Base Load Power Hub (BLPH)

Electrical Protection Relay Selectivity Study Report

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1 INTRODUCTION

1.1 PROJECT OVERVIEW

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.

Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.1.1 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.

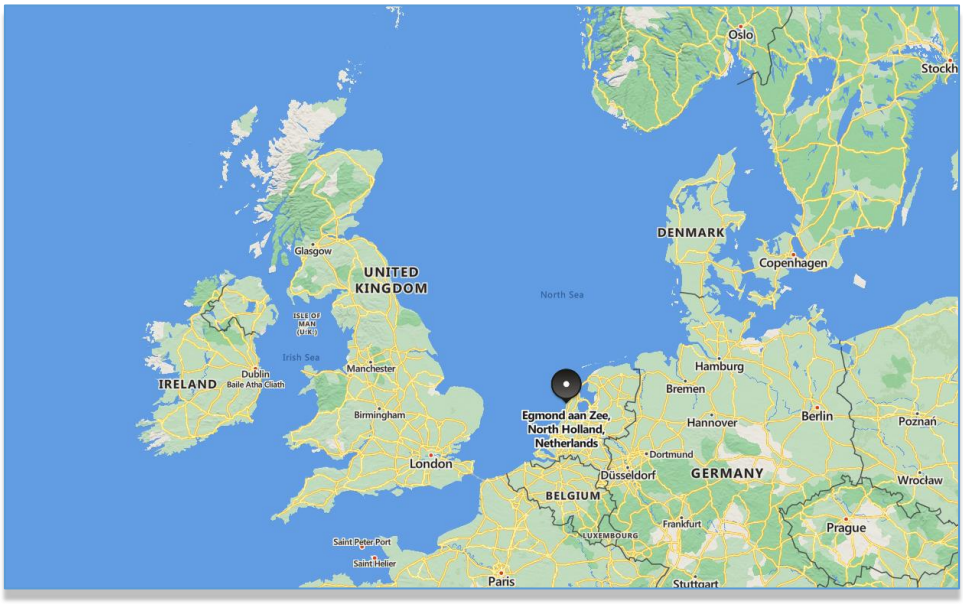


Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map

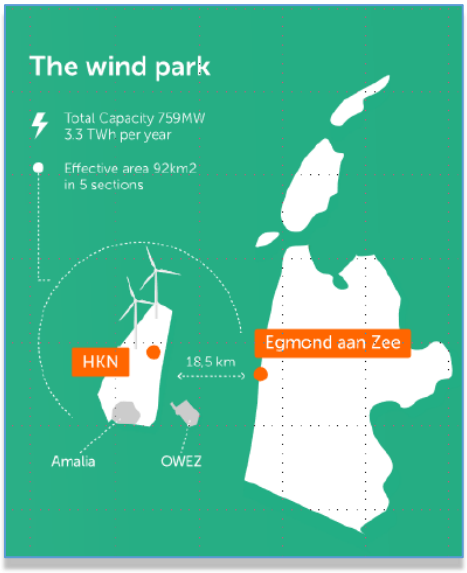


Figure 2 - Wind Park Details

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile 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.

1.1.2 Project Concept

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 PV farm) and release it during periods of low generation. In practice, it is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.

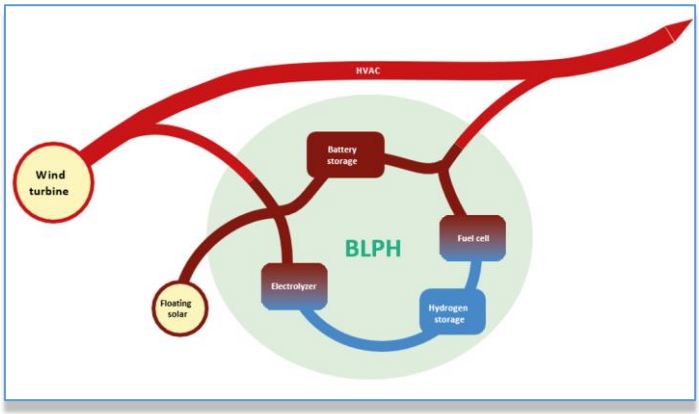


Figure 3 – BLPH Concept

Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.

The purpose of the BLPH s to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

2 DOCUMENT SCOPE

The purpose of this document is to determine the appropriate settings for the protection relays in the BLPH system.

Basically, the protective system design is based on the knowledge that the faults or abnormal operating conditions can be led to:

- overloads;
- ground faults;
- phase to phase and three phase faults.

The detection of the above conditions is undertaken by the protective relays, whose task is to shut down the faulted part from operation and separate it from the electrical distribution system. The settings of the relays have been selected in order to allow a reliable operation of the system, keeping as long and as much as possible the feeders or the system in service without risk of damage. Settings are fairly above any transient current, voltage, frequency conditions, and operating times allow for the recovery of the electrical parameters within their normal operating values.

2.1.1 Study Organization

This document has been subdivided in several sections.

At the beginning, some general information about the system and a summarized description of the protection system are presented.

Main criteria for relay settings are then described.

The section relevant to the selectivity analysis is subsequently presented, with the following main subsections:

Main Equipment Data

The main equipment data for relay coordination are presented in these schedules. The indicated values are the following:

- transformers: rated power, primary and secondary rated voltage, connection type, short circuit impedance, X/R ratio, secondary side grounding resistance value (if applicable);
- motors: rated power, rated voltage, rated current, starting current at rated voltage and at 80% of rated voltage, starting time at rated voltage and at 80% of rated voltage, locked rotor time capability (cold and hot values), CT ratio.

Setting Calculation for Differential Relays

In this subsection, setting calculation for differential relays are presented.

One Line Diagrams

The one-line diagrams show in a simplified form the electrical network as well as the point of installation of the main relays being part of the protective system.

The relays are identified by the ANSI Standard code number or by their graphic symbol.

All the relays that must be coordinated are identified with a number to allow an easy identification in the setting tables and coordination sheets.

Setting Tables

The setting ranges and values of the primary and secondary protections are defined into the setting tables. The sequence used to group all the tables is in accordance with the switchboard code numbering. Into the column's "function", "page", "numbers", the code number of the relays, the pages where the coordination curves are drawn and the labels of the relevant curves are indicated.

Selectivity Curves

The selectivity curves section includes the plots of the curves that are significant for the relay coordination.

The curves detail and demonstrate protective relays setting/coordination. For direct acting protections, the time takes into account the operating time of the circuit breaker, while for indirect relay, the indicated time is related only to the relay operating time: opening time of the circuit breaker shall be added to obtain the total clearing time.

In the selectivity curves sheets, the following relevant points (landmarks) are indicated:

- short circuit current values;
- transformers FLA, inrush current point and capability points according to ANSI C57;
- maximum foreseen feeder "reacceleration" current IREAX;
- a little vertical line in the superior part of the page is drawn in correspondence of the setting value of inverse type relays.

IREAX current is intended to be the peak feeder (MCC or SG) loading current, under largest motor starting conditions or motors reacceleration conditions. The time during which the feeder loading current is assumed equal to IREAX is related to motor starting time.

2.1.2 System Analysis Software

To perform these network calculations, ETAP PowerStation Version 22.5.0 by OTI has been used.

2.2 REFERENCES

Doc. No.	Description
123A90-DDL-EL-DG-20158 Rev. 1	Overall Single Line Diagram
123A90-PML-PM-TQ-00033	Technical Query – Electrical data of WTG-57
123A90-DDL-EL-RE-20171 Rev. 1	Electrical System Study Report – Short Circuit
1723002197-EL-DG-00010	Electrical Single Line Diagram for SG-100D1
BASE LOAD POWER HUB (BLPH) 66kV_2024.06.04	66kV Switchgear (GIS) - Circuit and Wiring Diagram
1723002197-EL-DG-00011 Rev.02	Electrical Single Line Diagram for SG-200N1
1723002197-EL-DG-00015	Functional Diagram Incoming Feeder TR-100AD1
1723002197-EL-DG-00016	Functional Diagram Bus Bar Metering
1723002197-EL-DG-00017	Functional Diagram BESS Feeder A-85000
1723002197-EL-DG-00018	Functional Diagram ELECTROLYSER Feeder A-20000
1723002197-EL-DG-00019	Functional Diagram FUEL CELL Feeder A-80000
1723002197-EL-DG-00020	Functional Diagram Transformer Feeder TR-200ED1
1723002197-EL-DG-00021	Functional Diagram Transformer Feeder TR200DE1
123A90-DDL-EL-DG-20014 Rev. 1	Electrical Control, Protection and Metering Diagram

Table 1 - Reference Documents

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2.3 DEFINITIONS AND ABBREVIATIONS

BESS	Battery Energy Storage System
BLPH	Base Load Power Hub
COMPANY or Client (CPY):	Crosswind
CONTRACTOR (CTR):	ROSETTI MARINO S.p.A.
CT	Current Transformer
FLA	Full Load Ampere
HV	High Voltage
KNAN	Non mineral oil natural Air Natural
LV	Low Voltage
MV	Medium Voltage
N/A	Not Applicable
NER	Neutral Earthing Resistor
OCTC	Off Circuit Tap Changer
OLTC	On Load Tap Changer
PROJECT:	HOLLANDSE KUST NOORD WIND PARK Project
SCC	Short Circuit Current
SLD	Single Line Diagram
TCC	Time Current Curve
U_k	Short-circuit impedance
VT	Voltage Transformer
WTG	Wind Turbine Generator
CPI	Company Provided Items (i.e. BESS, Electrolyser, Fuell Cell and Solar packages)

Table 2 - Definitions and Abbreviations

3 DESIGN BASIS

This section presents the details of all the input data, as well as assumptions used for the system studies for BLPH.

3.1 SYSTEM OVERVIEW

The system studied in this report is based on the single line diagram, 123A90-DDL-EL-DG-20158 Rev. 1. The WTG-57 is the wind turbine being connected to the BLPH. It is connected to the rest of the Crosswind offshore windfarm at the end of string A at a 66 kV busbar. The BLPH is also connected to this busbar via a 66/6.9 kV transformer. At the BLPH 6.6 kV BLPH busbar the BESS, electrolyser, fuel cell and solar farm is connected. There is also a 6.6/0.42 kV transformer supplying different loads at the BLPH.

3.2 MODEL OVERVIEW

WTG-57 is connected to the Crosswind offshore windfarm, via string A. WTG-57 is at the end of this string A.

BLPH is connected to the Crosswind offshore windfarm at the common 66 kV busbar with the WTG-57.

At this 66 kV busbar, the rest of the components in the string A is modelled as the supply network. This is termed as "windfarm" in the model.

Other electrical components connected to this 66 kV busbar, 6.6 kV busbar and 400 V busbar are in accordance with the single line diagram in 123A90-DDL-EL-DG-20158 Rev. 1, as well as datasheets of transformers.

Data provided in the single line diagram 123A90-DDL-EL-DG-20158 Rev. 1 were used to model these transformers.

3.3 ANALYSIS DESIGN DATA

In the following paragraphs, a brief summary of BLPH Platform main equipment data is presented.

More details are available in the attached ETAP calculations reports.

3.3.1 Supply network

ITEM	3-PH SCC Max [kA]	X/R	3-PH SCC Min [kA]	X/R [pu]
66kV Network 3Ph	15.5	10.0	8.7	10.0
66kV Network 1Ph	7.10	10.0	6.3	10.0

Table 3 - Data for External Network

3.3.2 Power Sources

ITEM	Rated Power [kVA]	Vn [kV]	In [A]	Maximum Generated Active Power [kW]	Sustained SCC [% In]
A-85000 BESS package	1250.0	6.6	109.3	1000.0	150.0
A-80000 Fuel cell package	1250.0	6.6	109.3	1000.0	150.0
PV_Plant	660.0	0.8	476.3	480.0	100.0

Table 4 - Data for Internal Power Sources

3.3.3 Transformers

ITEM	An [kVA]	V1n/V2n [kV]	I1n/I2n [A]	Zcc [%]	X/R [pu]	Vector Group
TR-100AD1	7000.0	66.0+/-8x1.25%/0.69	61.2/585.7	8.0	16.01	Dyn11
TR-200DE1	1600.0	6.6/0.42	139.9/2199.5	6.0	7.94	Dyn11
TR-200ED1	500.0	6.6/0.8	43.7/360.8	6.0	7.63	Dyn11

Table 5 - Data for Main Transformers

3.3.4 Switchgear Data

ITEM	Rated Voltage [kV]	Rated Ampacity [A]	Short Circuit Rating [kA - s]
HNA6-AFA70	66.0	1250.0	31.5 - 1s
SG-100D1	6.6	630.0	25.0 – 1s
SG-200N1	0.4	2500.0	50.0 – 1s

Table 6 – Data for Main Switchgears

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3.4 SHORT CIRCUIT CURRENTS

The following table summarizes the maximum and minimum short circuit values, as per 123A90-DDL-EL-RE-20171 Rev. 1 - Electrical System Study Report – Short Circuit.

ITEM	Rated Voltage [kV]	Ph-Ph SCC-Max [kA]	PH-G SCC-Max [kA]	Ph-Ph SCC-Min [kA]	PH-G SCC-Min [kA] (*)	PH-PH Through Fault Current [kA]
HNA6-AFA70	66	14.76	6.71	7.30	5.97	--
SG-100D1	6.6	8.11	0.4	5.08	0.4	--
TR-100AD1	6.9	8.11	0.4	5.08	0.4	7.67
SG-200N1	0.4	31.35	33.52	18.76	6.58	--
TR200DE1	0.4	31.35	33.52	18.76	6.58	30.36

Table 7 - Data for Short Circuit Current

(*) In order to consider the arc fault resistance in LV system, the L-G Minimum SCC has been calculated as follows: Icc PH-G_min = Icc 3PH_min x 0.28

4 RELAY COORDINATION STUDY

4.1 PROTECTION SYSTEM DESCRIPTION

The protective relays undertake the detection of abnormal conditions, whose task is to shut down the faulted part from the operation and separate it from the electrical distribution system. The setting of the relays has been selected to allow a reliable operation of the system, keeping as long and as much as possible the feeders or the system in service without risk of damage.

Two different kinds of protective devices have been used for protection of the electrical system:

- thermal overload relays and electronic built-in overcurrent and ground fault releases for low voltage distribution.
- secondary relays fed from CTs and VTs for overcurrent and short circuit protection and ground fault protection, for low and high voltage level.

For the indirect relays, the microprocessor technology has been used; the protection functions which have been considered active in the multifunction relays are indicated in the setting tables and in the one-line diagrams.

Network protections are schematically shown in the simplified one-line diagrams, by using ANSI code numbers or graphic symbols (LV equipment).

4.2 ISLAND OPERATION MODE

To assure the best protection level in case of island operation, dedicated thresholds have been considered to be activated only in that case. The REX640 protection relay installed on the 6.6 kV incoming cubicle has to detect the island and send a signal on the IEC 61850 network so that all the other protection relays of the same switchgear and on the LV income protection can activate the relevant settings.

With respect to the phase-to-ground fault, the 6.6 kV system is ungrounded when on the island, so it will be detected by means of the residual overvoltage protection (59N), which has been set to trip first the feeders to the solar package and then the one to the fuel cells. The BESS feeder will be tripped as the last one since it means losing the auxiliary transformer TR-200DE1 feeder.

4.3 SETTING CRITERIA

4.3.1 LV Feeders

Generally, thermal unit shall be set above maximum service current, while magnetic unit shall consider operating conditions and coordination with downstream circuit breakers, considering a minimum value of five time of maximum service current.

4.3.2 LV Transformer Incoming

Two phase overcurrent units have been used:

- Low level: inverse time curve; pick-up equal to about incoming transformer FLA and time multiplier chosen to achieve selectivity with downstream protection.

- High level (when suitable): definite time curve; pick-up above 1.2 times the downstream protections high level value. To assure selectivity, a grading margin of at least 200ms with tie breaker protection shall be chosen.

One residual earth overcurrent unit has been used:

- Low level: inverse time curve; the minimum pick-up value is 0.1 CT primary current and time multiplier chosen to achieve selectivity with downstream protection. To assure selectivity, a grading margin of at least 200ms with downstream protection shall be chosen.

4.3.3 Star Point of HV/LV Transformer

Star point earth overcurrent unit has been used:

- Low level: inverse time curve; pick-up equal to about 1.2 times the incoming protection value. To assure selectivity, a grading margin of at least 200ms with downstream protection.

4.3.4 HV/LV Transformer Feeders

Three phase overcurrent units have been used:

- Low level: dependent time curve; pick-up equal to about 1.4 transformer FLA and time multiplier chosen to achieve selectivity with downstream protection and assure transformer protection according to transformer capability curve.
- First high level (when suitable): definite time curve; pick-up above high level of LV incoming protection, referred to primary side. To assure selectivity, a grading margin of about 200ms with downstream protection shall be chosen.
- Second high level: instantaneous time curve; pick-up above 1.3 times the secondary short circuit level or the inrush current, whatever is the higher, in order to take into account current asymmetry. To assure selectivity with Fuse, a grading margin is considered.

One earth overcurrent protection unit has been used:

- Low level: definite time curve; pick-up equal to about 0.1 CT primary current and time delay equal to 100ms.

4.3.5 HV Package Feeders (CPI)

CPI suppliers are responsible for the setting of their internal protection, taking into account the data indicated in the present study, to have a selective behaviour with upstream the HV protections.

Two overcurrent units have been used:

- Low level: dependent time curve; pick-up equal to about 1.2 maximum service current and time multiplier chosen to achieve selectivity with downstream protection, if any.

- First high level (when suitable): definite time curve; pick-up equal to about 2.5 maximum service current. The minimum time delay has been calculated to assure the selectivity between the fuse and the maximum breaking current of the contactor.

One earth overcurrent protection unit has been used:

- Low level: definite time curve; pick-up equal to about 0.1 CT primary current and time delay equal to 100ms.

4.3.6 HV/HV Transformer Incoming

Two phase overcurrent units have been used:

- Low level: inverse time curve; pick-up equal to about incoming transformer FLA and time multiplier chosen to achieve selectivity with downstream protection.
- High level (when suitable): definite time curve; pick-up above 1.2 times the downstream protections high level value. To assure selectivity, a grading margin of at least 200ms with tie breaker protection shall be chosen.

One residual earth overcurrent unit has been used:

- Low level: definite time curve; pick-up above 1.2 times the downstream protections high level value. To assure selectivity, a grading margin of at least 200ms with tie breaker protection shall be chosen.

4.3.7 Star Point of HV/HV Transformer

Star point earth overcurrent unit has been used:

- Low level: definite time curve; pick-up above 1.2 times the downstream protections high level value. To assure selectivity, a grading margin of at least 200ms with tie breaker protection shall be chosen.

4.3.8 HV/HV Transformer Feeders

- The TR-100AD1 is protected by differential relay. For all type of faults, this protection assures an intrinsically selective behavior, thus it can operate instantaneously. In this case, other protections assure the back-up function.
- Mixed current and time selectivity assures protection coordination.

Three overcurrent units have been used:

- Low level: dependent time curve; pick-up equal to about 1.4 transformer FLA and time multiplier chosen to achieve selectivity with downstream protection and assure transformer protection according to transformer capability curve for infrequent faults.

- First high level (when suitable): definite time curve; pick-up above high level of MV incoming protection, referred to primary side. To assure selectivity, a grading margin of about 200ms with downstream protection shall be chosen.
- Second high level: instantaneous time curve; pick-up above 1.3 times the secondary short circuit level or the inrush current, whatever is the higher, in order to take into account current asymmetry.

4.3.9 Setting Calculation for Transformer Differential Protection (87T) and Restricted Ground Fault Protection (64REF)

TR-100AD1 – 7MVA – 66/6.9kV – 61.23/585.72 transformer differential (87T) protection

Differential relay SIEMENS 7UT85

- HV 66kV CT = 250/1
- MV 6.9kV CT = 600/1
- Transformer Starpoint CT = 250/1
- The transformer group is Dyn11.

PERCENT DIFFERENTIAL PICKUP: This setting defines the minimum differential current required for operation. It is chosen, based on the amount of differential current that might be seen under normal operating conditions. Two factors may create differential current during the normal transformer operation: errors due to CT inaccuracies and current variation due to onload tap changer operation.

Percent Differential: Pickup proposed setting = 20%

PERCENT DIFFERENTIAL SLOPE 1: This setting defines the differential restraint during normal operating conditions to assure sensitivity to internal faults. The setting must be high enough, however, to cope with CT saturation errors during saturation under small current magnitudes but significant and long-lasting DC components (such as during distant external faults in vicinity of generators).

Percent Differential: Slope 1 proposed setting = 30%

INTERSECTION 2: The settings for Intersection 2 depend very much on the capability of CTs to correctly transform primary into secondary currents during external faults. Intersection 2 should be set below the fault current that is most likely to saturate some CTs due to an AC component alone.

Is2: proposed setting = 2.0 pu

PERCENT DIFFERENTIAL SLOPE 2: The slope 2 setting ensures stability during heavy through fault conditions, where CT saturation results in high differential current. Slope 2 should be set high to cater for the worst case where one set of CTs saturates but the other set doesn't. In such a case the ratio of the differential current to restraint current can be as high as 95 to 98%.

Percent Differential: Slope 2 setting is chosen equal to 75%.

Other setting as indicated in the relevant Setting Table.

Restricted ground function settings: the setting for the Is1 thresholds is 10-25% of the minimum earth fault current for a fault at the transformer terminals when resistance earthed. In this case, it has been chosen 24% (60 A). As per Siemens manual the recommended setting for the slope is 7%, in order to avoid spurious tripping has been set to 10%.

Regarding the time delay, the chosen setting is 0.1 s.

4.4 COMMENTS ON SELECTIVITY STUDY

The selective behaviour of the protections is assured in any service condition, both for phase and for ground faults.

