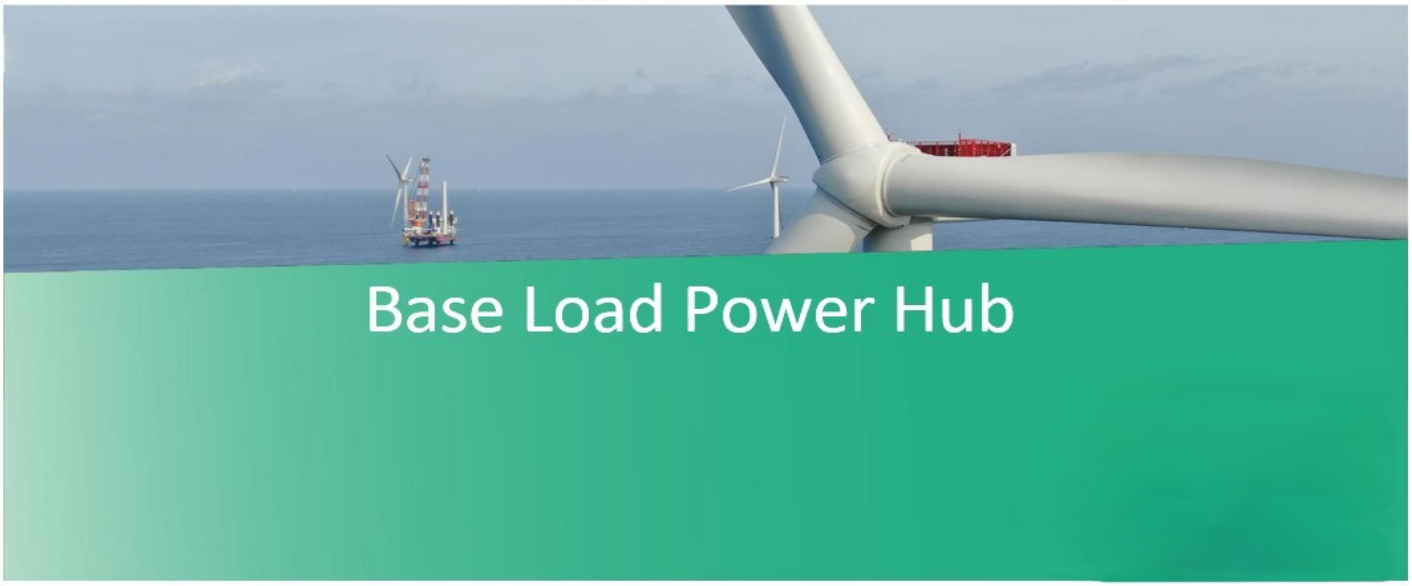
CROSSWIND

ROSETTI MARINO

PROVERLIS

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



MECHANICAL COMPLETION DOSSIER (ONSHORE)

SYSTEM

87

Instrumentation Systems incl. general control room equipment

SUBSYSTEM

87-00

Power Distribution System (EMCS)

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

Sub System N°:	87-00	Tick as appropriate	ONSHORE	O
Description:	Power Distribution System (EMCS)		OFFSHORE	NA

1.	***READY FOR COMMISSIONING CERTIFICATE*** *Ready For Commissioning Certificate (RFC)*	O
2.	***CONSOLIDATED PUNCH LISTS*** *Cleared and Residual Items*	O
3.	***SYSTEM/SUB-SYSTEM LIMIT DRAWINGS*** *Mark-up drawings showing the limits of the relevant System/Sub-System*	O
4.	***MECHANICAL COMPLETION STATUS INDEX – BUILDING DISCIPLINE*** *Building Sub-System Status Index (Print out) and Check/Test sheets*	NA
5.	***MECHANICAL COMPLETION STATUS INDEX – ELECTRICAL DISCIPLINE*** *Electrical Sub-System Status Index (Print out) and Check/Test Sheets* *Hazardous Area Equipment Detailed Inspection*	O
6.	***MECHANICAL COMPLETION STATUS INDEX - INSTRUMENTAL DISCIPLINE*** *Instrumental Sub-System Status Index (Print out) and Check/Test Sheets*	O
7.	***MECHANICAL COMPLETION STATUS INDEX - MECHANICAL DISCIPLINE*** *Mechanical SubSystem Status Index (Print out) and Check/Test Sheets*	NA
8.	***MECHANICAL COMPLETION STATUS INDEX - TELECOMMUNICATION DISCIPLINE*** *Telecommunication Sub-System Status Index (Print out) and Check/Test Sheets*	NA
9.	***MECHANICAL COMPLETION STATUS INDEX - HVAC DISCIPLINE*** *HVAC Sub-System Status Index (Print out) and Check/Test Sheets*	NA
10.	***MECHANICAL COMPLETION STATUS INDEX - PIPING DISCIPLINE*** *Piping Sub-System Status Index and Check/Test Sheets*	NA
11.	***MECHANICAL COMPLETION INDEX - SAFETY DISCIPLINE*** *Safety Sub-System Status Index (Print out) and Check/Test Sheets*	NA
12.	***FAT / VENDOR REPORTS*** *Fat reports issued by vendors and/or vendor reports*	OK
13.	***MECHANICAL COMPLETION CHANGES / MARK-UPS*** *A copy of the changes initiated during the Mechanical Completion process pertaining to the relevant Sub-System will be incorporated in this section*	NA

Note: Under the generic terminology “Building” are also covered the following disciplines: **Structural, Painting**

Under the generic terminology “Instrumental” is also covered the following discipline: **Fire & Gas**

ROSETTI MARINO

123A90 - HOLLANDSE KUST NOORD WIND PARK
BLPH Project

CROSSWIND

Ready For Commissioning (RFC) Certificate

COMPLETE	●	PARTIAL	

Revision:	1		Issued on:	2024-11-27	
System:	87	/	Instrumentation Systems incl. general control room equipment		
SubSystem:	87-00	/	Power Distribution System (EMCS)		

1	COMPANY has, at its option and if required, reviewed the mechanical completion associated with the above-named system/sub-system of the SCOPE and observed that such functional sub-system has been brought into readiness for commencement of the associated pre-commissioning and commissioning activities, but for the outstanding punch list items, if any, attached and referred in this Certificate.
2	Issuance of this Certificate shall not release CONTRACTOR from any of his obligations, responsibilities or liabilities under the CONTRACT.
3	Mechanical Completion Status Index attached (per Discipline) Punch List report attached (Outstanding and Cleared)

PUNCH LIST	PENDING POINTS	
Note: All Category "A" Items must be cleared prior to issue a Ready For Commissioning (RFC) Certificate	A	B
	'0	12

REMARKS:

	CONTRACTOR Construction Manager	**CONTRACTOR** Commissioning Manager	**COMPANY** Construction Lead (if required)	**COMPANY** Commissioning Lead (if required)
Name	Wolmer Borghi	Anthony Iveson	CPY NOT PRESENT	CPY NOT PRESENT
Date	2024-11-28	2024-11-29	2024-11-29	2024-11-29
Signature	PROVERLIS Digitaly signed by Wolmer Borghi 2024-11-28T15:35:17.958Z	PROVERLIS Digitaly signed by Anthony Iveson 2024-11-29T08:17:08.616Z	PROVERLIS Digitaly signed by CPY NOT PRESEN 2024-11-29T08:23:27.128Z	PROVERLIS Digitaly signed by CPY NOT PRESEN 2024-11-29T08:23:33.945Z

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

STATUS INDEX DETAIL

Filtered on subsystem: 87-00 & process: MC

Electrical	87-00 Power Distribution System (EMCS)						
ITEM		TASK					
Code	Description	Location	Code	Form	Progress	Date	Certificate
83106-CEL	Lighting & Small Power DB BoP / EMCS -Controller and I/O Cabinet - Auxiliary	ONSHORE	C10000625	CPX09	100	2024-11-09	RFC 1
84305-CEL	AC UPS - PAS DB / EMCS -Controller and I/O Cabinet - Line A	ONSHORE	C10000583	CPX09	100	2024-11-08	RFC 1
84306-CEL	AC UPS - PAS DB / EMCS -Controller and I/O Cabinet - Line B	ONSHORE	C10000584	CPX09	100	2024-11-08	RFC 1

Project CROSSWIND

STATUS INDEX DETAIL

Filtered on subsystem: 87-00 & process: MC

Instrumental	87-00 Power Distribution System (EMCS)						
ITEM		TASK					
Code	Description	Location	Code	Form	Progress	Date	Certificate
B400-EMCS-001	EMCS Cabinet	ONSHORE	C10000838	CJX48	100	2024-11-20	RFC 1

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM	87	Instrumentation Systems incl. general control room equipment
SUBSYSTEM	87-00	Power Distribution System (EMCS)

Instrumental

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000221	A	B400-EMCS-001	Install MCT frame “B” on roof		ACTIVITY DONE	SLinari 2024-10-14	SLinari 2024-11-27	SLinari 2024-11-27	2024-11-27
C30000374	A	B400-EMCS-001	Install MCT frame "B" on roof		ACTIVITY DONE	SLinari 2024-10-14	SLinari 2024-11-27	SLinari 2024-11-27	2024-11-27
C30000220	B	B400-EMCS-001	Install and connect disconnector switches Q10 and Q11 with rating 32A, with NO auxiliary contact			SLinari 2024-10-14			
C30000373	B	B400-EMCS-001	Install and connect disconnector switches Q10 and Q11 with the right rating 32A, with NO auxiliary contact			SLinari 2024-10-14			
C30000603	B	B400-EMCS-001 C10000838	Cleaning is required inside the panels.	.		Gtangianu 2024-11-19			
C30000644	B	B400-EMCS-001 C10000838	24V/220V- plastic covers of cable tray inside the panel ,are not installed as per drawing.	.		Gtangianu 2024-11-20			
C30000645	B	B400-EMCS-001 C10000838	All documentation listed in the SMIR, shall be re-issued in final revision and approved by RM and CW	.		Gtangianu 2024-11-20			
C30000647	B	B400-EMCS-001 C10000838	Earthing cable need to be fix.	.		Gtangianu 2024-11-20			
C30000654	B	B400-EMCS-001 C10000838	Internal base plate will be installed after commissioning.	.		Gtangianu 2024-11-20			

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM	87	Instrumentation Systems incl. general control room equipment
SUBSYSTEM	87-00	Power Distribution System (EMCS)

Electrical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000336	B	84305-CEL C10000583	Plastic cable ties to be replaced on external routing. Cable needs to be fixed also on B-400 cable trays.	.		Gtangianu 2024-11-08			
C30000337	B	84306-CEL C10000584	Plastic cable ties to be replaced on external routing. Cable needs to be fixed also on B-400 cable trays.	.		Gtangianu 2024-11-08			
C30000341	B	84306-CEL C10000584	Missing cable tag inside/outside the Panel B400-SRV-001.	.		Gtangianu 2024-11-08			
C30000408	B	83106-CEL C10000625	Plastic cable ties to be replaced on external routing	.		Ecarotenuto 2024-11-09			
C30000409	B	83106-CEL C10000625	Missing cable tag inside the panel DP-200N1 and on MCT (both side)	.		Ecarotenuto 2024-11-09			

Section 2 CONSOLIDATED PUNCH LISTS

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM	87	Instrumentation Systems incl. general control room equipment
SUBSYSTEM	87-00	Power Distribution System (EMCS)

Instrumental

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000221	A	B400-EMCS-001	Install MCT frame “B” on roof		ACTIVITY DONE	SLinari 2024-10-14	SLinari 2024-11-27	SLinari 2024-11-27	2024-11-27
C30000374	A	B400-EMCS-001	Install MCT frame "B" on roof		ACTIVITY DONE	SLinari 2024-10-14	SLinari 2024-11-27	SLinari 2024-11-27	2024-11-27
C30000220	B	B400-EMCS-001	Install and connect disconnector switches Q10 and Q11 with rating 32A, with NO auxiliary contact		INSTALLED	SLinari 2024-10-14	SLinari 2024-12-10	SLinari 2024-12-10	2024-12-10
C30000373	B	B400-EMCS-001	Install and connect disconnector switches Q10 and Q11 with the right rating 32A, with NO auxiliary contact			SLinari 2024-10-14	2024-12-07	LNovaga 2024-12-07	2024-12-07
C30000603	B	B400-EMCS-001 C10000838	Cleaning is required inside the panels.	.		Gtangianu 2024-11-19	2024-12-28	Gtangianu 2024-12-28	2024-12-28
C30000644	B	B400-EMCS-001 C10000838	24V/220V- plastic covers of cable tray inside the panel ,are not installed as per drawing.	.		Gtangianu 2024-11-20	2025-03-03	Gtangianu 2025-03-03	2025-03-03
C30000645	B	B400-EMCS-001 C10000838	All documentation listed in the SMIR, shall be re-issued in final revision and approved by RM and CW	.		Gtangianu 2024-11-20			
C30000647	B	B400-EMCS-001 C10000838	Earthing cable need to be fix.	.		Gtangianu 2024-11-20	2025-02-27	JKrizanic 2025-02-27	2025-02-27
C30000654	B	B400-EMCS-001 C10000838	Internal base plate will be installed after commissioning.	.		Gtangianu 2024-11-20			

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

PUNCH LIST REPORT

SYSTEM	87	Instrumentation Systems incl. general control room equipment
SUBSYSTEM	87-00	Power Distribution System (EMCS)

Electrical

CODE	CAT	ITEM	DEFECT DESCRIPTION	CORRECTIVE ACTION	PERFORMED ACTION	ISSUED	CARRIED	CHECKED	APPROVED
C30000336	B	84305-CEL C10000583	Plastic cable ties to be replaced on external routing. Cable needs to be fixed also on B-400 cable trays.	.		Gtangianu 2024-11-08	2024-12-14	Ecarotenuto 2024-12-14	2024-12-14
C30000337	B	84306-CEL C10000584	Plastic cable ties to be replaced on external routing. Cable needs to be fixed also on B-400 cable trays.	.		Gtangianu 2024-11-08	2024-12-14	Ecarotenuto 2024-12-14	2024-12-14
C30000341	B	84306-CEL C10000584	Missing cable tag inside/outside the Panel B400-SRV-001.	.		Gtangianu 2024-11-08	2025-01-31	Gtangianu 2025-01-31	2025-01-31
C30000408	B	83106-CEL C10000625	Plastic cable ties to be replaced on external routing	.		Ecarotenuto 2024-11-09	2025-02-26	Pschintu 2025-02-26	2025-02-26
C30000409	B	83106-CEL C10000625	Missing cable tag inside the panel DP-200N1 and on MCT (both side)	.		Ecarotenuto 2024-11-09	2025-02-26	Pschintu 2025-02-26	2025-02-26

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000645

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000838	1.4 Discipline	Instrumental
1.2 Item	B400-EMCS-001	EMCS Cabinet	
1.3 Subsystem	87-00	Power Distribution System (EMCS)	

2 - OBSERVATION

All documentation listed in the SMIR, shall be re-issued in final revision and approved by RM and CW

Name: Giovanni Tangianu

Date: 2024-11-19

Signature: Digitaly signed by Giovanni Tangianu 2024-11-19T14:42:56.514Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Giovanni Tangianu
3.4 Activity code	MC Mechanical Completion	Date	2024-11-20
3.5 Action by	VND Vendor	Signature	Digitaly signed by Giovanni Tangianu 2024-11-20T13:28:10.791Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Name

Date

Signature

6- CLEARANCE APPROVAL

Name

Date

Signature

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000654

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000838	1.4 Discipline	Instrumental
1.2 Item	B400-EMCS-001	EMCS Cabinet	
1.3 Subsystem	87-00	Power Distribution System (EMCS)	

2 - OBSERVATION

Internal base plate will be installed after commissioning.

Name: Giovanni Tangianu

Date: 2024-11-20

Signature: Digitaly signed by Giovanni Tangianu 2024-11-20T14:03:18.956Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Giovanni Tangianu
3.4 Activity code	MC Mechanical Completion	Date	2024-11-20
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Giovanni Tangianu 2024-11-20T14:03:30.123Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Name

Date

Signature

6- CLEARANCE APPROVAL

Name

Date

Signature

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000220

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Instrumental
1.2 Item	B400-EMCS-001	EMCS Cabinet	
1.3 Subsystem	87-00	Power Distribution System (EMCS)	

2 - OBSERVATION

Install and connect disconnector switches Q10 and Q11 with rating 32A, with NO auxiliary contact

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Stefano Linari
3.4 Activity code	FAT factory acceptance test	Date	2024-10-14
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

INSTALLED

Name VENDOR YOKOGAWA

Date 2024-12-10

Signature Digitaly signed by VENDOR YOKOGAWA 2024-12-10T14:32:43.770Z

5 - CLEARANCE CHECK

INSTALLED

Name Stefano Linari

Date 2024-12-10

Signature Digitaly signed by Stefano Linari 2024-12-10T14:33:13.715Z

6- CLEARANCE APPROVAL

Name

Date

Signature



ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000221

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Instrumental
1.2 Item	B400-EMCS-001	EMCS Cabinet	
1.3 Subsystem	87-00	Power Distribution System (EMCS)	

2 - OBSERVATION

Install MCT frame “B” on roof

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	A PL A	Name	Stefano Linari
3.4 Activity code	FAT factory acceptance test	Date	2024-10-14
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

ACTIVITY DONE

Name YOKOGAWA

Date 2024-11-27

Signature Digitaly signed by YOKOGAWA 2024-11-27T15:32:29.144Z

5 - CLEARANCE CHECK

ACTIVITY DONE

Name Stefano Linari

Date 2024-11-27

Signature Digitaly signed by Stefano Linari 2024-11-27T15:32:43.193Z

6- CLEARANCE APPROVAL

Name

Date

Signature

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000336

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000583	1.4 Discipline	Electrical
1.2 Item	84305-CEL		AC UPS - PAS DB / EMCS -Controller and I/O Cabinet - Line A
1.3 Subsystem	87-00		Power Distribution System (EMCS)

2 - OBSERVATION

Plastic cable ties to be replaced on external routing. Cable needs to be fixed also on B-400 cable trays.

Name: Giovanni Tangianu

Date: 2024-11-08

Signature: Digitaly signed by Giovanni Tangianu 2024-11-08T10:59:58.786Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Giovanni Tangianu
3.4 Activity code	MC Mechanical Completion	Date	2024-11-08
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Giovanni Tangianu 2024-11-08T11:00:06.969Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

done

Name: Eleonora Carotenuto

Date: 2024-12-14

Signature: Digitaly signed by Eleonora Carotenuto 2024-12-14T09:55:53.916Z

6- CLEARANCE APPROVAL

Name

Date

Signature

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000337

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000584	1.4 Discipline	Electrical
1.2 Item	84306-CEL		AC UPS - PAS DB / EMCS -Controller and I/O Cabinet - Line B
1.3 Subsystem	87-00		Power Distribution System (EMCS)

2 - OBSERVATION

Plastic cable ties to be replaced on external routing. Cable needs to be fixed also on B-400 cable trays.

Name: Giovanni Tangianu

Date: 2024-11-08

Signature: Digitaly signed by Giovanni Tangianu 2024-11-08T12:36:12.518Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Giovanni Tangianu
3.4 Activity code	MC Mechanical Completion	Date	2024-11-08
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Giovanni Tangianu 2024-11-08T12:36:26.328Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

done

Name: Eleonora Carotenuto

Date: 2024-12-14

Signature: Digitaly signed by Eleonora Carotenuto 2024-12-14T09:56:04.421Z

6- CLEARANCE APPROVAL

Name

Date

Signature

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000341

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000584	1.4 Discipline	Electrical
1.2 Item	84306-CEL		AC UPS - PAS DB / EMCS -Controller and I/O Cabinet - Line B
1.3 Subsystem	87-00		Power Distribution System (EMCS)

2 - OBSERVATION

Missing cable tag inside/outside the Panel B400-SRV-001.

Name: Giovanni Tangianu

Date: 2024-11-08

Signature: Digitaly signed by Giovanni Tangianu 2024-11-08T13:05:00.593Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Giovanni Tangianu
3.4 Activity code	MC Mechanical Completion	Date	2024-11-08
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Giovanni Tangianu 2024-11-08T13:05:16.640Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Installed.

Name: Giovanni Tangianu

Date: 2025-01-31

Signature: Digitaly signed by Giovanni Tangianu 2025-01-31T10:48:46.285Z

6- CLEARANCE APPROVAL

Name

Date

Signature

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000373

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Instrumental
1.2 Item	B400-EMCS-001	EMCS Cabinet	
1.3 Subsystem	87-00	Power Distribution System (EMCS)	

2 - OBSERVATION

Install and connect disconnector switches Q10 and Q11 with the right rating 32A, with NO auxiliary contact

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Stefano Linari
3.4 Activity code	FAT factory acceptance test	Date	2024-10-14
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

Refer to punch number: C30000220

Name Lorenzo Novaga

Date 2024-12-07

Signature PROVERLIS Digitaly signed by Lorenzo Novaga 2024-12-07T09:58:04.969Z

6- CLEARANCE APPROVAL

Name

Date

Signature

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000374

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task		1.4 Discipline	Instrumental
1.2 Item	B400-EMCS-001	EMCS Cabinet	
1.3 Subsystem	87-00	Power Distribution System (EMCS)	

2 - OBSERVATION

Install MCT frame "B" on roof

Name

Date

Signature

3 - DEFECT ASSESSMENT

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	A PL A	Name	Stefano Linari
3.4 Activity code	FAT factory acceptance test	Date	2024-10-14
3.5 Action by		Signature	--- Proverlis --- Duplicata issued from database information Signature is on original form

4 - PERFORMED ACTION

ACTIVITY DONE

Name YOKOGAWA

Date 2024-11-27

Signature Digitaly signed by YOKOGAWA 2024-11-27T15:31:07.864Z

5 - CLEARANCE CHECK

ACTIVITY DONE

Name Stefano Linari

Date 2024-11-27

Signature Digitaly signed by Stefano Linari 2024-11-27T15:31:28.552Z

6- CLEARANCE APPROVAL

Name

Date

Signature

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000408

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000625	CPX09	1.4 Discipline	Electrical
1.2 Item	83106-CEL		Lighting & Small Power DB BoP / EMCS -Controller and I/O Cabinet - Auxiliary	
1.3 Subsystem	87-00		Power Distribution System (EMCS)	

2 - OBSERVATION

Plastic cable ties to be replaced on external routing

Name: Giovanni Tangianu

Date: 2024-11-08

Signature: Firma Digitale Sigura
Giovanni Tangianu
2024-11-08T09:42:00+0100

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Eleonora Carotenuto
3.4 Activity code	MC Mechanical Completion	Date	2024-11-09
3.5 Action by	RM Rosetti Marino Quality	Signature	Digitaly signed by Eleonora Carotenuto 2024-11-09T08:57:42.271Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Paolo Schintu

Date: 2025-02-26

Signature: Digitaly signed by Paolo Schintu
2025-02-26T12:39:30.438Z

6- CLEARANCE APPROVAL

Name

Date

Signature

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000409

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000625	CPX09	1.4 Discipline	Electrical
1.2 Item	83106-CEL		Lighting & Small Power DB BoP / EMCS -Controller and I/O Cabinet - Auxiliary	
1.3 Subsystem	87-00		Power Distribution System (EMCS)	

2 - OBSERVATION

Missing cable tag inside the panel DP-200N1 and on MCT (both side)

Name: Giovanni Tangianu

Date: 2024-11-08

Signature: Firma Digitale Sicura
Giovanni Tangianu
2024-11-08T09:44:57+0100

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Eleonora Carotenuto
3.4 Activity code	MC Mechanical Completion	Date	2024-11-09
3.5 Action by	PRE-COMM	Signature	Digitaly signed by Eleonora Carotenuto 2024-11-09T08:59:49.428Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Paolo Schintu

Date: 2025-02-26

Signature: Digitaly signed by Paolo Schintu
2025-02-26T12:39:39.745Z

6- CLEARANCE APPROVAL

Name

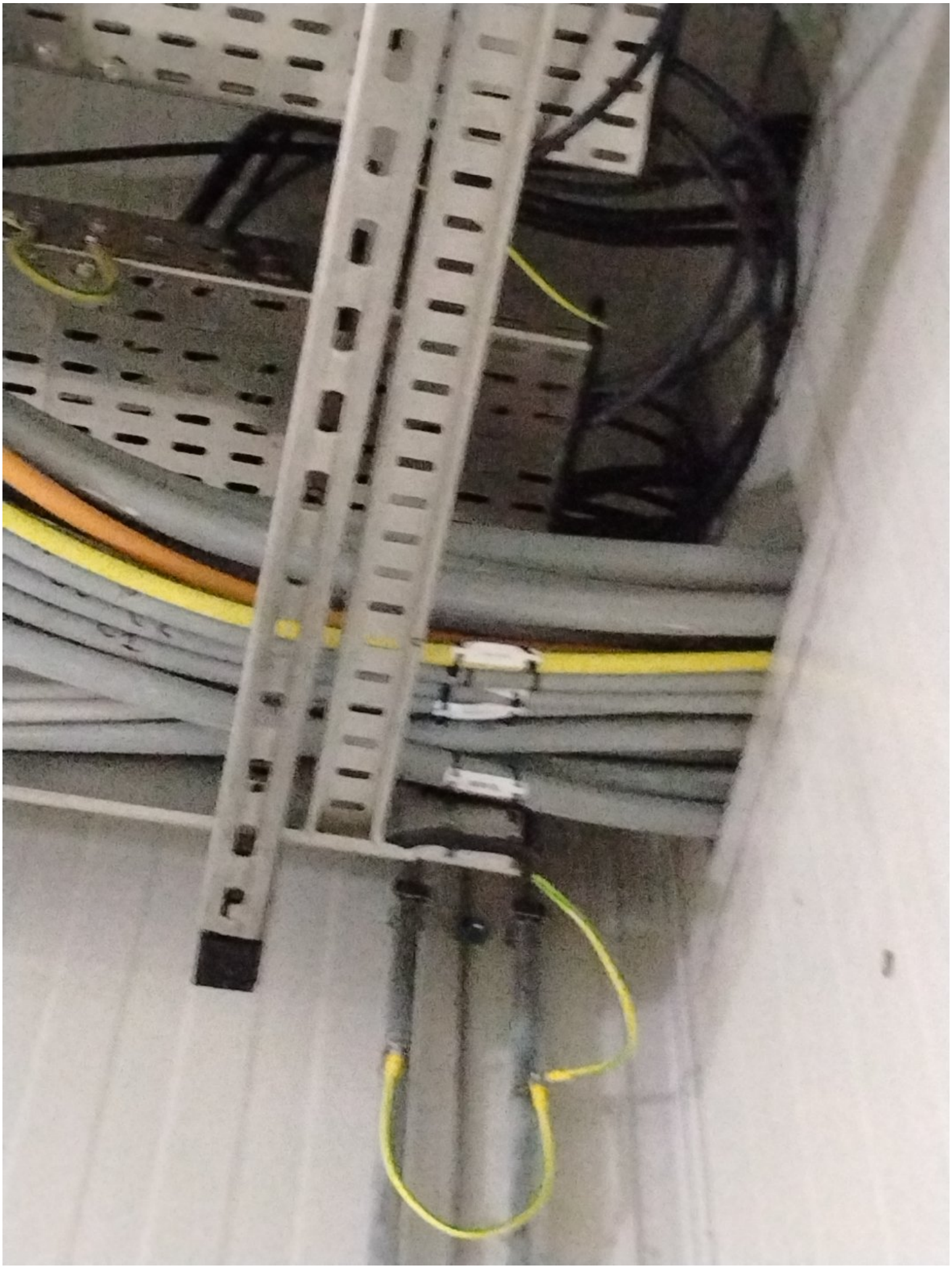
Date

Signature

2024-11-08 09:43 By Giovanni Tangianu



2024-11-08 09:44 By Giovanni Tangianu



ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000603

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000838	1.4 Discipline	Instrumental
1.2 Item	B400-EMCS-001	EMCS Cabinet	
1.3 Subsystem	87-00	Power Distribution System (EMCS)	

2 - OBSERVATION

Cleaning is required inside the panels.

Name: Giovanni Tangianu

Date: 2024-11-19

Signature: Digitaly signed by Giovanni Tangianu 2024-11-19T14:03:37.828Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Giovanni Tangianu
3.4 Activity code	MC Mechanical Completion	Date	2024-11-19
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Giovanni Tangianu 2024-11-19T14:04:00.286Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Done.

Name: Giovanni Tangianu

Date: 2024-12-28

Signature: Digitaly signed by Giovanni Tangianu 2024-12-28T08:54:33.631Z

6- CLEARANCE APPROVAL

Name

Date

Signature

ROSETTI MARINO CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000644

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000838	1.4 Discipline	Instrumental
1.2 Item	B400-EMCS-001	EMCS Cabinet	
1.3 Subsystem	87-00	Power Distribution System (EMCS)	

2 - OBSERVATION

24V/220V- plastic covers of cable tray inside the panel ,are not installed as per drawing.

Name: Giovanni Tangianu

Date: 2024-11-19

Signature: Digitaly signed by Giovanni Tangianu 2024-11-19T14:42:32.255Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Giovanni Tangianu
3.4 Activity code	MC Mechanical Completion	Date	2024-11-20
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Giovanni Tangianu 2024-11-20T13:27:18.256Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

Installed.

Name: Giovanni Tangianu

Date: 2025-03-03

Signature: Digitaly signed by Giovanni Tangianu 2025-03-03T10:44:26.008Z

6- CLEARANCE APPROVAL

Name

Date

Signature

ROSETTI MARINO
CROSSWIND

PUNCH ITEM ENTRY / CLEARANCE FORM

C30000647

PROVERLIS

1 -ELEMENT IDENTIFICATION

1.1 Task	C10000838	1.4 Discipline	Instrumental
1.2 Item	B400-EMCS-001	EMCS Cabinet	
1.3 Subsystem	87-00	Power Distribution System (EMCS)	

2 - OBSERVATION

Earthing cable need to be fix.

Name: Giovanni Tangianu

Date: 2024-11-20

Signature: Digitaly signed by Giovanni Tangianu 2024-11-20T13:52:06.532Z

3 - DEFECT ASSESSMENT

.

3.1 Corrective action proposal

3.2 Material required

3.3 Priority	B PL B	Name	Giovanni Tangianu
3.4 Activity code	MC Mechanical Completion	Date	2024-11-20
3.5 Action by	RM_CONSTR RM	Signature	Digitaly signed by Giovanni Tangianu 2024-11-20T13:52:19.027Z

4 - PERFORMED ACTION

Name

Date

Signature

5 - CLEARANCE CHECK

DONE

Name: Josip Krizanic

Date: 2025-02-27

Signature: Digitaly signed by Josip Krizanic 2025-02-27T15:42:49.945Z

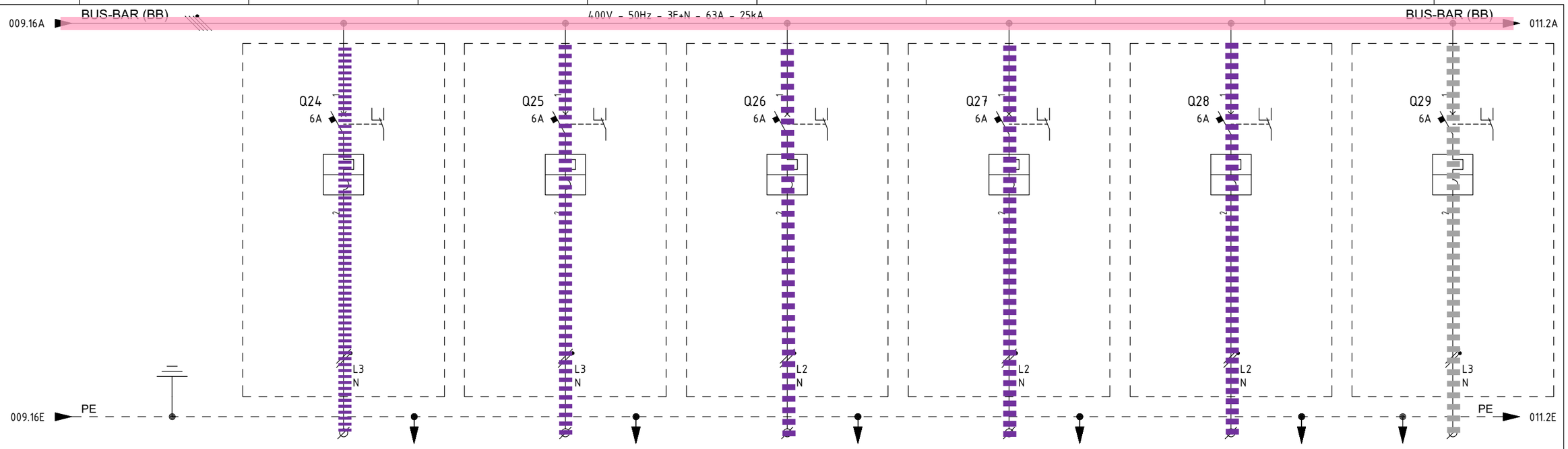
6- CLEARANCE APPROVAL

Name

Date

Signature

Section 3 SYSTEM,SUB-SYSTEM LIMIT DRAWINGS



ITEM			1	B400-PCS-001	B400-EMCS-001	B400-FGS-001	B400-NET-001	B400-SRV-001	CP-630E1
UTILITY			2	PCS-CONTROLLER AND I/O CABINET - AUXILIARY	EMCS-CONTROLLER AND I/O CABINET - AUXILIARY	FGS FIRE & GAS PANEL - AUXILIARY	SYSTEM SERVER / NETWORK CABINET - AUXILIARY	SERVER CABINET ITER - AUXILIARY	UCP - INSTRUMENT AIR PACKAGE -A-63000 - AUXILIARY
CUBICLE			3	+03	+03	+03	+03	+03	+03
RATED POWER | RATED CURRENT			4/5	0.5 KW | 2.72 A	0.5 KW | 2.72 A	0.8 KW | 4.35 A	0.5 KW | 2.72 A	0.5 KW | 2.72 A	0.5 KW | 2.72 A
TYPICAL FUNCTIONAL			6	-	-	-	-	-	-
CIRCUIT BREAKER (ABB)	TYPE		7	S302P-C6	S302P-C6	S302P-C6	S302P-C6	S302P-C6	S302P-C6
	VERSION		8	2P / MINIATURE	2P / MINIATURE	2P / MINIATURE	2P / MINIATURE	2P / MINIATURE	2P / MINIATURE
	TRIP UNITS		9	In=6A - Curve C	In=6A - Curve C	In=6A - Curve C	In=6A - Curve C	In=6A - Curve C	In=6A - Curve C
	Icu	KA	10	25kA	25kA	25kA	25kA	25kA	25kA
OVERLOAD	L	Range A	11	-	-	-	-	-	-
		Range t	12	-	-	-	-	-	-
SEL. SHORT-CIRCUIT	S	Range A	13	-	-	-	-	-	-
		Range t	14	-	-	-	-	-	-
INST. SHORT-CIRCUIT	I	Range A	15	-	-	-	-	-	-
		Range t	16	-	-	-	-	-	-
EARTH FAULT PROTECTION	G	Range A	17	-	-	-	-	-	-
		Range t	18	-	-	-	-	-	-
CONTACTOR (ABB)			19	-	-	-	-	-	-
THERMAL OVERLOAD RELAY (ABB)			20	-	-	-	-	-	-
SURGE ARRESTERS (DHENN)			21	-	-	-	-	-	-
TOROIDAL CURRENT TRANSFORMER (FRER)			22	-	-	-	-	-	-
FUSE HOLDER (ABB)			23	-	-	-	-	-	-
TWILIGHT SWITCH (ABB)			24	-	-	-	-	-	-
VOLTMETER (FRER)			25	-	-	-	-	-	-
CURRENT TRANSFORMER FOR MEASURE (FRER)	TYPE		26	-	-	-	-	-	-
	PERFORMANCE/CLASS		27	-	-	-	-	-	-
VOLTAGE TRANSFORMER FOR MEASURE (FRER)	TYPE		28	-	-	-	-	-	-
	PERFORMANCE/CLASS		29	-	-	-	-	-	-
POWER TERM. BLOCK (CABUR)		Type/mm²	30	SCREW / 4	SCREW / 4	SCREW / 4	SCREW / 4	SCREW / 4	SCREW / 4
POWER CONDUCTOR		mm²	31	3G2.5	3G2.5	3G2.5	3G2.5	3G2.5	3G2.5
				SUBSYSTEM 87-10	SUBSYSTEM 87-00	SUBSYSTEM 70-00	SUBSYSTEM 86-00	SUBSYSTEM 86-00	SUBSYSTEM 63-00

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
=					
+					
3	05/07/2024	Santinelli	Flamminio	Sigismondi	Accepted for construction (AFC)
2	24/04/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
1	15/03/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)
0	08/02/2024	Santinelli	Flamminio	Sigismondi	Issued for review (IFR)

IMESA ELECTRICAL ENGINEERING

DWG n° : 231298/SD/13

Item n° : PF1002888/101

CROSSWIND

ROSETTI MARINO

TITLE : "DP-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-00013

SHEET 010

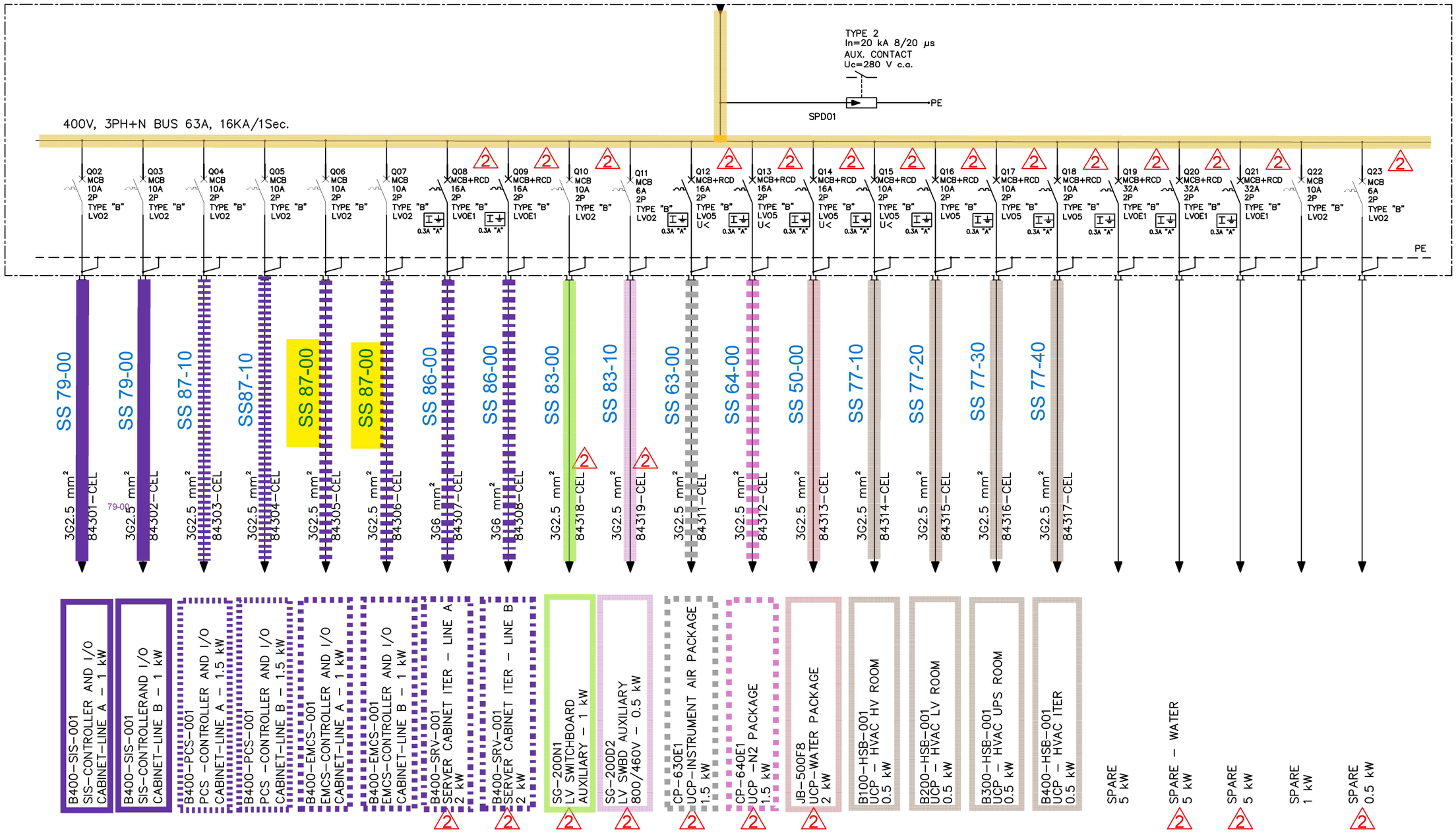
REV. 03

F.to UNI A3: 420mmx297mm

File Name : 1723002197-EL-DG-00013 Rev. 03

AC UPS – PAS SINGLE LINE DIAGRAM(UP–200F3) DISTRIBUTION BOARD DETAILS

AC UPS DISTRIBUTION BOARD–PAS
DP–200F3



REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	27/09/24	SAM	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	12/04/24	SAM	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	14/02/24	SAM	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL SINGLE LINE DIAGRAMS AC UPS SYSTEMS
AC UPS – PAS DISTRIBUTION BOARD SLD (UP–200F3)

CONTRACT NO./TITLE CW–I–WP4–2023–05/HOLLANDSE KUST NOORD WIND PARK | SCALE : 1:X

A3 | DRAWING NO. 123A90–DDL–EL–DG–20160 | SHEET 005 | REV. 02

File Name : 123A90–DDL–EL–DG–20160 Rev. 02

F.to UNI A3: 420mmx297mm

Section 4 MECHANICAL COMPLETION STATUS INDEX - BUILDING DISCIPLINE

NOT APPLICABLE

Section 5 MECHANICAL COMPLETION STATUS INDEX - ELECTRICAL DISCIPLINE

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

STATUS INDEX DETAIL

Filtered on subsystem: 87-00 & process: MC & discipline : E

Electrical	87-00 Power Distribution System (EMCS)						
ITEM		TASK					
Code	Description	Location	Code	Form	Progress	Date	Certificate
83106-CEL	Lighting & Small Power DB BoP / EMCS -Controller and I/O Cabinet - Auxiliary	ONSHORE	C10000625	CPX09	100	2024-11-09	RFC 1
84305-CEL	AC UPS - PAS DB / EMCS -Controller and I/O Cabinet - Line A	ONSHORE	C10000583	CPX09	100	2024-11-08	RFC 1
84306-CEL	AC UPS - PAS DB / EMCS -Controller and I/O Cabinet - Line B	ONSHORE	C10000584	CPX09	100	2024-11-08	RFC 1

ITEM	Tag	84305-CEL	: AC UPS - PAS DB / EMCS -Controller and I/O Cabinet - Line A		Dwg	123A90-DDL-EL-LIS-20148	
	S/Sys	87-00	: Power Distribution System (EMCS)		Module	LD_B-300/_LD-B-400	
TASK	code	C10000583	Location	Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	MC	Activity CCK	Discipline Electrical	Form	CPX09	LV Power Cable

CABLE DATA

Type Cu Cl.2/MGT/EPR/LSZH/GSWB/LSZH Cores/Size mm² 3G2.5 Color Orange

From DP-200F3 To B400-EMCS-001

1	Confirm cable is as specified in project cable schedule	OK
2	Visual Check cable physical integrity.	OK
3	Check is installed in accordance with layout drawing (segregation, distance…).	OK
4	Check cable is supported and fixed to rack according to project specification.	PL
5	Check bending radius is within the specified limits.	OK
6	Confirm cable glands suit for cable type, correctly mounted and tightened.	OK
7	Check gland plate for single core cables is non ferrous (non -magnetic).	NA
8	Confirm cable labelling is in accordance with specifications.	OK
9	Check cable is correctly loomed and segregated in accordance with specification.	OK
10	Check cable earthing against lastest drawings.	OK
11	Check cores marking are in accordance with termination diagram	OK
12	Check terminations are in accordance with latest termination diagram	OK
13	If required produce Red Line Mark Up for "AS BUILT"	

ROSETTI MARINO | PROVERLIS | CROSSWIND

ITEM	Tag	84305-CEL	: AC UPS - PAS DB / EMCS -Controller and I/O Cabinet - Line A			Dwg	123A90-DDL-EL-LIS-20148
	S/Sys	87-00	: Power Distribution System (EMCS)			Module	LD_B-300/_LD-B-400
TASK	code	C10000583		Location	Onshore Activities	User	Rosetti Marino Quality Control
FORM	Process	MC	Activity CCK	Discipline	Electrical	Form	CPX09 LV Power Cable

CONTINUITY				
5	CORE CONTINUITY Ω	PH 1	0.3	
6		PH 2	0.3	
7		PH 3	NA	
8	ARMOUR CONTINUITY Ω		0.4	
9	PROTECTIVE CONDUCTOR CONTINUITY Ω		0.3	
INSULATION				
10	CORES / ARMOUR+EARTH MΩ	PH1 / PH2-PH3-A-E	>999	
11		PH2 / PH1-PH3-A-E	>999	
12		PH3 / PH1-PH2-A-E	NA	
13	CABLE IS CORRECTLY RE-CONNECTED.		Yes	

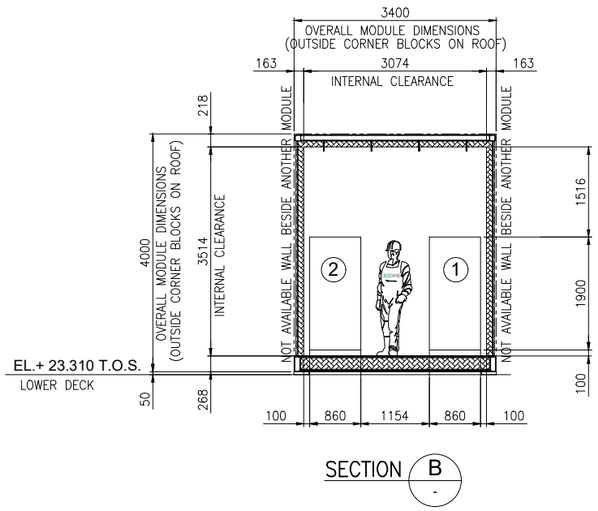
TESTING INSTRUMENTS USED			
TYPE / SERIAL N° :	MEGGER : KEW3125A SERIAL: W8330207	TYPE / SERIAL N° :	MULTIMETER: FLUKE 175 SERIAL:AW1/018(17140769)
Calibration certificate N° and date:	N°7722/24 _ 10/07/2024	Calibration certificate N° and date:	N°7715/24 _ 10/07/2024

Comments:

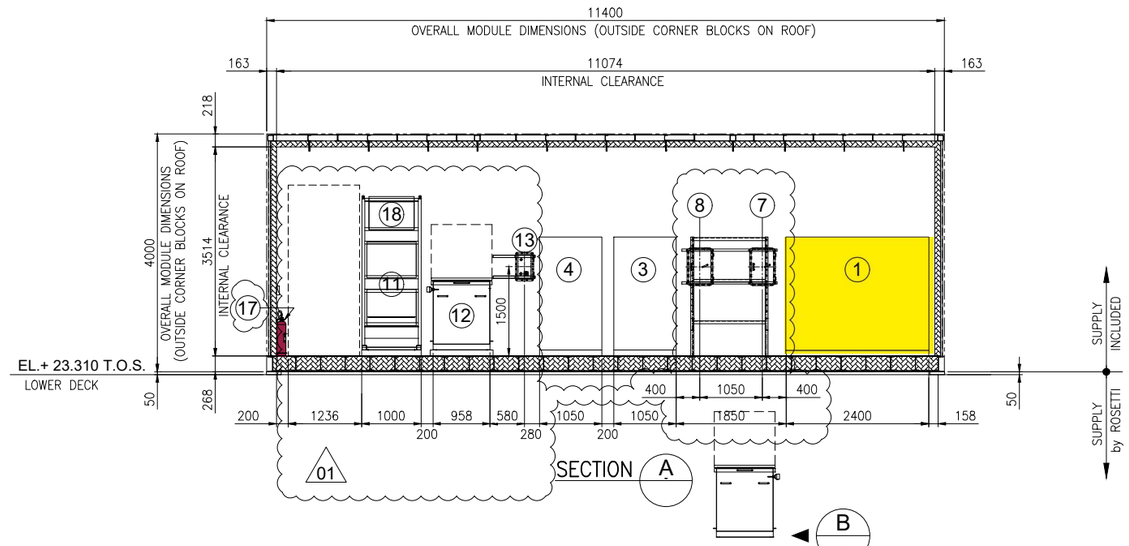
	Performed by	☉ WITNESS ☐ REVIEW	☐ WITNESS ☐ REVIEW
Company	ICS IMPIANTI	RM (Rosetti Marino)	
Name	Carmelo Bongiovanni	Giovanni Tangianu	
Date	2024-11-06	2024-11-08	
Signature	PROVERLIS Digitaly signed by Carmelo Bongiovanni 2024-11-06T17:13:20.215Z	PROVERLIS Digitaly signed by Giovanni Tangianu 2024-11-08T11:02:25.772Z	

DRAWING NO. 123A90-DDL-EL-DL-20106

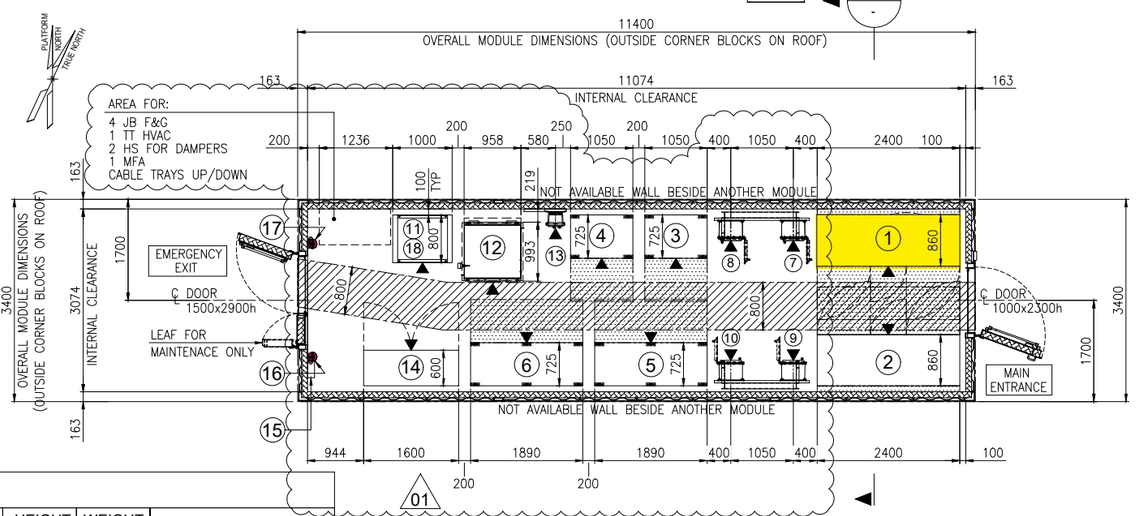
REV. 01



SECTION B



SECTION A



EQUIPMENT LAYOUT
"B-300" UPSs & BATTERIES SWITCHROOM
BOTTOM PLAN

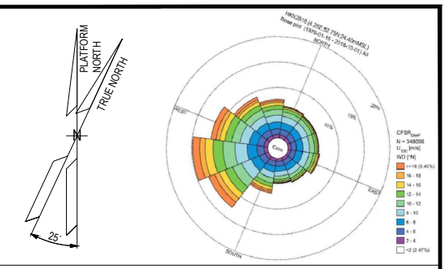
EQUIPMENT LIST

REF.	TAG No.	DESCRIPTION	LENGTH (mm)	WIDTH (mm)	HEIGHT (mm)	WEIGHT (Kg)	NOTES
1	UP-200F3	AC UPS 35kVA	2400	860	1915	2258	
2	UP-200F4	AC UPS 15kVA	2400	860	1915	2258	
3	BA-200F3A	BATTERY RACK GEL VRLA 7y AC UPS 35kVA	1050	725	1272	914	
4	BA-200F3B	BATTERY RACK GEL VRLA 7y AC UPS 35kVA	1050	725	1272	914	
5	BA-200F4A	BATTERY RACK GEL VRLA 7y AC UPS 15kVA	1890	725	1761	3429	
6	BA-200F4B	BATTERY RACK GEL VRLA 7y AC UPS 15kVA 01	1890	725	1761	3429	
7	CB-200F3A	ISOLATOR BOX AC UPS 35kVA	450	341	632	100	
8	CB-200F3B	ISOLATOR BOX AC UPS 35kVA	450	341	632	100	
9	CB-200F4A	ISOLATOR BOX AC UPS 15kVA	450	341	632	100	
10	CB-200F4B	ISOLATOR BOX AC UPS 15kVA	450	341	632	100	
11	NC-200F2	NAVAID PANEL 01	1000	800	2600	535	
12	BA-200F2	BATTERY BOX NAVAID	958	993	1210	1552	
13	CB-200F2	ISOLATOR BOX NAVAID	500	400	765	70	
14	B3000-HSB-001	DISTRIBUTION & HVAC PANEL - AC/UPS ROOM	1600	600	2300	1150	
15	-	EYE WASH STATION	228	80	290	5	
16	-	PORTABLE EXTINGUISHER (CO2) 5 Kg.	150	150	750	20	
17	-	PORTABLE EXTINGUISHER (CO2) 5 Kg.	150	150	750	20	
18	BC-200F2	BATTERY CHARGER NAVAID 01	-	-	-	-	INCLUDED IN THE RACK OF NC-200F2

VALID FOR CONSTRUCTION
FDL DWG: **123A90-FDL-EL-DL-20106**

REV.:	DATE:	SIGNATURE:
1_A	08/08/24	G.Randi

ROSETTI MARINO SpA



NOTES

01
1. U.N.O. ALL DIMENSIONS ARE IN MILLIMETERS.
2. EQUIPMENT DIMENSION ARE DEFINED ACCORDING TO THE LATEST DRAWING AND INFORMATION FROM THE VENDOR
3. DOCUMENT VALID ONLY FOR ELECTRICAL COMPONENT, FOR OTHER SCOPE LOCATION AND INFORMATION, PLEASE REFER TO VENDORS AND PROJECT DOCUMENTS.
   - "B-300" – GENERAL ARRANGEMENT DRAWING DOC. N. 1724000049-AR-DA-00016
   - "B-300" – DETAILED DRAWINGS DOC. N. 1724000049-AR-DD-00020

LEGEND

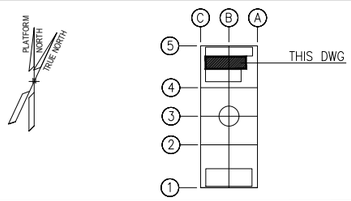
U.N.O. _____ UNLESS NOTED OTHERWISE
T.O.S. _____ TOP OF STEEL
_____ ESCAPE CORRIDOR – WIDTH 800mm.
_____ MAINTENANCE AREA – VENDOR REQUIREMENT
_____ SWITCHGEAR ROOM ENCLOUSURE
_____ FRONT OF EQUIPMENT

HOLDS

REFERENCE

DOCUMENT TITLE	DOCUMENT NUMBER
"B-300" GENERAL ARRANGEMENT DRAWING	1724000049-AR-DA-00016
"B-300" DETAILED DRAWINGS	1724000049-AR-DD-00020
"B-300" ARCHITECTURAL GENERAL LAYOUT PLAN, WIEW, SECTIONS & TYP. DETAILS	123A90-DDL-AR-DL-10022
PLOT PLAN – LOWER & UPPER DECK	123A90-DDL-PP-DL-70070

KEY PLAN



REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
01	23/07/24	SAM	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	28/03/24	SAM	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

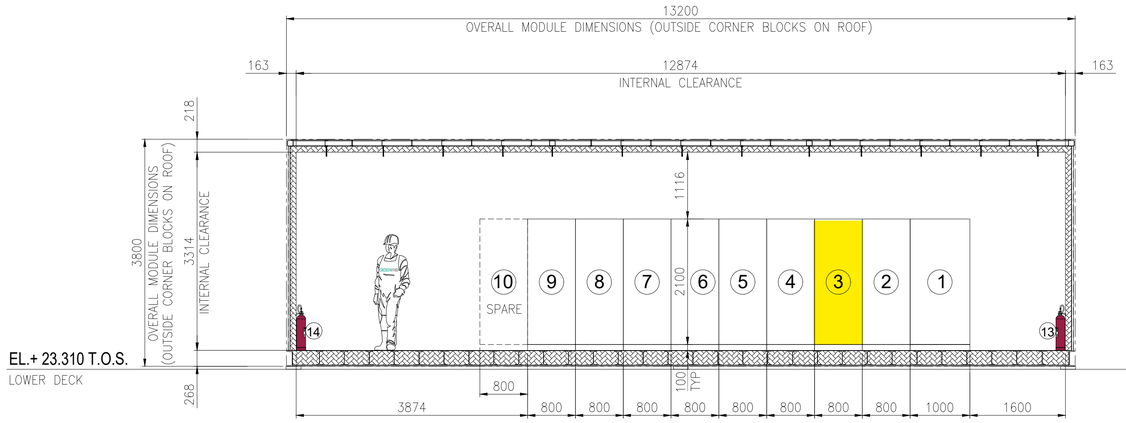
CROSSWIND | ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL EQUIPMENT LAYOUT
UPSs & BATTERIES SWITCHROOM

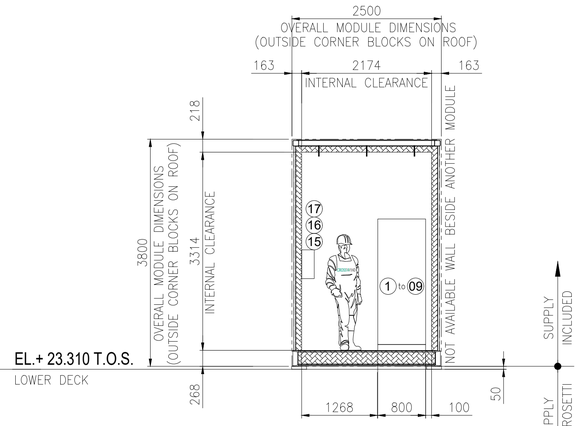
CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE 1:50
DRAWN SAM | CHECKED FMA/AMA | APPROVED FPA/DLO | DATE 23/07/24
A1 | DRAWING NO. 123A90-DDL-EL-DL-20106 | SHEET 001 | REV. 01

File Name : 123A90-DDL-EL-DL-20106 Rev.00.dwg

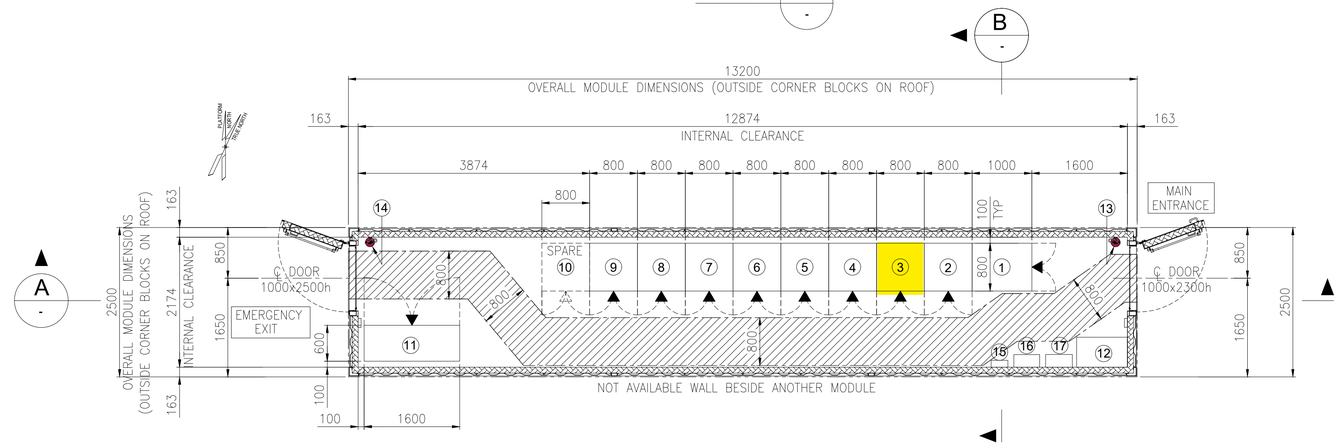
DRAWING NO. 123A90-DDL-IN-DL-40012 REV. 03



SECTION A -



SECTION B -

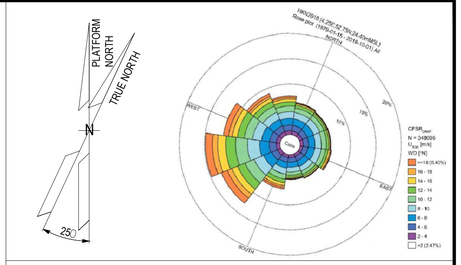


EQUIPMENT LAYOUT
"B-400" I&T EQUIPMENT ROOM
BOTTOM PLAN

EQUIPMENT LIST

REF.	TAG No.	DESCRIPTION	LENGTH (mm)	WIDTH (mm)	HEIGHT (mm)	NOTE
1	B400-SRV-001	SERVER CABINET	1000	800	2100	
2	B400-NET-001	NETWORK CABINET	800	800	2100	
3	B400-EMCS-001	EMCS SYSTEM CABINET	800	800	2100	
4	B400-PCS-002	PCS MARSHALLING CABINET	800	800	2100	
5	B400-PCS-001	PCS SYSTEM CABINET	800	800	2100	
6	B400-FGS-003	FGS MARSHALLING CABINET 2	800	800	2100	
7	B400-FGS-002	FGS MARSHALLING CABINET 1	800	800	2100	
8	B400-FGS-001	FGS SYSTEM CABINET	800	800	2100	
9	B400-SIS-001	SIS SYSTEM/MARSHALLING CABINET	800	800	2100	
10	-	SPARE				
11	B400-HSB-001	DISTRIBUTION & HVAC PANEL - I&T ROOM	1600	600	2300	
12	-	TABLE	850	500	750	
13	-	PORTABLE EXTINGUISHER (CO2) 5 Kg.	150	150	750	
14	-	PORTABLE EXTINGUISHER (CO2) 5 Kg.	150	150	750	
15	-	FIRST AID KIT	280	115	200	
16	-	RESUSCITATION UNIT	430	210	480	
17	-	CABINET INCLUDED N.10 ESCAPE MASK	448	213	422	

03



NOTES

1. U.N.O. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DOCUMENT VALID ONLY FOR INSTRUMENT COMPONENT, FOR OTHER SCOPE LOCATION AND INFORMATION, PLEASE REFER TO VENDORS AND PROJECT DOCUMENTS.

