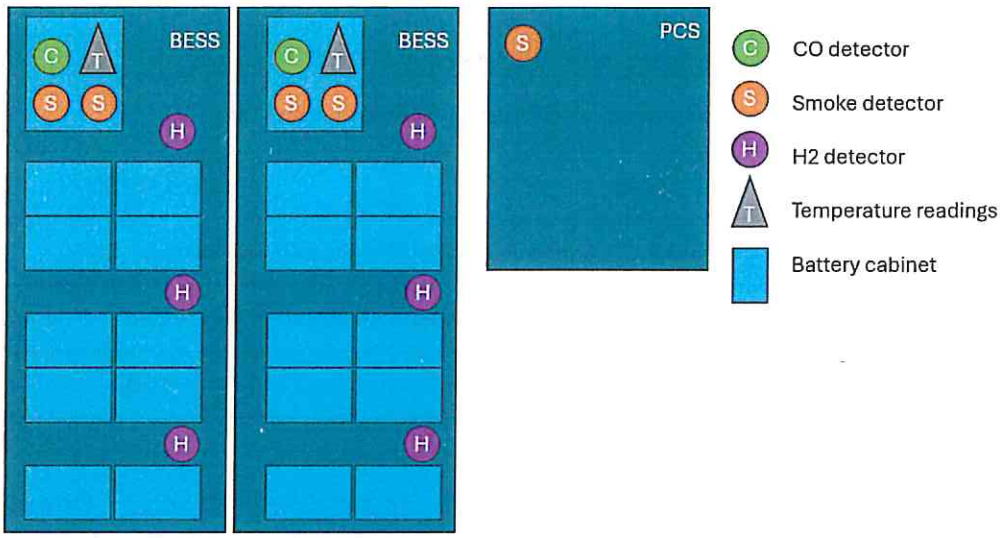
Company Name	Employee Name	Employee Signature	Abbreviation	Date
FREQCON	Md. Adnan Akram		MAA	08.04.25
CROSSWIND	ALESSANDRO SUTTO		ASU	08.04.25
CROSSWIND	JOHN MACKILLOP		JM	08.04.25
CROSSWIND	DAVE MUSGROVE		DM	08/04/2025

	Yes/No
All persons involved in the SAT were documented.	☒ Y ☐ N

Remarks:
B Punches C30000871, C30000874 remain open (Door handle on BESS 2 door & identifyer stickers for containers) to BE adressed

9 Appendix

9.1 Fire and Gas Cause and Effect



Simplified representation of the location of different components within the BESS system.

9.1.1 PCS container

1x smoke detector – trigger 1-out-of-1 – it can be reset remotely.
Once triggered it sends 85-XA-002 (confirmed smoke) hardwired signal to EMCS.
PCS Control Cabinet XT1-3&4

9.1.2 BESS container

3x H2 detectors – trigger is 2-out-of-3.
It generates 85-XA-001 (confirmed gas) hardwired signal to EMCS.
PCS Control Cabinet XT1-1&2

9.1.3 BESS cabinets (1 to 11 in each container) - independent reaction

1x CO detector – trigger is 1-out-of-1
2x Smoke detectors – trigger is 2-out-of-2
Module Temperature reading (from BMS) – trigger is > 60°C
They generate 85-XA-004 (Confirmed Thermal Runaway) hardwired signal to EMCS
Note: each detector type works independently. The first one to reach the triggers conditions will activate the HW signal to EMCS.

10 Check and Approval

The SAT protocol becomes the SAT report when it has been completed as the individual test reports have been completed and labelled with a test date. The SAT report is submitted to the customer for confirmation and the results must be documented in TR14.

TR14	Examination and authorisation of execution
Check the test results and the original data. Final assessment for SAT	
☒ PASS	☐ NOT PASSED
If there are any unresolved discrepancies, please fill in the following "remarks" table.	
Specify whether or not these unresolved discrepancies may affect the completion of the SAT.	
☐ YES	☒ NO

Remarks:
8 Punches C30000871, C30000874 remain Open
(Door handle on BESS2 & identifyer Sticker for BESS1&2)
to be adressed - not affecting completion of SAT

Carried out by:	M. Adnan Akram	Date:	2025 · 04 · 08
	FREQCON GmbH		YYYY/MM/DD
Authorised by:	ALESSANDRO SUTTO	Date:	2025 · 04 · 08
	Customer		YYYY/MM/DD

Supply
In = 160 A
Un = 400 V

K/L 3.2
Cable/Line
30 m
Cu (3x10/10/10)

NSHV 3
TN-S Un = 400 V

-684F4
Miniature circuit-breaker
In = 32 A
5SY43327/C

K/L 3.1
Cable/Line
1 m
Cu (3x4/4/4)

-684F3
Miniature circuit-breaker
In = 32 A
5SY43327/C

C/L 4.1
Cable/Line
1 m
Cu (3x4/4/4)

NSHV 5
TN-S Un = 400 V

-691F1
Miniature circuit-breaker
In = 6 A
5SY41067/C

C/L 4.2
Cable/Line
1 m
Cu (1x1,5/1,5/1,5)

Exhaust Unit / shut-off flap
Inner zone
In = 2,7 A
Un = 230 V
1+N-pole

-691F2
Miniature circuit-breaker
In = 6 A
5SY41067/C

C/L 4.3
Cable/Line
1 m
Cu (1x1,5/1,5/1,5)

Exhaust Unit / shut-off flap
Inner zone
In = 2,7 A
Un = 230 V
1+N-pole

-691F3
Miniature circuit-breaker
In = 6 A
5SY41067/C

C/L 4.4
Cable/Line
1 m
Cu (1x1,5/1,5/1,5)

Exhaust Unit / shut-off flap
Inner zone
In = 2,7 A
Un = 230 V
1+N-pole

-684F1
Miniature circuit-breaker
In = 32 A
5SY43327/C

C/L 5.1
Cable/Line
1 m
Cu (3x4/4/4)

Crane 3
Inner zone
In = 1,95 A
Un = 230 V
1+N-pole

C/L 5.7
Cable/Line
10 m
Cu (1x1,5/1,5/1,5)

-690F5
Miniature circuit-breaker
In = 6 A
5SY41067/C

Clima
Inner zone
In = 9 A
Un = 400 V
3+N-pole

C/L 5.8
Cable/Line
10 m
Cu (3x1,5/1,5/1,5)

-691F4
Miniature circuit-breaker
In = 16 A
5SY43167/C

NSHV 6
TN-S Un = 400 V

-690F1
Miniature circuit-breaker
In = 10 A
5SU13546KK10/B

C/L 5.2
Cable/Line
10 m
Cu (1x1,5/1,5/1,5)

Container Light
Inner zone
In = 1 A
Un = 230 V
1+N-pole

-690F3
Miniature circuit-breaker
In = 6 A
5SY41067/C

C/L 5.4
Cable/Line
10 m
Cu (1x1,5/1,5/1,5)

Crane 1
Inner zone
In = 1,95 A
Un = 230 V
1+N-pole

-690F4
Miniature circuit-breaker
In = 6 A
5SY41067/C

C/L 5.5
Cable/Line
10 m
Cu (1x1,5/1,5/1,5)

Crane 2
Inner zone
In = 1,95 A
Un = 230 V
1+N-pole

-101Q1
Circuit-breaker
In = 3,2 A
3RV20111DA25/LI

C/L 3.4
Cable/Line
2 m
Cu (3x1,5/1,5/1,5)

400V/230V Power Supply
Inner zone
In = 1,6 A
Un = 400 V
3+N-pole

-690F2
Miniature circuit-breaker
In = 20 A
5SU13547KK20/C

C/L 3.3
Cable/Line
10 m
Cu (1x2,5/2,5/2,5)

Container Sockets
Inner zone
In = 10 A
Un = 230 V
1+N-pole

230V Bat Cabinet 7
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-292W2-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

-688F1
Miniature circuit-breaker
In = 16 A
5SY41167/C

230V Bat Cabinet 8
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-292W3-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

-688F2
Miniature circuit-breaker
In = 16 A
5SY41167/C

230V Bat Cabinet 9
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-293W1-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

-688F3
Miniature circuit-breaker
In = 16 A
5SY41167/C

230V Bat Cabinet 10
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-293W2-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

-688F4
Miniature circuit-breaker
In = 16 A
5SY41167/C

230V Bat Cabinet 11
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-293W3-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

-688F5
Miniature circuit-breaker
In = 16 A
5SY41167/C

NSHV 4
TN-S Un = 400 V

-687F1
Miniature circuit-breaker
In = 16 A
5SY41167/C

-290W1-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

230V Bat Cabinet 1
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-687F2
Miniature circuit-breaker
In = 16 A
5SY41167/C

-290W2-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

230V Bat Cabinet 2
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-687F3
Miniature circuit-breaker
In = 16 A
5SY41167/C

-290W3-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

230V Bat Cabinet 3
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-687F4
Miniature circuit-breaker
In = 16 A
5SY41167/C

-291W1-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

230V Bat Cabinet 4
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-687F5
Miniature circuit-breaker
In = 16 A
5SY41167/C

-291W2-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

230V Bat Cabinet 5
Inner zone
In = 2 A
Un = 230 V
1+N-pole

-687F6
Miniature circuit-breaker
In = 16 A
5SY41167/C

-292W1-1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

230V Bat Cabinet 6
Inner zone
In = 2 A
Un = 230 V
1+N-pole

Project name:	Shell Crosswind Offshore		
Planner: Freqcon_DG		View: Device parameters	Sheet: 1/1
Design office: Freqcon GmbH		Location:	
Client: Statron AG		Created on: 4 Sep 2024	Changed on: 30 Oct 2024

SIMARIS design 24.1.0

Supply
In = 160 A
Un = 400 V

K/L 3.2
Cable/Line
30 m
Cu (3x10/10/10)

NSHV 1

TN-S Un = 400 V

=UNIT_01+CT+CTRL_1.3-84F2
Miniature circuit-breaker
In = 32 A
5SY43327/C

K/L 3.1
Cable/Line
1 m
Cu (3x4/4/4)

-190F3
Miniature circuit-breaker
In = 16 A
5SU13547KK16/C

K/L 3.6
Cable/Line
1 m
Cu (1x1,5/1,5/1,5)

Cabinet Light / Socket
Inner zone
In = 16 A
Un = 230 V
1+N-pole

-101Q1
Circuit-breaker
In = 3,2 A
3RV20111DA25/LI

Cable/Line
1 m
Cu (3x1,5/1,5/1,5)

400V/24V Power Supply
Inner zone
In = 2 A
Un = 400 V
3+N-pole

-191F1
Miniature circuit-breaker
In = 16 A
5SY43167/C

Cable/Line
10 m
Cu (3x1,5/1,5/1,5)

Clima 1
Inner zone
In = 9,1 A
Un = 400 V
3+N-pole

-191F2
Miniature circuit-breaker
In = 16 A
5SY43167/C

Cable/Line
10 m
Cu (3x1,5/1,5/1,5)

Clima 2
Inner zone
In = 9,1 A
Un = 400 V
3+N-pole

NSHV 2

TN-S Un = 400 V

-183F1
Miniature circuit-breaker
In = 16 A
5SY41167/C

-279W1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

CON Cabinet Fans
Inner zone
In = 1,5 A
Un = 230 V
1+N-pole

-183F2
Miniature circuit-breaker
In = 10 A
5SY41107/C

-281W1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

CIR Cabinet Fans
Inner zone
In = 0,9 A
Un = 230 V
1+N-pole

-185F1
Miniature circuit-breaker
In = 10 A
5SY41107/C

-278W1
Cable/Line
5 m
Cu (1x1,5/1,5/1,5)

CTRL Cabinet Fan
Inner zone
In = 0,17 A
Un = 230 V
1+N-pole

-185F2
Miniature circuit-breaker
In = 6 A
5SY41067/C

-185W1
Cable/Line
3 m
Cu (1x1,5/1,5/1,5)

Cabinet Heating
Inner zone
In = 3,48 A
Un = 230 V
1+N-pole

-187F1
Miniature circuit-breaker
In = 13 A
5SY41137/C

-80W2
Cable/Line
6 m
Cu (1x1,5/1,5/1,5)

230V 3WL
Inner zone
In = 0,57 A
Un = 230 V
1+N-pole

-181Q1
Circuit-breaker
In = 5 A
3RV20111FA25/LI

-181W1
Cable/Line
8 m
Cu (3x1,5/1,5/1,5)

Water Pump
Inner zone
In = 3,8 A
Un = 400 V
3+N-pole

-181Q2
Circuit-breaker
In = 6,3 A
3RV20111GA25/LI

-181W1
Cable/Line
8 m
Cu (3x1,5/1,5/1,5)

Water Heating
Inner zone
In = 4,33 A
Un = 400 V
3+N-pole

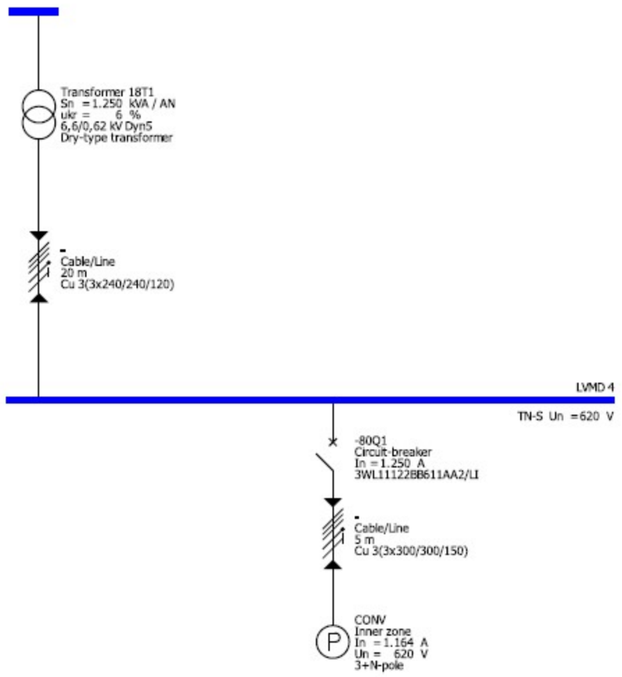
-182Q1
Circuit-breaker
In = 5 A
3RV20111FA25/LI

-181W1
Cable/Line
8 m
Cu (3x1,5/1,5/1,5)

Fan Heat Exchanger
Inner zone
In = 2,5 A
Un = 400 V
3+N-pole

Project name:	Shell Crosswind Offshore		
Planner: Freqcon_DG	View: Device parameters	Sheet: 1/1	
Design office: Freqcon GmbH	Location:		
Client: Statron AG	Created on: 4 Sep 2024	Changed on: 8 Oct 2024	

SIMARIS design 24.1.0



Project name:	Shell Crosswind Offshore		
Planner: Freqcon_DG		View: Device parameters	Sheet: 1/1
Design office: Freqcon GmbH		Location:	
Client: Statron AG		Created on: 4 Sep 2024	Changed on: 8 Oct 2024

Final Test Report of Battery Rack

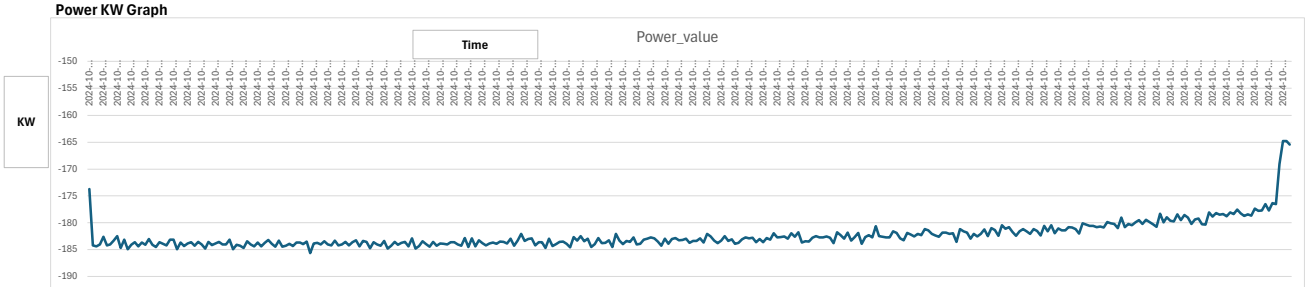
Customer	**Shell**	
Type of Test	Discharge - Battery Rack	
Date of Test	09-Oct-24	
Time -Start	10:18	**Uhr**
Time -Stop	11:38	**Uhr**
Duration of Test	01:20	**Stunde:Min**
Avg. Runing Current	-207.53	**A**
Avg. Runing Power	-182.31	**KW**
SOC Before Test	100.00	**%**
SOC After Test	2.71	**%**
Rack Capacity	280	**Kwh**
Generated Energy	-243.08	**Kwh**

Converter 3.1 - Rack 01 - DCPort 01			Before Test Values.				After Test Values			
Module	Artikel	Module Serial No.	Module Voltage1	Max. Cell Voltage1	Min. Cell Voltage1	Max Temperature1	Module Voltage2	Max. Cell Voltage2	Min. Cell Voltage2	Max Temperature2
Serial No.	No.	No.	V	V	V	C°	V	V	V	C°
1	509344	FRQ-509344000140	3.495	3.498	3.493	20.0	3.044	3.077	2.895	43.0
2	509344	FRQ-509344000181	3.495	3.497	3.491	20.0	3.083	3.087	3.061	43.0
3	509344	FRQ-509344000145	3.498	3.500	3.496	20.0	3.056	3.089	2.938	43.0
4	509344	FRQ-509344000168	3.496	3.498	3.492	21.0	3.062	3.101	2.937	44.0
5	509344	FRQ-509344000133	3.496	3.498	3.487	20.0	3.051	3.086	2.932	42.0
6	509344	FRQ-509344000126	3.497	3.500	3.495	21.0	3.048	3.084	2.925	44.0
7	509344	FRQ-509344000141	3.497	3.499	3.493	21.0	3.039	3.078	2.890	45.0
8	509344	FRQ-509344000143	3.499	3.501	3.497	20.0	3.044	3.084	2.898	44.0
9	509344	FRQ-509344000127	3.498	3.499	3.497	21.0	3.055	3.084	2.955	44.0
10	509344	FRQ-509344000132	3.498	3.499	3.497	21.0	3.055	3.082	2.963	44.0
11	509344	FRQ-509344000167	3.496	3.498	3.494	20.0	3.057	3.089	2.913	40.0
12	509344	FRQ-509344000146	3.499	3.504	3.496	21.0	3.053	3.083	2.928	41.0
13	509344	FRQ-509344000182	3.497	3.500	3.494	20.0	3.083	3.088	3.069	40.0
14	509344	FRQ-509344000139	3.498	3.500	3.497	21.0	3.048	3.079	2.929	44.0
15	509344	FRQ-509344000138	3.499	3.502	3.497	20.0	3.047	3.087	2.910	44.0
16	509344	FRQ-509344000183	3.496	3.505	3.493	20.0	3.059	3.091	2.949	44.0
17	509344	FRQ-509344000147	3.499	3.502	3.497	20.0	3.047	3.083	2.901	45.0
18	509344	FRQ-509344000161	3.499	3.501	3.496	21.0	3.052	3.089	2.916	45.0
19	509344	FRQ-509344000131	3.498	3.500	3.494	21.0	3.055	3.088	2.931	44.0
20	509344	FRQ-509344000128	3.499	3.503	3.497	20.0	3.057	3.098	2.948	43.0
21	509344	FRQ-509344000144	3.498	3.502	3.496	21.0	3.043	3.081	2.905	45.0
22	509344	FRQ-509344000142	3.497	3.500	3.494	20.0	3.034	3.077	2.880	44.0
23	509344	FRQ-509344000129	3.498	3.500	3.493	20.0	3.046	3.085	2.901	43.0
24	509344	FRQ-509344000130	3.498	3.501	3.494	21.0	3.044	3.086	2.882	47.0
25	509344	FRQ-509344000162	3.499	3.506	3.492	20.0	3.060	3.102	2.946	44.0
26	509344	FRQ-509344000148	3.499	3.501	3.495	20.0	3.052	3.084	2.920	45.0
27	509344	FRQ-509344000169	3.501	3.504	3.498	20.0	3.051	3.083	2.923	45.0
28	509344	FRQ-509344000137	3.499	3.502	3.495	20.0	3.040	3.081	2.878	44.0

Database Results



Power KW Graph



Final Test Report of Battery Rack

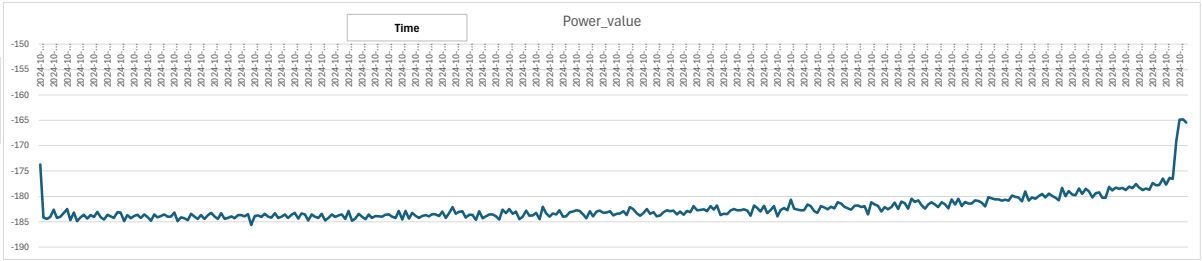
Customer	**Shell**	
Type of Test	Discharge - Battery Rack	
Date of Test	09-Oct-24	
Time -Start	10:18	**Uhr**
Time -Stop	11:38	**Uhr**
Duration of Test	01:20	**Stunde:Min**
Avg. Runing Current	-202.76	**A**
Avg. Runing Power	-182.31	**KW**
SOC Before Test	100.00	**%**
SOC After Test	4.01	**%**
Rack Capacity	280	**Kwh**
Generated Energy	-243.08	**Kwh**