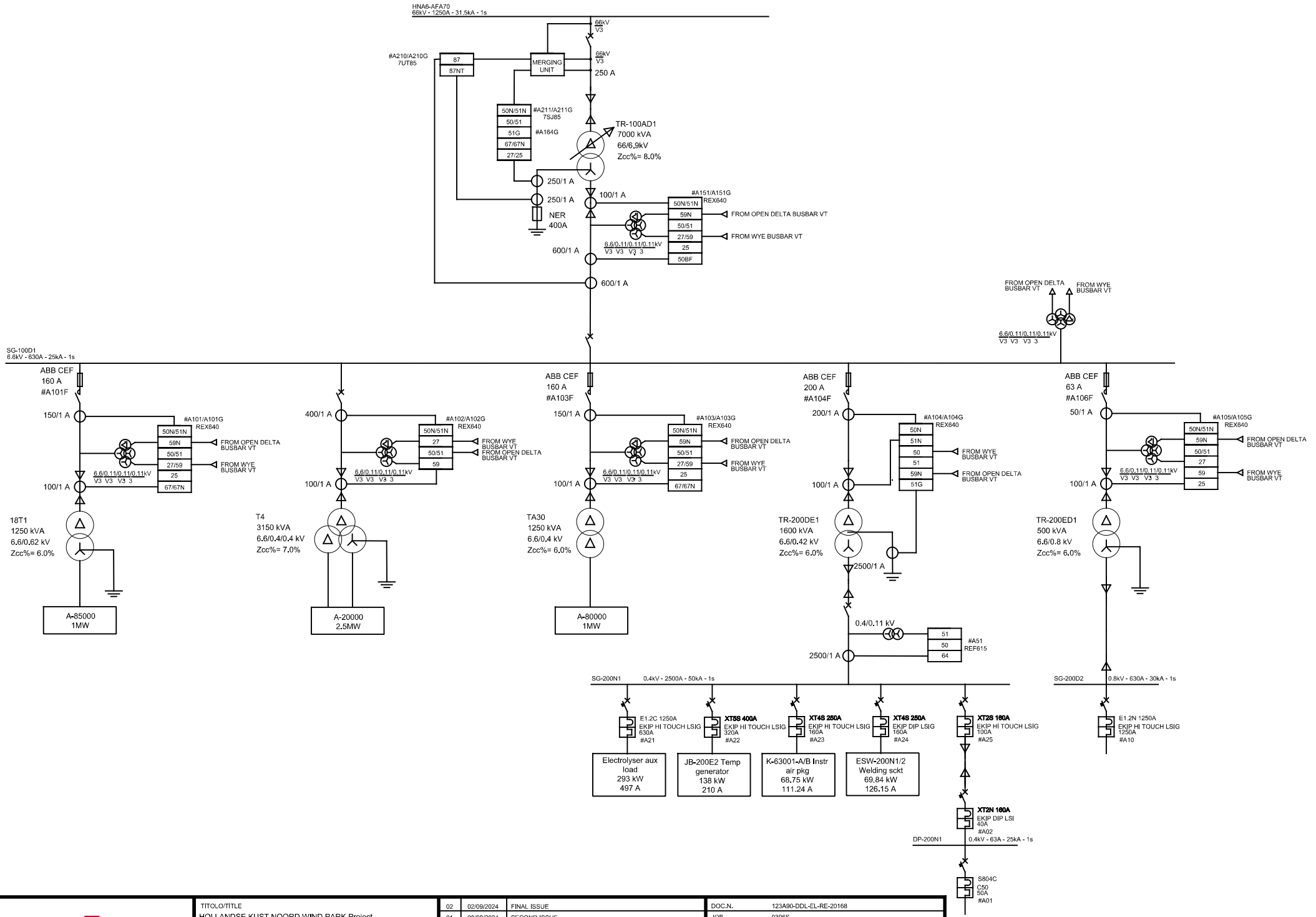
In the setting tables, the main setting of the multifunction relays is detailed. The use of output contacts, latched function, etc. must be chosen according to wiring diagrams.

5 ATTACHMENTS

- Attachment A: Simplified Single Line Diagrams.
- Attachment B: Setting Tables.
- Attachment C: Time Current Curve (TCC) printout.

ATTACHMENT A: SIMPLIFIED SINGLE LINE DIAGRAMS

Formato: A3



CROSSWIND ROSETTI MARINO

TITOLO/TITLE

HOLLANDSE KUST NOORD WIND PARK Project
SIMPLIFIED ONE LINE DIAGRAM FOR SELECTIVITY STUDY

REV.	DATA/DATE	DESCRIZIONE/DESCRIPTION
02	02/09/2024	FINAL ISSUE
01	08/08/2024	SECOND ISSUE
00	19/06/2024	FIRST ISSUE

DOC.N.	123A90-DDL-EL-RE-20168		
JOB	0396S		
FG/SH	A2	DI/OF	A2
FILE	RC-123A90-DDL-EL-RE-20168_ATTACHMENT_A.DWG		

ATTACHMENT B: Tables Setting

RELAY SETTING TABLE

SUBSTATION: BLPH | **SWITCHBOARD:** DP-200N1 | **VOLTAGE:** 0.40 kV

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **TRACE HEATING MAIN C.B.** In [A] : **32.0**	Manufacturer: **ABB** CB Type: **S804C** Release Type: **C50** Nom. Current [A]: **50** Function: **LI**	ID. CODE : **#A01** page: **C02** ID. CODE : page:	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	SETTING RANGE DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME	SETTINGS PRIMARY VALUE	SETTINGS I/U [pu/A/V]	SETTINGS TIME	NOTES
L		LT SETTING	50		***50.0***	***50.00***		
		DELAY		Fixed			***Fixed***	
I		I PICK-UP	500		***500.0***	***500.00***		
		DELAY		0.02s			***0.02***	

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Incoming from: **SG-200N1**	Manufacturer: **ABB** CB Type: **XT2N - 160A** Release Type: **EKIP DIP LSI** Nom. Current [A]: **63** Function: **LSI**	ID. CODE : **#A02** page: **C02** ID. CODE : page:	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	SETTING RANGE DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME	SETTINGS PRIMARY VALUE	SETTINGS I/U [pu/A/V]	SETTINGS TIME	NOTES
L		LT SETTING	0.4 - 1 xIn		***63.0***	***1.00***		
		DELAY		3 - 144s			***36***	
S		ST PICK-UP	OFF, 0.6 - 10 xIn		***630.0***	***10.00***		I2t = OFF
		DELAY		0.1 - 0.8s			***0.1***	
I		I PICK-UP	OFF, 1.5 - 15 xIn		***630.0***	***10.00***		
		DELAY		0.02s			***0.02***	

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RELAY SETTING TABLE

SUBSTATION: BLPH | **SWITCHBOARD:** SG-200D2 | **VOLTAGE:** 0.80 kV

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Incoming from: **Solar Farm**	Manufacturer: **ABB**	ID. CODE : **#A10**	
Pn [kW] : **500.0**	CB Type: **E1.2N/E9 1250A**	page: **C08**	
In [A] : **360.9**	Release Type: **EKIP HI TOUCH LSIG**		
	Nom. Current [A]: **1250**	ID. CODE :	
	Function: **LSIG**	page:	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	SETTING RANGE DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME	SETTINGS PRIMARY VALUE	SETTINGS I/U [pu/A/V]	SETTINGS TIME	NOTES
L		LT SETTING	0.4 - 1 xIn		***500.0***	***0.40***		
		DELAY		3 - 144s			***3***	
S		ST PICK-UP	OFF, 0.6 - 10 xIn		***1250.0***	***1.00***		I2t = OFF
		DELAY		0.1 - 0.8s			***0.1***	
I		I PICK-UP	OFF, 1.5 - 15 xIn		***1875.0***	***1.50***		
		DELAY		0.02s			***0.02***	
G		G PICK-UP	0.1 - 1 xIn		***250.0***	***0.2***		
		DELAY		0.1 - 0.8s			***0.1***	

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RELAY SETTING TABLE

SUBSTATION: BLPH | **SWITCHBOARD:** SG-200N1 | **VOLTAGE:** 0.40 kV

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **Electrolyser aux load**	Manufacturer: **ABB**	ID. CODE : **#A21**	
Pn [kW] : **293.0**	CB Type: **E1.2C 1250A**	page: **C03,C11**	
In [A] : **497.0**	Release Type: **EKIP HI TOUCH LSIG**		
	Nom. Current [A]: **630**	ID. CODE :	
	Function: **LSIG**	page:	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME	SETTINGS PRIMARY VALUE	SETTINGS I/U [pu/A/V]	SETTINGS TIME	NOTES
L		LT SETTING	0.4 - 1 xIn		***548.1***	***0.87***		
		DELAY		3 - 144s			***3***	
S		ST PICK-UP	OFF, 0.6 - 10 xIn		***2520.0***	***4.00***		I2t = OFF
		DELAY		0.1 - 0.8s			***0.1***	
I		I PICK-UP	OFF, 1.5 - 15 xIn		***5670.0***	***9.00***		
		DELAY		0.02s			***0.02***	
G		G PICK-UP	0.1 - 1 xIn		***126.0***	***0.2***		
		DELAY		0.1 - 0.8s			***0.1***	

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **JB-200E2 Temp generator**	Manufacturer: **ABB**	ID. CODE : **#A22**	
Pn [kW] : **138.0**	CB Type: **XT5S - 400A**	page: **C03,C11**	
In [A] : **210.0**	Release Type: **EKIP HI TOUCH LSIG**		
	Nom. Current [A]: **320**	ID. CODE :	
	Function: **LSIG**	page:	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME	SETTINGS PRIMARY VALUE	SETTINGS I/U [pu/A/V]	SETTINGS TIME	NOTES
L		LT SETTING	0.4 - 1 xIn		***224.0***	***0.70***		
		DELAY		3 - 144s			***3***	
S		ST PICK-UP	OFF, 0.6 - 10 xIn		***1120.0***	***3.50***		I2t = OFF
		DELAY		0.1 - 0.8s			***0.1***	
I		I PICK-UP	OFF, 1.5 - 15 xIn		***2240.0***	***7.00***		
		DELAY		0.02s			***0.02***	
G		G PICK-UP	0.1 - 1 xIn		***64.0***	***0.2***		
		DELAY		0.1 - 0.8s			***0.1***	

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **K-63001-A/B Instr air pkg**	Manufacturer: **ABB**	ID. CODE : **#A23**	
Pn [kW] : **68.8**	CB Type: **XT4S - 250A**	page: **C03**	
In [A] : **111.2**	Release Type: **EKIP HI TOUCH LSIG**		
	Nom. Current [A]: **160**	ID. CODE :	
	Function: **LSIG**	page:	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME	SETTINGS PRIMARY VALUE	SETTINGS I/U [pu/A/V]	SETTINGS TIME	NOTES
L		LT SETTING	0.4 - 1 xIn		***115.2***	***0.72***		
		DELAY		3 - 144s			***3***	
S		ST PICK-UP	OFF, 0.6 - 10 xIn		***560.0***	***3.50***		I2t = OFF
		DELAY		0.1 - 0.8s			***0.1***	
I		I PICK-UP	OFF, 1.5 - 15 xIn		***1120.0***	***7.00***		
		DELAY		0.02s			***0.02***	
G		G PICK-UP	0.1 - 1 xIn		***32.0***	***0.2***		
		DELAY		0.1 - 0.8s			***0.1***	

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **ESW-200N1/2 Welding sckt**	Manufacturer: **ABB**	ID. CODE : **#A24**	
Pn [kW] : **69.8**	CB Type: **XT4S - 250A**	page: **C03**	
In [A] : **126.2**	Release Type: **EKIP DIP LSIG**		
	Nom. Current [A]: **160**	ID. CODE :	
	Function: **LSIG**	page:	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME	SETTINGS PRIMARY VALUE	SETTINGS I/U [pu/A/V]	SETTINGS TIME	NOTES
L		LT SETTING	0.4 - 1 xIn		***128.0***	***0.80***		
		DELAY		3 - 144s			***3***	
S		ST PICK-UP	OFF, 0.6 - 10 xIn		***640.0***	***4.00***		
		DELAY		0.1 - 0.8s			***0.1***	
I		I PICK-UP	OFF, 1.5 - 15 xIn		***1280.0***	***8.00***		
		DELAY		0.02s			***0.02***	
G		G PICK-UP	0.1 - 1 xIn		***32.0***	***0.2***		
		DELAY		0.1 - 0.8s			***0.1***	

RELAY SETTING TABLE

SUBSTATION: BLPH | **SWITCHBOARD:** SG-200N1 | **VOLTAGE:** 0.40 kV

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **UP-200F4 - LINE A/B/BYPASS**	Manufacturer: **ABB**	ID. CODE :	
Pn [kW] : **18.0**	CB Type: **XT2S - 160A**	page:	
In [A] : **28.9**	Release Type: **EKIP DIP LSIG**		
	Nom. Current [A]: **63**	ID. CODE :	
	Function: **LSIG**	page:	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	SETTING RANGE DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME	SETTINGS PRIMARY VALUE	SETTINGS I/U [pu/A/V]	SETTINGS TIME	NOTES
L		LT SETTING	0.4 - 1 xIn		***31.5***	***0.50***		
		DELAY		3 - 144s			***3***	
S		ST PICK-UP	OFF, 0.6 - 10 xIn		***157.5***	***2.50***		
		DELAY		0.1 - 0.8s			***0.1***	
I		I PICK-UP	OFF, 1.5 - 15 xIn		***315.0***	***5.00***		
		DELAY		0.02s			***0.02***	
G		G PICK-UP	0.1 - 1 xIn		***12.6***	***0.2***		
		DELAY		0.1 - 0.8s			***0.1***	

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **UP-200F3 - LINE A/B/BYPASS**	Manufacturer: **ABB**	ID. CODE :	
Pn [kW] : **36.0**	CB Type: **XT2S - 160A**	page:	
In [A] : **57.8**	Release Type: **EKIP DIP LSIG**		
	Nom. Current [A]: **100**	ID. CODE :	
	Function: **LSIG**	page:	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	SETTING RANGE DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME	SETTINGS PRIMARY VALUE	SETTINGS I/U [pu/A/V]	SETTINGS TIME	NOTES
L		LT SETTING	0.4 - 1 xIn		***62.0***	***0.62***		
		DELAY		3 - 144s			***3***	
S		ST PICK-UP	OFF, 0.6 - 10 xIn		***300.0***	***3.00***		
		DELAY		0.1 - 0.8s			***0.1***	
I		I PICK-UP	OFF, 1.5 - 15 xIn		***600.0***	***6.00***		
		DELAY		0.02s			***0.02***	
G		G PICK-UP	0.1 - 1 xIn		***20.0***	***0.2***		
		DELAY		0.1 - 0.8s			***0.1***	

RELAY SETTING TABLE

SUBSTATION: BLPH | **SWITCHBOARD:** SG-200N1 | **VOLTAGE:** 0.40 kV

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **JB-200E3 Crane**	Manufacturer: **ABB**	ID. CODE :	
Pn [kW] : **14.8**	CB Type: **XT2S - 160A**	page:	
In [A] : **24.5**	Release Type: **EKIP HI TOUCH LSIG**		
	Nom. Current [A]: **63**	ID. CODE :	
	Function: **LSIG**	page:	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME	SETTINGS PRIMARY VALUE	SETTINGS I/U [pu/A/V]	SETTINGS TIME	NOTES
L		LT SETTING	0.4 - 1 xIn		***29.6***	***0.47***		
		DELAY		3 - 144s			***3***	
S		ST PICK-UP	OFF, 0.6 - 10 xIn		***157.5***	***2.50***		
		DELAY		0.1 - 0.8s			***0.1***	
I		I PICK-UP	OFF, 1.5 - 15 xIn		***315.0***	***5.00***		
		DELAY		0.02s			***0.02***	
G		G PICK-UP	0.1 - 1 xIn		***12.6***	***0.2***		
		DELAY		0.1 - 0.8s			***0.1***	

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **DP-200N1**	Manufacturer: **ABB**	ID. CODE : **#A25**	
Pn [kW] : **15.4**	CB Type: **XT2S - 160A**	page:	
In [A] : **23.7**	Release Type: **EKIP HI TOUCH LSIG**		
	Nom. Current [A]: **100**	ID. CODE : **#A25G**	
	Function: **LSIG**	page:	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME	SETTINGS PRIMARY VALUE	SETTINGS I/U [pu/A/V]	SETTINGS TIME	NOTES
L		LT SETTING	0.4 - 1 xIn		***65.0***	***0.65***		
		DELAY		3 - 144s			***72***	
S		ST PICK-UP	OFF, 0.6 - 10 xIn		***1000.0***	***10.00***		
		DELAY		0.1 - 0.8s			***0.1***	
I		I PICK-UP	OFF, 1.5 - 15 xIn			***OFF***		
		DELAY		0.02s				
G		G PICK-UP	0.1 - 1 xIn		***20.0***	***0.2***		
		DELAY		0.1 - 0.8s			***0.1***	

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **JB-500E8 Water package**	Manufacturer: **ABB**	ID. CODE :	
Pn [kW] : **48.8**	CB Type: **XT4S - 250A**	page:	
In [A] : **72.6**	Release Type: **EKIP HI TOUCH LSIG**		
	Nom. Current [A]: **160**	ID. CODE :	
	Function: **LSIG**	page:	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME	SETTINGS PRIMARY VALUE	SETTINGS I/U [pu/A/V]	SETTINGS TIME	NOTES
L		LT SETTING	0.4 - 1 xIn		***88.0***	***0.55***		
		DELAY		3 - 144s			***3***	
S		ST PICK-UP	OFF, 0.6 - 10 xIn		***480.0***	***3.00***		
		DELAY		0.1 - 0.8s			***0.1***	
I		I PICK-UP	OFF, 1.5 - 15 xIn		***960.0***	***6.00***		
		DELAY		0.02s			***0.02***	
G		G PICK-UP	0.1 - 1 xIn		***32.0***	***0.2***		
		DELAY		0.1 - 0.8s			***0.1***	

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **B100-HSB-001**	Manufacturer: **ABB**	ID. CODE :	
	CB Type: **XT2S - 160A**	page:	
Pn [kW] : **16.4**	Release Type: **EKIP HI TOUCH LSIG**		
In [A] : **33.9**	Nom. Current [A]: **40**	ID. CODE :	
	Function: **LSIG**	page:	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME	SETTINGS PRIMARY VALUE	SETTINGS I/U [pu/A/V]	SETTINGS TIME	NOTES
L		LT SETTING	0.4 - 1 xIn		***40.0***	***1.00***		
		DELAY		3 - 144s			***3***	
S		ST PICK-UP	OFF, 0.6 - 10 xIn		***200.0***	***5.00***		
		DELAY		0.1 - 0.8s			***0.1***	
I		I PICK-UP	OFF, 1.5 - 15 xIn		***400.0***	***10.00***		
		DELAY		0.02s			***0.02***	
G		G PICK-UP	0.1 - 1 xIn		***8.0***	***0.2***		
		DELAY		0.1 - 0.8s			***0.1***	

RELAY SETTING TABLE

SUBSTATION: BLPH | **SWITCHBOARD:** SG-200N1 | **VOLTAGE:** 0.40 kV

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **B200-HSB-001**	Manufacturer: **ABB**	ID. CODE :	
	CB Type: **XT2S - 160A**	page:	
Pn [kW] : **15.0**	Release Type: **EKIP HI TOUCH LSIG**		
In [A] : **33.5**	Nom. Current [A]: **40**	ID. CODE :	
	Function: **LSIG**	page:	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME	SETTINGS PRIMARY VALUE	SETTINGS I/U [pu/A/V]	SETTINGS TIME	NOTES
L		LT SETTING	0.4 - 1 xIn		***40.0***	***1.00***		
		DELAY		3 - 144s			***3***	
S		ST PICK-UP	OFF, 0.6 - 10 xIn		***200.0***	***5.00***		
		DELAY		0.1 - 0.8s			***0.1***	
I		I PICK-UP	OFF, 1.5 - 15 xIn		***400.0***	***10.00***		
		DELAY		0.02s			***0.02***	
G		G PICK-UP	0.1 - 1 xIn		***8.0***	***0.2***		
		DELAY		0.1 - 0.8s			***0.1***	

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **A-80000 Fuel cell aux**	Manufacturer: **ABB**	ID. CODE :	
Pn [kW] : **20.0**	CB Type: **XT2S - 160A**	page:	
In [A] : **32.8**	Release Type: **EKIP HI TOUCH LSIG**		
	Nom. Current [A]: **63**	ID. CODE :	
	Function: **LSIG**	page:	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME	SETTINGS PRIMARY VALUE	SETTINGS I/U [pu/A/V]	SETTINGS TIME	NOTES
L		LT SETTING	0.4 - 1 xIn		***37.8***	***0.60***		
		DELAY		3 - 144s			***3***	
S		ST PICK-UP	OFF, 0.6 - 10 xIn		***189.0***	***3.00***		
		DELAY		0.1 - 0.8s			***0.1***	
I		I PICK-UP	OFF, 1.5 - 15 xIn		***378.0***	***6.00***		
		DELAY		0.02s			***0.02***	
G		G PICK-UP	0.1 - 1 xIn		***12.6***	***0.2***		
		DELAY		0.1 - 0.8s			***0.1***	

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **CP-850F03 BESS PCS**	Manufacturer: **ABB**	ID. CODE :	
Pn [kW] : **11.1**	CB Type: **XT2S - 160A**	page:	
In [A] : **17.4**	Release Type: **EKIP HI TOUCH LSIG**		
	Nom. Current [A]: **40**	ID. CODE :	
	Function: **LSIG**	page:	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME	SETTINGS PRIMARY VALUE	SETTINGS I/U [pu/A/V]	SETTINGS TIME	NOTES
L		LT SETTING	0.4 - 1 xIn		***20.0***	***0.50***		
		DELAY		3 - 144s			***3***	
S		ST PICK-UP	OFF, 0.6 - 10 xIn		***100.0***	***2.50***		
		DELAY		0.1 - 0.8s			***0.1***	
I		I PICK-UP	OFF, 1.5 - 15 xIn		***200.0***	***5.00***		
		DELAY		0.02s			***0.02***	
G		G PICK-UP	0.1 - 1 xIn		***8.0***	***0.2***		
		DELAY		0.1 - 0.8s			***0.1***	