LEGEND

U.N.O. _____ UNLESS NOTED OTHERWISE
T.O.S. _____ TOP OF STEEL
_____ ESCAPE CORRIDOR – WIDTH 800mm.
_____ EQUIPMENT ROOM ENCLOUSURE
_____ FRONT OF EQUIPMENT

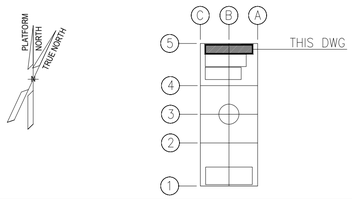
HOLDS

.

REFERENCE

DOCUMENT TITLE	DOCUMENT NUMBER
Control System Architecture Detailed Drawings	123A90-DDL-IN-DD-40096
Data Network Architecture Drawings	123A90-DDL-IN-DD-40019
Earthing layouts drawings (CCR, ITER)	123A90-DDL-IN-DL-40013
Instrument and Telecom MCT Layout – Lower Deck	123A90-DDL-IN-DL-40086
"B-400" I&T Equipment Room – Architectural Layout	123A90-DDL-AR-DL-10015
"B-400" ARCHITECTURAL GENERAL LAYOUT PLAN, WIEW, SECTIONS & TYP. DETAILS	123A90-DDL-AR-DL-10015
"B-400" GENERAL ARRANGEMENT DRAWING	1724000049-AR-DA-00017
"B-400" GENERAL ARRANGEMENT DRAWING	1724000049-AR-DD-00021
"B-400" HVAC SYSTEM G.A. and DETAILS	1724000049-HV-DA-00067

KEY PLAN



REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
03	04/10/24	VBA	LCA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
02	27/05/24	MGA	LCA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	22/01/24	VBA	LCA	DLO	ISSUE FOR REVIEW (IFR)
00	07/11/23	VBA	LCA	DLO	ISSUE FOR REVIEW (IFR)

CROSSWIND | ROSETTI MARINO

VALID FOR CONSTRUCTION
FDL DWG: **123A90-FDL-IN-DL-40012**

REV.:	DATE:	SIGNATURE:
3_A	07/10/24	G.Randi

ROSETTI MARINO SpA

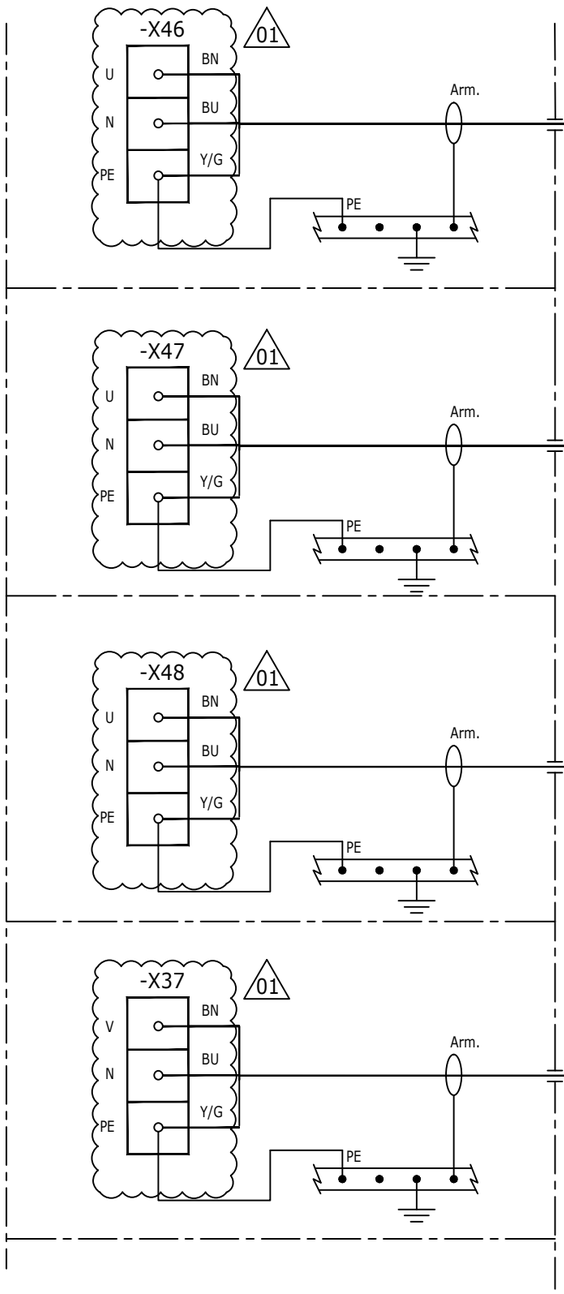
TITLE : BASE LOAD POWER HUB (BLPH)
OFF-SHORE ITER
EQUIPMENT LAYOUT

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE 1:33,3
DRAWN MGA | CHECKED LCA | APPROVED DLO | DATE 27/05/24
A1 | DRAWING NO. 123A90-DDL-IN-DL-40012 | SHEET 001 | REV. 03

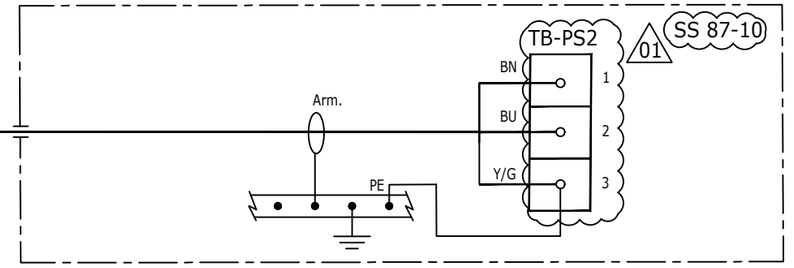
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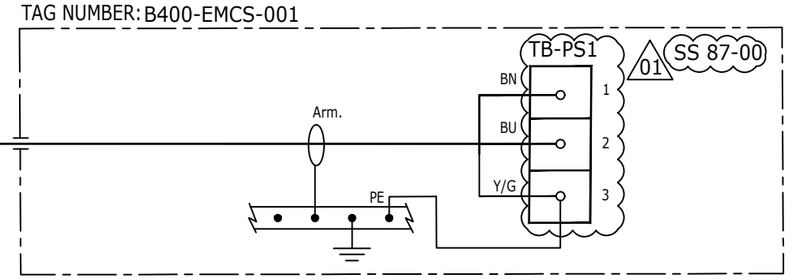
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TAG NUMBER: DP-200F3



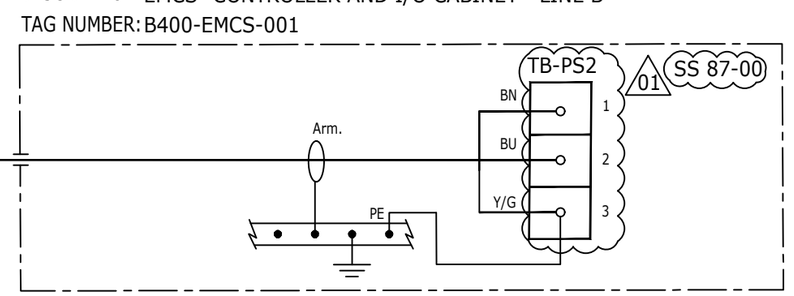
DESCRIPTION: PCS -CONTROLLER AND I/O CABINET - LINE B
TAG NUMBER: B400-PCS-001



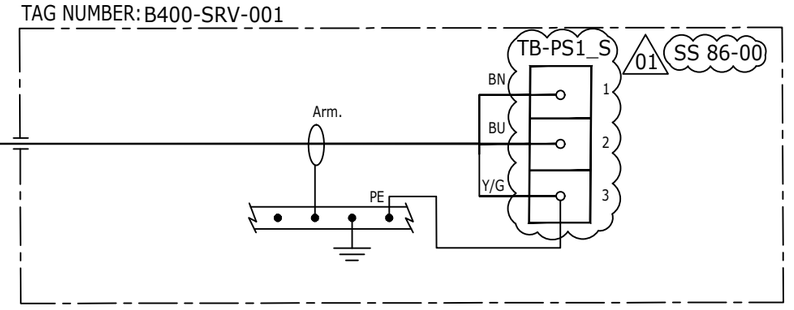
DESCRIPTION: EMCS -CONTROLLER AND I/O CABINET - LINE A
TAG NUMBER: B400-EMCS-001



DESCRIPTION: EMCS -CONTROLLER AND I/O CABINET - LINE B
TAG NUMBER: B400-EMCS-001



DESCRIPTION: SERVER CABINET ITER - LINE A
TAG NUMBER: B400-SRV-001



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

REV.:	DATE:	SIGNATURE:
1_A	17/10/24	G.Randi

ROSETTI MARINO SpA

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
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
AC UPS – PAS DB DP–200F3

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

SCALE : 1:X

A3

DRAWING NO. 123A90–DDL–EL–DG–20149

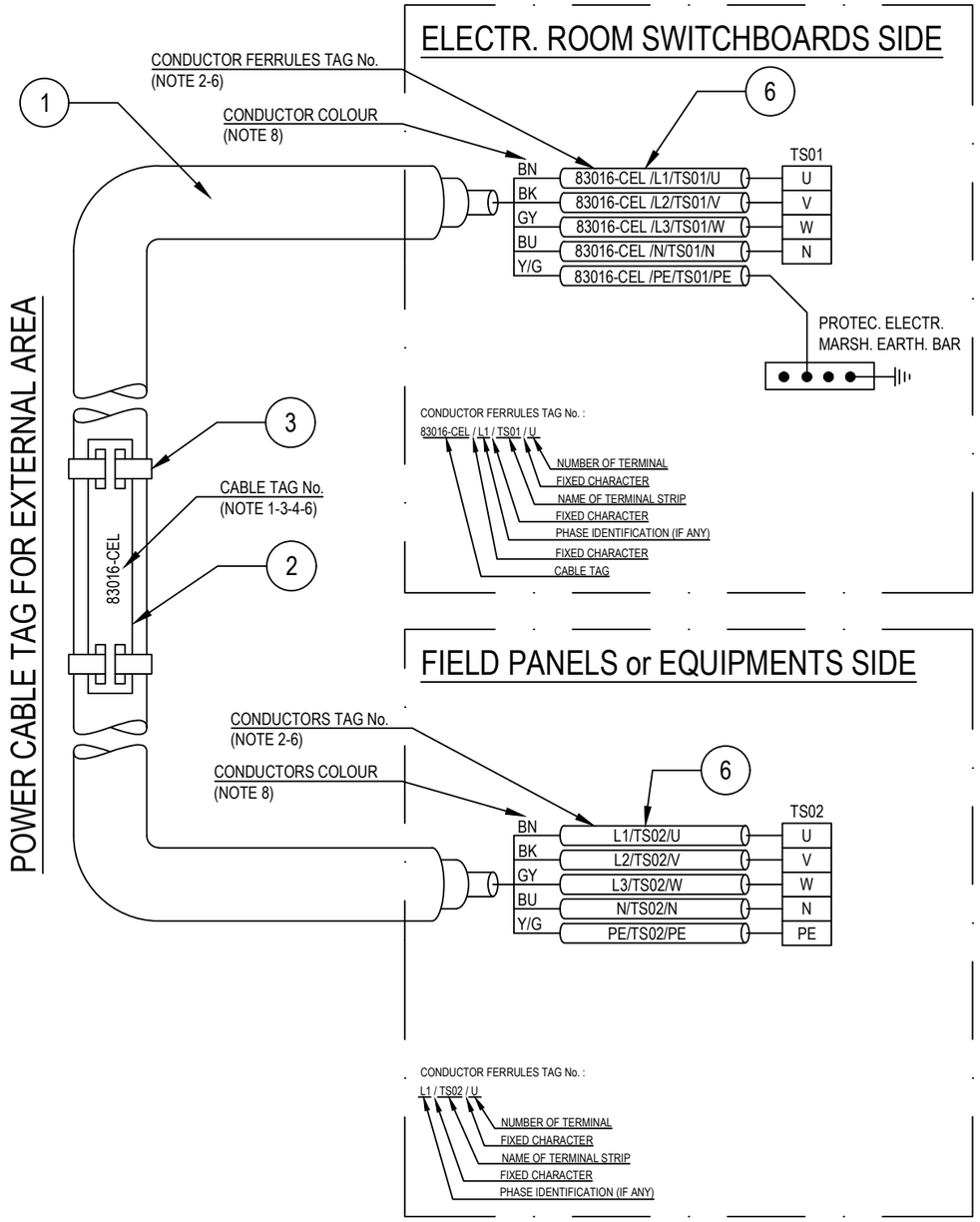
SHEET 039

REV. 01

F.to UNI A3: 420mmx297mm

File Name : 123A90–DDL–EL–DG–20162 Rev. 01

C02



POS.	DESCRIPTION	MATERIAL	SIZE	Q.TY	NOTE
1	UNARMOURED CABLE				
2	CABLE TAG FOR EXTERNAL AREA	HDG/SS			NOTE 1 NOTE 4
3	TIE FOR CABLE TAG IN EXTERNAL AREA	HDG/SS			
4	CABLE TAG FOR INTERNAL AREA	PVC			NOTE 1 NOTE 5
5	TIE FOR CABLE TAG IN INTERNAL AREA	NYLON 6.6			
6	CORE FERRULES	PVC			

NOTES:

1) ALL CABLES SHALL BE IDENTIFIED AT EACH TERMINATION AND EACH SIDE OF ANY OBSTACLE (E.G. CABLE TRANSIT ON WALLS INSIDE SHELTER AND FLOOR DECK CROSSING, BY THEIR RESPECTIVE TAGS/NUMBERS, AS INDICATED ON THE CABLE SCHEDULE.
CABLE IDENTIFICATION SHALL BE ALSO DONE BELOW AND IN THE SWITCHBOARD CABLE COMPARTMENT.

2) CABLE CORE FERRULES SHALL BE FITTED AT EVERY TERMINATION. THESE FERRULES SHALL BE OF ENGRAVED PLASTIC SLIP ON, INTERLOCKED AND SELF GRIP TYPE.

3) ON CABLE TRAYS OR LADDERS, CABLES SHALL BE IDENTIFIED AT EACH END, AND EVERY 25 METERS.

4) THE CABLE TAG FOR EXTERNAL AREA SHALL DONE BY 316L STAINLESS STEEL LABELS, TAG (H=5mm) SHALL BE LASER PRINTED PREFERABLY OR EMBOSSED, LABEL HELD BY TWO 316L STAINLESS STEEL TIES.

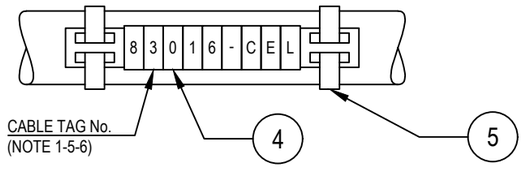
5) THE CABLE TAG FOR INTERNAL AREA SHALL BE DONE BY ENGRAVED PLASTIC SLIP ON CHARACTERS ONTO PLASTIC TIE, BLACK LETTER (H=5mm) ON WHITE.

6) CABLE AND CONDUCTOR TAG ARE INDICATIVE ONLY.

7) WITHIN TECHNICAL BUILDING, PROTECTIVE CONDUCTOR SHALL BE TAGGED BETWEEN FOLLOWING ITEMS:
- PANEL (SWITCHBOARD, SWITCHGEAR, DISTRIBUTION BOARD, ETC) AND EARTH BAR
- EARTH BAR AND EARTH BOSS

8) ONLY IF NECESSARY, SHRINK TUBES OF THE APPROPRIATE COLOR WILL BE INSTALLED TO COVER THE WRONG CONDUCTOR COLOR, THIS WILL BE PERFORMED IN EACH SIDE OF THE CABLES WHERE NECESSARY.

POWER CABLE TAG FOR INTERNAL AREA



VALID FOR CONSTRUCTION
FDL DWG: 123A90-FDL-EL-DD-20092
REV.: 2_A | DATE: 28/08/24 | SIGNATURE: G.Randi
ROSETTI MARINO SpA

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	28/08/24	GRA	AMA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	04/07/24	NLK	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	21/11/23	SPS	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL TYPICAL INSTALLATION DETAILS-POWER SYSTEM & CABLE INSTALLATION
CABLES INSTALLATION SYSTEM IDENTIFICATION FOR POWER CABLES

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

A3 | DRAWING NO. 123A90-DDL-EL-DD-20092 | SHEET 007 | REV. 02

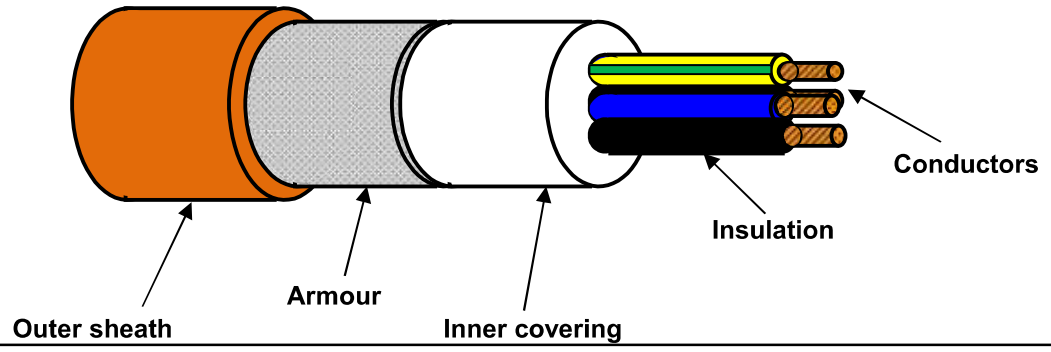
F.to UNI A3: 420mmx297mm

File Name : 123A90-DDL-EL-DD-20092 REV.02.DWG

Tag Number	Category	Discipline	Eng Status	NativeDoc	Parent Tag	Main Function	Secondary Function	Area	From Tag	From Main Function	From Area	To Tag	To Main Function	To Area	Material ID	Material Desc.	Gland Standar	From Gland	From Entry	From Fitting	To Gland	To Entry	To Fitting	Routing	Routing Manual
84305-CEL	Cable	EL	VFC	123A90-DDL-EL-LIS-20148					DP-200F3	AC UPS 35 kVA Distribution Board	Lower Deck (B-300)	B400-EMCS-001	EMCS Cabinet	Lower Deck (B-400)	ELECV19-3G2,5	Cable Cu Cl.2/MGT/EPR/LSZH/GSWB/LSZH 0,6/1kV 3G2,5mm² - Orange	M20	T2_M20_D ouble			n.a.				L-450-101-LVT-040 / L-600-101 LVT-036 / L-600-101-LVT-038 / L-600-101-LVT-035 / E-MCT-302 / L-450-101-LVT-005 / L-600-101-LVT-010 / L-750-101-LVT-015 / L-300-101-LVT-007 / E-MCT-402 / L-300-101-LVT-065 / L-300-101-LVT-066 / L-300-101-LVT-067 / L-150-101-LVT-149

Cu Cl.2/MGT/EPR/LSZH/GSWB/LSZH 0,6/1 KV

3G2,5 - L.V. POWER CABLE - Fire Resistant & Flame Retardant - ARMOURED



TECHNICAL FEATURES

Conductors :	**STRANDED** plain/bare annealed copper wires	IEC 60228 Class 2
Insulation :	Mica/Glass Tape (MGT) plus EPR compound, quality to IEC 60092.360, Nominal Thickness 1,0 mm	
Cores colour code :	**Brown - Blue - Yellow/Green**	
Pair Assembling :	Not required	
Pair Wrapping:	Not required	
Drain wire :	Not required	
Pair Shield :	Not required	
Shield Insulation :	Not Required	
Total Assembling :	Cores layed up with optimal lay length	
Overall Wrapping:	Not required	
Drain wire :	Not required	
Overall Shield:	Not required	
Inner covering :	Extruded LSZH compound, Average Thickness 1,0 mm	
Inner covering color code:	**Black or Natural**	
Armour :	**Galvanized Steel Wire Braid Armour (coverage ≥ 90%)**	
Outer sheath :	Extruded LSZH Thermoplastic Compound (O.I. ≥ 30%), type **SHF1** to IEC 60093.360, Average Thickness 1,3 mm	
Outer sheath color code:	**Orange**	
Outer printing (INKJET) :	**FLEI - ELECTRIC CABLE - 1000V - 3G2,5 SQMM - MGT/EPR/LSZH/GSWB/LSZH - 0,6/1 KV - IEC 60331.21 - IEC 60332.1.2 - IEC 60332.3.22 - Year of Manufacture - CE + Meter Marking**	
Under Armour diameter :	(11,7 ± 10%) mm	
Over Armour diameter :	(12,9 ± 10%) mm	
Outer diameter :	(15,5 ± 10%) mm	
Bending radius :	cable outer diameter x 10	(in fixed installation)
Voltage test :	3,5 kV a.c. for 5' (Between Cores - Armour)	
Conductors DC Resistance :		IEC 60228 Class 2
Insulation Resistance :	≥ 940 MΩ x Km (@ 20°C)	
Applicable Standards		
Design Guidelines :	**IEC 60092.353**	
ON COMPLETE CABLE		
Fire Resistant test :	**IEC 60331.21**	
Flame Retardant test :	IEC 60332.1.2 - IEC 60332.3.22	
Acid Gas generation :	IEC 60754.1/2	
Smoke density/Light Transmittance	IEC 61034.2 (LT ≥ 60%)	
Temperature Range :		
ON INSULATION	(max +90°C)	(max continuous operation temperature of conductors)
	(max +250°C)	(max conductors temperature during short-circuit for 5 seconds)
ON COMPLETE CABLE		
During Operation :	(-20°C up to +90°C)	(in fixed installation)
During installation :	(- 5°C up to +50°C)	
Note :	**To meet the requirements of installation and use in Zone 1 & Zone 2 (IEC 60079-14) and "Gas & Vapour Tight" the cable must be provided with Penetrating Inner covering together with correct ATEX approved equipment or accessories.**	

Office	Date	Sign	Rev.	Date	Sign
Drawn by :	29/03/2024	Messa			
Checked :	29/03/2024	Spaccasassi			
Approved :	29/03/2024	Cucinotta			

The data provided, lending assent for the treatment, will be used to the sense of the article 13 of of the Regulation (UE) 2016/679, also through outsiders, in order to allow the realization of the fulfilments informatives, administrative, commercial and accounting related to the contractual relationship. Integral copy of the informative could be requested at our offices.

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ITEM	Tag	84306-CEL	: AC UPS - PAS DB / EMCS -Controller and I/O Cabinet - Line B		Dwg	123A90-DDL-EL-LIS-20148	
	S/Sys	87-00	: Power Distribution System (EMCS)		Module	LD_B-300/LD_B-400	
TASK	code	C10000584	Location	Onshore Activities	User	Rosetti Marino Quality Control	
FORM	Process	MC	Activity CCK	Discipline Electrical	Form	CPX09	LV Power Cable

CABLE DATA

Type Cu Cl.2/MGT/EPR/LSZH/GSWB/LSZH Cores/Size mm² 3G2.5 Color Orange

From DP-200F3 To B400-EMCS-001

1	Confirm cable is as specified in project cable schedule	OK
2	Visual Check cable physical integrity.	OK
3	Check is installed in accordance with layout drawing (segregation, distance…).	OK
4	Check cable is supported and fixed to rack according to project specification.	PL
5	Check bending radius is within the specified limits.	OK
6	Confirm cable glands suit for cable type, correctly mounted and tightened.	OK
7	Check gland plate for single core cables is non ferrous (non -magnetic).	NA
8	Confirm cable labelling is in accordance with specifications.	OK
9	Check cable is correctly loomed and segregated in accordance with specification.	OK
10	Check cable earthing against lastest drawings.	OK
11	Check cores marking are in accordance with termination diagram	OK
12	Check terminations are in accordance with latest termination diagram	OK
13	If required produce Red Line Mark Up for "AS BUILT"	

REFER TO FINAL SHEET FOR ACCEPTANCE

ROSETTI MARINO PROVERLIS CROSSWIND

ITEM	Tag	84306-CEL	: AC UPS - PAS DB / EMCS -Controller and I/O Cabinet - Line B			Dwg	123A90-DDL-EL-LIS-20148
	S/Sys	87-00	: Power Distribution System (EMCS)			Module	LD_B-300/LD_B-400
TASK	code	C10000584	Location	Onshore Activities		User	Rosetti Marino Quality Control
FORM	Process	MC	Activity CCK	Discipline	Electrical	Form CPX09	LV Power Cable

CONTINUITY				
5	CORE CONTINUITY Ω	PH 1	0,4	
6		PH 2	0,4	
7		PH 3	NA	
8	ARMOUR CONTINUITY Ω		0,4	
9	PROTECTIVE CONDUCTOR CONTINUITY Ω		0,4	
INSULATION				
10	CORES / ARMOUR+EARTH MΩ	PH1 / PH2-PH3-A-E	>999	
11		PH2 / PH1-PH3-A-E	>999	
12		PH3 / PH1-PH2-A-E	NA	
13	CABLE IS CORRECTLY RE-CONNECTED.		Yes	

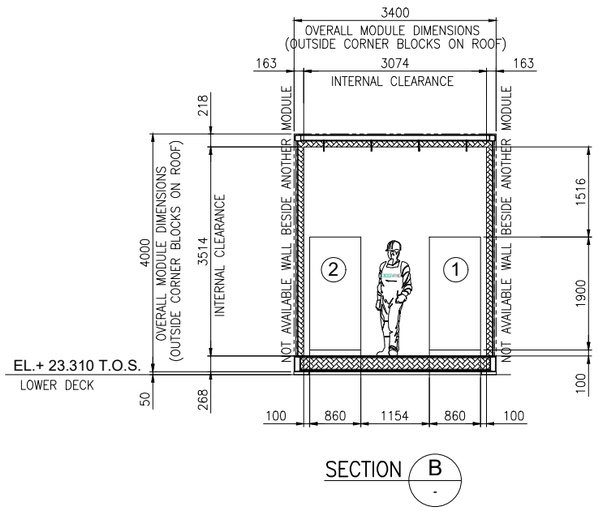
TESTING INSTRUMENTS USED			
TYPE / SERIAL N° :	MEGGER : KEW3125A SERIAL: W8330207	TYPE / SERIAL N° :	MULTIMETER: FLUKE 175 SERIAL:AW1/018(17140769)
Calibration certificate N° and date:	N°7722/24 _ 10/07/2024	Calibration certificate N° and date:	N°7715/24 _ 10/07/2024

Comments:

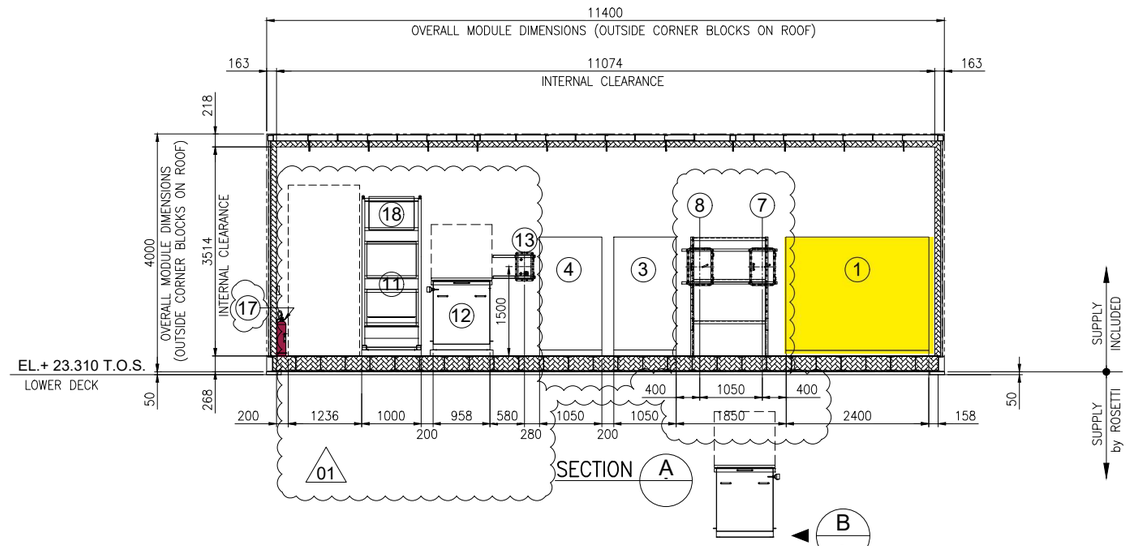
	Performed by	● WITNESS ☐ REVIEW	☐ WITNESS ☐ REVIEW
Company	ICS IMPIANTI	RM (ROSETTI MARINO)	
Name	Carmelo Bongiovanni	Giovanni Tangianu	
Date	2024-11-06	2024-11-08	
Signature	PROVERLIS Digitaly signed by Carmelo Bongiovanni 2024-11-06T17:13:36.750Z	PROVERLIS Digitaly signed by Giovanni Tangianu 2024-11-08T12:47:38.633Z	

DRAWING NO. 123A90-DDL-EL-DL-20106

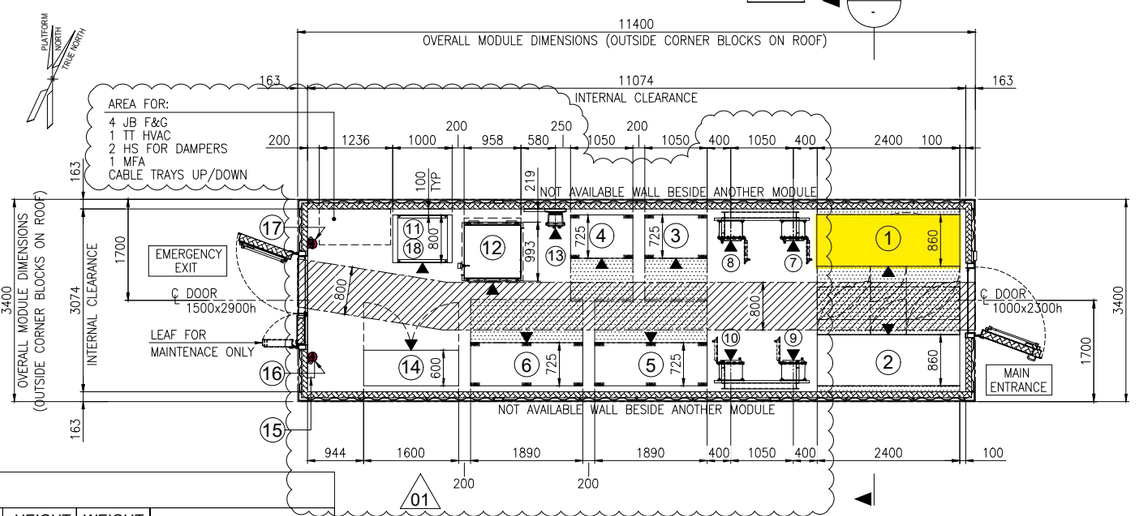
REV. 01



SECTION B



SECTION A



EQUIPMENT LAYOUT
"B-300" UPSs & BATTERIES SWITCHROOM
BOTTOM PLAN

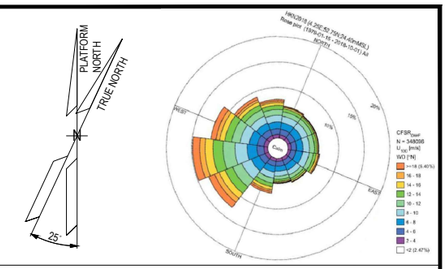
EQUIPMENT LIST

REF.	TAG No.	DESCRIPTION	LENGTH (mm)	WIDTH (mm)	HEIGHT (mm)	WEIGHT (Kg)	NOTES
1	UP-200F3	AC UPS 35kVA	2400	860	1915	2258	
2	UP-200F4	AC UPS 15kVA	2400	860	1915	2258	
3	BA-200F3A	BATTERY RACK GEL VRLA 7y AC UPS 35kVA	1050	725	1272	914	
4	BA-200F3B	BATTERY RACK GEL VRLA 7y AC UPS 35kVA	1050	725	1272	914	
5	BA-200F4A	BATTERY RACK GEL VRLA 7y AC UPS 15kVA	1890	725	1761	3429	
6	BA-200F4B	BATTERY RACK GEL VRLA 7y AC UPS 15kVA 01	1890	725	1761	3429	
7	CB-200F3A	ISOLATOR BOX AC UPS 35kVA	450	341	632	100	
8	CB-200F3B	ISOLATOR BOX AC UPS 35kVA	450	341	632	100	
9	CB-200F4A	ISOLATOR BOX AC UPS 15kVA	450	341	632	100	
10	CB-200F4B	ISOLATOR BOX AC UPS 15kVA	450	341	632	100	
11	NC-200F2	NAVAID PANEL 01	1000	800	2600	535	
12	BA-200F2	BATTERY BOX NAVAID	958	993	1210	1552	
13	CB-200F2	ISOLATOR BOX NAVAID	500	400	765	70	
14	B3000-HSB-001	DISTRIBUTION & HVAC PANEL - AC/UPS ROOM	1600	600	2300	1150	
15	-	EYE WASH STATION	228	80	290	5	
16	-	PORTABLE EXTINGUISHER (CO2) 5 Kg.	150	150	750	20	
17	-	PORTABLE EXTINGUISHER (CO2) 5 Kg.	150	150	750	20	
18	BC-200F2	BATTERY CHARGER NAVAID 01	-	-	-	-	INCLUDED IN THE RACK OF NC-200F2

VALID FOR CONSTRUCTION
FDL DWG: **123A90-FDL-EL-DL-20106**

REV.:	DATE:	SIGNATURE:
1_A	08/08/24	G.Randi

ROSETTI MARINO SpA



NOTES

01
1. U.N.O. ALL DIMENSIONS ARE IN MILLIMETERS.
2. EQUIPMENT DIMENSION ARE DEFINED ACCORDING TO THE LATEST DRAWING AND INFORMATION FROM THE VENDOR
3. DOCUMENT VALID ONLY FOR ELECTRICAL COMPONENT, FOR OTHER SCOPE LOCATION AND INFORMATION, PLEASE REFER TO VENDORS AND PROJECT DOCUMENTS.
   - "B-300" – GENERAL ARRANGEMENT DRAWING DOC. N. 1724000049-AR-DA-00016
   - "B-300" – DETAILED DRAWINGS DOC. N. 1724000049-AR-DD-00020

LEGEND

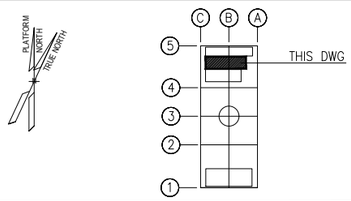
U.N.O. _____ UNLESS NOTED OTHERWISE
T.O.S. _____ TOP OF STEEL
_____ ESCAPE CORRIDOR – WIDTH 800mm.
_____ MAINTENANCE AREA – VENDOR REQUIREMENT
_____ SWITCHGEAR ROOM ENCLOUSURE
_____ FRONT OF EQUIPMENT

HOLDS

REFERENCE

DOCUMENT TITLE	DOCUMENT NUMBER
"B-300" GENERAL ARRANGEMENT DRAWING	1724000049-AR-DA-00016
"B-300" DETAILED DRAWINGS	1724000049-AR-DD-00020
"B-300" ARCHITECTURAL GENERAL LAYOUT PLAN, WIEW, SECTIONS & TYP. DETAILS	123A90-DDL-AR-DL-10022
PLOT PLAN – LOWER & UPPER DECK	123A90-DDL-PP-DL-70070

KEY PLAN



REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
01	23/07/24	SAM	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	28/03/24	SAM	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

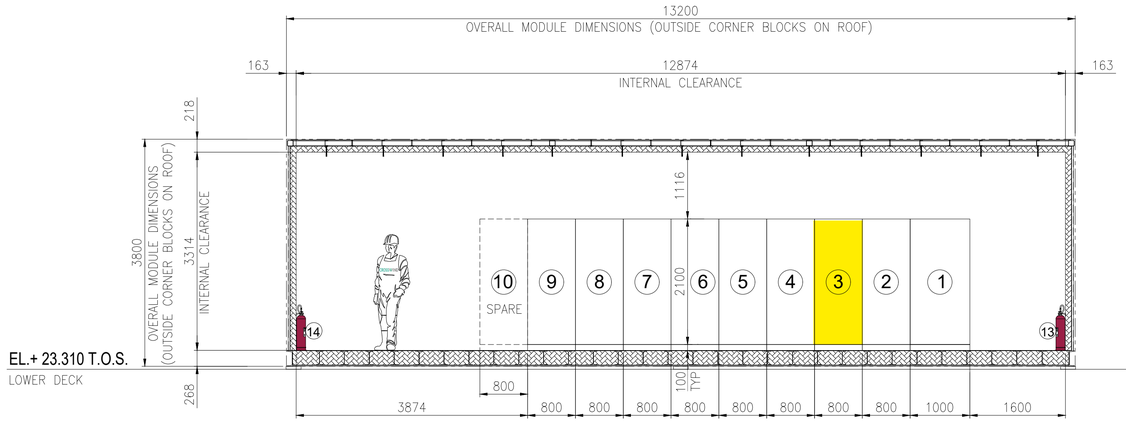
CROSSWIND | ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL EQUIPMENT LAYOUT
UPSs & BATTERIES SWITCHROOM

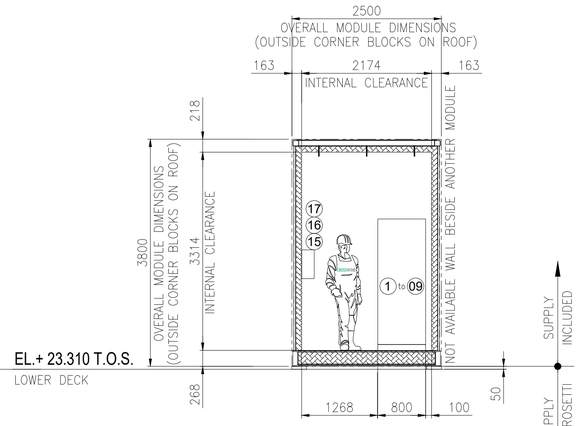
CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE 1:50
DRAWN SAM | CHECKED FMA/AMA | APPROVED FPA/DLO | DATE 23/07/24
A1 | DRAWING NO. 123A90-DDL-EL-DL-20106 | SHEET 001 | REV. 01

File Name : 123A90-DDL-EL-DL-20106 Rev.00.dwg

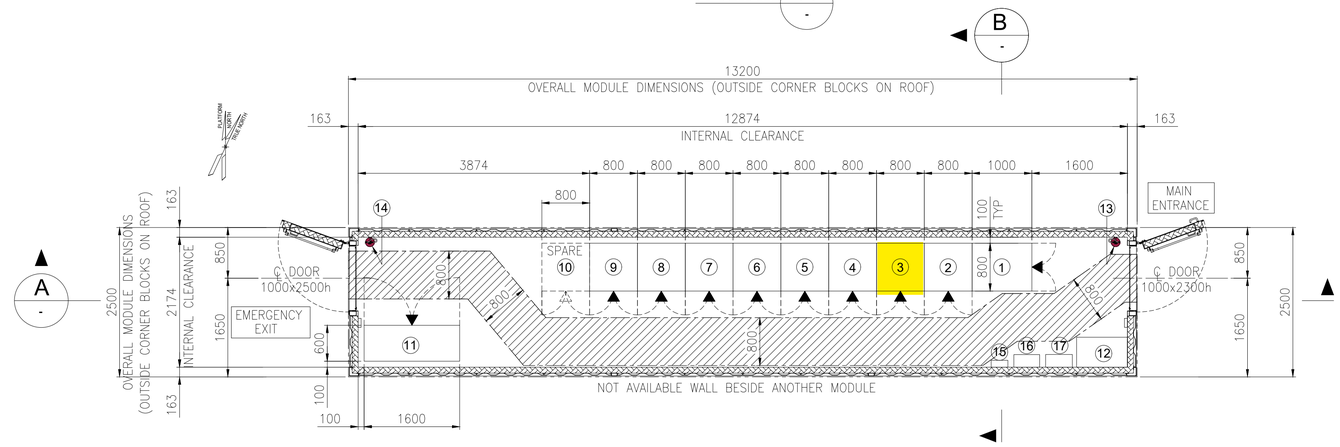
DRAWING NO. 123A90-DDL-IN-DL-40012 REV. 03



SECTION A -



SECTION B -

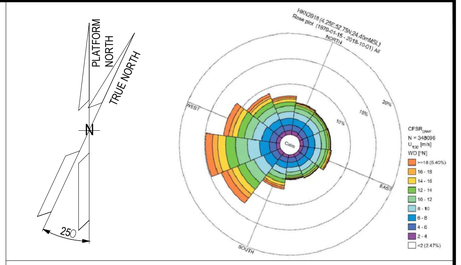


EQUIPMENT LAYOUT
"B-400" I&T EQUIPMENT ROOM
BOTTOM PLAN

EQUIPMENT LIST

REF.	TAG No.	DESCRIPTION	LENGTH (mm)	WIDTH (mm)	HEIGHT (mm)	NOTE
1	B400-SRV-001	SERVER CABINET	1000	800	2100	
2	B400-NET-001	NETWORK CABINET	800	800	2100	
3	B400-EMCS-001	EMCS SYSTEM CABINET	800	800	2100	
4	B400-PCS-002	PCS MARSHALLING CABINET	800	800	2100	
5	B400-PCS-001	PCS SYSTEM CABINET	800	800	2100	
6	B400-FGS-003	FGS MARSHALLING CABINET 2	800	800	2100	
7	B400-FGS-002	FGS MARSHALLING CABINET 1	800	800	2100	
8	B400-FGS-001	FGS SYSTEM CABINET	800	800	2100	
9	B400-SIS-001	SIS SYSTEM/MARSHALLING CABINET	800	800	2100	
10	-	SPARE				
11	B400-HSB-001	DISTRIBUTION & HVAC PANEL - I&T ROOM	1600	600	2300	
12	-	TABLE	850	500	750	
13	-	PORTABLE EXTINGUISHER (CO2) 5 Kg.	150	150	750	
14	-	PORTABLE EXTINGUISHER (CO2) 5 Kg.	150	150	750	
15	-	FIRST AID KIT	280	115	200	
16	-	RESUSCITATION UNIT	430	210	480	
17	-	CABINET INCLUDED N.10 ESCAPE MASK	448	213	422	

03



NOTES

1. U.N.O. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DOCUMENT VALID ONLY FOR INSTRUMENT COMPONENT, FOR OTHER SCOPE LOCATION AND INFORMATION, PLEASE REFER TO VENDORS AND PROJECT DOCUMENTS.

LEGEND

U.N.O. _____ UNLESS NOTED OTHERWISE
T.O.S. _____ TOP OF STEEL
_____ ESCAPE CORRIDOR – WIDTH 800mm.
_____ EQUIPMENT ROOM ENCLOUSURE
_____ FRONT OF EQUIPMENT

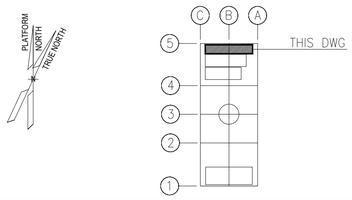
HOLDS

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REFERENCE

DOCUMENT TITLE	DOCUMENT NUMBER
Control System Architecture Detailed Drawings	123A90-DDL-IN-DD-40096
Data Network Architecture Drawings	123A90-DDL-IN-DD-40019
Earthing layouts drawings (CCR, ITER)	123A90-DDL-IN-DL-40013
Instrument and Telecom MCT Layout – Lower Deck	123A90-DDL-IN-DL-40086
"B-400" I&T Equipment Room – Architectural Layout	123A90-DDL-AR-DL-10015
"B-400" ARCHITECTURAL GENERAL LAYOUT PLAN, WIEW, SECTIONS & TYP. DETAILS	123A90-DDL-AR-DL-10015
"B-400" GENERAL ARRANGEMENT DRAWING	1724000049-AR-DA-00017
"B-400" GENERAL ARRANGEMENT DRAWING	1724000049-AR-DD-00021
"B-400" HVAC SYSTEM G.A. and DETAILS	1724000049-HV-DA-00067

KEY PLAN



REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
03	04/10/24	VBA	LCA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
02	27/05/24	MGA	LCA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	22/01/24	VBA	LCA	DLO	ISSUE FOR REVIEW (IFR)
00	07/11/23	VBA	LCA	DLO	ISSUE FOR REVIEW (IFR)

CROSSWIND | ROSETTI MARINO

VALID FOR CONSTRUCTION
FDL DWG: **123A90-FDL-IN-DL-40012**

REV.:	DATE:	SIGNATURE:
3_A	07/10/24	G.Randi

ROSETTI MARINO SpA

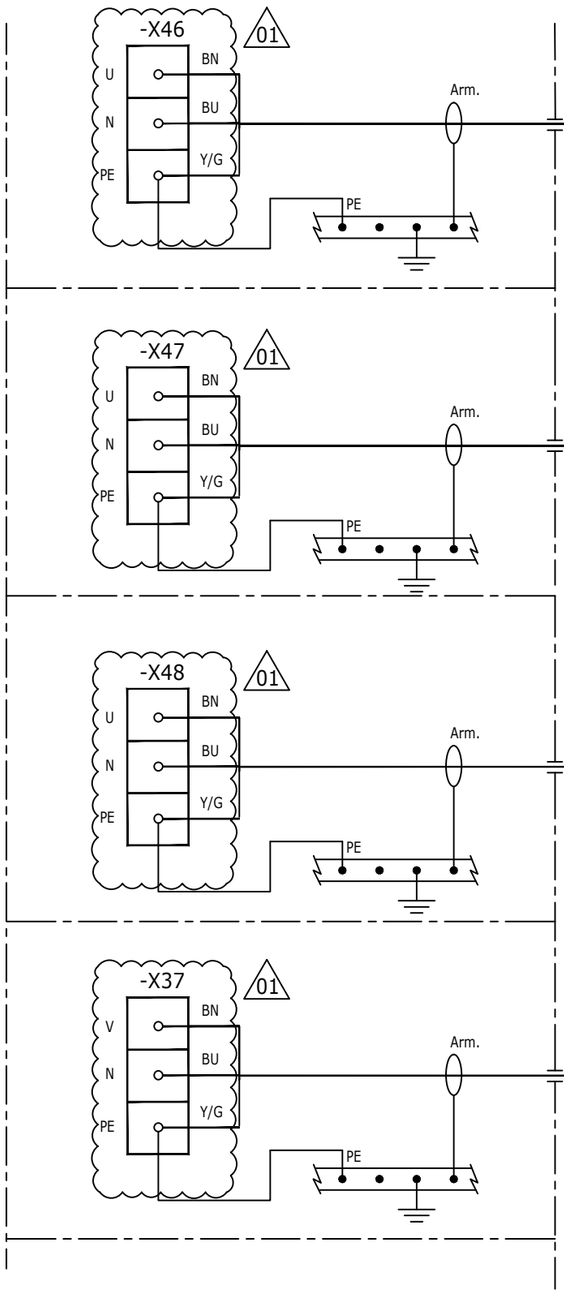
TITLE : BASE LOAD POWER HUB (BLPH)
OFF-SHORE ITER
EQUIPMENT LAYOUT

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE 1:33,3
DRAWN MGA | CHECKED LCA | APPROVED DLO | DATE 27/05/24
A1 | DRAWING NO. 123A90-DDL-IN-DL-40012 | SHEET 001 | REV. 03

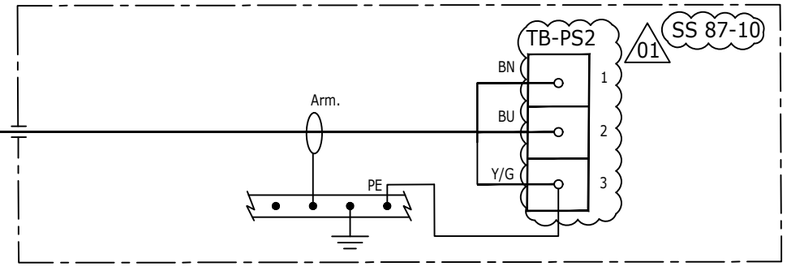
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FROM	TO

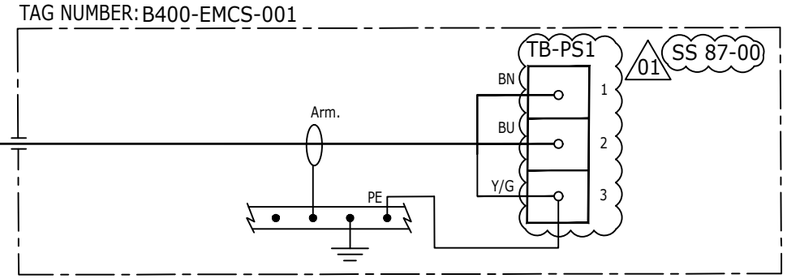
DESCRIPTION: AC UPS - PAS DB
TAG NUMBER: DP-200F3



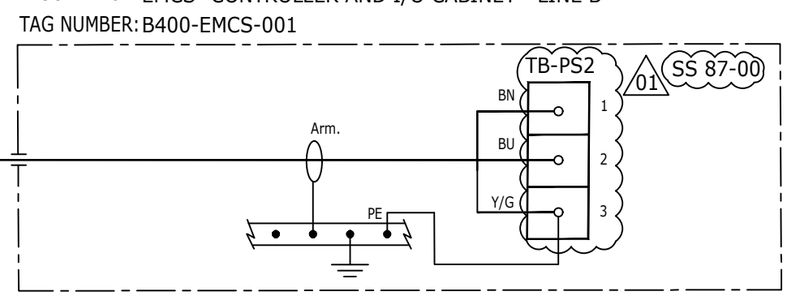
DESCRIPTION: PCS -CONTROLLER AND I/O CABINET - LINE B
TAG NUMBER: B400-PCS-001



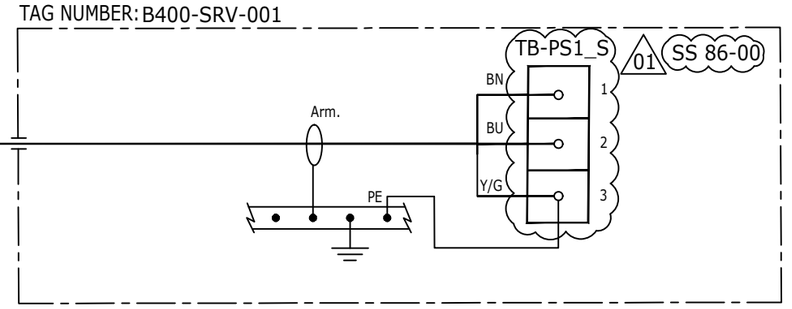
DESCRIPTION: EMCS -CONTROLLER AND I/O CABINET - LINE A
TAG NUMBER: B400-EMCS-001



DESCRIPTION: EMCS -CONTROLLER AND I/O CABINET - LINE B
TAG NUMBER: B400-EMCS-001



DESCRIPTION: SERVER CABINET ITER - LINE A
TAG NUMBER: B400-SRV-001



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

REV.:	DATE:	SIGNATURE:
1_A	17/10/24	G.Randi

ROSETTI MARINO SpA

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
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
AC UPS – PAS DB DP–200F3

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

SCALE : 1:X

A3

DRAWING NO. 123A90–DDL–EL–DG–20149

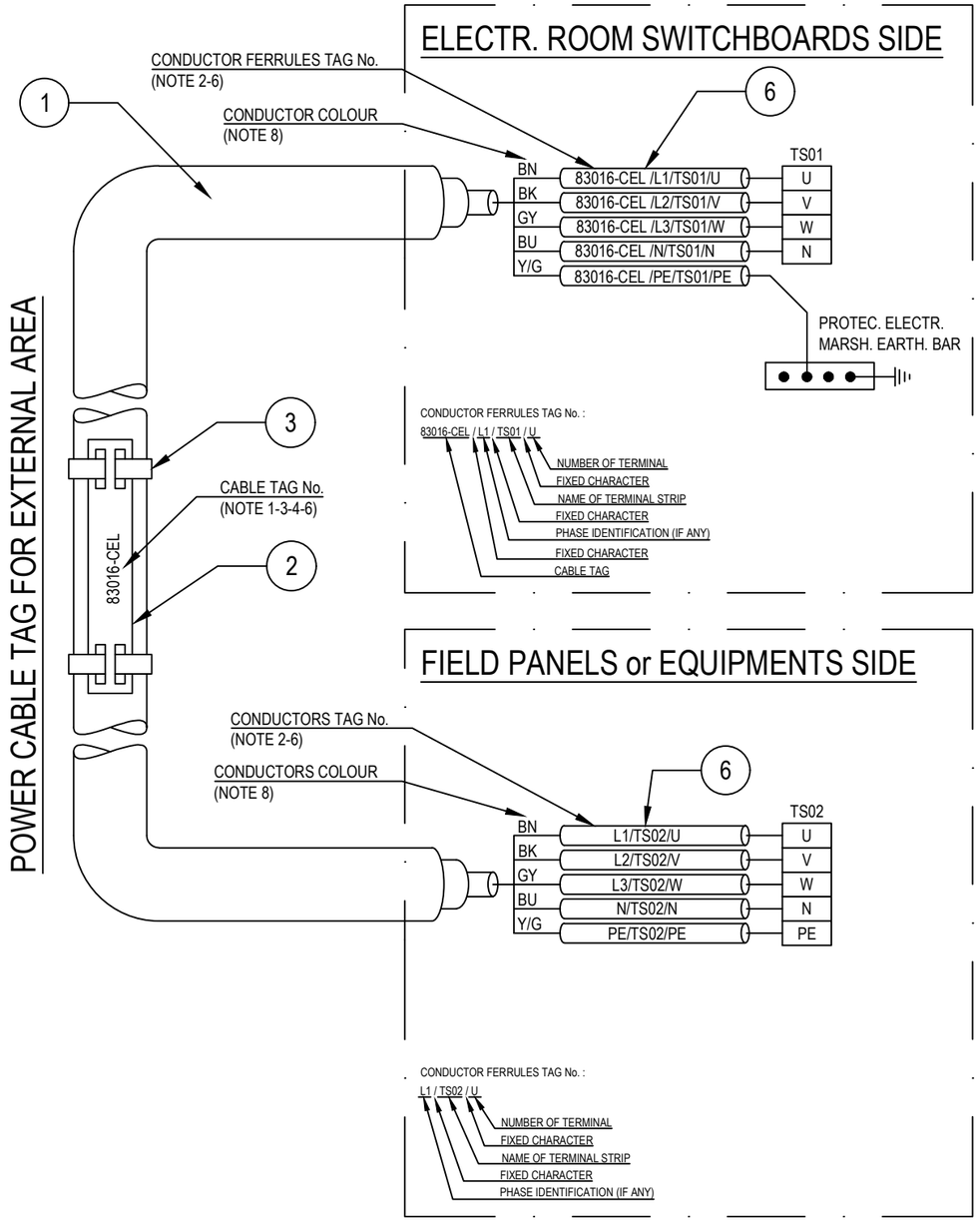
SHEET 039

REV. 01

F.to UNI A3: 420mmx297mm

File Name : 123A90–DDL–EL–DG–20162 Rev. 01

C02



POS.	DESCRIPTION	MATERIAL	SIZE	Q.TY	NOTE
1	UNARMOURED CABLE				
2	CABLE TAG FOR EXTERNAL AREA	HDG/SS			NOTE 1 NOTE 4
3	TIE FOR CABLE TAG IN EXTERNAL AREA	HDG/SS			
4	CABLE TAG FOR INTERNAL AREA	PVC			NOTE 1 NOTE 5
5	TIE FOR CABLE TAG IN INTERNAL AREA	NYLON 6.6			
6	CORE FERRULES	PVC			

NOTES:

1) ALL CABLES SHALL BE IDENTIFIED AT EACH TERMINATION AND EACH SIDE OF ANY OBSTACLE (E.G. CABLE TRANSIT ON WALLS INSIDE SHELTER AND FLOOR DECK CROSSING, BY THEIR RESPECTIVE TAGS/NUMBERS, AS INDICATED ON THE CABLE SCHEDULE.
CABLE IDENTIFICATION SHALL BE ALSO DONE BELOW AND IN THE SWITCHBOARD CABLE COMPARTMENT.

2) CABLE CORE FERRULES SHALL BE FITTED AT EVERY TERMINATION. THESE FERRULES SHALL BE OF ENGRAVED PLASTIC SLIP ON, INTERLOCKED AND SELF GRIP TYPE.

3) ON CABLE TRAYS OR LADDERS, CABLES SHALL BE IDENTIFIED AT EACH END, AND EVERY 25 METERS.