Converter 3.1 - Rack 02 - DCPort 01			Before Test Values.				After Test Values			
Module	Artikel	Module Serial No.	Module Voltage1	Max. Cell Voltage1	Min. Cell Voltage1	Max Temperature1	Module Voltage2	Max. Cell Voltage2	Min. Cell Voltage2	Max Temperature2
Serial No.	No.	No.	V	V	V	C°	V	V	V	C°
1	508972	FRQ-508972001263	3.497	3.498	3.496	21.0	3.029	3.090	3.011	44.0
2	508972	FRQ-508972001259	3.497	3.499	3.494	21.0	3.038	3.093	3.019	45.0
3	508972	FRQ-508972001265	3.497	3.499	3.495	20.0	3.045	3.097	3.024	45.0
4	508972	FRQ-508972001270	3.495	3.498	3.480	21.0	3.082	3.097	3.022	45.0
5	508972	FRQ-508972001274	3.497	3.498	3.495	20.0	3.043	3.092	3.026	45.0
6	508972	FRQ-508972001283	3.497	3.498	3.495	20.0	3.089	3.094	3.072	44.0
7	508972	FRQ-508972001278	3.497	3.498	3.496	20.0	3.024	3.083	2.999	45.0
8	508972	FRQ-508972001277	3.497	3.498	3.496	21.0	3.041	3.084	3.017	45.0
9	508972	FRQ-508972000708	3.496	3.498	3.495	20.0	3.093	3.103	3.080	46.0
10	508972	FRQ-508972001273	3.497	3.498	3.495	20.0	3.049	3.094	3.008	47.0
11	508972	FRQ-508972001269	3.497	3.498	3.496	20.0	3.038	3.099	3.006	40.0
12	508972	FRQ-508972001264	3.497	3.498	3.497	21.0	3.079	3.107	3.023	40.0
13	508972	FRQ-508972001258	3.497	3.498	3.496	20.0	3.036	3.096	3.015	42.0
14	508972	FRQ-508972001262	3.497	3.499	3.496	20.0	3.031	3.097	2.985	44.0
15	508972	FRQ-508972001261	3.498	3.498	3.497	21.0	3.026	3.088	2.994	44.0
16	508972	FRQ-508972001257	3.497	3.498	3.496	20.0	3.038	3.094	3.017	45.0
17	508972	FRQ-508972001251	3.496	3.498	3.495	21.0	3.036	3.096	3.018	46.0
18	508972	FRQ-508972001268	3.497	3.500	3.495	20.0	3.040	3.101	3.008	46.0
19	508972	FRQ-508972001272	3.496	3.498	3.493	21.0	3.093	3.100	3.088	46.0
20	508972	FRQ-508972001281	3.496	3.498	3.495	21.0	3.090	3.101	3.051	44.0
21	508972	FRQ-508972001276	3.496	3.500	3.493	20.0	3.033	3.093	3.007	45.0
22	508972	FRQ-508972001275	3.497	3.498	3.495	20.0	3.085	3.092	3.064	44.0
23	508972	FRQ-508972001280	3.496	3.499	3.494	21.0	3.091	3.107	3.071	44.0
24	508972	FRQ-508972001271	3.496	3.498	3.495	21.0	3.037	3.106	3.015	45.0
25	508972	FRQ-508972001267	3.496	3.498	3.494	21.0	3.045	3.095	3.008	44.0
26	508972	FRQ-508972001266	3.497	3.498	3.496	20.0	3.062	3.101	2.995	45.0
27	509344	FRQ-509344000083	3.497	3.499	3.494	21.0	3.066	3.092	2.988	45.0
28	508972	FRQ-508972001260	3.497	3.499	3.495	21.0	3.034	3.090	3.003	45.0

Database Results



Power KW Graph



Final Test Report of Battery Rack

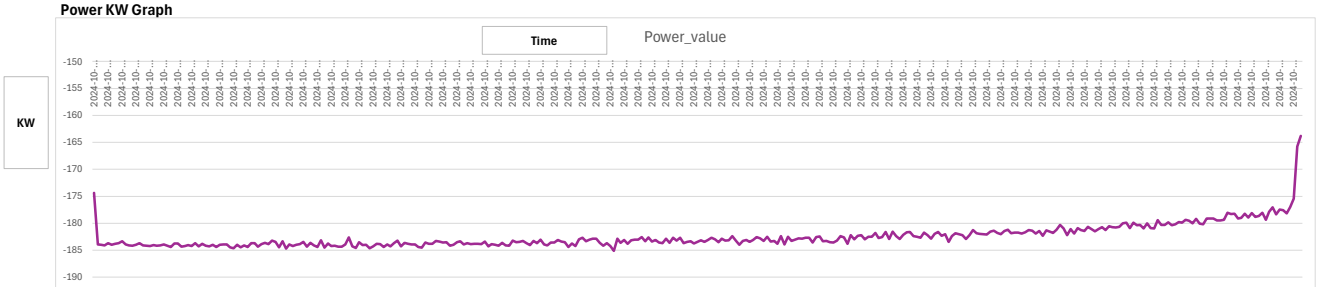
Customer	**Shell**	
Type of Test	Discharge - Battery Rack	
Date of Test	09-Oct-24	
Time -Start	10:18	**Uhr**
Time -Stop	11:38	**Uhr**
Duration of Test	01:20	**Stunde:Min**
Avg. Runing Current	-204.03	**A**
Avg. Runing Power	-182.45	**KW**
SOC Before Test	100.00	**%**
SOC After Test	4.22	**%**
Rack Capacity	280	**Kwh**
Generated Energy	-243.27	**Kwh**

Converter 3.1 - Rack 03 - DCPort 02			Before Test Values.				After Test Values			
Module Serial No.	Artikel No.	Module Serial No.	Module Voltage1 V	Max. Cell Voltage1 V	Min. Cell Voltage1 V	Max Temperature1 C°	Module Voltage2 V	Max. Cell Voltage2 V	Min. Cell Voltage2 V	Max Temperature2 C°
1	509344	FRQ-509344000136	3.477	3.480	3.475	22.0	3.076	3.093	3.010	45.0
2	509344	FRQ-509344000103	3.480	3.483	3.474	21.0	3.080	3.099	3.015	44.0
3	509344	FRQ-509344000108	3.476	3.479	3.473	20.0	3.076	3.094	3.014	44.0
4	509344	FRQ-509344000173	3.477	3.479	3.474	21.0	3.074	3.090	3.016	45.0
5	508972	FRQ-508972000671	3.477	3.480	3.473	21.0	3.060	3.091	2.955	45.0
6	509344	FRQ-509344000160	3.478	3.481	3.475	20.0	3.071	3.100	2.976	44.0
7	509344	FRQ-509344000154	3.477	3.480	3.474	21.0	3.065	3.093	2.979	44.0
8	509344	FRQ-509344000153	3.477	3.481	3.474	21.0	3.064	3.082	2.996	43.0
9	509344	FRQ-509344000159	3.478	3.481	3.474	21.0	3.072	3.087	2.998	43.0
10	509344	FRQ-509344000091	3.477	3.480	3.474	21.0	3.071	3.089	2.994	43.0
11	509344	FRQ-509344000172	3.477	3.480	3.475	20.0	3.076	3.092	3.007	40.0
12	509344	FRQ-509344000106	3.478	3.481	3.476	21.0	3.089	3.106	3.079	42.0
13	509344	FRQ-509344000114	3.479	3.483	3.475	21.0	3.089	3.107	3.077	41.0
14	509344	FRQ-509344000135	3.478	3.481	3.475	21.0	3.074	3.091	3.007	44.0
15	509344	FRQ-509344000134	3.478	3.481	3.470	21.0	3.073	3.095	2.974	45.0
16	509344	FRQ-509344000115	3.479	3.481	3.477	21.0	3.091	3.111	3.076	44.0
17	509344	FRQ-509344000107	3.477	3.481	3.470	20.0	3.087	3.098	3.078	45.0
18	509344	FRQ-509344000171	3.473	3.476	3.468	21.0	3.070	3.089	2.986	44.0
19	509344	FRQ-509344000090	3.475	3.481	3.467	21.0	3.072	3.098	2.953	44.0
20	509344	FRQ-509344000158	3.475	3.484	3.467	20.0	3.062	3.087	2.932	45.0
21	509344	FRQ-509344000155	3.477	3.483	3.474	21.0	3.062	3.097	2.944	45.0
22	509344	FRQ-509344000156	3.475	3.480	3.472	21.0	3.063	3.085	2.983	55.0
23	509344	FRQ-509344000157	3.475	3.482	3.473	21.0	3.068	3.086	2.970	44.0
24	509344	FRQ-509344000482	3.473	3.476	3.471	21.0	3.050	3.069	3.022	45.0
25	509344	FRQ-509344000170	3.476	3.477	3.473	21.0	3.069	3.094	2.982	45.0
26	509344	FRQ-509344000109	3.474	3.480	3.469	21.0	3.075	3.098	2.988	45.0
27	509344	FRQ-509344000116	3.477	3.480	3.474	21.0	3.074	3.093	2.998	48.0
28	509344	FRQ-509344000121	3.479	3.484	3.477	20.0	3.072	3.091	3.003	44.0

Database Results



Power KW Graph

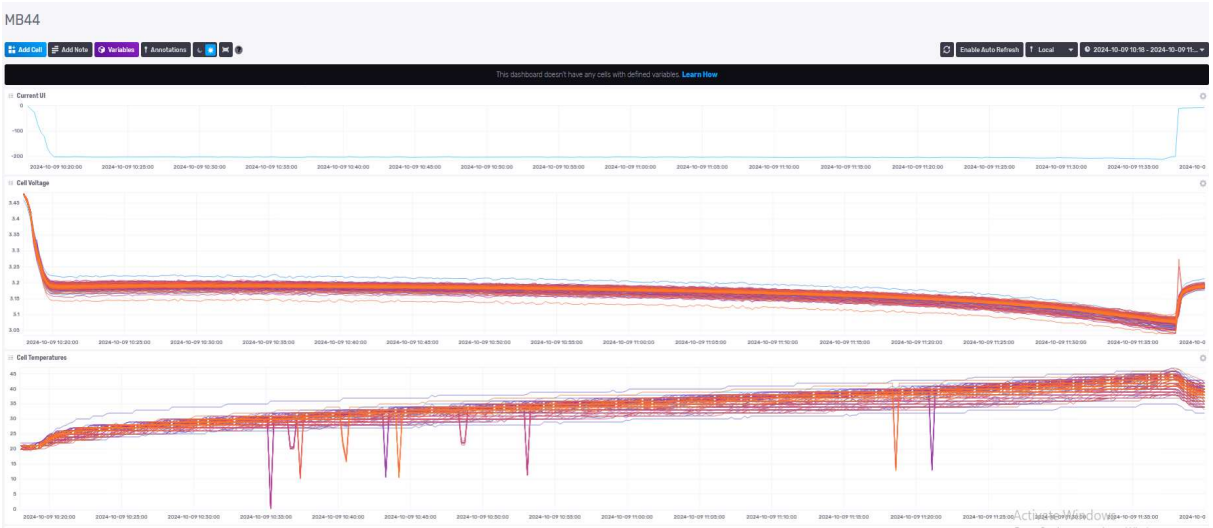


Final Test Report of Battery Rack

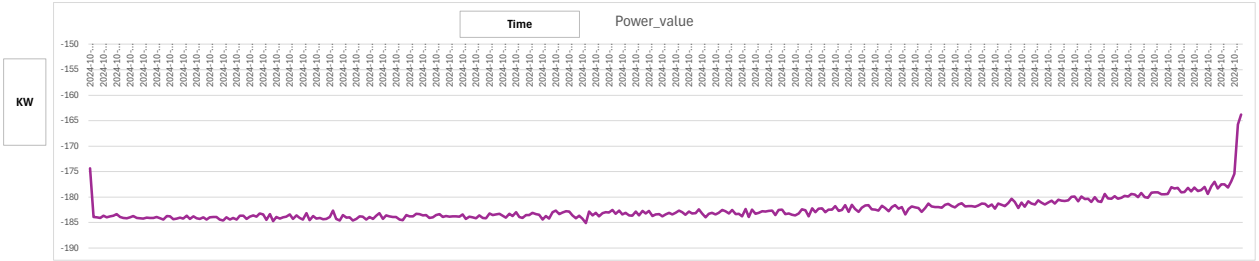
Customer	**Shell**	
Type of Test	Discharge - Battery Rack	
Date of Test	09-Oct-24	
Time -Start	10:18	**Uhr**
Time -Stop	11:38	**Uhr**
Duration of Test	01:20	**Stunde:Min**
Avg. Runing Current	-204.50	**A**
Avg. Runing Power	-182.45	**KW**
SOC Before Test	100.00	**%**
SOC After Test	3.15	**%**
Rack Capacity	280	**Kwh**
Generated Energy	-243.27	**Kwh**

Converter 3.1 - Rack 04 - DCPort 02			Before Test Values.				After Test Values			
Module Serial No.	Artikel No.	Module Serial No.	Module Voltage1 V	Max. Cell Voltage1 V	Min. Cell Voltage1 V	Max Temperature1 C°	Module Voltage2 V	Max. Cell Voltage2 V	Min. Cell Voltage2 V	Max Temperature2 C°
1	508972	FRQ-508972000463	3.477	3.480	3.474	21.0	3.071	3.080	3.050	44.0
2	508972	FRQ-508972000330	3.477	3.478	3.476	21.0	3.068	3.081	3.057	44.0
3	508972	FRQ-508972001449	3.475	3.480	3.461	20.0	3.065	3.075	3.042	44.0
4	508972	FRQ-508972000364	3.477	3.478	3.476	21.0	3.074	3.091	3.053	45.0
5	508972	FRQ-508972000417	3.478	3.481	3.476	21.0	3.070	3.084	3.065	45.0
6	508972	FRQ-508972000688	3.477	3.478	3.476	20.0	3.076	3.084	3.071	44.0
7	508972	FRQ-508972000527	3.477	3.479	3.475	21.0	3.070	3.081	3.055	45.0
8	508972	FRQ-508972000687	3.477	3.480	3.474	21.0	3.075	3.085	3.063	45.0
9	508972	FRQ-508972000287	3.478	3.478	3.476	21.0	3.075	3.082	3.071	45.0
10	508972	FRQ-508972000416	3.478	3.479	3.477	21.0	3.073	3.079	3.062	45.0
11	508972	FRQ-508972000327	3.478	3.480	3.476	20.0	3.070	3.083	3.065	40.0
12	508972	FRQ-508972000356	3.477	3.479	3.476	21.0	3.074	3.082	3.046	47.0
13	509344	FRQ-509344000007	3.478	3.480	3.476	21.0	3.076	3.083	3.050	42.0
14	509344	FRQ-509344000003	3.478	3.479	3.476	21.0	3.074	3.086	3.049	45.0
15	508972	FRQ-508972001043	3.478	3.479	3.476	21.0	3.076	3.085	3.056	46.0
16	509344	FRQ-509344000006	3.478	3.479	3.477	21.0	3.077	3.086	3.050	45.0
17	508972	FRQ-508972001052	3.479	3.479	3.477	21.0	3.078	3.094	3.047	46.0
18	509344	FRQ-509344000014	3.478	3.479	3.476	21.0	3.076	3.082	3.058	46.0
19	509344	FRQ-509344000020	3.478	3.479	3.476	22.0	3.077	3.089	3.054	45.0
20	509344	FRQ-509344000017	3.477	3.479	3.476	20.0	3.078	3.087	3.062	45.0
21	508972	FRQ-508972001051	3.478	3.479	3.476	21.0	3.072	3.079	3.041	46.0
22	509344	FRQ-509344000025	3.477	3.479	3.475	21.0	3.071	3.079	3.044	44.0
23	509344	FRQ-509344000024	3.477	3.478	3.476	21.0	3.077	3.085	3.045	44.0
24	509344	FRQ-509344000021	3.477	3.478	3.476	21.0	3.080	3.093	3.068	44.0
25	509344	FRQ-509344000013	3.477	3.479	3.476	21.0	3.075	3.093	3.049	44.0
26	509344	FRQ-509344000009	3.478	3.478	3.476	21.0	3.075	3.084	3.039	44.0
27	509344	FRQ-509344000004	3.478	3.478	3.476	21.0	3.077	3.090	3.067	44.0
28	509344	FRQ-509344000001	3.477	3.478	3.476	20.0	3.074	3.082	3.047	45.0

Database Results



Power KW Graph

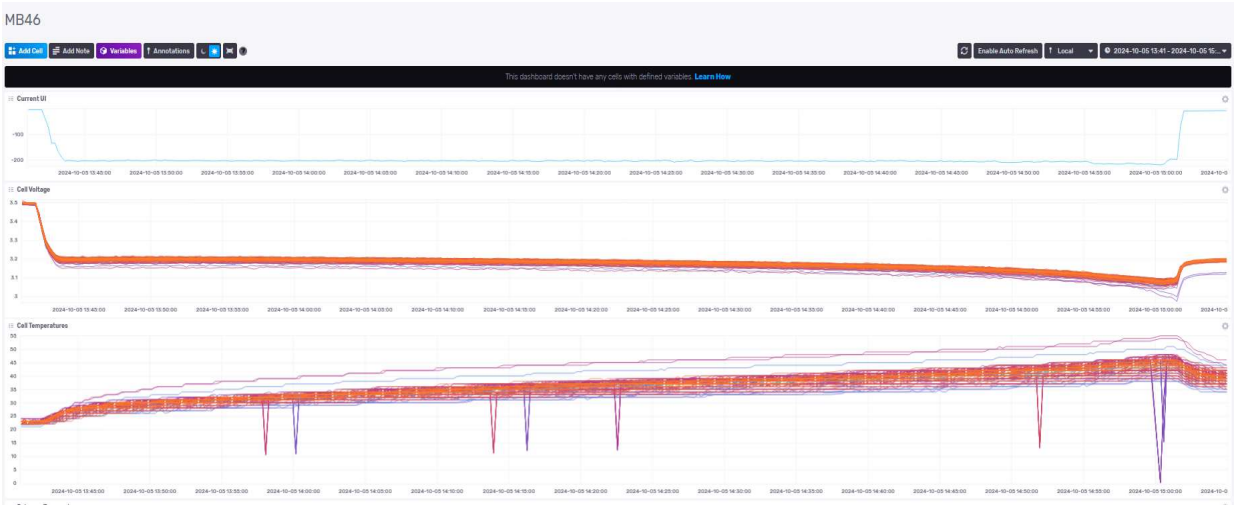


Final Test Report of Battery Rack

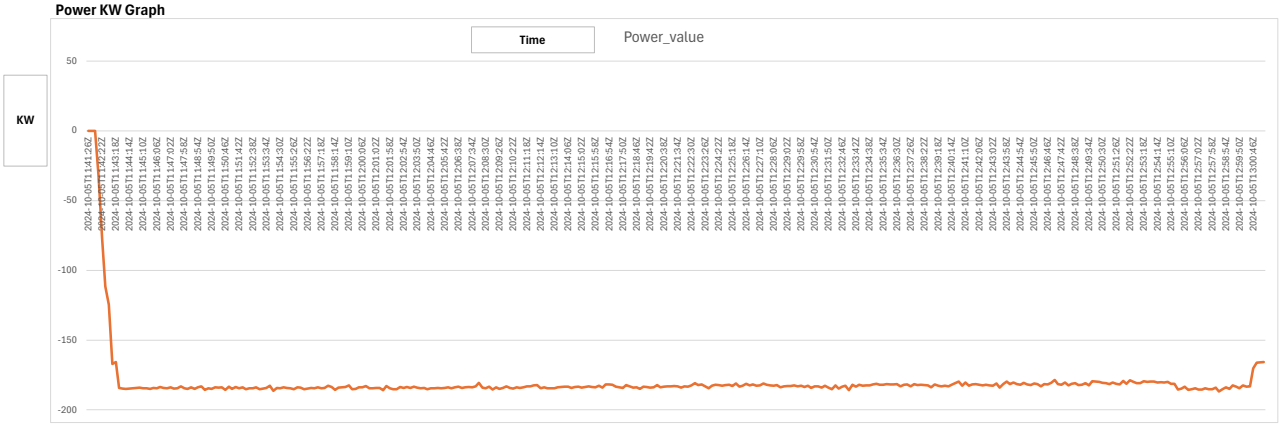
Customer	**Shell**	
Type of Test	Discharge - Battery Rack	
Date of Test	05-Oct-24	
Time -Start	13:41	**Uhr**
Time -Stop	15:05	**Uhr**
Duration of Test	01:20	**Stunde:Min**
Avg. Runing Current	-205.44	**A**
Avg. Runing Power	-182.17	**KW**
SOC Before Test	100.00	**%**
SOC After Test	3.75	**%**
Rack Capacity	280	**Kwh**
Generated Energy	-242.89	**Kwh**

Converter 3.1 - Rack 06 - DCPort 03			Before Test Values.				After Test Values			
Module Serial No.	Artikel No.	Module Serial No.	Module Voltage1 V	Max. Cell Voltage1 V	Min. Cell Voltage1 V	Max Temperature1 C°	Module Voltage2 V	Max. Cell Voltage2 V	Min. Cell Voltage2 V	Max Temperature2 C°
1	509344	FRQ-509344000243	3.495	3.498	3.491	22.0	3.079	3.087	3.072	44.0
2	509344	FRQ-509344000210	3.495	3.498	3.493	23.0	3.085	3.097	3.070	46.0
3	509344	FRQ-509344000207	3.495	3.496	3.493	23.0	3.084	3.093	3.071	45.0
4	509344	FRQ-509344000217	3.496	3.500	3.492	22.0	3.084	3.096	3.073	46.0
5	509344	FRQ-509344000267	3.496	3.498	3.494	23.0	3.084	3.096	3.067	45.0
6	509344	FRQ-509344000231	3.496	3.500	3.495	23.0	3.083	3.087	3.068	46.0
7	509344	FRQ-509344000241	3.496	3.500	3.494	23.0	3.076	3.083	3.047	46.0
8	509344	FRQ-509344000240	3.497	3.502	3.493	23.0	3.083	3.090	3.062	46.0
9	509344	FRQ-509344000238	3.498	3.501	3.496	23.0	3.084	3.093	3.072	50.0
10	509344	FRQ-509344000270	3.499	3.501	3.497	23.0	3.076	3.089	3.027	46.0
11	509344	FRQ-509344000214	3.499	3.502	3.497	23.0	3.084	3.089	3.071	42.0
12	509344	FRQ-509344000208	3.498	3.501	3.492	24.0	3.083	3.094	3.074	42.0
13	509344	FRQ-509344000211	3.499	3.501	3.494	23.0	3.083	3.089	3.075	43.0
14	509344	FRQ-509344000246	3.499	3.501	3.495	23.0	3.085	3.093	3.072	46.0
15	509344	FRQ-509344000244	3.499	3.501	3.496	23.0	3.085	3.100	3.064	53.0
16	509344	FRQ-509344000213	3.499	3.501	3.496	23.0	3.083	3.090	3.074	47.0
17	509344	FRQ-509344000206	3.500	3.502	3.498	23.0	3.084	3.093	3.066	47.0
18	509344	FRQ-509344000216	3.501	3.503	3.497	23.0	3.084	3.100	3.075	46.0
19	509344	FRQ-509344000268	3.498	3.502	3.490	24.0	3.084	3.096	3.074	48.0
20	509344	FRQ-509344000237	3.501	3.503	3.499	24.0	3.081	3.091	3.042	47.0
21	509344	FRQ-509344000239	3.500	3.502	3.498	23.0	3.080	3.085	3.069	46.0
22	509344	FRQ-509344000242	3.502	3.504	3.499	23.0	3.075	3.085	3.055	46.0
23	509344	FRQ-509344000232	3.498	3.502	3.496	23.0	3.082	3.091	3.067	45.0
24	509344	FRQ-509344000269	3.498	3.502	3.493	23.0	3.079	3.087	3.062	46.0
25	509344	FRQ-509344000215	3.500	3.502	3.496	23.0	3.080	3.091	3.071	54.0
26	509344	FRQ-509344000209	3.500	3.503	3.498	23.0	3.083	3.097	3.062	46.0
27	509344	FRQ-509344000212	3.501	3.503	3.499	23.0	3.083	3.100	3.069	48.0
28	509344	FRQ-509344000245	3.500	3.502	3.498	23.0	3.081	3.087	3.073	47.0