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **B300-HSB-001**	Manufacturer: **ABB**	ID. CODE :	
Pn [kW] : **15.0**	CB Type: **XT2S - 160A**	page:	
In [A] : **31.7**	Release Type: **EKIP HI TOUCH LSIG**		
	Nom. Current [A]: **63**	ID. CODE :	
	Function: **LSIG**	page:	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME	SETTINGS PRIMARY VALUE	SETTINGS I/U [pu/A/V]	SETTINGS TIME	NOTES
L		LT SETTING	0.4 - 1 xIn		***41.0***	***0.65***		
		DELAY		3 - 144s			***3***	
S		ST PICK-UP	OFF, 0.6 - 10 xIn		***189.0***	***3.00***		
		DELAY		0.1 - 0.8s			***0.1***	
I		I PICK-UP	OFF, 1.5 - 15 xIn		***441.0***	***7.00***		
		DELAY		0.02s			***0.02***	
G		G PICK-UP	0.1 - 1 xIn		***12.6***	***0.2***		
		DELAY		0.1 - 0.8s			***0.1***	

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RELAY SETTING TABLE

SUBSTATION: BLPH | **SWITCHBOARD:** SG-200N1 | **VOLTAGE:** 0.40 kV

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **B400-HSB-001** Pn [kW] : **18.4** In [A] : **38.5**	Manufacturer: **ABB** CB Type: **XT2S - 160A** Release Type: **EKIP HI TOUCH LSIG** Nom. Current [A]: **63** Function: **LSIG**	ID. CODE : page: ID. CODE : page:	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME	SETTINGS PRIMARY VALUE	SETTINGS I/U [pu/A/V]	SETTINGS TIME	NOTES
L		LT SETTING	0.4 - 1 xIn		***47.3***	***0.75***		
		DELAY		3 - 144s			***3***	
S		ST PICK-UP	OFF, 0.6 - 10 xIn		***252.0***	***4.00***		
		DELAY		0.1 - 0.8s			***0.1***	
I		I PICK-UP	OFF, 1.5 - 15 xIn		***504.0***	***8.00***		
		DELAY		0.02s			***0.02***	
		G PICK-UP	0.1 - 1 xIn		***12.6***	***0.2***		
G		DELAY		0.1 - 0.8s			***0.1***	

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **CN-200N1** An [kVA] : **14.0** In [A] : **23.8**	Manufacturer: **ABB** CB Type: **XT2S - 160A** Release Type: **EKIP HI TOUCH LSIG** Nom. Current [A]: **40** Function: **LSIG**	ID. CODE : page: ID. CODE : page:	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME	SETTINGS PRIMARY VALUE	SETTINGS I/U [pu/A/V]	SETTINGS TIME	NOTES
L		LT SETTING	0.4 - 1 xIn		***26.0***	***0.65***		
		DELAY		3 - 144s			***3***	
S		ST PICK-UP	OFF, 0.6 - 10 xIn		***120.0***	***3.00***		
		DELAY		0.1 - 0.8s			***0.1***	
I		I PICK-UP	OFF, 1.5 - 15 xIn		***240.0***	***6.00***		
		DELAY		0.02s			***0.02***	
		G PICK-UP	0.1 - 1 xIn		***8.0***	***0.2***		
G		DELAY		0.1 - 0.8s			***0.1***	

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **PM-50001 A/B** Pn [kW] : **6.1** In [A] : **11.0**	Manufacturer: **ABB** CB Type: **XT2S - 160A** Release Type: **MA** Nom. Current [A]: **20** Function:	ID. CODE : page: ID. CODE : page:	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME	SETTINGS PRIMARY VALUE	SETTINGS I/U [pu/A/V]	SETTINGS TIME	NOTES
I		I PICK-UP	120 - 280 A		***280.0***	***280.00***		
		DELAY		0.02s			***0.02***	

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **PM-50001 A/B** Pn [kW] : **6.1** In [A] : **11.0**	Manufacturer: **ABB** Release Type: **UMC100.3 UC**	ID. CODE : page: ID. CODE :	

MOTOR INFORMATION

29 - Nominal current Ie1	11.00	20 - Control Function	Direct Starter	26 - Resistive Load	No	Earth Fault	External with CEM11
47 - Number of phases	3	21 - Rev Locked out time	1.0 s	21 - Rev Locked out time	1.0 s		

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME	SETTINGS PRIMARY VALUE	SETTINGS I/U [pu/A/V]	SETTINGS TIME	NOTES
THERMAL OVERLOAD PROTECTION - TOL								
49	Ith	Function	Enab,Dis,Dis. Dur,startup			***Enabled***		
		Trip Class	Class 5,10, 20, 30			***10.00***		
		Current Factor	2…64000			***100.00***		
		Cooling Mode	Time/Restart Level			***Restart Level***		
		Cooling Time		30 - 64000 s				
		Restart level	10…100%			***30.00%***		
		Thermal load warning level	20…100%			***90.00%***		
STALL PROTECTION								
51LR		Function	Enab,Disable			***Enabled***		
		Locked rotor level	100 - 800% Ie1		***27.5***	***250.00%***		
		Locked rotor delay		0 - 25.0 s			***1***	
Ground Fault - CEM11								
50G		FBO.20/35/60/120				***FBP.35***		
		Earth Flt Trip Delay	0.1 - 3.4 A			***2.00***		
		Time delay to Set on PLC					***0.1 s***	

RELAY SETTING TABLE

SUBSTATION: BLPH | **SWITCHBOARD:** SG-200N1 | **VOLTAGE:** 0.40 kV

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **CP-850E1/2 BESS LV1/2** Pn [kW] : **11.3** In [A] : **18.1**	Manufacturer: **ABB** CB Type: **XT2S - 160A** Release Type: **EKIP HI TOUCH LSIG** Nom. Current [A]: **40** Function: **LSIG**	ID. CODE : page: ID. CODE : page:	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME	SETTINGS PRIMARY VALUE	SETTINGS I/U [pu/A/V]	SETTINGS TIME	NOTES
L		LT SETTING	0.4 - 1 xIn		***18.8***	***0.47***		
		DELAY		3 - 144s			***3***	
S		ST PICK-UP	OFF, 0.6 - 10 xIn		***100.0***	***2.50***		
		DELAY		0.1 - 0.8s			***0.1***	
I		I PICK-UP	OFF, 1.5 - 15 xIn		***200.0***	***5.00***		
		DELAY		0.02s			***0.02***	
G		G PICK-UP	0.1 - 1 xIn		***8.0***	***0.2***		
		DELAY		0.1 - 0.8s			***0.1***	

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **UP-200F1 A/B** Pn [kW] : **10.0** In [A] : **16.0**	Manufacturer: **ABB** CB Type: **XT2S - 160A** Release Type: **EKIP DIP LSIG** Nom. Current [A]: **63** Function: **LSIG**	ID. CODE : page: ID. CODE : page:	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME	SETTINGS PRIMARY VALUE	SETTINGS I/U [pu/A/V]	SETTINGS TIME	NOTES
L		LT SETTING	0.4 - 1 xIn		***25.2***	***0.40***		
		DELAY		3 - 144s			***3***	
S		ST PICK-UP	OFF, 0.6 - 10 xIn		***126.0***	***2.00***		
		DELAY		0.1 - 0.8s			***0.1***	
I		I PICK-UP	OFF, 1.5 - 15 xIn		***252.0***	***4.00***		
		DELAY		0.02s			***0.02***	
G		G PICK-UP	0.1 - 1 xIn		***12.6***	***0.2***		
		DELAY		0.1 - 0.8s			***0.1***	

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **UP-200F2 A/B** An [kVA] : **1.6** In [A] : **7.0**	Manufacturer: **ABB** CB Type: **XT2S - 160A** Release Type: **EKIP DIP LSIG** Nom. Current [A]: **63** Function: **LSIG**	ID. CODE : page: ID. CODE : page:	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME	SETTINGS PRIMARY VALUE	SETTINGS I/U [pu/A/V]	SETTINGS TIME	NOTES
L		LT SETTING	0.4 - 1 xIn		***25.2***	***0.40***		
		DELAY		3 - 144s			***3***	
S		ST PICK-UP	OFF, 0.6 - 10 xIn		***126.0***	***2.00***		
		DELAY		0.1 - 0.8s			***0.1***	
I		I PICK-UP	OFF, 1.5 - 15 xIn		***252.0***	***4.00***		
		DELAY		0.02s			***0.02***	
G		G PICK-UP	0.1 - 1 xIn		***12.6***	***0.2***		
		DELAY		0.1 - 0.8s			***0.1***	

RELAY SETTING TABLE

SUBSTATION: BLPH | **SWITCHBOARD:** SG-200N1 | **VOLTAGE:** 0.40 kV

USER		RELAY DESCRIPTION		RELAY IDENTIFICATION		ANALOG INPUT	
Incoming from:	**TR-200DE1**	Manufacturer:	**ABB**	ID. CODE :	**#A51**	Phase CT:	**2500 / 1**
An [MVA]:	**1.6**	Type:	**REF615**	page:	**C02,C03,C04,C11**	Earth CT:	**/**
I1n [A]:	**139.96**	Phase current [A]:	**1**				
I2n [A]:	**2199.43**	Earth current [A]:	**1**	ID. CODE :		Phase VT:	**400 / 110**
V1n [kV]:	**6.6**	Prim. Phase CT [A]:	**2500**	page:			
V2n [kV]:	**0.42**	Prim. Earth CT [A]:					
Zcc%:	**6.00**	Protect. functions:	**50,51,64**				

GENERAL SYSTEM SETTINGS

Rated frequency	50	Phase rotation	ABC	Blocking mode	Freeze	IDMT Sat point	50

ANALOG INPUTS

CURRENT (3I,CT)	VALUE	VOLTAGE (3U,VT)	VALUE	Current (Io,CT)	VALUE	VOLTAGE (Uo,VT)	VALUE
Primary Current	2500.0	Primary Voltage	400.0	Primary Current		Primary Voltage	400.0
Secondary Current	1.0	Secondary Voltage	110.0	Secondary Current		Secondary Voltage	110.0
Amplitude corr. A/B/C	1.0	VT Connection	Wye	Amplitude corr		Amplitude corr.	1
Angle corr. A/B/C	0.0	Amplitude corr. A/B/C	1.0	Angle correction			
Reverse polarity	False	Voltage input type	Volt. Trafo	Reverse polarity			
		Angle corr. A/B/C	0.0				

PHASE OVERCURRENT PROTECTION - DPHLPDOC1

51	DPHLPDOC1	Num of start phases	1/3,2/3,3/3			***1/3***		Operation =	**ON**
		Reset delay time		0.00…60s			***0.02***		
		Measurement mode	RMS/DFT/P-to-P			***DFT***		***Non - Dir***	
		Minimum operate time		0.020…60s			***0.5***		
		Start Value	0.05…5.00 xIn		***2200.0***	***0.88***			
		Start value Mult	0.8…10.0		***2200.0***	***1.00***			
		Operate delay time		0.040…200s					
		Operating curve type	IEC NI,VI,EI,DT			***IEC Inverse***			
		Time multiplier		0.05…15.00			***0.25***		
		Type of reset curve	Immediate/DT/INV			***Immediate***			

PHASE OVERCURRENT PROTECTION - DPHHPDOC1

50-1	DPHHPDOC1	Num of start phases	1/3,2/3,3/3			***1/3***		Operation =	**ON**
		Start Value	0.10…40.00 xIn		***5750.0***	***2.30***			
		Start value Mult	0.8…10.0		***5750.0***	***1.00***		***Non-Dir***	
		Operate delay time		0.040…200s			***0.3***		
		Operating curve type	IEC NI,VI,EI,DT			***DT***			
		Time multiplier		0.05…15.00					
		Type of reset curve	Immediate/DT/INV			***Immediate***			

PHASE OVERCURRENT PROTECTION - DPHLPDOC2

50	DPHLPDOC2	Num of start phases	1/3,2/3,3/3			***1/3***		Operation =	**ON**
		Reset delay time		0.00…60s			***0.02***		
		Measurement mode	RMS/DFT/P-to-P			***DFT***		***Non - Dir***	
		Minimum operate time		0.020…60s					
		Start Value	0.05…5.00 xIn		***1375.0***	***0.55***		**Activated ONLY in Island condition**	
		Start value Mult	0.8…10.0		***1375.0***	***1.00***		**Signal Received thorugh IEC61850**	
		Operate delay time		0.040…200s			***0.3***		
		Operating curve type	IEC NI,VI,EI,DT			***DT***			
		Time multiplier		0.05…15.00					
		Type of reset curve	Immediate/DT/INV			***Immediate***			

EARTH-FAULT PROTECTION - DEFLPDEF1

64	DEFLPDEF1	Reset delay time		0.00…60s			***0.02***	Operation =	**ON**
		Measurement mode	RMS/DFT/P-to-P			***DFT***			
		Io signal Sel	Meas./Calc.			***Calculated***		***Direction Mode: Non-Dir***	
		Start Value	0.005…1.000 xIn		***375.0***	***0.150***		***Allow Non Dir: True***	
		Start value Mult	0.8…10.0		***375.0***	***1.00***		***Pol Reversal: False***	
		Operate delay time		0.050…200s					
		Time multiplier		0.05…15.00			***0.12***		
		Operating curve type	IEC NI,VI,EI,DT			***IEC Normal Inverse***			

PHASE OVERCURRENT PROTECTION - PHIPTOC1 Used for the Maintenance Switch

50	PHIPTOC1	Start Value	1.00 - 40.00 x In		***5750.0***	***2.30***		Operation =	**ON**
		Start value Mult	0.8…10.0		***5750.0***	***1.00***		Reset delay time =	**20 ms**
		Operate delay time		0.050…200s			***0.05***	Num of start phases =	**1 out of 3**

RELAY SETTING TABLE

SUBSTATION: BLPH **SWITCHBOARD:** SG-100D1 **VOLTAGE:** 6.60 kV

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **A-20000**	Manufacturer: **ABB**	PHASE: **#A102**	Phase CT: **400 / 1**
An [MVA]: **3.15**	Type: **REX640**	page:	
I1n [A]: **275.55**	Phase current [A]: **1**		Earth CT: **100 / 1**
I2n [A]: **4546.63**	Phase current [A]:	EARTH: **#A102G**	Phase VT: **6.6k/110/110 /110**
I3n [A]: **4546.63**	Prim. Earth CT [A]: **1**	page:	**V3 V3 V3 3 3**
V1n [kV]: **6.6**	Prim. Phase CT [A]: **400**		
V2n [kV]: **0.4**	Prim. Phase CT [A]:		
V3n [kV]: **0.4**	Prim. Earth CT [A]: **100**		
Zcc%: **7.00**	Protect. functions: **50,51,50N,51N 27,59**		

ANALOG INPUTS

CURRENT (3I,CT)	VALUE	VOLTAGE (3U,VT)	VALUE	CURRENT (Io,CT)	VALUE	GENERAL SYSTEM SETTINGS	VALUE
Primary Current	400.0	Primary Voltage	6600.0	Primary Current	100.0	Rated frequency	50.0
Secondary Current	1.0	Secondary Voltage	110.0	Secondary Current	1.0	Phase rotation	ABC
Amplitude corr. A/B/C	1.0	VT Connection	Wye	Amplitude corr	1.0	Blocking mode	Freeze
Angle corr. A/B/C	0.0	Amplitude corr. A/B/C	1.0	Angle correction	0.0	IDMT Sat point	50
Reverse polarity	False	Voltage input type	Volt. Trafo	Reverse polarity	False		
		Angle corr. A/B/C	0.0				

VOLTAGE (Uo,VT)	VALUE
Primary Voltage	3810.6
Secondary Voltage	110.0
Amplitude corr	1.0
Angle correction	0.0

PROTECTION FUNCTIONS

ANSI CODE	IEC61850 ID.	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME [s]	SETTING PRIMARY VALUE	SETTING I/U [pu/A/V]	SETTING TIME	NOTES
PHASE OVERCURRENT PROTECTION - PHLPTOC1								
51-1	PHLPTOC1	Num of start phases	1/3,2/3,3/3			***1/3***		Operation = **ON**
		Reset delay time		0.00…60s			***0.02***	
		Measurement mode	RMS/DFT/P-to-P			***DFT***		
		Minimum operate time		0.020…60s			***0.3***	
		Start Value	0.05…5.00 xIn		***300.0***	***0.75***		
		Start value Mult	0.8…10.0		***300.0***	***1.00***		
		Operate delay time		0.040…200s				
		Operating curve type	IEC NI,VI,EI,DT			***IEC Normal Inverse***		
		Time multiplier		0.05…15.00			***0.2***	
		Type of reset curve	Immediate/DT/INV			***Immediate***		
PHASE OVERCURRENT PROTECTION - PHIPTOC1								
50-1	PHIPTOC1	Num of start phases	1/3,2/3,3/3			***1/3***		Operation = **ON**
		Reset delay time		0.00…60s			***0.02***	
		Start Value	1.00…40.00 xIn		***2600.0***	***6.50***		
		Start value Mult	0.8…10.0		***2600.0***	***1.00***		
		Operate delay time		0.020…300s			***0.05***	
EARTH-FAULT PROTECTION - EFLPTOC1								
51N	EFLPTOC1	Reset delay time		0.00…60s			***0.02***	Operation = **ON**
		Measurement mode	RMS/DFT/P-to-P			***DFT***		
		Start Value	0.010…10.000 xIn		***10.0***	***0.100***		
		Start value Mult	0.8…10.0		***10.0***	***1.00***		
		Operate delay time		0.040…300s			***0.1***	
		Operating curve type	IEC NI,VI,EI,DT			***DT***		
PHASE UNDERVOLTAGE PROTECTION - PHPTUV1								
27-1	PHPTUV1	Num of start phases	1/3,2/3,3/3			***1/3***		Operation = **ON**
		Minimum operate time		0.06…60s			***0.06***	
		Reset delay time		0.00…60s			***0.02***	
		Voltage block value	0.05…1.00 xUn		***660.0 V***	***0.10***		
		Enable block value	True / False			***False***		
		Voltage selection	Ph-Ph, Ph-Earth			***Ph-Ph***		
		Relative hysteresis	1.0…5.0%			***4.00***		
		Start value	0.05…1.20 xUn		***5280.0 V***	***0.80***		
		Operate delay time		0.060…300s			***2***	
		Operating curve type	IEC DT,Inv A,Inv B			***IEC DT***		
		Type of reset curve	Immediate/DT/INV			***Immediate***		
PHASE OVERVOLTAGE PROTECTION - PHPTOV1								
59-1	PHPTOV1	Num of start phases	1/3,2/3,3/3			***1/3***		Operation = **ON**
		Min operate time		0.06…60s			***0.06***	
		Reset delay time		0.00…60s			***0.02***	
		Voltage selection	Ph-Ph, Ph-Earth			***Ph-to-Ph***		
		Relative hysteresis	1.0…5.0%			***4.00***		
		Start value	0.05…1.20xUn		***7920.0***	***1.20***		**Only Alarm**
		Time multiplier	0.05…15.00					
		Operating delay time		0.06…300s			***0.5***	
		Operate curve type	IEC DT,Inv A,Inv B			***DT***		
RESIDUAL OVERVOLTAGE PROTECTION - ROVPTOV1								
59N	ROVPTOV1	Reset delay time		0.00…60s			***0.02***	Operation = **ON**
		Uo signal Sel	Meas./Calc.			***Measured***		**Trip**
		Start Value	0.010…1.00 xUn		***381.1***	***0.10***		
		Operate delay time		0.040…300s			***1.00***	

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RELAY SETTING TABLE

SUBSTATION: BLPH **SWITCHBOARD:** SG-100D1 **VOLTAGE:** 6.60 kV

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **TR-200DE1**	Manufacturer: **ABB**	PHASE: **#A104**	Star P CT: **200 / 1**
An [MVA]: **1.6**	Type: **REX640**	page:	Star earth CT: **2500 / 1**
I1n [A]: **139.96**	Phase current [A]: **1**		Earth CT: **100 / 1**
I2n [A]: **2199.43**	Phase current [A]: **1**	EARTH: **#A104G**	Phase VT: **6.6k/110/110 /110**
V1n [kV]: **6.6**	Prim. Earth CT [A]: **1**	page:	**V3 V3 V3 3 3**
V2n [kV]: **0.42**	Prim. Phase CT [A]: **200**		
Zcc%: **6.00**	Prim. Phase CT [A]: **2500**		
	Prim. Earth CT [A]: **100**	Star EARTH: **#A64G**	
	Protect. functions: **50,51,50N,51N,59N 51G,27,59**	page:	

ANALOG INPUTS

CURRENT (3I,CT)	VALUE	VOLTAGE (3U,VT)	VALUE	CURRENT (Io,CT)	VALUE
Primary Current	200.0	Primary Voltage	6600.0	Primary Current	100.0
Secondary Current	1.0	Secondary Voltage	110.0	Secondary Current	1.0
Amplitude corr. A/B/C	1.0	VT Connection	Wye	Amplitude corr	1.0
Angle corr. A/B/C	0.0	Amplitude corr. A/B/C	1.0	Angle correction	0.0
Reverse polarity	False	Voltage input type	Volt. Trafo	Reverse polarity	False
		Angle corr. A/B/C	0.0		
VOLTAGE (Uo,VT)	**VALUE**	**CURRENT (IoB,CT)**	**VALUE**		
Primary Voltage	3810.6	Primary Current	2500.0		
Secondary Voltage	110.0	Secondary Current	1.0		
Amplitude corr	1.0	Amplitude corr	1.0		
Angle correction	0.0	Angle correction	0.0		
		Reverse polarity	False		

GENERAL SYSTEM SETTINGS

SYSTEM - CONTROL	VALUE
Rated frequency	50.0
Phase rotation	ABC
Blocking mode	Freeze
IDMT Sat point	50