4) THE CABLE TAG FOR EXTERNAL AREA SHALL DONE BY 316L STAINLESS STEEL LABELS, TAG (H=5mm) SHALL BE LASER PRINTED PREFERABLY OR EMBOSSED, LABEL HELD BY TWO 316L STAINLESS STEEL TIES.

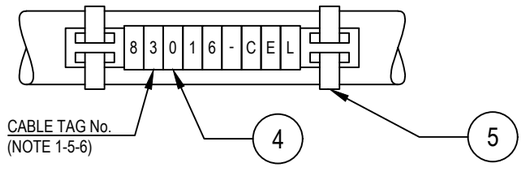
5) THE CABLE TAG FOR INTERNAL AREA SHALL BE DONE BY ENGRAVED PLASTIC SLIP ON CHARACTERS ONTO PLASTIC TIE, BLACK LETTER (H=5mm) ON WHITE.

6) CABLE AND CONDUCTOR TAG ARE INDICATIVE ONLY.

7) WITHIN TECHNICAL BUILDING, PROTECTIVE CONDUCTOR SHALL BE TAGGED BETWEEN FOLLOWING ITEMS:
- PANEL (SWITCHBOARD, SWITCHGEAR, DISTRIBUTION BOARD, ETC) AND EARTH BAR
- EARTH BAR AND EARTH BOSS

8) ONLY IF NECESSARY, SHRINK TUBES OF THE APPROPRIATE COLOR WILL BE INSTALLED TO COVER THE WRONG CONDUCTOR COLOR, THIS WILL BE PERFORMED IN EACH SIDE OF THE CABLES WHERE NECESSARY.

POWER CABLE TAG FOR INTERNAL AREA



VALID FOR CONSTRUCTION
FDL DWG: 123A90-FDL-EL-DD-20092
REV.: 2_A | DATE: 28/08/24 | SIGNATURE: G.Randi
ROSETTI MARINO SpA

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	28/08/24	GRA	AMA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	04/07/24	NLK	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	21/11/23	SPS	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL TYPICAL INSTALLATION DETAILS-POWER SYSTEM & CABLE INSTALLATION
CABLES INSTALLATION SYSTEM IDENTIFICATION FOR POWER CABLES

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

A3 | DRAWING NO. 123A90-DDL-EL-DD-20092 | SHEET 007 | REV. 02

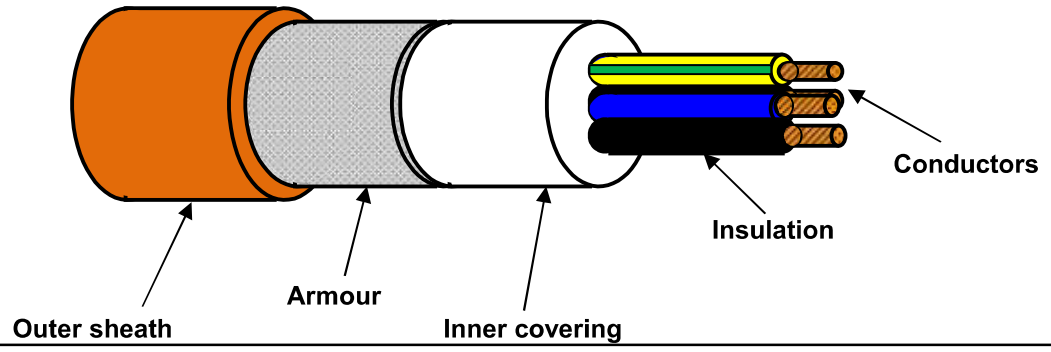
F.to UNI A3: 420mmx297mm

File Name : 123A90-DDL-EL-DD-20092 REV.02.DWG

Tag Number	Category	Discipline	Eng Status	NativeDoc	Parent Tag	Main Function	Secondary Function	Area	From Tag	From Main Function	From Area	To Tag	To Main Function	To Area	Material ID	Material Desc.	Gland Standar	From Gland	From Entry	From Fitting	To Gland	To Entry	To Fitting	Routing	Routing Manual
84306-CEL	Cable	EL	VFC	123A90-DDL-EL-LIS-20148					DP-200F3	AC UPS 35 kVA Distribution Board	Lower Deck (B-300)	B400-EMCS-001	EMCS Cabinet	Lower Deck (B-400)	ELECV19-3G2,5	Cable Cu Cl.2/MGT/EPR/LSZH/GSWB/LSZH 0,6/1kV 3G2,5mm² - Orange	M20	T2_M20_D ouble			n.a.				L-450-101-LVT-040 / L-600-101 LVT-036 / L-600-101-LVT-038 / L-600-101-LVT-035 / E-MCT-302 / L-450-101-LVT-005 / L-600-101-LVT-010 / L-750-101-LVT-015 / L-300-101-LVT-007 / E-MCT-402 / L-300-101-LVT-065 / L-300-101-LVT-066 / L-300-101-LVT-067 / L-150-101-LVT-149

Cu Cl.2/MGT/EPR/LSZH/GSWB/LSZH 0,6/1 KV

3G2,5 - L.V. POWER CABLE - Fire Resistant & Flame Retardant - ARMOURED



TECHNICAL FEATURES

Conductors :	**STRANDED** plain/bare annealed copper wires	IEC 60228 Class 2
Insulation :	Mica/Glass Tape (MGT) plus EPR compound, quality to IEC 60092.360, Nominal Thickness 1,0 mm	
Cores colour code :	**Brown - Blue - Yellow/Green**	
Pair Assembling :	Not required	
Pair Wrapping:	Not required	
Drain wire :	Not required	
Pair Shield :	Not required	
Shield Insulation :	Not Required	
Total Assembling :	Cores layed up with optimal lay length	
Overall Wrapping:	Not required	
Drain wire :	Not required	
Overall Shield:	Not required	
Inner covering :	Extruded LSZH compound, Average Thickness 1,0 mm	
Inner covering color code:	**Black or Natural**	
Armour :	**Galvanized Steel Wire Braid Armour (coverage ≥ 90%)**	
Outer sheath :	Extruded LSZH Thermoplastic Compound (O.I. ≥ 30%), type **SHF1** to IEC 60093.360, Average Thickness 1,3 mm	
Outer sheath color code:	**Orange**	
Outer printing (INKJET) :	**FLEI - ELECTRIC CABLE - 1000V - 3G2,5 SQMM - MGT/EPR/LSZH/GSWB/LSZH - 0,6/1 KV - IEC 60331.21 - IEC 60332.1.2 - IEC 60332.3.22 - Year of Manufacture - CE + Meter Marking**	
Under Armour diameter :	(11,7 ± 10%) mm	
Over Armour diameter :	(12,9 ± 10%) mm	
Outer diameter :	(15,5 ± 10%) mm	
Bending radius :	cable outer diameter x 10	(in fixed installation)
Voltage test :	3,5 kV a.c. for 5' (Between Cores - Armour)	
Conductors DC Resistance :		IEC 60228 Class 2
Insulation Resistance :	≥ 940 MΩ x Km (@ 20°C)	
Applicable Standards		
Design Guidelines :	**IEC 60092.353**	
ON COMPLETE CABLE		
Fire Resistant test :	**IEC 60331.21**	
Flame Retardant test :	IEC 60332.1.2 - IEC 60332.3.22	
Acid Gas generation :	IEC 60754.1/2	
Smoke density/Light Transmittance	IEC 61034.2 (LT ≥ 60%)	
Temperature Range :		
ON INSULATION	(max +90°C)	(max continuous operation temperature of conductors)
	(max +250°C)	(max conductors temperature during short-circuit for 5 seconds)
ON COMPLETE CABLE		
During Operation :	(-20°C up to +90°C)	(in fixed installation)
During installation :	(- 5°C up to +50°C)	
Note :	**To meet the requirements of installation and use in Zone 1 & Zone 2 (IEC 60079-14) and "Gas & Vapour Tight" the cable must be provided with Penetrating Inner covering together with correct ATEX approved equipment or accessories.**	

Office	Date	Sign	Rev.	Date	Sign
Drawn by :	29/03/2024	Messa			
Checked :	29/03/2024	Spaccasassi			
Approved :	29/03/2024	Cucinotta			

The data provided, lending assent for the treatment, will be used to the sense of the article 13 of of the Regulation (UE) 2016/679, also through outsiders, in order to allow the realization of the fulfilments informatives, administrative, commercial and accounting related to the contractual relationship. Integral copy of the informative could be requested at our offices.

All proprietary rights reserved according to law. This document shall be not reproduced without written permission. FLEI reserves the right to change characteristics and technical data of product shown at any time.

ITEM	Tag	83106-CEL	: Lighting & Small Power DB BoP / EMCS -Controller and I/O Cabinet - Auxiliary			Dwg	123A90-DDL-EL-LIS-20148
	S/Sys	87-00	: Power Distribution System (EMCS)			Module	LD_B-200/LD_B-400
TASK	code	C10000625		Location	Onshore Activities	User	Rosetti Marino Quality Control
FORM	Process	MC	Activity CCK	Discipline	Electrical	Form	CPX09 LV Power Cable

CABLE DATA

Type: Cu Cl.2/EPR/LSZH Cores/Size mm²: 3G2.5 Color: Grey

From: DP-200N1 To: B400-EMCS-001

1	Confirm cable is as specified in project cable schedule	OK
2	Visual Check cable physical integrity.	OK
3	Check is installed in accordance with layout drawing (segregation, distance…).	OK
4	Check cable is supported and fixed to rack according to project specification.	OK
5	Check bending radius is within the specified limits.	PL
6	Confirm cable glands suit for cable type, correctly mounted and tightened.	NA
7	Check gland plate for single core cables is non ferrous (non -magnetic).	NA
8	Confirm cable labelling is in accordance with specifications.	PL
9	Check cable is correctly loomed and segregated in accordance with specification.	OK
10	Check cable earthing against lastest drawings.	PL
11	Check cores marking are in accordance with termination diagram	PL
12	Check terminations are in accordance with latest termination diagram	OK
13	If required produce Red Line Mark Up for "AS BUILT"	

ROSETTI MARINO PROVERLIS CROSSWIND

ITEM	Tag	83106-CEL	: Lighting & Small Power DB BoP / EMCS -Controller and I/O Cabinet - Auxiliary			Dwg	123A90-DDL-EL-LIS-20148
	S/Sys	87-00	: Power Distribution System (EMCS)			Module	LD_B-200/LD_B-400
TASK	code	C10000625		Location	Onshore Activities	User	Rosetti Marino Quality Control
FORM	Process	MC	Activity CCK	Discipline	Electrical	Form	CPX09 LV Power Cable

CONTINUITY				
5	CORE CONTINUITY Ω	PH 1	0,4	
6		PH 2	0,4	
7		PH 3	NA	
8	ARMOUR CONTINUITY Ω		NA	
9	PROTECTIVE CONDUCTOR CONTINUITY Ω		0,5	
INSULATION				
10	CORES / ARMOUR+EARTH MΩ	PH1 / PH2-PH3-A-E	>1999	
11		PH2 / PH1-PH3-A-E	>1999	
12		PH3 / PH1-PH2-A-E	NA	
13	CABLE IS CORRECTLY RE-CONNECTED.		Yes	

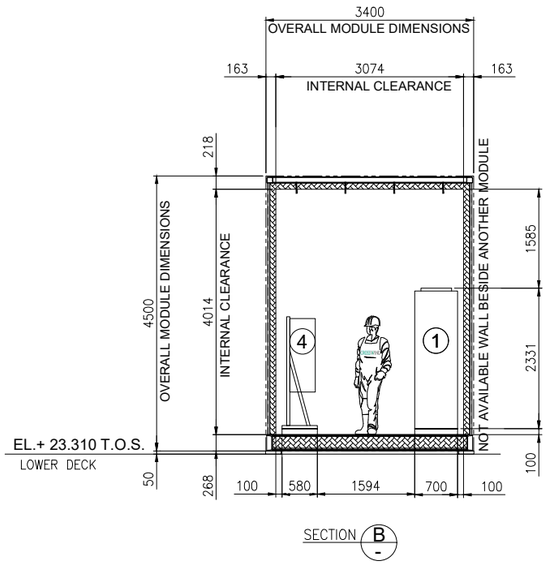
TESTING INSTRUMENTS USED

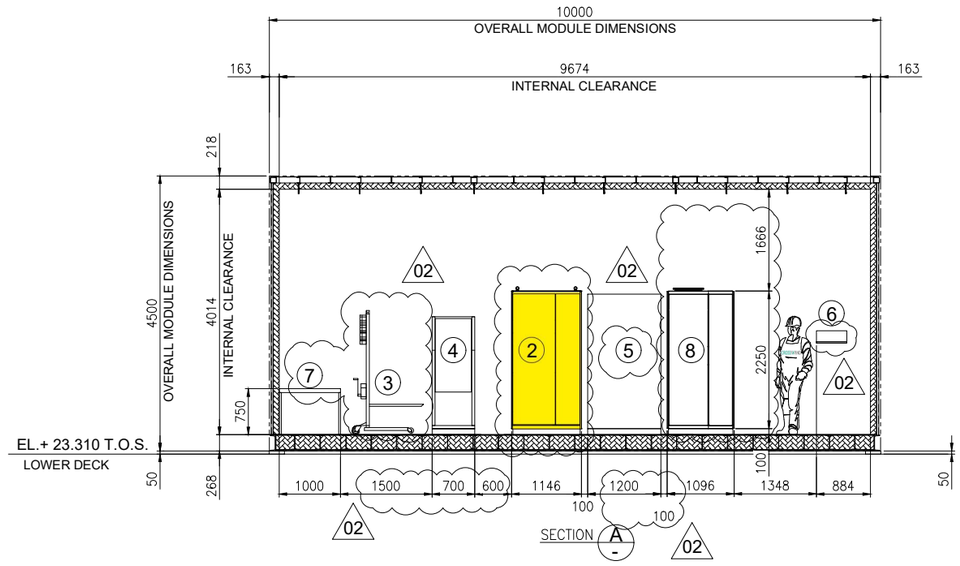
TYPE / SERIAL N° :	MEGGER : KEW3125A SERIAL: W8330207	TYPE / SERIAL N° :	MULTIMETER: FLUKE 175 SERIAL:AW1/018(17140769)
Calibration certificate N° and date:	N°7722/24 _ 10/07/2024	Calibration certificate N° and date:	N°7715/24 _ 10/07/2024

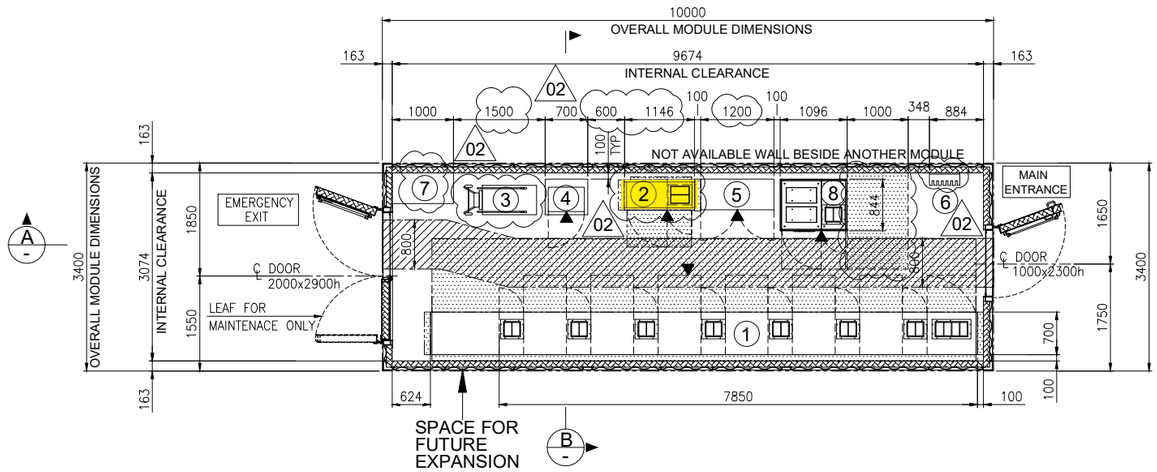
Comments:

	Performed by	☉ WITNESS ☐ REVIEW	☐ WITNESS ☐ REVIEW
Company	ICS IMPIANTI	RM (Rosetti Marino)	
Name	Carmelo Bongiovanni	Giovanni Tangianu	
Date	2024-11-06	2024-11-09	
Signature	PROVERLIS Digitaly signed by Carmelo Bongiovanni 2024-11-06T17:17:38.672Z	PROVERLIS Digitaly signed by Giovanni Tangianu 2024-11-09T10:04:05.540Z	

DRAWING NO. 123A90-DDL-EL-DL-20105 | REV. 02





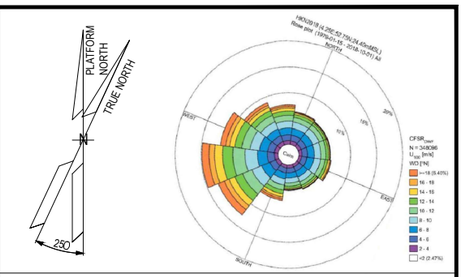


EQUIPMENT LAYOUT
"B-200" LV (400V) SWITCHGEAR ROOM
BOTTOM PLAN

1

EQUIPMENT LIST

REF.	TAG No.	DESCRIPTION	LENGTH (mm)	WIDTH (mm)	HEIGHT (mm)	NOTE
1	SG-200N1	400V SWITCHGEAR	7850	700	2331	
2	DP-200N1	DISTRIBUTION BOARD FOR LIGHTING AND SMALL POWER B.O.P.	1146	520	2250	
3	-	SERVICE TROLLEY FOR 400V SWITCHGEAR	1034	490	2030	
4	CN-200N1	ICCP PANEL	700	580	1830	
5	B200-HSB-001	DISTRIBUTION & HVAC PANEL - LV ROOM	1200	600	1900	02
6	-	TOOL BOX	495	200	200	
7	-	TABLE	1000	500	750	
8	SG-200D2	ACB PANEL FOR SOLAR PACKAGE	1096	844	2294	



NOTES

1. U.N.O. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DELETED.
3. DOCUMENT VALID ONLY FOR ELECTRICAL COMPONENT, FOR OTHER SCOPE LOCATION AND INFORMATION, PLEASE REFER TO VENDORS AND PROJECT DOCUMENTS.
4. FOR OTHER ITEMS, CORRECT LOCATION AND INFORMATION, PLEASE REFER TO VENDORS AND DEDICATED PROJECT DOCUMENTATION.
5. HEIGHT OF ALL PANELS IN THE EQUIPMENT LIST TABLE IS WITHOUT THE BASE FRAME (100mm)

02

LEGEND

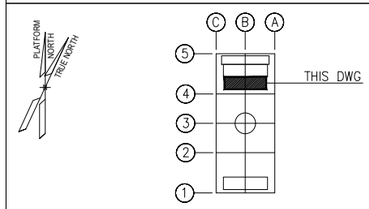
U.N.O. _____ UNLESS NOTED OTHERWISE
T.O.S. _____ TOP OF STEEL
_____ ESCAPE CORRIDOR - WIDTH 800mm.
_____ MAINTENANCE AREA - VENDOR REQUIREMENT
_____ SWITCHGEAR ROOM ENCLOUSURE
_____ FRONT OF EQUIPMENT

REFERENCES

DOCUMENT TITLE	DOCUMENT NUMBER
SG-200N1 GENERAL ARRANGEMENT DRAWING	1723002197-EL-DA-00007
SG-200D2 GENERAL ARRANGEMENT DRAWING	1723002197-EL-DA-00008
DP-200N1 GENERAL ARRANGEMENT DRAWING	1723002197-EL-DA-00009
AC UPS – GENERAL ARRANGEMENT AND DIMENSIONAL DRAWINGS	1724000372-EL-DA-00004
AC UPS – BATTERY LAYOUT INTERCONNECTING DIAGRAM	1724000372-EL-DG-00011
B-200 -GENERAL ARRANGEMENT DRAWINGS - E&I SHELTER	1724000049-AR-DA-00015
ICCC PANEL GENERAL ARRANGEMENT DRAWING	144671-CORR-TF-FAB-DWG-0003

02

KEY PLAN



VALID FOR CONSTRUCTION
FDL DWG: **123A90-FDL-EL-DL-20105**

REV.:	DATE:	SIGNATURE:
2_A	08/08/24	G.Randi

ROSETTI MARINO SpA

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	27/05/2024	FMO	LMA/AMA	LMA/MDO	ACCEPTED FOR CONSTRUCTION (AFC)
01	26/03/2024	GPA	LMA/AMA	LMA/MDO	ISSUE FOR REVIEW (IFR)
00	08/11/2023	DSF	CB/AMA	OYFO/MDO	ISSUE FOR REVIEW (IFR)

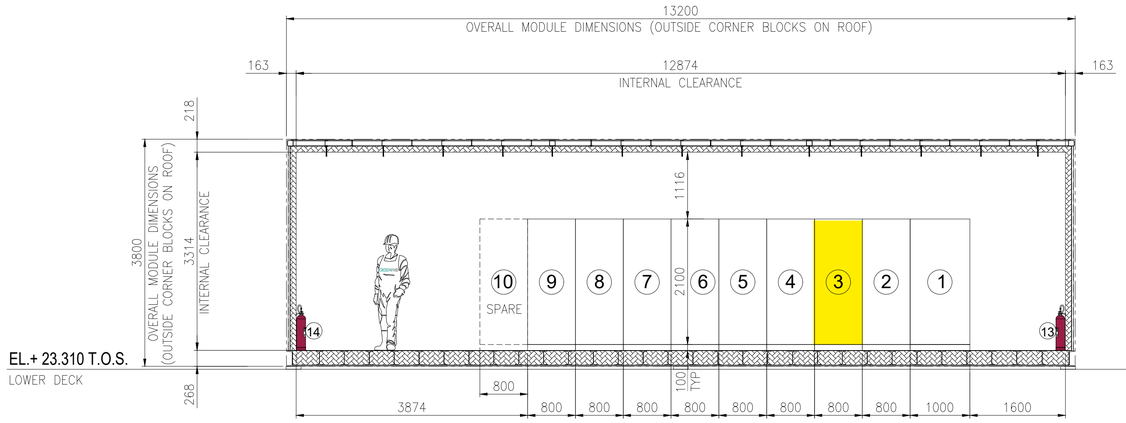
CROSSWIND | ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL EQUIPMENT LAYOUT
LV SWITCHROOM

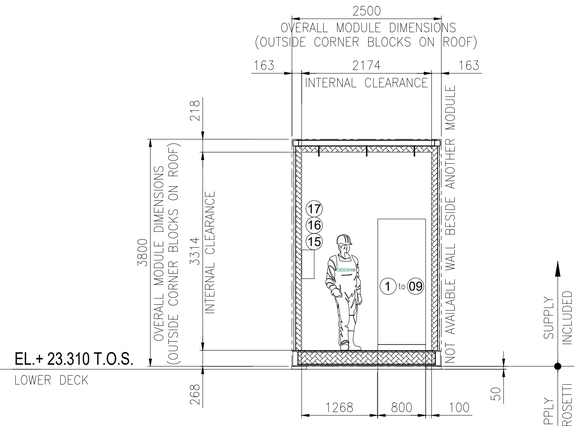
CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK			SCALE 1:50
DRAWN FMO	CHECKED LMA/AMA	APPROVED LMA/MDO	DATE 27/05/2024
A1	DRAWING NO. 123A90-DDL-EL-DL-20105	SHEET 001	REV. 02

File Name : 123A90-DDL-EL-DL-20105_REV02.dwg

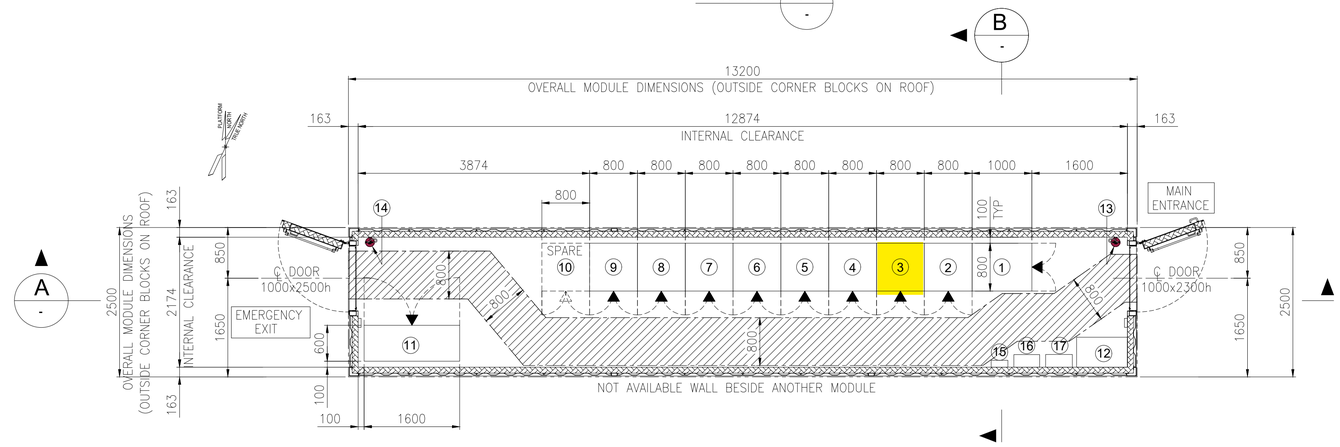
DRAWING NO. 123A90-DDL-IN-DL-40012 REV. 03



SECTION A -



SECTION B -

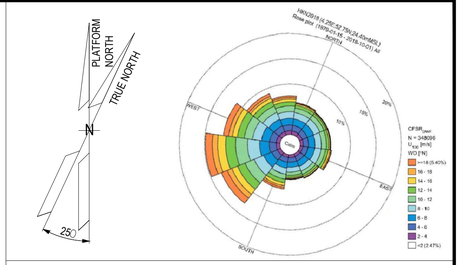


EQUIPMENT LAYOUT
"B-400" I&T EQUIPMENT ROOM
BOTTOM PLAN

EQUIPMENT LIST

REF.	TAG No.	DESCRIPTION	LENGTH (mm)	WIDTH (mm)	HEIGHT (mm)	NOTE
1	B400-SRV-001	SERVER CABINET	1000	800	2100	
2	B400-NET-001	NETWORK CABINET	800	800	2100	
3	B400-EMCS-001	EMCS SYSTEM CABINET	800	800	2100	
4	B400-PCS-002	PCS MARSHALLING CABINET	800	800	2100	
5	B400-PCS-001	PCS SYSTEM CABINET	800	800	2100	
6	B400-FGS-003	FGS MARSHALLING CABINET 2	800	800	2100	
7	B400-FGS-002	FGS MARSHALLING CABINET 1	800	800	2100	
8	B400-FGS-001	FGS SYSTEM CABINET	800	800	2100	
9	B400-SIS-001	SIS SYSTEM/MARSHALLING CABINET	800	800	2100	
10	-	SPARE				
11	B400-HSB-001	DISTRIBUTION & HVAC PANEL - I&T ROOM	1600	600	2300	
12	-	TABLE	850	500	750	
13	-	PORTABLE EXTINGUISHER (CO2) 5 Kg.	150	150	750	
14	-	PORTABLE EXTINGUISHER (CO2) 5 Kg.	150	150	750	
15	-	FIRST AID KIT	280	115	200	
16	-	RESUSCITATION UNIT	430	210	480	
17	-	CABINET INCLUDED N.10 ESCAPE MASK	448	213	422	

03



NOTES

1. U.N.O. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DOCUMENT VALID ONLY FOR INSTRUMENT COMPONENT, FOR OTHER SCOPE LOCATION AND INFORMATION, PLEASE REFER TO VENDORS AND PROJECT DOCUMENTS.

LEGEND

U.N.O. _____ UNLESS NOTED OTHERWISE
T.O.S. _____ TOP OF STEEL
_____ ESCAPE CORRIDOR – WIDTH 800mm.
_____ EQUIPMENT ROOM ENCLOUSURE
_____ FRONT OF EQUIPMENT

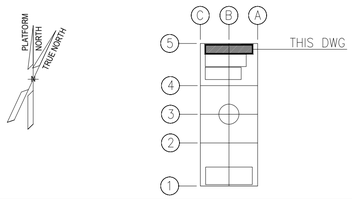
HOLDS

.

REFERENCE

DOCUMENT TITLE	DOCUMENT NUMBER
Control System Architecture Detailed Drawings	123A90-DDL-IN-DD-40096
Data Network Architecture Drawings	123A90-DDL-IN-DD-40019
Earthing layouts drawings (CCR, ITER)	123A90-DDL-IN-DL-40013
Instrument and Telecom MCT Layout – Lower Deck	123A90-DDL-IN-DL-40086
"B-400" I&T Equipment Room – Architectural Layout	123A90-DDL-AR-DL-10015
"B-400" ARCHITECTURAL GENERAL LAYOUT PLAN, WIEW, SECTIONS & TYP. DETAILS	123A90-DDL-AR-DL-10015
"B-400" GENERAL ARRANGEMENT DRAWING	1724000049-AR-DA-00017
"B-400" GENERAL ARRANGEMENT DRAWING	1724000049-AR-DD-00021
"B-400" HVAC SYSTEM G.A. and DETAILS	1724000049-HV-DA-00067

KEY PLAN



REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
03	04/10/24	VBA	LCA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
02	27/05/24	MGA	LCA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	22/01/24	VBA	LCA	DLO	ISSUE FOR REVIEW (IFR)
00	07/11/23	VBA	LCA	DLO	ISSUE FOR REVIEW (IFR)

CROSSWIND | ROSETTI MARINO

VALID FOR CONSTRUCTION
FDL DWG: **123A90-FDL-IN-DL-40012**

REV.:	DATE:	SIGNATURE:
3_A	07/10/24	G.Randi

ROSETTI MARINO SpA

TITLE : BASE LOAD POWER HUB (BLPH)
OFF-SHORE ITER
EQUIPMENT LAYOUT

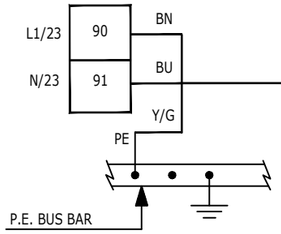
CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE 1:33,3
DRAWN MGA | CHECKED LCA | APPROVED DLO | DATE 27/05/24
A1 | DRAWING NO. 123A90-DDL-IN-DL-40012 | SHEET 001 | REV. 03

File Name : 123A90-DDL-IN-DL-40012 Rev.03.dwg

FROM	TO

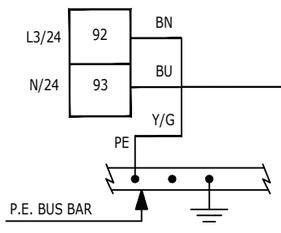
DESCRIPTION: LIGHTING & SMALL POWER DB BOP
TAG NUMBER: DP-200N1

CUBICLE/CB: +03/Q23



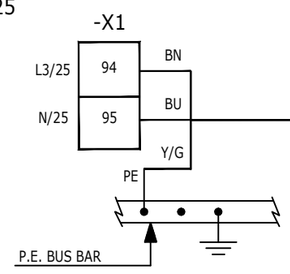
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3G2.5 mm²

CUBICLE/CB: +03/Q24



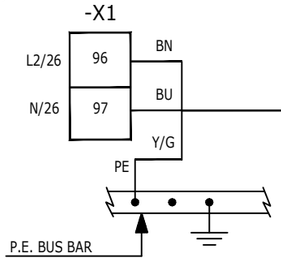
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3G2.5 mm²

CUBICLE/CB: +03/Q25



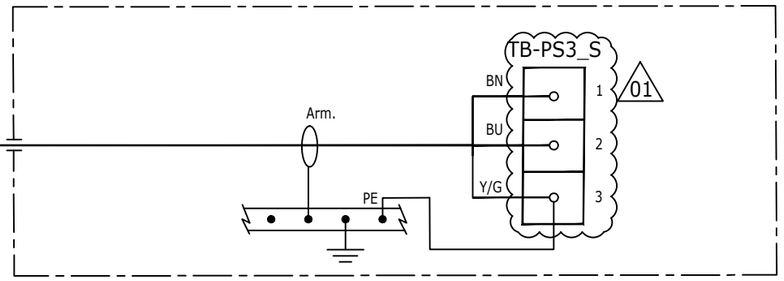
83106-CEL
3G2.5 mm²

CUBICLE/CB: +03/Q26

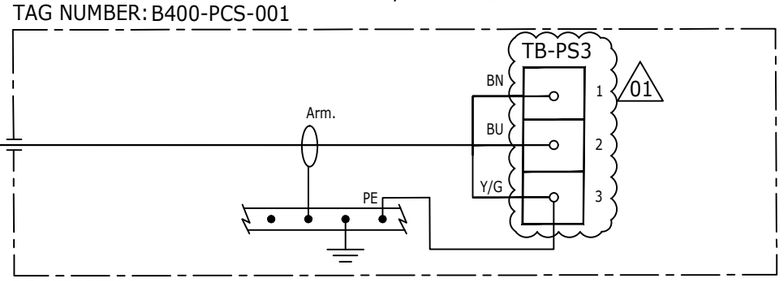


83107-CEL
3G2.5 mm²

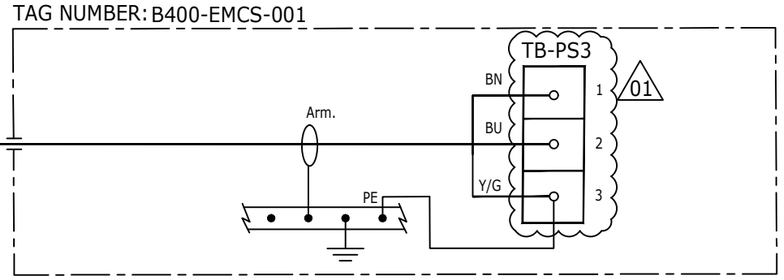
DESCRIPTION: SIS -CONTROLLER AND I/O CABINET - AUXILIARY
TAG NUMBER: B400-SIS-001



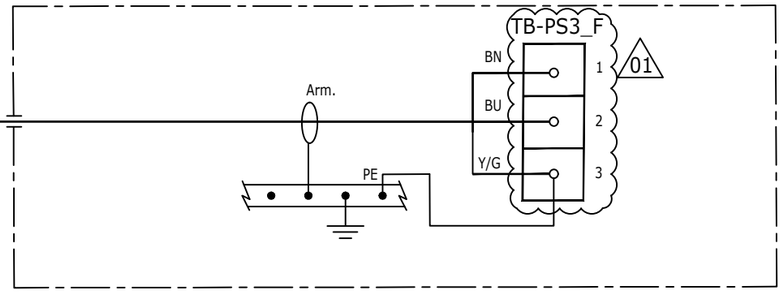
DESCRIPTION: PCS -CONTROLLER AND I/O CABINET - AUXILIARY
TAG NUMBER: B400-PCS-001



DESCRIPTION: EMCS -CONTROLLER AND I/O CABINET - AUXILIARY
TAG NUMBER: B400-EMCS-001



DESCRIPTION: FGS FIRE & GAS PANEL - AUXILIARY
TAG NUMBER: B400-FGS-001



VALID FOR CONSTRUCTION
FDL DWG: 123A90-FDL-EL-DL-20149
REV.: 1_A | DATE: 17/10/24 | SIGNATURE: G.Randi
ROSETTI MARINO SpA

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
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
LIGHTING & SMALL POWER DB BOP

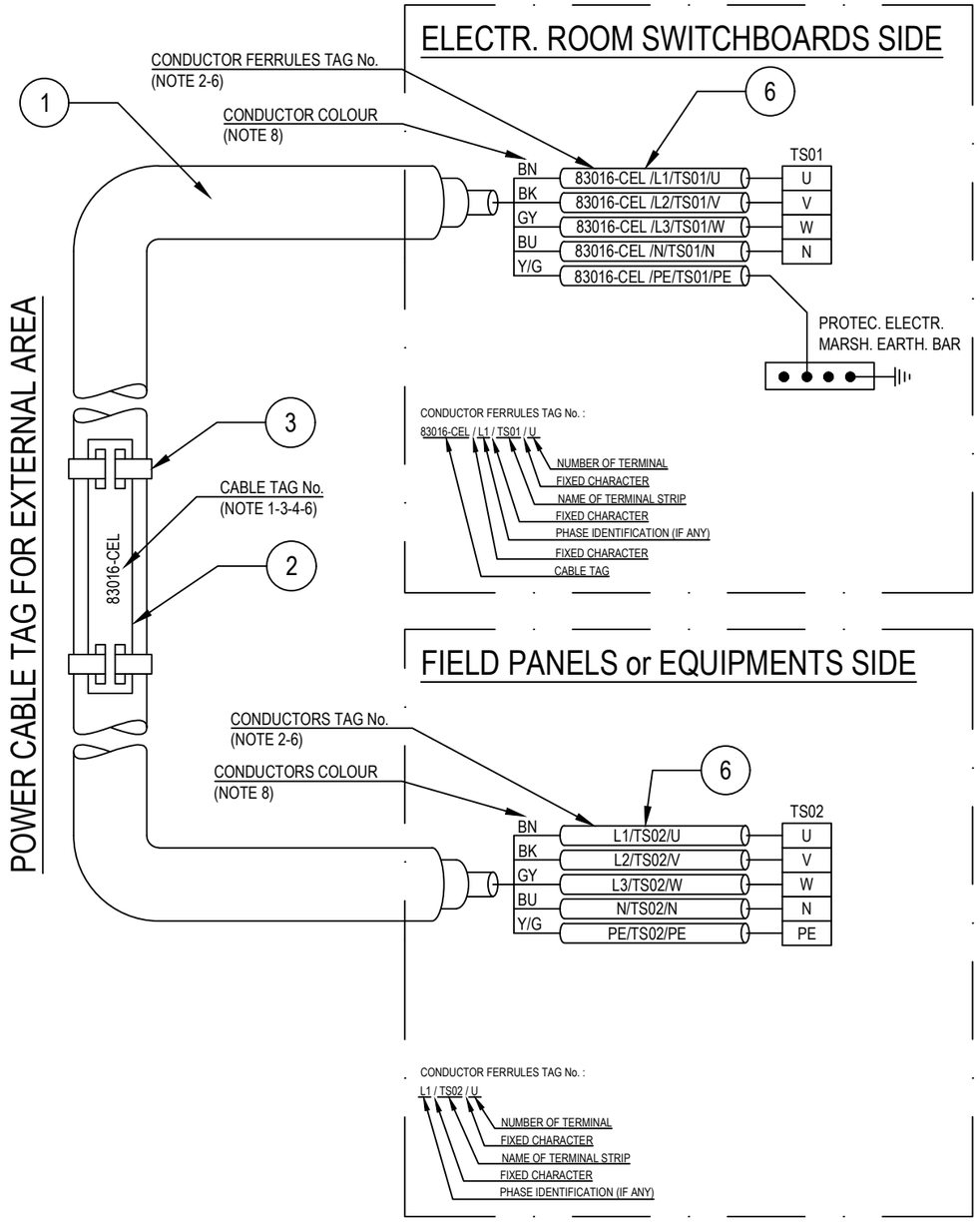
CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : 1:X

A3 | DRAWING NO. 123A90-DDL-EL-DG-20149 | SHEET 052 | REV. 01

F.to UNI A3: 420mmx297mm

File Name : 123A90-DDL-EL-DG-20162 Rev. 01

C02



POS.	DESCRIPTION	MATERIAL	SIZE	Q.TY	NOTE
1	UNARMOURED CABLE				
2	CABLE TAG FOR EXTERNAL AREA	HDG/SS			NOTE 1 NOTE 4
3	TIE FOR CABLE TAG IN EXTERNAL AREA	HDG/SS			
4	CABLE TAG FOR INTERNAL AREA	PVC			NOTE 1 NOTE 5
5	TIE FOR CABLE TAG IN INTERNAL AREA	NYLON 6.6			
6	CORE FERRULES	PVC			

NOTES:

1) ALL CABLES SHALL BE IDENTIFIED AT EACH TERMINATION AND EACH SIDE OF ANY OBSTACLE (E.G. CABLE TRANSIT ON WALLS INSIDE SHELTER AND FLOOR DECK CROSSING, BY THEIR RESPECTIVE TAGS/NUMBERS, AS INDICATED ON THE CABLE SCHEDULE.
CABLE IDENTIFICATION SHALL BE ALSO DONE BELOW AND IN THE SWITCHBOARD CABLE COMPARTMENT.

2) CABLE CORE FERRULES SHALL BE FITTED AT EVERY TERMINATION. THESE FERRULES SHALL BE OF ENGRAVED PLASTIC SLIP ON, INTERLOCKED AND SELF GRIP TYPE.

3) ON CABLE TRAYS OR LADDERS, CABLES SHALL BE IDENTIFIED AT EACH END, AND EVERY 25 METERS.

4) THE CABLE TAG FOR EXTERNAL AREA SHALL DONE BY 316L STAINLESS STEEL LABELS, TAG (H=5mm) SHALL BE LASER PRINTED PREFERABLY OR EMBOSSED, LABEL HELD BY TWO 316L STAINLESS STEEL TIES.

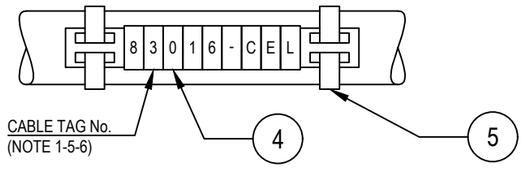
5) THE CABLE TAG FOR INTERNAL AREA SHALL BE DONE BY ENGRAVED PLASTIC SLIP ON CHARACTERS ONTO PLASTIC TIE, BLACK LETTER (H=5mm) ON WHITE.

6) CABLE AND CONDUCTOR TAG ARE INDICATIVE ONLY.

7) WITHIN TECHNICAL BUILDING, PROTECTIVE CONDUCTOR SHALL BE TAGGED BETWEEN FOLLOWING ITEMS:
- PANEL (SWITCHBOARD, SWITCHGEAR, DISTRIBUTION BOARD, ETC) AND EARTH BAR
- EARTH BAR AND EARTH BOSS

8) ONLY IF NECESSARY, SHRINK TUBES OF THE APPROPRIATE COLOR WILL BE INSTALLED TO COVER THE WRONG CONDUCTOR COLOR, THIS WILL BE PERFORMED IN EACH SIDE OF THE CABLES WHERE NECESSARY.

POWER CABLE TAG FOR INTERNAL AREA



VALID FOR CONSTRUCTION
FDL DWG: 123A90-FDL-EL-DD-20092
REV.: 2_A | DATE: 28/08/24 | SIGNATURE: G.Randi
ROSETTI MARINO SpA

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	28/08/24	GRA	AMA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	04/07/24	NLK	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	21/11/23	SPS	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL TYPICAL INSTALLATION DETAILS-POWER SYSTEM & CABLE INSTALLATION
CABLES INSTALLATION SYSTEM IDENTIFICATION FOR POWER CABLES

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

A3 | DRAWING NO. 123A90-DDL-EL-DD-20092 | SHEET 007 | REV. 02

F.to UNI A3: 420mmx297mm

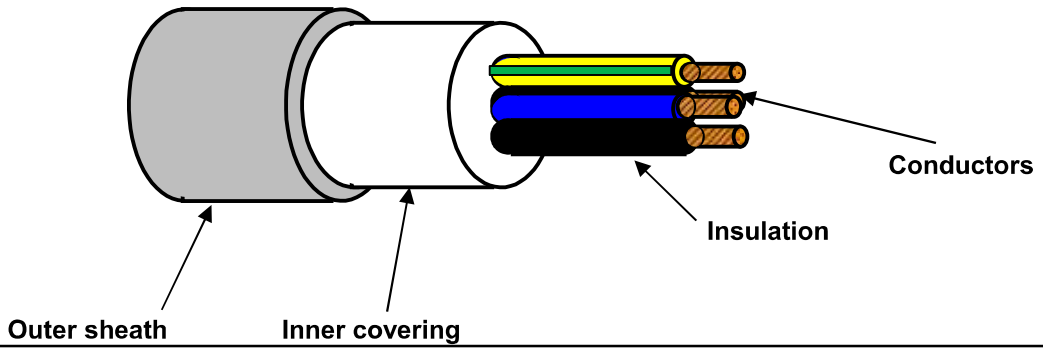
File Name : 123A90-DDL-EL-DD-20092 REV.02.DWG

Tag Number	Category	Discipline	Eng Status	NativeDoc	Parent Tag	Main Function	Secondary Function	Area	From Tag	From Main Function	From Area	To Tag	To Main Function	To Area	Material ID	Material Desc.	Gland Standar	From Gland	From Entry	From Fitting	To Gland	To Entry	To Fitting	Routing	Routing Manual
83106-CEL	Cable	EL	VFC	123A90-DDL-EL-LIS-20148					DP-200N1	LV 0,4 / 0,23 kV Distribution Switchgear	Lower Deck (B-200)	B400-EMCS-001	EMCS Cabinet	Lower Deck (B-400)	ELECV06-3G2,5	Cable Cu Cl.2/EPR/LSZH 0,6/1kV 3G2,5mm² - Grey	M20	n.a.			n.a.					L-450-101-LVT-030 / L-600-101-LVT-020 / L-600-101-LVT-018 / L-600-101-LVT-017 / E-MCT-201 / L-750-101-LVT-011 / L-450-101-LVT-008 / L-300-101-LVT-009 / E-MCT-401 / L-300-101-LVT-065 / L-300-101-LVT-066 / L-300-101-LVT-067 / L-150-101-LVT-149

FLEI s.r.l.

Cu Cl.2/EPR/LSZH 0,6/1 KV

3G2,5 - L.V. POWER CABLE - Flame Retardant



TECHNICAL FEATURES

Conductors :	**STRANDED** plain/bare annealed copper wires	IEC 60228 Class 2
Insulation :	EPR compound, quality to IEC 60092.360, Nominal Thickness 1,0 mm	
Cores colour code :	**Brown - Blue - Yellow/Green**	
Pair Assembling :	Not required	
Pair Wrapping:	Not required	
Drain wire :	Not required	
Pair Shield :	Not required	
Shield Insulation :	Not Required	
Total Assembling :	Cores layed up with optimal lay length	
Overall Wrapping:	Not required	
Drain wire :	Not required	
Overall Shield:	Not required	
Inner covering :	Extruded LSZH compound, Average Thickness 1,0 mm	
Inner covering color code:	**Black or Natural**	
Armour :	Not required	
Outer sheath :	Extruded LSZH Thermoplastic Compound (O.I. ≥ 30%), type **SHF1** to IEC 60093.360, Average Thickness 1,2 mm	
Outer sheath color code:	**Grey**	
Outer printing (INKJET) :	**FLEI - ELECTRIC CABLE - 1000V - 3G2,5 SQMM - EPR/LSZH - 0,6/1 KV - IEC 60332.1.2 - IEC 60332.3.22 -**	
	Year of Manufacture - CE + Meter Marking	
Outer diameter :	(13,0 ± 10%) mm	
Bending radius :	cable outer diameter x 10	(in fixed installation)
Voltage test :	3,5 kV a.c. for 5' (Between Cores)	
Conductors DC Resistance :		IEC 60228 Class 2
Insulation Resistance :	≥ 1100 MΩ x Km (@ 20°C)	
Applicable Standards		
Design Guidelines :	**IEC 60092.353**	
ON COMPLETE CABLE		
Flame Retardant test :	IEC 60332.1.2 - IEC 60332.3.22	
Acid Gas generation :	IEC 60754.1/2	
Smoke density/Light Transmittance	IEC 61034.2 (LT ≥ 60%)	
Temperature Range :		
ON INSULATION	(max +90°C)	(max continuous operation temperature of conductors)
	(max +250°C)	(max conductors temperature during short-circuit for 5 seconds)
ON COMPLETE CABLE		
During Operation :	(-20°C up to +90°C)	(in fixed installation)
During installation :	(- 5°C up to +50°C)	
Note :	**To meet the requirements of installation and use in Zone 1 & Zone 2 (IEC 60079-14) and "Gas & Vapour Tight" the cable must be provided with Penetrating Inner covering together with correct ATEX approved equipment or accessories.**	

Office	Date	Sign	Rev.	Date	Sign
Drawn by :	29/03/2024	Messa			
Checked :	29/03/2024	Spaccasassi			
Approved :	29/03/2024	Cucinotta			

The data provided, lending assent for the treatment, will be used to the sense of the article 13 of of the Regulation (UE) 2016/679, also through outsiders, in order to allow the realization of the fulfilments informatives, administrative, commercial and accounting related to the contractual relationship. Integral copy of the informative could be requested at our offices.

All proprietary rights reserved according to law. This document shall be not reproduced without written permission. FLEI reserves the right to change characteristics and technical data of product shown at any time.

Section 6 MECHANICAL COMPLETION STATUS INDEX - INSTRUMENTAL DISCIPLINE

CROSSWIND

ROSETTI MARINO

Project CROSSWIND

STATUS INDEX DETAIL

Filtered on subsystem: 87-00 & process: MC & discipline : I

Instrumental	87-00 Power Distribution System (EMCS)						
ITEM		TASK					
Code	Description	Location	Code	Form	Progress	Date	Certificate
B400-EMCS-001	EMCS Cabinet	ONSHORE	C10000838	CJX48	100	2024-11-20	RFC 1

ITEM	Tag	B400-EMCS-001	: EMCS Cabinet		Dwg	123A90-DDL-IN-DL-40012	
	S/Sys	87-00	: Power Distribution System (EMCS)		Module	LD_B-400	
TASK	code	C10000838		Location	Onshore Activities	User	Rosetti Marino Quality Control
FORM	Process	MC	Activity CCK	Discipline	Instrumental	Form CJX48	Indoor Cabinet/Panel

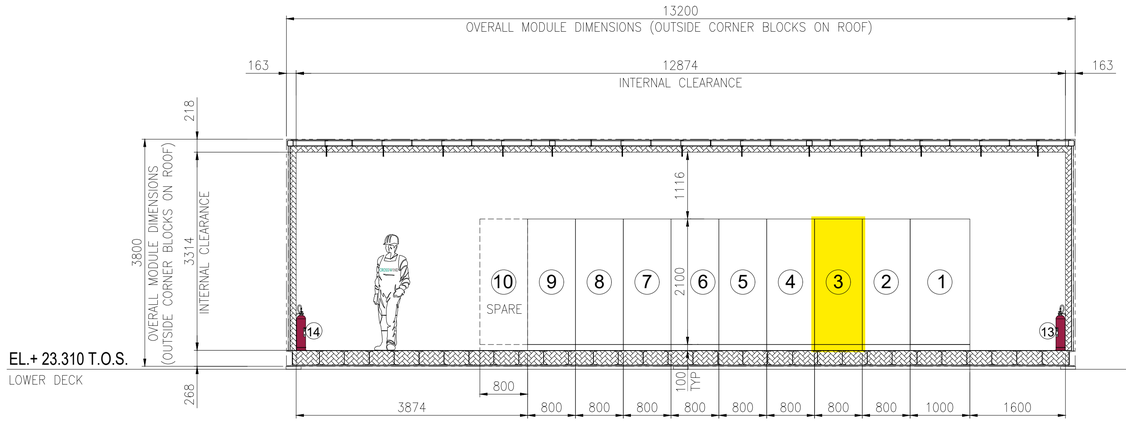
1	Check for mechanical damage (Panel and internal items).	OK
2	Check that the Panel is de-energized and safe.	OK
3	Check identification (tag number, tag plates).	OK
4	Check supporting and protection against vibrations.	OK
5	Check door handles (type, locking, …).	OK
6	Check data sheet and general arrangement are conforms to drawings.	PL
7	Check internal layout conforms to drawings.	Note
8	Check signals segregation conforms to specifications.	OK
9	Check that anti-condensation heaters are ready to be energized.	OK
10	Check earthing connections are properly fixed and tightened.	PL
11	Check incoming cables identification .	Note
12	Check if accessibility and maintenance are possible and safe.	OK
13	If required produce Red Line Mark Up for "AS BUILT"	

Comments: Note : Refer to punch list raised during FAT:

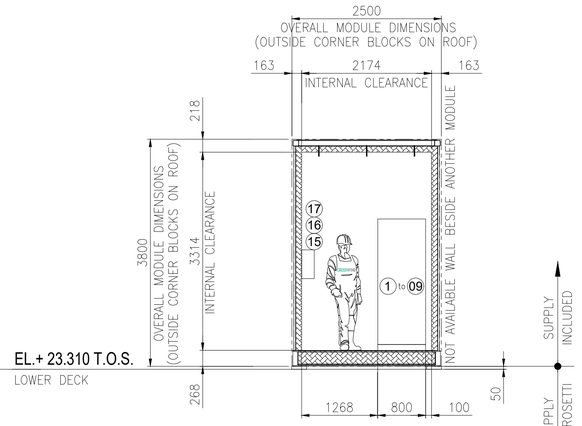
Note 7: C30000220
Note 11: C30000221

	Performed by	● WITNESS ☐ REVIEW	☐ WITNESS ☐ REVIEW
Company	ICS IMPIANTI	RM (ROSETTI MARINO)	
Name	Carmelo Bongiovanni	Giovanni Tangianu	
Date	2024-11-06	2024-11-20	
Signature	Digitaly signed by Carmelo Bongiovanni 2024-11-06T17:18:25.978Z	Digitaly signed by Giovanni Tangianu 2024-11-20T13:39:54.508Z	

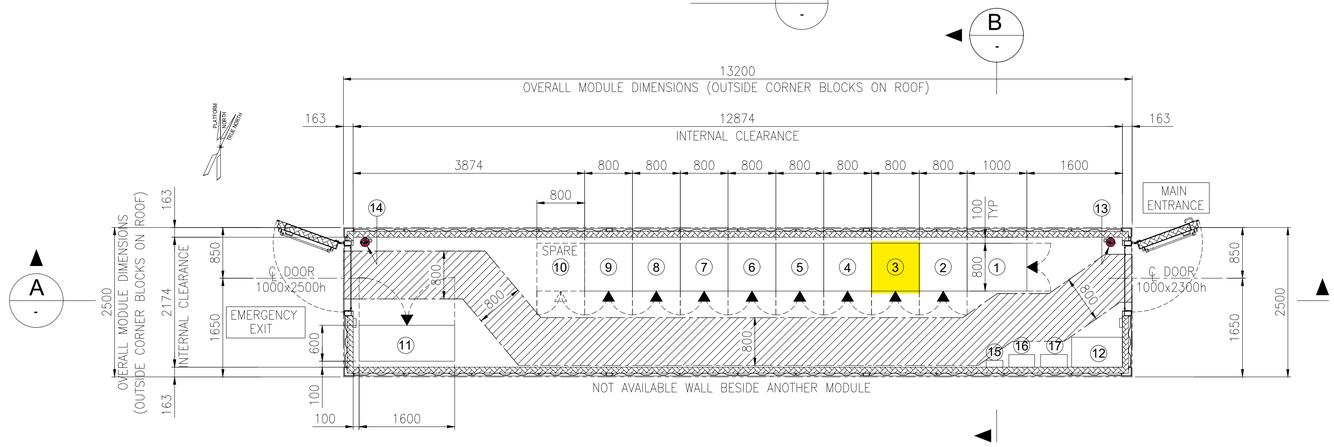
DRAWING NO. 123A90-DDL-IN-DL-40012 REV. 03



SECTION A -



SECTION B -

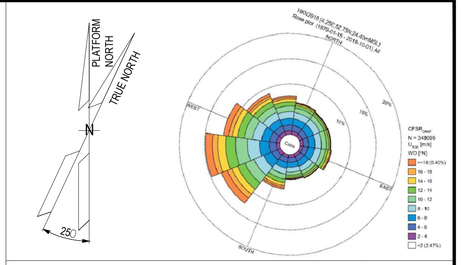


EQUIPMENT LAYOUT
"B-400" I&T EQUIPMENT ROOM
BOTTOM PLAN

EQUIPMENT LIST

REF.	TAG No.	DESCRIPTION	LENGTH (mm)	WIDTH (mm)	HEIGHT (mm)	NOTE
1	B400-SRV-001	SERVER CABINET	1000	800	2100	
2	B400-NET-001	NETWORK CABINET	800	800	2100	
3	B400-EMCS-001	EMCS SYSTEM CABINET	800	800	2100	
4	B400-PCS-002	PCS MARSHALLING CABINET	800	800	2100	
5	B400-PCS-001	PCS SYSTEM CABINET	800	800	2100	
6	B400-FGS-003	FGS MARSHALLING CABINET 2	800	800	2100	
7	B400-FGS-002	FGS MARSHALLING CABINET 1	800	800	2100	
8	B400-FGS-001	FGS SYSTEM CABINET	800	800	2100	
9	B400-SIS-001	SIS SYSTEM/MARSHALLING CABINET	800	800	2100	
10	-	SPARE				
11	B400-HSB-001	DISTRIBUTION & HVAC PANEL - I&T ROOM	1600	600	2300	
12	-	TABLE	850	500	750	
13	-	PORTABLE EXTINGUISHER (CO2) 5 Kg.	150	150	750	
14	-	PORTABLE EXTINGUISHER (CO2) 5 Kg.	150	150	750	
15	-	FIRST AID KIT	280	115	200	
16	-	RESUSCITATION UNIT	430	210	480	
17	-	CABINET INCLUDED N.10 ESCAPE MASK	448	213	422	

03



NOTES

1. U.N.O. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DOCUMENT VALID ONLY FOR INSTRUMENT COMPONENT, FOR OTHER SCOPE LOCATION AND INFORMATION, PLEASE REFER TO VENDORS AND PROJECT DOCUMENTS.