Database Results



Power KW Graph



Final Test Report of Battery Rack

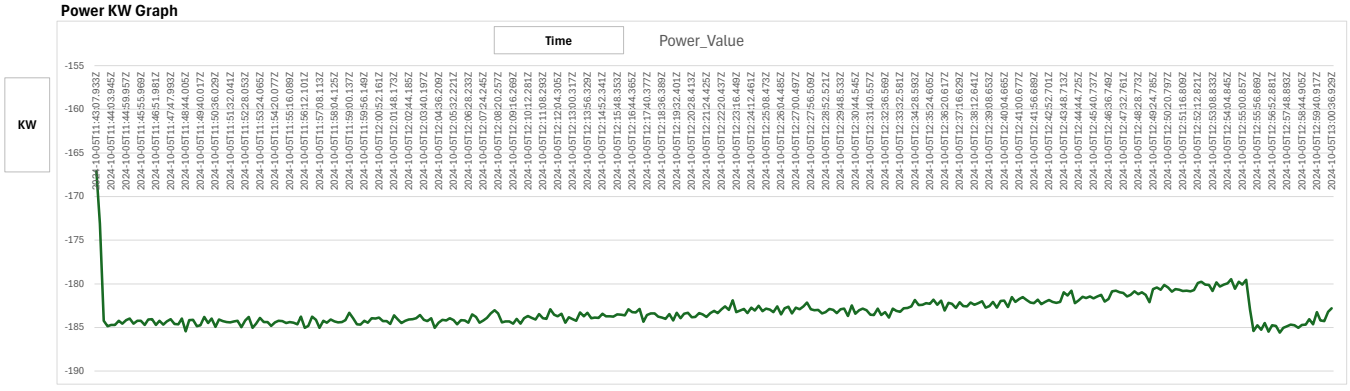
Customer	**Shell**	
Type of Test	Discharge - Battery Rack	
Date of Test	05-Oct-24	
Time -Start	13:41	**Uhr**
Time -Stop	15:05	**Uhr**
Duration of Test	01:20	**Stunde:Min**
Avg. Runing Current	-203.81	**A**
Avg. Runing Power	-183.00	**KW**
SOC Before Test	100.00	**%**
SOC After Test	4.449	**%**
Rack Capacity	280	**Kwh**
Generated Energy	-244.00	**Kwh**

Converter 3.1 - Rack 08 - DCPort 04			Before Test Values.				After Test Values			
Module	Artikel	Module Serial No.	Module Voltage1	Max. Cell Voltage1	Min. Cell Voltage1	Max Temperature1	Module Voltage2	Max. Cell Voltage2	Min. Cell Voltage2	Max Temperature2
Serial No.	No.	No.	V	V	V	C°	V	V	V	C°
1	509344	FRQ-509344000257	3.493	3.498	3.491	23.0	3.076	3.090	3.018	45.0
2	509344	FRQ-509344000228	3.492	3.494	3.489	23.0	3.079	3.092	3.030	45.0
3	509344	FRQ-509344000265	3.493	3.495	3.490	23.0	3.089	3.097	3.065	45.0
4	509344	FRQ-509344000262	3.494	3.499	3.490	23.0	3.076	3.092	3.008	46.0
5	509344	FRQ-509344000248	3.494	3.497	3.490	23.0	3.092	3.098	3.080	46.0
6	509344	FRQ-509344000236	3.494	3.497	3.492	23.0	3.090	3.096	3.075	46.0
7	509344	FRQ-509344000271	3.493	3.500	3.490	23.0	3.085	3.096	3.057	48.0
8	509344	FRQ-509344000272	3.493	3.497	3.489	23.0	3.089	3.095	3.075	46.0
9	509344	FRQ-509344000235	3.492	3.493	3.489	23.0	3.090	3.096	3.078	45.0
10	509344	FRQ-509344000249	3.494	3.498	3.492	23.0	3.076	3.090	3.022	46.0
11	509344	FRQ-509344000261	3.494	3.497	3.491	23.0	3.077	3.094	3.022	40.0
12	509344	FRQ-509344000264	3.495	3.501	3.491	23.0	3.093	3.118	3.078	42.0
13	509344	FRQ-509344000227	3.494	3.495	3.492	23.0	3.073	3.090	3.007	43.0
14	509344	FRQ-509344000252	3.494	3.498	3.491	23.0	3.076	3.090	3.013	46.0
15	509344	FRQ-509344000251	3.494	3.498	3.492	23.0	3.074	3.103	3.002	46.0
16	509344	FRQ-509344000229	3.494	3.497	3.489	23.0	3.077	3.095	3.014	46.0
17	509344	FRQ-509344000263	3.496	3.498	3.494	23.0	3.089	3.099	3.074	47.0
18	509344	FRQ-509344000259	3.495	3.499	3.491	23.0	3.075	3.090	3.017	46.0
19	509344	FRQ-509344000250	3.494	3.497	3.482	23.0	3.090	3.097	3.079	47.0
20	509344	FRQ-509344000234	3.489	3.494	3.486	23.0	3.076	3.083	3.071	45.0
21	509344	FRQ-509344000273	3.491	3.494	3.488	22.0	3.086	3.090	3.076	46.0
22	509344	FRQ-509344000274	3.490	3.494	3.486	23.0	3.086	3.095	3.074	46.0
23	509344	FRQ-509344000233	3.488	3.493	3.479	23.0	3.085	3.092	3.074	45.0
24	509344	FRQ-509344000247	3.490	3.495	3.487	22.0	3.090	3.100	3.078	45.0
25	509344	FRQ-509344000260	3.489	3.494	3.487	23.0	3.071	3.087	3.005	45.0
26	509344	FRQ-509344000266	3.489	3.490	3.486	23.0	3.072	3.094	2.993	47.0
27	508972	FRQ-508972000727	3.492	3.497	3.489	23.0	3.067	3.086	2.988	47.0
28	509344	FRQ-509344000258	3.490	3.495	3.487	23.0	3.071	3.097	2.992	46.0

Database Results



Power KW Graph

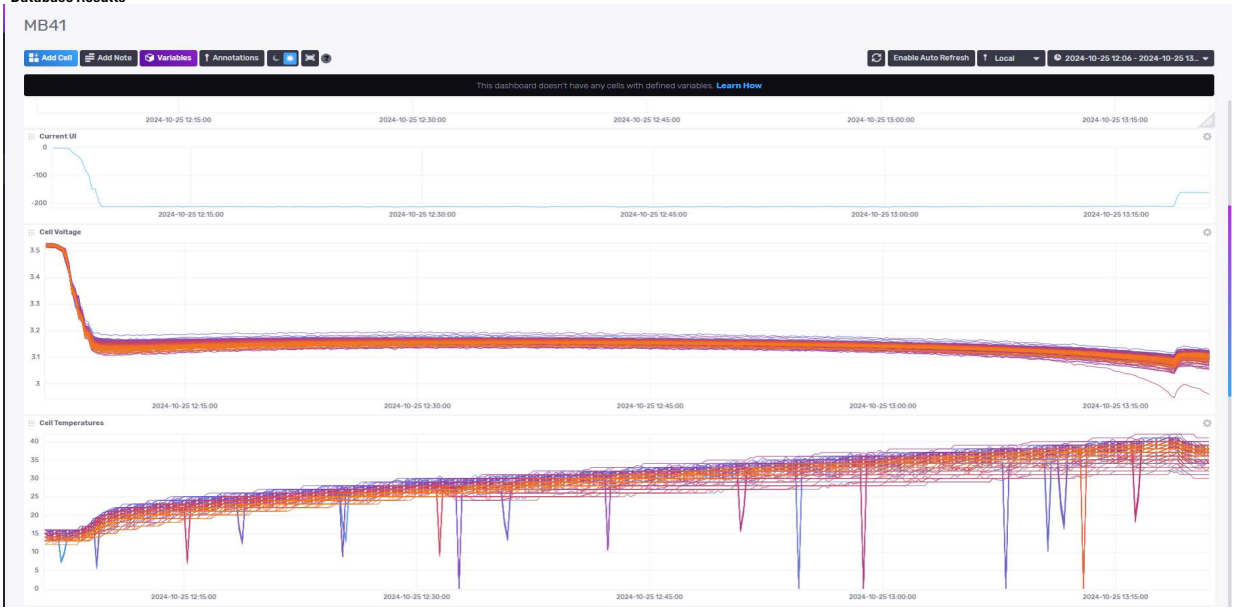


Final Test Report of Battery Rack

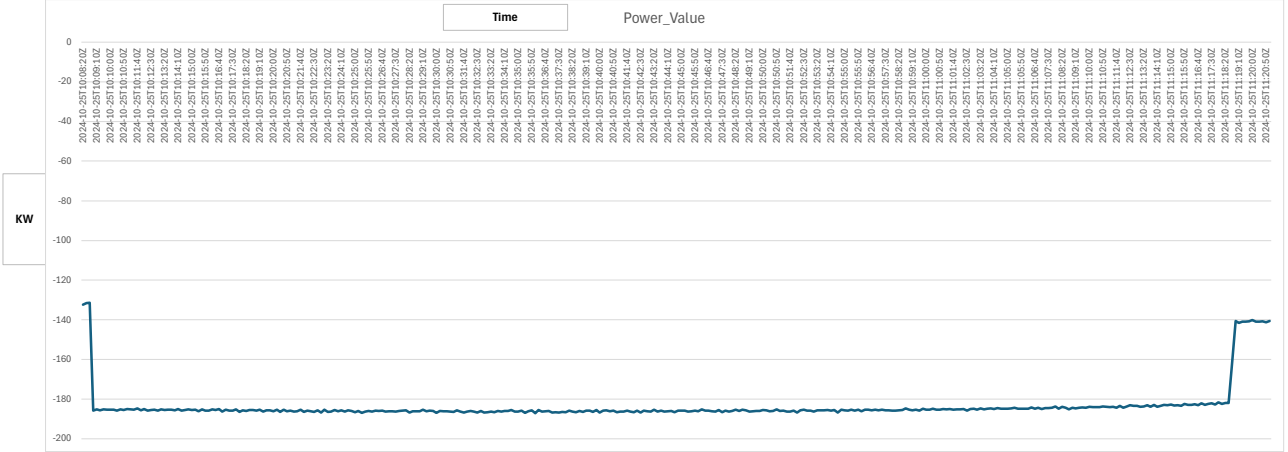
Customer	**Shell**	
Type of Test	Discharge - Battery Rack	
Date of Test	25-Oct-24	
Time -Start	12:06	**Uhr**
Time -Stop	13:21	**Uhr**
Duration of Test	01:15	**Stunde:Min**
Avg. Runing Current	-208.28	**A**
Avg. Runing Power	-183.44	**KW**
SOC Before Test	100.00	**%**
SOC After Test	7.5	**%**
Rack Capacity	280	**Kwh**
Generated Energy	-229.30	**Kwh**

Converter 3.2 - Rack 01 -DCPort 01			Before Test Values.				After Test Values			
Module	Artikel	Module Serial No.	Module Voltage1	Max. Cell Voltage1	Min. Cell Voltage1	Max Temperature1	Module Voltage2	Max. Cell Voltage2	Min. Cell Voltage2	Max Temperature2
Serial No.	No.	No.	V	V	V	C°	V	V	V	C°
1	509344	FRQ-509344000318	3.5323	3.534	3.53	15	3.0924	3.102	3.075	39.0
2	508972	FRQ-508972000690	3.5306	3.536	3.528	15	3.0989	3.106	3.088	40.0
3	508972	FRQ-508972001018	3.5318	3.534	3.529	15	3.1028	3.115	3.096	40.0
4	508972	FRQ-508972000413	3.5316	3.533	3.529	15	3.0976	3.109	3.080	41.0
5	509344	FRQ-509344000255	3.5329	3.535	3.528	15	3.0879	3.097	3.056	40.0
6	509344	FRQ-509344000301	3.5336	3.537	3.53	15	3.0967	3.112	3.076	40.0
7	509344	FRQ-509344000305	3.5321	3.534	3.528	16	3.0884	3.097	3.069	40.0
8	508972	FRQ-508972000689	3.5264	3.531	3.522	16	3.0988	3.121	3.077	40.0
9	508972	FRQ-508972000697	3.5279	3.532	3.524	16	3.098	3.105	3.075	39.0
10	509344	FRQ-509344000087	3.5342	3.536	3.532	16	3.1013	3.113	3.058	39.0
11	508972	FRQ-508972000317	3.5261	3.534	3.523	16	3.0998	3.108	3.080	37.0
12	509344	FRQ-509344000276	3.5316	3.534	3.528	16	3.0863	3.110	3.046	37.0
13	509344	FRQ-509344000523	3.5316	3.537	3.526	16	3.0766	3.096	3.056	37.0
14	508972	FRQ-508972000460	3.5227	3.527	3.521	16	3.0948	3.100	3.074	40.0
15	509344	FRQ-509344000320	3.5274	3.536	3.521	16	3.0865	3.099	3.048	39.0
16	508972	FRQ-508972000288	3.5255	3.528	3.523	16	3.0952	3.101	3.078	39.0
17	508972	FRQ-508972000705	3.5221	3.525	3.519	16	3.1009	3.109	3.084	41.0
18	509344	FRQ-509344000225	3.5293	3.536	3.526	16	3.0928	3.103	3.070	41.0
19	509344	FRQ-509344000350	3.5229	3.526	3.52	16	3.0756	3.097	2.974	41.0
20	509344	FRQ-509344000303	3.5244	3.529	3.522	16	3.094	3.106	3.047	40.0
21	509344	FRQ-509344000307	3.5259	3.535	3.52	14	3.0873	3.096	3.071	40.0
22	508972	FRQ-508972000770	3.5241	3.526	3.521	15	3.0922	3.101	3.073	40.0
23	509344	FRQ-509344000511	3.524	3.533	3.521	14	3.0769	3.086	3.056	39.0
24	509344	FRQ-509344000253	3.5268	3.531	3.524	14	3.0836	3.098	3.067	39.0
25	509344	FRQ-509344000226	3.5274	3.537	3.525	13	3.0822	3.094	3.057	38.0
26	509344	FRQ-509344000278	3.5267	3.531	3.525	14	3.08	3.091	3.063	40.0
27	509344	FRQ-509344000317	3.5278	3.53	3.526	14	3.0891	3.097	3.067	39.0
28	509344	FRQ-509344000321	3.5277	3.533	3.526	14	3.0858	3.094	3.067	40.0

Database Results



Power KW Graph



Final Test Report of Battery Rack

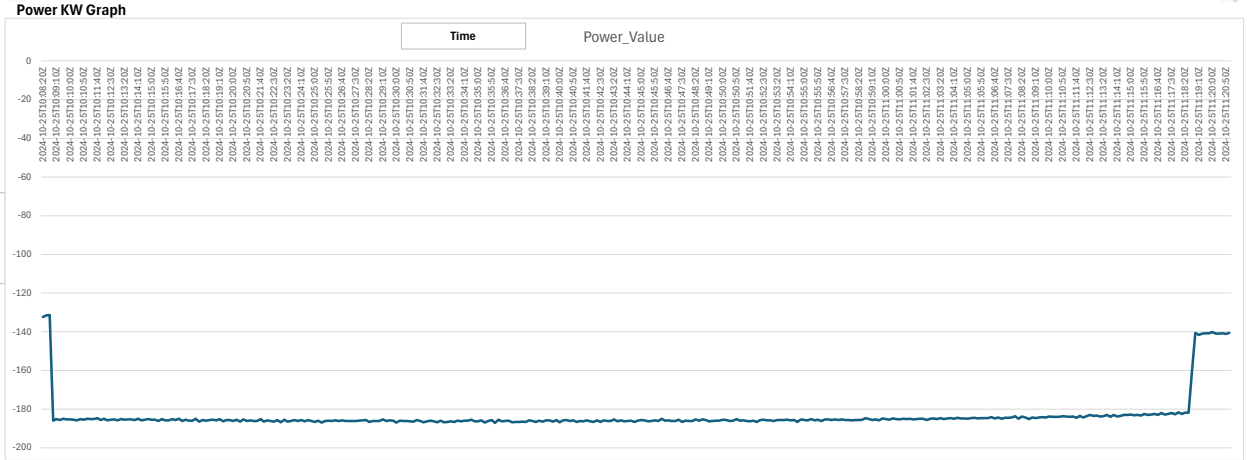
Customer	**Shell**	
Type of Test	Discharge - Battery Rack	
Date of Test	25-Oct-24	
Time -Start	12:06	**Uhr**
Time -Stop	13:21	**Uhr**
Duration of Test	01:15	**Stunde:Min**
Avg. Runing Current	-206.87	**A**
Avg. Runing Power	-183.44	**KW**
SOC Before Test	100.00	**%**
SOC After Test	6.78	**%**
Rack Capacity	280	**Kwh**
Generated Energy	-229.30	**Kwh**

Container 3.2 Rack 02 -DCPort 01			Before Test Values.				After Test Values			
Module	Artikel	Module Serial No.	Module Voltage1	Max. Cell Voltage1	Min. Cell Voltage1	Max Temperature1	Module Voltage2	Max. Cell Voltage2	Min. Cell Voltage2	Max Temperature2
Serial No.	No.	No.	V	V	V	C°	V	V	V	C°
1	509344	FRQ-509344000030	3.5307	3.532	3.529	14	3.0818	3.118	3.066	39.0
2	509344	FRQ-509344000036	3.5314	3.533	3.53	14	3.0808	3.104	3.054	38.0
3	509344	FRQ-509344000041	3.5318	3.535	3.529	14	3.0924	3.109	3.060	39.0
4	509344	FRQ-509344000045	3.5306	3.533	3.527	13	3.0906	3.109	3.054	38.0
5	509344	FRQ-509344000043	3.5313	3.534	3.529	13	3.0882	3.099	3.064	38.0
6	509344	FRQ-509344000052	3.5311	3.532	3.528	13	3.0831	3.097	3.061	38.0
7	509344	FRQ-509344000056	3.5308	3.534	3.529	13	3.0868	3.116	3.053	37.0
8	509344	FRQ-509344000053	3.5311	3.534	3.529	13	3.0856	3.105	3.075	38.0
9	509344	FRQ-509344000042	3.5215	3.525	3.518	13	3.0939	3.107	3.078	37.0
10	509344	FRQ-509344000049	3.53	3.531	3.529	14	3.0876	3.110	3.080	36.0
11	509344	FRQ-509344000047	3.5305	3.532	3.528	14	3.0947	3.103	3.066	33.0
12	509344	FRQ-509344000039	3.5309	3.533	3.529	14	3.0875	3.098	3.076	36.0
13	509344	FRQ-509344000033	3.5303	3.533	3.529	15	3.0945	3.111	3.074	36.0
14	508972	FRQ-508972001045	3.5299	3.532	3.528	15	3.1003	3.116	3.083	38.0
15	509344	FRQ-509344000088	3.5311	3.533	3.53	16	3.0926	3.106	3.048	38.0
16	509344	FRQ-509344000034	3.5307	3.533	3.528	14	3.096	3.120	3.064	39.0
17	508972	FRQ-508972000318	3.5286	3.531	3.526	14	3.1073	3.114	3.090	38.0
18	509344	FRQ-509344000046	3.5274	3.529	3.524	14	3.104	3.108	3.093	39.0
19	508972	FRQ-508972001047	3.5272	3.531	3.524	14	3.1075	3.119	3.082	39.0
20	509344	FRQ-509344000050	3.5301	3.531	3.528	15	3.0933	3.115	3.075	39.0
21	509344	FRQ-509344000054	3.5297	3.532	3.526	14	3.0923	3.108	3.082	39.0
22	509344	FRQ-509344000055	3.5297	3.533	3.527	13	3.0934	3.102	3.084	38.0
23	509344	FRQ-509344000332	3.5299	3.533	3.528	13	3.0875	3.096	3.074	38.0
24	509344	FRQ-509344000048	3.5284	3.531	3.524	14	3.0977	3.109	3.065	41.0
25	509344	FRQ-509344000038	3.5215	3.523	3.519	13	3.0928	3.106	3.085	39.0
26	509344	FRQ-509344000037	3.5299	3.534	3.526	14	3.0935	3.115	3.066	40.0
27	509344	FRQ-509344000035	3.5289	3.53	3.527	15	3.0838	3.109	3.074	39.0
28	508972	FRQ-508972000722	3.5282	3.53	3.525	15	3.0946	3.102	3.077	40.0

Database Results



Power KW Graph



Final Test Report of Battery Rack

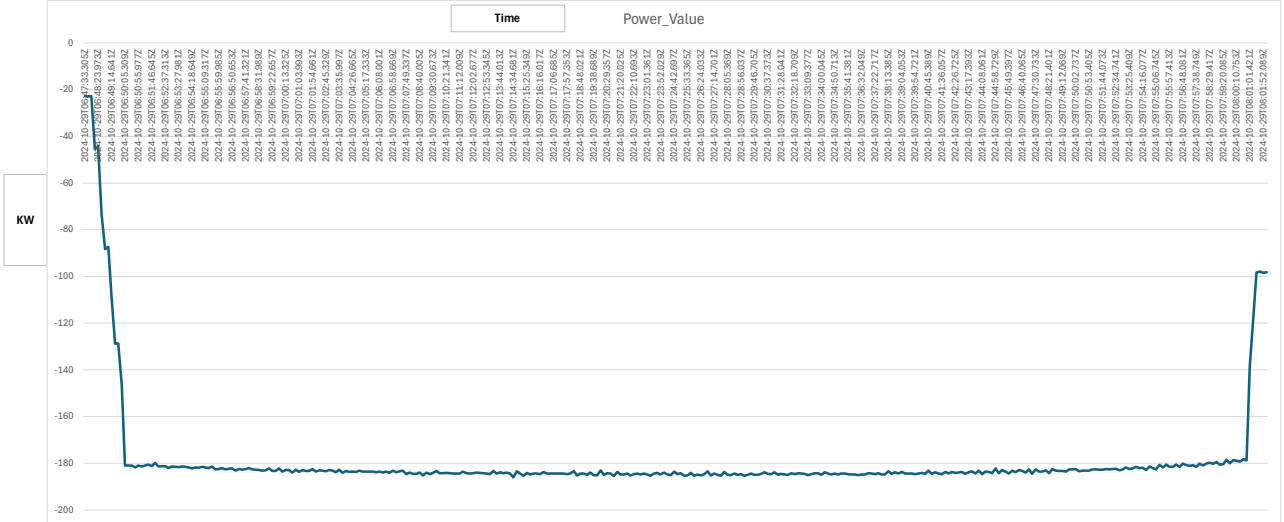
Customer	**Shell**	
Type of Test	Discharge - Battery Rack	
Date of Test	29-Oct-24	
Time -Start	07:46	**Uhr**
Time -Stop	09:02	**Uhr**
Duration of Test	01:16	**Stunde:Min**
Avg. Runing Current	-207.14	**A**
Avg. Runing Power	-181.42	**KW**
SOC Before Test	100.00	**%**
SOC After Test	6.86	**%**
Rack Capacity	280	**Kwh**
Generated Energy	-229.80	**Kwh**