ANSI CODE	IEC61850 ID.	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME [s]	SETTING PRIMARY VALUE	SETTING I/U [pu/A/V]	SETTING TIME	NOTES
PHASE OVERCURRENT PROTECTION - PHLPTOC1								
51	PHLPTOC1	Num of start phases	1/3,2/3,3/3			***1/3***		Operation = **ON**
		Reset delay time		0.00…60s			***0.02***	
		Measurement mode	RMS/DFT/P-to-P			***DFT***		
		Minimum operate time		0.020…60s			***0.5***	
		Start Value	0.05…5.00 xIn		***200.0***	***1.00***		
		Start value Mult	0.8…10.0		***200.0***	***1.00***		
		Operate delay time		0.040…200s				
		Operating curve type	IEC NI,VI,EI,DT			***IEC Inverse***		
		Time multiplier		0.05…15.00			***0.3***	
		Type of reset curve	Immediate/DT/INV			***Immediate***		
PHASE OVERCURRENT PROTECTION - PHHPTOC1								
50-1	PHHPTOC1	Num of start phases	1/3,2/3,3/3			***1/3***		Operation = **ON**
		Start Value	0.10…40.00 xIn		***530.0***	***2.65***		
		Start value Mult	0.8…10.0		***530.0***	***1.00***		
		Operate delay time		0.040…200s			***0.5***	
		Operating curve type	IEC NI,VI,EI,DT			***DT***		
		Time multiplier		0.05…15.00				
		Type of reset curve	Immediate/DT/INV			***Immediate***		
PHASE OVERCURRENT PROTECTION - PHIPTOC1								
50-2	PHIPTOC1	Num of start phases	1/3,2/3,3/3			***1/3***		Operation = **OFF**
		Reset delay time		0,00…60s			***0.02***	
		Start Value	1.00…40.00 xIn		***2520.0***	***12.60***		
		Start value Mult	0.8…10.0		***2520.0***	***1.00***		
		Operate delay time		0.020…200s			***0.35***	
EARTH-FAULT PROTECTION - EFLPTOC1								
51N	EFLPTOC1	Reset delay time		0.00…60s			***0.02***	Operation = **ON**
		Measurement mode	RMS/DFT/P-to-P			***DFT***		
		Start Value	0.010…10.000 xIn		***10.0***	***0.100***		**From Core Balance CT 6.6kV**
		Start value Mult	0.8…10.0		***10.0***	***1.00***		
		Operate delay time		0.040…300s			***0.1***	
		Operating curve type	IEC NI,VI,EI,DT			***DT***		
DIRECTIONAL EARTH-FAULT PROTECTION - EFHPTOC1								
51G	EFHPTOC1	Reset delay time		0.00…60s			***0.02***	Operation = **ON**
		Measurement mode	RMS/DFT/P-to-P			***DFT***		
		Minimum operate time		0.020…60s			***0.1***	
		Start Value	0.10…40.00 xIn		***500.0***	***0.20***		**From Satr Point CT 0.4kV**
		Start value Mult	0.8…10.0		***500.0***	***1.00***		
		Operate delay time		0.040…200s				
		Time multiplier		0.05…15.00			***0.18***	
		Operating curve type	IEC NI,VI,EI,DT			***IEC Normal Inverse***		
RESIDUAL OVERVOLTAGE PROTECTION - ROVPTOV1								
59N	ROVPTOV1	Reset delay time		0.00…60s			***0.02***	Operation = **ON**
		Uo signal Sel	Meas./Calc.			***Measured***		**Alarm**
		Start Value	0.010…1.00 xUn		***381.1***	***0.10***		
		Operate delay time		0.040…300s			***0.50***	
RESIDUAL OVERVOLTAGE PROTECTION - ROVPTOV2								
59N	ROVPTOV2	Reset delay time		0.00…60s			***0.02***	Operation = **ON**
		Uo signal Sel	Meas./Calc.			***Measured***		**Trip**
		Start Value	0.010…1.00 xUn		***381.1***	***0.10***		
		Operate delay time		0.040…300s			***1.50***	

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RELAY SETTING TABLE

SUBSTATION: BLPH **SWITCHBOARD:** SG-100D1 **VOLTAGE:** 6.60 kV

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **TR-200DE1**	Manufacturer: **ABB**	PHASE: **#A104**	Star P CT: **200 / 1**
An [MVA]: **1.6**	Type: **REX640**	page:	Star earth CT: **2500 / 1**
I1n [A]: **139.96**	Phase current [A]: **1**		Earth CT: **100 / 1**
I2n [A]: **2199.43**	Phase current [A]: **1**	EARTH: **#A104G**	Phase VT: **6.6k/110/110 /110**
V1n [kV]: **6.6**	Prim. Earth CT [A]: **1**	page:	**V3 V3 V3 3 3**
V2n [kV]: **0.42**	Prim. Phase CT [A]: **200**		
Zcc%: **6.00**	Prim. Phase CT [A]: **2500**		
	Prim. Earth CT [A]: **100**	Star EARTH: **#A64G**	
	Protect. functions: **50,51,50N,51N,59N 51G,27,59**	page:	

ANALOG INPUTS

CURRENT (3I,CT)	VALUE	VOLTAGE (3U,VT)	VALUE	CURRENT (Io,CT)	VALUE
Primary Current	200.0	Primary Voltage	6600.0	Primary Current	100.0
Secondary Current	1.0	Secondary Voltage	110.0	Secondary Current	1.0
Amplitude corr. A/B/C	1.0	VT Connection	Wye	Amplitude corr	1.0
Angle corr. A/B/C	0.0	Amplitude corr. A/B/C	1.0	Angle correction	0.0
Reverse polarity	False	Voltage input type	Volt. Trafo	Reverse polarity	False
		Angle corr. A/B/C	0.0		
VOLTAGE (Uo,VT)	**VALUE**	**CURRENT (IoB,CT)**	**VALUE**		
Primary Voltage	6600.0	Primary Current	2500.0		
Secondary Voltage	110.0	Secondary Current	1.0		
Amplitude corr	1.0	Amplitude corr	1.0		
Angle correction	0.0	Angle correction	0.0		
		Reverse polarity	False		

GENERAL SYSTEM SETTINGS

SYSTEM - CONTROL	VALUE
Rated frequency	50.0
Phase rotation	ABC
Blocking mode	Freeze
IDMT Sat point	50

PROTECTION FUNCTIONS

ANSI CODE	IEC61850 ID.	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME [s]	SETTING PRIMARY VALUE	SETTING I/U [pu/A/V]	SETTING TIME	NOTES
PHASE UNDERVOLTAGE PROTECTION - PHPTUV1								
27-1	PHPTUV1	Num of start phases	1/3,2/3,3/3			***1/3***		Operation = **ON**
		Minimum operate time		0.06…60s			***0.06***	
		Reset delay time		0.00…60s			***0.02***	
		Voltage block value	0.05…1.00 xUn		***660.0 V***	***0.10***		
		Enable block value	True / False			***False***		
		Voltage selection	Ph-Ph, Ph-Earth			***Ph-Ph***		
		Relative hysteresis	1.0…5.0%			***4.00***		
		Start value	0.05…1.20 xUn		***5280.0 V***	***0.80***		
		Operate delay time		0.060…300s			***2***	
		Operating curve type	IEC DT,Inv A,Inv B			***IEC DT***		
		Type of reset curve	Immediate/DT/INV			***Immediate***		
PHASE OVERVOLTAGE PROTECTION - PHPTOV1								
59-1	PHPTOV1	Num of start phases	1/3,2/3,3/3			***1/3***		Operation = **ON**
		Min operate time		0.06…60s			***0.06***	
		Reset delay time		0.00…60s			***0.02***	
		Voltage selection	Ph-Ph, Ph-Earth			***Ph-to-Ph***		
		Relative hysteresis	1.0…5.0%			***4.00***		
		Start value	0.05…1.20xUn		***7920.0***	***1.20***		**Only Alarm**
		Time multiplier	0.05…15.00					
		Operating delay time		0.06…300s			***0.5***	
		Operate curve type	IEC DT,Inv A,Inv B			***DT***		
PHASE OVERCURRENT PROTECTION - PHLPTOC2								
51	PHLPTOC2	Num of start phases	1/3,2/3,3/3			***1/3***		Operation = **ON**
		Reset delay time		0.00…60s			***0.02***	
		Measurement mode	RMS/DFT/P-to-P			***DFT***		
		Minimum operate time		0.020…60s			***0.5***	
		Start Value	0.05…5.00 xIn		***104.0***	***0.52***		**Activated ONLY in Island condition**
		Start value Mult	0.8…10.0		***104.0***	***1.00***		**Signal Received thorugh IEC61850**
		Operate delay time		0.040…200s			***0.5***	
		Operating curve type	IEC NI,VI,EI,DT			***DT***		
		Time multiplier		0.05…15.00				
		Type of reset curve	Immediate/DT/INV			***Immediate***		
PHASE OVERCURRENT PROTECTION - PHHPTOC2								
50	PHHPTOC2	Num of start phases	1/3,2/3,3/3			***1/3***		Operation = **ON**
		Start Value	0.10…40.00 xIn		***420.0***	***2.10***		**Activated ONLY in Island condition**
		Start value Mult	0.8…10.0		***420.0***	***1.00***		**Signal Received thorugh IEC61850**
		Operate delay time		0.040…200s			***0.05***	
		Operating curve type	IEC NI,VI,EI,DT			***DT***		
		Time multiplier		0.05…15.00				
		Type of reset curve	Immediate/DT/INV			***Immediate***		

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RELAY SETTING TABLE

SUBSTATION: BLPH **SWITCHBOARD:** SG-100D1 **VOLTAGE:** 6.60 kV

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **TR-200DE1** An [MVA]: **1.6** I1n [A]: **139.96** I2n [A]: **2199.43** V1n [kV]: **6.6** V2n [kV]: **0.42** Zcc%: **6.00**	Manufacturer **ABB** Fuse Type **CMF** Fuse Nominal Current: **250.00 A** Protection Functions **I**	ID. CODE : **#A104F** page: **C04,C07,C12**	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	SETTING RANGE DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME [s]	SETTING PRIMARY VALUE	SETTING I/U [pu/A/V]	SETTING TIME	NOTES
I	I	I PICK-UP	250 A		***250.0***	***250.00***		
		DELAY		FIXED			***FIXED***	

RELAY SETTING TABLE

SUBSTATION: BLPH **SWITCHBOARD:** SG-100D1 **VOLTAGE:** 6.60 kV

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Incoming from: **A-85000**	Manufacturer: **ABB**	PHASE: **#A101**	Phase CT: **150 / 1**
An [MVA]: **1.25**	Type: **REX640**	page:	**/**
I1n [A]: **103.10**	Phase current [A]: **1**		Earth CT: **100 / 1**
I2n [A]: **1164.01**	Phase current [A]:	EARTH: **#A101G**	Phase VT: **6.6k/110/110 /110**
V1n [kV]: **7**	Prim. Earth CT [A]: **1**	page:	**V3 V3 V3 3 3**
V2n [kV]: **0.62**	Prim. Phase CT [A]: **150**		
Zcc%: **6.00**	Prim. Phase CT [A]:		
	Prim. Earth CT [A]: **100**		
	Protect. functions: **50,51,50N,51N,59N,67,67N 25,27,59**		

ANALOG INPUTS

CURRENT (3I,CT)	VALUE	VOLTAGE (3U,VT)	VALUE	CURRENT (Io,CT)	VALUE
Primary Current	150.0	Primary Voltage	6600.0	Primary Current	100.0
Secondary Current	1.0	Secondary Voltage	110.0	Secondary Current	1.0
Amplitude corr. A/B/C	1.0	VT Connection	Wye	Amplitude corr	1.0
Angle corr. A/B/C	0.0	Amplitude corr. A/B/C	1.0	Angle correction	0.0
Reverse polarity	False	Voltage input type	Volt. Trafo	Reverse polarity	False
		Angle corr. A/B/C	0.0		

VOLTAGE (Uo,VT)	VALUE
Primary Voltage	3810.6
Secondary Voltage	110.0
Amplitude corr	1.0
Angle correction	0.0

GENERAL SYSTEM SETTINGS

SYSTEM - CONTROL	VALUE
Rated frequency	50.0
Phase rotation	ABC
Blocking mode	Freeze
IDMT Sat point	50

PROTECTION FUNCTIONS

ANSI CODE	IEC61850 ID.	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME [s]	SETTING PRIMARY VALUE	SETTING I/U [pu/A/V]	SETTING TIME	NOTES
PHASE OVERCURRENT PROTECTION - PHLPTOC1								
51-1	PHLPTOC1	Num of start phases	1/3,2/3,3/3			***1/3***		Operation = **ON**
		Reset delay time		0.00…60s			***0.02***	
		Measurement mode	RMS/DFT/P-to-P			***DFT***		
		Minimum operate time		0.020…60s			***0.3***	
		Start Value	0.05…5.00 xIn		***105.0***	***0.70***		
		Start value Mult	0.8…10.0		***105.0***	***1.00***		
		Operate delay time		0.040…200s				
		Operating curve type	IEC NI,VI,EI,DT			***IEC Inverse***		
		Time multiplier		0.05…15.00			***0.15***	
		Type of reset curve	Immediate/DT/INV			***Immediate***		
PHASE OVERCURRENT PROTECTION - PHIPTOC1								
50-1	PHIPTOC1	Num of start phases	1/3,2/3,3/3			***1/3***		Operation = **ON**
		Reset delay time		0.00…60s			***0.02***	
		Start Value	1.00…40.00 xIn		***450.0***	***3.00***		
		Start value Mult	0.8…10.0		***450.0***	***1.00***		
		Operate delay time		0.020…300s			***0.25***	
EARTH-FAULT PROTECTION - EFLPTOC1								
51N	EFLPTOC1	Reset delay time		0.00…60s			***0.02***	Operation = **ON**
		Measurement mode	RMS/DFT/P-to-P			***DFT***		
		Start Value	0.010…10.000 xIn		***10.0***	***0.100***		
		Start value Mult	0.8…10.0		***10.0***	***1.00***		
		Operate delay time		0.040…300s			***0.1***	
		Operating curve type	IEC NI,VI,EI,DT			***DT***		
SYNCROCHECK PROTECTION - SECRSYN								
25	SECRSYN	Syncro check mode	Synch/Asynch/OFF			***Asynchounous***		Operation = **ON**
		Control mode	Continuous/Command			***Continuous***		
		Dead line value	0.1…0.8xUn		***660.0***	***0.10***		
		Live line value	0.2…1.0xUn		***5715.6***	***0.50***		
		Dead bus value	0.1…0.8xUn		***660.0***	***0.10***		
		Live bus value	0.2…1.0xUn		***5715.6***	***0.50***		
		Max energizing V	0.50…1.5xUn		***7316.0***	***0.64***		
		Phase Shift	-180…+180 DEG			***0.00***		
		Minimum Syn time		0.0…60s			***10.00***	
		Energizing time		0.0…60s			***0.10***	
		Closing time CB		0.040…0.250s			***0.05***	
		Live dead mode				***No Both Live***		
		Difference Voltage	0.01…0.5xUn		***330.0***	***0.05***		
		Difference phase angle	5…90 DEG			***5.00***		
		Difference frequency	0.001…0.10 Hz		***0.5***	***0.01***		
RESIDUAL OVERVOLTAGE PROTECTION - ROVPTOV1								
59N	ROVPTOV1	Reset delay time		0.00…60s			***0.02***	Operation = **ON**
		Uo signal Sel	Meas./Calc.			***Measured***		**Alarm**
		Start Value	0.010…1.00 xUn		***11.0***	***0.10***		
		Operate delay time		0.040…300s			***0.50***	
RESIDUAL OVERVOLTAGE PROTECTION - ROVPTOV2								
59N	ROVPTOV2	Reset delay time		0.00…60s			***0.02***	Operation = **ON**
		Uo signal Sel	Meas./Calc.			***Measured***		**Trip**
		Start Value	0.010…1.00 xUn		***11.0***	***0.10***		
		Operate delay time		0.040…300s			***1.50***	

RELAY SETTING TABLE

SUBSTATION: BLPH **SWITCHBOARD:** SG-100D1 **VOLTAGE:** 6.60 kV

USER		RELAY DESCRIPTION		RELAY IDENTIFICATION		ANALOG INPUT	
Incoming from:	**A-85000**	Manufacturer:	**ABB**	PHASE:	**#A101**	Star P CT:	**150 / 1**
An [MVA]:	**1.25**	Type:	**REX640**	page:		Line P CT:	/
I1n [A]:	**103.10**	Phase current [A]:	**1**			Earth CT:	**100 / 1**
I2n [A]:	**1164.01**	Phase current [A]:		EARTH:	**#A101G**	Phase VT:	**6.6k/110/110 /110**
V1n [kV]:	**7**	Prim. Earth CT [A]:	**1**	page:			**V3 V3 V3 3 3**
V2n [kV]:	**0.62**	Prim. Phase CT [A]:	**150**				
Zcc%:	**6.00**	Prim. Phase CT [A]:					
		Prim. Earth CT [A]:	**100**				
		Protect. functions:	**50,51,50N,51N,59N,67,67N 25**				

ANALOG INPUTS

CURRENT (3I,CT)	VALUE	VOLTAGE (3U,VT)	VALUE	CURRENT (Io,CT)	VALUE	GENERAL SYSTEM SETTINGS	
						SYSTEM - CONTROL	VALUE
Primary Current	150.0	Primary Voltage	6600.0	Primary Current	100.0	Rated frequency	50.0
Secondary Current	1.0	Secondary Voltage	110.0	Secondary Current	1.0	Phase rotation	ABC
Amplitude corr. A/B/C	1.0	VT Connection	Wye	Amplitude corr	1.0	Blocking mode	Freeze
Angle corr. A/B/C	0.0	Amplitude corr. A/B/C	1.0	Angle correction	0.0	IDMT Sat point	50
Reverse polarity	False	Voltage input type	Volt. Trafo	Reverse polarity	False		
		Angle corr. A/B/C	0.0				

VOLTAGE (Uo,VT)	VALUE
Primary Voltage	3810.6
Secondary Voltage	110.0
Amplitude corr	1.0
Angle correction	0.0

PROTECTION FUNCTIONS

			SETTING RANGE		SETTING			NOTES
ANSI CODE	IEC61850 ID.	DESCRIPTION	I/U [A/V]	TIME [s]	PRIMARY VALUE	I/U [pu/A/V]	TIME	
PHASE OVERCURRENT PROTECTION - DPHLPDOC1								
67-1	DPHLPDOC1	Reset delay time		0.00…60s			***0.02***	Operation = **ON**
		Num of start phases	1/3,2/3,3/3				***1/3***	
		Minimum operate time		0.020…60s			***0.02***	
		Allow Non Dir	False/True				***False***	
		Measurement mode	RMS/DFT/P-to-P				***DFT***	
		Min operate current	0.005- 1.00 x In				***0.01***	
		Min operate voltage	0.01 - 1.00 x Un				***0.01***	
		Start Value	0.05…5.00 xIn		***120.0***	***0.80***		**Activated ONLY in Island condition**
		Start value Mult	0.8…10.0		***120.0***	***1.00***		**Signal Received thorugh IEC61850**
		Operate delay time		0.040…300s			***0.9***	
		Operating curve type	IEC NI,VI,EI,DT				***DT***	
		Time multiplier		0.05…15.00				
		Type of reset curve	Immediate/DT/INV			***Immediate***		
		Directional Mode	Fwr, Rev, Non-Dir				***Rev***	**Busbar Direction**
		Characteristic angle	-179 - +180 deg				***60.00***	
		Max forward angle	0 - 90 deg				***80.00***	
		Max reverse angle	0 - 90 deg				***80.00***	
		Min forward angle	0 - 90 deg				***80.00***	
		Min reverse angle	0 - 90 deg				***80.00***	
		Pol quantity	Cross Pol…				***Cross Pol***	
PHASE OVERCURRENT PROTECTION - DPHLPDOC2								
67-2	DPHLPDOC2	Reset delay time		0.00…60s			***0.02***	Operation = **ON**
		Num of start phases	1/3,2/3,3/3				***1/3***	
		Minimum operate time		0.020…60s			***0.02***	
		Allow Non Dir	False/True				***False***	
		Measurement mode	RMS/DFT/P-to-P				***DFT***	
		Min operate current	0.005- 1.00 x In				***0.01***	
		Min operate voltage	0.01 - 1.00 x Un				***0.01***	
		Start Value	0.05…5.00 xIn		***120.0***	***0.80***		**Activated ONLY in Island condition**
		Start value Mult	0.8…10.0		***120.0***	***1.00***		**Signal Received thorugh IEC61850**
		Operate delay time		0.040…300s			***0.1***	
		Operating curve type	IEC NI,VI,EI,DT				***DT***	
		Time multiplier		0.05…15.00				
		Type of reset curve	Immediate/DT/INV			***Immediate***		
		Directional Mode	Fwr, Rev, Non-Dir				***Fwd***	**Line Direction**
		Characteristic angle	-179 - +180 deg				***60.00***	
		Max forward angle	0 - 90 deg				***80.00***	
		Max reverse angle	0 - 90 deg				***80.00***	
		Min forward angle	0 - 90 deg				***80.00***	
		Min reverse angle	0 - 90 deg				***80.00***	
		Pol quantity	Cross Pol…				***Cross Pol***	

RELAY SETTING TABLE

SUBSTATION: BLPH | **SWITCHBOARD:** SG-100D1 | **VOLTAGE:** 6.60 kV

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Incoming from: **A-85000**	Manufacturer: **ABB**	PHASE: **#A101**	Star P CT: **150 / 1**
An [MVA]: **1.25**	Type: **REX640**	page:	Line P CT: /
I1n [A]: **103.10**	Phase current [A]: **1**		Earth CT: **100 / 1**
I2n [A]: **1164.01**	Phase current [A]:	EARTH: **#A101G**	Phase VT: **6.6k/110/110 /110**
V1n [kV]: **7**	Prim. Earth CT [A]: **1**	page:	**V3 V3 V3 3 3**
V2n [kV]: **0.62**	Prim. Phase CT [A]: **150**		
Zcc%: **6.00**	Prim. Phase CT [A]:		
	Prim. Earth CT [A]: **100**		
	Protect. functions: **50,51,50N,51N,59N,67,67N 25,27,59**		

ANALOG INPUTS

CURRENT (3I,CT)	VALUE	VOLTAGE (3U,VT)	VALUE	CURRENT (Io,CT)	VALUE
Primary Current	150.0	Primary Voltage	6600.0	Primary Current	100.0
Secondary Current	1.0	Secondary Voltage	110.0	Secondary Current	1.0
Amplitude corr. A/B/C	1.0	VT Connection	Wye	Amplitude corr	1.0
Angle corr. A/B/C	0.0	Amplitude corr. A/B/C	1.0	Angle correction	0.0
Reverse polarity	False	Voltage input type	Volt. Trafo	Reverse polarity	False
		Angle corr. A/B/C	0.0		