LEGEND

U.N.O. _____ UNLESS NOTED OTHERWISE
T.O.S. _____ TOP OF STEEL
_____ ESCAPE CORRIDOR – WIDTH 800mm.
_____ EQUIPMENT ROOM ENCLOUSURE
_____ FRONT OF EQUIPMENT

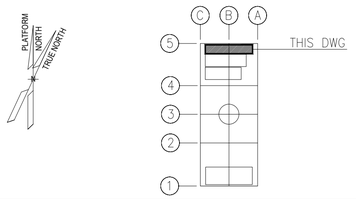
HOLDS

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REFERENCE

DOCUMENT TITLE	DOCUMENT NUMBER
Control System Architecture Detailed Drawings	123A90-DDL-IN-DD-40096
Data Network Architecture Drawings	123A90-DDL-IN-DD-40019
Earthing layouts drawings (CCR, ITER)	123A90-DDL-IN-DL-40013
Instrument and Telecom MCT Layout – Lower Deck	123A90-DDL-IN-DL-40086
"B-400" I&T Equipment Room – Architectural Layout	123A90-DDL-AR-DL-10015
"B-400" ARCHITECTURAL GENERAL LAYOUT PLAN, WIEW, SECTIONS & TYP. DETAILS	123A90-DDL-AR-DL-10015
"B-400" GENERAL ARRANGEMENT DRAWING	1724000049-AR-DA-00017
"B-400" GENERAL ARRANGEMENT DRAWING	1724000049-AR-DD-00021
"B-400" HVAC SYSTEM G.A. and DETAILS	1724000049-HV-DA-00067

KEY PLAN



REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
03	04/10/24	VBA	LCA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
02	27/05/24	MGA	LCA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	22/01/24	VBA	LCA	DLO	ISSUE FOR REVIEW (IFR)
00	07/11/23	VBA	LCA	DLO	ISSUE FOR REVIEW (IFR)

CROSSWIND — ROSETTI MARINO

VALID FOR CONSTRUCTION
FDL DWG: **123A90-FDL-IN-DL-40012**

REV.:	DATE:	SIGNATURE:
3_A	07/10/24	G.Randi

ROSETTI MARINO SpA

TITLE : BASE LOAD POWER HUB (BLPH)
OFF-SHORE ITER
EQUIPMENT LAYOUT

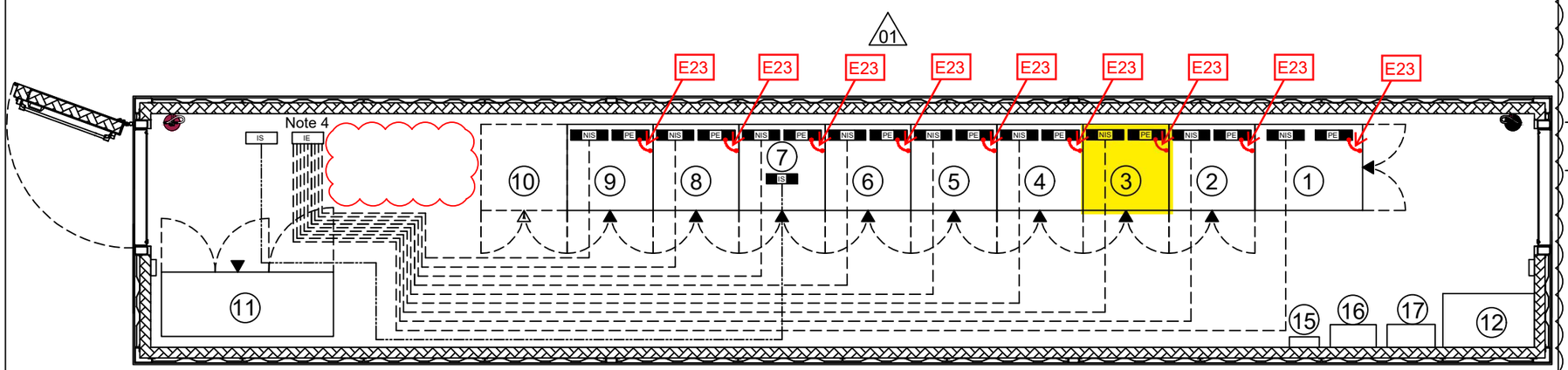
CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK			SCALE 1:33,3
DRAWN MGA	CHECKED LCA	APPROVED DLO	DATE 27/05/24
A1	DRAWING NO. 123A90-DDL-IN-DL-40012	SHEET 001	REV. 03

File Name : 123A90-DDL-IN-DL-40012 Rev.03.dwg

INSTRUMENT EQUIPMENT LIST		
REF.	TAG No.	DESCRIPTION
1	B400-SRV-001	SERVER CABINET
2	B400-NET-001	NETWORK CABINET
3	B400-EMCS-001	EMCS SYSTEM CABINET
4	B400-PCS-001	PCS SYSTEM CABINET
5	B400-PCS-002	PCS MARSHALLING CABINET
6	B400-FGS-001	FGS SYSTEM CABINET
7	B400-FGS-002	FGS MARSHALLING CABINET 1
8	B400-FGS-003	FGS MARSHALLING CABINET 2
9	B400-SIS-001	SIS SYSTEM/MARSHALLING CABINET
10	-	SPARE
11	B400-HSB-001	DISTRIBUTION & HVAC PANEL - I&T ROOM
12	-	TABLE
13	-	PORTABLE EXTINGUISHER (CO2) 5 Kg.
14	-	PORTABLE EXTINGUISHER (CO2) 5 Kg.
15	-	FIRST AID KIT
16	-	RESUSCITATION UNIT
17	-	CABINET INCLUDED N.10 ESCAPE MASK

NOTES

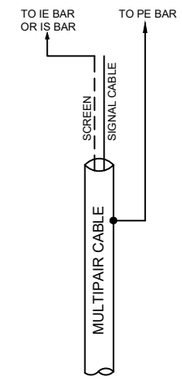
1 - THIS DOCUMENT IS VALID ONLY FOR EARTHING LAYOUT.
2 - THE CABLE SIZE SHALL BE CONFIRMED
3 - THE EXACT POSITION OF EARTHING/MARSHALLING BUS BAR SHALL BE DEFINED IN FIELD.
4 - THE EARTHING BUS BARS INSTALLATION SHALL BE PREFERABLY IN VERTICAL MODE.
5 - FOR EARTHING TYPICAL DETAILS AND Y/G CONDUCTOR CROSS SECTION SEE DOC. 123A90-DDL-EL-DD-20090 "ELECTRICAL TYPICAL INSTALLATION DETAILS - EARTHING SYSTEM".
6 - DUE TO THE TOP CABLE ENTRIES THE EARTHING BUS BAR INSIDE THE CABINETS SHALL BE INSTALLED AT THE TOP OF THE CABINETS THEMSELVES.
7 - IN CASE OF CABLE CONNECTIONS BETWEEN TWO CABINETS, THE CABLE SCREEN SHALL BE CONNECTED TO IE AT MARSHALLING SIDE ONLY.



LEGEND

- PE — EARTHING BUS BAR AISI 316L
- NIS — INSULATED INSTRUMENT EARTH BUS BAR NOT INTRINSIC SAFETY DIM. 450x60x5mm AISI 316L
- IS — INSULATED INSTRUMENT EARTH BUS BAR INTRINSIC SAFETY DIM. 450x60x5mm AISI 316L
- 35sqmm Y/G INSULATED COPPER CONDUCTOR FOR PE (SEE NOTE 2)
- 35sqmm Y/G INSULATED COPPER CONDUCTOR FOR I.S. & NON I.S. (SEE NOTE 2)
- EARTHING BUS BAR 60x5mm AISI 316L (SEE NOTE 3)
- PE — PROTECTIVE EARTH
- IE — INSTRUMENT EARTH
- IS — INTRINSICALLY SAFE EARTH

KEY



VALID FOR CONSTRUCTION
FDL DWG: **123A90-FDL-IN-DL-40013**

REV.:	DATE:	SIGNATURE:
1_B	11/11/24	G.Randi

ROSETTI MARINO SpA

01

CROSSWIND

ROSETTI MARINO

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
01	14/05/24	MGA	LCA	DLO	ACCEPTED FOR CONSTRUCTION
00	19/01/24	INVIRAJ	AMBE/LCA	OYFO/MDO	ISSUE FOR REVIEW (IFR)

TITLE : BASE LOAD POWER HUB (BLPH)
EARTHING LAYOUT DRAWINGS(OFFSHORE ITER)
EQUIPMENT LAYOUT

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

SCALE : NTS

A3

DRAWING NO. 123A90-DDL-IN-DL-40013

SHEET 003

REV. 01

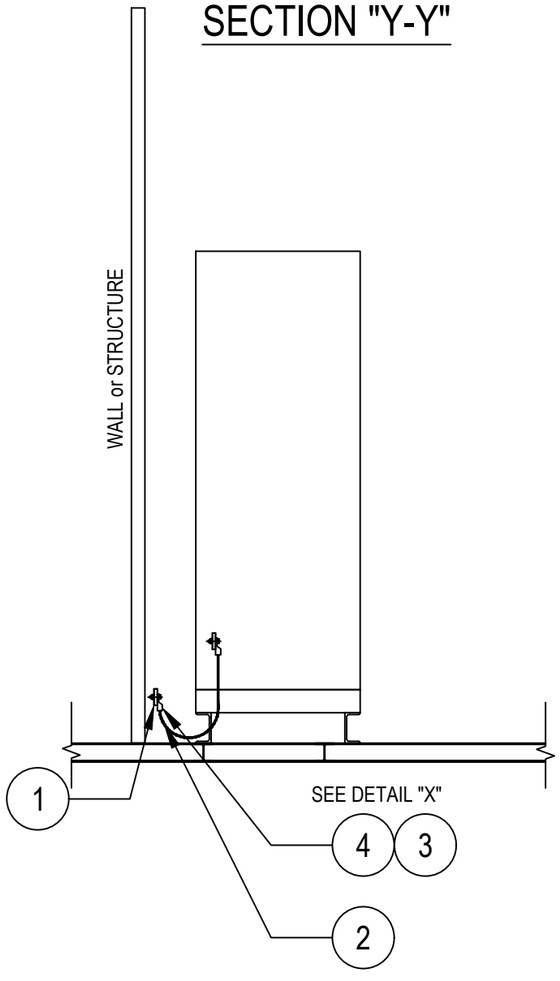
F.to UNI A3: 420mmx297mm

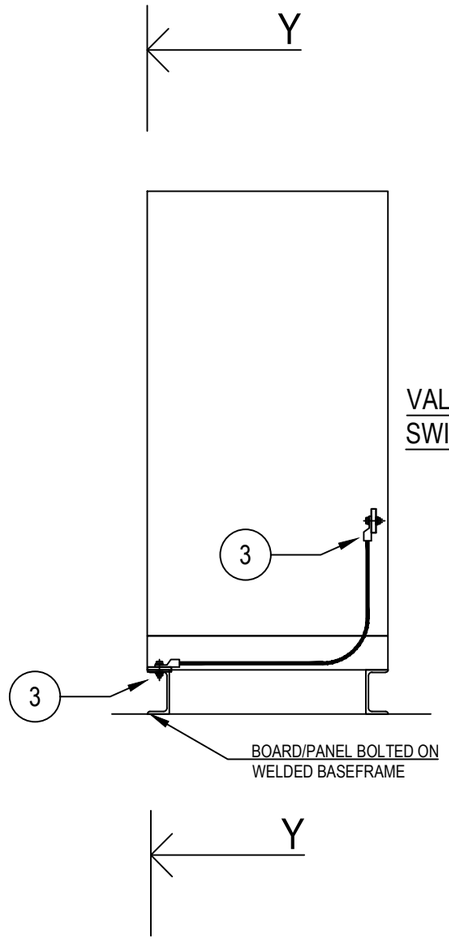
File Name : 123A90-DDL-IN-DL-430013 Rev. 01

E23

POS.	DESCRIPTION	MATERIAL	SIZE	Q.TY	NOTE
1	MARSHALLING EARTHING BAR	TINNED COPPER	50X5		NOTE 1
2	Y/G INSULATING COPPER CONDUCTOR	COPPER	35mm² SEE NOTE 1		NOTE 1
3	COMPRESSION TYPE LUG FOR INSULATION COPPER CONDUCTOR	TINNED COPPER	35mm² SEE NOTE 1	4	NOTE 1
4	BOLT, PLANE WASHER, GROWER SPRING WASHER AND NUT	AISI 316L	M10X30	4	

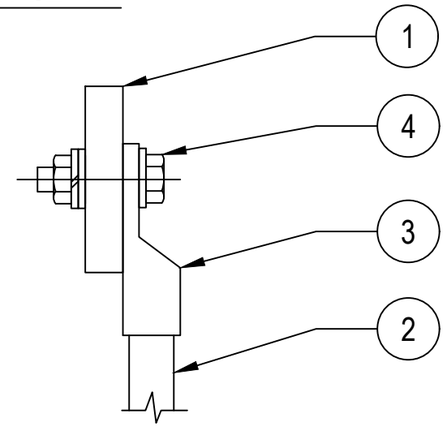
SECTION "Y-Y"





VALID FOR HV/LV SWITCHGEAR

DETAIL "X"



NOTES:

1) FOR SIZE OF THE EARTHING CABLE SEE ALSO EARTHING LAYOUT DRAWINGS OF RESPECTIVE AREAS

VALID FOR CONSTRUCTION
FDL DWG: **123A90-FDL-EL-DD-20090**

REV.:	DATE:	SIGNATURE:
2_I	07/11/24	G.Randi

ROSETTI MARINO SpA

REV.	DATE	DRN	CHKD	APPD	DESCRIPTION
02	26/08/24	GRA	AMA	DLO	ACCEPTED FOR CONSTRUCTION (AFC)
01	10/06/24	SPS	FMA/AMA	FPA/DLO	ACCEPTED FOR CONSTRUCTION (AFC)
00	21/11/23	SPS	FMA/AMA	FPA/DLO	ISSUE FOR REVIEW (IFR)

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
ELECTRICAL TYPICAL INSTALLATION DETAILS–EARTHING SYSTEM
EARTHING FOR PANELS/BOARDS IN TECHNICAL ROOM

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

A3	DRAWING NO.	SHEET	REV.
	123A90–DDL–EL–DD–20090	011	02

F.to UNI A3: 420mmx297mm

File Name : 123A90-DDL-EL-DD-20090 REV.02.DWG

BASE LOAD POWER HUB (BLPH)
EMCS CABINET
GENERAL ARRANGEMENT DRAWINGS AND INTERNAL LAYOUT

ROSETTI MARINO	
1	NO COMMENTS - APPROVED - WORK MAY PROCEED
2	MINOR COMMENTS - REVISE AND RESUBMIT - WORK MAY PROCEED
3	MAJOR COMMENTS – REJECTED – DO NOT PROCEED
4	APPROVAL NOT REQUIRED
NOTE: Approval doesn't relieve the supplier from mandatory compliance with contractual documents and specifications. Comments made do not imply acceptance of any cost or delivery impact.	
Sign	Date
	02/10/2024

MASTER
COPIA X TEST FINALE
DATE 7/10/24

NEXT REVISION SHALL BE "ACCEPTED FOR CONSTRUCTION (AFC)"

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	30.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	13.06.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA ◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_CLO

CROSSWIND | ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS. CABINET IN ITER GEN. ARR. DRW. AND INTERNAL LAYOUT
COVER PAGE

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DA-00013

SHEET 001

REV. 1

PAG. NR.	REVISION 0	1	2	3	4	5	6	7	8	TITLE
001	X	X								BASE LOAD POWER HUB (BLPH) COVER PAGE
002	X	X								BASE LOAD POWER HUB (BLPH) INDEX
003	X	X								BASE LOAD POWER HUB (BLPH) DATA SHEET
004	X	X								BASE LOAD POWER HUB (BLPH) INTERNAL WIRING INFORMATION
005	X	X								BASE LOAD POWER HUB (BLPH) TYPICAL WIRE MARKING & EARTH BAR CONNECTION DETAILS
006	X	X								BASE LOAD POWER HUB (BLPH) EMCS - EXTERNAL FRONT VIEW & FRONT DOOR OPENED VIEW
007	X									BASE LOAD POWER HUB (BLPH) EMCS - EXTERNAL LEFT SIDE & RIGHT SIDE VIEW
008	X	X								BASE LOAD POWER HUB (BLPH) EMCS - EXTERNAL LEFT SIDE & RIGHT SIDE VIEW WHITOUT PANEL
009	X									BASE LOAD POWER HUB (BLPH) EMCS - EXTERNAL REAR VIEW
010	X	X								BASE LOAD POWER HUB (BLPH) EMCS - BASEPLATE DETAILS
011	X	X								BASE LOAD POWER HUB (BLPH) EMCS- EXTERNAL & INTERNAL TOP VIEW
012	X	X								BASE LOAD POWER HUB (BLPH) EMCS - LIFTING DETAILS
013	X									BASE LOAD POWER HUB (BLPH) EMCS - FRONT DOOR CUT-OUT DETAILS
014	X	X								BASE LOAD POWER HUB (BLPH) EMCS - FRONT SIDE INTERNAL VIEWS
015	X	X								BASE LOAD POWER HUB (BLPH) EMCS - FRONT SIDE INTERNAL VIEWS
016	X									BASE LOAD POWER HUB (BLPH) EMCS - SPARE PAGE
017	X									BASE LOAD POWER HUB (BLPH) BH AND MANUFACTURER LABEL DETAILS
018	X									BASE LOAD POWER HUB (BLPH) EMCS SECTION IDENTIFIER NAMEPLATE DETAILS
019	X									BASE LOAD POWER HUB (BLPH) SPARE PAGE
020	X	X								BASE LOAD POWER HUB (BLPH) CERTIFICATION LABEL

PAG. NR.	REVISION 0	1	2	3	4	5	6	7	8	TITLE
021	X	X								BASE LOAD POWER HUB (BLPH) EMCS MAIN COMPONENT LIST
022	X	X								BASE LOAD POWER HUB (BLPH) EMCS MAIN COMPONENT LIST
023	X	X								BASE LOAD POWER HUB (BLPH) EMCS MAIN COMPONENT LIST

PAG. NR.	REVISION 0	1	2	3	4	5	6	7	8	TITLE

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	30.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	13.06.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA ◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_CLO

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS. CABINET IN ITER GEN. ARR. DRW. AND INTERNAL LAYOUT
INDEX

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DA-00013

SHEET 002

REV. 1

A - GENERAL DATA

A1	TYPE	☐ MANUFACTURER STANDARD	■ AUGER	
A2	REFERENCE CODE	■ IEC	☐ IEC NORTH AMERICA SUITABLE (THIRD PARTY CERTIFIED)	
A3	CONTRACTUAL LANGUAGE	■ ENGLISH	☐	
A4	INSTALLATION	SAFE AREA, AIR CONDITIONING CONTROL ROOM/CAB HEAVY INDUSTRY ENVIRONMENT		
A5	OPERATING TEMPERATURE	+5°C TO +45 °C		
A6	OPERATING HUMIDITY	10 TO 93 % RH NOT CONDENSING		
A7	MARSHALLING TERMINAL STRIP	■ WITH	☐ WITHOUT	
A8	TERMINAL STRIP	☐ MIRROR OF JUNCTION BOX	■ NOT MIRROR OF JUNCTION BOX	
A9	SPARE TERMINALS	☐ NO	■ YES, NOT WIRED	☐ YES, JUMPERED TO I.E. OR I.S. BAR
A10	CABLES & CABLE TRAYS	☐ PVC	■ HALOGEN FREE AND LOW SMOKE <1>	
A11	INTRINSICALLY SAFE BARRIERS/ISOLATORS	■ NO	☐ YES	
A12	SURGE ARRESTORS	■ NO	☐ YES, ONLY FOR POWER SUPPLY LINE IN	
A13	POLLUTION DEGREE	■ 2 AS PER IEC60664-1		
A14	STORAGE TEMPERATURE	-20°C TO 50°C UP TO 80% HUMIDITY		
A15	MATERIAL	■ CARBON STEEL	☐ STAINLESS STEEL AISI 304	☐ STAINLESS STEEL AISI 316

B - MECHANICAL DATA

B1	OVERALL DIMENSION	800 mm x 800 mm x 2100 mm (L x D x H) (NOTE B1)		
B2	PROTECTION DEGREE	■ IP 43	☐ IP 55	
B3	STEEL THICKNESS	■ STRUCTURE: 1.5 mm	■ DOORS: 2 mm	
B4	CABLE ENTRY	■ TOP	☐ BOTTOM	
B5	CABLE ENTRY FIXING	☐ REMOVABLE PLATES	☐ CLAMPS	■ MCT <1>
B6	ACCESSIBILITY	■ FRONT ONLY	☐ FRONT / REAR	
B7	LIFTING SYSTEM	■ EYE BOLTS	☐ LIFTING BAR "L" TYPE	
B8	BASE PLINTH	■ SEPARATE PIECES		
B9	DOOR LOCKS	■ KEY LOCKED WITH UNIQUE KEY PER UCP		
B10	APPROXIMATIVE WEIGHT	250 Kg		

NOTE B1 : ALLOWED TOLERANCE FOR PANEL HEIGHT/DEPTH: +/-5mm;
ALLOWED TOLERANCE FOR PANEL STRUCTURES AND SUPPORTS: +/-2mm;
ALLOWED TOLERANCE FOR TOTAL PANEL LENGTH : +/-2% OF TOTAL PANEL LENGTH;
(IN ANY CASE, MAXIMUM LENGTH TOLERANCE ALLOWED FOR PANEL WITH 2 OR MORE COLUMNS IS +/-50mm)
REMOVALE BOTTOM PLATES SHALL BE PROVIDED
<1>

C - PAINTING

C1	REFERENCE SPECIFICATIONS	■ AUGER STANDARD	☐ JOB SPECIFIC	☐ MFR STANDARD
C2	EXTERIOR TYPE	☐ SMOOTH	■ PEEL TYPE	
	EXTERIOR COLOUR	■ RAL 7035	☐ RAL 7032	☐ RAL 7030
C3	BASE PLINTH	■ AS EXTERIOR		
C4	INTERIOR	■ GALVANISED (ALUZINC)		
C5	INTERNAL MOUNTING PLATES	■ GALVANISED (ALUZINC)		

D - ELECTRICAL DATA

.	SUPPLY LINE	UPS LINE 1	UPS LINE 2	NON-UPS LINE 3
D1	SUPPLY VOLTAGE	230Vac	230Vac	230Vac
D2	FREQUENCY	50Hz	50Hz	50Hz
D3	LOAD	0,7kW <1>	0,7kW <1>	0,6kW <1>
D4	INTERNAL LIGHTING WITH DOOR LIMIT SWITCH OPERATION	■ FLUORESCENT (230Vac - 50Hz)		
D5	ANTI CONDENSING HEATER WITH TEMPERATURE THERMOSTAT	■ YES		
D6	VENTILATION FAN WITH FLOW SWITCH AND TEMPERATURE THERMOSTAT	■ YES		
D7	SERVICE SOCKET	■ YES		

E - NAMEPLATES

.	.	EXTERNAL PANEL	INTERNAL PANEL
E1	MATERIAL	■ TRAFFOLYTE	■ TAPE
E2	BACKGROUND COLOUR	■ WHITE	■ WHITE
E3	TEXT COLOUR	■ BLACK	■ BLACK
E4	FIXING	■ WITH SCREWS	■ SELF-ADHESIVE
E5	WARNING LABELS	■ SELF-ADHESIVE	■ SELF-ADHESIVE
E6	LANGUAGE	■ ENGLISH	■ ENGLISH

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	30.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	13.06.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA ◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_CLO

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS. CABINET IN ITER GEN. ARR. DRW. AND INTERNAL LAYOUT
DATA SHEET

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DA-00013

SHEET 003

REV. 1

A - PANEL CONTROL CABLES

CABLE FUNCTION	CONDUCTOR SIZE	CONDUCTOR COLORS	OUTER SHEATH COLOR NON Intrinsically Safe Circuit	OUTER SHEATH COLOR Intrinsically Safe Circuit
BIPOLAR ANALOG SIGNALS (NOTE A1)	(2x0.5) + Shield	BLACK (BK) - WHITE (WH)	GREY (GR)	BLUE (BL)
TRIPOLAR ANALOG SIGNALS (NOTE A1)	(3x0.5) + Shield	BLACK (BK) - WHITE (WH) RED (RD)	GREY (GR)	BLUE (BL)

NOTE A1 : FOR THE ABOVE MENTIONED ANALOG SIGNALS, PAIRS OR TRIADS SHIELDED SPIRAL CABLES SHALL BE USED, WITH THE EXCEPTION OF THOSE "SINK" INPUTS OR OUTPUTS OF THE CONTROLLER WHERE AN EXTERNAL FEED IS NEEDED. ONLY FOR THIS SPECIFIC CASE, SINGLE WIRE CABLE SHALL BE USED.

C-GROUNDING CONNECTIONS

EARTH TYPE	CONDUCTOR SIZE Cable size shall not exceed max allowable section as per device's manufacturer recommendation	WIRE COLOR	ID RING COLOR
P.E. (PROTECTIVE EARTH)	(1x2.5) - (1x6) - (1x16) - (1x25)	YELLOW/GREEN (YG)	-
I.E. (INSTRUMENT EARTH)	(1x2.5) - (1x6) - (1x16) - (1x25)	GREEN (GN)	-
I.S.E. (INTRINSICALLY SAFE EARTH)	(1x2.5) - (1x6) - (1x16) - (1x25)	WHITE (WH)	-

B -PANEL SINGLE-CORE CABLES

SINGLE-CORE CABLE FUNCTION	CONDUCTOR SIZE Cable size shall not exceed max allowable section as per device's manufacturer recommendation	WIRE COLOR NON Intrinsically Safe Circuit	WIRE COLOR Intrinsically Safe Circuit
AC LINE	(1x2.5) - (1x4) - (1x6)	BROWN (BR)	N/A
AC NEUTRAL	(1x2.5) - (1x4) - (1x6)	LIGHT BLUE (LB)	N/A
DC 24Vdc (POSITIVE)	(1x2.5) - (1x4) - (1x6)	RED (RD)	N/A
DC 24Vdc (NEGATIVE)	(1x2.5) - (1x4) - (1x6)	BLUE (BU)	N/A
DIGITAL SIGNALS (POSITIVE)	(1x1)	BLACK (BK)	N/A
DIGITAL SIGNALS (NEGATIVE)	(1x1)	WHITE (WH)	N/A
ANALOG SIGNALS (2 WIRE POSITIVE)	(1x1)	BLACK (BK)	N/A
ANALOG SIGNALS (2 WIRE NEGATIVE)	(1x1)	WHITE (WH)	N/A
ANALOG SIGNALS (3 WIRE POSITIVE)	(1x1)	BLACK (BK)	N/A
ANALOG SIGNALS (3 WIRE NEGATIVE)	(1x1)	RED (RD)	N/A
ANALOG SIGNALS (3 WIRE SIGNAL)	(1x1)	WHITE (WH)	N/A

GENERAL NOTE : MINIMUM SECTION 1.5 mm² FOR CPU PANEL INTERNAL LAMPS, LIMIT SWITCHES, FANS, THERMOSTATS, ISOLATORS POWER SUPPLY

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	30.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	13.06.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA ◆ PROJECT Nr. E36672C00 DESCRIPTION: E366772C00-EMCS_CLO

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS. CABINET IN ITER GEN. ARR. DRW. AND INTERNAL LAYOUT
INTERNAL WIRING INFORMATION

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DA-00013

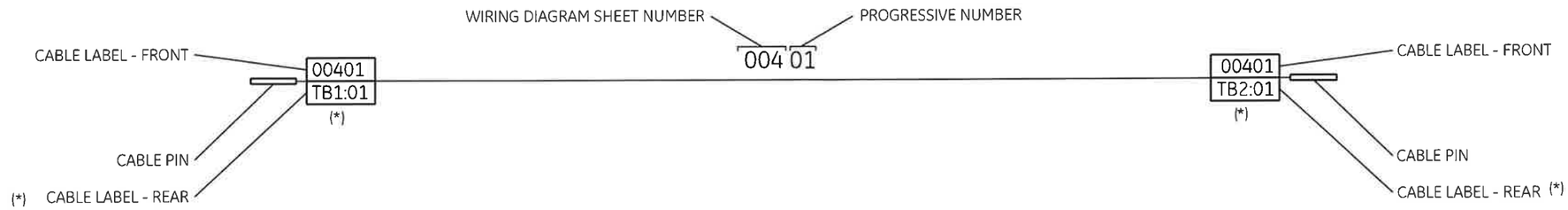
SHEET 004

REV. 1

COLOR ACRONYMS LIST :

RD - RED
BK - BLACK
BL - BLUE
LB - LIGHT BLUE
GR - GREY
GN - GREEN
YE - YELLOW
Y/G - YELLOW/GREEN
BR - BROWN
WH - WHITE

TYPICAL WIRE MARKING



EARTH CONNECTION RESUME TABLE:

		CABINET
	P.E. EARTH	▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪
<1>	I.E. EARTH	▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪
	I.S.E. EARTH	▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪

EARTH ACRONYMS LEGEND :

P.E. (GND) - PROTECTION EARTH (GROUND, FRAME CHASSIS)
I.E. (F.E.) - INSTRUMENT EARTH (NOISELESS), FUNCTIONAL EARTH
I.S. (I.S.E.) - INTRINSICALLY SAFE EARTH

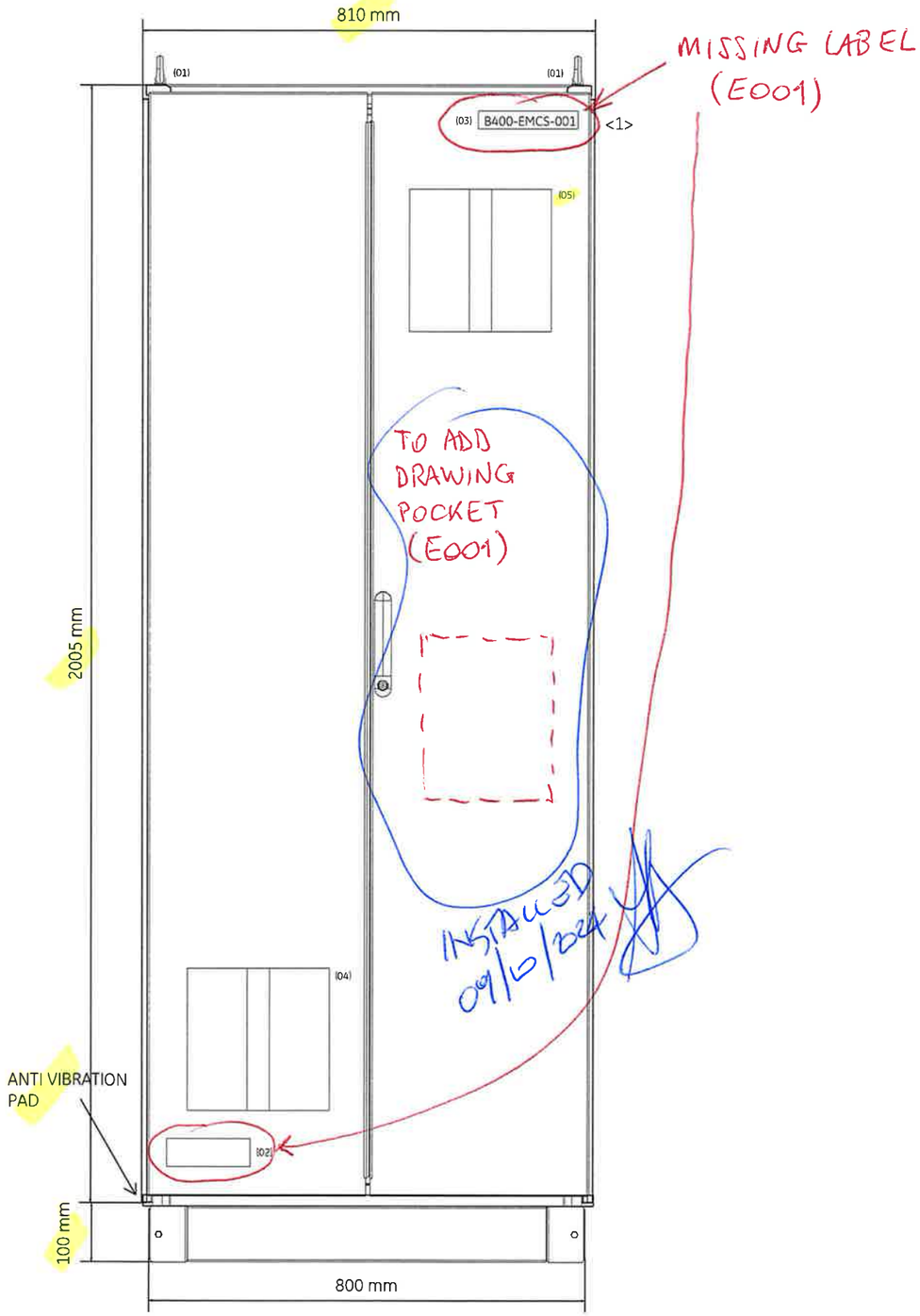
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1	30.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	13.06.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

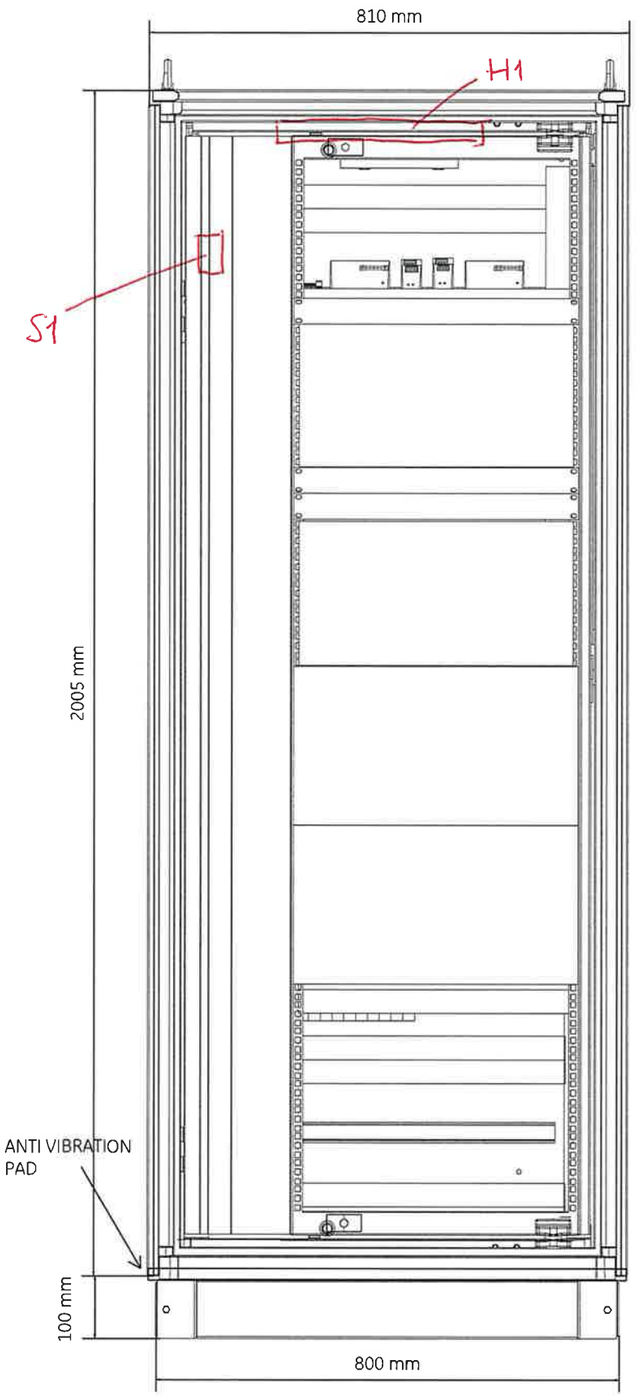
YOKOGAWA ◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_CLO
CROSSWIND
ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS. CABINET IN ITER GEN. ARR. DRW. AND INTERNAL LAYOUT
TYPICAL WIRE MARKING & EARTH BAR CONNECTION DETAILS

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK
SCALE : 1
A3
DRAWING NO. 1724000594-IN-DA-00013
SHEET 005
REV. 1

EMCS PANEL - EXTERNAL FRONT VIEW & FRONT DOOR OPENED VIEW





DRAWING SCALE 1:10

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	30.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	13.06.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA ◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_CLO

CROSSWIND | ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS. CABINET IN ITER GEN. ARR. DRW. AND INTERNAL LAYOUT
EMCS - EXTERNAL FRONT VIEW & FRONT DOOR OPENED VIEW

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

SCALE : 1

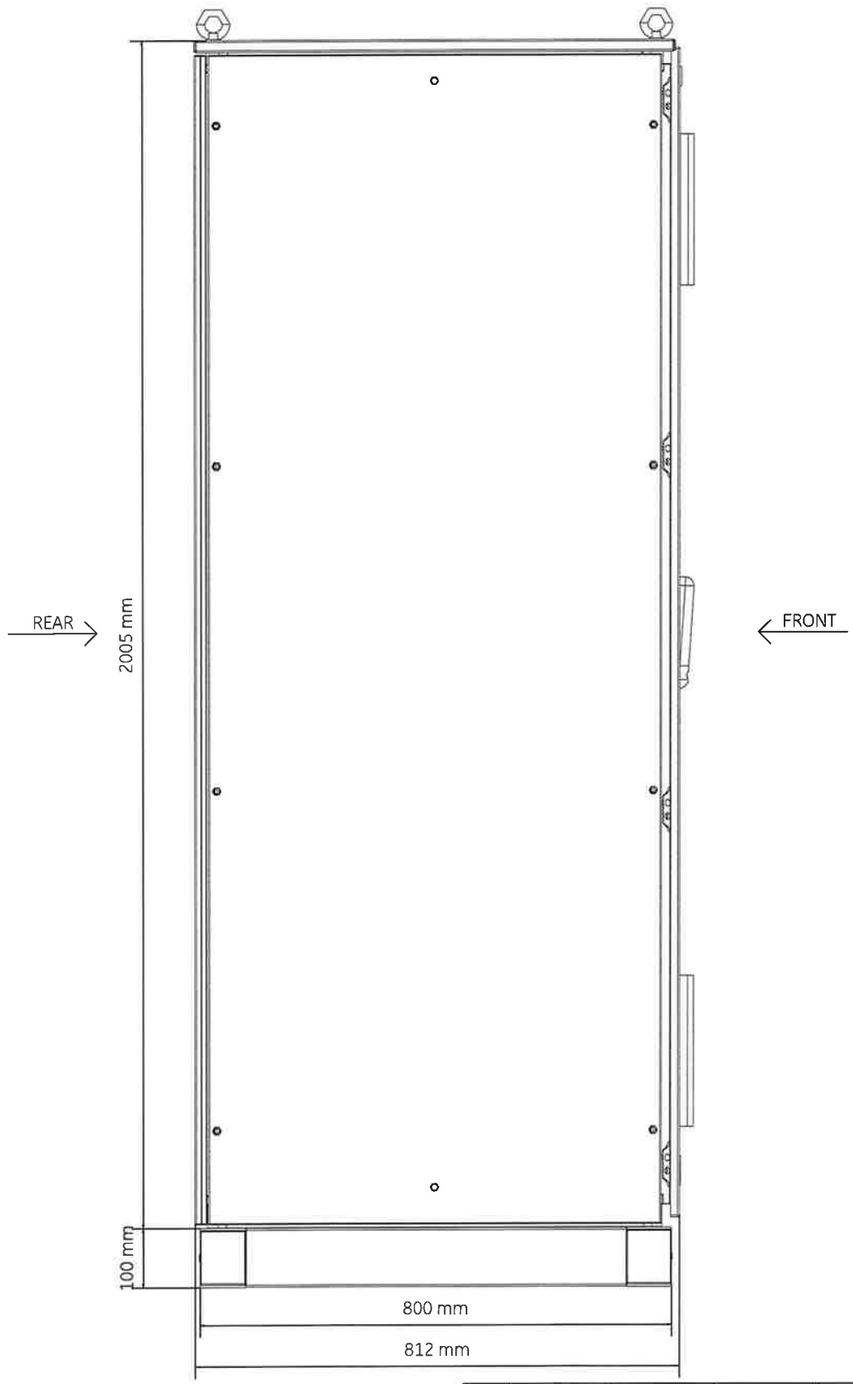
A3

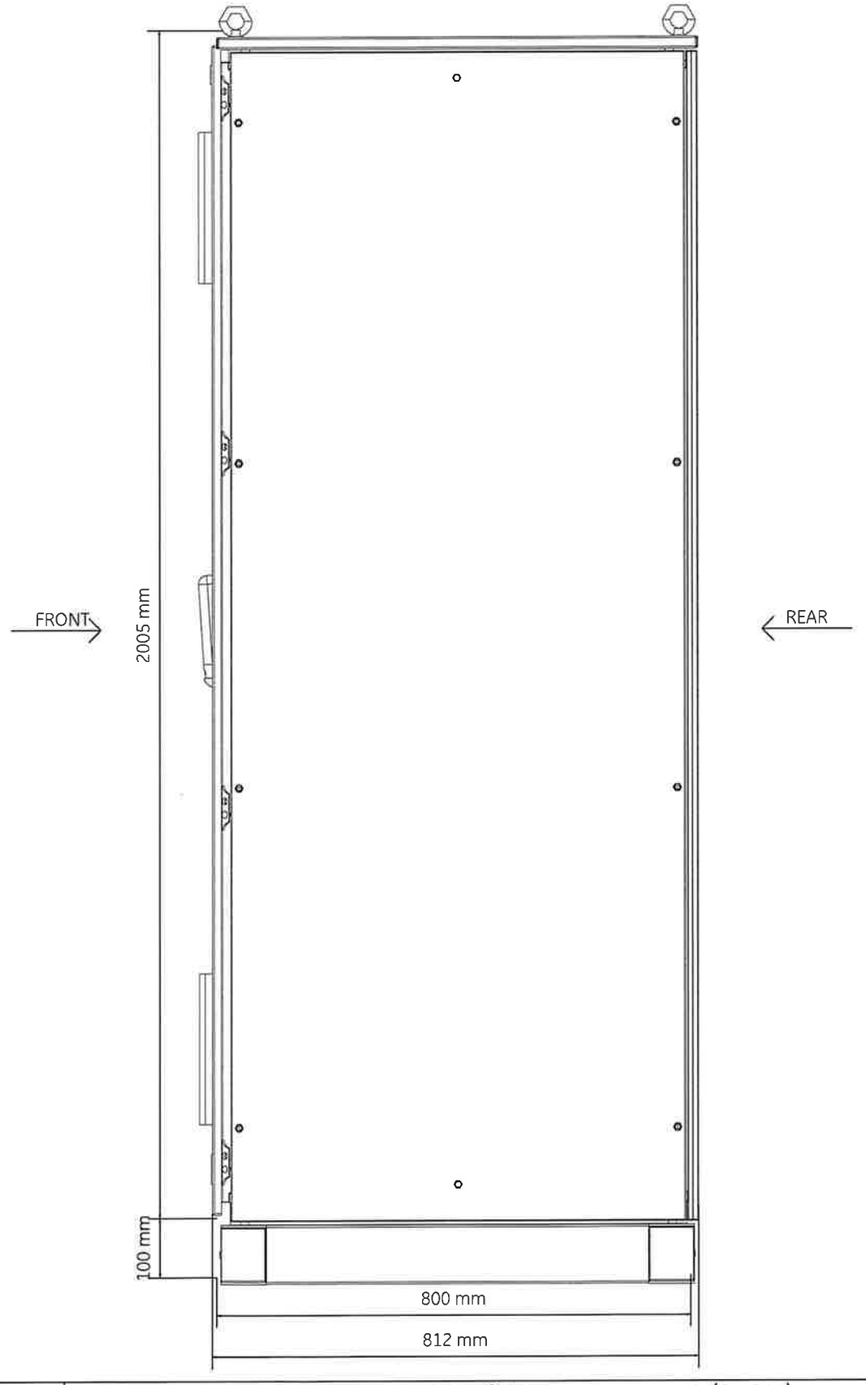
DRAWING NO. 1724000594-IN-DA-00013

SHEET 006

REV. 1

EMCS PANEL - EXTERNAL LEFT SIDE & RIGHT SIDE VIEW





DRAWING SCALE 1:10

YOKOGAWA ◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_CLO

CROSSWIND | ROSETTI MARINO

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	30.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	13.06.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS. CABINET IN ITER GEN. ARR. DRW. AND INTERNAL LAYOUT
EMCS - EXTERNAL LEFT SIDE & RIGHT SIDE VIEW

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

SCALE : 1

A3

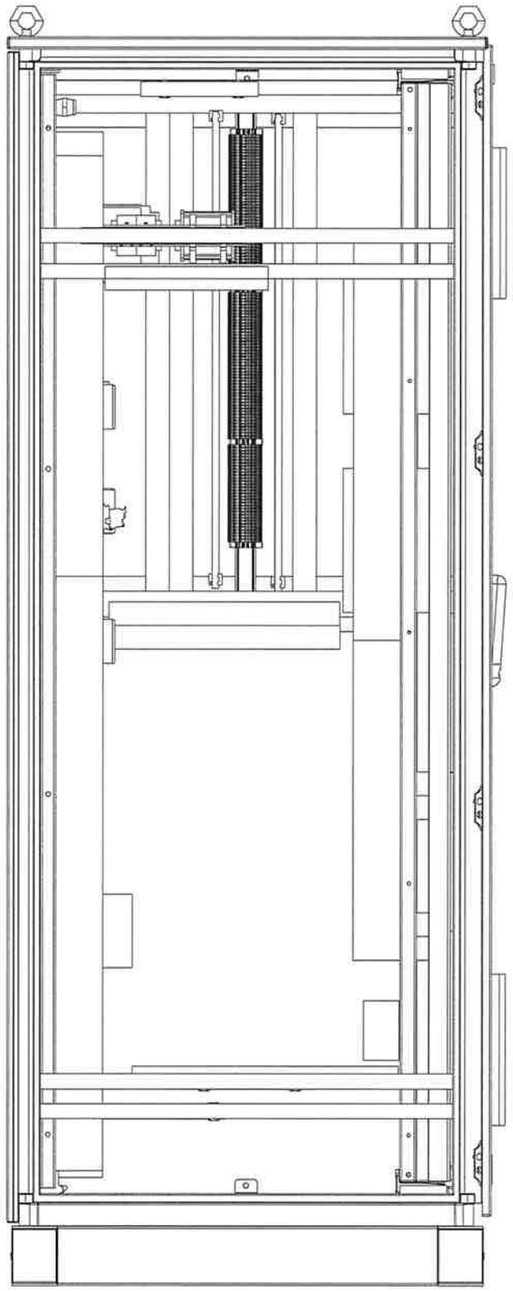
DRAWING NO. 1724000594-IN-DA-00013

SHEET 007

REV. 1

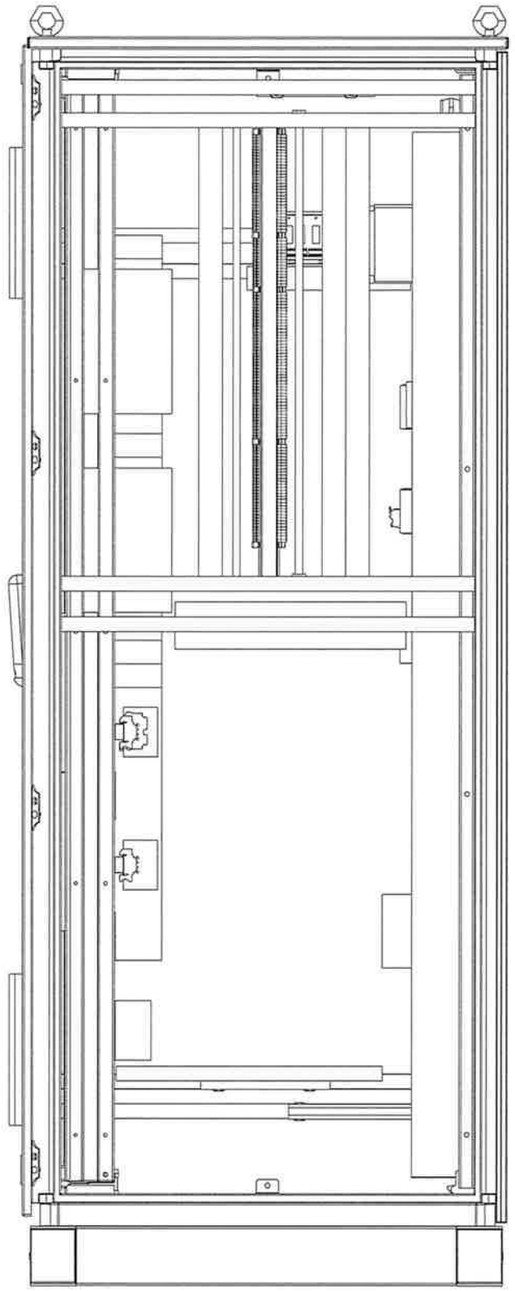
EMCS PANEL - EXTERNAL LEFT SIDE & RIGHT SIDE WHITOUT PANEL

REAR



FRONT

FRONT



REAR

DRAWING SCALE 1:10

1	30.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	13.06.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION

YOKOGAWA ◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_CLO

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS. CABINET IN ITER GEN. ARR. DRW. AND INTERNAL LAYOUT
EMCS - EXTERNAL LEFT SIDE & RIGHT SIDE VIEW WHITOUT PANEL

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

SCALE : 1

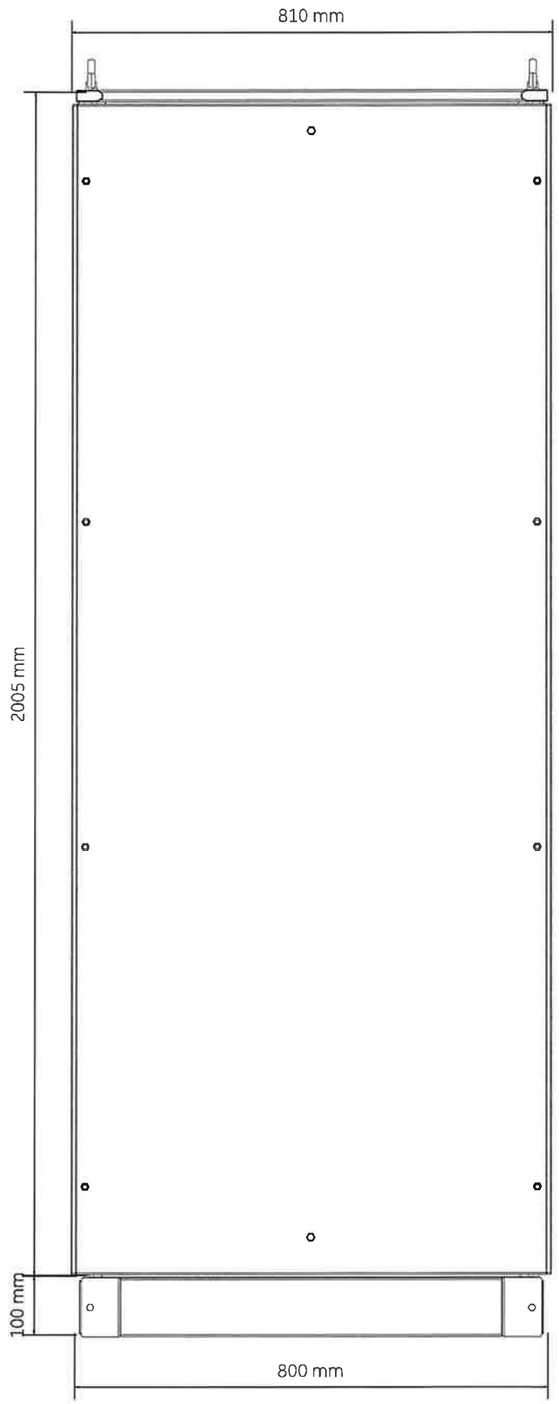
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DRAWING NO. 1724000594-IN-DA-00013

SHEET 008

REV. 1

EMCS PANEL - EXTERNAL REAR VIEW



DRAWING SCALE 1:10

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	30.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	13.06.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA ◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_CLO

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS. CABINET IN ITER GEN. ARR. DRW. AND INTERNAL LAYOUT
EMCS - EXTERNAL REAR VIEW

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DA-00013

SHEET 009

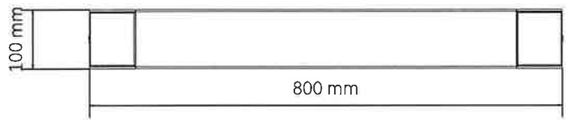
REV. 1

EMCS PANEL - BASEPLATE DETAILS

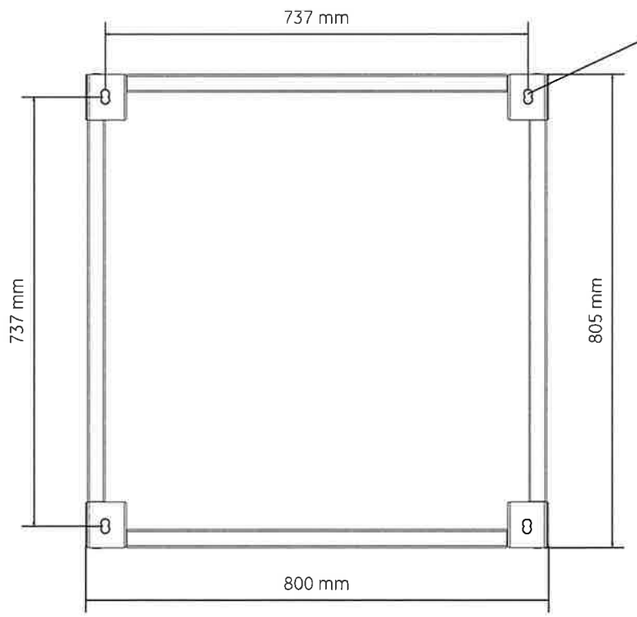
BASEPLATE SIDE VIEW



BASEPLATE FRONT VIEW

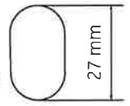


BASEPLATE BOTTOM VIEW
REAR SIDE



FRONT SIDE

<1>



DETAIL OF FIXING HOLE:
Ø 16mm

DRAWING SCALE 1:10

YOKOGAWA ◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_CLO

CROSSWIND

ROSETTI MARINO

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	30.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	13.06.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS. CABINET IN ITER GEN. ARR. DRW. AND INTERNAL LAYOUT
EMCS - BASEPLATE DETAILS

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DA-00013

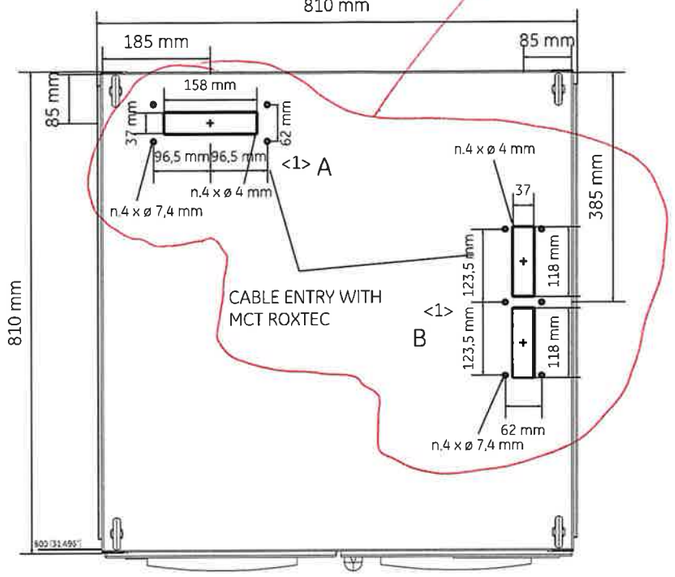
SHEET 010

REV. 1

EMCS PANEL - EXTERNAL & INTERNAL TOP VIEW

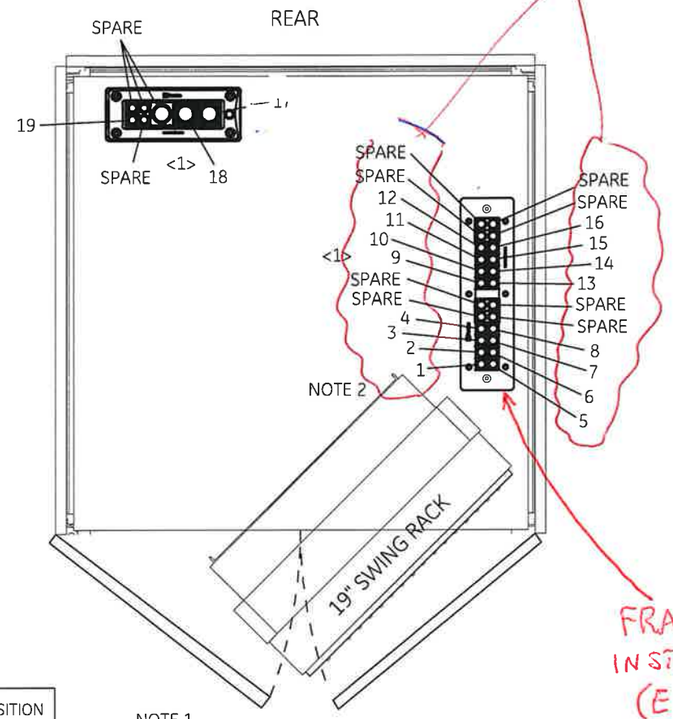
EXTERNAL TOP VIEW

MCT NOT INSTALLED YET (E002)



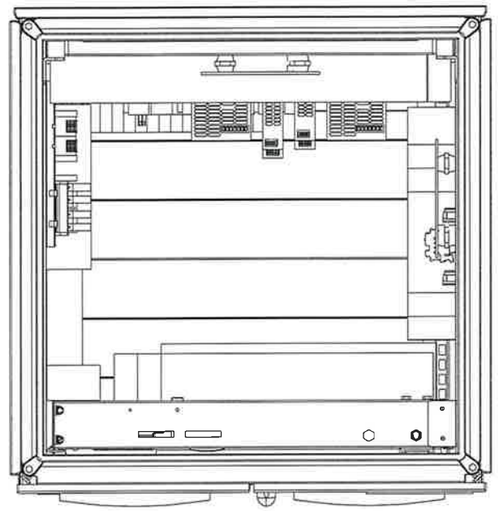
EXTERNAL TOP VIEW (DOOR OPEN)

TO UPDATE



FRAME TO BE INSTALLED IN YARD (E006)

INTERNAL TOP VIEW



<1>

CABLE TAG	CABLE TYPE	OUTER CABLE DIAMETER (mm)	MCT SIZE	LOCATION	POSITION
~~EP-100E1/B400-EMCS-001.01~~	~~FO12-OM2-ARM-FRet-ORANGE-NIS~~	~~8.9~~	~~20x40~~	~~A~~	~~11~~
~~EP-102E1/B400-EMCS-001-02~~	~~LFO12-OM2-ARM-FRet-ORANGE-NIS~~	~~8.9~~	~~20x40~~	~~A~~	~~12~~
~~SG-100G1/B400-EMCS100L01~~	~~CAT.6A 4x2xAWG23-SH+SHT+ARM-FRet-GREEN-NIS~~	~~10.7~~	~~20x40~~	~~A~~	~~5~~
~~SG-100G1/B400-EMCS-001.02~~	~~CAT.6A 4x2xAWG23+SH+SHT+ARM-FRet-GREEN-NIS~~	~~10.7~~	~~20x40~~	~~A~~	~~4~~
~~SG-100G1/B400-EMCS-001.02~~	~~CAT.6A 4x2xAWG23-SH+SHT+ARM-FRet-GREEN-NIS~~	~~10.7~~	~~20x40~~	~~A~~	~~3~~
~~SG-100N1/B400-EMCS-001-01~~	~~CAT.6A 4x2xAWG23-SH+SHT+ARM-FRet-GREEN-NIS~~	~~10.7~~	~~20x40~~	~~A~~	~~6~~
~~SG-200N1/B400-EMCS-001.02~~	~~CAT.6A 4x2xAWG23-SH+SHT+ARM-FRet-GREEN-NIS~~	~~10.7~~	~~20x40~~	~~A~~	~~7~~
~~SG-200N1/B400-EMCS-001.03~~	~~CAT.6A 4x2xAWG23-SH+SHT+ARM-FRet-GREEN-NIS~~	~~10.7~~	~~20x40~~	~~A~~	~~8~~
~~SG-200G2/B400-EMCS-001~~	~~CAT.6A 4x2xAWG23-SH+SHT+ARM-FRet-GREEN-NIS~~	~~10.7~~	~~20x40~~	~~A~~	~~9~~
~~UP-200F1/B400-EMCS-001-01~~	~~CAT.6A 4x2xAWG23+SH+SHT+ARM-FRet-GREEN-NIS~~	~~10.7~~	~~20x40~~	~~A~~	~~10~~
~~UP-200F2/B400-EMCS-001.02~~	~~CAT.6A 4x2xAWG23-SH+SHT+ARM-FRet-GREEN-NIS~~	~~10.7~~	~~20x40~~	~~A~~	~~11~~
~~UP-200F3/B400-EMCS-001-02~~	~~CAT.6A 4x2xAWG23-SH+SHT+ARM-FRet-GREEN-NIS~~	~~10.7~~	~~20x40~~	~~A~~	~~12~~
~~UP-200F4/B400-EMCS-001-01~~	~~CAT.6A 4x2xAWG23-SH+SHT+ARM-FRet-GREEN-NIS~~	~~10.7~~	~~20x40~~	~~A~~	~~14~~
~~UP-200F4/B400-EMCS-001.02~~	~~CAT.6A 4x2xAWG23-SH+SHT+ARM-FRet-GREEN-NIS~~	~~10.7~~	~~20x40~~	~~A~~	~~13~~
~~FR-100N1/B400-EMCS-001~~	~~CAT.6A 4x2xAWG23-SH+SHT+ARM-FRet-GREEN-NIS~~	~~10.7~~	~~20x40~~	~~A~~	~~15~~
84305-CEL	3G2.5	15.5	40x40	A	17
84306-CEL	3G2.5	15.5	40x40	A	18
83106-CEL	3G2.5	13	20x40	A	19
85002-CEC	7C X 1.5	13.5			