Container 3.2 - Rack 03 -DCPort 02			Before Test Values.				After Test Values			
Module	Artikel	Module Serial No.	Module Voltage1	Max. Cell Voltage1	Min. Cell Voltage1	Max Temperature1	Module Voltage2	Max. Cell Voltage2	Min. Cell Voltage2	Max Temperature2
Serial No.	No.	No.	V	V	V	C°	V	V	V	C°
1	509344	FRQ-509344000330	3.4384	3.44	3.436	9	3.0228	3.047	2.924	38.0
2	509344	FRQ-509344000327	3.4357	3.439	3.432	8	3.0466	3.073	3.013	37.0
3	509344	FRQ-509344000322	3.4364	3.44	3.431	8	3.0557	3.070	3.026	38.0
4	509344	FRQ-509344000291	3.4356	3.438	3.433	8	3.0288	3.051	2.935	38.0
5	509344	FRQ-509344000279	3.4371	3.44	3.434	8	3.0225	3.033	3.015	38.0
6	509344	FRQ-509344000286	3.4325	3.437	3.43	8	3.0358	3.057	2.933	38.0
7	509344	FRQ-509344000312	3.433	3.437	3.43	9	3.0392	3.053	3.014	39.0
8	509344	FRQ-509344000309	3.4326	3.435	3.429	8	3.0453	3.057	3.006	38.0
9	509344	FRQ-509344000285	3.4335	3.436	3.432	8	3.0277	3.066	2.953	37.0
10	509344	FRQ-509344000280	3.4343	3.437	3.433	8	3.0318	3.052	3.015	37.0
11	509344	FRQ-509344000288	3.4347	3.437	3.432	8	3.0351	3.068	2.985	33.0
12	509344	FRQ-509344000292	3.4344	3.436	3.432	8	3.0517	3.064	3.032	35.0
13	509344	FRQ-509344000326	3.4357	3.439	3.433	8	3.0343	3.059	2.983	34.0
14	509344	FRQ-509344000329	3.4362	3.439	3.433	8	3.0373	3.053	3.001	38.0
15	509344	FRQ-509344000314	3.4344	3.438	3.43	8	3.0588	3.070	3.023	38.0
16	509344	FRQ-509344000325	3.4345	3.436	3.432	8	3.0265	3.069	2.965	38.0
17	509344	FRQ-509344000287	3.4346	3.438	3.431	8	3.0515	3.070	2.976	38.0
18	509344	FRQ-509344000289	3.4362	3.442	3.43	8	3.0246	3.039	2.953	38.0
19	509344	FRQ-509344000281	3.4371	3.44	3.435	9	3.0357	3.054	3.017	39.0
20	509344	FRQ-509344000284	3.4353	3.438	3.433	8	3.0333	3.066	2.944	38.0
21	509344	FRQ-509344000311	3.4354	3.437	3.433	9	3.0482	3.056	3.025	39.0
22	509344	FRQ-509344000310	3.4355	3.437	3.433	9	3.0373	3.051	2.982	38.0
23	509344	FRQ-509344000283	3.4354	3.437	3.431	9	3.0131	3.059	2.900	39.0
24	509344	FRQ-509344000282	3.4371	3.439	3.434	10	3.0258	3.067	3.013	38.0
25	509344	FRQ-509344000290	3.4352	3.437	3.433	9	3.0332	3.056	2.961	38.0
26	509344	FRQ-509344000323	3.4346	3.436	3.432	9	3.0532	3.065	3.010	39.0
27	509344	FRQ-509344000324	3.4339	3.437	3.429	10	3.0511	3.069	2.994	40.0
28	509344	FRQ-509344000328	3.4381	3.439	3.436	8	3.0286	3.046	3.001	39.0

Database Results



Power KW Graph



Final Test Report of Battery Rack

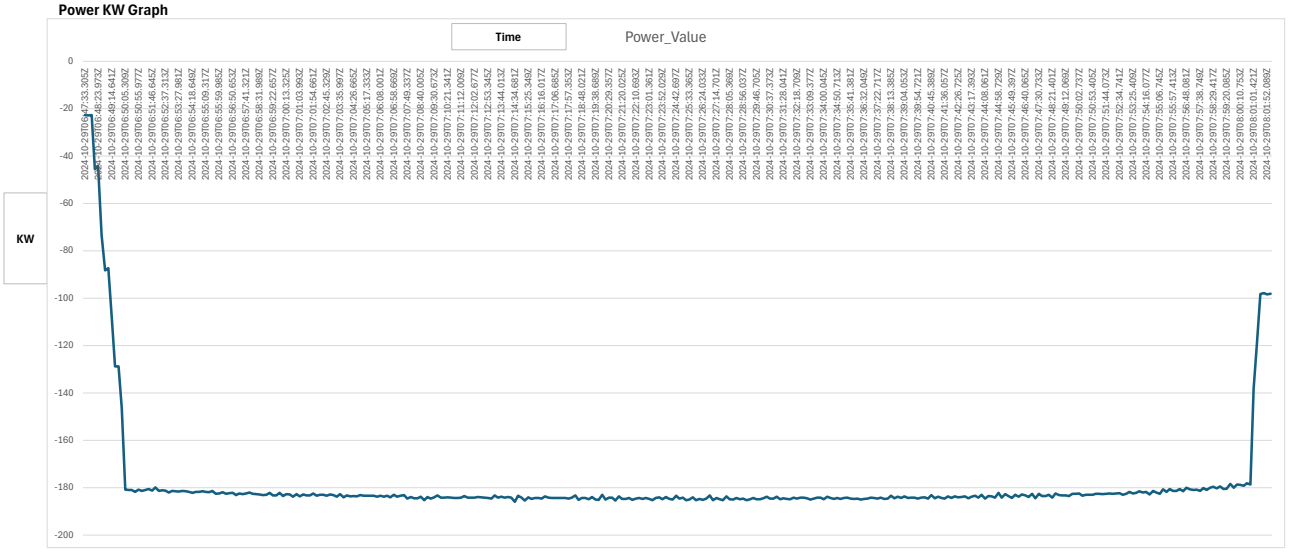
Customer	**Shell**	
Type of Test	Discharge - Battery Rack	
Date of Test	29-Oct-24	
Time -Start	07:46	**Uhr**
Time -Stop	09:02	**Uhr**
Duration of Test	01:16	**Stunde:Min**
Avg. Runing Current	-206.15	**A**
Avg. Runing Power	-181.42	**KW**
SOC Before Test	100.00	**%**
SOC After Test	8.16	**%**
Rack Capacity	280	**Kwh**
Generated Energy	-229.80	**Kwh**

Container 3.2 - Rack 04 -DCPort 02			Before Test Values.				After Test Values			
Module	**Artikel**	**Module Serial No.**	**Module Voltage1**	**Max. Cell Voltage1**	**Min. Cell Voltage1**	**Max Temperature1**	**Module Voltage2**	**Max. Cell Voltage2**	**Min. Cell Voltage2**	**Max Temperature2**
Serial No.	**No.**	**No.**	**V**	**V**	**V**	**C°**	**V**	**V**	**V**	**C°**
1	508972	FRQ-508972000064	3.4349	3.437	3.433	7	3.0528	3.070	2.999	38.0
2	508972	FRQ-508972000044	3.4351	3.439	3.433	8	3.0529	3.077	3.006	37.0
3	508972	FRQ-508972000939	3.4336	3.439	3.431	7	3.0253	3.079	2.995	37.0
4	508972	FRQ-508972000090	3.4358	3.44	3.433	8	3.0391	3.070	2.915	39.0
5	508972	FRQ-508972000938	3.4339	3.437	3.432	8	2.9718	3.068	2.895	39.0
6	508972	FRQ-508972000691	3.4343	3.437	3.432	6	3.0647	3.077	3.051	37.0
7	508972	FRQ-508972000089	3.4348	3.438	3.433	8	3.0233	3.052	2.872	39.0
8	508972	FRQ-508972000170	3.4352	3.439	3.433	8	3.0191	3.051	2.905	39.0
9	508972	FRQ-508972000018	3.436	3.442	3.432	8	3.0547	3.072	2.991	39.0
10	508972	FRQ-508972000088	3.4351	3.438	3.433	7	3.0466	3.067	2.969	36.0
11	508972	FRQ-508972000124	3.4329	3.436	3.431	7	3.0467	3.063	2.987	33.0
12	508972	FRQ-508972000165	3.4347	3.438	3.434	7	3.0481	3.068	2.974	34.0
13	508972	FRQ-508972000168	3.4354	3.439	3.432	6	3.0484	3.070	2.949	33.0
14	508972	FRQ-508972000013	3.4346	3.438	3.432	7	3.0486	3.068	2.977	37.0
15	508972	FRQ-508972000039	3.4338	3.438	3.425	8	3.04	3.062	2.949	37.0
16	508972	FRQ-508972000066	3.4353	3.443	3.432	7	3.0527	3.068	3.001	37.0
17	508972	FRQ-508972000930	3.4334	3.437	3.431	7	3.0158	3.075	2.985	38.0
18	508972	FRQ-508972000125	3.4349	3.437	3.433	7	3.0454	3.063	2.995	38.0
19	508972	FRQ-508972000043	3.435	3.439	3.432	7	3.046	3.065	2.989	38.0
20	508972	FRQ-508972000040	3.4364	3.441	3.435	8	3.0458	3.065	2.958	38.0
21	508972	FRQ-508972000716	3.4337	3.435	3.431	7	3.0389	3.047	3.020	38.0
22	508972	FRQ-508972000057	3.4344	3.438	3.432	8	3.0147	3.047	2.890	38.0
23	508972	FRQ-508972000019	3.4346	3.437	3.432	8	3.0389	3.059	2.959	37.0
24	509344	FRQ-509344000334	3.4334	3.437	3.431	8	3.0396	3.072	3.002	37.0
25	508972	FRQ-508972000121	3.434	3.436	3.431	7	3.0144	3.060	2.865	37.0
26	508972	FRQ-508972000381	3.4339	3.438	3.431	8	3.0477	3.055	3.036	38.0
27	508972	FRQ-508972000087	3.4347	3.439	3.431	8	3.0277	3.066	2.895	39.0
28	508972	FRQ-508972000355	3.4326	3.435	3.431	7	3.0444	3.051	3.020	39.0

Database Results



Power KW Graph



Final Test Report of Battery Rack

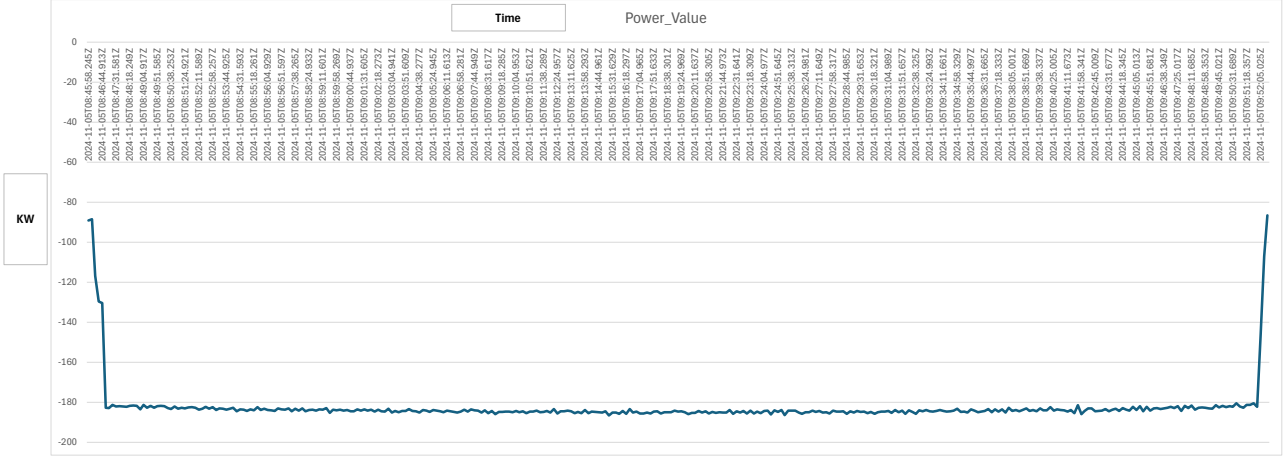
Customer	**Shell**	
Type of Test	Discharge - Battery Rack	
Date of Test	05-Nov-24	
Time -Start	09:44	**Uhr**
Time -Stop	10:54	**Uhr**
Duration of Test	01:10	**Stunde:Min**
Avg. Runing Current	-217.16	**A**
Avg. Runing Power	-182.23	**KW**
SOC Before Test	100.00	**%**
SOC After Test	6.58	**%**
Rack Capacity	280	**Kwh**
Generated Energy	-212.60	**Kwh**

Container 3.2 - Rack 05 -DCPort 03			Before Test Values.				After Test Values			
Module	Artikel	Module Serial No.	Module Voltage1	Max. Cell Voltage1	Min. Cell Voltage1	Max Temperature1	Module Voltage2	Max. Cell Voltage2	Min. Cell Voltage2	Max Temperature2
Serial No.	No.	No.	V	V	V	C°	V	V	V	C°
1	508972	FRQ-508972001050	3.449	3.452	3.447	9	3.1105	3.115	3.098	35.0
2	509344	FRQ-509344000068	3.4495	3.453	3.446	10	3.1028	3.115	3.080	36.0
3	509344	FRQ-509344000070	3.4489	3.451	3.448	10	3.1053	3.115	3.066	36.0
4	509344	FRQ-509344000069	3.4489	3.451	3.447	10	3.1052	3.117	3.073	35.0
5	509344	FRQ-509344000080	3.4484	3.451	3.447	11	3.1039	3.119	3.059	35.0
6	508972	FRQ-508972000323	3.4492	3.452	3.446	9	3.0958	3.105	3.079	35.0
7	508972	FRQ-508972000694	3.4491	3.452	3.447	10	3.0227	3.059	3.005	36.0
8	508972	FRQ-508972000055	3.4488	3.454	3.446	10	3.0907	3.100	3.063	36.0
9	508972	FRQ-508972001407	3.4473	3.449	3.446	10	3.0674	3.111	3.053	34.0
10	509344	FRQ-509344000079	3.4498	3.453	3.447	10	3.1075	3.118	3.071	34.0
11	509344	FRQ-509344000074	3.448	3.452	3.444	9	3.1039	3.116	3.061	32.0
12	509344	FRQ-509344000071	3.4481	3.45	3.446	10	3.1055	3.117	3.069	33.0
13	509344	FRQ-509344000067	3.4496	3.451	3.448	10	3.1065	3.124	3.098	32.0
14	509344	FRQ-509344000058	3.4486	3.45	3.447	11	3.097	3.111	3.084	36.0
15	509344	FRQ-509344000059	3.4485	3.45	3.447	11	3.0953	3.105	3.081	37.0
16	509344	FRQ-509344000061	3.449	3.452	3.447	9	3.0998	3.104	3.095	36.0
17	509344	FRQ-509344000072	3.4477	3.45	3.446	11	3.1036	3.112	3.065	37.0
18	509344	FRQ-509344000075	3.4472	3.45	3.446	10	3.1045	3.113	3.077	36.0
19	509344	FRQ-509344000081	3.4482	3.452	3.446	10	3.0953	3.104	3.066	36.0
20	509344	FRQ-508972001189	3.4461	3.449	3.443	11	3.0762	3.110	3.016	36.0
21	509344	FRQ-509344000399	3.4451	3.446	3.444	9	3.0522	3.087	2.953	36.0
22	509344	FRQ-509344000365	3.446	3.447	3.443	10	3.0599	3.086	2.944	37.0
23	509344	FRQ-509344000364	3.4459	3.447	3.445	10	3.0471	3.068	2.938	35.0
24	509344	FRQ-509344000077	3.4476	3.45	3.445	10	3.102	3.114	3.053	35.0
25	509344	FRQ-509344000076	3.4479	3.451	3.445	9	3.1048	3.121	3.068	35.0
26	509344	FRQ-509344000073	3.4473	3.449	3.446	9	3.1031	3.117	3.062	36.0
27	509344	FRQ-509344000066	3.4462	3.449	3.428	10	3.099	3.109	3.082	36.0
28	509344	FRQ-509344000060	3.4464	3.449	3.442	9	3.0922	3.107	3.081	36.0

Database Results



Power KW Graph



Final Test Report of Battery Rack

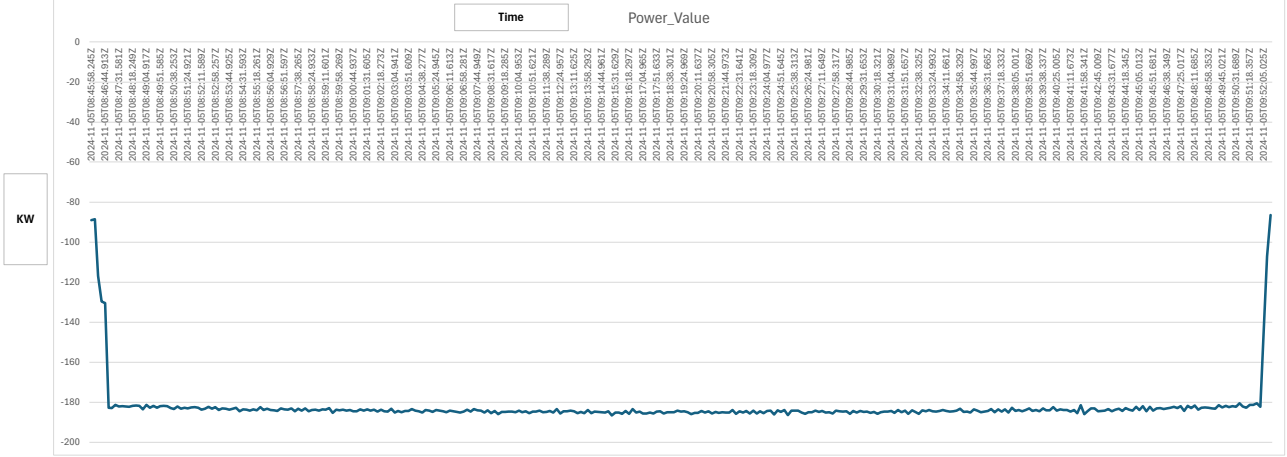
Customer	**Shell**	
Type of Test	Discharge - Battery Rack	
Date of Test	05-Nov-24	
Time -Start	09:44	**Uhr**
Time -Stop	10:54	**Uhr**
Duration of Test	01:10	**Stunde:Min**
Avg. Runing Current	-200.25	**A**
Avg. Runing Power	-182.23	**KW**
SOC Before Test	100.00	**%**
SOC After Test	8.66	**%**
Rack Capacity	280	**Kwh**
Generated Energy	-212.60	**Kwh**

Container 3.2 - Rack 06 -DCPort 03			Before Test Values.				After Test Values			
Module	Artikel	Module Serial No.	Module Voltage1	Max. Cell Voltage1	Min. Cell Voltage1	Max Temperature1	Module Voltage2	Max. Cell Voltage2	Min. Cell Voltage2	Max Temperature2
Serial No.	No.	No.	V	V	V	C°	V	V	V	C°
1	508972	FRQ-508972000120	3.4516	3.454	3.449	9	3.0939	3.104	3.064	37.0
2	508972	FRQ-508972000010	3.4509	3.452	3.449	8	3.0938	3.102	3.068	33.0
3	508972	FRQ-508972000380	3.4505	3.453	3.449	8	3.1002	3.117	3.082	33.0
4	508972	FRQ-508972000153	3.4506	3.452	3.449	8	3.0926	3.103	3.070	33.0
5	508972	FRQ-508972000021	3.4509	3.454	3.448	8	3.0935	3.105	3.068	33.0
6	508972	FRQ-508972000130	3.4511	3.454	3.448	7	3.0926	3.102	3.070	34.0
7	508972	FRQ-508972000164	3.4505	3.454	3.448	9	3.0885	3.098	3.064	33.0
8	508972	FRQ-508972000098	3.4508	3.453	3.449	8	3.0959	3.103	3.070	33.0
9	508972	FRQ-508972000024	3.4376	3.44	3.435	8	3.0967	3.108	3.065	32.0
10	508972	FRQ-508972000737	3.4494	3.452	3.448	8	3.1	3.104	3.094	33.0
11	508972	FRQ-508972000011	3.4362	3.44	3.435	6	3.0937	3.108	3.064	30.0
12	508972	FRQ-508972000219	3.4505	3.453	3.447	8	3.0957	3.104	3.075	31.0
13	508972	FRQ-508972001453	3.448	3.451	3.44	8	3.0772	3.090	3.063	31.0
14	508972	FRQ-508972000096	3.4501	3.451	3.449	9	3.0917	3.104	3.048	33.0
15	508972	FRQ-508972000746	3.4506	3.452	3.448	8	3.097	3.103	3.084	33.0
16	508972	FRQ-508972000082	3.4503	3.454	3.449	5	3.0942	3.114	3.062	33.0
17	508972	FRQ-508972000136	3.4488	3.454	3.447	8	3.0923	3.102	3.060	33.0
18	508972	FRQ-508972000008	3.4492	3.451	3.448	7	3.0955	3.106	3.077	33.0
19	508972	FRQ-508972000126	3.4491	3.452	3.447	9	3.098	3.111	3.060	33.0
20	508972	FRQ-508972000023	3.449	3.451	3.447	9	3.0954	3.110	3.062	34.0
21	508972	FRQ-508972000100	3.4498	3.453	3.447	7	3.0954	3.106	3.077	36.0
22	508972	FRQ-508972001025	3.4484	3.452	3.446	10	3.0892	3.093	3.085	36.0
23	508972	FRQ-508972000022	3.4489	3.453	3.446	8	3.0952	3.115	3.061	35.0
24	508972	FRQ-508972000145	3.4481	3.451	3.445	8	3.0947	3.106	3.066	33.0
25	508972	FRQ-508972000149	3.4485	3.453	3.446	9	3.094	3.103	3.070	34.0
26	508972	FRQ-508972000091	3.4485	3.452	3.445	7	3.0925	3.105	3.063	34.0
27	508972	FRQ-508972000012	3.4489	3.451	3.446	10	3.0944	3.105	3.058	34.0
28	508972	FRQ-508972000119	3.4488	3.453	3.446	8	3.0949	3.103	3.062	33.0