VOLTAGE (Uo,VT)	VALUE
Primary Voltage	3810.6
Secondary Voltage	110.0
Amplitude corr	1.0
Angle correction	0.0

GENERAL SYSTEM SETTINGS

SYSTEM - CONTROL	VALUE
Rated frequency	50.0
Phase rotation	ABC
Blocking mode	Freeze
IDMT Sat point	50

PROTECTION FUNCTIONS

ANSI CODE	IEC61850 ID.	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME [s]	SETTING PRIMARY VALUE	SETTING I/U [pu/A/V]	SETTING TIME	NOTES
PHASE UNDERVOLTAGE PROTECTION - PHPTUV1								
27-1	PHPTUV1	Num of start phases	1/3,2/3,3/3			1/3		Operation = ON
		Minimum operate time		0.06…60s			0.06	
		Reset delay time		0.00…60s			0.02	
		Voltage block value	0.05…1.00 xUn		1320.0 V	0.20		
		Enable block value	True / False			True		
		Voltage selection	Ph-Ph, Ph-Earth			Ph-Ph		
		Relative hysteresis	1.0…5.0%			4.00		
		Start value	0.05…1.20 xUn		5280.0 V	0.80		
		Operate delay time		0.060…300s			2	
		Operating curve type	IEC DT,Inv A,Inv B			IEC DT		
		Type of reset curve	Immediate/DT/INV			Immediate		
PHASE UNDERVOLTAGE PROTECTION - PHPTUV2								
27-2	PHPTUV2	Num of start phases	1/3,2/3,3/3			1/3		Operation = ON
		Minimum operate time		0.06…60s			0.06	
		Reset delay time		0.00…60s			0.02	
		Voltage block value	0.05…1.00 xUn		1320.0 V	0.20		
		Enable block value	True / False			True		
		Voltage selection	Ph-Ph, Ph-Earth			Ph-Ph		
		Relative hysteresis	1.0…5.0%			4.00		
		Start value	0.05…1.20 xUn		3300.0 V	0.50		
		Operate delay time		0.060…300s			0.2	
		Operating curve type	IEC DT,Inv A,Inv B			IEC DT		
		Type of reset curve	Immediate/DT/INV			Immediate		
PHASE OVERVOLTAGE PROTECTION - PHPTOV1								
59-1	PHPTOV1	Num of start phases	1/3,2/3,3/3			1/3		Operation = ON
		Min operate time		0.06…60s			0.06	
		Reset delay time		0.00…60s			0.02	
		Voltage selection	Ph-Ph, Ph-Earth			Ph-to-Ph		
		Relative hysteresis	1.0…5.0%			4.00		
		Start value	0.05…1.20xUn		7920.0	1.20		Only Alarm
		Time multiplier	0.05…15.00					
		Operating delay time		0.06…300s			0.5	
		Operate curve type	IEC DT,Inv A,Inv B			DT		
PHASE OVERVOLTAGE PROTECTION - PHPTOV2								
59-2	PHPTOV2	Num of start phases	1/3,2/3,3/3			1/3		Operation = ON
		Min operate time		0.06…60s			0.06	
		Reset delay time		0.00…60s			0.02	
		Voltage selection	Ph-Ph, Ph-Earth			Ph-to-Ph		
		Relative hysteresis	1.0…5.0%			4.00		
		Start value	0.05…1.20xUn		8580.0	1.30		
		Time multiplier	0.05…15.00					
		Operating delay time		0.06…300s			0.1	
		Operate curve type	IEC DT,Inv A,Inv B			DT		

RELAY SETTING TABLE

SUBSTATION: BLPH **SWITCHBOARD:** SG-100D1 **VOLTAGE:** 6.60 kV

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Incoming from: **A-85000**	Manufacturer **ABB** Fuse Type **CEF** Fuse Nominal Current: **160.00 A** Protection Functions **I**	ID. CODE : **#A101F** page: **C06,C12** ID. CODE : page:	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	SETTING RANGE DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME [s]	SETTING PRIMARY VALUE	SETTING I/U [pu/A/V]	SETTING TIME	NOTES
I	I	I PICK-UP	160 A		***160.0***	***160.00***		
		DELAY		FIXED			***FIXED***	

RELAY SETTING TABLE

SUBSTATION: BLPH | **SWITCHBOARD:** SG-100D1 | **VOLTAGE:** 6.60 kV

USER		RELAY DESCRIPTION		RELAY IDENTIFICATION		ANALOG INPUT	
Incoming from:	**A-80000**	Manufacturer:	**ABB**	PHASE:	**#A103**	Star P CT:	**150 / 1**
An [MVA]:	**1.25**	Type:	**REX640**	page:		Line P CT:	/
I1n [A]:	**109.35**	Phase current [A]:	**1**			Earth CT:	**100 / 1**
I2n [A]:	**1804.22**	Phase current [A]:		EARTH:	**#A103G**	Phase VT:	**6.6k/110/110 /110**
V1n [kV]:	**6.6**	Prim. Earth CT [A]:	**1**	page:			**V3 V3 V3 3 3**
V2n [kV]:	**0.4**	Prim. Phase CT [A]:	**150**				
Zcc%:	**6.00**	Prim. Phase CT [A]:					
		Prim. Earth CT [A]:	**100**				
		Protect. functions:	**50,51,50N,51N,59N,67,67N 25,27,59**				

ANALOG INPUTS

CURRENT (3I,CT)	VALUE	VOLTAGE (3U,VT)	VALUE	CURRENT (Io,CT)	VALUE
Primary Current	150.0	Primary Voltage	6600.0	Primary Current	100.0
Secondary Current	1.0	Secondary Voltage	110.0	Secondary Current	1.0
Amplitude corr. A/B/C	1.0	VT Connection	Wye	Amplitude corr	1.0
Angle corr. A/B/C	0.0	Amplitude corr. A/B/C	1.0	Angle correction	0.0
Reverse polarity	False	Voltage input type	Volt. Trafo	Reverse polarity	False
		Angle corr. A/B/C	0.0		

VOLTAGE (Uo,VT)	VALUE
Primary Voltage	3810.6
Secondary Voltage	110.0
Amplitude corr	1.0
Angle correction	0.0

GENERAL SYSTEM SETTINGS

SYSTEM - CONTROL	VALUE
Rated frequency	50.0
Phase rotation	ABC
Blocking mode	Freeze
IDMT Sat point	50

PROTECTION FUNCTIONS

ANSI CODE	IEC61850 ID.	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME [s]	SETTING PRIMARY VALUE	SETTING I/U [pu/A/V]	SETTING TIME	NOTES
PHASE OVERCURRENT PROTECTION - PHLPTOC1								
51-1	PHLPTOC1	Num of start phases	1/3,2/3,3/3			***1/3***		Operation = **ON**
		Reset delay time		0.00…60s			***0.02***	
		Measurement mode	RMS/DFT/P-to-P			***DFT***		
		Minimum operate time		0.020…60s			***0.3***	
		Start Value	0.05…5.00 xIn		***105.0***	***0.70***		
		Start value Mult	0.8…10.0		***105.0***	***1.00***		
		Operate delay time		0.040…200s				
		Operating curve type	IEC NI,VI,EI,DT			***IEC Inverse***		
		Time multiplier		0.05…15.00			***0.15***	
		Type of reset curve	Immediate/DT/INV			***Immediate***		
PHASE OVERCURRENT PROTECTION - PHIPTOC1								
50-1	PHIPTOC1	Num of start phases	1/3,2/3,3/3			***1/3***		Operation = **ON**
		Reset delay time		0.00…60s			***0.02***	
		Start Value	1.00…40.00 xIn		***450.0***	***3.00***		
		Start value Mult	0.8…10.0		***450.0***	***1.00***		
		Operate delay time		0.020…300s			***0.25***	
EARTH-FAULT PROTECTION - EFLPTOC1								
51N	EFLPTOC1	Reset delay time		0.00…60s			***0.02***	Operation = **ON**
		Measurement mode	RMS/DFT/P-to-P			***DFT***		
		Start Value	0.010…10.000 xIn		***0.1***	***0.100***		
		Start value Mult	0.8…10.0		***0.1***	***1.00***		
		Operate delay time		0.040…300s			***0.1***	
		Operating curve type	IEC NI,VI,EI,DT			***DT***		
PHASE OVERCURRENT PROTECTION - DPHLPDOC1								
67-1	DPHLPDOC1	Reset delay time		0.00…60s			***0.02***	Operation = **ON**
		Num of start phases	1/3,2/3,3/3			***1/3***		
		Minimum operate time		0.020…60s			***0.02***	
		Allow Non Dir	False/True			***False***		
		Measurement mode	RMS/DFT/P-to-P			***DFT***		
		Min operate current	0.005- 1.00 x In			***0.01***		
		Min operate voltage	0.01 - 1.00 x Un			***0.01***		
		Start Value	0.05…5.00 xIn		***120.0***	***0.80***		**Activated ONLY in Island condition**
		Start value Mult	0.8…10.0		***120.0***	***1.00***		**Signal Received thorugh IEC61850**
		Operate delay time		0.040…300s			***0.7***	
		Operating curve type	IEC NI,VI,EI,DT			***DT***		
		Time multiplier		0.05…15.00				
		Type of reset curve	Immediate/DT/INV			***Immediate***		
		Directional Mode	Fwr, Rev, Non-Dir			***Rev***		**Busbar Direction**
		Characteristic angle	-179 - +180 deg			***60.00***		
		Max forward angle	0 - 90 deg			***80.00***		
		Max reverse angle	0 - 90 deg			***80.00***		
		Min forward angle	0 - 90 deg			***80.00***		
		Min reverse angle	0 - 90 deg			***80.00***		
		Pol quantity	Cross Pol…			***Cross Pol***		

RELAY SETTING TABLE

SUBSTATION: BLPH | **SWITCHBOARD:** SG-100D1 | **VOLTAGE:** 6.60 kV

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Incoming from: **A-80000**	Manufacturer: **ABB**	PHASE: **#A103**	Star P CT: **150 / 1**
An [MVA]: **1.25**	Type: **REX640**	page:	Line P CT: /
I1n [A]: **109.35**	Phase current [A]: **1**		Earth CT: **100 / 1**
I2n [A]: **1804.22**	Phase current [A]:	EARTH: **#A103G**	Phase VT: **6.6k/110/110 /110**
V1n [kV]: **6.6**	Prim. Earth CT [A]: **1**	page:	**V3 V3 V3 3 3**
V2n [kV]: **0.4**	Prim. Phase CT [A]: **150**		
Zcc%: **6.00**	Prim. Phase CT [A]:		
	Prim. Earth CT [A]: **100**		
	Protect. functions: **50,51,50N,51N,59N,67,67N 25,27,59**		

ANALOG INPUTS

CURRENT (3I,CT)	VALUE	VOLTAGE (3U,VT)	VALUE	CURRENT (Io,CT)	VALUE
Primary Current	150.0	Primary Voltage	6600.0	Primary Current	100.0
Secondary Current	1.0	Secondary Voltage	110.0	Secondary Current	1.0
Amplitude corr. A/B/C	1.0	VT Connection	Wye	Amplitude corr	1.0
Angle corr. A/B/C	0.0	Amplitude corr. A/B/C	1.0	Angle correction	0.0
Reverse polarity	False	Voltage input type	Volt. Trafo	Reverse polarity	False
		Angle corr. A/B/C	0.0		

VOLTAGE (Uo,VT)	VALUE
Primary Voltage	3810.6
Secondary Voltage	110.0
Amplitude corr	1.0
Angle correction	0.0

GENERAL SYSTEM SETTINGS

SYSTEM - CONTROL	VALUE
Rated frequency	50.0
Phase rotation	ABC
Blocking mode	Freeze
IDMT Sat point	50

PROTECTION FUNCTIONS

ANSI CODE	IEC61850 ID.	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME [s]	SETTING PRIMARY VALUE	SETTING I/U [pu/A/V]	SETTING TIME	NOTES
PHASE OVERCURRENT PROTECTION - DPHLPDOC2								
67-2	DPHLPDOC2	Reset delay time		0.00…60s			***0.02***	Operation = **ON**
		Num of start phases	1/3,2/3,3/3			***1/3***		
		Minimum operate time		0.020…60s			***0.02***	
		Allow Non Dir	False/True			***False***		
		Measurement mode	RMS/DFT/P-to-P			***DFT***		
		Min operate current	0.005- 1.00 x In			***0.01***		
		Min operate voltage	0.01 - 1.00 x Un			***0.01***		
		Start Value	0.05…5.00 xIn		***120.0***	***0.80***		**Activated ONLY in Island condition**
		Start value Mult	0.8…10.0		***120.0***	***1.00***		**Signal Received thorugh IEC61850**
		Operate delay time		0.040…300s			***0.1***	
		Operating curve type	IEC NI,VI,EI,DT			***DT***		
		Time multiplier		0.05…15.00				
		Type of reset curve	Immediate/DT/INV			***Immediate***		
		Directional Mode	Fwr, Rev, Non-Dir			***Fwd***		**Line Direction**
		Characteristic angle	-179 - +180 deg			***60.00***		
		Max forward angle	0 - 90 deg			***80.00***		
		Max reverse angle	0 - 90 deg			***80.00***		
		Min forward angle	0 - 90 deg			***80.00***		
		Min reverse angle	0 - 90 deg			***80.00***		
		Pol quantity	Cross Pol…			***Cross Pol***		
SYNCROCHECK PROTECTION - SECRSYN								
25	SECRSYN	Syncro check mode	Synch/Asynch/OFF			***Asynchounous***		Operation = **ON**
		Control mode	Continuous/Command			***Continuous***		
		Dead line value	0.1…0.8xUn		***660.0***	***0.10***		
		Live line value	0.2…1.0xUn		***5715.6***	***0.50***		
		Dead bus value	0.1…0.8xUn		***660.0***	***0.10***		
		Live bus value	0.2…1.0xUn		***5715.6***	***0.50***		
		Max energizing V	0.50…1.5xUn		***7316.0***	***0.64***		
		Phase Shift	-180…+180 DEG			***0.00***		
		Minimum Syn time		0.0…60s			***10.00***	
		Energizing time		0.0…60s			***0.10***	
		Closing time CB		0.040…0.250s			***0.05***	
		Live dead mode				***No Both Live***		
		Difference Voltage	0.01…0.5xUn		***330.0***	***0.05***		
		Difference phase angle	5…90 DEG			***5.00***		
		Difference frequency	0.001…0.10 Hz		***0.5***	***0.01***		
RESIDUAL OVERVOLTAGE PROTECTION - ROVPTOV1								
59N	ROVPTOV1	Reset delay time		0.00…60s			***0.02***	Operation = **ON**
		Uo signal Sel	Meas./Calc.			***Measured***		**Alarm**
		Start Value	0.010…1.00 xUn		***381.1***	***0.10***		
		Operate delay time		0.040…300s			***0.50***	
RESIDUAL OVERVOLTAGE PROTECTION - ROVPTOV2								
59N	ROVPTOV2	Reset delay time		0.00…60s			***0.02***	Operation = **ON**
		Uo signal Sel	Meas./Calc.			***Measured***		**Trip**
		Start Value	0.010…1.00 xUn		***381.1***	***0.10***		
		Operate delay time		0.040…300s			***1.00***	

RELAY SETTING TABLE

SUBSTATION: BLPH **SWITCHBOARD:** SG-100D1 **VOLTAGE:** 6.60 kV

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Incoming from: **A-80000**	Manufacturer: **ABB**	PHASE: **#A103**	Star P CT: **150** / **1**
An [MVA]: **1.25**	Type: **REX640**	page:	Line P CT: /
I1n [A]: **109.35**	Phase current [A]: **1**		Earth CT: **100** / **1**
I2n [A]: **1804.22**	Phase current [A]:	EARTH: **#A103G**	Phase VT: **6.6k/110/110** **/110**
V1n [kV]: **6.6**	Prim. Earth CT [A]: **1**	page:	**V3 V3 V3 3 3**
V2n [kV]: **0.4**	Prim. Phase CT [A]: **150**		
Zcc%: **6.00**	Prim. Phase CT [A]:		
	Prim. Earth CT [A]: **100**		
	Protect. functions: **50,51,50N,51N,59N,67,67N 25,27,59**		

ANALOG INPUTS

CURRENT (3I,CT)	VALUE	VOLTAGE (3U,VT)	VALUE	CURRENT (Io,CT)	VALUE
Primary Current	150.0	Primary Voltage	6600.0	Primary Current	100.0
Secondary Current	1.0	Secondary Voltage	110.0	Secondary Current	1.0
Amplitude corr. A/B/C	1.0	VT Connection	Wye	Amplitude corr	1.0
Angle corr. A/B/C	0.0	Amplitude corr. A/B/C	1.0	Angle correction	0.0
Reverse polarity	False	Voltage input type	Volt. Trafo	Reverse polarity	False
		Angle corr. A/B/C	0.0		

VOLTAGE (Uo,VT)	VALUE
Primary Voltage	3810.6
Secondary Voltage	110.0
Amplitude corr	1.0
Angle correction	0.0

GENERAL SYSTEM SETTINGS

SYSTEM - CONTROL	VALUE
Rated frequency	50.0
Phase rotation	ABC
Blocking mode	Freeze
IDMT Sat point	50

PROTECTION FUNCTIONS

ANSI CODE	IEC61850 ID.	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME [s]	SETTING PRIMARY VALUE	SETTING I/U [pu/A/V]	SETTING TIME	NOTES
PHASE UNDERVOLTAGE PROTECTION - PHPTUV1								
27-1	PHPTUV1	Num of start phases	1/3,2/3,3/3			1/3		Operation = ON
		Minimum operate time		0.06…60s			0.06	
		Reset delay time		0.00…60s			0.02	
		Voltage block value	0.05…1.00 xUn		1320.0 V	0.20		
		Enable block value	True / False			True		
		Voltage selection	Ph-Ph, Ph-Earth			Ph-Ph		
		Relative hysteresis	1.0…5.0%			4.00		
		Start value	0.05…1.20 xUn		5280.0 V	0.80		
		Operate delay time		0.060…300s			2	
		Operating curve type	IEC DT,Inv A,Inv B			IEC DT		
		Type of reset curve	Immediate/DT/INV			Immediate		
PHASE UNDERVOLTAGE PROTECTION - PHPTUV2								
27-2	PHPTUV2	Num of start phases	1/3,2/3,3/3			1/3		Operation = ON
		Minimum operate time		0.06…60s			0.06	
		Reset delay time		0.00…60s			0.02	
		Voltage block value	0.05…1.00 xUn		1320.0 V	0.20		
		Enable block value	True / False			True		
		Voltage selection	Ph-Ph, Ph-Earth			Ph-Ph		
		Relative hysteresis	1.0…5.0%			4.00		
		Start value	0.05…1.20 xUn		3300.0 V	0.50		
		Operate delay time		0.060…300s			0.2	
		Operating curve type	IEC DT,Inv A,Inv B			IEC DT		
		Type of reset curve	Immediate/DT/INV			Immediate		
PHASE OVERVOLTAGE PROTECTION - PHPTOV1								
59-1	PHPTOV1	Num of start phases	1/3,2/3,3/3			1/3		Operation = ON
		Min operate time		0.06…60s			0.06	
		Reset delay time		0.00…60s			0.02	
		Voltage selection	Ph-Ph, Ph-Earth			Ph-to-Ph		
		Relative hysteresis	1.0…5.0%			4.00		
		Start value	0.05…1.20xUn		7920.0	1.20		Only Alarm
		Time multiplier	0.05…15.00					
		Operating delay time		0.06…300s			0.5	
		Operate curve type	IEC DT,Inv A,Inv B			DT		
PHASE OVERVOLTAGE PROTECTION - PHPTOV2								
59-2	PHPTOV2	Num of start phases	1/3,2/3,3/3			1/3		Operation = ON
		Min operate time		0.06…60s			0.06	
		Reset delay time		0.00…60s			0.02	
		Voltage selection	Ph-Ph, Ph-Earth			Ph-to-Ph		
		Relative hysteresis	1.0…5.0%			4.00		
		Start value	0.05…1.20xUn		8580.0	1.30		
		Time multiplier	0.05…15.00					
		Operating delay time		0.06…300s			0.1	
		Operate curve type	IEC DT,Inv A,Inv B			DT		

RELAY SETTING TABLE

SUBSTATION: BLPH **SWITCHBOARD:** SG-100D1 **VOLTAGE:** 6.60 kV

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Incoming from: **A-80000**	Manufacturer **ABB** Fuse Type **CEF** Fuse Nominal Current: **160.00 A** Protection Functions **I**	ID. CODE : **#A103F** page: **C06,C12** ID. CODE : page:	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	SETTING RANGE DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME [s]	SETTING PRIMARY VALUE	SETTING I/U [pu/A/V]	SETTING TIME	NOTES
I	I	I PICK-UP	160 A		***160.0***	***160.00***		
		DELAY		FIXED			***FIXED***	

RELAY SETTING TABLE

SUBSTATION: BLPH **SWITCHBOARD:** SG-100D1 **VOLTAGE:** 6.60 kV

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **TR-200ED1**	Manufacturer: **ABB**	PHASE: **#A105**	Star P CT: **50 / 1**
An [MVA]: **0.5**	Type: **REX640**	page:	Star earth CT: /
I1n [A]: **43.74**	Phase current [A]: **1**		Earth CT: **100 / 1**
I2n [A]: **360.84**	Phase current [A]:	EARTH: **#A105G**	Phase VT: **6.6k/110/110 /110**
V1n [kV]: **6.6**	Prim. Earth CT [A]: **1**	page:	**V3 V3 V3 3 3**
V2n [kV]: **0.8**	Prim. Phase CT [A]: **50**		
Zcc%: **6.00**	Prim. Phase CT [A]:		
	Prim. Earth CT [A]: **100**		
	Protect. functions: **50,51,51N,59N,25,27,59**		