ALL THESE CABLES ARE CONNECTED TO B400-NET-001, NOT TO THIS CABINET

Missing no.4 communication cables to B400-NET-001

SUPPLIED BY YOKOGAWA:
B400-NET1-E8
B400-NET1-E9
B400-NET1-E17
B400-NET1-E19

CABLE TO BE ADDED

NOTE 1: DOOR LOCK AT 110°
NOTE 2: DOOR LOCK AT 90°
DRAWING SCALE 1:10

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	30.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	13.06.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA ◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_CLO

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS. CABINET IN ITER GEN. ARR. DRW. AND INTERNAL LAYOUT
EMCS- EXTERNAL & INTERNAL TOP VIEW

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

SCALE : 1

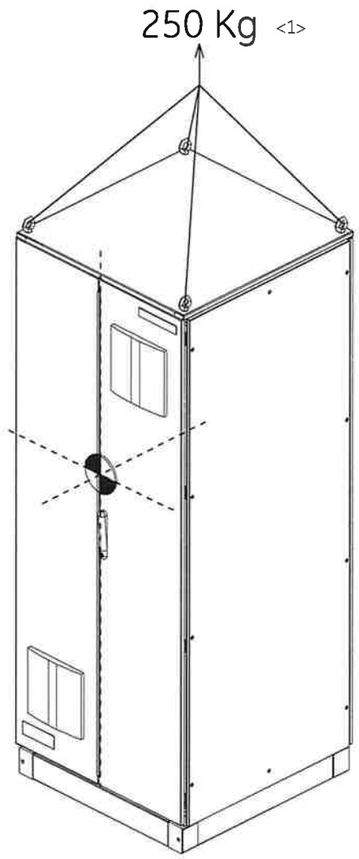
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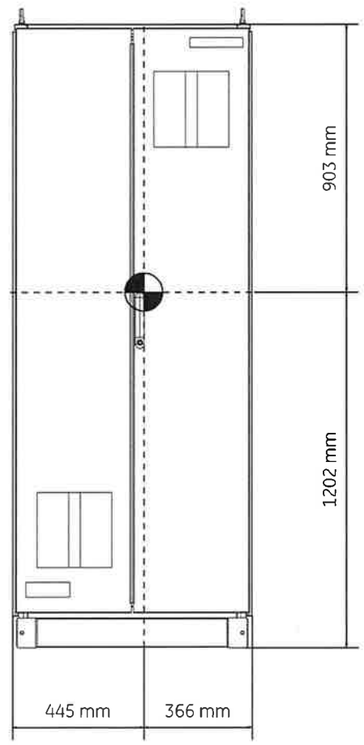
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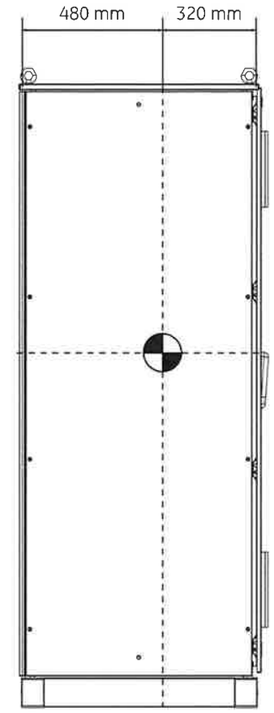
SHEET 011

REV. 1

EMCS PANEL - LIFTING DETAILS







= CENTER OF GRAVITY

DRAWING SCALE 1:20
ALL QUOTES SHOWN ARE APPROXIMATE VALUE

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	30.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	13.06.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA ◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_CLO

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS. CABINET IN ITER GEN. ARR. DRW. AND INTERNAL LAYOUT
EMCS - LIFTING DETAILS

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

SCALE : 1

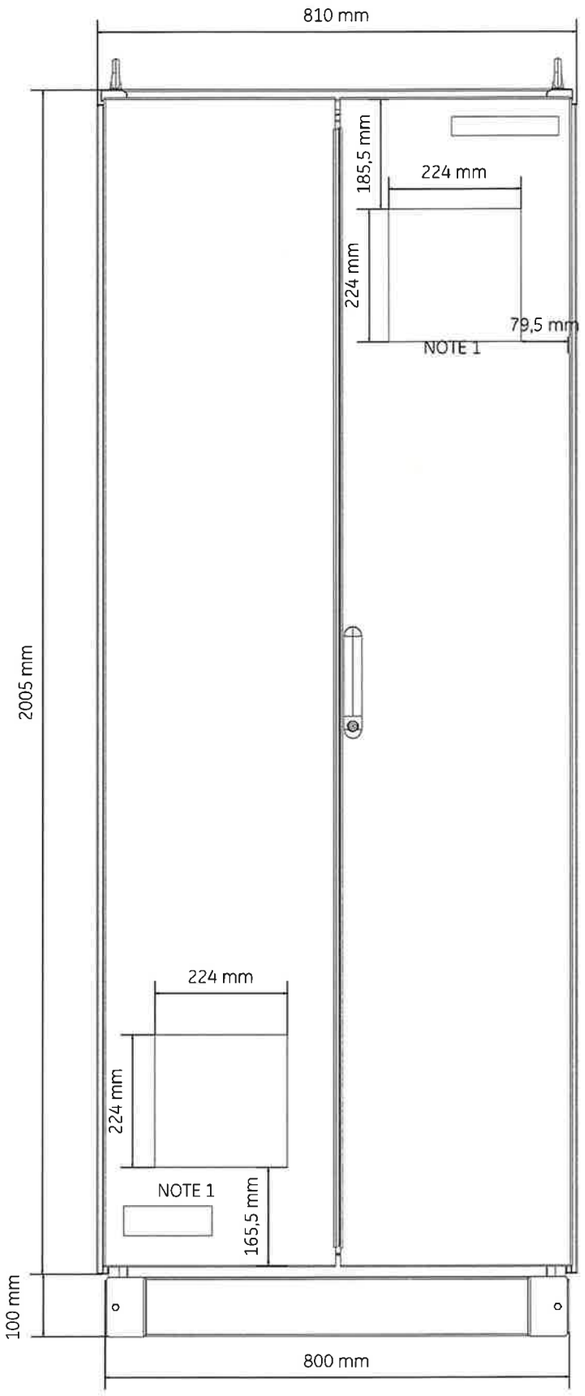
A3

DRAWING NO. 1724000594-IN-DA-00013

SHEET 012

REV. 1

EMCS PANEL - FRONT DOOR CUT-OUT DETAILS



NOTE 1 : CUT-OUT FOR AIR VENTILATION FILTER

DRAWING SCALE 1:10

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	30.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	13.06.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA ◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_CLO

CROSSWIND | ROSETTI MARINO

TITLE :
BASE LOAD POWER HUB (BLPH)
EMCS. CABINET IN ITER GEN. ARR. DRW. AND INTERNAL LAYOUT
EMCS - FRONT DOOR CUT-OUT DETAILS

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

SCALE : 1

A3

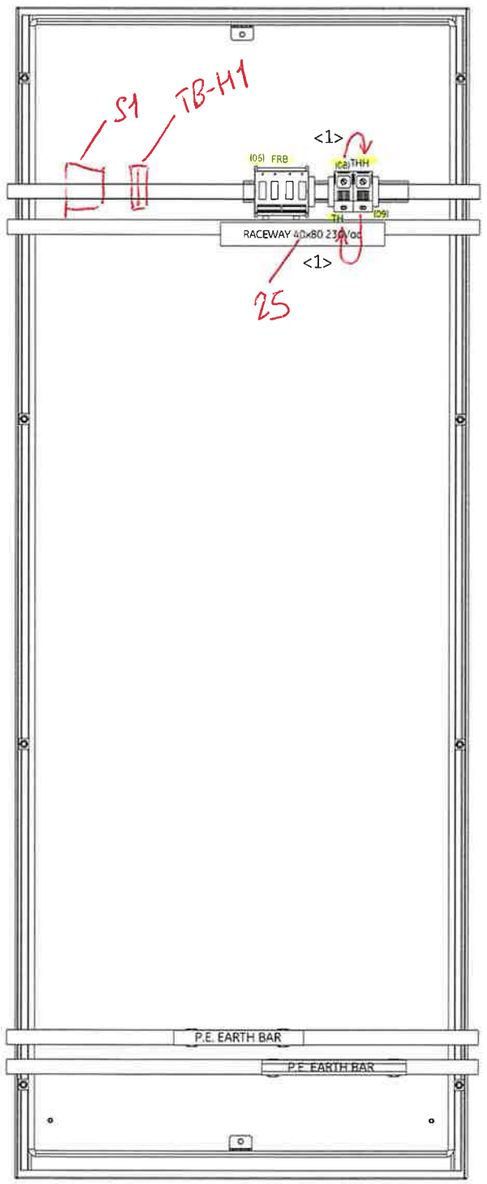
DRAWING NO.
1724000594-IN-DA-00013

SHEET 013

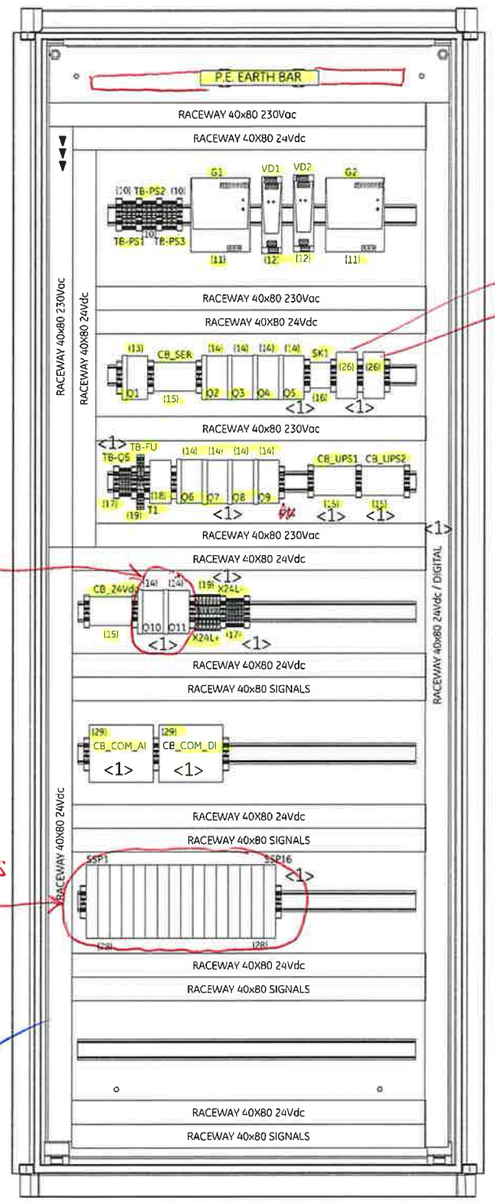
REV. 1

EMCS PANEL - FRONT SIDE INTERNAL VIEW

LEFT SIDE



FRONT PLATE



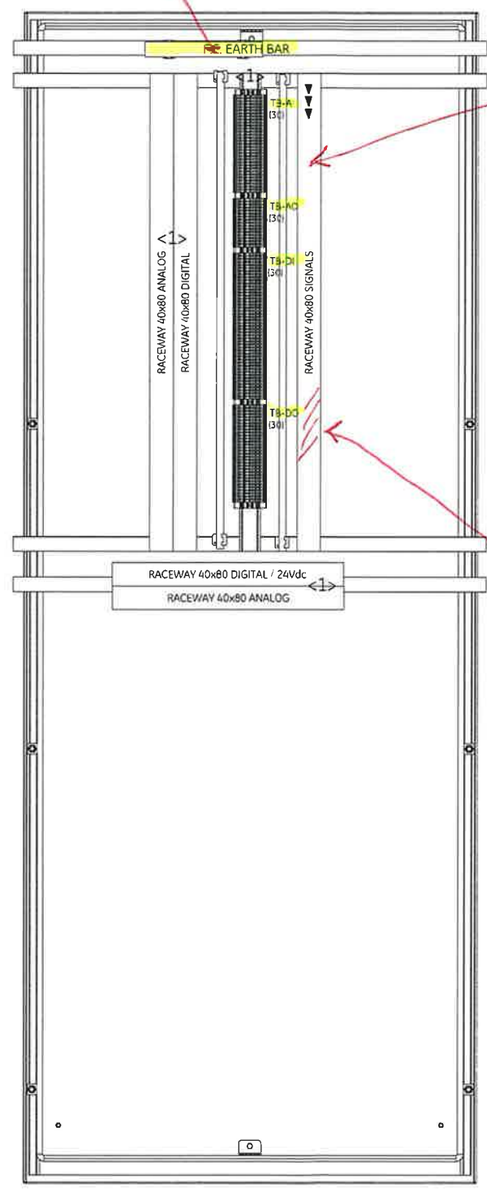
Q10-Q11 NOT YET INSTALLED (E003)

MS1
MS2

SIGNAL SPLITTERS NOT INSTALLED (E004)

INSTALLED 09/10/2024

RIGHT SIDE



I.E.

TO REPLACE WITH 100x80 (E005)

USE A DIFFERENT PATTERN TO IDENTIFY FIELD CABLES RACEWAYS

DRAWING SCALE 1:10

▼ = CABLE ENTRY

YOKOGAWA ◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_CLO

CROSSWIND

ROSETTI MARINO

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
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0	13.06.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

TITLE :
BASE LOAD POWER HUB (BLPH)
EMCS. CABINET IN ITER GEN. ARR. DRW. AND INTERNAL LAYOUT
EMCS - FRONT SIDE INTERNAL VIEWS

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

SCALE : 1

A3

DRAWING NO.
1724000594-IN-DA-00013

SHEET 014

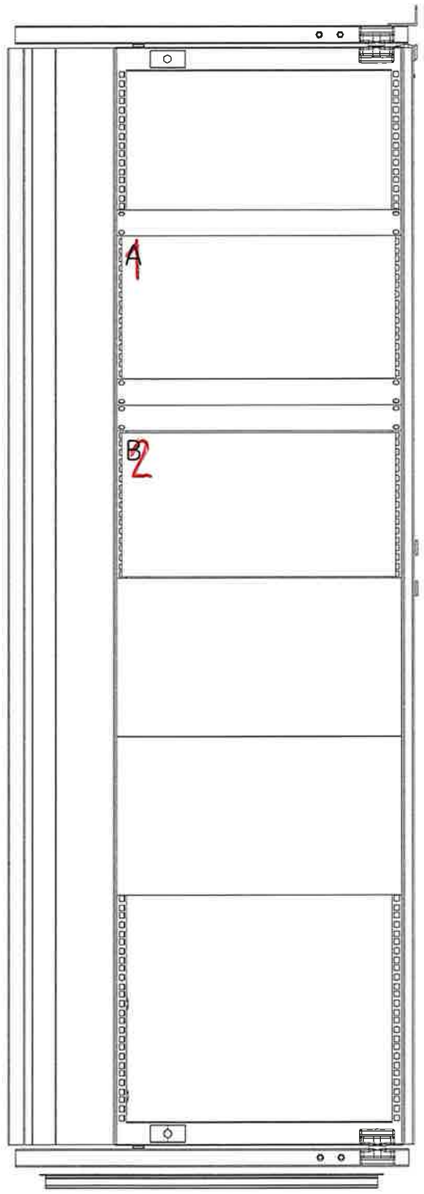
REV. 1

EMCS PANEL - FRONT SIDE SWING RACK INTERNAL VIEW

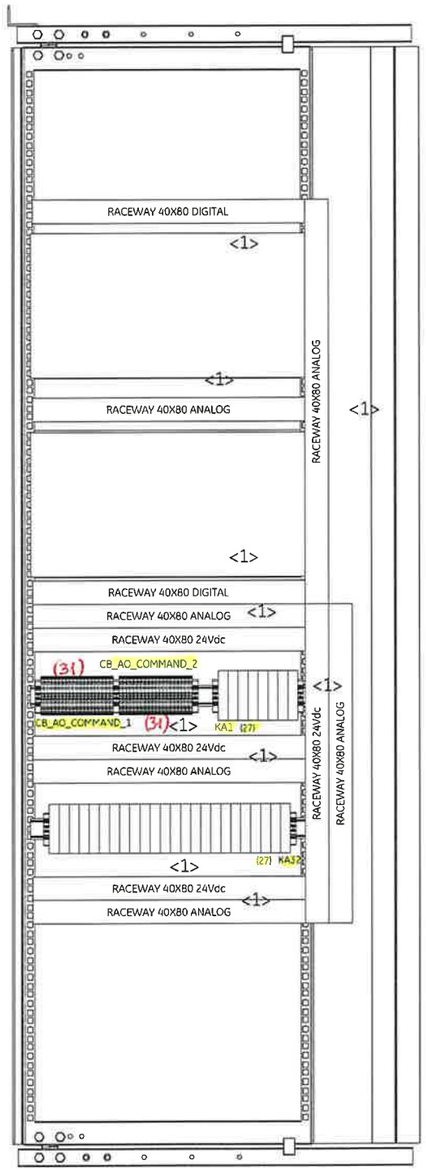
DEVICE "A"
(07) -N: 1 SEL-2241
(21) -N: 1 SEL-2243
(22) -N: 1 SEL-2245-2
(23) -N: 1 SEL-2245-3
(24) -N: 1 SEL-2244-2
(25) -N: 1 SEL-2244-3

DEVICE "B"
(07) -N: 1 SEL-2241
(21) -N: 1 SEL-2243
(22) -N: 1 SEL-2245-2
(23) -N: 1 SEL-2245-3
(24) -N: 1 SEL-2244-2
(25) -N: 1 SEL-2244-3

FRONT RACK



REAR RACK



DRAWING SCALE 1:10

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
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0	13.06.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA ◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_CLO

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS. CABINET IN ITER GEN. ARR. DRW. AND INTERNAL LAYOUT
EMCS - FRONT SIDE INTERNAL VIEWS

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DA-00013

SHEET 015

REV. 1

SHEET LEFT INTENTIONALLY BLANK

1	30.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	13.06.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION

YOKOGAWA ◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_CLO

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS. CABINET IN ITER GEN. ARR. DRW. AND INTERNAL LAYOUT
EMCS - SPARE PAGE

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DA-00013

SHEET 016

REV. 1

TYPICAL 01



TYPICAL 01

MANUFACTURER LABEL ITEM (02)

MATERIAL	:	ALUMINIUM
DIMENSION	:	150mm x 50mm (lxh)
BACKGROUND COLOUR	:	ALUMINIUM
TEXT COLOUR	:	BLACK & GREEN
FIXING	:	BY STAINLESS STEEL SCREWS

DRAWING SCALE 1:1

YOKOGAWA ◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_CLO

CROSSWIND | ROSETTI MARINO

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	30.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	13.06.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS. CABINET IN ITER GEN. ARR. DRW. AND INTERNAL LAYOUT
BH AND MANUFACTURER LABEL DETAILS

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DA-00013

SHEET 017

REV. 1

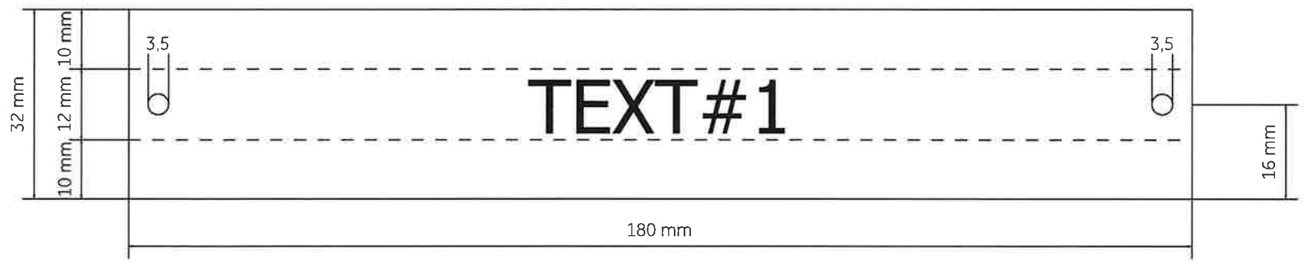
EMCS PANEL - SECTION IDENTIFIER NAMEPLATE DETAILS

TYPICAL 02

LABEL FOR SECTION IDENTIFIER ITEM (03)

MATERIAL	:	TRAFOLYTE
DIMENSION	:	200mm x 45mm (lxh)
BACKGROUND COLOUR	:	TRAFOLYTE
TEXT COLOUR	:	BLACK
TEXT HEIGHT	:	15 mm / 10 mm
TEXT FONT	:	ARIAL
FIXING	:	BY STAINLESS STEEL SCREWS

TYPICAL 02



CABINET	TEXT#1
EMCS	B400-EMCS-001

DRAWING SCALE 1:1

YOKOGAWA ◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_CLO

CROSSWIND | ROSETTI MARINO

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TITLE : BASE LOAD POWER HUB (BLPH)
EMCS. CABINET IN ITER GEN. ARR. DRW. AND INTERNAL LAYOUT
EMCS SECTION IDENTIFIER NAMEPLATE DETAILS

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : 1

A3 | DRAWING NO. 1724000594-IN-DA-00013 | SHEET 018 | REV. 1

SHEET LEFT INTENTIONALLY BLANK

DRAWING SCALE 1:1

YOKOGAWA ◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_CLO

CROSSWIND | ROSETTI MARINO

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TITLE : BASE LOAD POWER HUB (BLPH)
EMCS. CABINET IN ITER GEN. ARR. DRW. AND INTERNAL LAYOUT
SPARE PAGE

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DA-00013

SHEET 019

REV. 1

CERTIFICATION LABELS DETAILS

TYPICAL 05

LABEL FOR ITEM IDENTIFIER : ITEM (25)

MATERIAL	:	TRAFFOLYTE
DIMENSION	:	150mm x 150mm (lxh)
BACKGROUND COLOUR	:	WHITE
TEXT COLOUR	:	BLACK
TEXT HEIGHT	:	4 mm
TEXT FONT	:	ARIAL
FIXING	:	SS316L SCREWS OR RIVETS

<1>

PREI

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INDUSTRIALI

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22040 ALZATE BRIANZA (CO) ITALY Via Pascoli 150 Ph. +39031631875 website : www.prei.it

PREI JOB/SN: C\5529 CONSTRUCTION YEAR: 2024

CUSTOMER PURCHASE ORDER: 4511988955

CUSTOMER JOB N°: E366772C00

REFERENCE DRAWINGS : 1724000594-IN-DA-00013 - OUTLINE DRAWING

1724000594-IN-DG-00024 - SCHEMATIC DRAWING

Line 1: VOLTAGE 230 Vac / 50 Hz Line 1: CURRENT 3A

Line 1: SHORT CIRCUIT CURRENT RATING: 10kA

Line 2: VOLTAGE 230 Vac / 50 Hz Line 2: CURRENT 3A

Line 2: SHORT CIRCUIT CURRENT RATING: 10kA

Line 3: VOLTAGE 230 Vac / 50 Hz Line 3: CURRENT 2,6A

Line 3: SHORT CIRCUIT CURRENT RATING: 10kA

PANEL PROTECTION DEGREE IP43

PANEL OPERATING TEMPERATURE RANGE: +5-+45°C

DRAWING SCALE 1:1
ALL QUOTES SHOWN ARE IN MILLIMETERS

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YOKOGAWA ◆ PROJECT Nr. E36672C00
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CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS. CABINET IN ITER GEN. ARR. DRW. AND INTERNAL LAYOUT
CERTIFICATION LABEL

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DA-00013

SHEET 020

REV. 1

EMCS PANEL COMPONENT LIST

POS.	DESCRIPTION	MANUFACTURER TYPE & MODEL	SHIPPING BOM MARK	Q.TY	NAMEPLATE
01	REMOVABLE LIFTING LUGS -	MANUFACTURER STANDARD	NA001_01	4	MECHANICAL PART NAMEPLATE NOT REQUIRED
02	CABINET MANUFACTURER LABEL -	MANUFACTURER STANDARD	NA001_02	1	DETAILS ON SHEET 027 TYPICAL 02
03	SECTION IDENTIFICATION LABEL -	MANUFACTURER STANDARD	NA001_03	1	DETAILS ON SHEET 028 TYPICAL 03
04	AIR INLET FILTER -	AUGER STANDARD	NA001_04	1	MECHANICAL PART NAMEPLATE NOT REQUIRED
05	FRONT-MOUNTED AIR EXTRACTOR FAN (SUPPLIED WITH AIR FILTER) -	AUGER STANDARD	NA001_05	1	EV1 ~~EV~~ (INTERNAL LABEL) EXTERNAL LABEL NOT REQUIRED
06	PRE-ASSEMBLED RELAY BOARD FOR FAN FAULT CIRCUIT -	PREI	NA001_06	1	FRB (INTERNAL LABEL) EXTERNAL LABEL NOT REQUIRED
07	RTAC SEL 2241 CHASSIS/BACKPLANE	<1> SEL	NA001_07	2	~~T.B.D.~~ AX10N1 - AX10N2 EXTERNAL LABEL NOT REQUIRED
08	THERMOSTAT FOR FAN ON/OFF CIRCUIT -	MANUFACTURER STANDAR	NA001_08	1	TH (INTERNAL LABEL) EXTERNAL LABEL NOT REQUIRED
09	THERMOSTAT FOR HIGH TEMPERATURE ALARM -	MANUFACTURER STANDARD	NA001_09	1	THH (INTERNAL LABEL) EXTERNAL LABEL NOT REQUIRED
10	FEED-THROUGH TYPE TERMINAL SCREW TYPE - GREY COLOUR - SECTION 6mm²	PHOENIX CONTACT UT 6	NA001_10	9	TB-PS1 ÷ TB-PS3 (INTERNAL LABEL) EXTERNAL LABEL NOT REQUIRED
11	POWER SUPPLY FEEDER MODULE INPUT 230Vac (AUTO-RANGING) - OUTPUT 24Vdc-20a	WEIDMULLER QUINT4-PS/1AC/24DC/20 WDM.1469510000	NA001_11	2	G1 ÷ G2 (INTERNAL LABEL) EXTERNAL LABLE NOT REQUIRED
12	DECOUPLING & PROTECTIVE DIODE FOR REDUNDANCY - 24Vdc -	WEIDMULLER PRO DM 20 WDM.2486080000	NA001_12	2	VD1 - VD2 (INTERNAL LABEL) EXTERNAL LABLE NOT REQUIRED
13	PURE Id CIRCUIT BREAKER WITH AUXILIARY CONTACT 2 POLES - 240Vac - 50Hz - 25A - Id: 30mA	EATON FAZ SERIES	NA001_13	1	Q1 (INTERNAL LABEL) EXTERNAL LABEL NOT REQUIRED
14	AUTOMATIC MAGNETO-THERMAL CIRCUIT BREAJER - 115Vac / 240Vac WHIT AUXILIARY CONTACT TO SPLIT BY DIFFERENT RATING	EATON FAZ SERIES	NA001_14	<1> 10	<1> Q2 ÷ Q11 (INTERNAL LABEL) EXTERNAL LABEL NOT REQUIRED

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YOKOGAWA ◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_CLO

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS. CABINET IN ITER GEN. ARR. DRW. AND INTERNAL LAYOUT
EMCS MAIN COMPONENT LIST

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DA-00013

SHEET 021

REV. 1

EMCS PANEL COMPONENT LIST

POS.	DESCRIPTION	MANUFACTURER TYPE & MODEL	SHIPPING BOM MARK	Q.TY	NAMEPLATE
15	2 POLES COMMON BOX - 7 CONNECTION EACH POLE -	<1> CABUR QBLOCK SERIES	NA001_15	<1> 4	<1> CB_SER - CB_24Vdc - CB_UPS1 - CB_UPS2 (INTERNAL LABEL) EXTERNAL LABEL NOT REQUIRED
16	SERVICE SOCKET INCLUDING SOCKET DIN MOUNTING KIT	MANUFACTURER STANDARD	NA001_16	1	SK1 (INTERNAL LABEL) EXTERNAL LABEL NOT REQUIRED
17	DISTRIBUTION TERMINALS - SCREW TYPE - SECTION 2.5mm² FEED THROUGH TYPE - GREY COLOUR	PHOENIX CONTACT UT 2.5 PXC.3044076	NA001_17	<1> 11	<1> TB-Q5 - X24L- (INTERNAL LABLE) EXTERNAL LABEL NOT REQUIRED
18	TRASFORMER 240Vac / 24Vac - 50Hz 10VA -	ABB TM10 124 EA2616	NA001_18	1	T1 (INTERNAL LABEL) EXTERNAL LABEL NOT REQUIRED
19	TERMINALS - SCREW TYPE - SECTION 4mm² FUSE DISCONNECT TYPE - BLACK COLOUR	PHOENIX CONTACT UT 4 HESI PXC.3046032	NA001_19	<1> 9	<1> TB-FU - X24L+ (INTERNAL LABEL) EXTERNAL LABEL NOT REQUIRED
20	~~INTERPOSING RELAY FOR HEATER CUT-OUT~~ ~~COIL 240Vac 50Hz 2 CONTACTS~~	~~PHOENIX CONTACT~~ ~~PLC-RCS-230UC/21-21~~ ~~PXC.2967099~~	~~NA001_20~~	~~1~~	~~KTHG (INTERNAL LABEL)~~ ~~EXTERNAL LABEL NOT REQUIRED~~
21	RTAC SEL 2243 POWER COUPLER MODULE	<1> SEL	NA001_21	2	T.B.D. EXTERNAL LABEL NOT REQUIRED
22	RTAC SEL 2245-2 ANALOG INPUT MODULE	<1> SEL	NA001_22	2	T.B.D. EXTERNAL LABEL NOT REQUIRED
23	RTAC SEL-2245-3 ANALOG OUTPUT MODULE	<1> SEL	NA001_23	2	T.B.D. EXTERNAL LABEL NOT REQUIRED
24	RTAC SEL-2244-2 DIGITAL INPUT MODULE	<1> SEL	NA001_24	2	T.B.D. EXTERNAL LABEL NOT REQUIRED
25	RTAC SEL-2244-3 DIGITAL OUTPUT MODULE	<1> SEL	NA001_25	2	T.B.D. EXTERNAL LABEL NOT REQUIRED
<1> 26	ROTATIVE MAIN SWITCH - 230Vac - 50Hz - ~~25A~~ 32 A -	LOVATO LOGA0~~2~~3~~5~~A	NA001_26	2	MS1 - MS2 (INTERNAL LABEL) EXTERNAL LABEL NOT REQUIRED
<1> 27	MODULAR STEP RELAYS 16 A -	FINDER 202290240000	NA001_27	32	KA1 ÷ KA32 (INTERNAL LABEL) EXTERNAL LABEL NOT REQUIRED
<1> 28	SIGNAL SPLITTER -	PEPPERL+FUCHS KFD2-STC5-1.20	NA001_28	16	SSP1 ÷ SSP16 (INTERNAL LABEL) EXTERNAL LABEL NOT REQUIRED

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YOKOGAWA ◆ PROJECT Nr. E36672C00
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CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS. CABINET IN ITER GEN. ARR. DRW. AND INTERNAL LAYOUT
EMCS MAIN COMPONENT LIST

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DA-00013

SHEET 022

REV. 1

EMCS PANEL COMPONENT LIST

POS.	DESCRIPTION	MANUFACTURER TYPE & MODEL	SHIPPING BOM MARK	Q.TY	NAMEPLATE
<1> 29	2 POLES COMMON BOX - 60 CONNECTION EACH POLE -	CABUR QBLOCK SERIES	NA001_29	2	CB_COM_AI - CB_COM_DI (INTERNAL LABEL) EXTERNAL LABEL NOT REQUIRED
<1> 30	SCREW TYPE TERMINALS - SECTION 2,5 KNIFE DISCONNECTING TYPE - GREY COLOUR	PHOENIX CONTACTS UT 2,5 MT PXC.3046362	NA001_30	128	TB_AI - TB_AO - TB_DI - TB_DO EXTERNAL LABEL NOT REQUIRED
<1> 31	SCREW TYPE TERMINALS - SECTION 2,5 FEED THROUGH TYPE - GREY COLOUR	PHOENIX CONTACTS UT 2,5 QUATRO PXC.3044542	NA001_31	40	CB_AO_COMMAND_1 - CB_AO_COMMAND_2 (INTERNAL LABEL) EXTERNAL LABEL NOT REQUIRED
32	- -	-	NA001_32	-	- -
33	- -	-	NA001_33	-	- -
34	- -	-	NA001_34	-	- -
35	- -	-	NA001_35	-	- -
36	- -	-	NA001_36	-	- -
37	- -	-	NA001_37	-	- -
38	- -	-	NA001_38	-	- -
39	- -	-	NA001_39	-	- -
40	- -	-	NA001_40	-	- -
41	- -	-	NA001_41	-	- -
42	- -	-	NA001_42	-	- -

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
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CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS. CABINET IN ITER GEN. ARR. DRW. AND INTERNAL LAYOUT
EMCS MAIN COMPONENT LIST

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DA-00013

SHEET 023

REV. 1

BASE LOAD POWER HUB (BLPH)
EMCS CABINET
WIRING DIAGRAMS AND TERMINAL STRIPS

ROSETTI MARINO	
1	NO COMMENTS - APPROVED - WORK MAY PROCEED
2	MINOR COMMENTS - REVISE AND RESUBMIT - WORK MAY PROCEED
3	MAJOR COMMENTS – REJECTED – DO NOT PROCEED
4	APPROVAL NOT REQUIRED
NOTE: Approval doesn't relieve the supplier from mandatory compliance with contractual documents and specifications. Comments made do not imply acceptance of any cost or delivery impact.	
Sign	Date
	01/10/2024

MASTER
COPIA X TEST FINALI
ROSSI DATE 1/10/24

NEXT REVISION SHALL BE "ACCEPTED FOR CONSTRUCTION (AFC)"

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	25.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	05.08.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_WD

CROSSWIND | ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
COVER PAGE

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

SCALE : n.a.

A3

DRAWING NO. 1724000594-IN-DG-00024

SHEET 001

REV. 1

PAG. NR.	REVISION 0	1	2	3	4	5	6	7	8	TITLE
001	X	X								BASE LOAD POWER HUB (BLPH) COVER PAGE
002	X	X								BASE LOAD POWER HUB (BLPH) INDEX
003	X									BASE LOAD POWER HUB (BLPH) LEGEND
004	X	X								BASE LOAD POWER HUB (BLPH) SYMBOL LEGEND
005	X	X								BASE LOAD POWER HUB (BLPH) TYPICAL WIRE MARKING & EARTH BAR CONNECTION DETAILS
016	X									BASE LOAD POWER HUB (BLPH) EMCS PANEL - 230Vac POWER DISTRIBUTION FROM UPS LINE 1
017	X									BASE LOAD POWER HUB (BLPH) EMCS PANEL - 230Vac POWER DISTRIBUTION FROM UPS LINE 2
018	X									BASE LOAD POWER HUB (BLPH) EMCS PANEL - 230Vac POWER DISTRIBUTION FROM NON-UPS
019	X									BASE LOAD POWER HUB (BLPH) EMCS PANEL - 230Vac POWER DISTRIBUTION FROM NON-UPS
020	X	X								BASE LOAD POWER HUB (BLPH) EMCS PANEL - 230Vac 50Hz POWER DISTRIBUTION VENTILATION FAN
021	X									BASE LOAD POWER HUB (BLPH) SPARE PAGE
022	X	X								BASE LOAD POWER HUB (BLPH) EMCS PANEL - 230Vac / 24Vdc POWER DISTRIBUTION
023	X									BASE LOAD POWER HUB (BLPH) SPARE PAGE
024	X	X								BASE LOAD POWER HUB (BLPH) EMCS PANEL - BREAKER FAULT ALARM CIRCUIT
025	X									BASE LOAD POWER HUB (BLPH) EMCS PANEL - SHIELD / GROUND CONNECTION
026	X	X								BASE LOAD POWER HUB (BLPH) EMCS PANEL - FAULT ALARM SIGNALS TO DCS
027	X	X								BASE LOAD POWER HUB (BLPH) EMCS PANEL - 24Vdc POWER DISTRIBUTION
028	X	X								BASE LOAD POWER HUB (BLPH) EMCS PANEL - AO SWITCH COMMAND
029	X	X								BASE LOAD POWER HUB (BLPH) EMCS PANEL - RACK "A"-SEL-2241
030	X	X								BASE LOAD POWER HUB (BLPH) EMCS PANEL - RACK "B"-SEL-2241

PAG. NR.	REVISION 0	1	2	3	4	5	6	7	8	TITLE
031	X	X								BASE LOAD POWER HUB (BLPH) EMCS PANEL - TYPICAL WIRING DIGITAL INPUT (COMMON NEGATIVE)
032	X	X								BASE LOAD POWER HUB (BLPH) EMCS PANEL - TYPICAL WIRING DIGITAL INPUT (INDEPENDENT NEGATIVE)
033	X	X								BASE LOAD POWER HUB (BLPH) EMCS PANEL - TYPICAL WIRING DIGITAL OUTPUT
034	X	X								BASE LOAD POWER HUB (BLPH) EMCS PANEL - TYPICAL WIRING ANALOG INPUT
035	X	X								BASE LOAD POWER HUB (BLPH) EMCS PANEL - TYPICAL WIRING ANALOG OUTPUT
036	X	X								BASE LOAD POWER HUB (BLPH) EMCS PANEL - DIGITAL INPUT SIGNALS
037		X								BASE LOAD POWER HUB (BLPH) EMCS PANEL - DIGITAL OUTPUT SIGNALS
038		X								BASE LOAD POWER HUB (BLPH) EMCS PANEL - ANALOG INPUT SIGNALS
039		X								BASE LOAD POWER HUB (BLPH) EMCS PANEL - ANALOG OUTPUT SIGNALS (SIGNAL PART)
040		X								BASE LOAD POWER HUB (BLPH) EMCS PANEL - ANALOG OUTPUT SIGNALS (SWITCH PART)

PAG. NR.	REVISION 0	1	2	3	4	5	6	7	8	TITLE

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
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YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_WD

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
INDEX

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DG-00024

SHEET 002

REV. 1

NUMBER	SYMBOL	REFERENCE	DESCRIPTION
01		IEC 60417-5031	DIRECT CURRENT
02		IEC 60417-5032	ALTERNATING CURRENT
03		IEC 60417-5033	BOTH DIRECT AND ALTERNATING CURRENT
04		.	THREE-PHASE ALTERNATING CURRENT
05		IEC 60417-5017	EARTH (GROUND) TERMINAL
06		IEC 60417-5019	PROTECTIVE CONDUCTOR TERMINAL
07		IEC 60417-5020	FRAME OR CHASSIS TERMINAL
08		IEC 60417-5021	EQUIPOTENTIALITY
09		IEC 60417-5007	ON (SUPPLY)
10		IEC 60417-5008	OFF (SUPPLY)
11		IEC 60417-5172	EQUIPMENT PROTECTED THROUGHOUT BY DOUBLE INSULATION OR REINFORCED INSULATION
12		.	CAUTION RISK OF ELECTRIC SHOCK
13		IEC 60417-5041	CAUTION HOT SURFACE
14		ISO 7000-0434	CAUTION RISK OF DANGER
15		IEC 60417-5266	IN POSITION OF A BI-STABLE PUSH CONTROL
16		IEC 60417-5269	OUT POSITION OF A BI-STABLE PUSH CONTROL

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CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
LEGEND

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

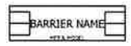
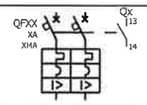
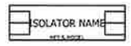
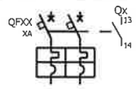
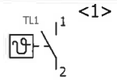
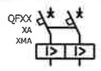
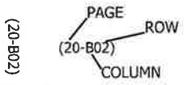
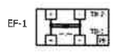
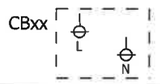
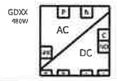
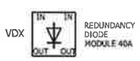
SCALE : 1

A3

DRAWING NO. 1724000594-IN-DG-00024

SHEET 003

REV. 1

	ROTATIVE MAIN SWITCH -		ELECTRIC FAN WITH FAULT DETECTION		I.S. BARRIER (NOTE: AB-xx FOR ACTIVE BARRIERS, ZB-xx FOR ZENER BARRIERS)
	DIFFERENTIAL RESIDUAL CURRENT CIRCUIT BREAKER WITH AUXILIARY CONTACT		PANEL ELECTRIC HEATER -		GALVANIC ISOLATOR -
	AUTOMATIC CIRCUIT BREAKER WITH AUXILIARY CONTACT		AC/AC VOLTAGE TRANSFORMER -		FUSED TERMINAL -
	DISCONNECTOR WITH FUSE -		THERMOSTATE NO CONTACT -		KNIFE TERMINAL -
	PURE RESIDUAL CURRENT CIRCUIT BREAKER		NO CONTACT -		FEED THROUGH TERMINAL -
	SURGE ARRESTOR -		NC CONTACT -		PAGE CROSS REFERENCE INDICATION -
	LINE FILTER MODULE -		DOOR LIMIT SWITCH -		COMMON BOX -
	SERVICE SOCKET -		FRONT PANEL ALARM BUZZER -		- -
	AC/DC FEEDER -		INTERNAL LIGHT OR FRONT PANEL LIGHT		- -
	REDUNDANCY DIODE MODULE -		MUSHROOM PUSHBUTTON INDICATOR NORMAL PUSHBUTTON INDICATOR		- -
	RELAYS -		ROTATIVE SELECTOR INDICATOR -		- -
	- -		RESISTOR -		- -
	- -		- -		- -

ADD SYMBOL FOR STEP RELAYS

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	25.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	05.08.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_WD

CROSSWIND ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
SYMBOL LEGEND

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DG-00024

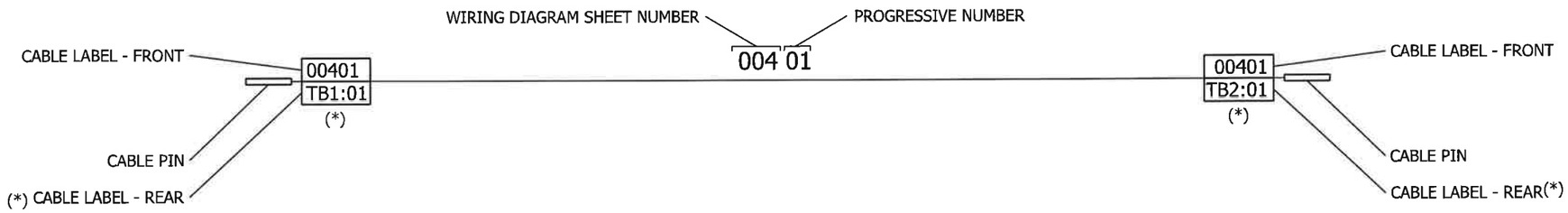
SHEET 004

REV. 1

COLOR ACRONYMS LIST :

RD	-	RED
BK	-	BLACK
BL	-	BLUE
LB	-	LIGHT BLUE
GR	-	GREY
GN	-	GREEN
YE	-	YELLOW
Y/G	-	YELLOW/GREEN
BR	-	BROWN
WH	-	WHITE

TYPICAL WIRE MARKING



EARTH CONNECTION RESUME TABLE:

	CABINET
P.E. EARTH	●●●●●●●●●●●●●●●
I.E. EARTH	●●●●●●●●●●●●●●●

EARTH ACRONYMS LEGEND :

P.E. (GND) - PROTECTION EARTH (GROUND, FRAME CHASSIS)
I.E. (F.E.) - INSTRUMENT EARTH (NOISELESS), FUNCTIONAL EARTH

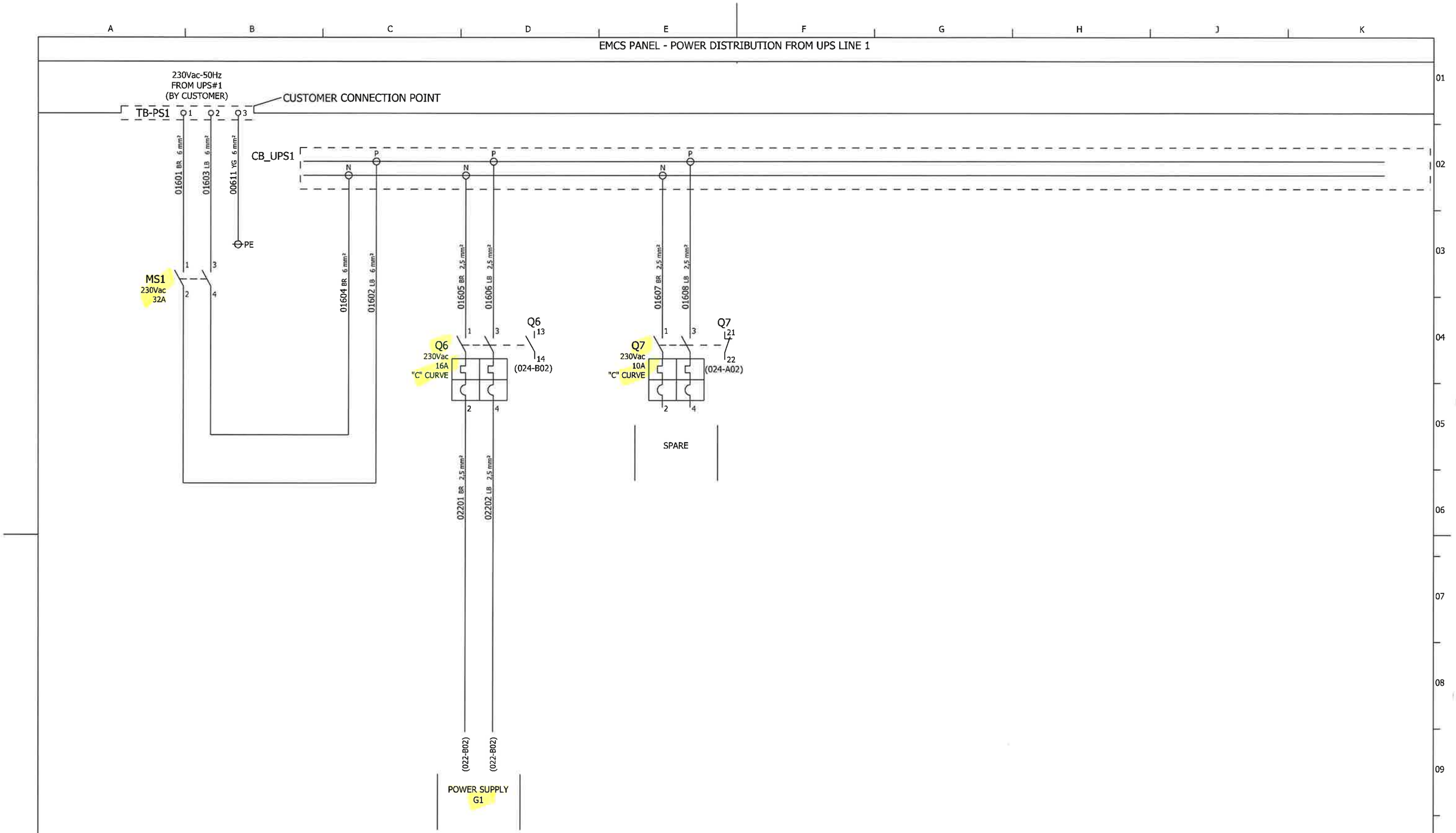
REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	25.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	05.08.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_WD
CROSSWIND
ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
TYPICAL WIRE MARKING & EARTH BAR CONNECTION DETAILS

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK
SCALE : 1
A3
DRAWING NO. 1724000594-IN-DG-00024
SHEET 005
REV. 1

EMCS PANEL - POWER DISTRIBUTION FROM UPS LINE 1



1	25.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	05.08.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION

YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_WD

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
EMCS PANEL - 230Vac POWER DISTRIBUTION FROM UPS LINE 1

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DG-00024

SHEET 016

REV. 1

EMCS PANEL - POWER DISTRIBUTION FROM UPS LINE 2

230Vac-50Hz
FROM UPS#2
(BY CUSTOMER)

CUSTOMER CONNECTION POINT

TB-PS2 1 2 3

01701 BR 6 mm²
01703 LB 6 mm²
00611 YG 6 mm²
PE

CB_UPS2 N P N P N P

MS2
230Vac
32A
1 3 2 4

01704 BR 6 mm²
01702 LB 6 mm²
01705 BR 2,5 mm²
01706 LB 2,5 mm²
01707 BR 2,5 mm²
01708 LB 2,5 mm²

Q8
230Vac
16A
"C" CURVE
1 3 2 4
Q8 13 14
(024-A03)

Q9
230Vac
10A
"C" CURVE
1 3 2 4
Q9 21 22
(024-B03)

SPARE

02203 BR 2,5 mm²
02204 LB 2,5 mm²
(022-H02)
(022-H02)

POWER SUPPLY
G2

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	25.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	05.08.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_WD

CROSSWIND

ROSETTI MARINO

TITLE :
BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
EMCS PANEL - 230Vac POWER DISTRIBUTION FROM UPS LINE 2

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

SCALE : 1

A3

DRAWING NO.
1724000594-IN-DG-00024

SHEET 017

REV. 1

EMCS PANEL - POWER DISTRIBUTION FROM NON UPS

230Vac-50Hz
FROM MCC
(BY CUSTOMER)

CUSTOMER CONNECTION POINT

TB-PS3 1 2 3

01801 BR 6 mm² | 01803 LB 6 mm² | 00611 YG 6 mm² → PE

CB_SER
(019-A01)

N P P N P N P N

(019-A01)
(019-A01)

01804 LB 6 mm² | 01802 BR 6 mm²

01805 BR 2.5 mm² | 01807 LB 2.5 mm²

01809 BR 2.5 mm² | 01813 LB 2.5 mm²

01814 BR 2.5 mm² | 01815 LB 2.5 mm²

Q1
230Vac
25A
Id 30mA
(024-G02)

Q2
230Vac
16A
"C" CURVE
(024-F02)

Q3
230Vac
2A
"C" CURVE
(024-E02)

Q4
230Vac
4A
"C" CURVE
(024-D02)

SPARE

01806 BR 2.5 mm² | 01808 LB 2.5 mm²

01810 BR 1.5 mm²

S1

01811 BR 1.5 mm² | 01812 LB 1.5 mm²

H1

SK1

00611 YG 2.5 mm² → PE

SERVICE SOCKET
230Vac 50Hz

INTERNAL LIGHT
230Vac 50Hz
TOTAL CONSUMPTION: 15W

NOTE:
INTERNAL LAMP IS DOUBLE INSULATION DEVICE.
NO EARTH CONNECTION REQUIRED.

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	25.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	05.08.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_WD

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
EMCS PANEL - 230Vac POWER DISTRIBUTION FROM NON-UPS

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

SCALE : 1

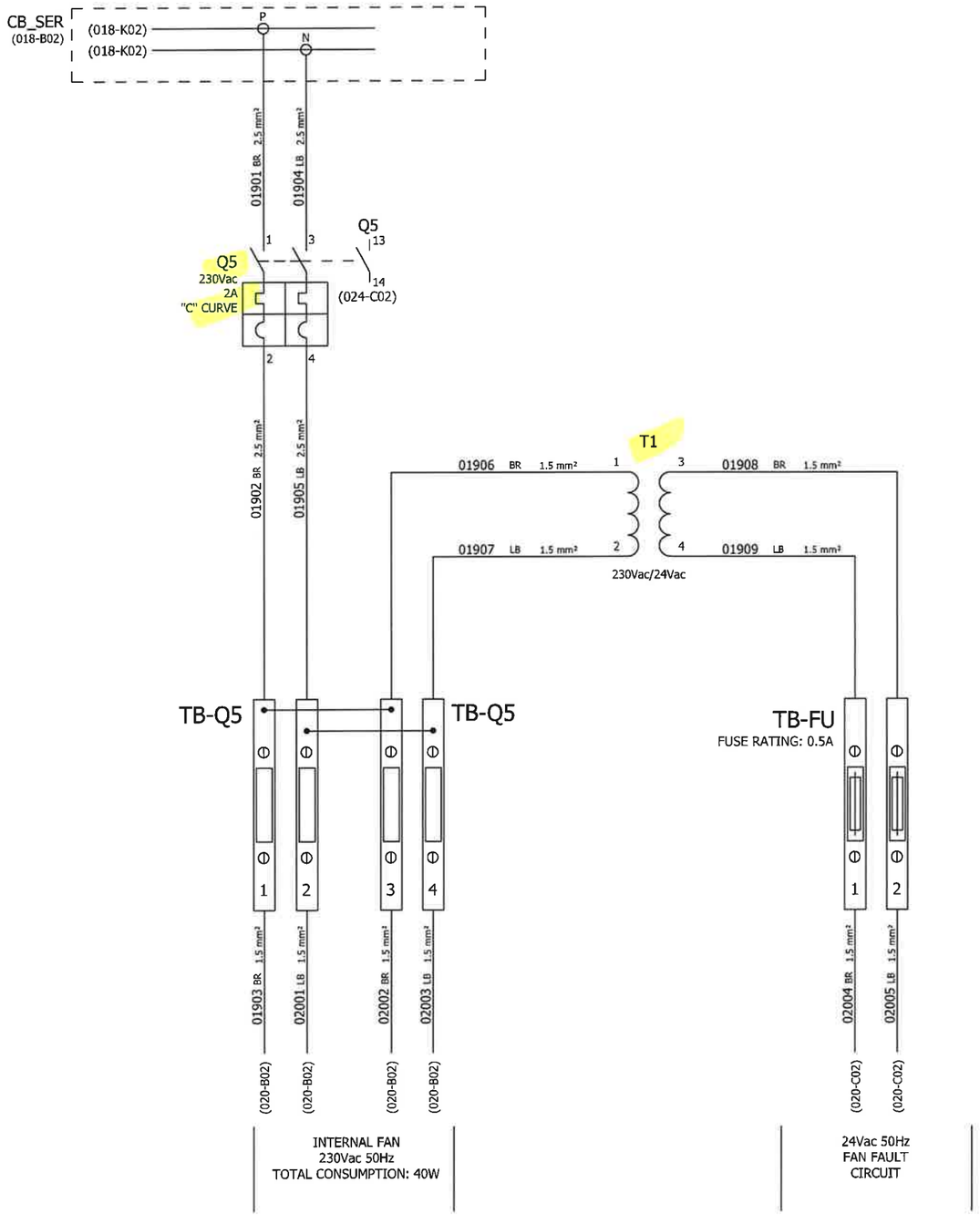
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DRAWING NO. 1724000594-IN-DG-00024

SHEET 018

REV. 1

EMCS PANEL - POWER DISTRIBUTION FROM NON UPS



REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	25.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	05.08.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_WD

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
EMCS PANEL - 230Vac POWER DISTRIBUTION FROM NON-UPS

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

SCALE : 1

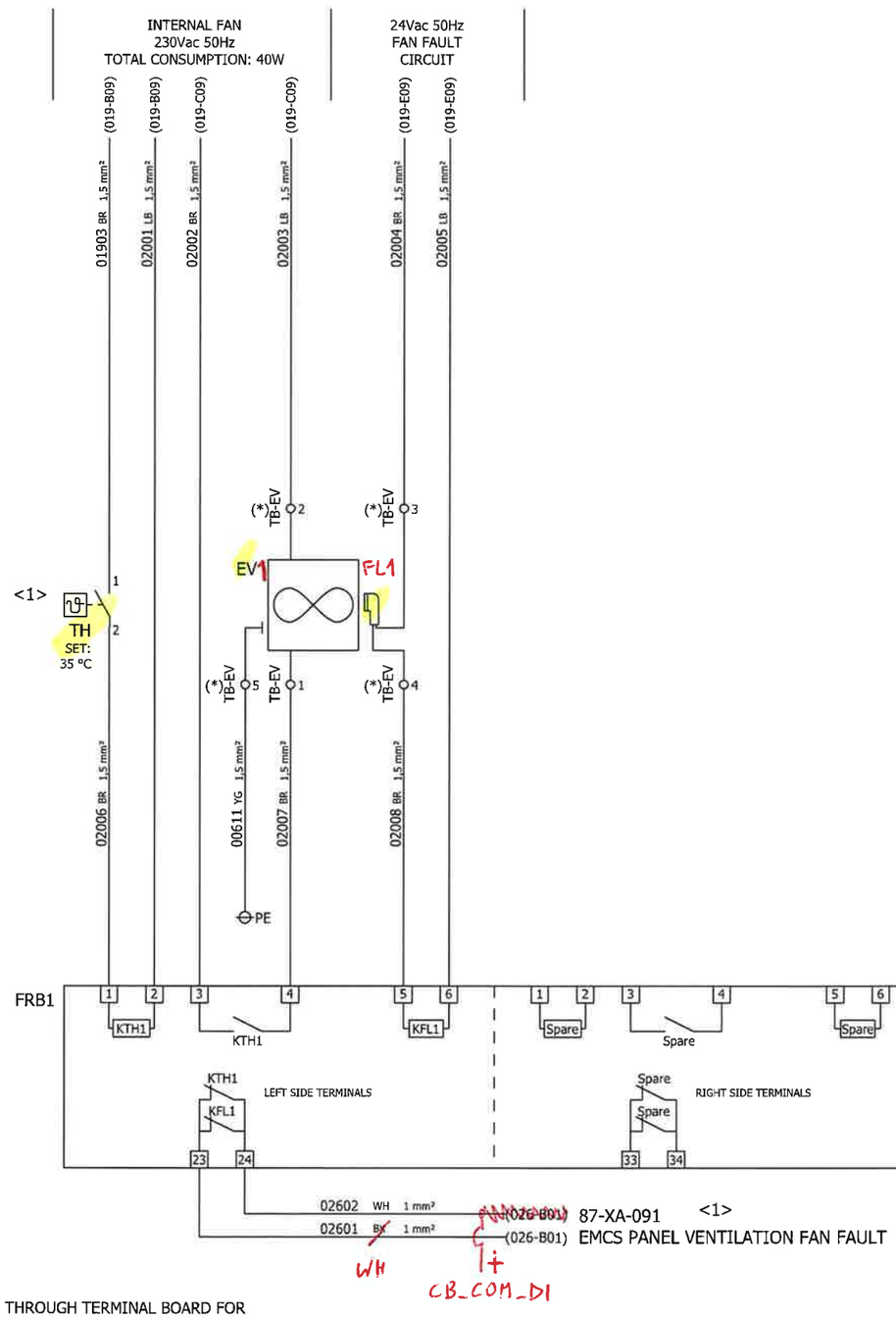
A3

DRAWING NO. 1724000594-IN-DG-00024

SHEET 019

REV. 1

EMCS PANEL - 230Vac 50Hz POWER DISTRIBUTION VENTILATION FAN & HEATER



NOTE (*):
TB-EV IS A FEED THROUGH TERMINAL BOARD FOR PRE-WIRED ITEMS CONNECTION. FOR THIS REASON, WIRE NUMBERS WILL BE THE SAME ON BOTH SIDES.