Database Results



Power KW Graph



Final Test Report of Battery Rack

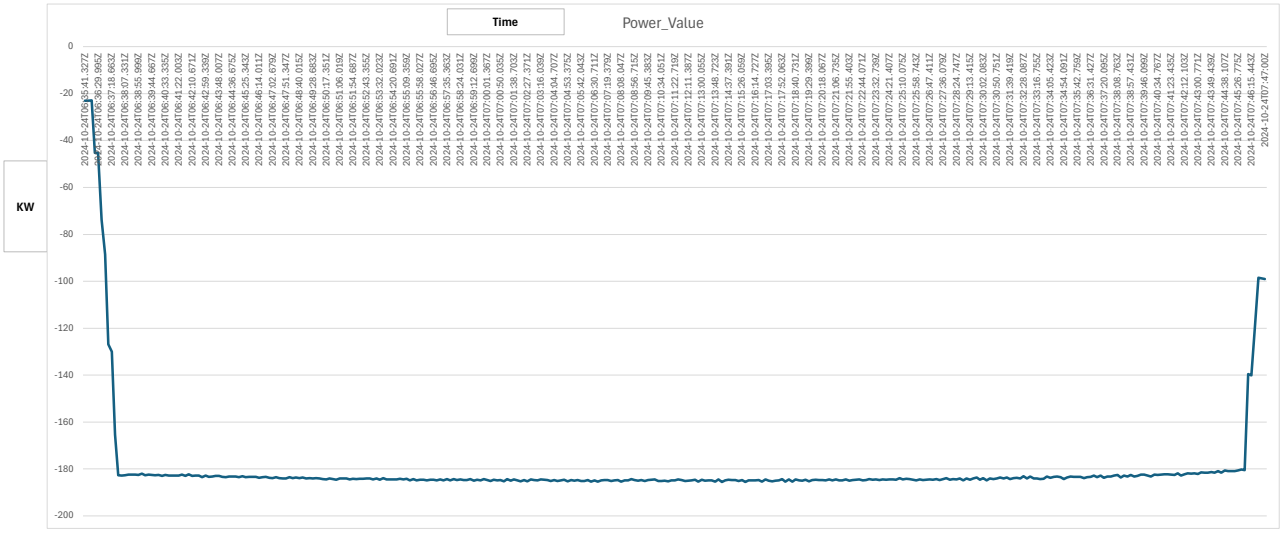
Customer	**Shell**	
Type of Test	Discharge - Battery Rack	
Date of Test	24-Oct-24	
Time -Start	08:34	**Uhr**
Time -Stop	09:47	**Uhr**
Duration of Test	01:13	**Stunde:Min**
Avg. Runing Current	-209.99	**A**
Avg. Runing Power	-179.71	**KW**
SOC Before Test	100.00	**%**
SOC After Test	7.6	**%**
Rack Capacity	280	**Kwh**
Generated Energy	-218.65	**Kwh**

Container 3.2 - Rack 07 -DCPort 04			Before Test Values.				After Test Values			
Module	Artikel	Module Serial No.	Module Voltage1	Max. Cell Voltage1	Min. Cell Voltage1	Max Temperature1	Module Voltage2	Max. Cell Voltage2	Min. Cell Voltage2	Max Temperature2
Serial No.	No.	No.	V	V	V	C°	V	V	V	C°
1	508972	FRQ-508972000093	3.4697	3.475	3.468	9	3.1135	3.147	3.016	35.0
2	508972	FRQ-508972000161	3.4692	3.471	3.468	9	3.1264	3.138	3.086	36.0
3	508972	FRQ-508972000033	3.47	3.473	3.468	9	3.1289	3.141	3.090	37.0
4	508972	FRQ-508972000063	3.4699	3.472	3.468	10	3.1305	3.143	3.090	37.0
5	508972	FRQ-508972000134	3.468	3.47	3.466	13	3.1159	3.137	3.018	37.0
6	508972	FRQ-508972000009	3.4686	3.474	3.466	9	3.1278	3.139	3.078	35.0
7	509344	FRQ-509344000331	3.466	3.468	3.464	9	3.1033	3.126	3.091	35.0
8	508972	FRQ-508972000062	3.4691	3.472	3.465	9	3.1287	3.142	3.084	34.0
9	508972	FRQ-508972000005	3.4683	3.472	3.465	9	3.1275	3.143	3.060	34.0
10	508972	FRQ-508972000031	3.4685	3.474	3.466	10	3.1354	3.145	3.093	34.0
11	508972	FRQ-508972001569	3.4531	3.465	3.448	9	3.0943	3.121	3.070	31.0
12	508972	FRQ-508972000736	3.4686	3.471	3.467	11	3.1433	3.152	3.130	34.0
13	508972	FRQ-508972000103	3.4693	3.472	3.467	10	3.1322	3.143	3.099	32.0
14	508972	FRQ-508972001575	3.4623	3.469	3.456	10	3.0979	3.138	3.076	34.0
15	508972	FRQ-508972000112	3.4695	3.473	3.467	10	3.1248	3.144	3.023	35.0
16	508972	FRQ-508972000162	3.4691	3.472	3.467	10	3.1375	3.145	3.114	35.0
17	508972	FRQ-508972000344	3.4679	3.472	3.463	10	3.1418	3.147	3.134	38.0
18	508972	FRQ-508972000007	3.4683	3.47	3.467	10	3.1356	3.147	3.098	37.0
19	508972	FRQ-508972000032	3.4675	3.47	3.457	9	3.1329	3.145	3.094	37.0
20	508972	FRQ-508972000932	3.4689	3.471	3.467	10	3.1235	3.161	3.100	35.0
21	508972	FRQ-508972000085	3.4687	3.471	3.466	9	3.1281	3.140	3.081	35.0
22	508972	FRQ-508972000004	3.4686	3.472	3.467	10	3.126	3.138	3.085	37.0
23	508972	FRQ-508972000139	3.4686	3.472	3.466	10	3.1146	3.141	3.024	38.0
24	508972	FRQ-508972000354	3.468	3.472	3.466	9	3.1419	3.147	3.129	36.0
25	508972	FRQ-508972000006	3.4679	3.47	3.463	9	3.1353	3.146	3.093	35.0
26	508972	FRQ-508972000217	3.4686	3.47	3.467	9	3.1262	3.146	3.026	35.0
27	508972	FRQ-508972000128	3.4648	3.468	3.462	10	3.1151	3.140	3.016	35.0
28	508972	FRQ-508972000378	3.4675	3.471	3.466	10	3.1357	3.140	3.121	35.0

Database Results



Power KW Graph



Final Test Report of Battery Rack

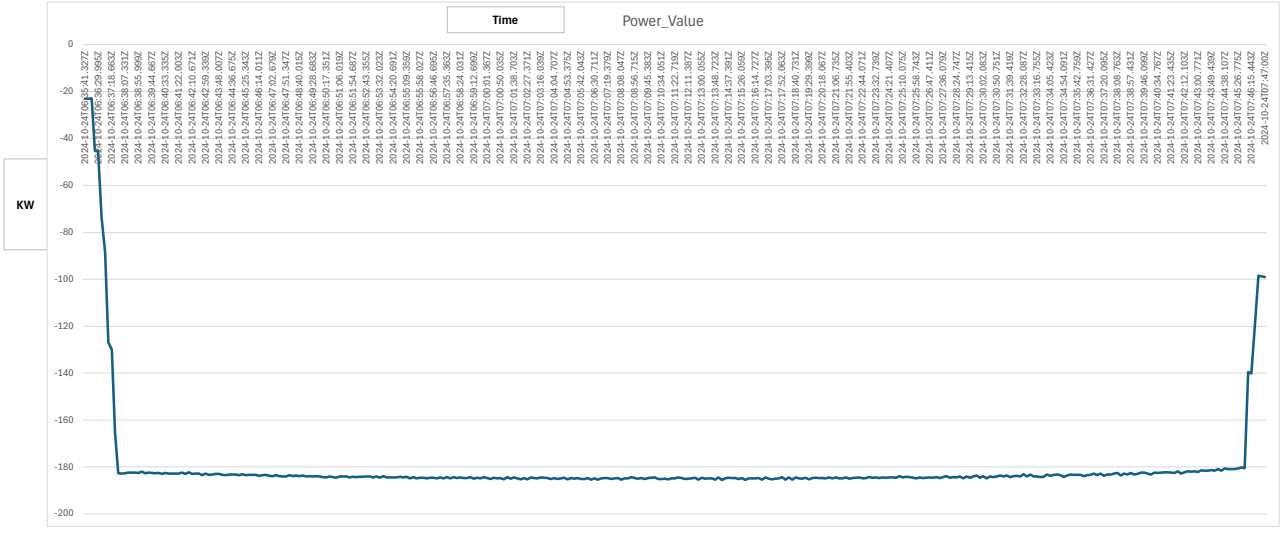
Customer	**Shell**	
Type of Test	Discharge - Battery Rack	
Date of Test	24-Oct-24	
Time -Start	08:34	**Uhr**
Time -Stop	09:47	**Uhr**
Duration of Test	01:13	**Stunde:Min**
Avg. Runing Current	-204.55	**A**
Avg. Runing Power	-179.71	**KW**
SOC Before Test	100.00	**%**
SOC After Test	7.92	**%**
Rack Capacity	280	**Kwh**
Generated Energy	-218.65	**Kwh**

Container 3.2 - Rack 08 -DCPort 04			Before Test Values.				After Test Values			
Module	**Artikel**	**Module Serial No.**	**Module Voltage1**	**Max. Cell Voltage1**	**Min. Cell Voltage1**	**Max Temperature1**	**Module Voltage2**	**Max. Cell Voltage2**	**Min. Cell Voltage2**	**Max Temperature2**
Serial No.	**No.**	**No.**	**V**	**V**	**V**	**C°**	**V**	**V**	**V**	**C°**
1	508972	FRQ-508972000943	3.4706	3.475	3.467	10	3.1183	3.138	3.108	37.0
2	508972	FRQ-508972000132	3.4694	3.472	3.468	10	3.1284	3.140	3.090	36.0
3	508972	FRQ-508972000171	3.4671	3.47	3.464	10	3.1331	3.142	3.106	36.0
4	508972	FRQ-508972000245	3.4688	3.474	3.464	11	3.1299	3.144	3.078	36.0
5	508972	FRQ-508972000049	3.4684	3.474	3.465	10	3.1279	3.137	3.093	36.0
6	508972	FRQ-508972000067	3.4679	3.477	3.465	9	3.1288	3.139	3.092	35.0
7	508972	FRQ-508972000241	3.4687	3.478	3.466	10	3.1192	3.134	3.070	35.0
8	508972	FRQ-508972000257	3.4677	3.471	3.464	9	3.1209	3.139	3.063	35.0
9	508972	FRQ-508972000118	3.4676	3.478	3.448	10	3.1234	3.144	3.056	34.0
10	509344	FRQ-509344000333	3.4677	3.474	3.464	10	3.1286	3.138	3.105	34.0
11	508972	FRQ-508972000135	3.4679	3.473	3.466	9	3.1355	3.147	3.089	30.0
12	508972	FRQ-508972000252	3.4678	3.471	3.465	9	3.132	3.153	3.066	31.0
13	508972	FRQ-508972000154	3.4682	3.477	3.464	9	3.1371	3.151	3.103	31.0
14	508972	FRQ-508972000002	3.4703	3.491	3.467	10	3.138	3.149	3.101	35.0
15	508972	FRQ-508972000003	3.4673	3.473	3.464	10	3.1242	3.147	3.003	34.0
16	508972	FRQ-508972000129	3.4684	3.475	3.464	9	3.1284	3.140	3.083	34.0
17	508972	FRQ-508972000173	3.4674	3.474	3.465	11	3.1372	3.153	3.100	36.0
18	508972	FRQ-508972000729	3.4674	3.469	3.466	10	3.1455	3.151	3.130	35.0
19	508972	FRQ-508972000150	3.4675	3.474	3.463	10	3.1328	3.143	3.102	36.0
20	508972	FRQ-508972000078	3.4676	3.476	3.464	10	3.1348	3.148	3.079	34.0
21	508972	FRQ-508972000246	3.4678	3.474	3.465	9	3.1217	3.138	3.060	35.0
22	508972	FRQ-508972000101	3.4668	3.475	3.464	10	3.1289	3.141	3.066	34.0
23	509344	FRQ-509344000300	3.4659	3.47	3.464	9	3.0674	3.089	2.993	34.0
24	508972	FRQ-508972000152	3.4677	3.475	3.464	14	3.1296	3.140	3.096	36.0
25	508972	FRQ-508972000383	3.4668	3.473	3.463	9	3.1355	3.142	3.124	33.0
26	508972	FRQ-508972000048	3.467	3.471	3.463	8	3.1305	3.140	3.103	35.0
27	508972	FRQ-508972000131	3.4686	3.481	3.465	9	3.1295	3.140	3.093	34.0
28	508972	FRQ-508972000941	3.47	3.475	3.467	9	3.1153	3.142	3.105	34.0

Database Results



Power KW Graph



Final Test Report of Battery Rack

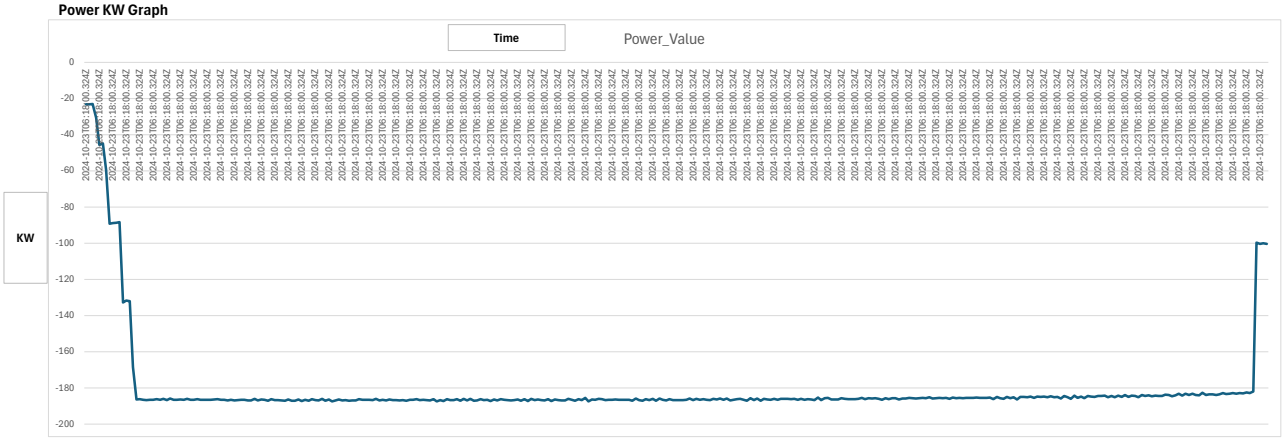
Customer	**Shell**	
Type of Test	Discharge - Battery Rack	
Date of Test	23-Oct-24	
Time -Start	08:16	**Uhr**
Time -Stop	09:27	**Uhr**
Duration of Test	01:11	**Stunde:Min**
Avg. Runing Current	-206.63	**A**
Avg. Runing Power	-180.32	**KW**
SOC Before Test	100.00	**%**
SOC After Test	6.55	**%**
Rack Capacity	280	**Kwh**
Generated Energy	-213.38	**Kwh**

Container 4.2 - Rack 03 -DCPort 02			Before Test Values.				After Test Values			
Module	Artikel	Module Serial No.	Module Voltage1	Max. Cell Voltage1	Min. Cell Voltage1	Max Temperature1	Module Voltage2	Max. Cell Voltage2	Min. Cell Voltage2	Max Temperature2
Serial No.	No.	No.	V	V	V	C°	V	V	V	C°
1	508972	FRQ-508972000308	3.4443	3.446	3.442	17	3.1085	3.120	3.090	40.0
2	509344	FRQ-509344000373	3.4523	3.455	3.442	18	3.0992	3.116	3.015	43.0
3	509344	FRQ-509344000379	3.4443	3.451	3.441	18	3.1029	3.123	3.009	40.0
4	509344	FRQ-509344000356	3.4501	3.452	3.445	18	3.09	3.110	3.025	41.0
5	509344	FRQ-509344000380	3.4466	3.455	3.439	18	3.092	3.113	3.012	40.0
6	509344	FRQ-509344000390	3.4424	3.45	3.434	17	3.1	3.115	3.022	40.0
7	509344	FRQ-509344000400	3.4441	3.454	3.441	19	3.0738	3.093	2.976	42.0
8	509344	FRQ-509344000401	3.4456	3.451	3.442	16	3.0842	3.105	2.994	39.0
9	508972	FRQ-508972001573	3.4421	3.445	3.439	17	3.1045	3.112	3.100	39.0
10	509344	FRQ-509344000381	3.4432	3.451	3.439	17	3.0923	3.116	2.977	38.0
11	509344	FRQ-509344000357	3.4513	3.454	3.446	16	3.0928	3.115	3.011	36.0
12	509344	FRQ-509344000378	3.4455	3.453	3.441	16	3.1071	3.124	3.046	37.0
13	509344	FRQ-509344000372	3.4524	3.457	3.446	16	3.1065	3.128	3.038	36.0
14	508972	FRQ-508972000576	3.4483	3.451	3.447	16	3.1222	3.131	3.103	39.0
15	509344	FRQ-509344000398	3.4432	3.448	3.439	16	3.0957	3.111	3.031	39.0
16	509344	FRQ-509344000374	3.4513	3.454	3.444	17	3.1017	3.115	3.041	40.0
17	509344	FRQ-509344000377	3.4487	3.452	3.44	18	3.1079	3.126	3.082	42.0
18	509344	FRQ-509344000358	3.4479	3.451	3.445	18	3.0981	3.115	3.044	41.0
19	509344	FRQ-509344000382	3.4424	3.454	3.437	19	3.1048	3.125	3.055	48.0
20	508972	FRQ-508972001574	3.4413	3.451	3.435	19	3.103	3.114	3.075	42.0
21	509344	FRQ-509344000402	3.4429	3.449	3.438	19	3.0796	3.103	3.013	41.0
22	508972	FRQ-508972001572	3.4375	3.448	3.433	18	3.0728	3.112	3.052	40.0
23	509344	FRQ-509344000347	3.4463	3.45	3.441	17	3.0771	3.099	2.989	40.0
24	509344	FRQ-509344000383	3.4424	3.449	3.438	17	3.0793	3.110	2.936	40.0
25	508972	FRQ-508972000050	3.4463	3.454	3.442	17	3.1189	3.128	3.085	40.0
26	509344	FRQ-509344000376	3.4483	3.451	3.442	18	3.1059	3.122	3.079	41.0
27	509344	FRQ-509344000391	3.4433	3.449	3.44	19	3.1099	3.124	3.054	46.0
28	508972	FRQ-508972001508	3.4444	3.454	3.439	18	3.1036	3.116	3.067	41.0

Database Results



Power KW Graph



Final Test Report of Battery Rack

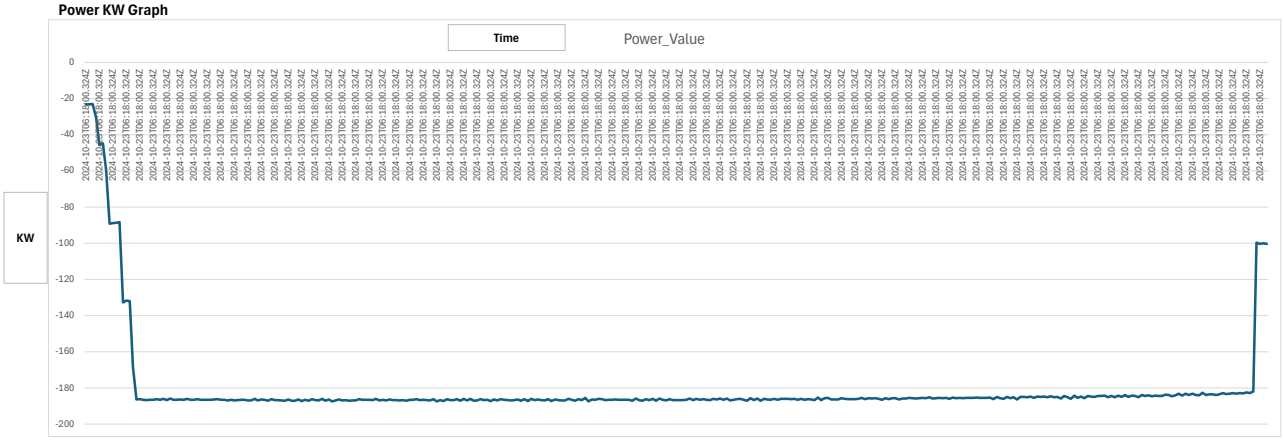
Customer	**Shell**	
Type of Test	Discharge - Battery Rack	
Date of Test	23-Oct-24	
Time -Start	08:16	**Uhr**
Time -Stop	09:27	**Uhr**
Duration of Test	01:11	**Stunde:Min**
Avg. Runing Current	-205.17	**A**
Avg. Runing Power	-180.32	**KW**
SOC Before Test	100.00	**%**
SOC After Test	5.87	**%**
Rack Capacity	280	**Kwh**
Generated Energy	-213.38	**Kwh**

Container 4.2 - Rack 03 -DCPort 02			Before Test Values.				After Test Values			
Module	Artikel	Module Serial No.	Module Voltage1	Max. Cell Voltage1	Min. Cell Voltage1	Max Temperature1	Module Voltage2	Max. Cell Voltage2	Min. Cell Voltage2	Max Temperature2
Serial No.	No.	No.	V	V	V	C°	V	V	V	C°
1	509344	FRQ-509344000514	3.4465	3.455	3.441	17	3.112	3.124	3.080	40.0
2	509344	FRQ-509344000526	3.452	3.455	3.448	17	3.114	3.123	3.087	39.0
3	509344	FRQ-509344000359	3.4521	3.455	3.444	17	3.112	3.123	3.075	40.0
4	509344	FRQ-509344000339	3.4485	3.452	3.445	17	3.111	3.122	3.078	39.0
5	509344	FRQ-509344000492	3.449	3.45	3.448	17	3.094	3.111	3.059	41.0
6	509344	FRQ-509344000531	3.4483	3.451	3.443	17	3.086	3.113	3.049	39.0
7	509344	FRQ-509344000535	3.4448	3.45	3.44	17	3.087	3.100	3.030	38.0
8	509344	FRQ-509344000534	3.4467	3.455	3.442	16	3.089	3.108	3.057	38.0
9	509344	FRQ-509344000538	3.4478	3.451	3.445	17	3.089	3.113	3.043	38.0
10	509344	FRQ-509344000491	3.4514	3.458	3.447	16	3.106	3.125	3.059	38.0
11	509344	FRQ-509344000360	3.4463	3.454	3.441	16	3.114	3.133	3.062	36.0
12	509344	FRQ-509344000363	3.447	3.451	3.442	16	3.116	3.126	3.073	37.0
13	509344	FRQ-509344000386	3.4428	3.449	3.439	16	3.111	3.123	3.063	37.0
14	509344	FRQ-509344000349	3.4492	3.452	3.447	16	3.103	3.115	3.058	39.0
15	509344	FRQ-509344000512	3.4442	3.45	3.441	17	3.104	3.113	3.066	38.0
16	509344	FRQ-509344000524	3.4447	3.449	3.441	17	3.109	3.115	3.083	39.0
17	509344	FRQ-509344000362	3.4464	3.451	3.44	17	3.109	3.117	3.081	40.0
18	509344	FRQ-509344000341	3.4485	3.453	3.445	18	3.107	3.128	3.069	41.0
19	509344	FRQ-509344000493	3.4476	3.449	3.446	18	3.087	3.112	3.037	40.0
20	509344	FRQ-509344000537	3.4446	3.449	3.44	18	3.090	3.102	3.037	40.0
21	509344	FRQ-509344000533	3.4437	3.452	3.438	17	3.089	3.106	3.069	39.0
22	509344	FRQ-509344000532	3.4433	3.45	3.437	18	3.072	3.092	3.035	39.0
23	509344	FRQ-509344000536	3.4413	3.449	3.436	16	3.086	3.106	3.019	39.0
24	509344	FRQ-509344000494	3.4462	3.45	3.442	17	3.080	3.106	3.027	40.0
25	509344	FRQ-509344000342	3.4438	3.452	3.44	17	3.096	3.116	2.990	40.0
26	509344	FRQ-509344000348	3.4471	3.449	3.445	18	3.096	3.113	3.038	41.0
27	509344	FRQ-509344000525	3.4445	3.448	3.44	17	3.103	3.112	3.061	40.0
28	509344	FRQ-509344000513	3.4435	3.451	3.439	17	3.100	3.112	3.038	40.0