ANALOG INPUTS

CURRENT (3I,CT)	VALUE	VOLTAGE (3U,VT)	VALUE	CURRENT (Io,CT)	VALUE	GENERAL SYSTEM SETTINGS	VALUE
Primary Current	50.0	Primary Voltage	6600.0	Primary Current	100.0	Rated frequency	50.0
Secondary Current	1.0	Secondary Voltage	110.0	Secondary Current	1.0	Phase rotation	ABC
Amplitude corr. A/B/C	1.0	VT Connection	Wye	Amplitude corr	1.0	Blocking mode	Freeze
Angle corr. A/B/C	0.0	Amplitude corr. A/B/C	1.0	Angle correction	0.0	IDMT Sat point	50
Reverse polarity	False	Voltage input type	Volt. Trafo	Reverse polarity	False		
		Angle corr. A/B/C	0.0				

VOLTAGE (Uo,VT)	VALUE
Primary Voltage	3810.6
Secondary Voltage	110.0
Amplitude corr	1.0
Angle correction	0.0

PROTECTION FUNCTIONS

ANSI CODE	IEC61850 ID.	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME [s]	SETTING PRIMARY VALUE	SETTING I/U [pu/A/V]	SETTING TIME	NOTES
PHASE OVERCURRENT PROTECTION - PHLPTOC1								
51-1	PHLPTOC1	Num of start phases	1/3,2/3,3/3			***1/3***		Operation = **ON**
		Reset delay time		0.00…60s			***0.02***	
		Measurement mode	RMS/DFT/P-to-P			***DFT***		
		Minimum operate time		0.020…60s			***0.3***	
		Start Value	0.05…5.00 xIn		***60.0***	***1.20***		
		Start value Mult	0.8…10.0		***60.0***	***1.00***		
		Operate delay time		0.040…200s				
		Operating curve type	IEC NI,VI,EI,DT			***IEC Normal Inverse***		
		Time multiplier		0.05…15.00			***0.3***	
		Type of reset curve	Immediate/DT/INV			***Immediate***		
PHASE OVERCURRENT PROTECTION - PHIPTOC1								
50-1	PHIPTOC1	Num of start phases	1/3,2/3,3/3			***1/3***		Operation = **ON**
		Reset delay time		0,00…60s			***0.02***	
		Start Value	1.00…40.00 xIn		***200.0***	***4.00***		
		Start value Mult	0.8…10.0		***200.0***	***1.00***		
		Operate delay time		0.020…300s			***0.25***	
EARTH-FAULT PROTECTION - EFLPTOC1								
51N	EFLPTOC1	Reset delay time		0.00…60s			***0.02***	Operation = **ON**
		Measurement mode	RMS/DFT/P-to-P			***DFT***		
		Start Value	0.010…10.000 xIn		***0.1***	***0.100***		
		Start value Mult	0.8…10.0		***0.1***	***1.00***		
		Operate delay time		0.040…300s			***0.1***	
		Operating curve type	IEC NI,VI,EI,DT			***DT***		
SYNCROCHECK PROTECTION - SECRSYN								
25	SECRSYN	Syncro check mode	Synch/Asynch/OFF			***Asynchounous***		Operation = **ON**
		Control mode	Continuous/Command			***Continuous***		
		Dead line value	0.1…0.8xUn		***660.0***	***0.10***		
		Live line value	0.2…1.0xUn		***5715.6***	***0.50***		
		Dead bus value	0.1…0.8xUn		***660.0***	***0.10***		
		Live bus value	0.2…1.0xUn		***5715.6***	***0.50***		
		Max energizing V	0.50…1.5xUn		***7316.0***	***0.64***		
		Phase Shift	-180…+180 DEG			***0.00***		
		Minimum Syn time		0.0…60s			***10.00***	
		Energizing time		0.0…60s			***0.10***	
		Closing time CB		0.040…0.250s			***0.05***	
		Live dead mode				***No Both Live***		
		Difference Voltage	0.01…0.5xUn		***330.0***	***0.05***		
		Difference phase angle	5…90 DEG			***5.00***		
		Difference frequency	0.001…0.10 Hz		***0.5***	***0.01***		
RESIDUAL OVERVOLTAGE PROTECTION - ROVPTOV1								
59N	ROVPTOV1	Reset delay time		0.00…60s			***0.02***	Operation = **ON**
		Uo signal Sel	Meas./Calc.			***Measured***		**Alarm**
		Start Value	0.010…1.00 xUn		***381.1***	***0.10***		
		Operate delay time		0.040…300s			***0.50***	
RESIDUAL OVERVOLTAGE PROTECTION - ROVPTOV2								
59N	ROVPTOV2	Reset delay time		0.00…60s			***0.02***	Operation = **ON**
		Uo signal Sel	Meas./Calc.			***Measured***		**Trip**
		Start Value	0.010…1.00 xUn		***381.1***	***0.10***		
		Operate delay time		0.040…300s			***1.00***	

RELAY SETTING TABLE

SUBSTATION: BLPH **SWITCHBOARD:** SG-100D1 **VOLTAGE:** 6.60 kV

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **TR-200ED1**	Manufacturer: **ABB**	PHASE: **#A105**	Star P CT: **50 / 1**
An [MVA]: **0.5**	Type: **REX640**	page:	Star earth CT: /
I1n [A]: **43.74**	Phase current [A]: **1**		Earth CT: **100 / 1**
I2n [A]: **360.84**	Phase current [A]:	EARTH: **#A105G**	Phase VT: **6.6k/110/110 /110**
V1n [kV]: **6.6**	Prim. Earth CT [A]: **1**	page:	**V3 V3 V3 3 3**
V2n [kV]: **0.8**	Prim. Phase CT [A]: **50**		
Zcc%: **6.00**	Prim. Phase CT [A]:		
	Prim. Earth CT [A]: **100**		
	Protect. functions: **50,51,51N,59N,25,27,59**		

ANALOG INPUTS

CURRENT (3I,CT)	VALUE	VOLTAGE (3U,VT)	VALUE	CURRENT (Io,CT)	VALUE	GENERAL SYSTEM SETTINGS	
						SYSTEM - CONTROL	VALUE
Primary Current	50.0	Primary Voltage	6600.0	Primary Current	100.0	Rated frequency	50.0
Secondary Current	1.0	Secondary Voltage	110.0	Secondary Current	1.0	Phase rotation	ABC
Amplitude corr. A/B/C	1.0	VT Connection	Wye	Amplitude corr	1.0	Blocking mode	Freeze
Angle corr. A/B/C	0.0	Amplitude corr. A/B/C	1.0	Angle correction	0.0	IDMT Sat point	50
Reverse polarity	False	Voltage input type	Volt. Trafo	Reverse polarity	False		
		Angle corr. A/B/C	0.0				

VOLTAGE (Uo,VT)	VALUE
Primary Voltage	3810.6
Secondary Voltage	110.0
Amplitude corr	1.0
Angle correction	0.0

PROTECTION FUNCTIONS

			SETTING RANGE		SETTING			NOTES
ANSI CODE	IEC61850 ID.	DESCRIPTION	I/U [A/V]	TIME [s]	PRIMARY VALUE	I/U [pu/A/V]	TIME	
PHASE UNDERVOLTAGE PROTECTION - PHPTUV1								
27-1	PHPTUV1	Num of start phases	1/3,2/3,3/3				***1/3***	Operation = **ON**
		Minimum operate time		0.06…60s			***0.06***	
		Reset delay time		0.00…60s			***0.02***	
		Voltage block value	0.05…1.00 xUn		***1320.0 V***	***0.20***		
		Enable block value	True / False			***True***		
		Voltage selection	Ph-Ph, Ph-Earth			***Ph-Ph***		
		Relative hysteresis	1.0…5.0%			***4.00***		
		Start value	0.05…1.20 xUn		***5280.0 V***	***0.80***		
		Operate delay time		0.060…300s			***2***	
		Operating curve type	IEC DT,Inv A,Inv B			***IEC DT***		
		Type of reset curve	Immediate/DT/INV			***Immediate***		
PHASE UNDERVOLTAGE PROTECTION - PHPTUV2								
27-2	PHPTUV2	Num of start phases	1/3,2/3,3/3				***1/3***	Operation = **ON**
		Minimum operate time		0.06…60s			***0.06***	
		Reset delay time		0.00…60s			***0.02***	
		Voltage block value	0.05…1.00 xUn		***1320.0 V***	***0.20***		
		Enable block value	True / False			***True***		
		Voltage selection	Ph-Ph, Ph-Earth			***Ph-Ph***		
		Relative hysteresis	1.0…5.0%			***4.00***		
		Start value	0.05…1.20 xUn		***3300.0 V***	***0.50***		
		Operate delay time		0.060…300s			***0.2***	
		Operating curve type	IEC DT,Inv A,Inv B			***IEC DT***		
		Type of reset curve	Immediate/DT/INV			***Immediate***		
PHASE OVERVOLTAGE PROTECTION - PHPTOV1								
59-1	PHPTOV1	Num of start phases	1/3,2/3,3/3				***1/3***	Operation = **ON**
		Min operate time		0.06…60s			***0.06***	
		Reset delay time		0.00…60s			***0.02***	
		Voltage selection	Ph-Ph, Ph-Earth			***Ph-to-Ph***		
		Relative hysteresis	1.0…5.0%			***4.00***		
		Start value	0.05…1.20xUn		***7920.0***	***1.20***		**Only Alarm**
		Time multiplier	0.05…15.00					
		Operating delay time		0.06…300s			***0.5***	
		Operate curve type	IEC DT,Inv A,Inv B			***DT***		
PHASE OVERVOLTAGE PROTECTION - PHPTOV2								
59-2	PHPTOV2	Num of start phases	1/3,2/3,3/3				***1/3***	Operation = **ON**
		Min operate time		0.06…60s			***0.06***	
		Reset delay time		0.00…60s			***0.02***	
		Voltage selection	Ph-Ph, Ph-Earth			***Ph-to-Ph***		
		Relative hysteresis	1.0…5.0%			***4.00***		
		Start value	0.05…1.20xUn		***8580.0***	***1.30***		
		Time multiplier	0.05…15.00					
		Operating delay time		0.06…300s			***0.1***	
		Operate curve type	IEC DT,Inv A,Inv B			***DT***		

RELAY SETTING TABLE

SUBSTATION: BLPH | **SWITCHBOARD:** SG-100D1 | **VOLTAGE:** 6.60 kV

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **TR-200ED1**	Manufacturer: **ABB**	PHASE: **#A105**	Star P CT: **50 / 1**
An [MVA]: **0.5**	Type: **REX640**	page:	Star earth CT: /
I1n [A]: **43.74**	Phase current [A]: **1**		Earth CT: **100 / 1**
I2n [A]: **360.84**	Phase current [A]:	EARTH: **#A105G**	Phase VT: **6.6k/110/110 /110**
V1n [kV]: **6.6**	Prim. Earth CT [A]: **1**	page:	**V3 V3 V3 3 3**
V2n [kV]: **0.8**	Prim. Phase CT [A]: **50**		
Zcc%: **6.00**	Prim. Phase CT [A]:		
	Prim. Earth CT [A]: **100**		
	Protect. functions: **50,51,51N,59N,25,27,59**		

ANALOG INPUTS

CURRENT (3I,CT)	VALUE	VOLTAGE (3U,VT)	VALUE	CURRENT (Io,CT)	VALUE
Primary Current	50.0	Primary Voltage	6600.0	Primary Current	100.0
Secondary Current	1.0	Secondary Voltage	110.0	Secondary Current	1.0
Amplitude corr. A/B/C	1.0	VT Connection	Wye	Amplitude corr	1.0
Angle corr. A/B/C	0.0	Amplitude corr. A/B/C	1.0	Angle correction	0.0
Reverse polarity	False	Voltage input type	Volt. Trafo	Reverse polarity	False
		Angle corr. A/B/C	0.0		

VOLTAGE (Uo,VT)	VALUE
Primary Voltage	3810.6
Secondary Voltage	110.0
Amplitude corr	1.0
Angle correction	0.0

GENERAL SYSTEM SETTINGS

SYSTEM - CONTROL	VALUE
Rated frequency	50.0
Phase rotation	ABC
Blocking mode	Freeze
IDMT Sat point	50

PROTECTION FUNCTIONS

ANSI CODE	IEC61850 ID.	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME [s]	SETTING PRIMARY VALUE	SETTING I/U [pu/A/V]	SETTING TIME	NOTES
PHASE OVERCURRENT PROTECTION - DPHLPDOC1								
67-1	DPHLPDOC1	Reset delay time		0.00…60s			***0.02***	Operation = **ON**
		Num of start phases	1/3,2/3,3/3			***1/3***		
		Minimum operate time		0.020…60s			***0.02***	
		Allow Non Dir	False/True			***False***		
		Measurement mode	RMS/DFT/P-to-P			***DFT***		
		Min operate current	0.005- 1.00 x In			***0.01***		
		Min operate voltage	0.01 - 1.00 x Un			***0.01***		
		Start Value	0.05…5.00 xIn		***50.0***	***1.00***		**Activated ONLY in Island condition**
		Start value Mult	0.8…10.0		***50.0***	***1.00***		**Signal Received thorugh IEC61850**
		Operate delay time		0.040…300s			***0.7***	
		Operating curve type	IEC NI,VI,EI,DT			***DT***		
		Time multiplier		0.05…15.00				
		Directional Mode	Fwr, Rev, Non-Dir			***Rev***		**Busbar Direction**
		Characteristic angle	-179 - +180 deg			***60.00***		
		Max forward angle	0 - 90 deg			***80.00***		
		Max reverse angle	0 - 90 deg			***80.00***		
		Min forward angle	0 - 90 deg			***80.00***		
		Min reverse angle	0 - 90 deg			***80.00***		
		Pol quantity	Cross Pol…			***Cross Pol***		
PHASE OVERCURRENT PROTECTION - DPHLPDOC2								
67-2	DPHLPDOC2	Reset delay time		0.00…60s			***0.02***	Operation = **ON**
		Num of start phases	1/3,2/3,3/3			***1/3***		
		Minimum operate time		0.020…60s			***0.02***	
		Allow Non Dir	False/True			***False***		
		Measurement mode	RMS/DFT/P-to-P			***DFT***		
		Min operate current	0.005- 1.00 x In			***0.01***		
		Min operate voltage	0.01 - 1.00 x Un			***0.01***		
		Start Value	0.05…5.00 xIn		***50.0***	***1.00***		**Activated ONLY in Island condition**
		Start value Mult	0.8…10.0		***50.0***	***1.00***		**Signal Received thorugh IEC61850**
		Operate delay time		0.040…300s			***0.1***	
		Operating curve type	IEC NI,VI,EI,DT			***DT***		
		Time multiplier		0.05…15.00				
		Directional Mode	Fwr, Rev, Non-Dir			***Fwd***		**Line Direction**
		Characteristic angle	-179 - +180 deg			***60.00***		
		Max forward angle	0 - 90 deg			***80.00***		
		Max reverse angle	0 - 90 deg			***80.00***		
		Min forward angle	0 - 90 deg			***80.00***		
		Min reverse angle	0 - 90 deg			***80.00***		
		Pol quantity	Cross Pol…			***Cross Pol***		

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **TR-200ED1**	Manufacturer **ABB**	ID. CODE : **#A106F**	
	Fuse Type **CEF**	page: **C08,C12**	
	Fuse Nominal Current: **63.00 A**		
	Protection Functions **I**	page:	

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME [s]	SETTING PRIMARY VALUE	SETTING I/U [pu/A/V]	SETTING TIME	NOTES
I	I	I PICK-UP	63 A		***63.0***	***63.00***		
		DELAY		FIXED			***FIXED***	

RELAY SETTING TABLE

SUBSTATION: BLPH **SWITCHBOARD:** SG-100D1 **VOLTAGE:** 6.60 kV

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Incoming from: **TR-100AD1**	Manufacturer: **ABB**	PHASE: **#A151**	Star P CT: **600 / 1**
An [MVA]: **7**	Type: **REX640**	page:	Star earth CT: /
I1n [A]: **61.23**	Phase current [A]: **1**		Earth CT: **100 / 1**
I2n [A]: **585.72**	Phase current [A]:	EARTH: **#A151G**	Phase VT: **6.6k/110/110 /110**
V1n [kV]: **66**	Prim. Earth CT [A]: **1**	page:	**V3 V3 V3 3 3**
V2n [kV]: **6.9**	Prim. Phase CT [A]: **600**		
Zcc%: **8.00**	Prim. Phase CT [A]:		
	Prim. Earth CT [A]: **100**		
	Protect. functions: **50,51,50N,51N,59N 25,50BF,27,59**		

ANALOG INPUTS

CURRENT (3I,CT)	VALUE	VOLTAGE (3U,VT)	VALUE	CURRENT (Io,CT)	VALUE
Primary Current	600.0	Primary Voltage	6600.0	Primary Current	100.0
Secondary Current	1.0	Secondary Voltage	110.0	Secondary Current	1.0
Amplitude corr. A/B/C	1.0	VT Connection	Wye	Amplitude corr	1.0
Angle corr. A/B/C	0.0	Amplitude corr. A/B/C	1.0	Angle correction	0.0
Reverse polarity	False	Voltage input type	Volt. Trafo	Reverse polarity	False
		Angle corr. A/B/C	0.0		

VOLTAGE (Uo,VT)	VALUE
Primary Voltage	3810.6
Secondary Voltage	110.0
Amplitude corr	1.0
Angle correction	0.0

GENERAL SYSTEM SETTINGS

SYSTEM - CONTROL	VALUE
Rated frequency	50.0
Phase rotation	ABC
Blocking mode	Freeze
IDMT Sat point	50

PROTECTION FUNCTIONS

ANSI CODE	IEC61850 ID.	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME [s]	SETTING PRIMARY VALUE	SETTING I/U [pu/A/V]	SETTING TIME	NOTES
PHASE OVERCURRENT PROTECTION - PHLPTOC1								
51-1	PHLPTOC1	Num of start phases	1/3,2/3,3/3			***1/3***		Operation = **ON**
		Reset delay time		0.00…60s			***0.02***	
		Measurement mode	RMS/DFT/P-to-P			***DFT***		
		Minimum operate time		0.020…60s			***0.3***	
		Start Value	0.05…5.00 xIn		***588.0***	***0.98***		
		Start value Mult	0.8…10.0		***588.0***	***1.00***		
		Operate delay time		0.040…200s				
		Operating curve type	IEC NI,VI,EI,DT			***IEC Normal Inverse***		
		Time multiplier		0.05…15.00			***0.3***	
		Type of reset curve	Immediate/DT/INV			***Immediate***		
PHASE OVERCURRENT PROTECTION - PHIPTOC1								
50-1	PHIPTOC1	Num of start phases	1/3,2/3,3/3			***1/3***		Operation = **ON**
		Reset delay time		0.00…60s			***0.02***	
		Start Value	1.00…40.00 xIn		***3120.0***	***5.20***		
		Start value Mult	0.8…10.0		***3120.0***	***1.00***		
		Operate delay time		0.020…300s			***0.55***	
EARTH-FAULT PROTECTION - EFLPTOC1								
51N	EFLPTOC1	Reset delay time		0.00…60s			***0.02***	Operation = **ON**
		Measurement mode	RMS/DFT/P-to-P			***DFT***		
		Start Value	0.010…10.000 xIn		***0.2***	***0.150***		
		Start value Mult	0.8…10.0		***0.2***	***1.00***		
		Operate delay time		0.040…300s			***0.3***	
		Operating curve type	IEC NI,VI,EI,DT			***DT***		
SYNCROCHECK PROTECTION - SECRSYN								
25	SECRSYN	Syncro check mode	Synch/Asynch/OFF			***Asynchounous***		Operation = **ON**
		Control mode	Continuous/Command			***Continuous***		
		Dead line value	0.1…0.8xUn		***660.0***	***0.10***		
		Live line value	0.2…1.0xUn		***5715.6***	***0.50***		
		Dead bus value	0.1…0.8xUn		***660.0***	***0.10***		
		Live bus value	0.2…1.0xUn		***5715.6***	***0.50***		
		Max energizing V	0.50…1.5xUn		***7316.0***	***0.64***		
		Phase Shift	-180…+180 DEG			***0.00***		
		Minimum Syn time		0.0…60s			***10.00***	
		Energizing time		0.0…60s			***0.10***	
		Closing time CB		0.040…0.250s			***0.05***	
		Live dead mode				***No Both Live***		
		Difference Voltage	0.01…0.5xUn		***330.0***	***0.05***		
		Difference phase angle	5…90 DEG			***5.00***		
		Difference frequency	0.001…0.10 Hz		***0.5***	***0.01***		
RESIDUAL OVERVOLTAGE PROTECTION - ROVPTOV1								
59N	ROVPTOV1	Reset delay time		0.00…60s			***0.02***	Operation = **ON**
		Uo signal Sel	Meas./Calc.			***Measured***		**Alarm**
		Start Value	0.010…1.00 xUn		***381.1***	***0.10***		
		Operate delay time		0.040…300s			***0.75***	
RESIDUAL OVERVOLTAGE PROTECTION - ROVPTOV2								
59N	ROVPTOV2	Reset delay time		0.00…60s			***0.02***	Operation = **ON**
		Uo signal Sel	Meas./Calc.			***Measured***		**Trip**
		Start Value	0.010…1.00 xUn		***381.1***	***0.10***		
		Operate delay time		0.040…300s			***1.50***	

RELAY SETTING TABLE

SUBSTATION: BLPH | **SWITCHBOARD:** SG-100D1 | **VOLTAGE:** 6.60 kV

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Incoming from: **TR-100AD1**	Manufacturer: **ABB**	PHASE: **#A151**	Star P CT: **600 / 1**
An [MVA]: **7**	Type: **REX640**	page:	Star earth CT: /
I1n [A]: **61.23**	Phase current [A]: **1**		Earth CT: **100 / 1**
I2n [A]: **585.72**	Phase current [A]:	EARTH: **#A151G**	Phase VT: **6.6k/110/110 /110**
V1n [kV]: **66**	Prim. Earth CT [A]: **1**	page:	**V3 V3 V3 3 3**
V2n [kV]: **6.9**	Prim. Phase CT [A]: **600**		
Zcc%: **8.00**	Prim. Phase CT [A]:		
	Prim. Earth CT [A]: **100**		
	Protect. functions: **50,51,50N,51N,59N 25,50BF,27,59**		