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	25.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	05.08.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_WD

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
EMCS PANEL - 230Vac 50Hz POWER DISTRIBUTION VENTILATION FAN

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DG-00024

SHEET 020

REV. 1

SHEET LEFT INTENTIONALLY BLANK

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0	05.08.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION

YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_WD

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
SPARE PAGE

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DG-00024

SHEET 021

REV. 1

EMCS PANEL - 230Vac/24Vdc POWER DISTRIBUTION

POWER SUPPLY LINE
230Vac 50Hz
FROM UPS#1

(016-D09)
02201 BR 2,5 mm²
(016-D09)
02202 LB 2,5 mm²

CB_COM_D1
+

G1
IN: 230Vac
OUT: 24Vdc
480W
20A
WEIDMULLER PRO ECO
code 1469510000

02603 WH 1 mm²
(026-B02)

87-XA-092
EMCS PANEL POWER SUPPLY
24Vdc FAILURE

<1>

00611 YG 2,5 mm²
PE

02205 RD 4 mm²
02207 BU 4 mm²
02206 RD 4 mm²
02210 BU 4 mm²

VD1
20A
WEIDMULLER PRO DM 20
code 2486080000
<1>

IN1+ IN1- IN2+ IN2-
OUT+ OUT-

<1>

Please confirm wiring for fault in diodes is not available, otherwise it shall be put back

02208 RD 6 mm²
02211 BU 6 mm²

Q10
24Vdc
32A
(024-G04)

NOT INSTALLED YET
(E003)

02209 RD 6 mm²
02212 BU 6 mm²

CB_24Vdc
(027-A01)

POWER SUPPLY LINE
230Vac 50Hz
FROM UPS#2

(017-D09)
02203 BR 2,5 mm²
(017-D09)
02204 LB 2,5 mm²

G2
IN: 230Vac
OUT: 24Vdc
480W
20A
WEIDMULLER PRO ECO
code 1469510000

02213 WH 1 mm²
02604 WH 1 mm²
(026-B03)

87-XA-092
EMCS PANEL POWER SUPPLY
24Vdc FAILURE

00611 YG 2,5 mm²
PE

02214 RD 4 mm²
02216 BU 4 mm²
02215 RD 4 mm²
02219 BU 4 mm²

VD2
20A
WEIDMULLER PRO DM 20
code 2486080000
<1>

IN1+ IN1- IN2+ IN1-
OUT+ OUT-

<1>

02217 RD 6 mm²
02220 BU 6 mm²

Q11
24Vdc
32A
(024-F04)

02218 RD 6 mm²
02221 BU 6 mm²

(027-A01)
(027-A01)

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
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0	05.08.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_WD

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
EMCS PANEL - 230Vac / 24Vdc POWER DISTRIBUTION

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DG-00024

SHEET 022

REV. 1

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REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
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0	05.08.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_WD

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
SPARE PAGE

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

SCALE : 1

A3

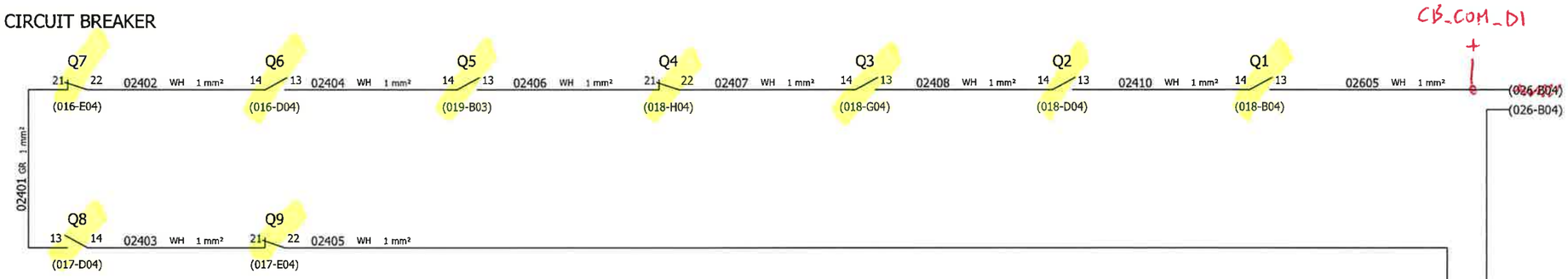
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SHEET 023

REV. 1

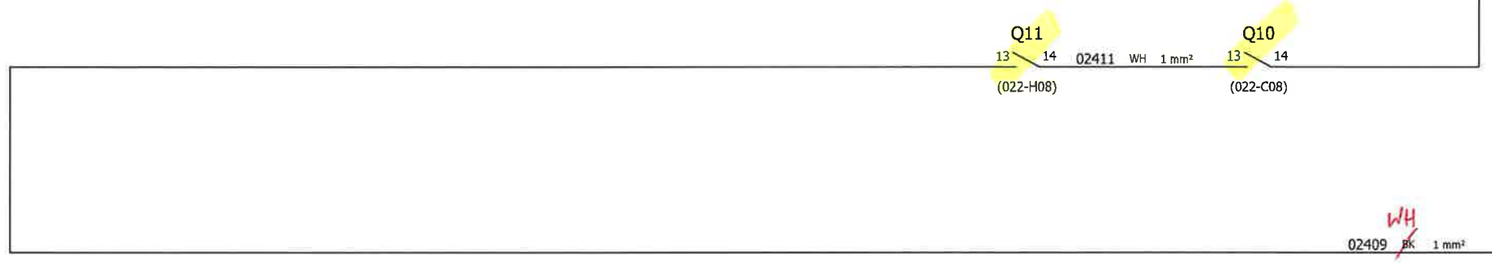
EMCS PANEL - BRAKER FAULT ALARM CIRCUIT

230Vac CIRCUIT BREAKER



<1>
87-XA-093
EMCS PANEL CUMULATIVE
BREAKER FAULT

24Vdc CIRCUIT BREAKER



NOTE : SPARE CIRCUIT BREAKER FAULT CONTACT TO BE CONNECTED ON NORMALLY CLOSE CONTACT.
CHANGE CONNECTION TO NORMALLY OPEN CONTACT WHEN THE BREAKER WILL BE USED

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
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0	05.08.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_WD

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
EMCS PANEL - BREAKER FAULT ALARM CIRCUIT

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

SCALE : 1

A3

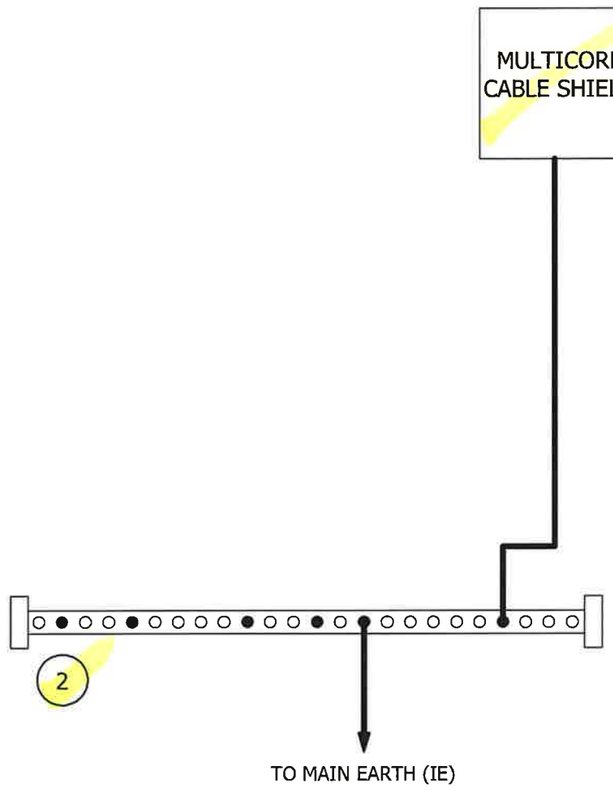
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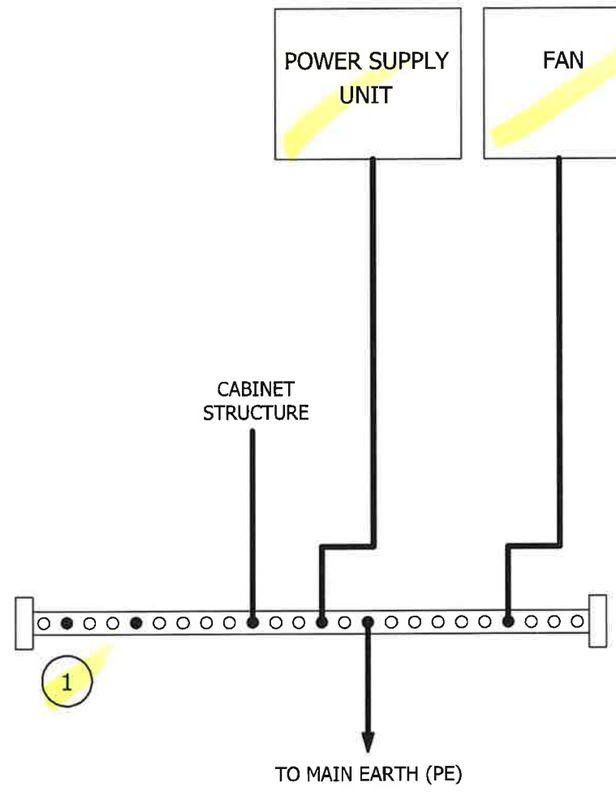
SHEET 024

REV. 1

EMCS PANEL - SHIELD/GROUND CONNECTION

POS.	EARTH TYPE	DESCRIPTION SYSTEM EARTH
1	P.E. EARTH	PROTECTION EARTH (GROUND, FRAME CHASSIS)
2	I.E. EARTH	INSTRUMENTAL EARTH





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0	05.08.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_WD

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
EMCS PANEL - SHIELD / GROUND CONNECTION

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

SCALE : 1

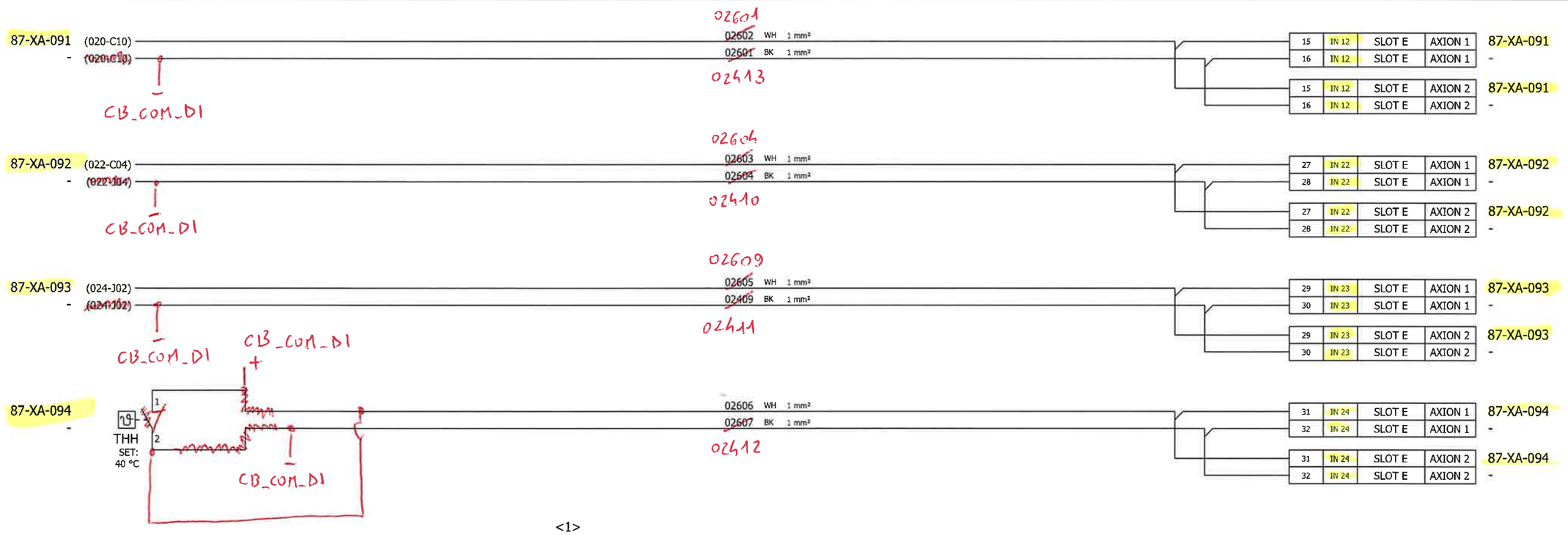
A3

DRAWING NO. 1724000594-IN-DG-00024

SHEET 025

REV. 1

EMCS PANEL - FAULT ALARM SIGNALS TO DCS



<1>

CUSTOMER TAG	SIGNAL DESCRIPTION FROM IO LIST
87-XA-091	EMCS PANEL VENTILATION FAN FAULT
87-XA-092	EMCS PANEL POWER SUPPLY & DIODES FAILURE
87-XA-093	EMCS PANEL CUMULATIVE BREAKER FAULT
87-XA-094	EMCS PANEL HIGH TEMPERATURE ALARM

CUSTOMER TAG	SIGNAL DESCRIPTION FROM IO LIST
-	-
-	-
-	-
-	-
-	-

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	25.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	05.08.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_WD

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
EMCS PANEL - FAULT ALARM SIGNALS TO DCS

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DG-00024

SHEET 026

REV. 1

EMCS PANEL - 24Vdc POWER DISTRIBUTION

CB_24Vdc
(022-B10) | (022-J10)
| (022-J10)

02701 RD 1.5 mm²
02704 RD 1.5 mm²
02709 RD 1,5 mm²
02706 BU 1.5 mm²
02708 BU 1.5 mm²

X24L+
6,3A FUSE RATING (1-2)
1A FUSE RATING (3-4)
10A FUSE RATING (5)
7
1 2 3 4 5 6 7
SPARE
SPARE

X24L-
1 2 3 4 5 6 7
SPARE
SPARE

02901 RD 1.5 mm² (029-C09)
02902 BU 1.5 mm² (029-C09)
03001 RD 1.5 mm² (030-C09)
03002 BU 1.5 mm² (030-C09)
02801 RD 1.5 mm² (028-A01)
02802 BU 1.5 mm² (028-A02)

24Vdc for RACK 1 - SEL-2241
24Vdc for RACK 2 - SEL-2241
24Vdc AO SWITCH COMMAND 1

02702 RD 1.5 mm²
02707 BU 1.5 mm²
02703 RD 1.5 mm²
02705 BU 1.5 mm²

CB_COM_AI
(034-B08)
(034-B08) +
(034-B08) -

CB_COM_DI
(031-A07)
(031-H07)
(031-J07) +
(031-B07) -

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	25.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	05.08.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-PCS_WD
CROSSWIND
ROSETTI MARINO

TITLE :
BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
EMCS PANEL - 24Vdc POWER DISTRIBUTION

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK
SCALE : 1
A3
DRAWING NO. 1724000594-IN-DG-00020
SHEET 027
REV. 1

EMCS PANEL - AO SWITCH COMMAND

(027-E07)
(027-E07)

02802 BU 1.5 mm²
02801 RD 1.5 mm²
02803 BK 1.5 mm²
02805 BK 1.5 mm²
02806 BK 1.5 mm²
02804 BK 1.5 mm²

29	OUT 15	SLOT F	AXION 1	87-XA-054
30	OUT 15	SLOT F	AXION 1	-
31	OUT 16	SLOT F	AXION 1	87-XA-054
32	OUT 16	SLOT F	AXION 1	-
29	OUT 15	SLOT F	AXION 2	87-XA-054
30	OUT 15	SLOT F	AXION 2	-
31	OUT 16	SLOT F	AXION 2	87-XA-054
32	OUT 16	SLOT F	AXION 2	-

CB_AO_COMMAND_1
(035-A06)
(035-B06)
(035-B06)

CB_AO_COMMAND_2
(035-A08)
(035-B08)
(035-B08)

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	25.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	05.08.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-PCS_WD
CROSSWIND
ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
EMCS PANEL - AO SWITCH COMMAND

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK
SCALE : 1
A3
DRAWING NO. 1724000594-IN-DG-00020
SHEET 028
REV. 1

EMCS PANEL - RACK 1-SEL-2241

THE RTAC MODULE IS CONNECTED TO EMCS SERVER VIA REDUNDANT IEC61850 LINKS

A	B	C	D	E	F	G	H	I	J
SLOT 1	SLOT 2	SLOT 3	SLOT 4	SLOT 5	SLOT 6	SLOT 7	SLOT 8	SLOT 9	SLOT 10
RTAC MODULE CARD SEL-2241	POWER SUPPLY (24Vdc) SEL-2243	ANALOG INPUT CARD SEL-2245-2	ANALOG OUTPUT CARD SEL-2245-3	DIGITAL INPUT CARD SEL-2244-2	DIGITAL OUTPUT CARD SEL-2244-3	SPARE	SPARE	SPARE	SPARE

<1>

TO VNET/IP
(SERVER ITER)

+ 02901 RD 1,5 mm² (027-E06)

- 02902 BU 1,5 mm² (027-E06)

POWER SUPPLY LINE
24Vdc FROM X24L

PLEASE ADD THIS NOTE

REFER TO DOC. N. 1724000594-IN-DG-00016
"NETWORK CONNECTION DIAGRAM"

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	25.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	05.08.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_WD

CROSSWIND | ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
EMCS PANEL - RACK "1"-SEL-2241

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DG-00024

SHEET 029

REV. 1

EMCS PANEL - RACK 2-SEL-2241

A	B	C	D	E	F	G	H	I	J
SLOT 1	SLOT 2	SLOT 3	SLOT 4	SLOT 5	SLOT 6	SLOT 7	SLOT 8	SLOT 9	SLOT 10
RTAC MODULE CARD SEL-2241	POWER SUPPLY (24Vdc) SEL-2243	ANALOG INPUT CARD SEL-2245-2	ANALOG OUTPUT CARD SEL-2245-3	DIGITAL INPUT CARD SEL-2244-2	DIGITAL OUTPUT CARD SEL-2244-3	SPARE	SPARE	SPARE	SPARE

<1>

TO VNET/IP
(SERVER ITER)

\+ 03001 RD 1,5 mm² (027-E06)

\- 03002 BU 1,5 mm² (027-E07)

POWER SUPPLY LINE
24Vdc FROM X24L

SAME COMMENTS OF PREVIOUS SHEET APPLY

REFER TO DOC. N. 1724000594-IN-DG-00016
"NETWORK CONNECTION DIAGRAM"

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
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YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_WD

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
EMCS PANEL - RACK "2"-SEL-2241

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DG-00024

SHEET 030

REV. 1

EMCS PANEL - TYPICAL WIRING DIGITAL INPUT (COMMON NEGATIVE)

EMCS_DI01

SEL - DIGITAL INPUT CARD - SEL-2244-2 - AXION RACK FIRST CARD
DIGITAL INPUT - 24 POINTS

CARD A + CHANNEL

CARD A - CHANNEL

SEL - DIGITAL INPUT CARD - SEL-2244-2 - AXION RACK SECOND CARD
DIGITAL INPUT - 24 POINTS

CARD B + CHANNEL

CARD B - CHANNEL

WIRE A1 +

<1>

WIRE A2 -

WIRE A1 -

WIRE +

<1>

T.S. - NUM.

T.S. + NUM.

CB_COM_DI
(027-D10)
(031-H07)
(027-E10)
-

KNIFE DISCONNECT TERMINALS
MARSH T.S. NAME

CB_COM_DI
(027-D10)
(031-A07)
(027-E10)
+

<1>

TO FIELD

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	25.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	05.08.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_WD

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
EMCS PANEL - TYPICAL WIRING DIGITAL INPUT (~~COMMON NEGATIVE~~)

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DG-00024

SHEET 031

REV. 1

EMCS PANEL - TYPICAL WIRING DIGITAL INPUT (INDEPENDENT NEGATIVE)

EMCS_DI02

SEL - DIGITAL INPUT CARD - SEL-2244-2 - AXION RACK FIRST CARD
DIGITAL INPUT - 24 POINTS

CARD A + CHANNEL

CARD A - CHANNEL

SEL - DIGITAL INPUT CARD - SEL-2244-2 - AXION RACK SECOND CARD
DIGITAL INPUT - 24 POINTS

CARD B + CHANNEL

CARD B - CHANNEL

<1>
WIRE A1+

<1>
WIRE A1 -

T.S. - NUM.

T.S. + NUM.

KNIFE DISCONNECT TERMINALS
MARSH T.S. NAME

TO FIELD

TO BE DELETED

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	25.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	05.08.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_WD

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
EMCS PANEL - TYPICAL WIRING DIGITAL INPUT (INDEPENDENT NEGATIVE)

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DG-00024

SHEET 032

REV. 1

EMCS PANEL - TYPICAL WIRING DIGITAL OUTPUT

EMCS_DO01

SEL - DIGITAL OUTPUT CARD - SEL-2244-3 - AXION RACK FIRST CARD
DIGITAL OUPUT - 16 POINTS

CARD A + CHANNEL **CARD A - CHANNEL**

SEL - DIGITAL OUTPUT CARD - SEL-2244-3 - AXION RACK SECOND CARD
DIGITAL OUPUT - 16 POINTS

CARD B + CHANNEL **CARD B - CHANNEL**

<1>
WIRE A1+

<1>
WIRE A1 -

T.S. - NUM. **T.S. + NUM.**

KNIFE DISCONNECT TERMINALS
MARSH T.S. NAME

TO FIELD

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	25.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	05.08.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_WD

CROSSWIND ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
EMCS PANEL - TYPICAL WIRING DIGITAL OUTPUT

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

SCALE : 1

A3

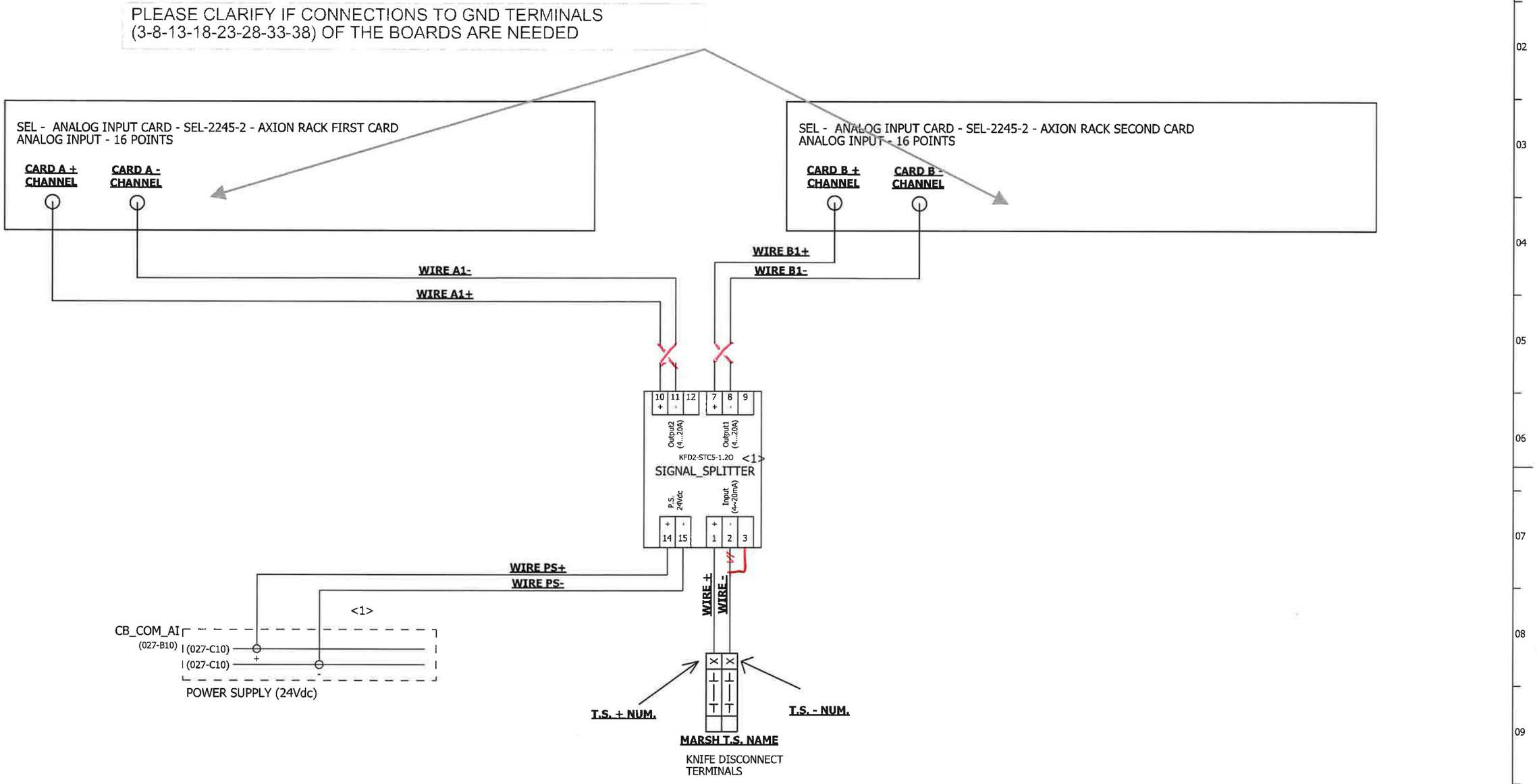
DRAWING NO. 1724000594-IN-DG-00024

SHEET 033

REV. 1

EMCS_AI01

PLEASE CLARIFY IF CONNECTIONS TO GND TERMINALS
(3-8-13-18-23-28-33-38) OF THE BOARDS ARE NEEDED



REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
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0	05.08.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_WD

CROSSWIND | ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
EMCS PANEL - TYPICAL WIRING ANALOG INPUT

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DG-00024

SHEET 034

REV. 1

EMCS_AO01

PLEASE CLARIFY IF CONNECTIONS TO GND TERMINALS (3-8-13-18) OF THE BOARDS ARE NEEDED

SEL - ANALOG OUTPUT CARD - SEL-2245-3 - AXION RACK FIRST CARD
ANALOG OUTPUT - 8 POINTS

CARD A + CHANNEL **CARD A - CHANNEL**

SEL - ANALOG OUTPUT CARD - SEL-2245-3 - AXION RACK SECOND CARD
ANALOG OUTPUT - 8 POINTS

CARD B + CHANNEL **CARD B - CHANNEL**

WIRE A1-

WIRE A1+

WIRE B1+

WIRE B1-

WIRE KA+ **WIRE KB+**

KA **KB**

WIRE KA- **WIRE KB-**

WIRE A2+ **WIRE A2-** **WIRE B2+** **WIRE B2-**

CB_AO_COMMAND_1
(028-C09) (028-D09) +
(028-D09) -

SYMBOL OF STEP RELAYS MUST BE DIFFERENT FROM "NORMAL" RELAYS.

WIRE KC+ **WIRE KD+**

KC **KD**

WIRE KC- **WIRE KD-**

CB_AO_COMMAND_2
(028-F09) (028-G09) +
(028-G09) -

WIRE -

WIRE +

T.S. + NUM. **T.S. - NUM.**

MARSH T.S. NAME

KNIFE DISCONNECT TERMINALS

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	25.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	05.08.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_WD

CROSSWIND ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
EMCS PANEL - TYPICAL WIRING ANALOG OUTPUT

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DG-00024

SHEET 035

REV. 1

insert "INPUT"

EMCS PANEL - DIGITAL SIGNALS

TAG NAME	IO TYPE	MARSH T.S. NAME	T.S. + NUM.	T.S. - NUM.	WIRE A1+	WIRE A1-	WIRE A2-	WIRE +	WIRE SECTION (A)	WIRE COLOUR + (A)	WIRE COLOUR - (A)	CARD (A&B) + CHANNEL	CARD (A&B) - CHANNEL	SLOT A&B	TYIPICAL	CHANNEL NUMBER
~~70XA-037~~	DI	TB_DI	01	02	03601	03602	03603	03604	1mm²	BK	WH	1	10	E	EMCS_DI01	1
~~70XA-038~~	DI	TB_DI	03	04	03605	==	==	03606	1mm²	BK	WH	2	10	E	EMCS_DI01	2
~~70XA-039~~	DI	TB_DI	05	06	03607	==	==	03608	1mm²	BK	WH	3	10	E	EMCS_DI01	3
~~70XA-040~~	DI	TB_DI	07	08	03609	==	==	03610	1mm²	BK	WH	4	10	E	EMCS_DI01	4
~~70XA-041~~	DI	TB_DI	09	10	03611	==	==	03612	1mm²	BK	WH	5	10	E	EMCS_DI01	5
~~70XA-042~~	DI	TB_DI	11	12	03613	==	==	03614	1mm²	BK	WH	6	10	E	EMCS_DI01	6
~~70XA-043~~	DI	TB_DI	13	14	03615	==	==	03616	1mm²	BK	WH	7	10	E	EMCS_DI01	7
~~70XA-044~~	DI	TB_DI	15	16	03617	==	==	03618	1mm²	BK	WH	8	10	E	EMCS_DI01	8
WS_DI09	DI	TB_DI	17	18	03619	==	==	03620	1mm²	BK	WH	9	10	E	EMCS_DI01	9
WS_DI13	DI	TB_DI	19	20	03621	03622	03623	03624	1mm²	BK	WH	17	26	E	EMCS_DI01	13
WS_DI14	DI	TB_DI	21	22	03625	==	==	03626	1mm²	BK	WH	18	26	E	EMCS_DI01	14
WS_DI15	DI	TB_DI	23	24	03627	==	==	03628	1mm²	BK	WH	19	26	E	EMCS_DI01	15
WS_DI16	DI	TB_DI	25	26	03629	==	==	03630	1mm²	BK	WH	20	26	E	EMCS_DI01	16
WS_DI17	DI	TB_DI	27	28	03631	==	==	03632	1mm²	BK	WH	21	26	E	EMCS_DI01	17
WS_DI18	DI	TB_DI	29	30	03633	==	==	03634	1mm²	BK	WH	22	26	E	EMCS_DI01	18
WS_DI19	DI	TB_DI	31	32	03635	==	==	03636	1mm²	BK	WH	23	26	E	EMCS_DI01	19
WS_DI20	DI	TB_DI	33	34	03637	==	==	03638	1mm²	BK	WH	24	26	E	EMCS_DI01	20
WS_DI21	DI	TB_DI	35	36	03639	==	==	03640	1mm²	BK	WH	25	26	E	EMCS_DI01	21
70ZSL-000	DI	TB_DI	37	38	03641	03642	N/A	N/A	1mm²	BK	WH	11	12	E	EMCS_DI01	10
70ZSH-005	DI	TB_DI	39	40	03643	03644	N/A	N/A	1mm²	BK	WH	13	14	E	EMCS_DI01	11

NOTE: FOR IN12, 22, 23, 24 CHECK PAGE ~~286~~(INTERNAL FAULT SYSTEM)

26

What are these signals?

CHANNEL NUMBER

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	25.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
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YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_WD

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
EMCS PANEL - DIGITAL INPUT SIGNALS

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DG-00024

SHEET 036

REV. 1

EMCS PANEL - DIGITAL OUTPUT SIGNALS

TAG TO BE ADDED

TAG NAME	IO TYPE	MARSH T.S. NAME	T.S. + NUM.	T.S. - NUM.	WIRE A1+	WIRE A1-	WIRE A2-	WIRE +	WIRE SECTION (A)	WIRE COLOUR + (A)	WIRE COLOUR - (A)	CARD (A&B) + CHANNEL	CARD (A&B) - CHANNEL	SLOT A&B	TYIPICAL	CHANNEL NUMBER
WS_DO01	DO	TB_DO	01	02	03701	03702	N/A	N/A	1mm²	BK	WH	1	2	F	EMCS_DO01	1
~~70HS-013~~	DO	TB_DO	03	04	03703	03704	N/A	N/A	1mm²	BK	WH	3	4	F	EMCS_DO01	2
~~70HS-014~~	DO	TB_DO	05	06	03705	03706	N/A	N/A	1mm²	BK	WH	5	6	F	EMCS_DO01	3
~~70XS-040~~	DO	TB_DO	07	08	03707	03708	N/A	N/A	1mm²	BK	WH	7	8	F	EMCS_DO01	4
~~70XS-041~~	DO	TB_DO	09	10	03709	03710	N/A	N/A	1mm²	BK	WH	9	10	F	EMCS_DO01	5
WS_DO06	DO	TB_DO	11	12	03711	03712	N/A	N/A	1mm²	BK	WH	11	12	F	EMCS_DO01	6
WS_DO07	DO	TB_DO	13	14	03713	03714	N/A	N/A	1mm²	BK	WH	13	14	F	EMCS_DO01	7
WS_DO08	DO	TB_DO	15	16	03715	03716	N/A	N/A	1mm²	BK	WH	15	16	F	EMCS_DO01	8
WS_DO09	DO	TB_DO	17	18	03717	03718	N/A	N/A	1mm²	BK	WH	17	18	F	EMCS_DO01	9
WS_DO10	DO	TB_DO	19	20	03719	03720	N/A	N/A	1mm²	BK	WH	19	20	F	EMCS_DO01	10
WS_DO11	DO	TB_DO	21	22	03721	03722	N/A	N/A	1mm²	BK	WH	21	22	F	EMCS_DO01	11
WS_DO12	DO	TB_DO	23	24	03723	03724	N/A	N/A	1mm²	BK	WH	23	24	F	EMCS_DO01	12
WS_DO13	DO	TB_DO	25	26	03725	03726	N/A	N/A	1mm²	BK	WH	25	26	F	EMCS_DO01	13
WS_DO14	DO	TB_DO	27	28	03727	03728	N/A	N/A	1mm²	BK	WH	27	28	F	EMCS_DO01	14

NOTE: FOR OUT15, 16 CHECK PAGE 28 (AO SWITCH COMMAND)

What are these signals?

"Permissive to grid forming" signal signal to BESS is missing

TERMINALS 29 TO 32 TO BE ADDED

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	25.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
0	05.08.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)

YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_WD

CROSSWIND

ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
EMCS PANEL - DIGITAL OUTPUT SIGNALS

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DG-00024

SHEET 037

REV. 1

A B C D E F G H J K

EMCS PANEL - ANALOG INPUT SIGNALS

TAG NAME	IO TYPE	MARSH T.S. NAME	T.S. + NUM.	T.S. - NUM.	WIRE +	WIRE -	WIRE A1+	WIRE A1-	WIRE B1+	WIRE B1-	WIRE SECTION (A&B)	WIRE COLOUR + (A&B)	WIRE COLOUR - (A&B)	WIRE PS+	WIRE PS-	WIRE SECTION PS	WIRE COLOUR PS +	WIRE COLOUR PS -	SIGNAL SPLITTER	CARD (A&B) + CHANNEL	CARD (A&B) - CHANNEL	SLOT	TYPICAL	CHANNEL NUMBER
WS_AI01	AI	TB_AI	1	2	03801	03802	03803	03804	03805	03806	1mm²	BK	WH	02811	02812	1,5mm²	RD	BU	SSP1	1	2	C	EMCS_AI01	1
WS_AI02	AI	TB_AI	3	4	03807	03808	03809	03810	03811	03812	1mm²	BK	WH	02813	02814	1,5mm²	RD	BU	SSP2	~~3~~ 4	~~4~~ 5	C	EMCS_AI01	2
WS_AI03	AI	TB_AI	5	6	03813	03814	03815	03816	03817	03818	1mm²	BK	WH	02815	02816	1,5mm²	RD	BU	SSP3	~~5~~ 6	6 7	C	EMCS_AI01	3
WS_AI04	AI	TB_AI	7	8	03819	03820	03821	03822	03823	03824	1mm²	BK	WH	02817	02818	1,5mm²	RD	BU	SSP4	~~7~~ 9	~~8~~ 10	C	EMCS_AI01	4
WS_AI05	AI	TB_AI	9	10	03825	03826	03827	03828	03829	03830	1mm²	BK	WH	02819	02820	1,5mm²	RD	BU	SSP5	~~9~~ 11	10 ~~12~~	C	EMCS_AI01	5
WS_AI06	AI	TB_AI	11	12	03831	03832	03833	03834	03835	03836	1mm²	BK	WH	02821	02822	1,5mm²	RD	BU	SSP6	~~11~~ 14	~~12~~ 15	C	EMCS_AI01	6
WS_AI07	AI	TB_AI	13	14	03837	03838	03839	03840	03841	03842	1mm²	BK	WH	02823	02824	1,5mm²	RD	BU	SSP7	~~13~~ 16	~~14~~ 17	C	EMCS_AI01	7
WS_AI08	AI	TB_AI	15	16	03843	03844	03845	03846	03847	03848	1mm²	BK	WH	02825	02826	1,5mm²	RD	BU	SSP8	~~15~~ 19	~~16~~ 20	C	EMCS_AI01	8
WS_AI09	AI	TB_AI	17	18	03849	03850	03851	03852	03853	03854	1mm²	BK	WH	02827	02828	1,5mm²	RD	BU	SSP9	~~17~~ 21	~~18~~ 22	C	EMCS_AI01	9
WS_AI10	AI	TB_AI	19	20	03855	03856	03857	03858	03859	03860	1mm²	BK	WH	02829	02830	1,5mm²	RD	BU	SSP10	~~19~~ 24	~~20~~ 25	C	EMCS_AI01	10
WS_AI11	AI	TB_AI	21	22	03861	03862	03863	03864	03865	03866	1mm²	BK	WH	02831	02832	1,5mm²	RD	BU	SSP11	~~21~~ 26	~~22~~ 27	C	EMCS_AI01	11
WS_AI12	AI	TB_AI	23	24	03867	03868	03869	03870	03871	03872	1mm²	BK	WH	02833	02834	1,5mm²	RD	BU	SSP12	~~23~~ 29	~~24~~ 30	C	EMCS_AI01	12
WS_AI13	AI	TB_AI	25	26	03873	03874	03875	03876	03877	03878	1mm²	BK	WH	02835	02836	1,5mm²	RD	BU	SSP13	~~25~~ 31	~~26~~ 32	C	EMCS_AI01	13
WS_AI14	AI	TB_AI	27	28	03879	03880	03881	03882	03883	03884	1mm²	BK	WH	02837	02838	1,5mm²	RD	BU	SSP14	~~27~~ 34	~~28~~ 35	C	EMCS_AI01	14
WS_AI15	AI	TB_AI	29	30	03885	03886	03887	03888	03889	03890	1mm²	BK	WH	02839	02840	1,5mm²	RD	BU	SSP15	~~29~~ 36	30 ~~37~~	C	EMCS_AI01	15
WS_AI16	AI	TB_AI	31	32	03891	03892	03893	03894	03895	03896	1mm²	BK	WH	02841	02842	1,5mm²	RD	BU	SSP16	~~31~~ 39	32 ~~40~~	C	EMCS_AI01	16

Card terminals are wrong! (3, 8, 13, 18, 23, 28, 33, 38 are ground terminals)

01 02 03 04 05 06 07 08 09 10

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
1	25.09.2024	A.G.	A.B.	S.C.	ISSUE FOR REVIEW (IFR)
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YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_WD

CROSSWIND ROSETTI MARINO

TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
EMCS PANEL - ANALOG INPUT SIGNALS

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DG-00024

SHEET 038

REV. 1

EMCS PANEL - ANALOG OUTPUT SIGNALS (SIGNAL PART)

TAG NAME	IO TYPE	MARSH T.S. NAME	T.S. + NUM.	T.S. - NUM.	WIRE +	WIRE -	WIRE A1+	WIRE A1-	WIRE B1+	WIRE B1-	WIRE A2+	WIRE A2-	WIRE B2+	WIRE B2-	WIRE SECTION (A&B)	WIRE COLOUR + (A&B)	WIRE COLOUR - (A&B)	CARD (A&B) + CHANNEL	CARD (A&B) - CHANNEL	SLOT
70VC-001	AO	TB_AO	1	2	03901	03902	03903	03904	03905	03906	03907	03908	03909	03910	1mm²	BK	WH	1	2	D
WS_AO02	AO	TB_AO	3	4	03911	03912	03913	03914	03915	03916	03917	03918	03919	03920	1mm²	BK	WH	3	4	D
WS_AO03	AO	TB_AO	5	6	03921	03922	03923	03924	03925	03926	03927	03928	03929	03930	1mm²	BK	WH	5	6	D
WS_AO04	AO	TB_AO	7	8	03931	03932	03933	03934	03935	03936	03937	03938	03939	03940	1mm²	BK	WH	7	8	D
WS_AO05	AO	TB_AO	9	10	03941	03942	03943	03944	03945	03946	03947	03948	03949	03950	1mm²	BK	WH	9	10	D
WS_AO06	AO	TB_AO	11	12	03951	03952	03953	03954	03955	03956	03957	03958	03959	03960	1mm²	BK	WH	11	12	D
WS_AO07	AO	TB_AO	13	14	03961	03962	03963	03964	03965	03966	03967	03968	03969	03970	1mm²	BK	WH	13	14	D
WS_AO03	AO	TB_AO	15	16	03971	03972	03973	03974	03975	03976	03977	03978	03979	03980	"	"	"	15	16	D

CHANNEL NUMBER
1
2
3
4
5
6
7
8

What is this signal?

Row no.8 is missing, please include (as done at sh.40)

Card terminals are wrong! (3, 8, 13, 18 are ground terminals)

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YOKOGAWA◆ PROJECT Nr. E36672C00
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EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
EMCS PANEL - ANALOG OUTPUT SIGNALS (SIGNAL PART)

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

SCALE : 1

A3

DRAWING NO. 1724000594-IN-DG-00024

SHEET 039

REV. 1

EMCS PANEL - ANALOG OUTPUT SIGNALS (SWITCH PART)

KA	KB	KC	KD	WIRE KA+	WIRE KA-	WIRE KB+	WIRE KB-	WIRE KC+	WIRE KC-	WIRE KD+	WIRE KD-	TYPICAL
KA1	KA2	KA3	KA4	04001	04002	04003	04004	04005	04006	04007	04008	EMCS_AO1
KA5	KA6	KA7	KA8	04009	04010	04011	04012	04013	04014	04015	04016	EMCS_AO1
KA9	KA10	KA11	KA12	04017	04018	04019	04020	04021	04022	04023	04024	EMCS_AO1
KA13	KA14	KA15	KA16	04025	04026	04027	04028	04029	04030	04031	04032	EMCS_AO1
KA17	KA18	KA19	KA20	04033	04034	04035	04036	04037	04038	04039	04040	EMCS_AO1
KA21	KA22	KA23	KA24	04041	04042	04043	04044	04045	04046	04047	04048	EMCS_AO1
KA25	KA26	KA27	KA28	04049	04050	04051	04052	04053	04054	04055	04056	EMCS_AO1
KA29	KA30	KA31	KA32	04057	04058	04059	04060	04061	04062	04063	04064	EMCS_AO1

01 02 03 04 05 06 07 08 09 10

YOKOGAWA◆ PROJECT Nr. E36672C00
DESCRIPTION: E366772C00-EMCS_WD

CROSSWIND ROSETTI MARINO

REV	DATE	PREPARED	CHECKED	APPROVED	DESCRIPTION
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TITLE : BASE LOAD POWER HUB (BLPH)
EMCS CABINET WIRING DIAGRAMS AND TERMINAL STRIPS
EMCS PANEL - ANALOG OUTPUT SIGNALS (SWITCH PART)

CONTRACT NO./TITLE CW-I-WP4-2023-05/HOLLANDSE KUST NOORD WIND PARK | SCALE : 1

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Base Load Power Hub (BLPH)

EMCS Software Functional Design Specification (FDS-SW)

Document Number: 1724000594-IN-SP-00019

Supplier Document Number: E366772C00-EMCS_FDS_SW

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On HOLD	
HOLDs	Description
HOLD 1	~~To the aim of reducing the issues about the fuel cell dynamics, it is assumed that for the current version the EMCS is sufficient to implement a generic rule in the control policy (as a deviation-vs-time filter on the set-point signal).~~
HOLD 2	~~An operator shall be able to set and hold the Supply Guarantee request status on NOT REQUIRED manually.~~
HOLD 3	~~For the EMCS, the BLPH shall be considered off-grid (i.e. not grid-tied) exclusively on the basis of the related hardwired signal. The latter is supposed to be an OR of the open condition of the INCOMMER 6.6kV CB and the GIS Q0(A1). This holds independently from the presence of grid signal and the status of the INCOMMER 6.6kV switchgear and any upward disconnector.~~
HOLD 4	~~(Under analysis, information arrived in May 2024): the "BESS charge level" and the related BESS.MINIMUM-EMERGENCY-RESERVE (and the others parameters about "BESS charge levels") are supposed to be expressed in SoC. However, such thresholds may need to be based on absolute values of energy, expressed in MWh, instead of SoC %: According to the meetings in held May 2024 with the BESS vendor, the BESS expose over the data interface the absolute value of energy available to the discharge, and this value is representative of the BESS ability to produce power and hence to sustain the isolated grid, while SoC value is not.~~
HOLD 5	~~The fuel cell, electrolyzer, BESS, solar farm will each provide a signal, or a set of signals, over the data interface with the EMCS which univocally identify the package status of ready to operate; the package vendor will document a static set of values of the mentioned signals for which such condition is met.~~
HOLD 6	~~the solar farm will provide a signal over the data interface with the EMCS, signaling that the solar farm is not able to guarantee the respect of the set-point from the EMCS (within the declared tolerances).~~
HOLD 7	~~The BESS is healthy is not a mandatory condition to enter in EXPORT MODE, if the fuel cell can produce power.~~
HOLD 8	~~EMCS shall constrain the range among positive set-points only (discharge), so to prevent power flow inversion (with the aim to avoid consequent possible stress on the BESS).~~
HOLD 9	~~The solar farm is able to guarantee the strict respect of the active power limit provided by the EMCS, or the respect of the limit with a maximum upward tolerance (supposed within 10%) in normal operating conditions.~~
HOLD 10	~~In grid-forming mode, if the BESS is not fully charged, it is always able to adsorb up to 1 MW (charging).~~
HOLD 11	~~It is supposed that the "BESS charge level" will be based on the SoC. HOWEVER, according to the BESS vendor, to assess the actually available margins of the BESS to charge and discharge, the energy margins shall be used instead of the SoC. In such case, it is also supposed that it is preferrable to operate around a point were energy margins in charging and discharging have similar values, instead of using the SoC as a reference (for the SoC, the optimal operational point was reported to be 50%). This affects the definition of any parameter related to the BESS stored energy level.~~
HOLD 12	~~BESS, electrolyzer, fuel cell, solar farm vendor will provide a heart-bit/watchdog allowing the package and the BESS to verify the presence of communication between the two systems.~~
HOLD 13	~~The suggested trade-off is the architecture with Fuel Cell in feedforward and BESS in~~

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	~~feedback~~
HOLD 14	~~It is assumed that (in EMERGENCY MODE), to prevent the (potential) power overload of the BESS, the sum of the fuel cell set-point and the solar farm set-point shall be less than the BESS charge power in any moment in time, which is assumed to be always more than 0.6 MW.~~
HOLD 15	~~The synchronization procedure shall be required by the EMCS to the BESS, using a dedicated command signal exposed in the data interface of the BESS. The BESS shall start and execute the procedure only if the command is True, stop otherwise.~~
HOLD 16	~~The BESS expose a signal that is True when it is running the synchronization procedure, false otherwise~~
HOLD 17	~~The BESS perform the parallel closing request to the INCOMMER CB automatically after the synchronization, without waiting any input from the EMCS.~~
HOLD 18	~~Time sync among EMCS and electrical equipment (protections and relays) will be done by PTP protocol.~~
HOLD 19	~~EMCS shall constrain the range among negative set points only (charge), so to prevent power flow inversion (with the aim to avoid consequent possible stress on the BESS).~~
HOLD 20	~~Definition of the condition for Supply Guarantee OFF (by Crosswind).~~
HOLD 21	~~Definition of BESS healthy no more required.~~
HOLD 22	~~To enter in EXPORT MODE, it is allowed to stop the Electrolyzer, i.e.; Able-to-Export shall consider also the possibility to use the ImperativeStop transition of the Electrolyzer. EMCS will allow to disable this possibility parametrically (Default: ImperativeStop allowed)~~
HOLD 23	~~Tanks are full~~ OR running from me than a time duration (new proposed condition)
HOLD 24	~~Minimum ON-time inertia~~
HOLD 25	~~Minimum OFF-time inertia~~
HOLD 26	~~Waiting from Crosswind~~
HOLD 27	~~waiting from Crosswind~~
HOLD 28	~~As per the document provided, "HKN1-02-REG-341 Manual for Controlling the Solar Farm via the Client Connector REV A," , mentioned in response to TQ-55, it also consists of a signal list. However, clarification/confirmation about the "availability to control" of the park controller from Crosswind is still required.~~
HOLD 29	~~The electrolyzer PLC requires a custom time synchronization interface, based on dedicated signals (specifically: year, month, day, hour, minute, second) to be updated by the EMCS; it is assumed that the precision required is equal to the resolution.~~
HOLD 30	~~The provided response Fuel Cell Signal Analysis, sent document " TQ-0008 – Signal Analysis Response" lack in item. 2.4, 2.6 and 2.8, awaiting for the updated "Crosswind Modbus Table - Main PLC - External Cut"~~
HOLD 31	~~In consequence conversation with vendor Electrolyzer~~
HOLD 32	~~It is assumed that preventing the hydrogen level to overpass a pre-defined threshold is a sufficient condition to prevent protective/emergency reaction of the PCS and any other safety system~~

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HOLD 33	~~Power Surplus formula is WTG.Power - 1 MW~~
HOLD 34	CW must provide the signal/s allowing to detect the Supply Guarantee status
HOLD 35	Total power consumption (W)" EMCS assume that the total Active Power absorbed by the Electrolyzer from the grid is not yet implemented (as per the response from the vendor).
HOLD 36	"Current Power Setpoint" EMCS assumes that the current power set point followed by Electrolyzer, or " Power setpoint(W)" used this information, there is no equivalent to power setpoint which is not yet implemented by vendor.
HOLD 37	To have the electrolyzer working it is enough to send the start command without the need to sent a setpoint
HOLD 38	Vendor shall specify, EL_MAX_SET_POINT in the IO list.
HOLD 39	Vendor shall specify, MIN_RUNNING_TIME (Minimum time to wait before the electrolyzer can be stopped) in the IO list.
HOLD 40	Exposed by FC interface
HOLD 41	This control logic does not prevent the ideal scenario where the BESS gets depleted while there is still some reserve of hydrogen. To guarantee to prevent it, an intentional charging of the BESS from the fuelcell should be foreseen when such incipient condition arises.
HOLD 42	The HV-SCADA will provide a signal to understand if the HNA5 is in fault.
HOLD 43	Ask Freqcon if the BESS is able to autoregulate and to follow the Loads energy consumption,
HOLD 44	In Grid-Forming mode, if the BESS is not fully charged, it is always able to adsorb up to 1 MW (charging) only during the time needed for packages to curtail at set-point send by EMCS, with the respect of the BESS-MAXIMUM-OPERATING-RESERVE.

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1. Scope of Document

This document describes the functional requirement specification of the Energy Management and Control System (EMCS) of the CROSSWIND BLPH project. This document is intended to produce a synthesis and unique interpretation of the requirements deriving from all the precedent project documents. The present functional requirement specifications are intended to be the input for the engineering design of the EMCS.

2. Context – Crosswind BLPH

The Base Load Power Hub (BLPH) is an innovation project which includes the piloting of an offshore water electrolysis-fuel cell round trip system and a lithium-ion battery installed on an offshore monopile. The BLPH is designed to integrate with one of the wind turbine generators in the Hollandse Kust Noord (HKN) wind farm thereby delivering a baseload of at least 20% of the average electricity production of a Wind Turbine Generator (WTG) (i.e., 1 MW) 99% of the time independent of wind conditions, demonstrating time-shifting flexibility on hours-to-days resulting in reduction of the intermittent power output.

BLPH will provide 'Innovation and Time Shifting Flexibility' where the power output of a single wind turbine will be shown to remain above 20% of average (1MW) regardless of the prevailing weather conditions for 98.5% of turbine up-time.

2.1 Project Overview

CrossWind, a Shell and Eneco joint venture, was recently awarded the tender to develop the offshore HKN wind farm, located 18.5km off the coast of The 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 enough renewable power to supply more than 1 million Dutch households with green electricity. Offshore wind projects produce intermittent electricity. Balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. That is why the offshore wind farm will include several new technology demonstrations that could be implemented at full-scale in the future. Among others, the new technologies being explored include a floating solar farm, a short- term battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a Fuel Cell (FC). The combination of these individual measures, herein referred to as the BLPH, will ensure a continuous power supply regardless of the wind situation. All components included in the BLPH will be 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 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. 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. In addition of the charge held by the BESS, pressurized H2 gas will be converted back into electricity using a FC cell to extend the discharge duration. Note that transporting H2 out of the BLPH is not an option, energy must leave the BLPH in the form of electricity through an inter-array cable leading to a substation provided by the Transmission System Operator (TSO) TenneT.

2.2 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.

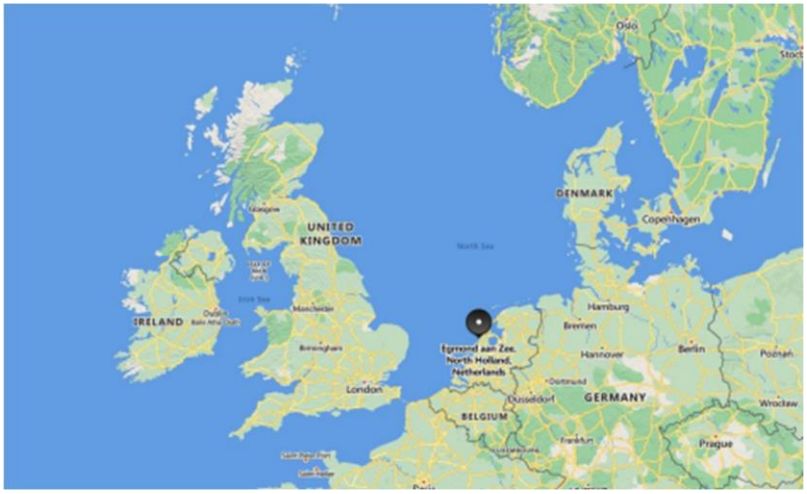


Figure 1 HOLLANDSE KUST NOORD WIND PART Location Map



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 located on coordinates E 590719.1, N 5841602.3 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.

2.3 Electrical Distribution

All components included in the BLPH will be integrated onshore on a topsides 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 farm) and release it during periods of low generation.

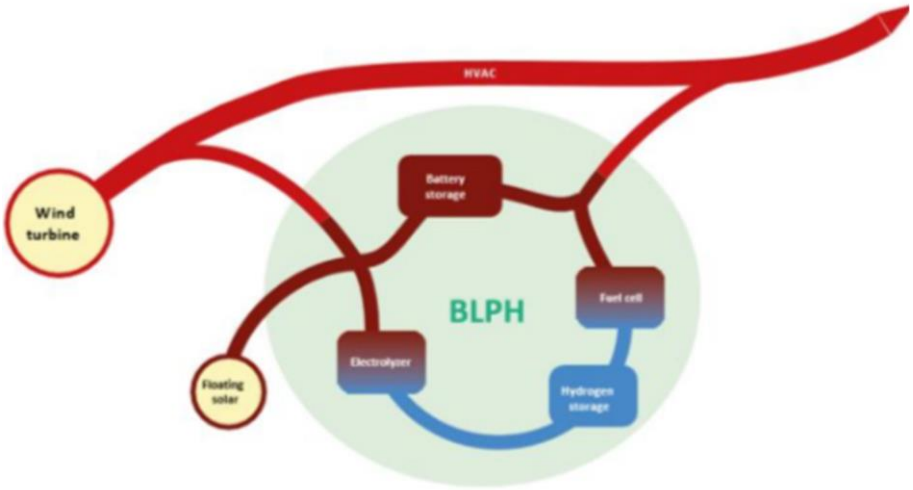


Figure 3 BLPH Concept

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.

2.4 Production Units and Loads

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 MW, 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 BLPHs 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.

2.5 Operational Constraints

The Central Control System (CCS) is responsible for the normal operations of BLPH, with an independent system to the elements of the Safety System. The components that CCS is required to control all process (power generation) systems, utilities systems, and electrical equipment on the platform following Document 123A-DDL-IN-DD-40019 Data Network Architecture. As agreed with operations, a single operator shall be required for both electrical and process systems on BLPH. CCS reacts to changes from the HNA5 Wind Turbine, power output only. Only output/status of HNA5 Wind Turbine effects operating modes. The CCS shall act independently of the safety system and shall not interfere with any of its functions. The objective of the BLPH is to demonstrate time shifting flexibility and capability of providing 1MW Power output using the full capacity of the inventory stored on the platform. BLPH does not plan its output on weather forecast – BLPH output is planned depending on the actual power output of the HNA5 Wind Turbine. The facility can be operated remotely from on-shore Control room, and has the ability to shut down, start-up, to adjust and/or tune, to connect and disconnect to the grid and to monitor BHLP. The measured response of BLPH will be tied to the power generation profile of an individual wind turbine HNA5.

The technologies being demonstrated at BLPH are:

1. Floating Solar farm.
2. Short-term Battery Energy Storage.
3. Long-term Hydrogen Energy Storage (Electrolyzer to create green hydrogen).
4. Fuel-Cell.

Energy harvested from both wind and sun will be stored either directly in a Battery Energy Storage System (BESS) or indirectly using water electrolysis to create hydrogen. Stored hydrogen will be consumed onboard by a fuel-cell to produce electrical power. Monitoring and control of BLPH will be remote (shore based control room) and the solar farm, battery and fuel-cell shall act cooperatively so that power from all sources will be combined to export power regardless of the prevailing weather. NOTE: Energy stored as hydrogen will leave only in the form of electricity through the Inter-Array Cable (IAC) connecting BLPH indirectly to a grid sub- station provided by Transmission System Operator (TSO) TenneT. The fuel-cell is slow-acting whilst the BESS is fast acting. Therefore, the BESS (whenever available) will be used as ‘lead supply’ / ‘load follower’ and operate in its most efficient / effective manner with the fuel cell operating in parallel or series to optimize both the efficiency and availability of the entire system. The CCS will be programmed to act upon multiple inputs / factors e.g. BESS SoC, HNA5 (EMCS will receive the data from HNA5 and based on these values will react), stored hydrogen availability, CCS operation mode, equipment operating status, equipment operating mode, circuit breaker status, etc. Whenever possible the fuel-cell will consume the platform’s stored hydrogen prior to discharging the BESS.

3. Reference Documents

This is a selection of the key documents of the project relevant for the EMCS. It is not an exhaustive list of the available documentation and not even of the relevant documentation for the EMCS. This set of documents should be enough to identify and have a first level refinement of all the requirements, operational constraints and interoperation aspects of the EMCS.