Database Results



Power KW Graph

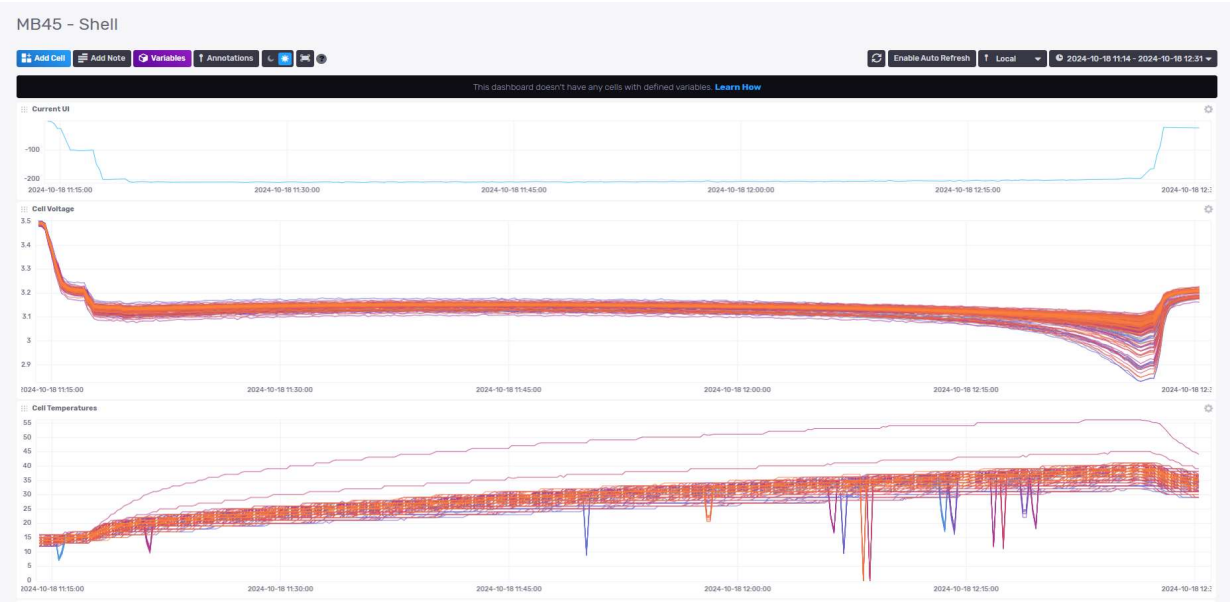


Final Test Report of Battery Rack

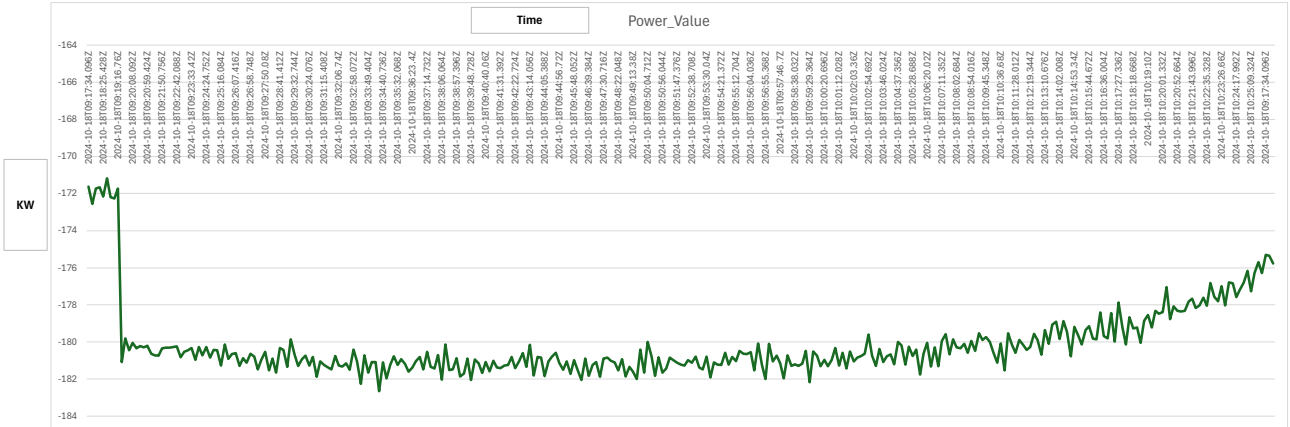
Customer	**Shell**	
Type of Test	Discharge - Battery Rack	
Date of Test	18-Oct-24	
Time -Start	11:14	**Uhr**
Time -Stop	12:31	**Uhr**
Duration of Test	01:17	**Stunde:Min**
Avg. Runing Current	-204.39	**A**
Avg. Runing Power	-180.14	**KW**
SOC Before Test	100.00	**%**
SOC After Test	12	**%**
Rack Capacity	280	**Kwh**
Generated Energy	-231.18	**Kwh**

Container 4.2 - Rack 05 -DCPort 03			Before Test Values.				After Test Values			
Module Serial No.	Artikel No.	Module Serial No.	Module Voltage1 V	Max. Cell Voltage1 V	Min. Cell Voltage1 V	Max Temperature1 C°	Module Voltage2 V	Max. Cell Voltage2 V	Min. Cell Voltage2 V	Max Temperature2 C°
1	509344	FRQ-509344000431	3.576	3.578	3.575	16.0	3.058	3.090	2.981	40.0
2	509344	FRQ-509344000432	3.571	3.572	3.569	15.0	3.068	3.092	2.967	39.0
3	509344	FRQ-509344000405	3.570	3.572	3.567	14.0	3.035	3.068	2.884	39.0
4	509344	FRQ-509344000407	3.571	3.572	3.569	15.0	3.039	3.081	2.891	40.0
5	509344	FRQ-509344000353	3.570	3.574	3.567	15.0	3.024	3.061	2.882	40.0
6	508972	FRQ-508972001539	3.571	3.572	3.569	15.0	3.095	3.107	3.076	39.0
7	509344	FRQ-509344000392	3.573	3.574	3.571	15.0	3.014	3.065	2.820	41.0
8	509344	FRQ-509344000393	3.573	3.576	3.571	14.0	3.025	3.072	2.812	39.0
9	509344	FRQ-509344000369	3.573	3.575	3.572	14.0	3.029	3.061	2.961	37.0
10	509344	FRQ-509344000354	3.574	3.575	3.573	14.0	3.029	3.066	2.880	37.0
11	509344	FRQ-509344000406	3.575	3.579	3.572	15.0	3.031	3.069	2.865	36.0
12	509344	FRQ-509344000409	3.574	3.575	3.572	15.0	3.062	3.075	3.032	38.0
13	509344	FRQ-509344000433	3.574	3.576	3.572	14.0	3.052	3.092	2.946	36.0
14	509344	FRQ-509344000430	3.577	3.579	3.576	15.0	3.048	3.079	2.863	39.0
15	509344	FRQ-509344000429	3.576	3.577	3.574	14.0	3.063	3.090	2.961	39.0
16	509344	FRQ-509344000435	3.577	3.578	3.575	15.0	3.046	3.082	2.920	40.0
17	509344	FRQ-509344000082	3.576	3.578	3.575	15.0	3.062	3.095	2.912	39.0
18	508972	FRQ-508972000274	3.577	3.578	3.575	14.0	3.110	3.123	3.089	39.0
19	509344	FRQ-509344000355	3.577	3.579	3.576	15.0	3.044	3.094	2.855	40.0
20	509344	FRQ-509344000371	3.576	3.579	3.574	16.0	3.033	3.083	2.894	40.0
21	509344	FRQ-509344000394	3.578	3.579	3.576	16.0	3.049	3.081	2.949	40.0
22	509344	FRQ-509344000395	3.578	3.580	3.576	16.0	3.038	3.085	2.869	40.0
23	509344	FRQ-509344000370	3.577	3.579	3.575	16.0	3.039	3.096	2.936	41.0
24	508972	FRQ-508972000459	3.578	3.581	3.576	16.0	3.109	3.123	3.072	39.0
25	509344	FRQ-509344000404	3.578	3.580	3.576	15.0	3.079	3.108	2.980	40.0
26	509344	FRQ-509344000411	3.577	3.579	3.575	16.0	3.056	3.091	2.893	40.0
27	509344	FRQ-509344000434	3.578	3.580	3.576	16.0	3.070	3.115	2.860	41.0
28	509344	FRQ-509344000428	3.577	3.580	3.575	15.0	3.067	3.097	2.951	40.0

Database Results



Power KW Graph



Final Test Report of Battery Rack

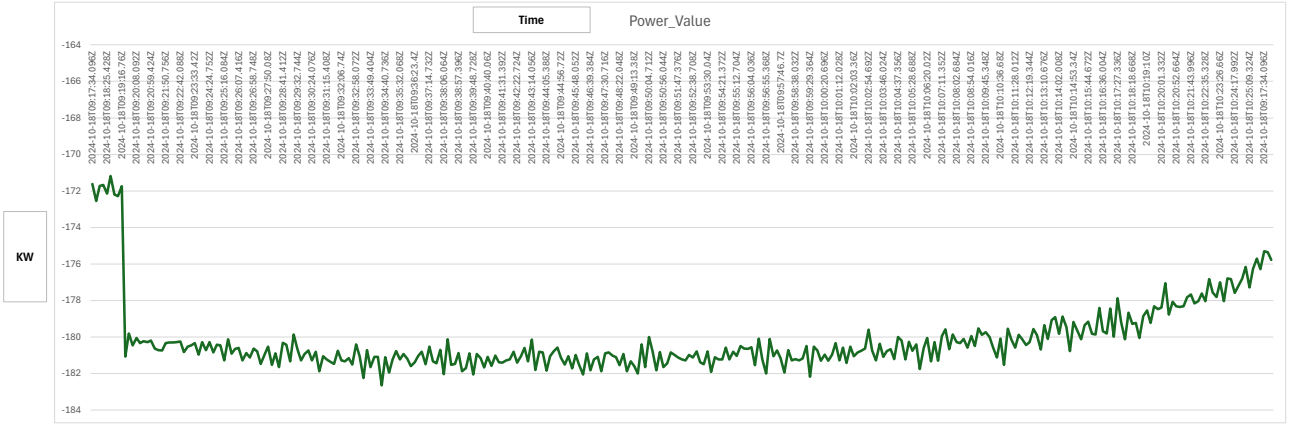
Customer	**Shell**	
Type of Test	Discharge - Battery Rack	
Date of Test	18-Oct-24	
Time -Start	11:14	**Uhr**
Time -Stop	12:31	**Uhr**
Duration of Test	01:17	**Stunde:Min**
Avg. Runing Current	-203.38	**A**
Avg. Runing Power	-180.14	**KW**
SOC Before Test	100.00	**%**
SOC After Test	12	**%**
Rack Capacity	280	**Kwh**
Generated Energy	-231.18	**Kwh**

Container 4.2 - Rack 06 - DCPort 03			Before Test Values.				After Test Values			
Module Serial No.	Artikel No.	Module Serial No.	Module Voltage1 V	Max. Cell Voltage1 V	Min. Cell Voltage1 V	Max Temperature1 C°	Module Voltage2 V	Max. Cell Voltage2 V	Min. Cell Voltage2 V	Max Temperature2 C°
1	509344	FRQ-509344000500	3.577	3.579	3.574	15.0	3.062	3.080	2.996	40.0
2	509344	FRQ-509344000499	3.578	3.579	3.574	15.0	3.058	3.078	3.001	40.0
3	509344	FRQ-509344000517	3.578	3.579	3.576	15.0	3.063	3.081	3.003	41.0
4	509344	FRQ-509344000487	3.578	3.580	3.575	15.0	3.043	3.070	2.988	41.0
5	509344	FRQ-509344000010	3.578	3.579	3.576	15.0	3.081	3.094	3.053	41.0
6	509344	FRQ-509344000495	3.577	3.580	3.576	14.0	3.016	3.052	2.967	40.0
7	509344	FRQ-509344000486	3.578	3.580	3.576	14.0	2.991	3.026	2.936	39.0
8	508972	FRQ-508972000379	3.579	3.581	3.577	13.0	3.072	3.084	3.028	40.0
9	509344	FRQ-509344000498	3.578	3.580	3.576	14.0	3.009	3.050	2.959	39.0
10	509344	FRQ-509344000527	3.578	3.581	3.576	14.0	3.055	3.089	3.004	39.0
11	509344	FRQ-509344000488	3.579	3.580	3.577	13.0	3.048	3.077	3.006	36.0
12	509344	FRQ-509344000518	3.577	3.579	3.574	14.0	3.067	3.080	3.009	37.0
13	509344	FRQ-509344000501	3.577	3.578	3.576	13.0	3.058	3.080	3.034	36.0
14	509344	FRQ-509344000504	3.576	3.578	3.569	14.0	3.062	3.085	2.969	39.0
15	509344	FRQ-509344000505	3.576	3.579	3.574	14.0	3.042	3.075	3.003	39.0
16	509344	FRQ-509344000502	3.577	3.579	3.576	14.0	3.076	3.095	3.056	41.0
17	509344	FRQ-509344000515	3.577	3.579	3.574	15.0	3.083	3.104	3.036	42.0
18	509344	FRQ-509344000489	3.576	3.577	3.575	15.0	3.071	3.102	3.019	41.0
19	509344	FRQ-509344000528	3.574	3.576	3.572	16.0	3.057	3.090	3.011	46.0
20	509344	FRQ-509344000497	3.573	3.575	3.572	15.0	3.033	3.081	2.971	41.0
21	509344	FRQ-509344000484	3.574	3.575	3.572	16.0	3.027	3.069	2.972	40.0
22	509344	FRQ-509344000483	3.574	3.576	3.573	15.0	3.013	3.054	2.975	41.0
23	509344	FRQ-509344000496	3.575	3.577	3.574	15.0	3.052	3.083	3.006	41.0
24	509344	FRQ-509344000529	3.576	3.579	3.574	15.0	3.071	3.093	3.035	40.0
25	509344	FRQ-509344000490	3.575	3.577	3.573	14.0	3.072	3.097	3.023	40.0
26	509344	FRQ-509344000516	3.576	3.577	3.574	15.0	3.090	3.099	3.068	41.0
27	508972	FRQ-508972001571	3.571	3.578	3.567	16.0	3.086	3.095	3.062	40.0
28	508972	FRQ-508972001492	3.576	3.578	3.575	16.0	3.084	3.092	3.072	40.0

Database Results



Power KW Graph



Final Test Report of Battery Rack

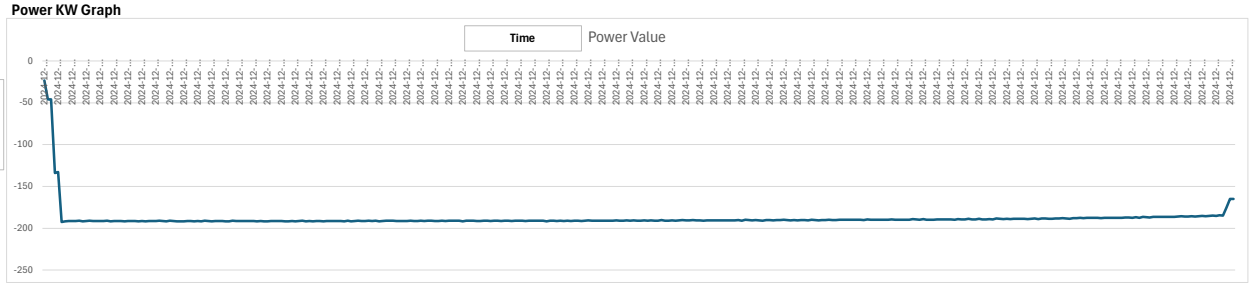
Customer	**Shell**	
Type of Test	Discharge - Battery Rack	
Date of Test	01-Dec-24	
Time -Start	10:45	**Uhr**
Time -Stop	12:01	**Uhr**
Duration of Test	01:16	**Stunde:Min**
Avg. Runing Current	-214.68	**A**
Avg. Runing Power	-188.32	**KW**
SOC Before Test	100.00	**%**
SOC After Test	3.33	**%**
Rack Capacity	280	**Kwh**
Generated Energy	-238.54	**Kwh**

Container 4.1 - Rack 07 - DCPort 04			Before Test Values.				After Test Values			
Module	Artikel	Module Serial No.	Module Voltage1	Max. Cell Voltage1	Min. Cell Voltage1	Max Temperature1	Module Voltage2	Max. Cell Voltage2	Min. Cell Voltage2	Max Temperature2
Serial No.	No.	No.	V	V	V	C°	V	V	V	C°
1	508972	FRQ-508972000280	3.554	3.562	3.544	21.0	3.081	3.088	3.067	46.0
2	509344	FRQ-509344000098	3.563	3.564	3.562	21.0	3.069	3.085	3.009	46.0
3	509344	FRQ-509344000194	3.563	3.564	3.562	21.0	3.084	3.090	3.065	46.0
4	509344	FRQ-509344000120	3.563	3.565	3.560	21.0	3.065	3.087	2.971	46.0
5	509344	FRQ-509344000195	3.563	3.564	3.562	20.0	3.085	3.091	3.066	45.0
6	509344	FRQ-509344000199	3.563	3.564	3.562	21.0	3.081	3.087	3.063	46.0
7	509344	FRQ-509344000203	3.563	3.564	3.561	21.0	3.073	3.083	3.043	46.0
8	509344	FRQ-509344000202	3.563	3.564	3.562	21.0	3.079	3.084	3.060	46.0
9	509344	FRQ-509344000198	3.563	3.564	3.562	20.0	3.076	3.088	3.014	45.0
10	509344	FRQ-509344000174	3.563	3.564	3.562	20.0	3.062	3.084	2.980	45.0
11	509344	FRQ-509344000119	3.563	3.564	3.562	19.0	3.068	3.092	2.993	39.0
12	509344	FRQ-509344000185	3.563	3.564	3.562	20.0	3.087	3.110	3.067	41.0
13	509344	FRQ-509344000100	3.564	3.564	3.563	20.0	3.062	3.085	2.962	41.0
14	509344	FRQ-509344000105	3.562	3.564	3.560	21.0	3.062	3.087	2.975	46.0
15	509344	FRQ-509344000110	3.563	3.564	3.562	20.0	3.063	3.100	2.968	45.0
16	509344	FRQ-509344000099	3.562	3.564	3.561	20.0	3.068	3.090	2.978	46.0
17	509344	FRQ-509344000184	3.562	3.564	3.561	21.0	3.083	3.091	3.059	46.0
18	509344	FRQ-509344000117	3.562	3.564	3.561	20.0	3.060	3.082	2.970	46.0
19	509344	FRQ-509344000196	3.562	3.564	3.561	21.0	3.080	3.085	3.062	47.0
20	508972	FRQ-508972000692	3.562	3.564	3.560	21.0	3.068	3.081	3.050	46.0
21	509344	FRQ-509344000204	3.563	3.564	3.561	21.0	3.075	3.085	3.054	47.0
22	509344	FRQ-509344000205	3.562	3.564	3.560	21.0	3.069	3.082	3.051	46.0
23	509344	FRQ-509344000201	3.563	3.565	3.561	21.0	3.074	3.083	3.061	46.0
24	509344	FRQ-509344000197	3.562	3.564	3.560	20.0	3.080	3.088	3.058	45.0
25	509344	FRQ-509344000118	3.562	3.564	3.560	20.0	3.055	3.082	2.948	45.0
26	509344	FRQ-509344000175	3.562	3.564	3.561	21.0	3.056	3.087	2.938	47.0
27	509344	FRQ-509344000097	3.563	3.564	3.561	21.0	3.054	3.078	2.951	46.0
28	509344	FRQ-509344000111	3.563	3.564	3.561	21.0	3.060	3.097	2.943	47.0

Database Results



Power KW Graph

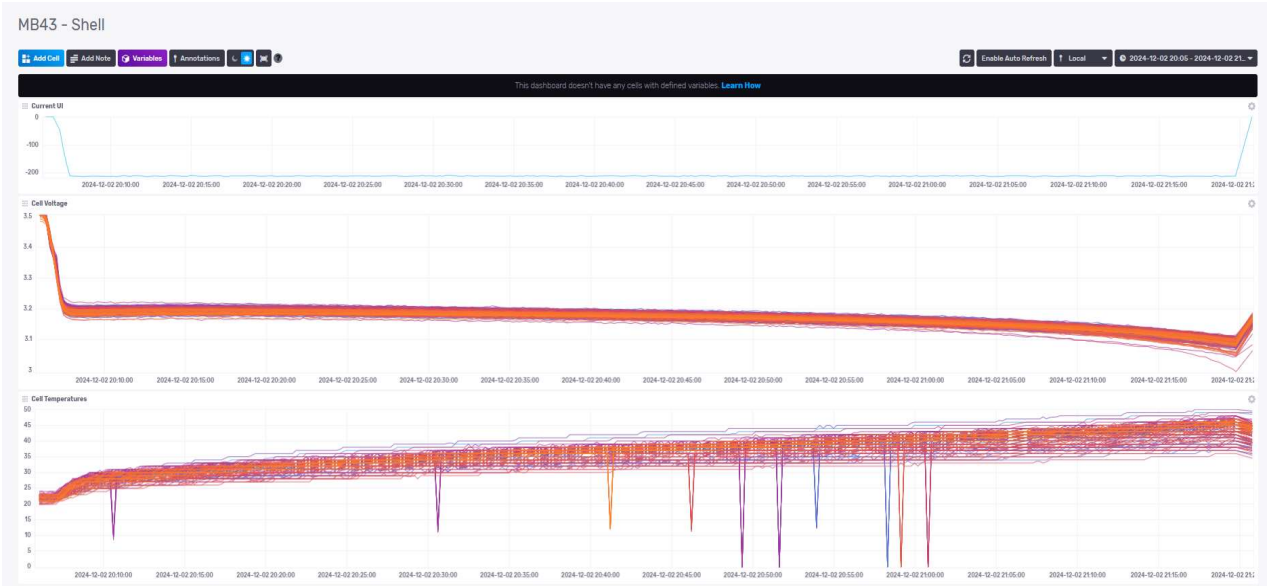


Final Test Report of Battery Rack

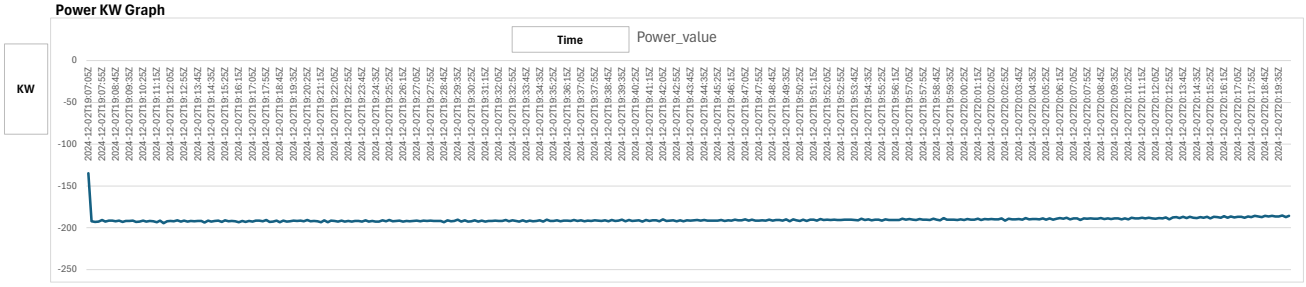
Customer	**Shell**	
Type of Test	Discharge - Battery Rack	
Date of Test	02-Dec-24	
Time -Start	20:07	**Uhr**
Time -Stop	21:20	**Uhr**
Duration of Test	01:13	**Stunde:Min**
Avg. Runing Current	-211.43	**A**
Avg. Runing Power	-190.43	**KW**
SOC Before Test	100.00	**%**
SOC After Test	7.23	**%**
Rack Capacity	280	**Kwh**
Generated Energy	-231.69	**Kwh**