ANALOG INPUTS

CURRENT (3I,CT)	VALUE	VOLTAGE (3U,VT)	VALUE	CURRENT (Io,CT)	VALUE
Primary Current	600.0	Primary Voltage	6600.0	Primary Current	100.0
Secondary Current	1.0	Secondary Voltage	110.0	Secondary Current	1.0
Amplitude corr. A/B/C	1.0	VT Connection	Wye	Amplitude corr	1.0
Angle corr. A/B/C	0.0	Amplitude corr. A/B/C	1.0	Angle correction	0.0
Reverse polarity	False	Voltage input type	Volt. Trafo	Reverse polarity	False
		Angle corr. A/B/C	0.0		

VOLTAGE (Uo,VT)	VALUE
Primary Voltage	3810.6
Secondary Voltage	110.0
Amplitude corr	1.0
Angle correction	0.0

GENERAL SYSTEM SETTINGS

SYSTEM - CONTROL	VALUE
Rated frequency	50.0
Phase rotation	ABC
Blocking mode	Freeze
IDMT Sat point	50

PROTECTION FUNCTIONS

ANSI CODE	IEC61850 ID.	DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME [s]	SETTING PRIMARY VALUE	SETTING I/U [pu/A/V]	SETTING TIME	NOTES
PHASE UNDERVOLTAGE PROTECTION - PHPTUV1								
27-1	PHPTUV1	Num of start phases	1/3,2/3,3/3			***1/3***		Operation = **ON**
		Minimum operate time		0.06…60s			***0.06***	
		Reset delay time		0.00…60s			***0.02***	
		Voltage block value	0.05…1.00 xUn		***1320.0 V***	***0.20***		
		Enable block value	True / False			***True***		
		Voltage selection	Ph-Ph, Ph-Earth			***Ph-Ph***		
		Relative hysteresis	1.0…5.0%			***4.00***		
		Start value	0.05…1.20 xUn		***5280.0 V***	***0.80***		
		Operate delay time		0.060…300s			***2.5***	
		Operating curve type	IEC DT,Inv A,Inv B			***IEC DT***		
		Type of reset curve	Immediate/DT/INV			***Immediate***		
PHASE UNDERVOLTAGE PROTECTION - PHPTUV2								
27-2	PHPTUV2	Num of start phases	1/3,2/3,3/3			***1/3***		Operation = **ON**
		Minimum operate time		0.06…60s			***0.06***	
		Reset delay time		0.00…60s			***0.02***	
		Voltage block value	0.05…1.00 xUn		***1320.0 V***	***0.20***		
		Enable block value	True / False			***True***		
		Voltage selection	Ph-Ph, Ph-Earth			***Ph-Ph***		
		Relative hysteresis	1.0…5.0%			***4.00***		
		Start value	0.05…1.20 xUn		***3300.0 V***	***0.50***		
		Operate delay time		0.060…300s			***0.4***	
		Operating curve type	IEC DT,Inv A,Inv B			***IEC DT***		
		Type of reset curve	Immediate/DT/INV			***Immediate***		
PHASE OVERVOLTAGE PROTECTION - PHPTOV1								
59-1	PHPTOV1	Num of start phases	1/3,2/3,3/3			***1/3***		Operation = **ON**
		Min operate time		0.06…60s			***0.06***	
		Reset delay time		0.00…60s			***0.02***	
		Voltage selection	Ph-Ph, Ph-Earth			***Ph-to-Ph***		
		Relative hysteresis	1.0…5.0%			***4.00***		
		Start value	0.05…1.20xUn		***7920.0***	***1.20***		**Only Alarm**
		Time multiplier	0.05…15.00					
		Operating delay time		0.06…300s			***0.75***	
		Operate curve type	IEC DT,Inv A,Inv B			***DT***		
PHASE OVERVOLTAGE PROTECTION - PHPTOV2								
59-2	PHPTOV2	Num of start phases	1/3,2/3,3/3			***1/3***		Operation = **ON**
		Min operate time		0.06…60s			***0.06***	
		Reset delay time		0.00…60s			***0.02***	
		Voltage selection	Ph-Ph, Ph-Earth			***Ph-to-Ph***		
		Relative hysteresis	1.0…5.0%			***4.00***		
		Start value	0.05…1.20xUn		***8580.0***	***1.30***		
		Time multiplier	0.05…15.00					
		Operating delay time		0.06…300s			***0.25***	
		Operate curve type	IEC DT,Inv A,Inv B			***DT***		

RELAY SETTING TABLE

SUBSTATION: BLPH **SWITCHBOARD:** HNA6-AFA70 **VOLTAGE:** 66.00 kV

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **TR-100AD1**	Manufacturer: **SIEMENS**	PHASE: **#A210**	W1 Phase CT: **250**
An [MVA]: **7.00**	Type: **7UT85**	page:	W2 Phase CT: **600 / 1**
I1n [A]: **61.23**	Phase current [A]:		Star earth CT: **250 / 1**
I2n [A]: **585.72**	Phase current [A]: **1**	EARTH: **#A210G**	Phase VT:
V1n [kV]: **66.00**	Prim. Earth CT [A]: **1**	page:	
V2n [kV]: **6.90**	Prim. Phase CT [A]: **250**		
Zcc%: **8.00**	Prim. Phase CT [A]: **600**		
	Prim. Earth CT [A]: **250**		
	Protect. functions: **87T,51G**		

CT PHASES CT1	SETTING	CT PHASES CT2	SETTING	TR Side 1: General	SETTING	TR Side 2: General	SETTING
Rated Primary Current	250.0	Rated Primary Current	600.0	Rated Apparent Power	7.0 MVA	Rated Apparent Power	7.0 MVA
Rated Secondary Current		Rated Secondary Current	1	Rated Volatge	66kV	Rated Volatge	6.9
Current Range		Current Range		Rated Current	61 A	Rated Current	586
Internal CT type		Internal CT type		Neutral Point	Isolated	Neutral Point	grounded
Neautral Point in Dir. Of Ref. Obj	No	Neautral Point in Dir. Of Ref. Obj	No	Winding Configuration	Delta	Winding Configuration	Wye
Inverted Phases	No	Inverted Phases	No	Vector group numeral	0	Vector group numeral	11
CT NEUTRAL CT1	**SETTING**						
Rated Primary Current	250.0	**CT1.1**	**SET**	**CT2.1**	**SET**	**CT2.3**	**SET**
Rated Secondary Current	1	Magnitude correction	1	Magnitude correction	1	Magnitude correction	1
Neautral Point in Dir. Of Ref. Obj	Yes	**CT1.2**	**SET**	**CT2.2**	**SET**	**CT2.4**	**SET**
Inverted Phases	No	Magnitude correction	1	Magnitude correction	1	Magnitude correction	1
POWER SYSTEM SETUP							
Rated Frequency	50.0	Phase Rotation	ABC				

ANSI CODE	RELAY CODE	DESCRIPTION	I/U [A/V]	TIME	PRIMARY VALUE	I/U [pu/A/V]	TIME	
87T diff. Prot. 1								
87	Id>	Operate & flt.rec. Blocked	Yes/No			***No***		Mode = **ON**
		Operate delay		0.00 s to 60.00 s			***0.00***	
		Threshold value	0.05 to 2.00 I/Ir			***0.20***		
		Slope 1	0.00 to 0.80			***0.30***		
		Intersection 1 Irest	0.00 to 5.00 I/Ir			***0.67***		
		Slope 2	0.25 to 0.95			***0.75***		
		Intersection 2 Irest	1.00 to 20.00 I/Ir			***2.00***		
		Startup detection threshold value	0.1 to 2.0			***0.10***		
		Characteristic curve incr. factor	1.0 to 5.0			***2.00***		
		Maximum starting time		0.1 s to 180.0 s			***5.00***	
		Charact. curve incr. factor DC	1.0 to 5.0			***2.30***		
		2nd harmonic content	10 % to 45 %			***12.00***		
		Crossblk. time 2nd har.		0.00 s to 200.00 s or ∞			***0.50***	
		3rd harmonic content	10 % to 80 %			***NO***		
		Crossblk. time 3rd har.		0.00 s to 200.00 s or ∞				
		5th harmonic content	10 % to 80 %					
		Crossblk. time 5th har.		0.00 s to 200.00 s or ∞		***NO***		
		Idiff limit 3rd, 5th harm.	0.5 to 20.0 I/Ir			***1.50***		
		Add-on stab. Threshold value	1.00 to 20.00 I/Ir			***2.00***		
		Add-on stabilization time		0.00 s to 5.00 s or ∞			***0.30***	
		Crossblk. time additional stab.		0.00 s to 2.00 s or ∞			***0.30***	
		I DIFF Fast Threshold	0.5 to 35.0 I/IrObj			***5.00***		I DIF Fast Mode **ON**
		DIFF fast:Operate delay		0.00 s to 60.00 s			***0.00***	
87N REF 1								
87N REF 1	Iod>	Operate & flt.rec. Blocked	Yes/No			***No***		Mode = **ON**
		Threshold	0.05 to 2.00 I/IrObj			***0.10***		
		Slope	0.00 to 0.95			***0.05***		
		Operate delay		0.00 s to 60.00 s			***0.10***	

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RELAY SETTING TABLE

SUBSTATION: BLPH **SWITCHBOARD:** HNA6-AFA70 **VOLTAGE:** 66.00 kV

USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **TR-100AD1**	Manufacturer: **SIEMENS**	PHASE: **#A211**	Star P CT: **600 / 1**
An [MVA]: **7**	Type: **7SJ85**	page:	Star earth CT: **250 / 1**
I1n [A]: **61.23**	Phase current [A]: **1**		Earth CT:
I2n [A]: **585.72**	Prim. Earth CT [A]: **1**	EARTH: **#A211G**	Phase VT: **66.00 kV**
V1n [kV]: **66**		page:	**V3**
V2n [kV]: **6.9**	Prim. Phase CT [A]: **600**		
Zcc%: **8.00**	Prim. Earth CT [A]: **250**	EARTH: **#AA164G**	
	Protect. functions: **50,51,50N,51N,59G**	page:	

CT PHASES CT1	SETTING	VT PHASES	SETTING	POWER SYSTEM SETUP	SETTING	General	
Rated Primary Current	600.0	Rated Primary Voltage	66000.0	Rated Frequency	50	Rated Current	
Rated Secondary Current	1			Phase Rotation	ABC	Rated Voltage	
Current Range						PS Neutral Point	
Internal CT type				**CT1.1**	**SET**	**CT2.1**	**SET**
Neautral Point in Dir. Of Ref. Obj				Magnitude correction	1	Magnitude correction	1
Inverted Phases				**CT1.2**	**SET**	**CT2.2**	**SET**
CT NEUTRAL CT1	**SETTING**			Magnitude correction	1	Magnitude correction	1
Rated Primary Current	250.0			**CT1.3**	**SET**	**CT2.3**	**SET**
Rated Secondary Current	1			Magnitude correction	1	Magnitude correction	1
Current Range				**CT1.4**	**SET**		
Internal CT type				Magnitude correction	1		

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	SETTING RANGE DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME	SETTINGS PRIMARY VALUE	SETTINGS I/U [pu/A/V]	SETTINGS TIME	NOTES
50/51 OC-3ph A1								
51	I>	Operate & flt.rec. Blocked	Yes/No			***No***		Mode = **ON**
		Blk. w. inrush curr. detect.	Yes/No			***No***		
		Method of measurement	Fund/RMS	0		***Fund***		
		Threshold	0.030 A to 35.000 A		***204***	***0.34***		
		Type of Characteristic curve	IEC VI, SI EI…			***IEC Normal Inverse***		
		Reset delay time				***Instant***		
		Time Dial		0.00 to 15.00			***0.35***	
50/51 OC-3ph A1								
50-1	I>>	Operate & flt.rec. Blocked	Yes/No			***No***		Mode = **ON**
		Blk. w. inrush curr. detect.	Yes/No			***No***		
		Method of measurement	Fund/RMS	0		***Fund***		
		Threshold	0.030 A to 35.000 A		***960***	***1.60***		
		Operate delay time		0.00 s to 60.00 s			***0.80***	
50/51 OC-3ph A1								
50-2	I>>>	Operate & flt.rec. Blocked	Yes/No			***No***		Mode = **ON**
		Blk. w. inrush curr. detect.	Yes/No			***No***		
		Method of measurement	Fund/RMS	0		***Fund***		
		Threshold	0.030 A to 35.000 A		***2502***	***4.17***		
		Operate delay time		0.00 s to 60.00 s			***0.05***	
50N/51N OC-gnd-A1								
51N	General	Emergency mode	Yes/No			***no***		
		Measured value	IN Meas/Calculated			***3I0 Calculated***		
	Inverse-T1	Mode	On/Off/Test			***On***		
		Operate & flt rec blocked	yes/no			***No***		
		Dynamic setting	Yes/No			***no***		
		Blk w. Inrush curr detect	Yes/No			***no***		
		Method of measurement	Fund Comp			***Fund Comp***		
		Threshold	0.010 - 35.000A		***60***	***0.10***		
		Type of character curve	IEC Norm Inv			***IEC DT***		
		Min time of the curve		0.00 - 1.00 s				
		Operating Time		0.00 - 60.00			***0.1***	
		Time dial		0.05 - 15.00				
		Additional time delay		0.000 - 60.000s			***0***	
		Reset	Inst/Disk Emulation			***Instantaneous***		
50N/51N OC-gnd-A1								
51G	General	Emergency mode	Yes/No			***no***		
		Measured value	IN Meas/Calculated			***IN Measured***		
	Inverse-T1	Mode	On/Off/Test			***On***		
		Operate & flt rec blocked	yes/no			***No***		
		Dynamic setting	Yes/No			***no***		
		Blk w. Inrush curr detect	Yes/No			***no***		
		Method of measurement	Fund Comp			***Fund Comp***		
		Threshold	0.010 - 35.000A		***25***	***0.10***		**From Star Point CT on 6.6kV Side**
		Type of character curve	IEC Norm Inv			***IEC DT***		
		Operating Time		0.00 - 60.00			***0.5***	
		Min time of the curve		0.00 - 1.00 s				
		Time dial		0.05 - 15.00				
		Additional time delay		0.000 - 60.000s			***0***	
		Reset	Inst/Disk Emulation			***Instantaneous***		

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RELAY SETTING TABLE

SUBSTATION: BLPH **SWITCHBOARD:** HNA6-AFA70 **VOLTAGE:** 66.00 kV

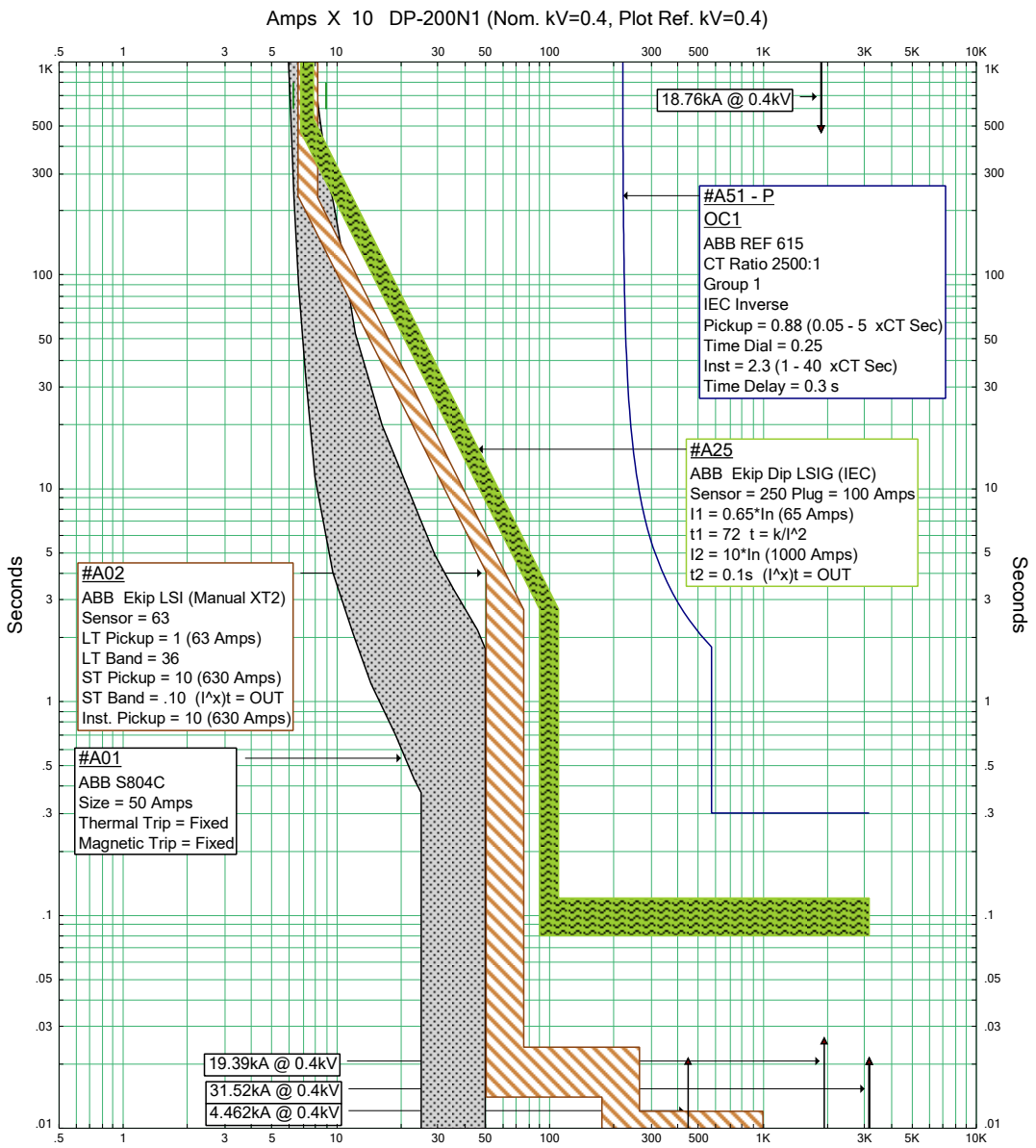
USER	RELAY DESCRIPTION	RELAY IDENTIFICATION	ANALOG INPUT
Feeder to: **TR-100AD1**	Manufacturer: **SIEMENS**	PHASE: **#A211**	Star P CT: **600** / **1**
An [MVA]: **7**	Type: **7SJ85**	page:	Star earth CT: **250** / **1**
I1n [A]: **61.23**	Phase current [A]: **1**		Earth CT:
I2n [A]: **585.72**	Prim. Earth CT [A]: **1**	EARTH: **#A211G**	Phase VT: **66.00 kV**
V1n [kV]: **66**		page:	**V3**
V2n [kV]: **6.9**	Prim. Phase CT [A]: **600**		
Zcc%: **8.00**	Prim. Earth CT [A]: **250**	EARTH: **#AA164G**	
	Protect. functions: **50,51,50N,51N,59G**	page:	

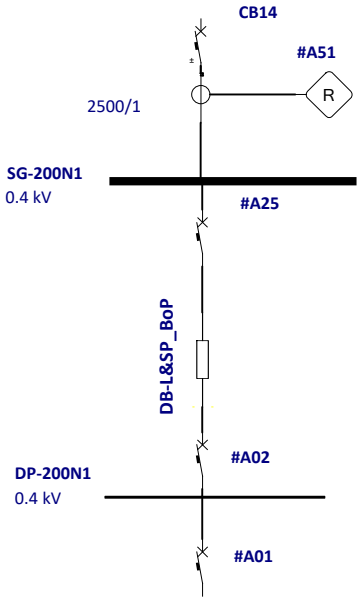
CT PHASES CT1	SETTING	VT PHASES	SETTING	POWER SYSTEM SETUP	SETTING	General	
Rated Primary Current	600.0	Rated Primary Voltage	66000.0	Rated Frequency	50	Rated Current	
Rated Secondary Current	1			Phase Rotation	ABC	Rated Voltage	
Current Range						PS Neutral Point	
Internal CT type				**CT1.1**	**SET**	**CT2.1**	**SET**
Neautral Point in Dir. Of Ref. Obj				Magnitude correction	1	Magnitude correction	1
Inverted Phases				**CT1.2**	**SET**	**CT2.2**	**SET**
CT NEUTRAL CT1	**SETTING**			Magnitude correction	1	Magnitude correction	1
Rated Primary Current	250.0			**CT1.3**	**SET**	**CT2.3**	**SET**
Rated Secondary Current	1			Magnitude correction	1	Magnitude correction	1
Current Range				**CT1.4**	**SET**		
Internal CT type				Magnitude correction	1		

PROTECTION FUNCTIONS

ANSI CODE	RELAY CODE	SETTING RANGE DESCRIPTION	SETTING RANGE I/U [A/V]	SETTING RANGE TIME	SETTINGS PRIMARY VALUE	SETTINGS I/U [pu/A/V]	SETTINGS TIME	NOTES
27 Undervoltage-3ph								
27	U<	Operate & flt.rec. Blocked	Yes/No			***No***		Mode = **ON**
		Blk. w. inrush curr. detect.	Yes/No			***No***		
		Measured value	Ph to Ph / Ph tp Grnd	0		***Ph tp Ph***		
		Method of measurement	Fund/RMS	0		***Fund***		
		Pickup mode	1 out of 3/3 out of 3			***1 out of 3***		
		Threshold	0.300 V to 175.000 V		***46200***	***70.00***		
		Type of Characteristic curve	IEC VI, SI EI...			***Definite Time***		
		Reset delay time				***Instant***		
		Operating Time		0.00 to 300.00 s			***1.00***	
25 Synchrocheck								
25		Continuous supervision	False/True			***True***		Mode = **ON**
		Min. operating limit Vmin	0.300 - 340.00 V		***59400***	***90.00***		
		Max. operat. limit Vmax	0.300 - 340.00 V		***72600***	***110.00***		
		Max.durat. sync.process		0.00 s - 3600.00 s			***30.00***	
		Direct close command	Yes/No			***No***		
		Voltage adjustment	0.500 - 2.000			***1.00***		
		Close cmd. at V1< & V2>	Yes/No			***No***		
		Close cmd. at V1> & V2<	Yes/No			***Yes***		
		Close cmd. at V1< & V2<	Yes/No			***No***		
		V1, V2 without voltage	0.300 - 170.00 V		***3300***	***5.00***		
		V1, V2 with voltage	0.300 - 340.00 V		***52800***	***80.00***		
		Supervision time		0.00 - 60.00 s			***0.30***	Sync. operating mode = **ON**
		Max. voltage diff. V2>V1	0.300 - 170.00 V		***3300***	***5.00***		
		Max. voltage diff. V2<V1	0.300 - 170.00 V		***3300***	***5.00***		
		Max. frequency diff. f2>f1	0.000 - 2.000 Hz		***66***	***0.10***		
		Max. frequency diff. f2<f1	0.000 - 2.000 Hz		***66***	***0.10***		
		Max. angle diff. α2>α1	0° - 90°		***6600***	***10.00***		
		Max. angle diff. α2<α1	0° - 90°		***6600***	***10.00***		