Document No.	Description
123A90-DDL-IN-RE-40095	Process Control Logics Description
123A90-DDL-EL-SP-20141	Electrical System Description & Design Philosophy
123A90-DDL-IN-SP-40098	Control System (PCS) Specification
123A90-DDL-EL-RE-20176	Electrical System Study Report - Transient In-Rush
123A90-DDL-EL-RE-20171	Electrical System Study Report - Short Circuit
K559-2254-PM-PLN-003	Basic Design Engineering Package BLPH FEED
123A90-PML-PM-TQ-00050	Reactive power control requirement for BLPH
123A90-DDL-EL-DG-20158	Overall/Key Single Line Diagram
1724000594-IN-DD-00015	System Architecture
SRN – 04270	Operations Modes Review – Base Load Power Hub
123A90-DDL-IN-SP-40097	System Specification for Main Automation Contractor
123A90-DDL-IN-SP-40100	Safety System (ESD, Fire and Gas) Specification)
123A90-MOM-RM-STAT-CW-003	Minute of Meeting - Freqcon & Statron-Control Workshop with Rosetti's MAC
123A90-MOM-RM-STAT-CW-003	123A90 - Interface control workshop with Rosetti MAC-BESS-Point 9 and 10-Synchronization Procedure-Via Mail
123A90-PML-PM-TQ-00053	Technical Query – Interface with BESS
123A90-MOM-ELO-ROS-CW-003	Minute of Meeting- Electrolyzer- CPI Interface Meeting
123A90-PML-PM-TQ-00052	Technical Query – Interface with Electrolyzer
123A90-PML-PM-TQ-00051	Technical Query – Interface with Fuel Cell
123A90-MOM-RM-BAL-CW-004	Minute of Meeting – Control Workshop with Rosetti's MAC.
123A90-PML-PM-TQ-00055	Technical Query – Interface with Solar Farm

123A90-DDL-IN-RE-40095	Process Control Logics Description
123A90-PML-PM-TQ-00054	Technical Query – Interface with Windfarm and HNA5
123A90-MOM-ELE-ROS-CW-023	Minute of Meeting - Control Workshop with Rosetti's MAC
K559-2254-CWIWP4202201-C08-001	BESS - Control Philosophy & Block Logic Diagrams
C63-AUT-002	Electrolyzer – Communication Table
K559-2254-CWIWP4202202-C08-001 Rev 03	BLPH Project - Control Philosophy & Block Logic Diagrams
2021074-FDS-003	SCADA Functional Design Specification
123A90-DDL-EL-LIS-20016	Electrical Load List & Balance (CCS MODE 1 'IMPORT')
123A90-DDL-EL-LIS-20143	Electrical Load List & Balance (CCS MODE 3 'HOT STANDBY')
123A90-DDL-EL-LIS-20144	Electrical Load List & Balance (CCS MODE 2 'EXPORT')
123A90-DDL-EL-LIS-20145	Electrical Load List & Balance (CCS MODE 4 'COLD STANDBY')
123A90-DDL-EL-LIS-20146	Electrical Load List & Balance (CCS MODE 5 'EMERGENCY MODE')
23A2007_240628_PROFINET_Register BESS_V1_0_0_3	BESS_PROFINET_SIGNAL LIST
C63-AUT-002_03_Communication table	ELECTROYLYZER_Signal List
K559-2254-CWIWP4202201-J10-001	FREQCON MSC - Product Description
K559-2254-CWIWP4202202-C08-001Rev004	C08 – Control Philosophy and Logic Block Diagrams
MAN002 Integration Manual FCwave 2.2.0	FC Wave Marine Fuel Cell Integration Manual
CW-BALL-TQ-0008 - Fuel Cell - Rev B - BAL RESPONSE	Minute of Meeting Response
Crosswind Modbus Table - Main PLC - External Cut	Fuel Cell MODBUS Map
HKN1-02-REG-341	Manual for controlling the solar farm via the client connector REV A
123A90-PML-PM-TQ-00054 (002) response	Technical Query_ Wind Farm

3.1 Definition & Abbreviations

ALARP	As Low as Reasonably Possible
AVR/OLTC	Automatic Voltage Regulator/On Load Tap Changer
BESS	Battery Energy Storage System
BLPH	Base Load Power Hub
BPCS	Basic Process Control System
COMPANY or Client (CPY)	Crosswind
CCS	Central Control System (PCS + EMCS)
CPI	Company Provided Item
DCS	Distributed Control System
ESD	Emergency Shut down
EWS	Engineering Workstation
EMCS	Electrical Management Control System
FEED	Front-end Engineering Design
FGS	Fire & Gas System
FO	Fiber Optics
GUI	Graphical User Interface
HMI	Human Machine Interface
HKN	Hollandse Kust Noord
HV-SCADA	The given name for the COMPANY's control system for the HKN wind farm infrastructure. BLPH's control system shall operate autonomously but will interface with HV-SCADA
HSE	Health, Safety & Environment
HV	High Voltage
HVAC	Heating, Ventilation and Air Conditioning
IACS	Industrial Automation & Control System
ITER	Instrument & Telecoms Equipment Room (located Offshore)
LV	Low Voltage
MV	Medium Voltage
OER	Onshore Equipment Room
PAS	Process Automation System
PFD	Process Flow Diagram
P&ID	Piping & Instrumentation Diagram
PSD	Process Shut Down
PV	Photo Voltaic
SCADA	Supervisory Control and Data Acquisition
SoC	State of Charge
SF	Solar Farm
SS	Safety System (SIS+FGS)
TQ	Technical Query
UCP	Unit Control Panel
UFD	Utility Flow Diagram

UPS	Uninterrupted Power Supply
WTG	Wind Turbine Generator

4. Functionalities of the EMCS

The EMCS has the following primary functionalities:

1. Enable Supervision and Control by CCS and Higher-Level SCADA
2. Power Control & Energy Management
3. Load Shedding
4. Manage the Electrical Distribution Equipment
5. Wind Farm Grid Connection Procedure

Each functionality is defined in the following sections.

4.1 Enable Supervision and Control by CCS SCADA HMI

We refer to the "CCS SCADA" as the CI Servers, which are supposed to implement the CCS HMI. The user interaction with the EMCS within the CCS is supposed to be made through such HMI.

NOTE: The communication interface between the Electrical Monitoring & Control System (EMCS) and the Process Control System (PCS) will be separated from the one between the EMCS and the CCS SCADA (CI Server).

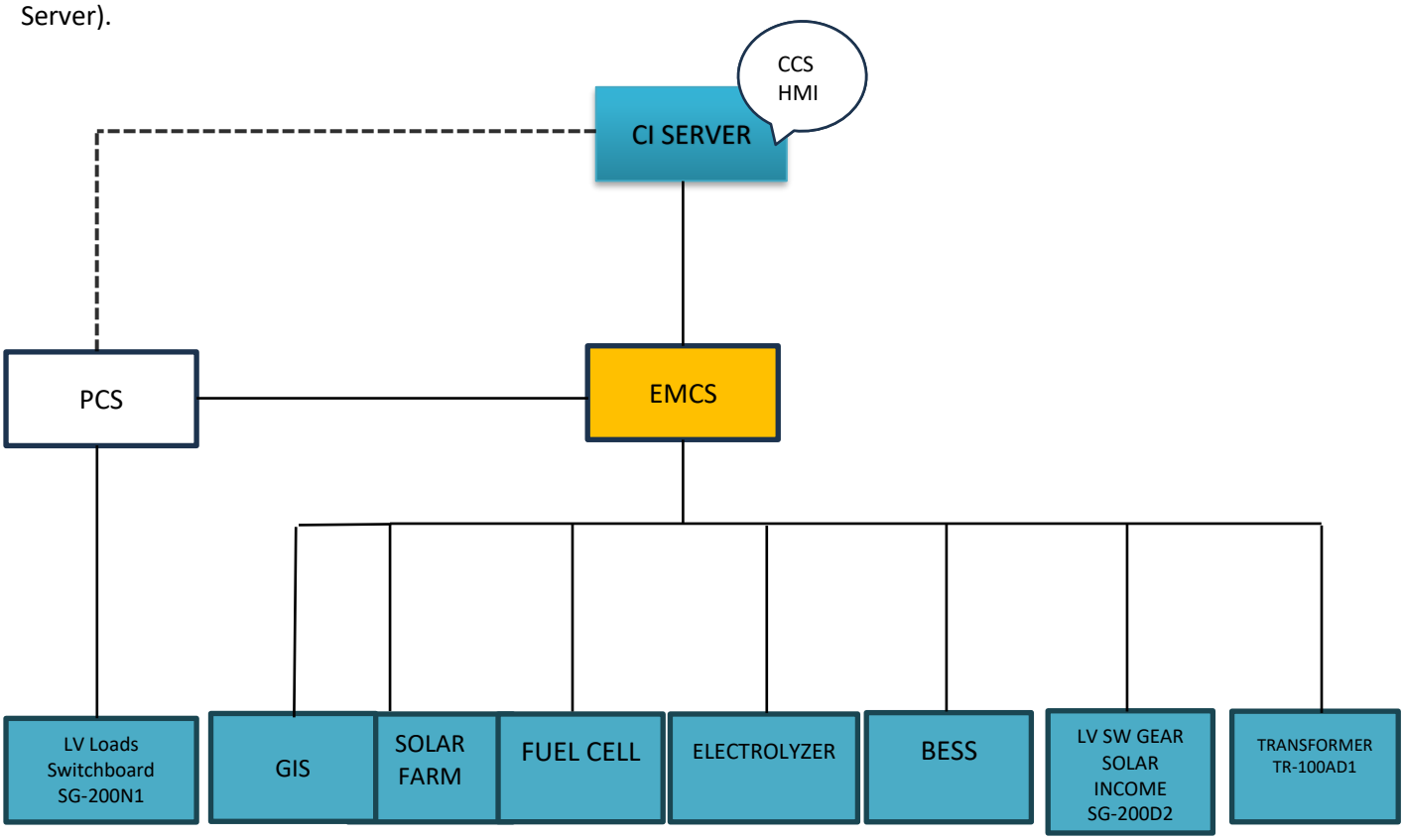


Figure 4 System Architecture Data Flow

4.1.1 Supervision

The EMCS shall gather the real-time power and status signals exposed by the peripheric elements (packages, OLTC, WF HV-SCADA…) and it shall provide these signals to the CCS SCADA, so to feed its supervision and, through the CCS SCADA, enable any higher-level supervision. Among the others, the signals exposed to the CCS SCADA shall include all the permissive signals which enable or prevent the execution of commands, so to allow the SCADA HMI to report to the operator the correct availability of the commands.

The EMCS shall provide to the CCS SCADA all the samples received from the peripheric elements, within the technical limits of the data interface selected.

The EMCS shall expose the original timestamp samples, if available in the communication protocol of the package, in its interface to the CCS SCADA.

For each signal, the EMCS shall expose the data to the CCS SCADA preserving the sequence of events of every sample reported.

In its interface to the CCS SCADA, for these signals the EMCS receives over a protocol without external timestamping, this including hardwired signals, the EMCS shall expose the reception time as the original timestamp of the data.

The EMCS shall expose to the CCS SCADA the real-time value of status and variables defining the state machine of the control policy of the EMCS. The EMCS shall expose to the CCS SCADA its real-time diagnostic signals, so to allow the CCS SCADA to detect the presence of anomalies in the EMCS.

4.1.2 Command

The EMCS shall receive real-time commands, concerning EMCS control functions, from the CCS SCADA.

The EMCS interface for real-time commands with the CCS SCADA, shall be “fire and forget”; i.e.: the reception of a single command message shall be sufficient to produce the execution of the command, without requiring, putting on hold or expecting further interaction with the CCS SCADA.

The EMCS shall not implement intentional delays of the commands received from the CCS SCADA, unless specifically required.

4.1.3 EMCS Flow Chart

Figure 5 EMCS Flow Chart shows the transition between each mode with respect to the pre-condition.

The 1-minute transition time condition can be considered that the modes transition can take 1-minute. On the other hand, it can be configured in the software algorithm to keep the previous mode until the 1-minute transition time is completed.

These are extreme conditions, but the system knows where to be according to the Status Machine. Additionally, added the "set first execution," which is independent of the time variable. So, if the system is in EMCS automatic mode, grid-tied, and supply guarantee on, the first start/execution will be 1-minute time independent until it resides in one of the modes (Export, Cold Stand-by, Hot Stand-by, Import 1A, or Import 1B) as per the preconditions. Once the EMCS is in mode, it will follow the 1-minute transition time to move from one mode to another.

Another possible scenario is if a reset occurs and the system goes off-grid or into EMCS manual mode, the timer condition will be reset. It will then follow the same pattern of neglecting the time variable, residing in the mode that fulfills the precondition, and then proceeding from one mode to another following 1-minute time variable.

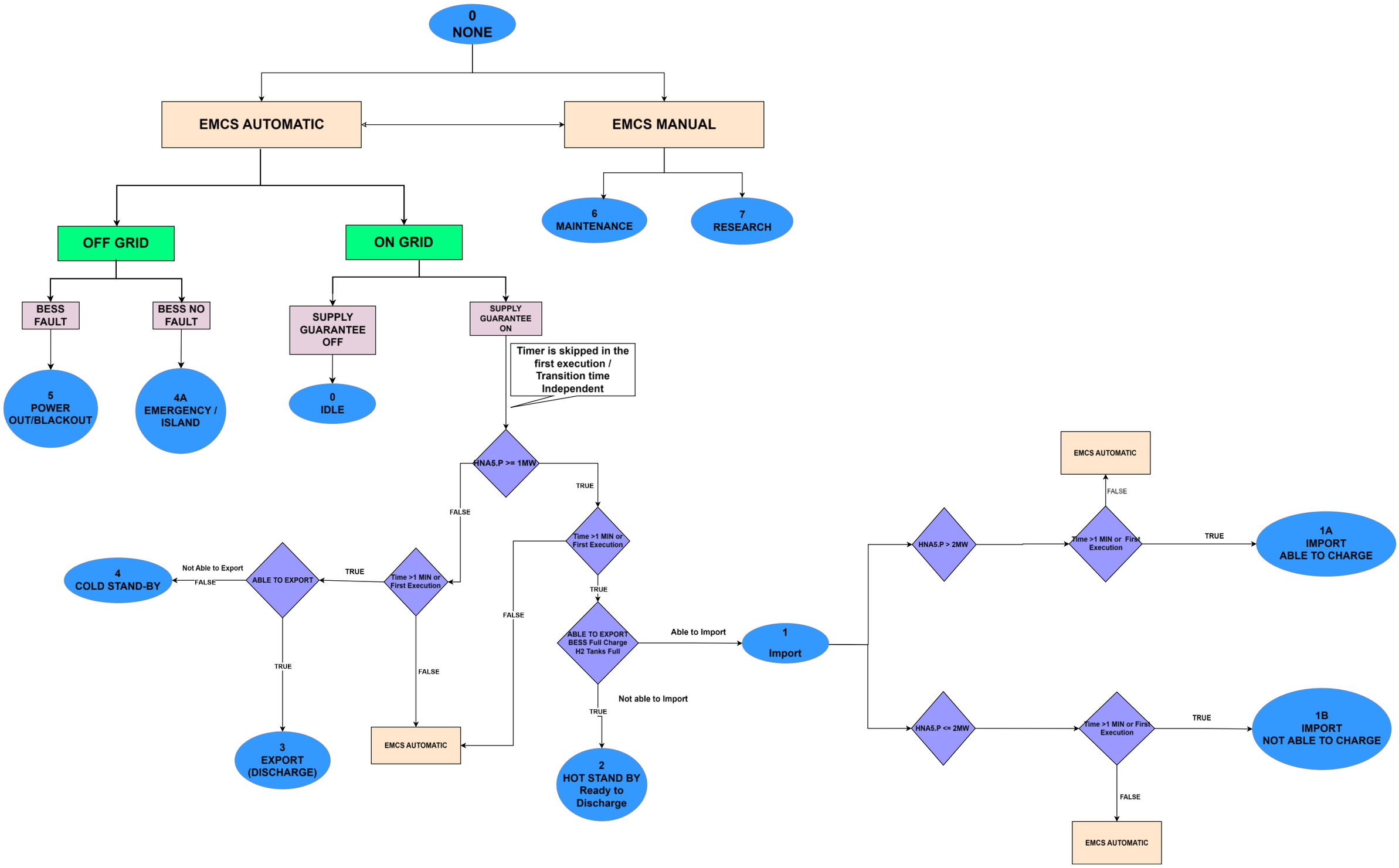


Figure 5 EMCS Flow Chart

4.1.1 EMCS Status Machine



Figure 6 EMCS Status Machine

4.2 Power Control & Energy Management

4.2.1 Energy Management

4.2.1.1 Introduction

Functional Statement (from the Electrical System Description & Design Philosophy, 123A90-DDL-EL-SP-20141 Rev.00):

> When HNA5 is connected / operating and providing at least 1MW to the wind farm 'surplus' powerwill potentially be available for import to BLPH. This renewable energy will be used to run the plant whilst simultaneously charging the BESS and/or running the electrolyzer to create & store hydrogen. Conversely, when WTG 57 provides less than 1MW BLPH will export solar power (if available) and/or the energy stored in the BESS or produced by Fuel Cell to ensure the wind farm continues to receive at least 1MW. NOTE: Power provided by the solar farm shall always be used to the fullest extent possible.

The energy management design philosophy described in the project documents is founded on a BLPH logic variable, dubbed MODE, identified by the real time conditions of the BLPH and of the HNA5. The MODE is intended to univocally define the steady-state (i.e. tendential) operational mode of each subsystem of the BLPH, and in particular its power units (Solar Farm, BESS, Fuel Cell, Electrolyzer). In such a design philosophy, the MODE is supposed function of: the ability to operate ("healthiness") of the machines (HNA5, BESS, Fuel Cell, Electrolyzer), the production of the HNA5, the status of electrical interconnection of the BLPH with the grid. The control policy was supposed to do not affect any of these conditions with its activity, with the exception of the state of the energy reserves (BESS and hydrogen), which indirectly affects the ability to operate of BESS and Fuel Cell. Such design philosophy, and particularly the provided descriptions of the MODES, introduces some constraints and deviations from the goal defined in the Functional Statement. Due to this, the latter is not supposed to be the direct basis of the functional requirement of the control.

In the following, we preserved such base structure of the design philosophy, updating it considering the additional available information, merging different statements, and finally translating it into functional requirements. In merging conflicting inputs, we have been driven primarily by the mentioned Functional Statement and secondarily by an interpretation of the aim of the constraints introduced in the definition of the MODES.

There are some main elements introduced in the present definition of the BLPH state-machine that shall be noted:

- The state-machine is entirely based on the definition of the transition conditions: There are defined the trigger condition for the transition in each MODE instead of the supposed status condition once in the MODE.
- There is a decoupling of the BLPH and sub-system state-machines: there are defined the effect of the MODE on triggering or allowing transition of the sub-systems (mainly the packages), instead of a rigid mapping (one-to-one) of the MODE statuses with the machines statuses.

4.2.1.2 Assumptions & Definitions

The BLPH is always in a single MODE at a time.

The BLPH MODE state-machine is fully determined by the real-time conditions reported to the EMCS, except for stabilization control features as hysteresis and inertia implemented in the EMCS.

The BLPH MODE state-machine has the following pseudo steady-state statuses, dubbed MODES:

- MODE 0 = IDLE (Power Import Only)
- MODE 1A = IMPORT MODE (Able to Charge)
- MODE 1B = IMPORT MODE (Not Able to Charge)
- MODE 2 = HOT STANDBY (Ready to Discharge)
- MODE 3 = EXPORT MODE (Discharge)
- MODE 4 = COLD STANDBY (Powe Import: Not able to Export)
- MODE 4A = EMERGENCY MODE (Island)
- MODE 5 = POWER OUT (Black-Out)
- MODE 6 = MAINTENANCE
- MODE 7 = RESEARCH
- MODE 8 = NONE MODE

The additional NONE MODE is intended for specific conditions, such as during EMCS initialization except after the BLACK START because after black start the initialization will start from RESEARCH MODE. In NONE mode, the system can decide next modes according to the environmental condition and CPI status machines.

The EMCS should try to use the solar farm to the maximum extent possible.

The charging of the BESS while the Fuel Cell is producing shall be considered energy inefficient in steady-state condition.

There is no requirement to prevent in hard-lock (as with an interlock) the charging of the BESS while the Fuel Cell is producing; it is allowed to happen in transients (and it must be allowed in off-grid scenario, for system balance).

The EMCS shall be designed such that rapid cycling / quick switching of the BESS, Fuel Cell and Electrolyzer is prevented.

The fuel cell internal production balancing logic implemented by the fuel cell controller foresees committing fuel cell modules in sequence, according to the power set-point. Due to this, the raise of the set-point over specific levels produces the start of the warmup of part of the still unused modules; conversely, the decrease of the fuel cell power set-point may produce the stop of some modules in production. Considering this, the fuel cell vendor suggested considering specific control policy prescription. According to the information received by Fuel Cell vendor, such policy shall at least contain the following prescriptions:

1. The set point of the fuel cell shall be usually raised in steps, avoiding ramp ups to a final value, so to allow the controller since the beginning to properly warm up all the modules required.
2. Oscillating trespassing the critical set-point values has to be avoided.
3. Within the ranges between two critical set-point values, set-point adjustments produce less issues to the fuel cell system. We note that a refined power management architecture would be to delegate to the EMCS the definition of the amount of power to be kept in hot standby, independently from the power set-point; however, the latter is not foreseen in the current project architecture.

To the aim of reducing the issues about the fuel cell dynamics, it is assumed that for the current version the EMCS is sufficient to implement a generic rule in the control policy (as a deviation-vs-time filter on the set-point signal).

The HNA5 Active Power value will be delivered to the EMCS through the interface link with the Wind Farm (HV-SCADA)

The Active Power value produced/consumed by BLPH will be read at the QA1 of HNA6-AFA70.

“Supply Guarantee” definition: It is a status of the HNA5 Wind Turbine – Supply Guarantee is either ACTIVE or INACTIVE.

Supply Guarantee ACTIVE: It means the Wind Turbine is Healthy and the BLPH shall EXPORT power when needed to achieve the desired project outcome which is “ BLPH will provide ‘Innovation and Time Shifting Flexibility’ where the power output of a single wind turbine will be shown to remain above 20% of average (1MW) regardless of the prevailing weather conditions for 98.5% of turbine up-time. NOTE: The measured response of BLPH will specifically exclude the utility consumption of the platform itself (gross exported power) “

Supply Guarantee INACTIVE: It means that there is a problem with HNA5 (FAULT) and the BLPH is NOT required to EXPORT power.

HOLD 34: CW must provide the signal/s allowing to detect the Supply Guarantee status.

With a parameter it will be possible to enable the feature allowing an operator to set the Supply Guarantee Mode INACTIVE.

The Supply Guarantee request status can be ACTIVE or INACTIVE. By default, the Supply Guarantee is ACTIVE. When it is INACTIVE, there is no request to comply with any power supply level, not even zero.

“Power Surplus” definition: It refers to the HNA5 Wind Turbine producing Active Power > 1MW.

The EMCS will drive the electrolyzer as a load (ON/OFF), no partialization will be implemented.

The energy management policy implemented by the EMCS shall foresee to stop the electrolyzer only if the hydrogen tanks are full.

For the Energy Management goals, in case HNA5-AFA70 power will go under zero, it shall be considered as zero.

The EMCS has no control over the HNA5 or the wind farm, this including the related electrical equipment.

The BLPH activity has no direct or indirect effect on the ability to operate or the production of the HNA5 or the wind farm, this includes the status of the related electrical equipment. This includes the absence of any control logic of the HNA5 or wind farm that takes in input any status or level from the BLPH, so to avoid the creation of any feedback loop. The EMCS is not in charge of implementing any electrical protection function. Among the others, this holds true with specific reference to overcurrent, underfrequency, undervoltage, synchronization check functions and safety interlocks.

The EMCS will open the CB of a package if the package does not apply the control requests.

For example, if the EMCS will send the stop command to the Fuel Cell, and it does not stop within a timeout (parametric), the EMCS will open the related CB on the SG-100D1.

4.2.1.3 Description of Requirements Priority & Evaluation Rule

Conditions						MODE	Specific exit contition
EMCS in automatic identification of the MODE	Grid-tied	Supply Guarantee ON	HNA5.P < 1 MW for a min time (1 minute)	Able to export		**EXPORT** (Discharge)	
				Not able to export		**COLD STANDBY** (Not Able to Discharge)	
			HNA5.P >= 1 MW for a min time (1 minute)	Not able to import	Able to export (BESS full charge & H2 Tanks full)	**HOT STANDBY** (Ready to Discharge)	
				Able to import	HNA5.P > 2 MW for a min time (1 minute)	**IMPORT 1A** (Able to Charge)	
					HNA5.P <= 2 MW for a min time (1 minute)	**IMPORT 1B** (Not Able to Charge)	
		Supply Guarantee OFF				**IDLE** (Power Import Only)	
	Off-grid (i.e. not grid-tied)	BESS → NO FAULT				**EMERGENCY** (ISLAND)	
		BESS → FAULT (ie. BESS problems, BESS SoC in low range, etc.)				**POWER OUT** (Black Out)	
Command to enter in RESEARCH MODE						**RESEARCH**	Command to return in automatic identification of the mode
Command to enter in MAINTENANCE MODE						**MAINTENANCE**	Command to return in automatic identification of the mode
Default / fallback						**NONE**	

Figure 7 BLPH Mode Transition Table

Figure 7 BLPH Mode Transition Table demonstrates the conditions under which an EMCS transitions between different modes take place. It categorizes these conditions based on the system being grid-tied or off-grid (i.e.: not grid-tied), with further distinctions depending on whether the supply guarantee is Active/ON or INACTIVE/off, and specific power thresholds (HNA5.P < 1 MW and HNA5.P > 1 MW) that determine the system's ability to export or import power. For instance, when grid-tied with the supply guarantee on and HNA5.P < 1 MW for a minimum time (1-minute), the system enters either the EXPORT or COLD STANDBY mode based on its export capability. Conversely, with HNA5.P > 1 MW for a minimum time (1 minute), the system can enter HOT STANDBY (Ready to Discharge) if it can't import (able to export, when BESS is fully charged & H2 Tanks are full). On the other hand in the similar condition if the system is being grid-tied, Supply Guarantee ON and HNA5.P > 1 MW but able to Import in two conditions, first condition is if HNA5.P > 2 MW for (1-minute) the system will enter in Import A (Able to Charge), second condition is if HNA5.P <= 2 MW for (1-minute) the system will enter in Import B (Not able to Charge)If the supply guarantee is off, the system remains in IDLE mode. Off-grid scenarios are distinguished by the status of BESS (NO FAULT) & MV 6.6kV bars, with energized bars triggering EMERGENCY mode and non-energized bars triggering POWER OUT mode BESS (FAULT). Special modes like RESEARCH and MAINTENANCE can be manually entered (protected by password), with specific commands to revert to automatic mode identification.

To ensure optimal operation and accurate mode transitions, the system prioritizes safety, placing the highest importance on modes like EMERGENCY and POWER OUT. Operational efficiency follows, prioritizing modes such as EXPORT and IMPORT. Reliability ensures the system transitions seamlessly into HOT STANDBY and COLD STANDBY when needed, while flexibility allows entry into RESEARCH and MAINTENANCE modes without disrupting performance. The system continuously monitors conditions, verifying them against mode criteria and applying transition logic to shift to the appropriate mode. It resolves conflicts using predefined priority rules and checks exit conditions for special modes, reverting to automatic identification when necessary.

NOTE: The EMCS shall always choose an operating mode. If the conditions to enter or remain in an operating mode fail or are not met, the EMCS will move the BLPH into another operational mode. While waiting for signals from other systems, the BLPH will remain in the previous mode and the HMI will blink.

In healthy status the BESS is able to operate. For the definition of HEALTHY status see the paragraph

4.2.1.6.2.

4.2.1.4 Layered Structure Among State-machine

The state-machine composing the system: Design includes one State Machine for the BLPH and one State Machine for each package, which is as follows:

- BLPH
- Electrolyzer
- BESS
- Fuel Cell
- Solar Farm

In Figure 8 BLPH State Machine Transition, state-machine of each package interacts with the state-machine of BLPH MODE, as the status of one can enable or trigger the transitions in another. The logic works in layer, each layer can perform the actions allowed by the lower layer.

The power control policy is implemented through the BLPH MODE state-machine, which translates these policies into specific operational modes. Subsystem state-machines then execute actions allowed by the BLPH MODE, ensuring that interlocks and permissions managed by the PCS are respected.

4.2.1.5 BLPH State-Machine

The BLPH MODE state-machine governs the overall operational mode of the system. It interacts with the state-machines of various subsystems to coordinate transitions and ensure cohesive operation. This interaction ensures that changes in one subsystem can trigger necessary transitions in others, maintaining an integrated control approach.

Hierarchy of logics is as follows:

- BLPH Power Control Policy
- BLPH MODE state-machine
- Sub-system state-machine
- Interlocks / Permissions (e.g. PCS coordination)
- Physical capability & communication limits.

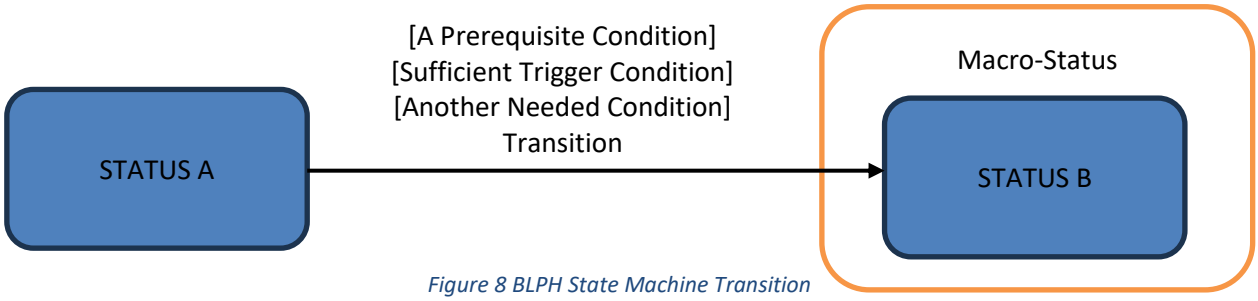


Figure 8 BLPH State Machine Transition

4.2.1.6 Electrolyzer State Machine

In Figure 9 Electrolyzer State Machine manages the electrolyzer's operation through states such as Running, Stoppable, Started, and stop. It transitions between these states based on conditions like running duration and PCS permission.(For Example: the system will transition to Stop state if PCS permission is revoked (i.e., Tanks are full).

The BLPH State Machine will correspond with Electrolyzer State Machine, to do the following:

- EMCS requires permissive signal from PCS to start the Electrolyzer. (i.e. PCS.PermToStartEL).
- EMCS shall not partialize the Electrolyzer, requiring it either to not produce or to produce at full power (EL_MAX_SET_POINT).
- If the PCS.PermToStartEL is not fulfilled the Electrolyzer will be stopped by EMCS.

HOLD 38: Vendor shall specify, EL_MAX_SET_POINT in the IO list.
HOLD 39: Vendor shall specify, MIN_RUNNING_TIME (Minimum time to wait before the electrolyzer can be stopped) in the IO list.

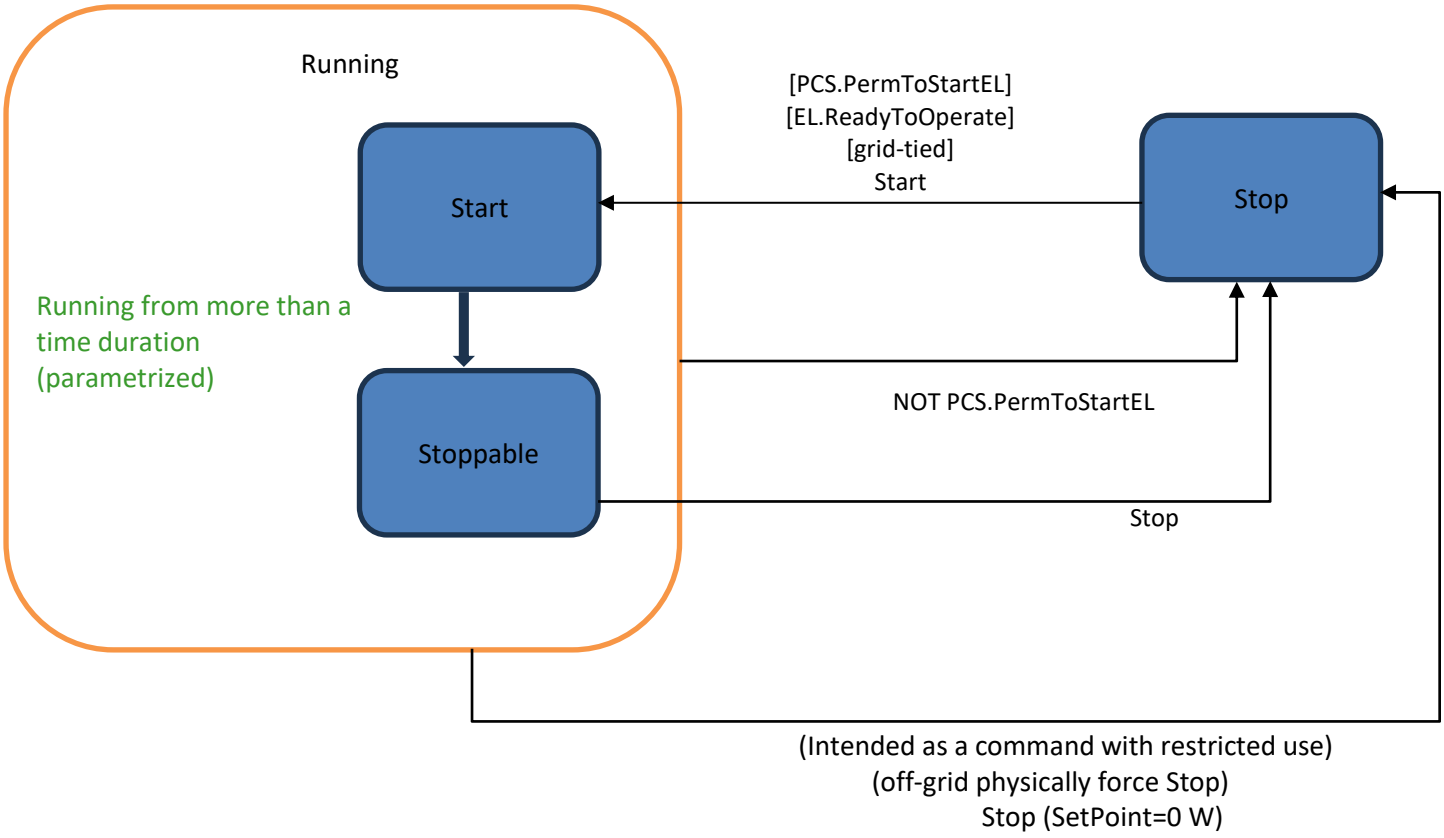


Figure 9 Electrolyzer State Machine

4.2.1.7 Fuel Cell State Machine

In Figure 10 Fuel Cell State Machine**Error! Reference source not found.** controls the Fuel Cell's operations, with states including Running, Stoppable, Unstoppable, Start-able, Unstart-able, and Stop. Transitions are dictated by conditions such as PCS permission(i.e., hydrogen level). The Fuel Cell can start if the PCS permission is granted, while the system will stop if PCS permission is revoked.

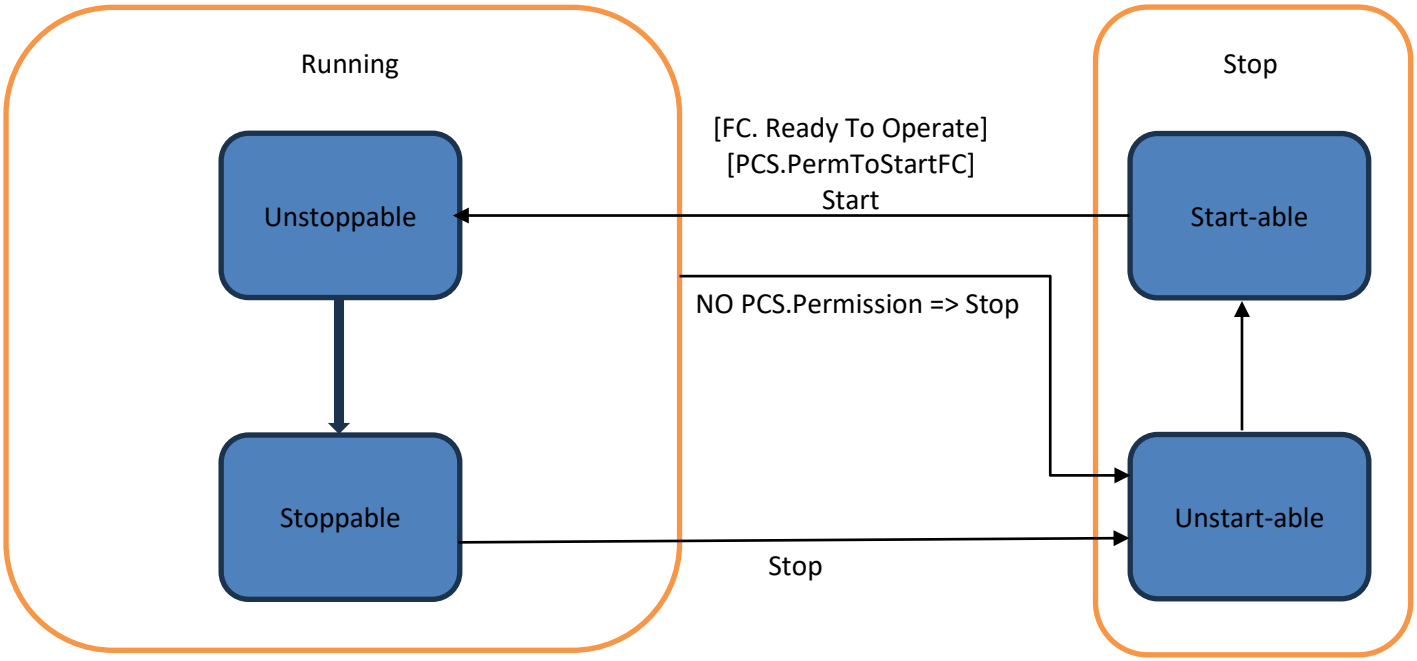


Figure 10 Fuel Cell State Machine

4.2.1.8 BESS State Machine

In Figure 11 BESS State Machine manages the charging and discharging processes of the Battery Energy Storage System. States include Charging, Discharging, and Idle, influenced by the State of Charge (SoC) and PCS permissions via EMCS. The system will charge if the SoC is below the maximum threshold and PCS permission is granted via EMCS, and it will discharge if the SoC is above the minimum threshold and PCS permission is granted via EMCS. The system transitions to Idle if PCS permission is revoked via EMCS.

To start BESS, via EMCS, as per the IO list "23A2007_240628_PROFINET_Register BESS_V1_0_0_3 " (Profile_converter_control 1.13) which: IF set to 1 = BESS start, IF set to 0 = BESS Stop.

Available Energy for charging, Profile_converter_status_3, charge_energy, defines the remaining capacity that can be charged into the BESS which (i.e., 200(Kwh), then 200(Kwh) can be stored in the BESS).

Available Energy for Discharging, Profile_converter_status_3, discharge_energy, defines the available energy for discharge from the BESS (i.e., 200(Kwh), then 200(Kwh) can be discharge from the BESS)

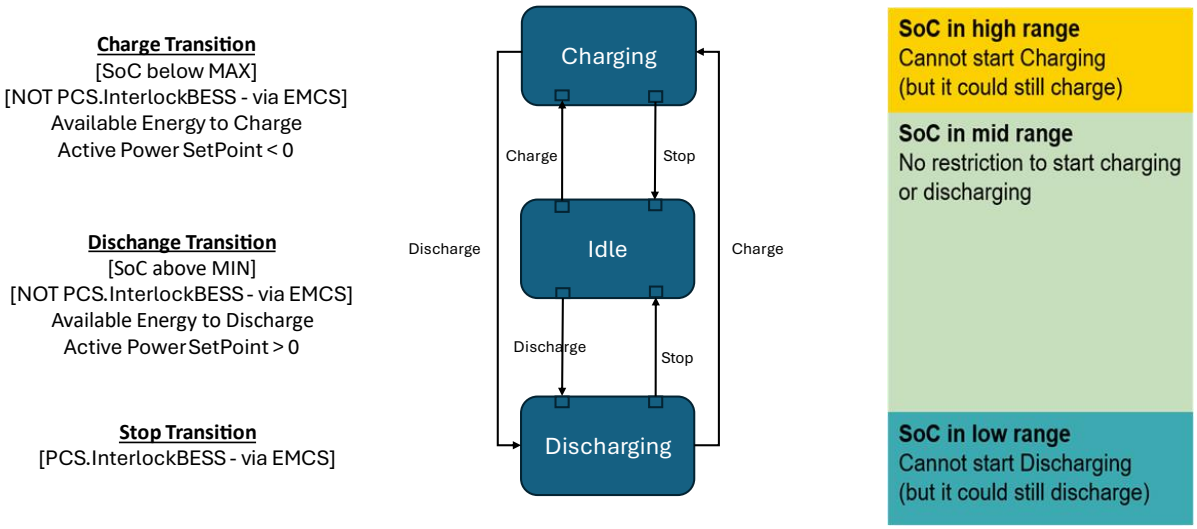


Figure 11 BESS State Machine

4.2.1.9 Solar Farm State Machine

In Figure 12 Solar Farm State Machine illustrates transitions between "Started" and "Stopped" states within the broader context of "Operating." The "Started" state indicates that the system is actively managing or generating energy, whereas the "Stopped" state signifies that the system is not operating and has been shut down. Conversely, the transition from "Started" to "Stopped," labeled as "Shutdown," can occur due to critical conditions such as emergency mode activation or the system not being grid-tied, ensuring the system is safely deactivated when necessary. Within the "Started" state, there is a loop indicating the "Curtail" action (EMERGENCY MODE only), which allows the system to reduce or adjust its output without shutting down completely, in response to conditions like excess energy production. This ability to curtail helps maintain efficient energy production while staying operational.

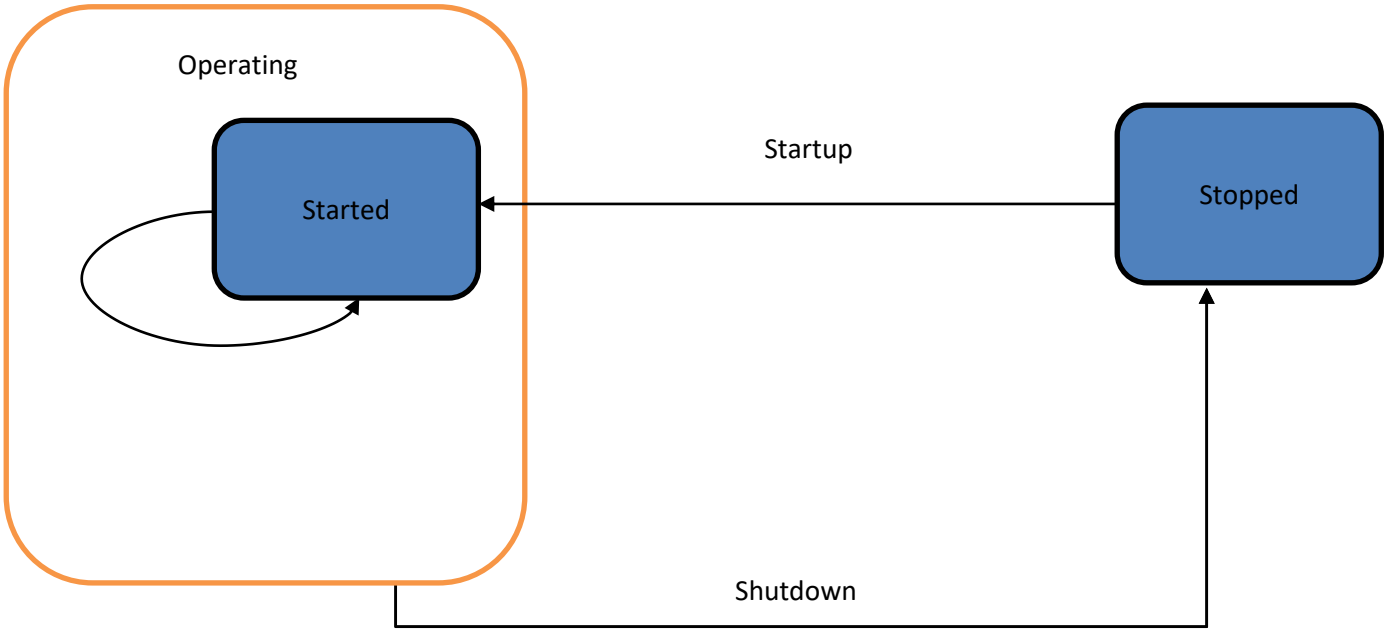


Figure 12 Solar Farm State Machine

4.2.1.10 General requirements on the Energy Management Policy

The EMCS shall drive the production and consumption of the power units in the BLPH and the Solar Farm according to a pre-defined, deterministic state-machine of the BLPH; such state-machine being defined in the present functional requirement specifications, specifically about the MODE.

The EMCS shall identify the real-time value of the BLPH MODE, reporting it over the data interface to the CCS SCADA.

The EMCS shall report the supply Guarantee request status over the data interface to the CCS SCADA.

The EMCS shall expose a command to the CCS SCADA under password protection that allows the operator to set the Supply Guarantee to INACTIVE.

The EMCS shall expose to the CCS SCADA, under password protection, the following parameters:

- EXPORT_POWER_SUPPLY_THRESHOLD (Default 1 MW)
- IMPORT_POWER_SURPLUS_THRESHOLD (Default 2 MW)
- POWER_SURPLUS_TIME_DURATION_IMPORT (Default 1 minute)
- POWER_DEFICIT_TIME_DURATION_IMPORT (Default 1 minute)

The EMCS shall expose a command to the CCS SCADA that forces the MODE into any of the listed values. NOTE: This means that the EMCS may act according to the control policy defined by a MODE, independently from the actual conditions of the system under password protection, the wind farm and the environment.

The above thresholds shall be intended as net values, i.e . HNA5.P - BLPH.AuxLoad + Solar.P.

4.2.1.11 General requirements on the Power Distribution Management

By default (i.e. unless required to open or keep open), the EMCS shall ask to close and keep closed all the MV (6.6kV) switchgears of the BLPH distribution under the busbar SG-100D1, this including the Solar Farm. This requirement explicitly does not apply to the incoming MV switchgear and upstream equipment.

By default (i.e. unless required to open or keep open), the EMCS shall ask to close and keep closed all the contactors of the BLPH LV loads (switchgear SG-200N1), EMCS interacts also with Solar Farm MODBUS interface to drive the switchgear SG-200D2 (managed by the Solar Farm via EMCS).

If an operator should manually open a circuit breaker locally (BLPH), the EMCS system must not close it automatically, even if it is in automatic logic. Instead, it should send an alarm signal to the HMI and HV-SCADA indicating the authorized opening of a circuit breaker. This is because the command to open the circuit breaker also functions as a STOP protection.

4.2.1.12 Grid forming service

The EMCS shall provide to the BESS a permissive signal that enables the grid-forming mode. By default, the signal shall be True. If the BESS charge level is below the BESS-MINIMUM-OPERATING-RESERVE threshold, the EMCS shall set to False the permissive signal that enables the grid-forming mode to the BESS.

The “BESS charge level” and the related BESS-MINIMUM-OPERATING-RESERVE (and the others parameters about “BESS charge levels”) are based on absolute values of energy, expressed in MWh, instead of SoC %: As per confirmation from the BESS vendor, the BESS expose over the data interface the absolute value of energy available to the discharge, and this value is representative of the BESS ability to produce power and hence to sustain the isolated grid, while SoC value is not.

4.2.1.13 General policies on the machines transitions

4.2.1.6.1 ELECTROLYZER

The EMCS shall not partialize the Electrolyzer, requiring it either to not produce or to produce at full power (EL_MAX_SET_POINT).

All the package control signals (Status & Commands) will be exchanged with BLPH State-machine through PROFINET Communication.

The EMCS shall not stop the Electrolyzer on the sole basis of the production needs required by the energy management policy (given by the MODES).

The EMCS shall stop the hydrogen production by the Electrolyzer when the storages are full (i.e. 100% value).

The EMCS request to the PCS the permissive to start the Electrolyzer and, after receiving "PCS.PermToStartEL" (true), it commands the start.

When "PCS.PermToStartEL" (permissive signal allowing the Electrolyzer to run) is set to false, the EMCS sends a command to stop the Electrolyzer. The PCS send also the "Process Fully Charged Status" to EMCS informing that tank storages are full.

The EMCS shall allow the start of the Electrolyzer only if the stored hydrogen level is below a threshold. When the Electrolyzer starting to produce Hydrogen the PCS, as per the EMCS requirement starts the "Process Charging Mode". The "Process Charging mode" is a normal operating mode when the hydrogen vessels are empty after a process discharging mode and the vessels that previously contained hydrogen shall be refilled.

"WATCHDOG" EMCS shall write a value in variable periodically, sending different values every second.

"Set-point Choice" EMCS shall set the value of this variable to 0 before to send a power set point to electrolyzer which will be as follows:

Bit = 0: Power Setpoint
Bit = 1: Flow H2 Setpoint

"Status_Electrolyzer", EMCS assumes that the Electrolyzer will ignore all commands when the status is one of the "LOCAL MODE" group. On the other side, the EMCS assumes that the Electrolyzer can receive set points command when the status is one of the "DISTANT MODE/REMOTE MODE" group.

HOLD 35: "Total power consumption (W)" EMCS assume that the total Active Power absorbed by the Electrolyzer from the grid is not yet implemented (as per the response from the vendor).

HOLD 36: "Current Power Setpoint" EMCS assumes that the current power set point followed by Electrolyzer, or " Power setpoint(W)" used this information, there is no equivalent to power setpoint which is not yet implemented by vendor.

The EMCS shall allow the start of the Electrolyzer only if the Electrolyzer is ready to operate, status_electrolyzer (14: MODE Stand-by)

HOLD 37: To have the electrolyzer working it is enough to send the start command without the need to sent a setpoint

4.2.1.6.2 BESS

The EMCS shall allow the request of BESS discharge (i.e. start and keep going) only if the BESS charge level is above the BESS-MINIMUM-OPERATING-RESERVE. The EMCS shall allow to set such parameter over the data interface with the CCS SCADA.

The EMCS shall allow the request to start BESS discharge only if the BESS charge level is above the BESS-MAXIMUM -DISCHARGE-START-RESERVE. The EMCS shall allow to set such parameter over the data interface with the CCS SCADA, and it shall be not lower than the BESS-MINIMUM-OPERATING-RESERVE value. Signal “Available Energy for Discharging“ “profile_converter_status_3.Discharge_Energy” indicates the available energy for discharge.

The EMCS shall allow the request of BESS charge (i.e. start and keep going) only if the BESS charge level is below the BESS-MAXIMUM-OPERATING-RESERVE. The EMCS shall allow to set such parameter over the data interface with the CCS SCADA. Signal “Available Energy for Charging” “profile_converter_status_3. Charge_Energy” indicates the remaining capacity that can be charged into the BESS.

The EMCS shall allow the request to start BESS charge only if the BESS charge level is below the BESS-MINIMUM-CHARGE-START-RESERVE. The EMCS shall allow to set such parameter over the data interface with the CCS SCADA, and it shall be not higher than the BESS-MAXIMUM-OPERATING-RESERVE value.

The figure below shows the BESS operating parameters:

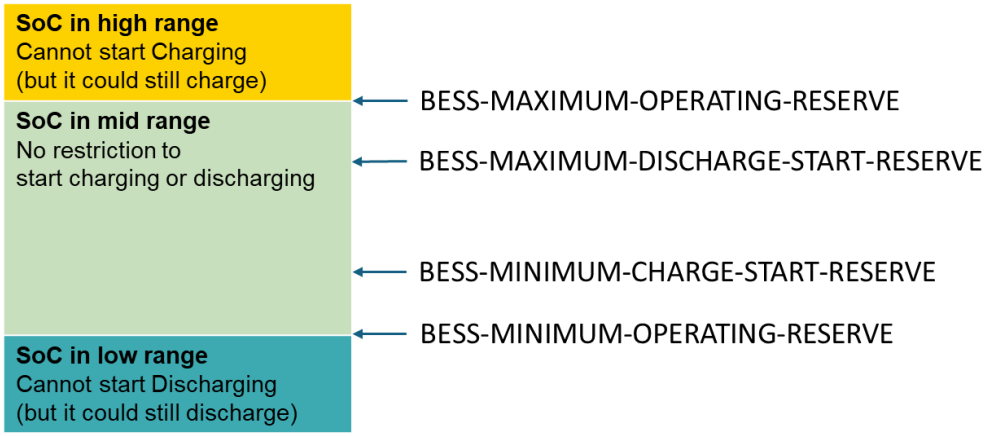


Figure 13 – BESS Operating Parameters

The EMCS shall allow to START & STOP the BESS with control variables (profile_converter_control 1.13):

IF set to 1 = BESS START

IF set to 0 = BESS STOP

The following values must be kept every time the profile_converter_control 1.13 signals are sent to BESS.

All the package control signals (Status & Commands) will be exchanged with BLPH State-machine through PROFINET Communication.All the package control signals (Status & Commands) will be exchanged with BLPH State-Machine through PROFINET Communication.

In HEALTHY status the BESS can operate in grid-forming mode, ensuring that the BLPH can operate as defined in the EMERGENCY mode (disconnected from the wind farm) providing energy for equipment and most important loads.

If the BESS is not HEALTHY, the disconnection from the grid will lead the EMCS to operate in POWER OUT mode, causing the open of the relevant switchgears to prevent damage on the equipment.

On the base of the I/O list “23A2007_230803_PROFINET_Register BESS_V1_0_0_3“, is that a healthy status can determined by the satisfaction of the following conditions:

Healthy = Profile_converter_status_3.available == true **AND**
Profile_converter_status_3.BESS_CPI_STATUS = true **AND**
Profile_converter_status_3.SOC > [CONFIGURABLE_SOC_THRESHOLD] **AND**
Profile_converter_status_1.Statusword.BIT_1 == 0 **AND** “Error”
(Profile_converter_status_1.Statusword.BIT_3 == 1 **OR** “Standby State”
Profile_converter_status_1.Statusword.BIT_5 == 1 **OR** “Ready State”
Profile_converter_status_1.Statusword.BIT_6 == 1 **OR**) “Active State”

Give the following StatusWord definition

Bit	Name
0	Warning
1	Error
2	Preheat State
3	Standby State
4	Precharge State
5	Ready State
6	Active State "In Operation"
7	Safety relais triggered

When EMSC receives the “BESS in fault” signal from the PCS, the EMCS stops immediately the BESS (regardless of the BLPC operating MODE).

4.2.1.6.3 FUEL CELL

The EMCS shall allow the start of the fuel cell only if it receives the PCS.PermToStartFC permissive signal (i.e., the stored hydrogen level is above a threshold). All the package control signals (Status & Commands) will be exchanged with BLPH State-machine through MODBUS TCP Communication.

The EMCS shall change the fuel cell set-point applying a deviation-vs-time filter on the requested value (the tendential set-point), unless the update is forced. Such deviation-vs-time filter shall produce an update of the signal according to the following conditions (evaluated in this given order), compared to the value and time of the last update:

- Do not update before a FC-SETPOINT-MIN-UPDATE-TIME (default value 0 seconds);
- Update after FC-SETPOINT-MAX-UPDATE-TIME (default value 60 seconds);
- Update if the upward deviation is more than FC-SETPOINT-HIGH-DEVIATION (default value 0.05 MW)
- Update if the downward deviation is more than FC-SETPOINT-LOW-DEVIATION (default value 0.05 MW).

The EMCS shall allow to set the parameters of the fuel cell set-point deviation-vs-time filter over the data interface with the CCS SCADA.

The EMCS shall set a power set-point of zero on the fuel cell for any value that would otherwise be less than the FC-MIN-NONZERO-SETPOINT parameter (defined non-negative, default value 0.05 MW), so to prevent the request of set-points lower than the threshold and different from zero. The EMCS shall allow to set such parameter over the data interface with the CCS SCADA.

4.2.1.6.4 SOLAR FARM

The EMCS shall allow the start of the solar farm only if the solar farm is ready to operate.

If the BLPH is off-grid and the solar farm reports to the EMCS that it is not able to guarantee the respect of the set-point from the EMCS, then the EMCS shall stop the solar farm.

Solar Farm will provide a set of signals over the data interface with the EMCS, signaling that the solar farm is not able to guarantee the respect of the set-point from the EMCS (within the declared tolerances).

The condition is retrieved by the elaboration of this formula:

Status= 0x0001 (Operating) **AND**
Remote Control Available= 0x0001 (Available) **AND**
Solar Farm Main CB Closed status = 0x0001 (Closed) **AND**
Solar Farm Main CB Open status = 0x0000 (Not Open) **AND**
External CB Closed status = 0x0001 (Closed) **AND**
External CB Open status = 0x0000 (Not Open)

NOTE: in the case the imposed set point is not followed by the solar plant controller, the EMCS will open the related SG-100D1 6.6kV CB.

4.2.1.14 Functional requirement related to the BLPH MODE

4.2.1.7.1 MODE 0 = IDLE (POWER IMPORT ONLY)

The BLPH shall enter in IDLE MODE if:

- It is grid tied
- Supply Guarantee is INACTIVE/OFF.

The EMCS shall allow to consider an inertia on the above entrance condition to IDLE MODE. Such time duration shall be parametric, positive, with default value zero seconds.

The Supply Guarantee is NOT REQUIRED if the HNA5 is unable to produce power. The latter condition including also the case of HNA5 disconnection (at QZ91) or HNA5 fault.

HOLD 42: the HV-SCADA will provide a signal to understand if the HNA5 is in fault.

In IDLE MODE the EMCS shall charge BESS and run the electrolyzer, according to their availability and machine transition policy, as much as the machines allows and follows logic:

- EMCS requires PCS to enter in “IDLE Mode“ with “PCS.EnterMode(IDLE)”
- Fuel Cell package is STOPPED (not in production)

NOTE: In IDLE MODE there are no constraints on the power import of the BLPH related to any target power exchange level with the wind farm.

EMCS shall implement out-of-command timeout of the stop packages commands, EMCS shall implement the related open command on each 6.6kV CB on SG-100D1 (even if this is due to the package being in local).

4.2.1.7.1 MODE 1 = IMPORT

The BLPH shall enter in IMPORT MODE 1, under following conditions:

- It is Grid Tied.
- Supply Guarantee ACTIVE.
- The HNA5 produces more than 1 MW for one minute.
- Check the BESS is NOT full charge or NOT PCS.ProcessFullyCharge (H2 vessels not full)

If the above condition is satisfied, the EMCS requests to the PCS to enter in IMPORT MODE. After receiving the permissive “PCS.PermToEnterImport”, the BLPH enter in IMPORT MODE.

The EMCS shall allow to consider an inertia on the above entrance condition to IMPORT MODE. Such time duration shall be parametric, positive, with default value zero seconds. The EMCS shall allow to set such time duration parameter over the data interface with the CCS SCADA.

The BLPH is considered “able to operate in import” if it can charge the BESS or produce H2 with the electrolyzer (at least one of the two) and neither the BESS nor the Fuel Cell are committed to continue producing power (according to their transition policy and any prevailing control logic).

The BLPH stay in this mode until the condition to move in MODE 1A or 1B are satisfied.

4.2.1.7.2 MODE 1A = IMPORT (CHARGING)

The BLPH shall enter in IMPORT MODE 1A (Able to Charge), under following condition:

- HNA5.P > 2 MW for one minute (Power surplus).

EMCS shall constrain the range among negative set-points only (charge), so to prevent power flow inversion (with the aim to avoid consequent possible stress on the BESS).

In IMPORT MODE 1A, the EMCS shall charge the energy storages (charge the BESS and run the electrolyzer to produce hydrogen), using the power surplus available in real-time (HNA5.P > 2MW), so to respect the Supply Guarantee (1 MW of active power to the wind farm for 1 minute, at point Q0(QA1) of GIS 66kV), the system will enter in IMPORT 1A (Able to Charge). In this mode, the system is able to import energy, which means it can charge the BESS or store energy in the hydrogen tanks. This state indicates surplus energy production that can be utilized for charging.

NOTE: To load the energy storages, the BLPH can utilize only the power surplus, so to respect the Supply Guarantee; however, this constraint is subordinated to the electrolyzer and BESS status, and any other machine transition policies. Due to this, the Supply Guarantee may be not respected in power reduction conditions, as the EMCS may be not allowed to stop consumption immediately (only for the electrolyzer).

In IMPORT MODE 1A, the EMCS shall allow the start of the electrolyzer only if the power surplus stays above a minimum value (i.e. a threshold relay with inertia) as per power management policy. The default values of these parameters shall be zero (i.e. no effect of the relay). NOTE: This is to avoid untimely the start of the electrolyzer. When the Electrolyzer is started it cannot be stopped until the H2 vessels are full (PCS.ProcessFullyCharged).