Container 4.1 - Rack 03 - DCPort 02			Before Test Values.				After Test Values			
Module Serial No.	Artikel No.	Module Serial No.	Module Voltage1 V	Max. Cell Voltage1 V	Min. Cell Voltage1 V	Max Temperature1 C°	Module Voltage2 V	Max. Cell Voltage2 V	Min. Cell Voltage2 V	Max Temperature2 C°
1	508972	FRQ-508972000285	3.502	3.503	3.501	22.0	3.093	3.103	3.073	46.0
2	508972	FRQ-508972000302	3.502	3.503	3.501	23.0	3.093	3.098	3.079	46.0
3	508972	FRQ-508972000471	3.502	3.504	3.499	23.0	3.098	3.111	3.081	46.0
4	508972	FRQ-508972000410	3.502	3.503	3.501	22.0	3.093	3.101	3.075	46.0
5	508972	FRQ-508972000726	3.502	3.503	3.501	22.0	3.092	3.097	3.071	49.0
6	508972	FRQ-508972000469	3.503	3.503	3.502	22.0	3.089	3.095	3.074	46.0
7	508972	FRQ-508972000765	3.502	3.503	3.501	22.0	3.088	3.097	3.066	46.0
8	508972	FRQ-508972000314	3.502	3.503	3.501	22.0	3.089	3.097	3.067	46.0
9	508972	FRQ-508972000284	3.502	3.504	3.500	22.0	3.092	3.104	3.070	45.0
10	508972	FRQ-508972000303	3.502	3.503	3.501	22.0	3.095	3.107	3.082	45.0
11	508972	FRQ-508972000396	3.502	3.503	3.502	22.0	3.098	3.106	3.072	42.0
12	508972	FRQ-508972001027	3.502	3.503	3.501	22.0	3.092	3.106	3.070	42.0
13	508972	FRQ-508972000533	3.502	3.503	3.501	22.0	3.096	3.105	3.082	42.0
14	508972	FRQ-508972001445	3.502	3.503	3.501	22.0	3.085	3.094	3.052	45.0
15	509344	FRQ-509344000085	3.502	3.503	3.501	22.0	3.089	3.105	3.036	45.0
16	508972	FRQ-508972001450	3.503	3.506	3.502	22.0	3.090	3.098	3.062	48.0
17	508972	FRQ-508972000711	3.502	3.503	3.501	22.0	3.093	3.098	3.083	50.0
18	508972	FRQ-508972000319	3.502	3.503	3.502	22.0	3.093	3.102	3.083	46.0
19	508972	FRQ-508972000702	3.503	3.504	3.501	23.0	3.089	3.102	3.070	48.0
20	508972	FRQ-508972000035	3.503	3.503	3.502	23.0	3.071	3.099	2.961	48.0
21	508972	FRQ-508972000350	3.503	3.505	3.501	22.0	3.127	3.131	3.116	46.0
22	508972	FRQ-508972000545	3.502	3.503	3.501	23.0	3.132	3.142	3.121	46.0
23	508972	FRQ-508972000393	3.502	3.503	3.501	23.0	3.130	3.132	3.122	46.0
24	508972	FRQ-508972000529	3.502	3.503	3.501	23.0	3.134	3.142	3.119	46.0
25	508972	FRQ-508972000934	3.502	3.503	3.501	23.0	3.100	3.142	3.084	45.0
26	508972	FRQ-508972000723	3.502	3.503	3.501	23.0	3.167	3.170	3.161	46.0
27	508972	FRQ-508972000400	3.502	3.503	3.501	23.0	3.165	3.168	3.163	47.0
28	509344	FRQ-509344000530	3.497	3.503	3.483	24.0	3.156	3.160	3.146	47.0

Database Results



Power KW Graph



Final Test Report of Battery Rack

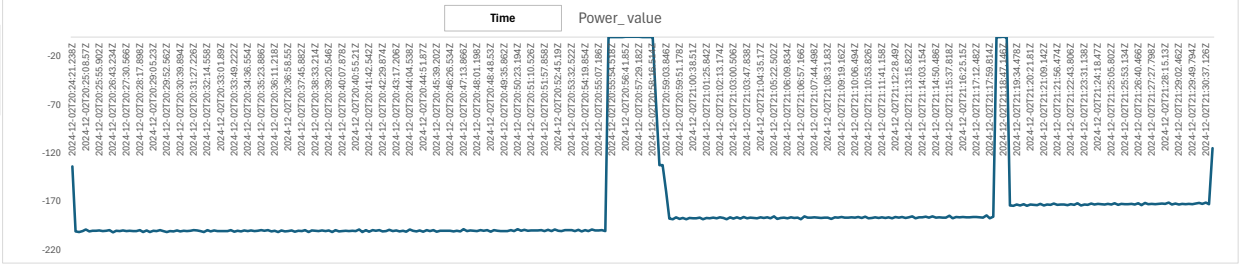
Customer	**Shell**	
Type of Test	Discharge - Battery Rack	
Date of Test	02-Dec-24	
Time -Start	21:25	**Uhr**
Time -Stop	22:33	**Uhr**
Duration of Test	01:08	**Stunde:Min**
Avg. Runing Current	-211.43	**A**
Avg. Runing Power	-183.93	**KW**
SOC Before Test	100.00	**%**
SOC After Test	19.88	**%**
Rack Capacity	280	**Kwh**
Generated Energy	-208.45	**Kwh**

Container 4.1 - Rack 05 - DCPort 03			Before Test Values.				After Test Values			
Module Serial No.	Artikel No.	Module Serial No.	Module Voltage1 V	Max. Cell Voltage1 V	Min. Cell Voltage1 V	Max Temperature1 C°	Module Voltage2 V	Max. Cell Voltage2 V	Min. Cell Voltage2 V	Max Temperature2 C°
1	509344	FRQ-509344000124	3.555	3.562	3.552	23.0	3.081	3.088	3.067	46.0
2	509344	FRQ-509344000191	3.559	3.563	3.556	23.0	3.069	3.085	3.009	46.0
3	509344	FRQ-509344000163	3.560	3.562	3.559	23.0	3.084	3.090	3.065	46.0
4	509344	FRQ-509344000149	3.556	3.559	3.554	23.0	3.065	3.087	2.971	46.0
5	509344	FRQ-509344000102	3.555	3.558	3.553	22.0	3.085	3.091	3.066	45.0
6	509344	FRQ-509344000193	3.554	3.557	3.551	22.0	3.081	3.087	3.063	46.0
7	509344	FRQ-509344000096	3.555	3.558	3.552	22.0	3.073	3.083	3.043	46.0
8	509344	FRQ-509344000095	3.556	3.560	3.554	21.0	3.079	3.084	3.060	46.0
9	509344	FRQ-509344000192	3.559	3.561	3.555	22.0	3.076	3.088	3.014	45.0
10	509344	FRQ-509344000101	3.554	3.559	3.551	22.0	3.062	3.084	2.980	45.0
11	509344	FRQ-509344000150	3.557	3.560	3.554	22.0	3.068	3.092	2.993	39.0
12	509344	FRQ-509344000352	3.546	3.551	3.543	22.0	3.087	3.110	3.067	41.0
13	509344	FRQ-509344000190	3.559	3.561	3.556	22.0	3.062	3.085	2.962	41.0
14	509344	FRQ-509344000125	3.556	3.559	3.553	22.0	3.062	3.087	2.975	46.0
15	509344	FRQ-509344000123	3.556	3.560	3.553	22.0	3.063	3.100	2.968	45.0
16	509344	FRQ-509344000189	3.559	3.561	3.557	22.0	3.068	3.090	2.978	46.0
17	509344	FRQ-509344000165	3.556	3.560	3.553	22.0	3.083	3.091	3.059	46.0
18	509344	FRQ-509344000151	3.557	3.561	3.554	22.0	3.060	3.082	2.970	46.0
19	509344	FRQ-509344000112	3.558	3.562	3.554	22.0	3.080	3.085	3.062	47.0
20	509344	FRQ-509344000187	3.560	3.562	3.558	19.0	3.068	3.081	3.050	46.0
21	509344	FRQ-509344000094	3.556	3.561	3.551	22.0	3.075	3.085	3.054	47.0
22	509344	FRQ-509344000093	3.554	3.559	3.552	23.0	3.069	3.082	3.051	46.0
23	509344	FRQ-509344000186	3.559	3.561	3.555	23.0	3.074	3.083	3.061	46.0
24	509344	FRQ-509344000113	3.555	3.559	3.552	23.0	3.080	3.088	3.058	45.0
25	508972	FRQ-508972001046	3.556	3.559	3.554	22.0	3.055	3.082	2.948	45.0
26	509344	FRQ-509344000166	3.553	3.555	3.545	23.0	3.056	3.087	2.938	47.0
27	509344	FRQ-509344000188	3.559	3.561	3.557	23.0	3.054	3.078	2.951	46.0
28	509344	FRQ-509344000122	3.555	3.561	3.551	23.0	3.060	3.097	2.943	47.0

Database Results



Power KW Graph



Final Test Report of Battery Rack

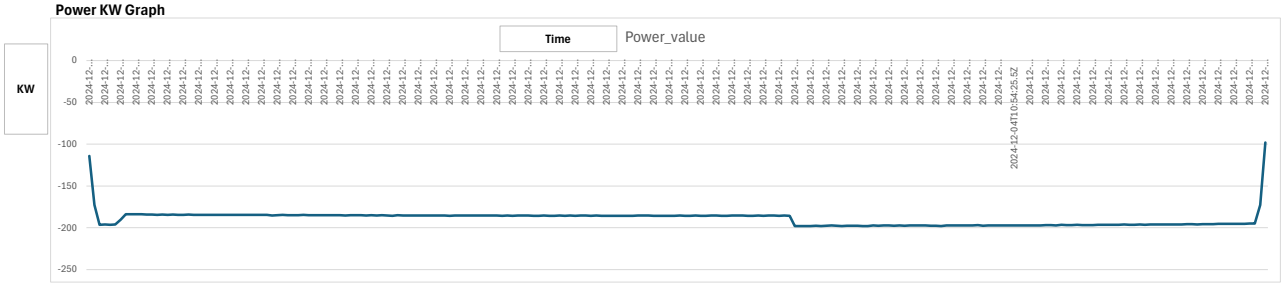
Customer	**Shell**	
Type of Test	Discharge - Battery Rack	
Date of Test	04-Dec-24	
Time -Start	11:05	**Uhr**
Time -Stop	12:07	**Uhr**
Duration of Test	01:02	**Stunde:Min**
Avg. Runing Current	-214.83	**A**
Avg. Runing Power	-189.06	**KW**
SOC Before Test	100.00	**%**
SOC After Test	19.46	**%**
Rack Capacity	280	**Kwh**
Generated Energy	-195.36	**Kwh**

Container 4.1 - Rack 07/Rack22 - DCPort 04			Before Test Values.				After Test Values			
Module Serial No.	Artikel No.	Module Serial No.	Module Voltage1 V	Max. Cell Voltage1 V	Min. Cell Voltage1 V	Max Temperature1 C°	Module Voltage2 V	Max. Cell Voltage2 V	Min. Cell Voltage2 V	Max Temperature2 C°
1	509344	FRQ-509344000542	3.576	3.577	3.572	21.0	3.119	3.126	3.088	43.0
2	509344	FRQ-509344000546	3.577	3.579	3.575	21.0	3.128	3.134	3.110	43.0
3	509344	FRQ-509344000550	3.576	3.578	3.574	21.0	3.132	3.140	3.116	43.0
4	509344	FRQ-509344000553	3.576	3.578	3.572	21.0	3.134	3.152	3.099	42.0
5	508972	FRQ-508972000772	3.571	3.572	3.569	8.0	3.083	3.097	3.062	40.0
6	509344	FRQ-509344000086	3.569	3.572	3.568	8.0	3.090	3.102	3.060	36.0
7	509344	FRQ-509344000040	3.572	3.574	3.570	7.0	3.083	3.095	3.071	34.0
8	509344	FRQ-509344000308	3.574	3.577	3.569	6.0	3.081	3.091	3.053	35.0
9	508972	FRQ-508972000054	3.571	3.573	3.569	8.0	3.085	3.094	3.056	37.0
10	509344	FRQ-509344000410	3.569	3.575	3.565	8.0	3.058	3.072	3.007	38.0
11	508972	FRQ-508972001017	3.572	3.575	3.561	10.0	3.078	3.085	3.052	44.0
12	509344	FRQ-509344000549	3.576	3.578	3.573	22.0	3.129	3.138	3.112	44.0
13	509344	FRQ-509344000545	3.575	3.578	3.574	22.0	3.123	3.149	3.078	44.0
14	509344	FRQ-509344000540	3.575	3.578	3.573	21.0	3.113	3.121	3.084	44.0
15	509344	FRQ-509344000541	3.577	3.579	3.575	21.0	3.105	3.114	3.080	44.0
16	509344	FRQ-509344000543	3.569	3.571	3.567	22.0	3.135	3.153	3.109	43.0
17	509344	FRQ-509344000547	3.575	3.578	3.573	22.0	3.135	3.142	3.115	43.0
18	509344	FRQ-509344000552	3.571	3.572	3.570	22.0	3.113	3.121	3.090	44.0
19	509344	FRQ-509344000078	3.573	3.575	3.570	9.0	3.106	3.115	3.061	39.0
20	509344	FRQ-509344000200	3.570	3.572	3.565	7.0	3.105	3.114	3.082	37.0
21	509344	FRQ-509344000351	3.568	3.574	3.566	8.0	2.993	3.024	2.924	37.0
22	509344	FRQ-509344000485	3.568	3.571	3.567	8.0	3.030	3.060	2.972	34.0
23	508972	FRQ-508972000182	3.571	3.573	3.567	9.0	3.087	3.098	3.052	38.0
24	508972	FRQ-508972000336	3.572	3.575	3.569	9.0	3.086	3.110	3.072	40.0
25	509344	FRQ-509344000551	3.575	3.576	3.573	21.0	3.132	3.153	3.108	44.0
26	509344	FRQ-509344000548	3.574	3.577	3.572	21.0	3.132	3.139	3.113	42.0
27	509344	FRQ-509344000544	3.575	3.577	3.573	21.0	3.122	3.133	3.090	43.0
28	509344	FRQ-509344000539	3.576	3.578	3.573	20.0	3.125	3.132	3.107	42.0

Database Results



Power KW Graph



Safety Data Sheet according to Regulation (EC) No. 1907/2006 (REACH) & HazCom 2012

5852 Baker Road
Minnetonka, MN 55345
USA

SDSR# FU004
DATE: 05/16

SECTION 1: Identification of the Substance/Mixture and of the Company/undertaking Product Identifier

Stat-X® Condensed Aerosol Generators - Models 30 to 2500.



Details of the supplier of the safety data sheet:
Fireaway Inc., 5852 Baker Road, Minnetonka, MN, 55345, USA
Telephone +1 (952) 935-9745, Fax +1 (952) 935-9757
Email address of the competent person: info@statx.com

For information only, call 1-952-935-9745.
For emergencies, call CHEMTREC: DOMESTIC NORTH AMERICA 800-424-9300 INTERNATIONAL 703-527-3887 (COLLECT)

SECTION 2: Hazards Identification

Possible exposure to aerosol suppression agent if generator is activated. May cause temporary, mild irritation of mucous membranes if inhaled.

SECTION 3: Composition/Information on Ingredients

Hazardous components: Does not contain dangerous materials as defined by ordinance on hazardous materials.

Components – Chemical (Hazardous Components ≥ 1%)	**CAS#**	**COMMENTS:**
Potassium Nitrate	7757-79-1	Components are blended and pressed into a highly stable, molded form. Molded composition is contained within a sealed double-walled stainless steel housing – no environmental exposure.
DCDA	461-58-5	
Organic Resin	9003-35-4	
Appearance & Odor:		Beige to white in color. No odor.
Auto-Ignition Temperature:		300°C
Solubility in Water:		Slightly Soluble

SECTION 4: First aid measures

Contact Method:	**Procedure:**
Inhalation	Remove to fresh air
Eye Contact	Flush with water
Skin Contact	Wash with soap and water.
Ingestion	Not a likely route of exposure.
Seek medical attention for further treatment, observation, and support if necessary.	

SECTION 5: Firefighting Measures

In the event of a fire, evacuate the area and inform emergency services. Ignition of Stat-X produces a fire-suppression aerosol. Water may be used as an additional suppression agent.

SECTION 6: Accidental Release Measures

If these devices are spilled they can be safely recovered by hand and should be inspected for damage prior to repacking. Suspect or damaged articles should be labeled and consigned for correct destruction.

SECTION 7: Handling and Storage

Store in temperate conditions. Avoid shock, electric currents, static discharge, excessive heat and extended periods of storage at temperatures greater than 65°C.

SECTION 8: Exposure Controls/Personal Protection

Respiratory Protection	Ventilate area completely after discharge. Do not enter area prior to complete venting of enclosure. Use filter mask as necessary during clean-up.
Hand Protection	Wear gloves if handling generators prior to cooling.
Eye Protection	Safety glasses are advisable.
Skin Protection	N/A

SECTION 9: Physical and Chemical Properties

Appearance:	Stainless Steel Cylinder up to 270 mm in length

SECTION 10: Stability and Reactivity

These devices are extremely stable below 125°C. They should be protected from fire, sources of electrical power, shock, and high temperatures.

SECTION 11: Toxicological Information

Toxic by-products of combustion are extremely low. Main by-products are listed below with 15-minute TWA values for a maximum 100g/m^3 concentration in a hermetically sealed volume.

Gas	15 minute Time Weighted Average in parts per million
NO_2	1.08
NO	0.97
CO	84.20

SECTION 12: Ecological Information

These devices are sealed and present no ecological hazards. The aerosol produced upon ignition has ver low global warming potential and an ozone depletion potential = 0.

SECTION 13: Disposal Considerations

Comply with all local, state, and federal/international regulations.

SECTION 14: Transport Information

UN Number: 3178	Shipping Limitations:	
UN Classification: UN3178, Flammable Solid, Inorganic, n.o.s, (contains potassium nitrate), 4.1, PG III	Cargo Air	Max single packaging – 100 kgs.
Packaging Group: III	Passenger Air	Max single packaging – 25 kgs.
Division 4.1 articles present no significant hazard as packaged for transport.		

SECTION 15: Regulatory Information

S15	Keep away from heat
S33	Take precautionary measures against risk of static discharge
S35	This material and its container must be disposed of in a safe way
S38	In case of insufficient ventilation wear suitable respiratory equipment
S39	Wear eye/face protection

SECTION 16: Other Information

Comply with manufacturer's installation and maintenance procedures.

Disclaimer:

The information contained herein is accurate to the best knowledge and belief of Fireaway Inc., and is intended to describe the product for health, safety, and environmental requirements only. It is not intended and should not be construed as a warranty. Consult Fireaway for further information.

PUMA AIR

OPERATING AND MAINTENANCE INSTRUCTIONS

TWIN FAN EXTRACT DIRECT DRIVEN UNITS – RUN & STANDBY

DESCRIPTION

All units are manufactured to a very high standard of construction.

The casing, internal fan plates, lid and spigots are formed from 18 swg or 16 swg mild steel plate. The units are generally finished in an attractive RAL 5017 blue polyester powder coat for weather proof units. Internal units have galvanised panels or powder coated to RAL 9005 satin black.

The supply and extract fans are of the double inlet, direct drive centrifugal type fitted with single phase motors to class E insulation. They are sized to suit the duty required with allowances for internal pressure drop within the unit. The extract air section is insulated with 25mm thick pyrosorb class O insulation, this has excellent noise absorption qualities and anti-condensation properties.

OPERATION

The twin fan units generally require a 240 Vac single phase supply. Where specified a 380/415 V ac 3 phase and neutral supply may be required (check serial plate on side of unit or sales literature).

Each unit is provided with cable entry glands and suitable terminal block. This is wired through a mains isolator switch.

Internal speed control devices for each fan are available to commission fan airflow duties when required.

All twin fan extract units require a Puma auto changeover panel to operate correctly.

When energised, the selected fan will run as the duty fan, if the fan fails then an airflow switch automatically switches on the standby fan and illuminates a fan fail (red) light on the auto changeover panel (see data sheet on auto changeover panels for differences in the basic and deluxe panel models). The duty fan can be manually selected by the fan selector switch on the auto changeover panel.

Unit C Alexander Bell Centre, Hopkinson Way, West Portway Business Park, Andover, Hampshire, England, SP10 3UR
Telephone: 0044 1264 333310 Co Reg No 12192146
Email: sales@pumaair.co.uk Website: www.pumaproducts.co.uk
Director Mr Phillip Newton M Inst.R, M.A.S.H.R.A.E.

INSTALLATION

The unit must be situated in a position with sufficient access to the removable panel/s. A distance given on the certified drawing of the unit must be allowed for access to the serviceable components.

The units are suitable for floor mounting on 'tico' pad or anti-vibration isolators if required (by others). Flexible connections may be required between spigot connections and solid ductwork if noise levels are appropriate (by others).

Twin fan extract units are available as weather proof versions (denoted WTFE). Anti-vibration isolators are recommended when installed on flat roofs.

SERVICE AND MAINTENANCE

The mains supply to all units must be disconnected at source before removing the lid.

The airflow failure switches should be checked for free movement and electrical conductance.

These fans are fitted with direct drive motors with sealed for life bearings that require no maintenance.

Refer to Puma colour technical sales leaflet for further information regarding dimensions, weights and unit performance and fan curves.

Unit C Alexander Bell Centre, Hopkinson Way, West Portway Business Park, Andover, Hampshire, England, SP10 3UR
Telephone: 0044 1264 333310 Co Reg No 12192146
Email: sales@pumaair.co.uk Website: www.pumaproducts.co.uk
Director Mr Phillip Newton M Inst.R, M.A.S.H.R.A.E.

FAULT FINDING

FAN/MOTOR FAILS TO RUN

1. Check the unit is connected correctly, as per the supplied wiring diagram.
2. Check the mains supply.
3. Check the control circuit fuse.
4. Is there a voltage at the fan? Yes would indicate motor failure or a neutral/phase problem. If no follow steps 4-7 below.
5. Check the mains isolator fitted to the side of the unit, if ok is the SR link (where fitted L1 L2 or SR1 SR2) in place.
6. Check the fan fuse, located below the isolator.(single phase fans only)
7. Three phase fans and belt driven units check the MCB is on, and the fan overload is on by pushing the manual reset button(red) on the fan contactor.(usually situated to the side of the fan on the fan plate left or right depending on handing of the unit)
8. If the MCB keeps tripping check the phases are ok, on belt drive units check the belt tension is correct and the fan motor overload is set to the rating of the motor. See motor serial plate for size/rating.

Most faults/problems can be resolved by following the above if the unit still fails to work correctly please contact Puma Air Movement Ltd for technical assistance.

10 CQ & TQ Documents

Commissioning Query Form

CROSSWIND
ROSETTI MARINO

		QUERY NUMBER	*CQ-017*			
SITE ORIGINATOR TO COMPLETE		**ORIGINATING LOCATION REF. NO**				
		DISCIPLINE:	**Electrical**	LOCATION:	**BESS**	
		WORKPACK REF:				
		SYSTEM:82		SUB SYSTEM:	82-10	
			Print: John Mackillop	*Sign:* John Mackillop	*Date: 07.04.25*	
		DESCRIPTION OF QUERY				
		During commissioning testing of the BESS, it was noticed the secondary voltage to the BESS was 587v, The vendor was expecting 620v, due to the Tx being 7kv/0.62kv. However the supply voltage being sent from SG-100D1 is 6.6Kv. The vendor believed the low secondary voltage was causing the BESS to trip on high loads (950kw+). It was agreed to change the tap setting on transformer 18T1 from 0% to -5% to complete the testing, this gave a secondary voltage of approx. 610v. This allowed testing to be completed up to 1MW. *Can we please have clarification if this is acceptable to remain in place and what else this will affect downstream?*				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		Photo's DWG_2305062_2023090001_REV00 en DWG_2305062_2023090001_REV00 DWG_2305062_2023090001_REV00 123A90-PML-COM-PRO-03063 - OTP – BESS				
		PROPOSED SOLUTION				
		To be confirmed by CPI				
		APPROVED FOR ISSUE BY SITE AUTHORISED SIGNATORY: (Y or N?)	Y	*Print: Martin Taylor*	*Sign:* Martin Taylor	*Date:07.04.25*
ENGINEERING TO COMPLETE		RECEIVED BY: (Y or N?)	Y	*Print:* C. Palenzuela	*Sign:*	*Date:* 14.04.2025
		ENGINEERING TECHNICAL RESPONSE				
		>> Detail the technical discipline response to the above query and proposal here Yes, this is acceptable to remain ith the current tap settings. This will not effect any function behaviour of the system downstream. Sinec 6.6 kV are required we adjusted the primaryvoltage by stepping stown the tap by 5%.				
		LIST OF DOCUMENTS ATTACHED (INCLUDE NAME / DESCRIPTION / REVISION / DATE OR N/A)				
		>> List any attached sketches/information required to fully describe the response here				
		REQUIRES CLARIFICATIONS (Y or N?)	Y	IF "Y", USE THE ABOVE "RESPONSE SPACE" TO DETAIL CLARIFICATION.		
		RESPONSE PREPARED BY:		*Print:* C. Palenzuela	*Sign:*	*Date:* 14.04.2025
		APPROVED DISCIPLINE LEAD (Y or N?)	Y	*Print:* C. Palenzuela	*Sign:*	*Date:* 14.04.2025

Commissioning Query Form

		HAVE ALL RELEVANT DISCIPLINES IMPACTED BEEN INFORMED? (Y or N) PROJECT ENG TO CONFIRM.		*Print:*	*Sign:*	*Date:*
		PAC TO BE ISSUED (Y or N?)		NCR TO BE ISSUED (Y or N?)		ATRAC No.:	
		APPROVED BY ASSIGNMENT ENGINEERING MANAGER (Y or N?)		*Print:*	*Sign:*	*Date:*
SITE ORIGINATOR		ORIGINATOR ACCEPTS PROPOSAL (Y or N?)		IF "NO", RETURN TO CROSSWIND WITH COMMENT		
		ORIGINATOR TO DETAIL THE ACTIONS TAKEN				
		>>Detail the actions taken here				
		SIGNATURE OF ORIGINATOR APPROVING THE PROPOSAL (Y or N?)		*Print:*	*Sign:*	*Date:*
PROJ.ENG.		TECHNICAL QUERY CLOSE OUT BY PROJECT ENGINEER (Y or N?)		*Print:*	*Sign:*	*Date:*

CROSSWIND

TECHNICAL QUERY
Hollandse Kust Noord

No. TQ :	CW-ROS-TQ-0013	Rev:	C

Originating Party	Crosswind					
Subject	BESS Key Interlock					
Author	S. Bremner	TQ Aconex unique number: CWHKN-INN-BPH-TQ-00049				
Interface TQ - from		TQ interface source Aconex unique number:				
Type	Query		X	Interface		
	Deviation			Derogation (SHALL[PS])		
	Note: No deviations nor derogations which have an adverse effect on HSSE will be granted					
Workpackage						
Area(s) of application	Design & Eng.	X	Procurement		Construction	
	Commissioning		Operations		Other	
Issue date	03-04-2024		Urgent reply 5 days	X	Routine reply 10 days	
Close-out date						
Closed-out by			TQ status:		Open	

1. Description

Reference documents / Aconex unique numbers:

For the BESS package, there is an open point from the SAFOP Review Qworkshop as detailed below.

Sr No.	Item	Description	Recommendation	Action	Responsible
32	Electrocution by direct contact	Manual operation (door opening, entrance etc.) training, guidelines and safety indicators	Check IEC and Dutch standard on live rooms	1. Review the standards and ensure compliance. 2. Ensure the possibility of locking electrical spaces while not under maintenance to avoid unwanted access	Freqcon

To resolve this issue, Crosswind are proposing the following system for Key Interlock.

Proposed Solution

It is proposed to use Castel captive key interlock system (or similar) to restrict access to the BESS PCS transformer enclosure by interlocking the BESS feeeder switchgear in MV Switchbaord SG-100D1 to ensure that the MV supply to the transformer is de-energised & safe before the transformer enclosure doors can be opened.

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Suggested Sequence of Operation

1. The 6.6kV BESS latched contactor feeder in MV switchboard SG-100D1 to be fitted with Castell safety Interlock & PCS (Transformer doors) key.

The FS/Q switchgear interlocks are designed to control the operation of HV/LV switchgear.

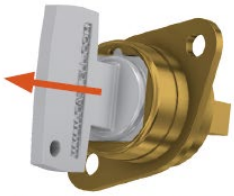
FS/Q switchgear interlock

1 **Key is trapped, HV/LV circuit is closed.**



While the key is trapped, the isolator is closed providing the power supply.

2 **Turn and release key to open the HV/LV circuit.**



Turning the key opens the isolator. The key can then be released.

3 **Key is free and the HV/LV circuit is open.**



The free key can be used to operate either a parallel supply stream or an access interlock.

The FS/Q switchgear interlocks are available in a clockwise or in an anti-clockwise mounting position.

A set range of rotational movement and spigot lengths are available (see page 5 for ordering details).

2. When BESS switchgear is isolated and earthed, the trapped PCS key can be released from the BESS feeder switchgear. The PCS key can be taken to the BESS PCS container.

3. PCS key can be inserted into the Access Interlock on the PCS container transformer door, to release the bolt to open the transformer door.

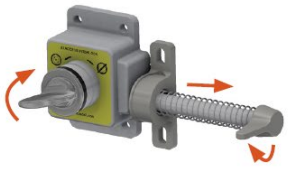
AI single key access interlock
(bolt trapped - key free)

1 **Key is free, bolt is trapped**



While the key is free, the bolt of the AI is trapped in the mechanism. The door is locked.

2 **Insert and turn key, then turn and release bolt**



By inserting and turning the key in the AI, the bolt is then free to be turned and released, which will trap the key in the lock.

3 **Key is trapped, bolt is unlocked**



The key stays trapped while the bolt is released and the door is open.

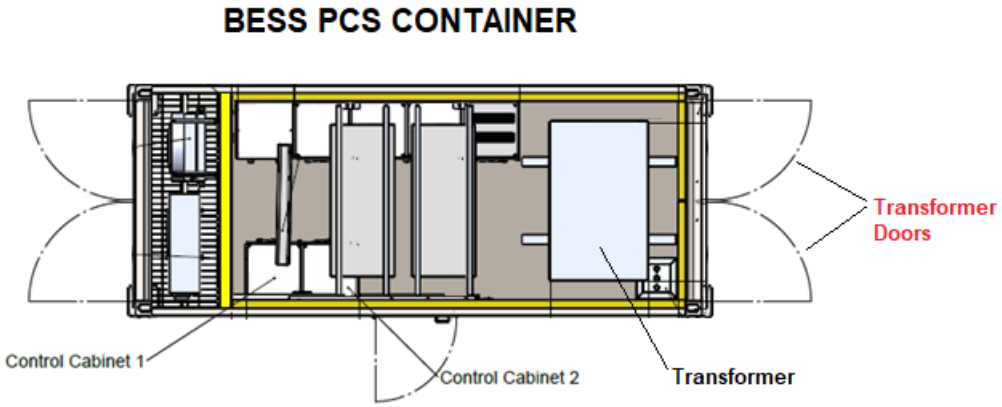
Transformer will remain de-Energised until sequence is reversed.

Items required

FS/Q Switchgear Interlock FS_Q_Jan_23.pdf (castell.com)
FS System Key, KEYS_Oct_22.pdf (castell.com)
AI Single Key Access Interlock, AI_Jan_2023.pdf (castell.com)

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Freqcon / Suretank will provide suitable mounting on plates the two PCS container access doors to the transformer enclosure (as below) to allow mounting of the Single key access system (Castell or similar) as per the attached datasheet. No other equipment necessary.



COMPANY requests CONTRACTOR to provide engineering design to supply, install and commission suitable Interlocking kit system complete consisting of:

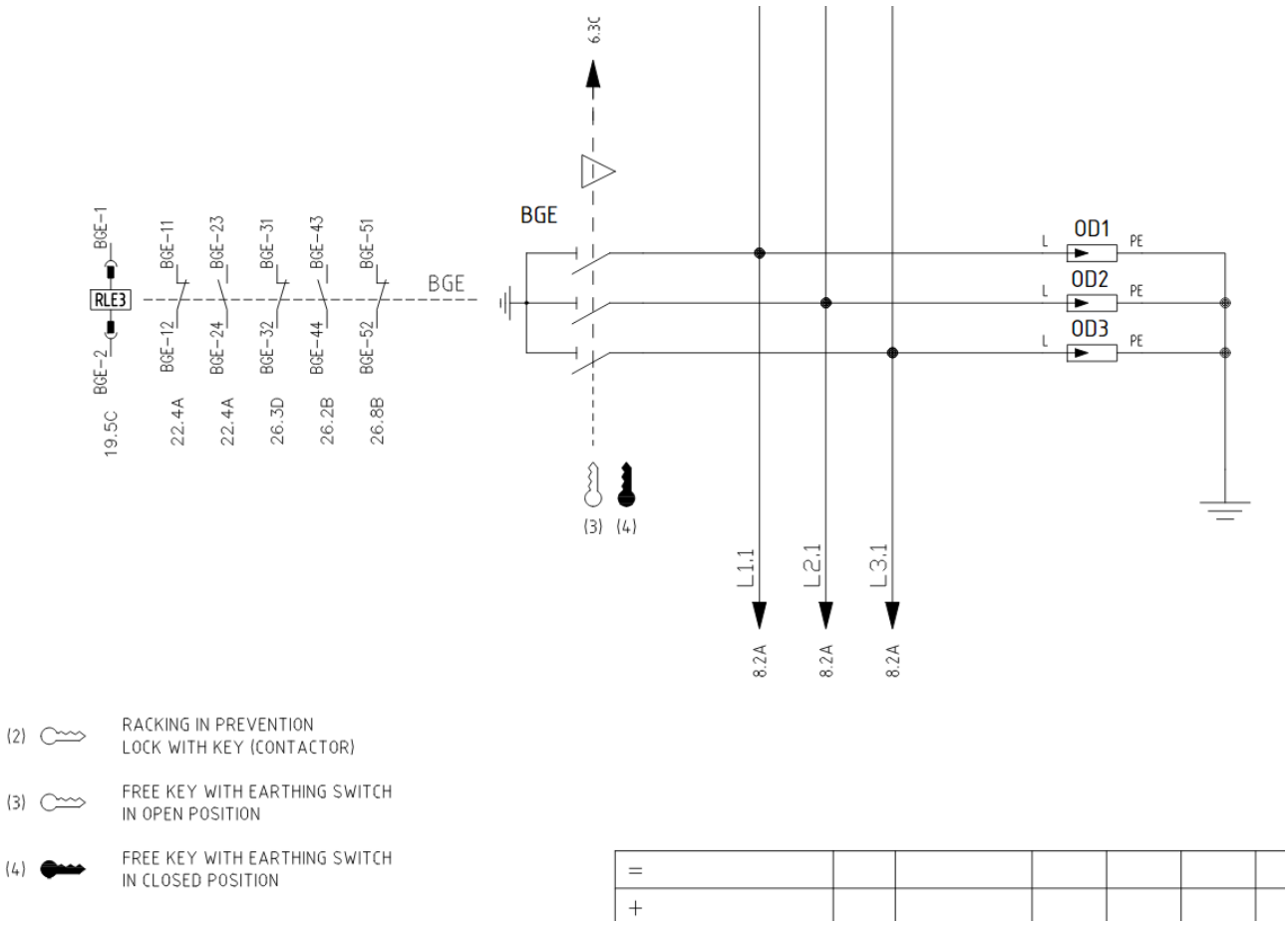
1. Switchgear interlock system suitable for the MV switchgear and earth switch
2. System Key – matched to switchgear interlock and Access Bolt Interlock
3. Single Key Access bolt interlock that will be mounted on plates provided by Freqcon/Suretank.

2. Response

Reference documents / Aconex unique numbers
1723002197-EL-DG-00017 - SG-100D1 MV SWBD 6,6kV - FUNCTIONAL DIAGRAM BESS FEEDER A-8500

As shown on the project documentation relevant to the 6.6 kV switchgear SG-100D1, each breaker/contactor trolley, as well each earthing switch is provided with keys interlocked with the corresponding mechanism.
In particular, as shown on the schematic drawing 1723002197-EL-DG-00017, the earthing switch on the BESS feeder is provided with the two keys shown in the following extract:

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Key 4 is free only when the earthing switch (BGE) is closed. Once the key is removed the earthing switch can not be open anymore, until the key is inserted again in the block.
This key cover exactly the function required in this technical query. i.e. the FS/Q switchgear interlock.

To comply with the requirement, it will be enough to ring the key 4 of SG-100D1 on BESS feeder with the key of the interlock to be installed on the PCS container door.

Once the earthing switch is closed the key 4 will be free, together with the door block key, which can be inserted in the block making possible unlocking and opening the door.

Contractor confirms that the design of the 6.6 kV switchgear is in line with the requirement and there is no need of any modification or additional device.

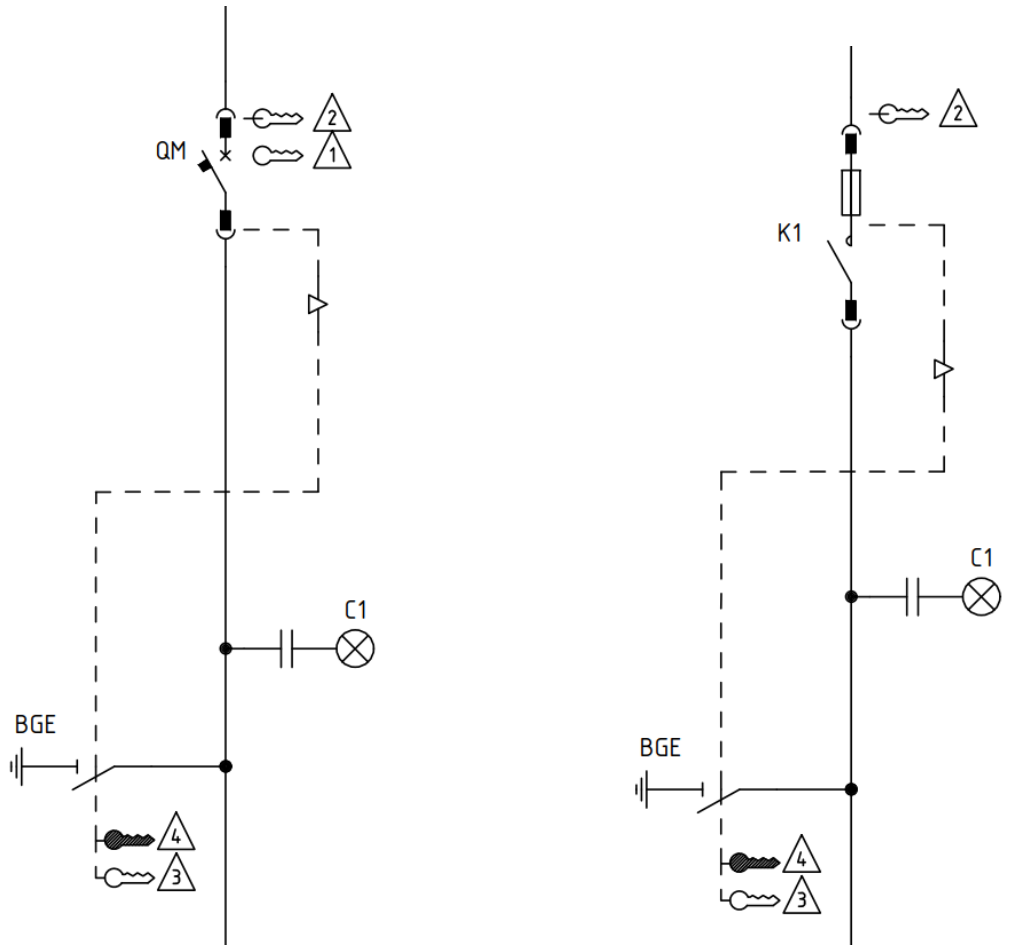
With respect to the PCS container, Contractor will not take care of supply and installation of any further key block, being these part of the BESS Supplier scope of work.

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3. Engineer's Response
Reference documents / Aconex unique numbers
Company acknowledges the use of the indicated key 4 as a proper way to ensure protection when operating on the BESS transformer. To maintain an easy setup, company advise contractor to free-issue a suitable lock assembly compatible with Key 4 that Freqcon/Suretank will then install on the BESS container in the reserved place on the transformer door.

4. Response
Reference documents / Aconex unique numbers **1723002197-EL-DG-00056 - SG-100D1 HV SWBD 6,6kV – OPERATION SEQUENCES AND KEY INTERLOCK**
As discussed and as per doc. N. **1723002197-EL-DG-00056 - SG-100D1 HV SWBD 6,6kV – OPERATION SEQUENCES AND KEY INTERLOCK** for the key interlocks, as well as on the other drawings relevant to the switchgear, each breaker/contactor trolley, as well each earthing switch is provided with keys interlocked with the corresponding mechanism. Here below some additional details: Imesa purchases the complete system of circuit breaker or contactor and earthing switch from ABB and the key system is coming from Italian supplier Giussani (https://www.giussanilocks.com/en/). These are the keys 1 to 4 for the breaker columns and 2 to 4 for the columns with fuses and contactor, as shown in the following sketches:

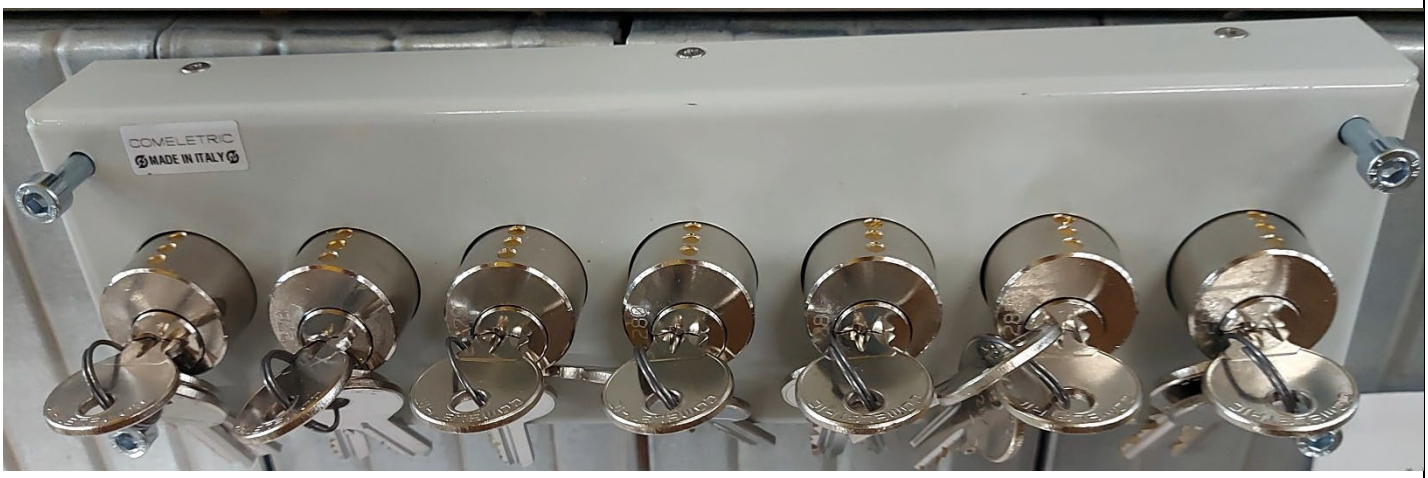
This communication is issued for the recipient's information and to facilitate the obligations of the Parties under the Contract. This communication has no authority to amend or vary the Contract nor relieve either Party of any duties, obligations or responsibilities.



The key distributor installed on the measure cubicle to manage the busbar earthing switch, as shown at page 6 of attached drawing, is purchased from Comelectric (https://www.comeletric.it/interlocking-devices/?lang=en&_gl=1*1fa0q1n*_up*MQ..*_ga*MjA5NjEzMjczOC4xNzE3NTQ0NTAx*_ga_EDJ8J0CRNL*MTcxNzU0NDQ5OS4xLjEuMTcxNzU0NDUxNS4wLjAuMA..).

Please find here a picture of a key distributor similar to the one will be used for our project:

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With respect to the interlock with the BESS transformer door, CTR's proposal is to ring together the key 4 of the drawing (i.e. the key free with the earthing switch closed) with the key necessary to open the BESS door, so that this key will be released and can be used only after closing the earthing switch.

Here below a picture of the ring normally used to ring together two or more keys (This ring is normally welded to avoid any possibility of separate the keys):



CTR kindly asks CPY to acknowledge the above already discussed solution rather than having a single key.

5. Engineer's Response

Reference documents / Aconex unique numbers

Company Acknowledges the proposed solution.

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The access key to the PCS container main door (hosting BESS transformer) as well as key of the Castell Lock locking the transformer access door (inside the container) will be provided to CTR to be ringed together upon commissioning.

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