In IMPORT MODE 1A, the EMCS shall give priority to the charging of the BESS over the electrolyzer in the use of the power surplus. NOTE: This means that the EMCS shall start the electrolyzer only when there is sufficient power surplus to run it after considering the BESS power draw. This is an energy requirement, and it does not impose that the BESS will start importing power after the electrolyzer.

NOTE: Electrolyzer policies may foresee to prevent the stop.

The formula to calculate the BESS set point is defined in the paragraph 4.2.3.3

The formula to calculate the BESS set point is defined in the paragraph 4.2.3.3

4.2.1.7.3 MODE 1B = IMPORT (NOT ABLE TO CHARGE)

The BLPH shall enter in IMPORT MODE 1B (Not Able to Charge), under following condition:

- HNA5.P <= 2 MW for one minute (Power Deficit).

In IMPORT MODE 1B, the EMCS shall not be able to charge the energy utilizing the power available in real-time (WTG.P <= 2MW), so to respect the Supply Guarantee (1 MW of active power to the wind farm for 1 minute, at point Q0(QA1) of GIS 66kV).

In this MODE BLPH will only sustain the platform LOADs.

4.2.1.7.4 MODE 2 = HOT STANDBY (READY TO EXPORT)

The BLPH shall enter in HOT STAND-BY MODE under following conditions:

- It is Grid Tied
- Supply Guarantee ACTIVE.
- The HNA5 produces more than 1 MW for one minute.
- Check the BESS is full charge AND PCS.ProcessFullyCharge (H2 vessels full)

EMCS requires PCS to enter in Hot Standby by “PCS.EnterMode(HOT STAND-BY)”. Once the permissive signal PCS.PermToEnterStartHOTStandby is received, the EMCS moves to the HOT STAND-BY mode.

The EMCS shall allow to consider an inertia on the above entrance condition to HOT STAND-BY MODE. Such time duration shall be parametric, positive, with default value zero seconds. The EMCS shall allow to set such time duration parameter over the data interface with the CCS SCADA.

In HOT STAND-BY, the EMCS shall keep the Fuel Cell in Hot Stand-by (e.g. in the following mode neither Electrolyzer nor the Fuel Cell is required to run).

The Electrolyzer is stopped.

4.2.1.7.5 MODE 3 = EXPORT MODE (DISCHARGING)

The BLPH shall enter in EXPORT MODE under following conditions

- If it is grid tied.
- Supply Guarantee is ACTIVE.
- The HNA5 produces less than 1 MW.
- BESS is Healthy

EMCS requires PCS to enter EXPORT MODE by “PCS.EnterMode(EXPORT)”. Once the permissive signal PCS. PermToStartEXPORT arrives, the EMCS moves to the EXPORT MODE.

The EMCS shall allow to consider an inertia on the above entrance condition to EXPORT MODE. Such time duration shall be parametric, positive, with default value zero seconds. The EMCS shall allow to set such time duration parameter over the data interface with the CCS SCADA.

The BLPH is considered “able to operate in export” if it can produce power from BESS. Electrolyzer will be stopped.
EMCS requires PCS the permission to start the Fuel Cell. Once the permissive signal arrives the EMCS starts the Fuel Cell. If the permission doesn’t arrive, the EMCS stay in EXPORT MODE and continues using the BESS energy until the minimum energy threshold is reached.

EMCS shall constrain the range among positive set-points only (discharge), so to prevent power flow inversion (with the aim to avoid consequent possible stress on the BESS) which is only valid for BESS.

In EXPORT MODE, the EMCS shall not start the Electrolyzer. BLPH exports power from the Solar Farm, BESS and/or fuel Cell to support HNA5, because BLPH will use available power from Solar(day), BESS and/or Fuel Cell to export NOT more than what’s necessary to guarantee the 1 MW energy in wind farm according to the production of HNA5 (to maximize the period of assistance that will be provided) as stated in Electrical System Description & Design Philosophy.

In EXPORT MODE the EMCS shall use the BESS and the fuel cell (if permission is received), according to their availability and machine transition policy, to generate enough power to meet the Supply Guarantee (delivery to the wind farm at switchgear Q0(QA1) of GIS 66kV), or at least to reduce as much as possible the related power shortfall.

In EXPORT MODE, the EMCS shall give priority to the use of the fuel cell over the BESS in the generation of power to meet the Supply Guarantee. This is an energy requirement, and it does not impose that the BESS will start producing power after the fuel cell.

4.2.1.7.6 MODE 4 = COLD STANDBY (NOT ABLE TO EXPORT)

The BLPH shall enter in COLD STANDBY MODE under following conditions:

- If it is in Grid-tied
- Supply Guarantee ACTIVE.
- HNA5 produces less than 1 MW
- BESS is not able to operate in export (BESS Fault)

EMCS requires PCS to enter in COLD STAND-BY MODE by "PCS.EnterMode(COLD STANDBY)"
PCS sends to EMCS the "Permissive to start" for COLD STAND-BY MODE with "PermToStartCOLD STAND-BY"

The EMCS shall allow to consider an inertia on the above entrance condition to COLD STANDBY MODE. Such time duration shall be parametric, positive, with default value zero seconds. The EMCS shall allow to set such time duration parameter over the data interface with the CCS SCADA. In COLD STANDBY MODE the EMCS shall stop the Electrolyzer and the Fuel Cell according to their machine transition policy.

In COLD STAND-BY MODE BLPH is unable to respect the supply guarantee.

In COLD STAND-BY MODE, all relevant auxiliaries will be operational at reduced capacity due to the equipment being out of operation. **Only those auxiliaries needed for the platform to remain safe will operate in this operation mode.**

The BLPH auxiliaries' loads will be supported by the wind farm and solar farm.

4.2.1.7.7 MODE 4A = EMERGENCY (ISLAND)

The BLPH shall enter in EMERGENCY MODE if:

- It is islanded (off-grid)
- BESS is healthy (NO FAULT)
- BESS charge level is above the BESS-MINIMUM-OPERATING-RESERVE threshold.

The EMCS shall allow to set the value of the BESS-MINIMUM-OPERATING-RESERVE parameter from the data interface with the CCS SCADA. The value shall be strictly positive. In EMERGENCY MODE, the EMCS shall curtail or stop the solar farm production, to prevent the overload of the system in a situation where the BESS cannot compensate the production exceedance.

Solar Farm is able to guarantee the strict respect of the active power limit provided by the EMCS, or the respect of the limit with a maximum upward tolerance (supposed within 10%, parametrized) in normal operating conditions.

In EMERGENCY MODE, if the solar farm reports to the EMCS that it is not able to guarantee the respect of the received set-point, the EMCS shall open the 6.6 kV CB on SG-100D1 and command Solar Farm to stop.

In EMERGENCY MODE, the EMCS shall curtail or stop the fuel cell production, to prevent the overload of the system in a situation where the BESS cannot compensate for the production exceedance. This also accounts for possible sudden drops in the loads.

HOLD 43: If the BESS is able to autoregulate and to follow the Loads energy consumption,

HOLD 44: In Grid-Forming mode, if the BESS is not fully charged, it is always able to adsorb up to 1 MW (charging) only during the time needed for packages to curtail at set-point send by EMCS, with the respect of the BESS-MAXIMUM-OPERATING-RESERVE.

In EMERGENCY MODE, The EMCS shall give priority to the use of the fuel cell over the BESS discharge, according to machines reaction times and capabilities.

In EMERGENCY MODE, The EMCS shall give priority to the reduction of fuel cell use over the BESS charge,

according to machines reaction times and capabilities.

In EMERGENCY MODE, BLPH operates as an 'Island' and if Solar Farm is not in production, BESS and/or Fuel Cell will use their stored energy to support BLPH for the maximum time possible, CCS will be programmed to minimize the balance of plant and vendor package auxiliary demand to prepare for the potential recovery from a 'black start' condition.

NOTE: There is no requirement to charge the BESS in EMERGENCY MODE; however, the BESS is allowed to charge and may be expected to charge in temporary periods. According to that, the EMCS may act so to track a BESS charge level to a target value or within a range. Charge and discharge periods may alternate in such tracking. Due to the fluctuation of loads (a sudden reduction) and solar production (a sudden increase), there may be transient periods where BESS is charging while the fuel cell is producing.

The "BESS charge level" will be based on the SoC. HOWEVER, according to the BESS vendor, to assess the actually available margins of the BESS to charge and discharge, the energy margins shall be used instead of the SoC. In such case, it is also supposed that it is preferrable to operate around a point were energy margins in charging and discharging have similar values, instead of using the SoC as a reference (for the SoC, the optimal operational point was reported to be 50%). This affects the definition of any parameter related to the BESS stored energy level.

NOTE: In Grid Forming Mode, the BESS production is determined by the energy balance of the BLPH.

EMCS – PCS coordination shall remain in place for package permissions.

In this mode the Load Shadding procedure will be applied according to the paragraph 4.3.

In EMERGENCY MODE, Formula/algorithm that will be used to estimate the remaining time before moving to POWER OUT MODE, is dependent on the following variables:

- T_{REM} = Remaining Time before Power Out mode
- E_{H2} = Energy available from Hydrogen tanks (based on current H2 level)
- P_{FC} = Power Output of the Fuel Cell (based on H2 consumption)
- E_{BESS} = Remaining Energy in the BESS (based on SoC and Available Energy for Discharging)
- P_{SF} = Current Power production from Solar Farm
- P_{Aux} = Power consumption of the auxiliary loads (measured at the incoming breaker SG-200N1)
- P_{Net} = Net power required after accounting for Solar & Auxiliary loads

The net power demand on the BESS and the fuel cell is the difference of total load and the contribution from the solar farm:

$$P_{Net} = P_{Aux} - P_{SF}$$

The total available energy from the BESS and the fuel cell:

$$E_{Total} = E_{H2} + E_{BESS}$$

Where:

- $E_{H2} = H_{2Quanity}$ x Conversion Efficiency x $FC_{Efficiency}$
- E_{BESS} = SoC x BESS Capacity

Variable	Description	Notes
$H_{2Quantity}$	Quantity of the H_2 for **all** vessels expressed in kg	Exposed by PCS
Conversion Efficiency	kWh produced per 1 kg of H_2	Exposed by FC interface (HOLD 40)
$FC_{Efficiency}$	Fuel Cell efficiency (> 0 and < 1)	Exposed by FC interface (Input Register 1202)

The remaining time before the energy reserves are depleted:

$$T_{REM} = \frac{E_{Total}}{P_{Net}}$$

The formula to estimate the remaining time T_{REM} before moving to POWER OUT mode is:

$$T_{REM} = \frac{E_{H2} + E_{BESS}}{P_{Aux} - P_{SF}}$$

4.2.1.7.8 MODE 5 = POWER OUT (BLACK-OUT)

The BLPH shall enter in POWER OUT MODE if:

- It is islanded (Off-Grid)
- Either the BESS charge level is below the BESS-MINIMUM-OPERATING-RESERVE threshold (BESS FAULT) or the SG-100D1 voltage measure on the BLPH 6.6kV distribution bus is absent.
- EMCS is informed of ESD-1D activation (reference doc. “Process Safety Cause & Effect Matrix”)

In POWER OUT MODE, the EMCS shall open all the CBs under the busbar SG-100D1, immediately.

NOTE: it shall not ensure that the CBs are held open, allowing manual closing.

Once in POWER OUT MODE, EMCS shall send a command to PCS (PCS.PowerOutMode) to trip all the valves, stop command for process items and according to their energy transition policy.

4.2.1.7.9 MODE 6 = MAINTENANCE

The BLPH shall enter and remain in MAINTENANCE MODE if the EMCS receives the request to enter in this MODE from the data interface of the CCS SCADA (protected under password).

The BLPH shall exit from the MAINTENANCE MODE if, and only if, the EMCS receives the request to return in automatic identification of the MODE from the data interface of the CCS SCADA through a software exit button.

In MAINTENANCE MODE, the EMCS implements the commands arriving from the data interface of the CCS SCADA, respecting permissions.

In MAINTENANCE MODE the EMCS shall not dispatch any command required by any automatic logic in the EMCS, including any open/close command, load shedding command, change in power setpoint.

NOTE: this is in order to assure total manual control to the operators.

Transition Conditions: Entrance on a command to get in the MANTENANCE MODE, Exit on a command to return in automation identification of the MODE.

EMCS perform pass-through of manual commands.

At entrance in the MODE a procedure shall be followed:

- EMCS shall stop and hold stop (prevent start command) the Electrolyzer.
- EMCS shall stop and hold stop (prevent start command) the Fuel Cell.

- EMCS shall stop the BESS.
- EMCS – PCS coordination shall remain in place for package permissions.
- EMCS sent to the PCS the command PCS.EnterMode(MANUAL).

4.2.1.7.10 MODE 7 = RESEARCH

The BLPH shall enter and remain in RESEARCH MODE if the EMCS receives the request to enter in this MODE from the data interface of the CCS SCADA (protected under password). BLPH will ignore the power output of the HNA5 wind turbine.

WARNING for the operator: while in the RESEARCH MODE one the following conditions could lead to BLPH black out:

- Intentional open of the QA1 of HNA6-AFA70.
- Intentional open the INCOMER CB of SG-100D1.
- Intentional open the CB of SG-100D1 for supply the SG-200N1.

EMCS requires PCS to enter RESEARCH MODE by “PCS.EnterMode(RESEARCH)”.

The BLPH shall exit from the RESEARCH MODE if, and only if, the EMCS receives the request to return in automatic identification of the MODE from the data interface of the CCS SCADA through an exit button.

RESEARCH MODE, shall be used for First energization and re-energization during Black Start.

In RESEARCH MODE, the EMCS implements the commands arriving from the data interface of the CCS SCADA, respecting permissions of packages state machines.

In RESEARCH MODE the EMCS shall not dispatch any command required by default behavior requirements, including any open/close command, load shedding command, change in power setpoint. NOTE: This does not prevent the EMCS to automatically dispatch commands that are due to specific functional requirements which are not indicated as generic defaults behavior (e.g. it does not prevent the EMCS to automatically stop the electrolyzer when the hydrogen tanks are full).

Transition Conditions: BLPH execute control commands arriving from the CCS SCADA. Entrance on a command to get in the RESEARCH MODE, exit on a command to return in automation definition of the MODE.

4.2.1.7.11 MODE 8 = NONE MODE

The EMCS shall identify NONE MODE as default BLPH MODE (i.e. entrance status and last mode if no other status is possible due to unmanaged logic conditions, if any) and during EMCS initialization.

In NONE MODE the EMCS shall not dispatch any command required by default behavior requirements, including any open/close command, load shedding command, change in power setpoint.

NOTE: This does not prevent the EMCS to dispatch commands that are due to specific functional requirements which are not indicated as generic defaults behavior (e.g. it does not prevent the EMCS to automatically stop the electrolyzer when the hydrogen tanks are full).

At start-up the EMCS shall enter into an initialization status. During initialization, EMCS shall not dispatch any command, manual or automatic, including any open/close command, load shedding command, change in power setpoint. The EMCS shall exit from initialization status if the conditions to enter in a BLPH MODE (different from None) are met.

4.2.2 Management Under BLPH Internal Communication Failures

Electrolyzer, Fuel Cell, Solar Farm vendor provide heartbit/watchdog allowing the package and the BESS to verify the presence of communication between the two systems.

In case of loss of communication, after OUT-OF-COM-TIMEOUT of that package, the EMCS shall consider that the package will auto shutdown. After MAX-GRACEFULL-SHUTDOWN- TIME (a parameter with default value zero seconds), if the package still exchange power, the EMCS shall open the related CB on SG-100D1 and EMCS will move BLPH in other MODE accordingly to CPI FAULT.

When the communication with the package is retrieves, the EMCS ensure that the package is stopped, and after the check, the EMCS command the closing of the related CB.

4.2.3 Power Control

Here describes the strategy of dynamic control of the active power tracking. The power control is intended to cope with the state machines, logic and physical constraints and limitations imposed by the system. The scope of the power control is to reach the best performance in chasing the target output, always considering the trade-off with the complexity of the design and implementation.

The EMCS shall implement power control in the following scenarios:

- When in EXPORT MODE, to guarantee the target power export, which is ideally defined as 1 MW export to the wind farm QZ93, by operating on the BESS and Fuel Cell.
- When in IMPORT MODE, to utilize the most, and only, the power surplus to charge the energy reserves of the BLPH, using BESS and electrolyzer for serial or parallel charging.
- In EMERGENCY MODE, to maintain the BESS within the due range of State of Charge, by operating the Solar Farm and the Fuel Cell. NOTE: In this scenario, there might be also the possible additional requirement, here not considered, to prevent frequent power inversions of the BESS, taking into account the oscillation of the power request, expected to be due to both the oscillation of the solar farm output and the loads.

NOTE: The power control is limited to active powers. No reactive power or power factor shall be controlled or accounted for by the EMCS; this holds in every BLPH operational scenario, independently from the fact that the BLPH is grid tied or islanded. At least for the EMCS purposes, there are no grid code requirements to comply with, except EMERGENCY MODE in which the BESS **is in charge of mitigation** of active power as well as reactive power.

4.2.3.2 Power Control in EXPORT MODE

The ideal goal of the BLPH in EXPORT MODE is, as stated in the Functional Statement, to guarantee 1 MW in export to the Wind Farm at QZ93. However, the measure of such quantity is not available. The goal of the BLPH is hence identified in guaranteeing the export of a quantity of power calculated and read on QA1 HNA6-AFA70 (GIS) as the complement to 1MW of the production of the HNA5. Such value can be considered independent from the BLPH power production itself (no feedback effect).

Considering the dynamics of the machines, the following control architecture has been identified:

- Pure feedforward (open loop)

The goal of the power control in EXPORT MODE: Guarantee the minimum power export target, ideally defined as 1 MW export to the Wind Farm. The practical goal, the target for the sum of BESS exported power and Fuel Cell exported power is:

BESS.ExportedPower + FuelCell.ExportedPower = 1MW – HNA5.Power

System Target = 1 MW – HNA5.Power

Whereas:

- Fuel Cell Setpoint = System Target
- BESS Setpoint = System Target - Fuel Cell Power (Formula floored to zero, i.e., negative values will be considered zero)

During the EXPORT MODE, the Loads consumption is not considered in the power provided to the Wind Farm and the Solar Farm production, because we are assuming that the production will compensate the Loads consumption. This could not guarantee the export of the required power during the night or adverse weather.

The Fuel Cell set point formula will actually have two parameters (C1 Default = 1; C2 Default = 0): Fuel Cell Setpoint = System Target * C1 - C2 (Formula floored to zero).

4.2.3.1 Pure Feedforward

Track the BLPH target in feedforward (open loop), defining the set-point of BESS and fuel cell as a repartition of the power target form storages according to a theoretical formula of the power need from the energy storages.

Both solar farm and loads are measured and shall not be controlled in this scenario, hence are usable as independent variables.

The repartition of the total power request between the BESS and the Fuel Cell can take into account desired energy priority, desired margins and also the different reaction time of the machines. A proposed repartition of the power request is the following:

1. Calculate the power set-point of the fuel cell (the slower machine) as a percentage of the total power request, or/and considering an absolute margin (to be always left to the BESS); apply a low pass filter in output to better respect fuel cell dynamics (i.e. average the result slowly, so to smooth any rapid movement).
2. Calculate the power set-point of the BESS as the difference between the total power request and the measured power output of the BESS (so to compensate its dynamics).

This architecture has no feedback loops at all, and it is intrinsically stable (in the limits of the internal stability of the machines in following a set-point); the resulting error is the one given by:

- The physical model approximation (i.e. the fact that the sum of the productions is not equal to the output)
- The disturbance due to the dynamics during the settling time of the machines, which is particularly relevant for the fuel cell and may be just partially limited by the BESS.
- The tracking error of the machines.

4.2.3.3 Power Control in IMPORT MODE

The goal of the BLPH in IMPORT MODE is to charge the energy reserves using the power surplus, which is the power available in excess of the Supply Guarantee level of 1 MW to the Wind Farm. As already explained in the paragraph 4.2.1.7.1 the BESS will be charged and the Electrolyzer will be started when the power produced by the HNA5 is above 2 MW.

It is particularly relevant that the electrolyzer cannot be partialized and its power is much more than that the one of the BESS.

Moreover, once started the electrolyzer cannot be stopped according to power needs. It may hence happen that the electrolyzer is still running even when there is no sufficient power surplus (or even any at all). This consideration, it is assumed that a simple control architecture based on feedforward control is the best trade-off, as there is no point in selecting a more complex architecture given the intrinsic limitations of the possible performances.

The proposed architecture is to identify the charging set-point of the BESS from the theoretic calculation of the power surplus available for the BESS charge, considering and based on the power measures of HNA5, solar farm, electrolyzer and loads consumption, plus an estimation of the internal losses. The set-point shall be limited to the maximum charge power of the BESS.

The electrolyzer will be started when the theoretic calculation of the power surplus available for the electrolyzer is higher than its nominal power; the power surplus available for the electrolyzer shall be calculated considering and based on the power measures of HNA5, solar farm, BESS and loads consumption, plus an estimation of the internal losses.

In this architecture, during a progressive rise of the power from the HNA5 and solar farm, the first to operate will be the BESS, rising from zero to its maximum power. Note that the maximum possible consumption of the BESS can be zero, if it is full. After the BESS has reached it maximum power, the power surplus available to the electrolyzer will start to rise starting from zero. When it reaches a level higher than the nominal power of the electrolyzer, the latter will start. Then, if the power from HNA5 and solar farm will decrease, the BESS will progressively reduce its charge power according to the available power surplus, eventually stopping.

This architecture may produce a stable behavior due to the all-or-nothing dynamics of the electrolyzer. However, these behaviors are prevented by the latching policy that prevents to stop the electrolyzer independently from the power needs, in the limit of the latching period.

During a progressive rise of the power from the HNA5 and Solar Farm:

- The first to operate will be the BESS, rising from zero to its maximum consumption power. NOTE: The maximum possible consumption of the BESS can be zero, if it is full.
- After the BESS has reached its maximum power, the power surplus available to the Electrolyzer will start to rise starting from zero. When it reaches a level higher than the nominal power of the Electrolyzer, the latter will start.

Afterwards, if the power from HNA5 and Solar Farm progressively decreases:

- The BESS will progressively reduce its power according to the available power surplus, eventually stopping.
- The Electrolyzer will be stopped only when its State-machine allows/impose such transition (which includes pre-conditions on the H_2 level); in case the Electrolyzer status allows the stop transition (but now impose it), the EMCS will stop the Electrolyzer if its start condition is not met (adding a hysteresis margin).

Power Surplus formula is HNA5.Power - 1 MW

The formula to calculate the BESS set point is the following:

BESS Set Point = HNA5.P – 1 MW – BLPH.AuxLoad – EL.Consumption + Solar.P

4.2.3.4 Power Control In EMERGENCY MODE (Islanded Mode, BESS in Grid Forming)

The goal of the BLPH in EMERGENCY MODE is to sustain the off-grid operativity as much as possible, which means to preserve the energy reserves, especially the one of the BESS. In case of need, the energy priority shall be to utilize the fuel cell before the BESS reserves.

The charging of the BESS while the fuel cell is producing energy is considered inefficient, so it will not be implemented in the control logic.

The control shall avoid the depletion of the BESS and its overload, which would lead to a power outage.

This considering, the goal of the power control can be reduced to maintaining a good level of charge of the BESS, respecting the mentioned constraints. It is assumed that, to prevent the (potential) power overload of the BESS, the sum of the Fuel Cell set-point and the Solar Farm set-point shall be less than the BESS charge power at any moment in time, which is assumed to be always more than 0.6 MW.

The control dispatchment policy shall be to implement such constraints in a hard manner, lowering one set-point increasing the other. The proposed architecture is based on the identification of a control range AA in the BESS charge levels (e.g. SoC 60%-80%), that should be parametrized (BESS-MINIMUM-OPRATING-RESERVE, BESS-MAXIMUM-OPERATING-RESERVE, see the paragraph 4.2.1.6.2).

The term "charge level of BESS AA" refers to the state of charge (SOC) of a specific Battery Energy Storage System (BESS) identified as "AA."

If the BESS charge level is below the control range AA (low range):

- The fuel cell set-point will be calculated as the difference between the load consumption and the solar farm production, if positive, averaged over a time window;
- The solar farm will be curtailed according to the BESS power overload constraint.

If the BESS charge level is within the control range AA (middle range):

- The fuel cell set-point will be calculated as the difference between the load consumption and the solar farm production, if positive, averaged over a time window and progressively limited, from 100% to 0%, linearly decreasing in the control range AA;
- The solar farm will be progressively limited, from 100% to 0%, linearly decreasing in the control range (independently from the power flows) and always respecting the BESS power overload constraint.

If the BESS charge level is above the control range AA (high range):

- The solar farm will be curtailed to zero power.
- The fuel cell set-point will be set to zero.

The progressive curtailment level of the solar farm within the control range AA is a means to avoid astable behavior.

HOLD 41: This control logic does not prevent the ideal scenario where the BESS gets depleted while there is still some reserve of hydrogen. To guarantee to prevent it, an intentional charging of the BESS from the fuel cell should be foreseen when such incipient condition arises.

The goal of the power control in EMERGENCY MODE: Sustain the off-grid operativity as much as possible, which means to preserve the energy reserves, especially the one of the BESS, the energy priority shall be to utilize the Fuel Cell before the BESS reserves.

To avoid outages, EMCS shall guarantee that, with the given setpoints:

Fuel Cell Power + Solar Farm Power < BESS Power Charge Capability [PowerLimit]

SoC in low range (below the SoC limitation range):

- $FC_{SetPoint}$ = Aux.Power – SolarFarm.Power
- Solar Farm is curtailed to respect the BESS Charge Capability

SoC in middle range (within the SoC limitation range):

- Fuel Cell set-point defined so to ideally compensate the residual load consumption considering Solar Farm production but capped to a progressively decreasing value.
- Solar Farm is curtailed to respect BESS Charge Capability but capped to a progressively decreasing value.

SoC in high range (above the SoC limitation range):

  - $FC_{SetPoint}$ = 0
  - $SF_{SetPoint}$ = 0

4.2.4 Forecasts-based Control

There are no requirements on the EMCS about using or receiving any forecast of data or values.

4.2.5 Coordination with the Process Control System

The EMCS shall not run (i.e. not starting and stop if running) the BESS without a positive permissive signal from the PCS.

PCS communicates with EMCS through serial internal communication and the necessary signals(commands, statuses and permissive) will be exchanged between two systems:

EMCS requires PCS to enter in IDLE MODE with “PCS.EnterMode(IDLE)”

EMCS requires PCS to enter in IMPORT MODE with “PCS.EnterMode(IMPORT)”

EMCS requires PCS to enter in HOT STANDBY MODE with “PCS.EnterMode(HOT STANDBY)”

PCS sends to EMCS the “Permissive to start“ for “HOT STANDBY MODE“ with “PermToStartHOTStandby”

EMCS requires PCS to enter in “EXPORT MODE“ with “PCS.EnterMode(EXPORT)”

EMCS requires PCS to enter COLD STANDBY MODE with “PCS.EnterMode(COLD STANDBY)”

PCS sends to EMCS the “Permissive to start“ for “ COLD STANDBY MODE “ with “PermToStartCOLDStandby”

EMCS requires to PCS enter in EMERGENCY MODE(Island) with “PCS.EnterMode(EMERGENCY)”

PCS sends to EMCS the “Permissive to start“ for “EMERGENCY MODE“ with “PermToStartEMERGENCY”

EMCS informs PCS for “Start Request“ for Electrolyzer Package with “PermToStartEL”

EMCS requires PCS the “Permissive to start“ for Fuel Cell Package with “PermToStartFC”

EMCS sends to PCS the “Command to Load shedding 1” – “Cmd.To.LoadShed”

All the above control signals (status & commands) will be exchanged with BLPH control system (PCS) through a Modbus TCP communication.

4.3 Load Shedding

In EMERGENCY MODE, the EMCS shall shed the loads in the list LOAD-TO-SHED-IN-EMERGENCY-MODE, by requesting the PCS “Cmd.To.LoadShed” to open the related LV contactors on the switchboard SG-200N1.

The EMCS shall allow to mark each load, singularly, as included or excluded in the LOAD-TO-SHED-IN-EMERGENCY-MODE from the data interface of the CCS SCADA.

The default list LOAD-TO-SHED-IN-EMERGENCY-MODE(Island) “Cmd.To.LoadShed_1” immediately upon entry is the following:

- PCS Stop Electrolyzer auxiliaries
- PCS Stop Water package
- PCS Stop Sea Water Pumps

The EMCS shall allow to reset the default value of LOAD-TO-SHED-IN-EMERGENCY-MODE from the data interface of the CCS SCADA.

In EMERGENCY MODE, if the SoC is below BESS-LIMIT-FOR-ADV-LOAD-SHEDDING parameter value, the EMCS shall shed the loads in the list LOAD-TO-SHED-IN-LOW-BESS-LEVEL, by requesting to the PCS to open the related LV contactors on the switchboard SG-200N1.

The EMCS shall allow to set the value of the parameter BESS-LIMIT-FOR-ADV-LOAD-SHEDDING over the data interface with the CCS SCADA. The default value of the parameter being 25% SoC.

The EMCS shall allow to mark each load, singularly, as included or excluded in the LOAD-TO-SHED-IN-LOW-BESS-LEVEL from the data interface of the CCS SCADA.

The list LOAD-TO-SHED-IN-LOW-BESS-LEVEL “Cmd.To.LoadShed_2” is the following:

- HVAC
- Welding Sockets
- BOP Distribution Panel
- Crane

During the electrical mode these systems are DISABLE to START according to Load Shedding:

- Electrolyzer
- Sea Water Pumps
- Water Treatment System
- HVAC
- Welding Sockets
- BOP Distribution Panel
- Crane

The EMCS shall allow to reset the default value of LOAD-TO-SHED-IN-LOW-BESS-LEVEL from the data interface of the CCS SCADA.

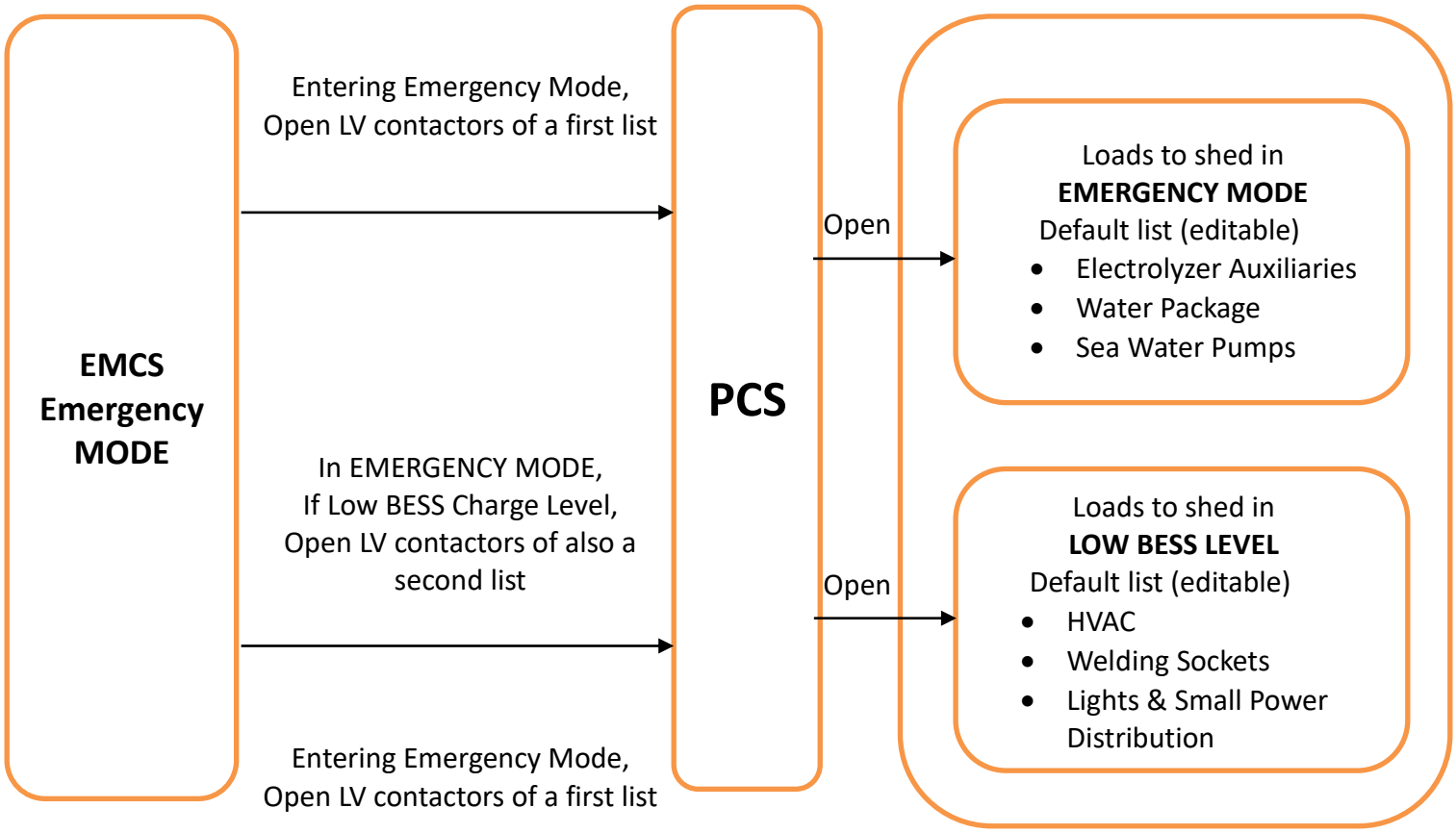


Figure 14 Load Shedding Procedure

4.4 Management of Electrical Distribution Equipment

If IEC 61850 communication between the HV-SCADA & 66kV GIS is lost, the GIS will not take any automatic action.

If OPC-UA communication between the HV-SCADA and EMCS is lost, the EMCS does not take any automatic action on 66kV GIS. In conjunction with this communication loss, the EMCS will immediately command the platform in IDLE MODE “PCS.EnterMode(IDLE)”.

The EMCS shall allow the operator to open the GIS Q0(QA1) from the data interface of the CCS SCADA.

The EMCS shall allow the operator to close the GIS Q0(QA1) from the CCS SCADA data interface only in presence of a permissive signal from the wind farm SCADA (and there is communication with the wind farm SCADA).

The HV-SCADA can open any time the GIS Q0(QA1) through the direct link (IEC-61850), while simultaneously removing the permissive signal to close.

The control of OLTC through AVR command has signals from the EMCS that allow to put the AVR/OLTC in MANUAL mode or AUTO mode, only software manual command by operator will be available (password protected). See the paragraph for the control logic 5.7.

The exiting from any island mode (RESEARCH or EMERGENCY), once the voltage is back on the Wind Farm up to the BLPH 66 kV GIS, it is possible to reconnect the system to the grid by means of manual procedure.

The operator first of all has to close the line switches and the circuit breaker of the 66 kV GIS in order to energize the step-up transformer, to be ready to take the load from the 6.6 kV system.

Once the transformer is energized, the operator will request from the CCS SCADA to close the incoming breaker on the 6.6 kV switchgear (only after black start scenario or first energization). The closure of the breaker will be managed by the BESS system (only in EMERGENCY mode), which has the capabilities necessary to synchronize the isolated 6.6 kV system with the grid.

With the closure of the 6.6 kV incoming breaker, the 6.6 kV system will be connected back to the grid and the BLPH platform will return in the operating mode requested in that moment.

4.5 Wind Farm Grid Connection and BLPH Synchronization After Emergency Mode

In Figure 15 Status of Signals & Electrical Sequence defines the status of signals and electrical sequence to manage the closing of the GIS on BLPH. Windfarm will have a direct connection to the BLPH 66kV GIS CB for control and monitoring, the electrical sequence is as follows:

- Q0(QA1) "CB Open" command, directly to the BLPH GIS from HV-SCADA
- Q0(QA1) "Ready to close" permissive to EMCS from HV-SCADA
- Full control of QZ92 line and earthing switches from HV-SCADA (not controlled by EMCS)

BLPH Q0(QA1) "CB Close" command and "CB Open" commands will also be available to BLPH GIS by the EMCS.

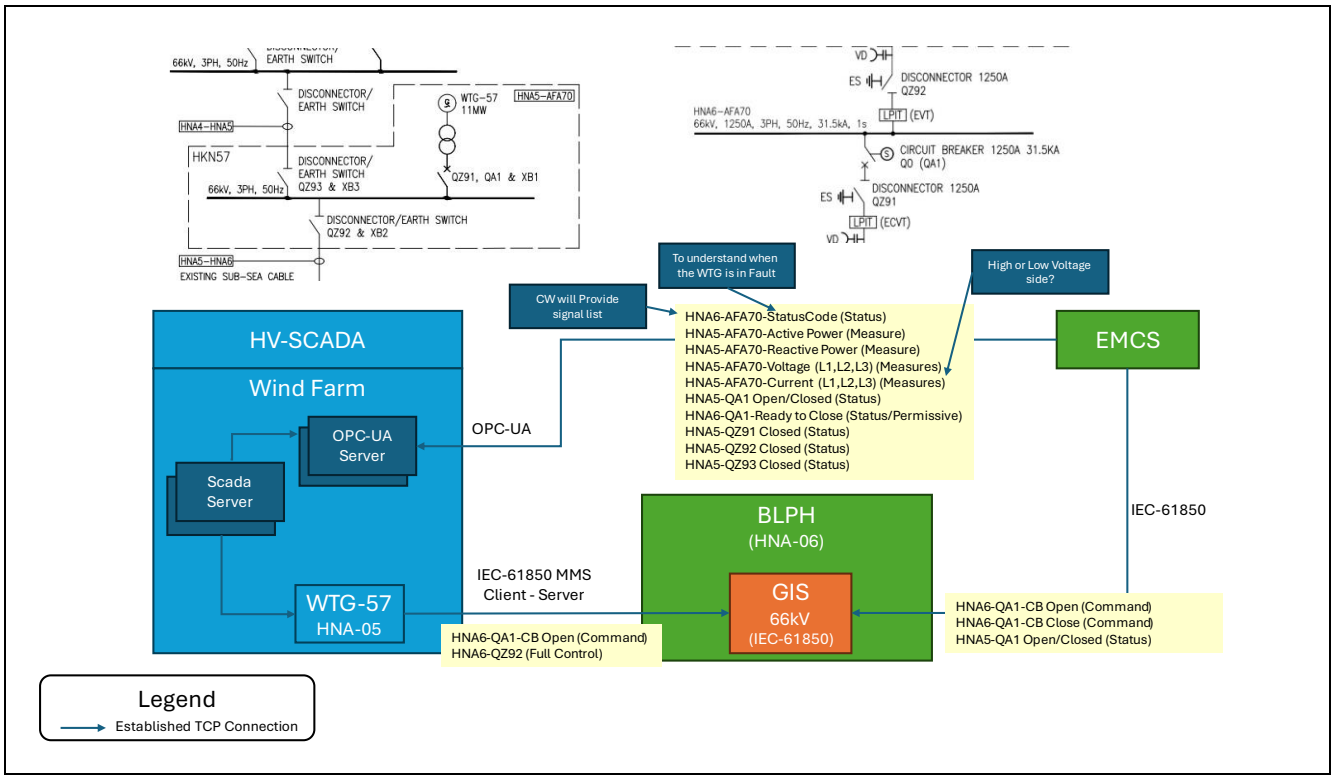


Figure 15 Status of Signals & Electrical Sequence

- The synchronization with the grid is performed by the BESS, by means of hardwired voltage measures connected directly to the BESS (from the SG-100D1).
- The BESS will provide the (hardwired) closing command directly to the 6.6kV incoming CB to perform the parallel with the grid.
- A hardwired signal will identify off-grid condition (an OR between Open status of Q0(QA1) HNA6-AFA70 and open status of 6.6kV SG INCOMMER CB).
- The EMCS will provide a hardwired permissive signal as described in Figure 16 BESS-Hardwired Interface_rev5_FREQ to the BESS allowing the Grid-Forming mode (enter and stay in such mode = 1)

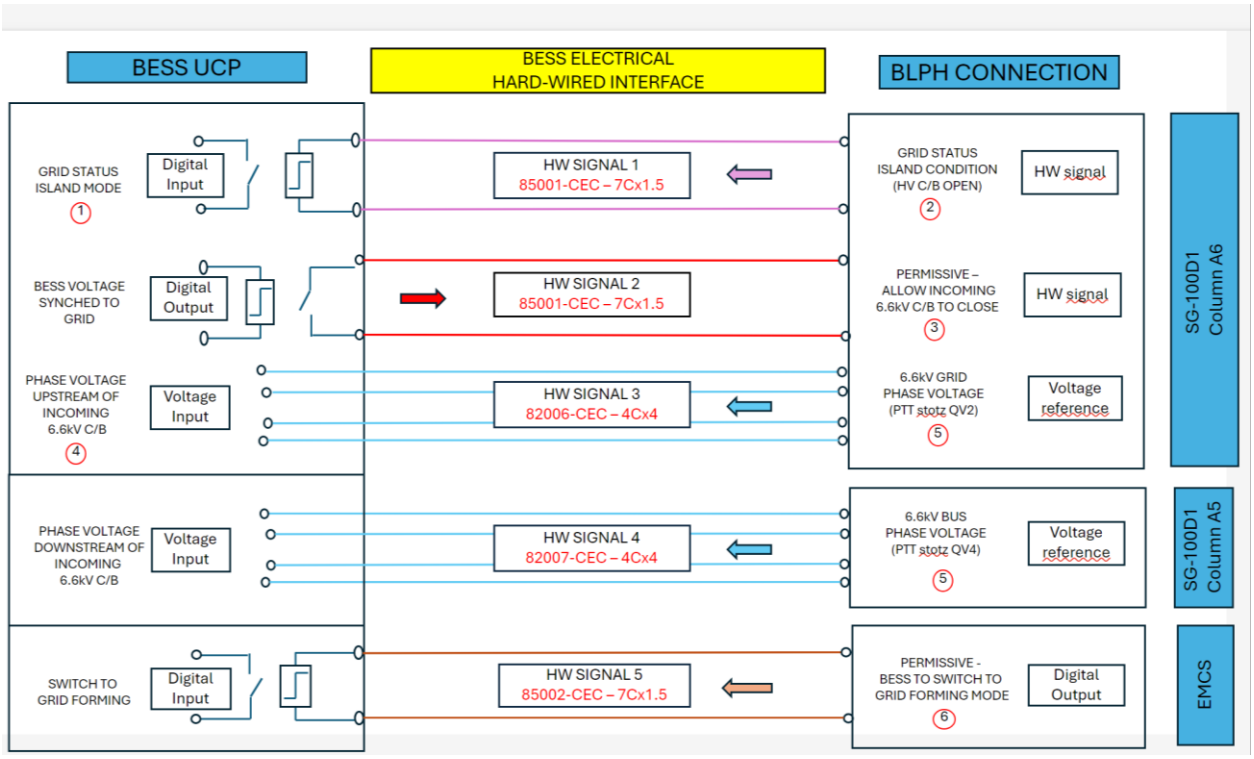
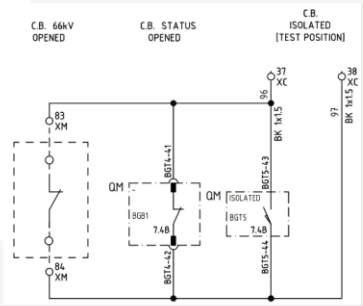


Figure 16 BESS-Hardwired Interface_rev5_FREQ

signals as described in Figure 17:

1 GRID STATUS ISLAND MODE: 0 = 6.6 kV System is synchronized with the grid and BESS has to operate in grid following
1 = 6.6 kV System is islanded from the grid and BESS has to operate in grid forming IF the permissive is received

2 GRID STATUS ISLAND MODE: the signal is generated as OR of the 66 kV CB open status and the 6.6 kV incoming CB open status as per following scheme



3 PERMISSIVE – ALLOW INCOMING 6.6kV C/B TO CLOSE: This signal is connected as input to the REX 640 protection relay on the 6.6 kV incoming CB in order to close the breaker, provided that the synchrocheck function gives the permissive. The input BI6 on card D will be used.

4 PHASE VOLTAGE UPSTREAM OF INCOMING 6.6 kV CB: Once BESS read a voltage 110 V on this signal it has automatically to start the synchronization to the grid in order to reach the synchronization and send the permissive to close signal to the incoming CB.

5 VOLTAGES FROM 6.6 kV SWITCHGEAR: These signals are voltage references from secondary side of voltage transformers, so they are at 110 V 50 Hz, with 4 wires.

6 PERMISSIVE - BESS TO SWITCH TO GRID FORMING MODE: This signal will be maintained at 1 until the operator will not reset it manually, in order to prevent the islanding or the automatic return from the island (as per note 4)

Figure 17

The BESS performs the parallel closing request to the INCOMMER CB SG-100D1 automatically after the synchronization, without waiting for any input from the EMCS.

5. Data Interoperation

5.1 BESS Data Interface

The EMCS commands and supervises the BESS. The data interface between the EMCS and the BESS will be based on PROFINET.

The signal list of the data interface with the BESS will be as reported in the document "23A2007_240628_PROFINET_Register BESS_V1_0_0_3".

5.2 Electrolyzer Data Interface

EMCS commands and supervises the Electrolyzer. The data interface between the EMCS and the electrolyzer will be based on PROFINET. No hardwired signals are shared between the EMCS and the electrolyzer.

The electrolyzer PLC requires a custom time synchronization interface, based on dedicated signals (specifically: year, month, day, hour, minute, second) to be updated by the EMCS; it is assumed that the precision required is equal to the resolution.

The signal list of the data interface with the Electrolyzer will be as reported in the document "C63-AUT-002_03_Communication table".

5.3 Fuel Cell Data Interface

EMCS commands and supervises the fuel cell.

The data interface between the EMCS and the fuel cell will be based on Modbus TCP.

The interface will allow to read the power set-point received by the EMCS. It will also provide information on the capability of the fuel cell to respect the power limitation imposed by such set-point within the given design tolerance (as opposite to the presence of an internal fault that prevents it).

No hardwired signals are shared between the EMCS and the fuel cell.

The signal list of the data interface with the Fuel Cell will be as reported in the document "Crosswind Modbus Table - Main PLC - External Cut v3".

5.4 Solar farm Data Interface

EMCS commands and supervises the solar farm.

The data interface between the EMCS and the solar farm will be based on ModbusTCP.

The interface will allow to read the power set-point received by the EMCS.

It will also provide information on the capability of the solar farm to respect the power limitation imposed by such set-point within the given design tolerance (as opposite to the presence of an internal fault that prevents it) and the signals that allows to communicate the commands to the EMCS regarding the solar farm CB SG-200D2.

No hardwired signals are shared between the EMCS and the solar farm.

The signal list of the data interface with the Electrolyzer will be as reported in the document "HKN1-02-REG-341 Manual for controlling the solar farm via the client connector REV A".

5.5 Wind Farm Data Interface

The EMCS receives information from the data interface of the Wind Farm SCADA (HV-SCADA).

The data interface between the EMCS and the Wind Farm SCADA (HV-SCADA) will be based on OPC-UA.

The presence of communication between the EMCS and the HV-SCADA is checked intrinsically by the OPC-UA client running in the EMCS.

The IEC-61850 network connection from HNA5 and GIS on BLPH will not be redundant and it shall be directly connected to GIS, since the EMCS is not allowed to share the same IEC-61850 connection.

The details of the signals exposed by the SCADA refers to Figure 15 Status of Signals & Electrical Sequence.

NOTE: The HNA5 power signal has a sampling rate of 5 seconds and resolution 0.1 MW.

5.6 Electrical Distribution Equipment

The EMCS will supervise and command the equipment of the electrical distribution of the BLPH, including switchgears on the 6.6kV and 66kV sides incoming CB SG-200N1 and 800V SG-200D2 directly. However, the other outgoing feeders of SG-200N1 or main items (UPSs) are supervised and directly controlled by PCS.

The data interface of the EMCS with the electrical distribution equipment of the BLPH will be based on IEC-61850 and Modbus TCP/IP.

5.7 OLTC/AVR Data Interface

The EMCS supervises and controls the AVR/OLTC of the TR-100AD1 6.6kV/66kV transformer.

EMCS provides to the AVR the set-point voltage reference for the secondary winding (the 6.6 kV side).

The EMCS can set the AVR/OLTC in AUTO or MANUAL mode, the latter mode intended to enable the possibility to directly control the OLTC position.

EMCS can provide the command to RAISE and the command to LOWER the position of the OLTC directly to the AVR, allowing the OLTC remote control by operator.

The data interface between the EMCS and the AVR will be based on Modbus TCP.

In MANUAL mode the operator pushes the button on the HMI which will allow EMCS to INCREASE and DECREASE movements of the OLTC position (one request, one step).

The EMCS shall provide to the AVR of the OLTC the set-point voltage target on the secondary winding (the 6.6. kV side). Such value being a parameter with default value 6.6 kV. The EMCS shall allow to set this value from the data interface of the CCS SCADA.

Only in RESEARCH MODE, the EMCS shall allow to set the AVR/OLTC in MANUAL mode or AUTO mode, from the data interface of the CCS SCADA.

In AUTO mode the operator writes a SET-POINTs, EMCS checks the error between BLPH voltage and the set-point and EMCS sends the command to AVR to move the OLTC cursors INCREASE or DECREASE (one request, one step) at each step EMCS re-check the error, reiterating the control and commands if necessary.

5.8 PCS and LV Loads

The EMCS exchange real-time signals with the Process Control System (PCS) in order to:

- Coordinate the operation of the packages with PCS (by requests and permissive signals);
- Request the opening/closing of the LV contactors (which are controlled by means of the PCS), in order to manage the load shedding;
- Obtain the hydrogen storage level;
- Obtain time reference for its time synchronization of server's clocks.

The data interface between the EMCS and the PCS will be based on the protocol Modbus TCP.

Section 7 MECHANICAL COMPLETION STATUS INDEX - MECHANICAL DISCIPLINE

NOT APPLICABLE

Section 8 MECHANICAL COMPLETION STATUS INDEX - TELECOMMUNICATION DISCIPLINE

NOT APPLICABLE

Section 9 MECHANICAL COMPLETION STATUS INDEX - HVAC DISCIPLINE

NOT APPLICABLE

Section 10 MECHANICAL COMPLETION STATUS INDEX - PIPING DISCIPLINE

NOT APPLICABLE

Section 11 MECHANICAL COMPLETION INDEX - SAFETY DISCIPLINE

NOT APPLICABLE

Section 12 FAT / VENDOR REPORTS

ROSETTI MARINO	**INSPECTION REPORT**	**Report No**. IR-YOK-0594-01	SHEET 1 di 6
		Data *Date from 04/10/2024 to 11/10/2024*	Rev. *Rev. 0*
PROGETTO *Project* **Base Load Power Hub (BLPH)**	**CLIENTE** *Client* CROSSWIND	**COMMESSA** / *Job* ***123A90***	**COMMESSA FORNITORE** / *Job Vendor* YOKOGAWA
FORNITORE *Supplier: YOKOGAWA*	**No. Ordine** *P.O. No.* **1724000594**	**OGGETTO** *Object* **INTEGRATED CONTROL AND SAFETY SYSTEM (ICSS)**	

DESCRIZIONE DEL MATERIALE / *Material Description*

POS. *Item*	**QUANTITA'** *Quantity*	**DESCRIZIONE** *Description*	**Nr. TAG** *TAG No.*	**TIPO DI ISPEZIONE** / *Kind of Inspection*	**ESITO** / *Result*
10	1	CONTROL SYSTEM	B400-PCS-001/002 B400-EMCS-001 B400-FGS-001/002/003 B400-SIS-001	Visual Check & FAT	**Satisfactory with Punch list**

DOCUMENTI APPLICABILI / *Applicable Documents*

TITOLO DOCUMENTO / *Document Title*	**NUMERO DOCUMENTO** / *Document Number*	**REVISIONE** / *Revision*	**STATO DOCUMENTO** / *Document Status*
INSPECTION AND TEST PLAN	1724000594-QC-ITP-00002	01	AFC
HARDWARE FACTORY ACCEPTANCE TEST (FAT) PROCEDURE	1724000594-QC-PRO-00030	01	AFC
*	*	*	*

Remarks:
*all other dwg's applicable are listed in section D like attachements

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 from 04/10/2024 to 11/10/2024 at PREI factory (sucontractor of YOKOGAWA), located in ALZATE BRIANZA, ITALY.
The following inspection activities were witnessed by Rosetti Marino and Crosswind as specified in the Notification of Inspection (Noi) and in accordance with ITP and Factory acceptance test procedure
Attendees the test:

Mauro Dossena (Rosetti Marino)
Fabio Sirigu (Rosetti Marino)
Luigi Pignatelli (Crosswind)
Alessandro Giorgetti (Yokogawa)
Alessandro Berra (Yokogawa)

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.

ROSETTI MARINO	**INSPECTION REPORT**	**Report No**. IR-YOK-0594-01	SHEET 2 di 6
		Data *Date from 04/10/2024 to 11/10/2024*	Rev. *Rev. 0*
PROGETTO *Project* **Base Load Power Hub (BLPH)**	**CLIENTE** *Client* CROSSWIND	**COMMESSA** / *Job* ***123A90***	**COMMESSA FORNITORE** / *Job Vendor* YOKOGAWA
FORNITORE *Supplier: YOKOGAWA*	**No. Ordine** *P.O. No.* **1724000594**	**OGGETTO** *Object* **INTEGRATED CONTROL AND SAFETY SYSTEM (ICSS)**	

Area of concern
None

B –SCOPO DELL'ISPEZIONE / *Scope of Inspection*

DESCRIZIONE DEI TEST PRESENZIATI / *Description of witnessed tests*	**ESITO** / *Result*
DAY 1 **B400-PCS-001/002** - Visual & dimensional check - Electrical distribution functional check - Power supplies redundancy functional tests - I/O Functional test - I/O Redundancy functional tests - CPU and I/O bus couplers redundancy functional tests **DAY 2-3** **B400-EMCS-001** - Visual & dimensional check - Electrical distribution functional check - Power supplies redundancy functional tests - I/O Functional test - I/O Redundancy functional tests **DAY 4-5** **B400-FGS-001/002/003** - Visual & dimensional check - Electrical distribution functional check - Power supplies redundancy functional tests - I/O Functional test - I/O Redundancy functional tests - CPU and I/O bus couplers redundancy functional tests **DAY 6** **B400-SIS-001** - Visual & dimensional check - Electrical distribution functional check - Power supplies redundancy functional tests - I/O Functional test	**Satisfactory with Punch List**

L' INCARICATO / *The person in charge*	**IL RAPP. DEL CLIENTE** / *Client's Representative*	**IL FORNITORE** / *Supplier*
ROSETTI MARINO *Supply Management dept.*		

- I/O Redundancy functional tests
- CPU and I/O bus couplers redundancy functional tests

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*
Multimeter	**FLUKE**	**87V (serial N. 96410192)**	**(1)**
Multifunction calibrator	**DRUCK**	**UPS-II (serial N. 59160)**	**(2)**

Remarks

(1) Refer to calibration certificate N. 210866V10e24 issued by Aviatronik Trescal on 10th May 2024, here attached
(2) Refer to calibration certificate N. 210863V10e24 issued by Aviatronik Trescal on 10th May 2024, here attached

D –ALLEGATI / *Attachments (***CERTIFICATI E TEST REPORT** */ Certificates and Test Reports)*

NUMERO DOCUMENTO / *Document Number*	**DESCRIZIONE** / *Description*	**TIPO** / *Type*	**NR. PAGINE** / *No. Pages*
1724000594-QC-PRO-00030	HW FACTORY ACCEPTANCE TEST (FAT) PROCEDURE	Signed copy	112
1724000594-IN-DA-00009	PCS CABINETS GENERAL ARRANGEMENT DRAWINGS AND INTERNAL LAYOUT	Mark-up copy	23
1724000594-IN-DG-00020	PCS CABINETS WIRING DIAGRAMS AND TERMINAL STRIPS	Mark-up copy	43
1724000594-IN-DA-00013	EMCS CABINETS GENERAL ARRANGEMENT DRAWINGS AND INTERNAL LAYOUT	Mark-up copy	23
1724000594-IN-DG-00024	EMCS CABINETS WIRING DIAGRAMS AND TERMINAL STRIPS	Mark-up copy	30
1724000594-IN-DA-00010	SAFETY SYSTEMS CABINETS (SIS AND FGS) GENERAL ARRANGEMENT DRAWINGS AND INTERNAL LAYOUT	Mark-up copy	36
1724000594-IN-DG-00021	SAFETY SYSTEMS CABINETS (SIS AND FGS) WIRING DIAGRAMS AND TERMINAL STRIPS	Mark-up copy	78
-	PUNCH LIST	Signed copy	1
-	B400-PCS-001-2 Check Sheet and Punch Records	Signed copy	13
-	B400-EMCS-001 Check Sheet and Punch Records	Signed copy	7
-	B400-FGS-001-2-3 Check Sheet and Punch Records	Signed copy	7
-	B400-SIS-001 Check Sheet and Punch Records	Signed copy	8

E – DETTAGLI ED ESITO DELL'ISPEZIONE */ Details and Results of Inspection*

All details have been highlighted in the test reports

F – CONCLUSIONI */ Conclusions*

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-YOK-0594-01	SHEET 4 di 6
		Data *Date from 04/10/2024 to 11/10/2024*	Rev. *Rev. 0*
PROGETTO *Project* **Base Load Power Hub (BLPH)**	**CLIENTE** *Client* CROSSWIND	**COMMESSA** / *Job* ***123A90***	**COMMESSA FORNITORE** / *Job Vendor* YOKOGAWA
FORNITORE *Supplier: YOKOGAWA*	**No. Ordine** *P.O. No.* **1724000594**	**OGGETTO** *Object* **INTEGRATED CONTROL AND SAFETY SYSTEM (ICSS)**	

FAT for B400-PCS-001/002, B400-EMCS-001, B400-FGS-001/002/003, B400-SIS-001 has been completed successfully with Punch Lists.
During FAT has been created a Master Copy of documents with all red marked up in order to create a pictures for construction and commission team.
The above cabinets will be delivered during week 42.

G – PUNTI IRRISOLTI / *Outstanding points*

See attached Punch List

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)*



Punch P005



Punch P008

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-YOK-0594-01	SHEET 5 di 6
		Data *Date from 04/10/2024 to 11/10/2024*	Rev. *Rev. 0*
PROGETTO *Project* **Base Load Power Hub (BLPH)**	**CLIENTE** *Client* CROSSWIND	**COMMESSA** / *Job* ***123A90***	**COMMESSA FORNITORE** / *Job Vendor* YOKOGAWA
FORNITORE *Supplier: YOKOGAWA*	**No. Ordine** *P.O. No.* **1724000594**	**OGGETTO** *Object* **INTEGRATED CONTROL AND SAFETY SYSTEM (ICSS)**	



Punch E003



Punch E006



Punch F003



Punch F004

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-YOK-0594-01	SHEET 6 di 6
		Data *Date from 04/10/2024 to 11/10/2024*	Rev. *Rev. 0*
PROGETTO *Project* **Base Load Power Hub (BLPH)**	**CLIENTE** *Client* CROSSWIND	**COMMESSA** / *Job* ***123A90***	**COMMESSA FORNITORE** / *Job Vendor* YOKOGAWA
FORNITORE *Supplier:* *YOKOGAWA*	**No. Ordine** *P.O. No.* **1724000594**	**OGGETTO** *Object* **INTEGRATED CONTROL AND SAFETY SYSTEM (ICSS)**	



Punch S002



Punch S003



Punch S005

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 /
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Section 13 MECHANICAL COMPLETION CHANGES / MARK-UPS

NOT APPLICABLE