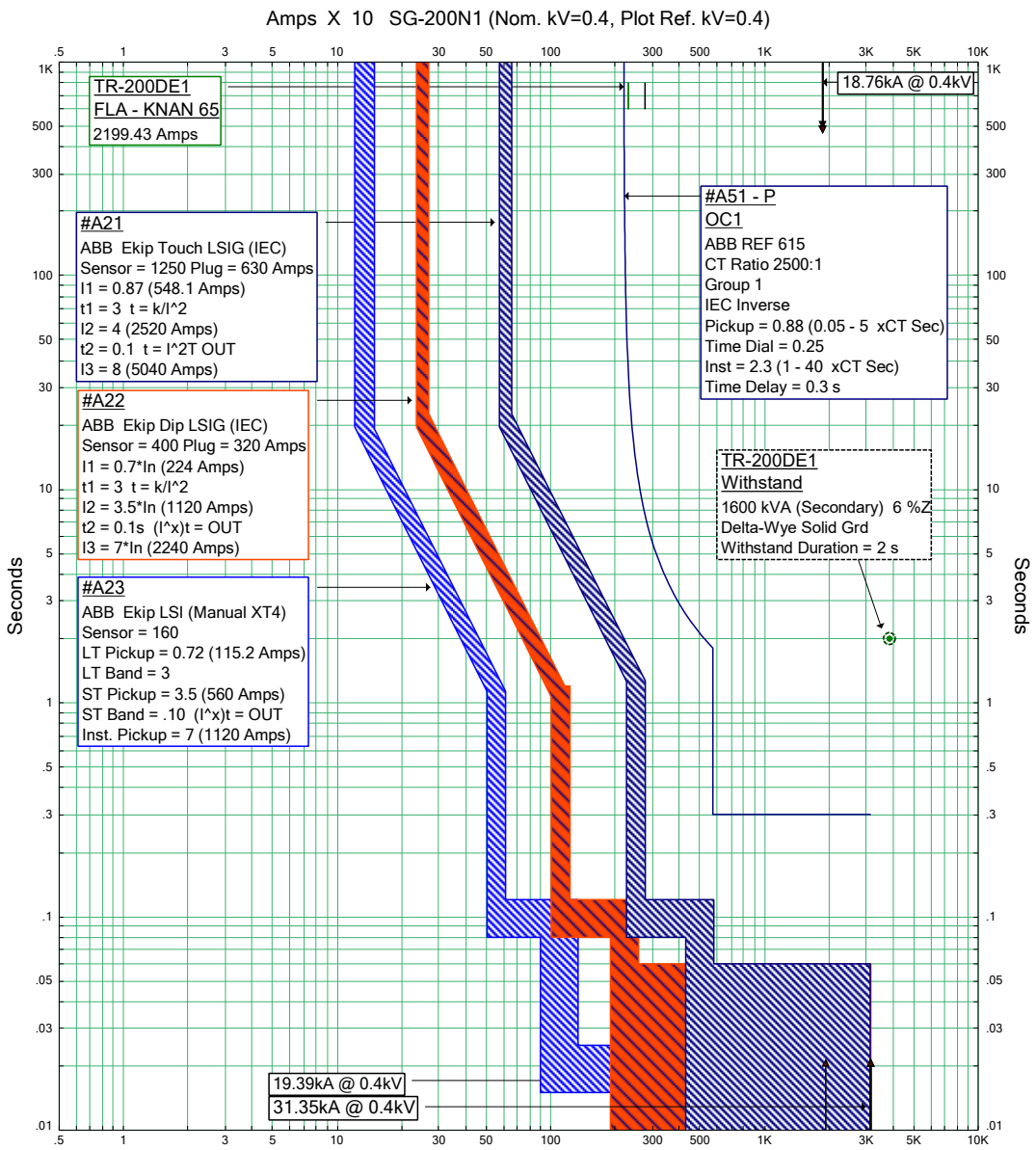
ATTACHMENT C: TIME CURRENT CURVE (TCC) PRINTOUT

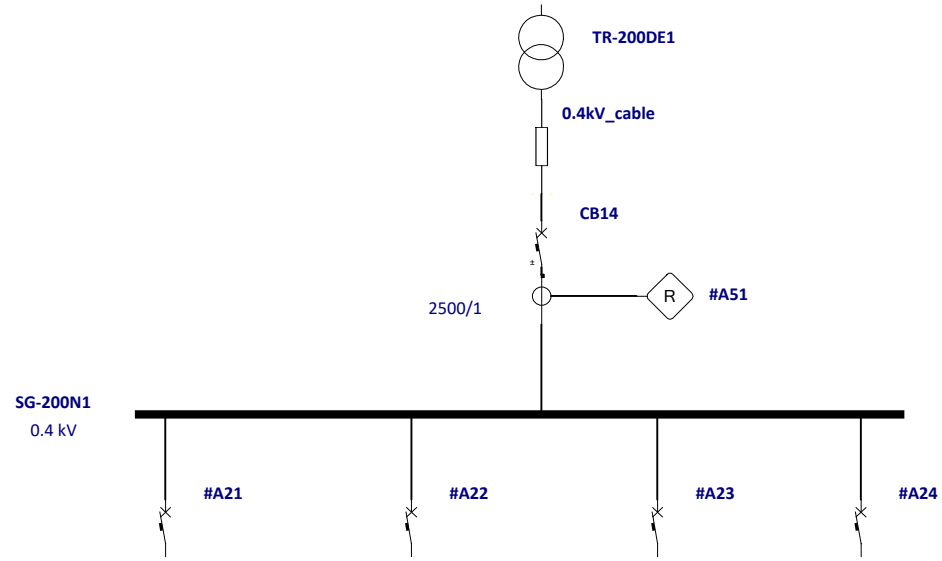




ETAP Star 22.5.0C

CROSSWIND / ROSETTI MARINO	PH SEL DP-200N1	C02
Project: HOLLANDSE KUST NOORD WIND PARK Location: Netherlands Engineer: Stefano Puddu		SN: SPNGSRLIT Fault: Phase





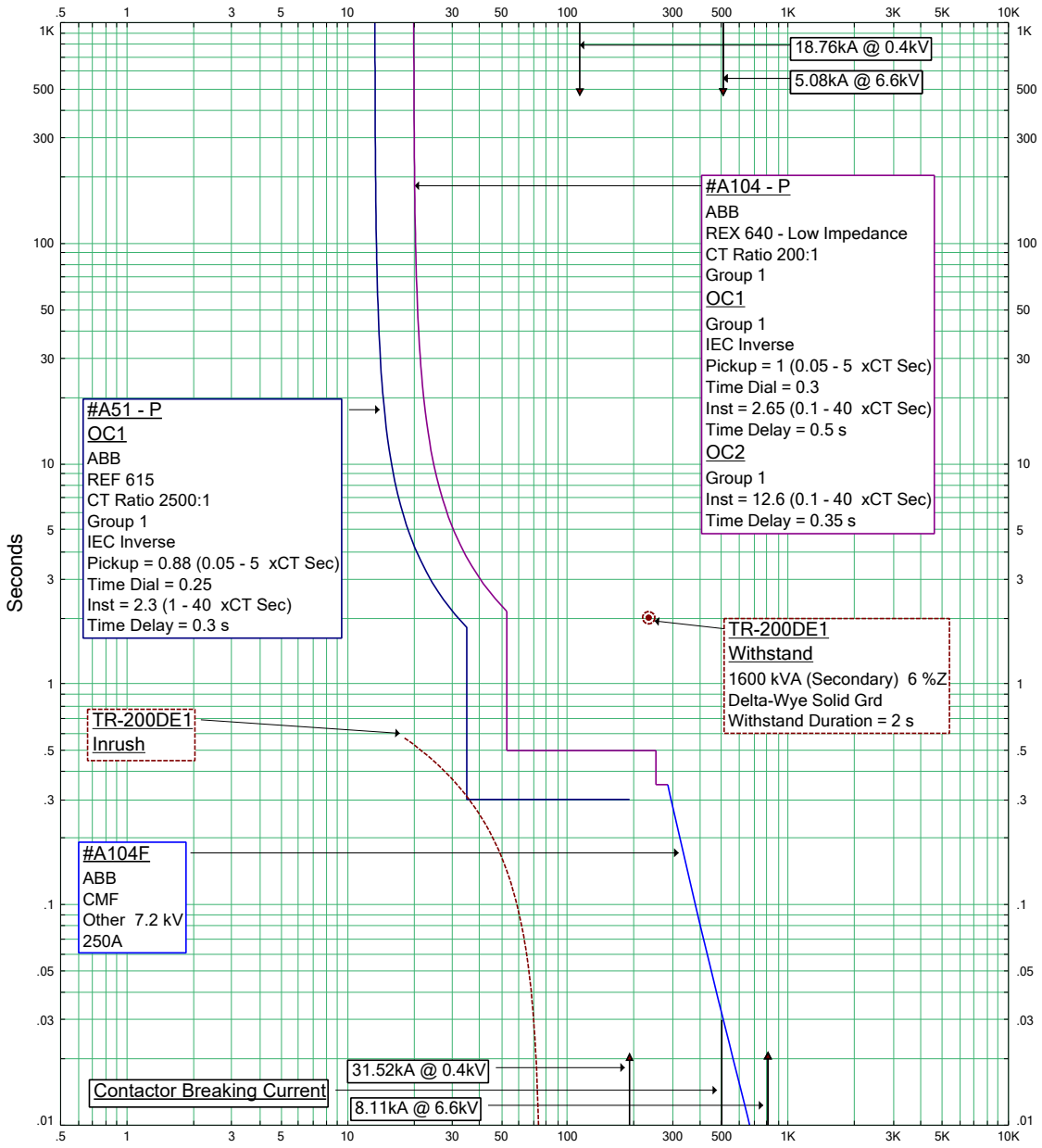
ETAP Star 22.5.0C

CROSSWIND / ROSETTI MARINO	PH SEL SG-200N1 PAGE 1	C03

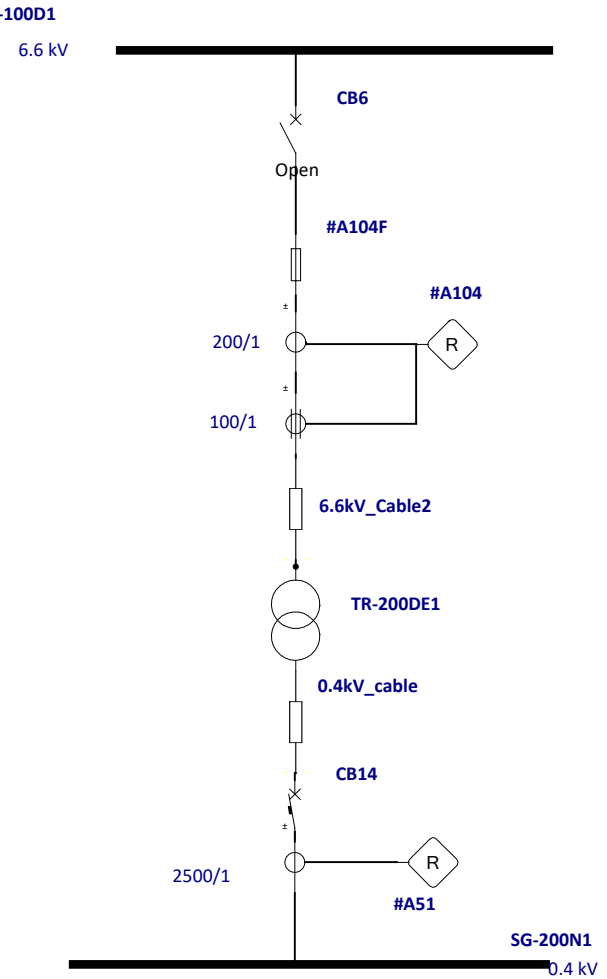
Project: HOLLANDSE KUST NOORD WIND PARK
Location: Netherlands
Engineer: Stefano Puddu

SN: SPNGSRLIT
Fault: Phase

Amps X 10 SG-100D1 (Nom. kV=6.6, Plot Ref. kV=6.6)



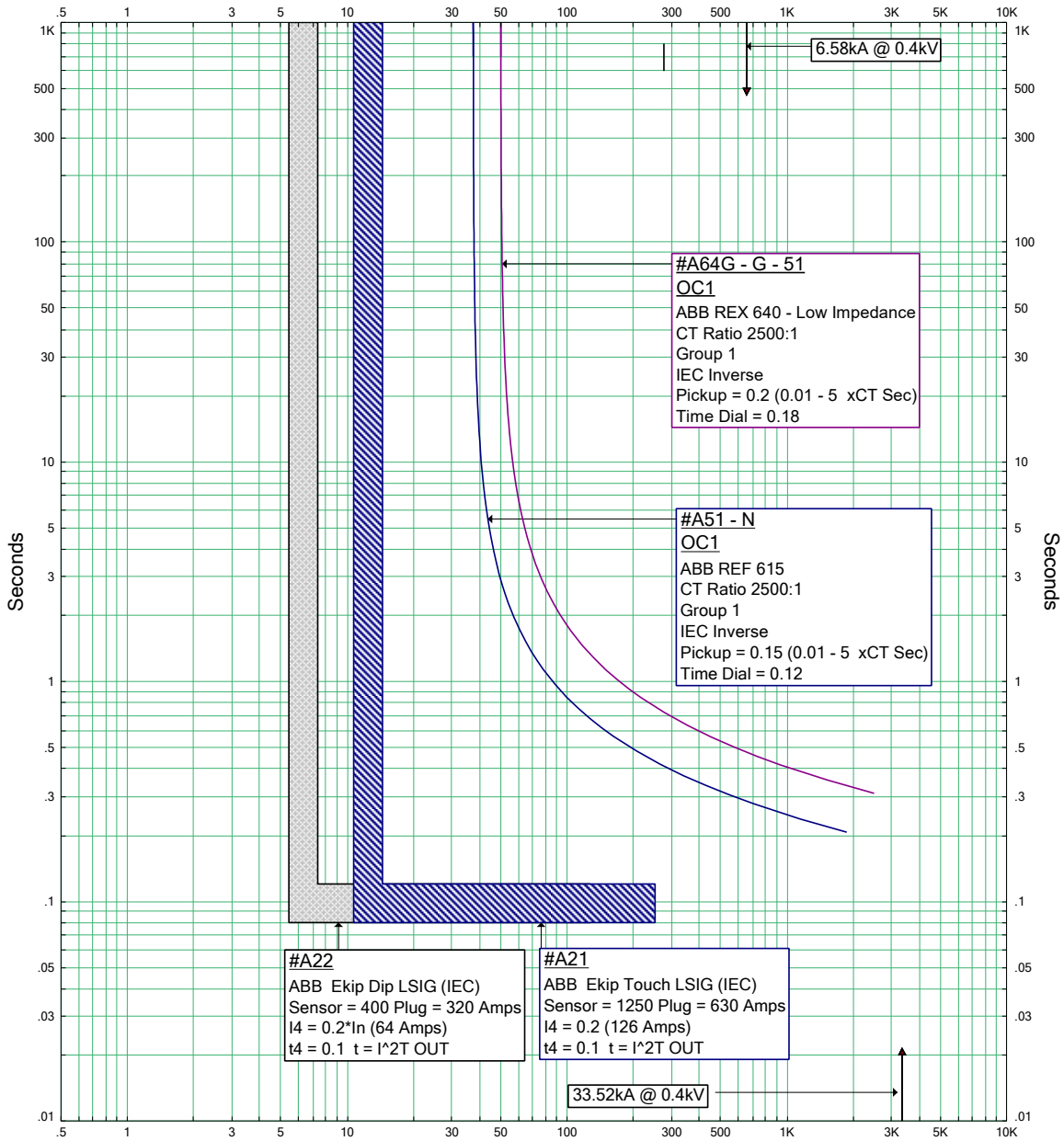
Amps X 10 SG-100D1 (Nom. kV=6.6, Plot Ref. kV=6.6)



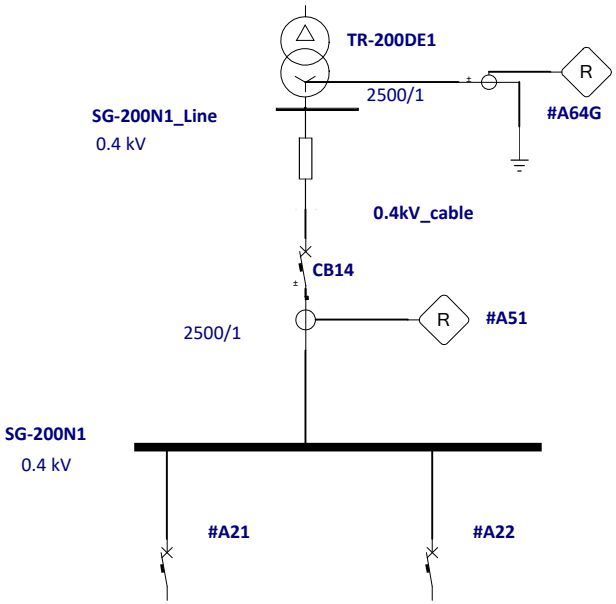
ETAP Star 22.5.0C

CROSSWIND / ROSETTI MARINO	PH SEL SG-200N1 PAGE 2	C04
Project: HOLLANDSE KUST NOORD WIND PARK Location: Netherlands Engineer: Stefano Puddu		SN: SPNGSRLIT Fault: Phase

Amps X 10 SG-200N1_Line (Nom. kV=0.4, Plot Ref. kV=0.4)

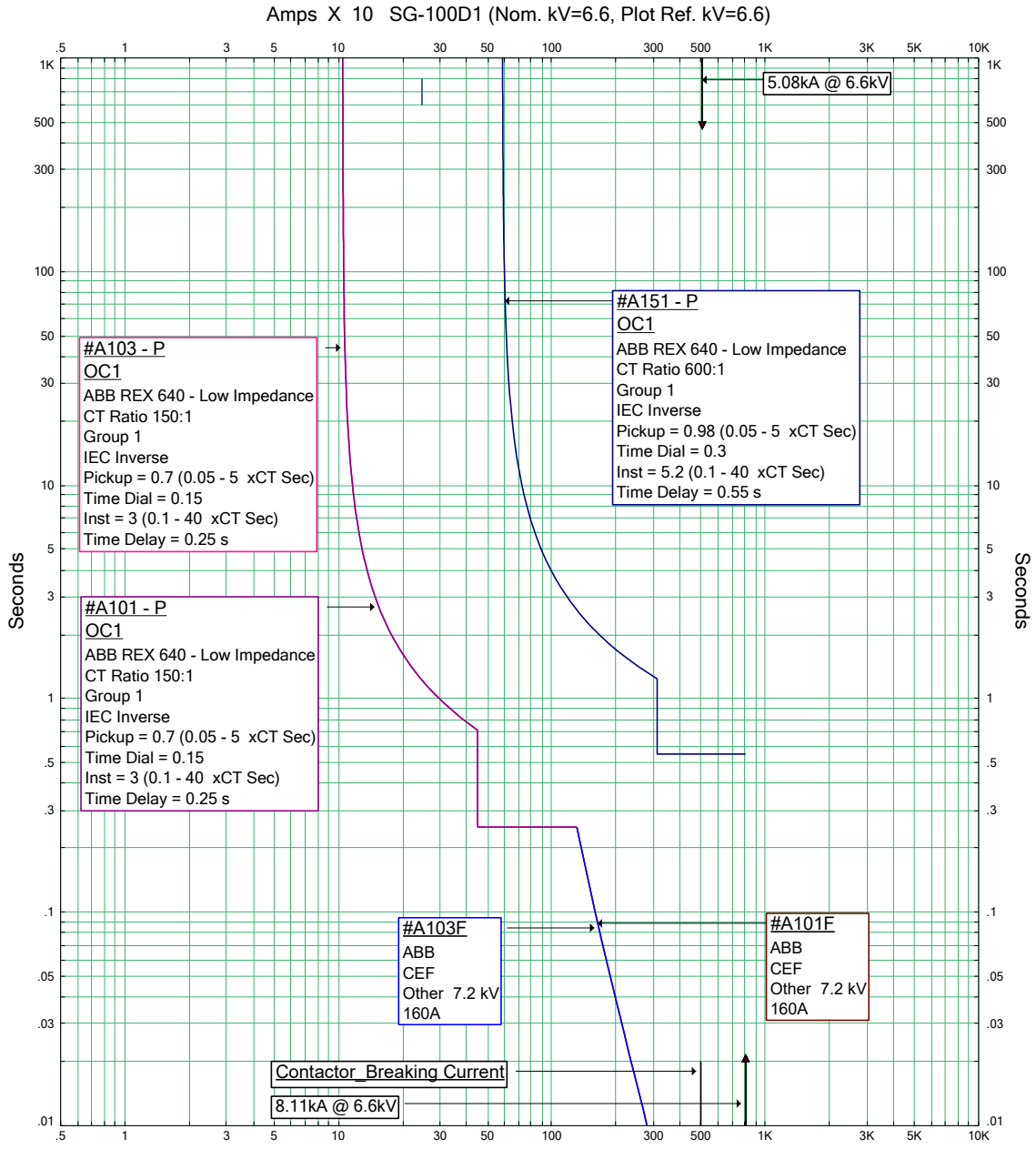


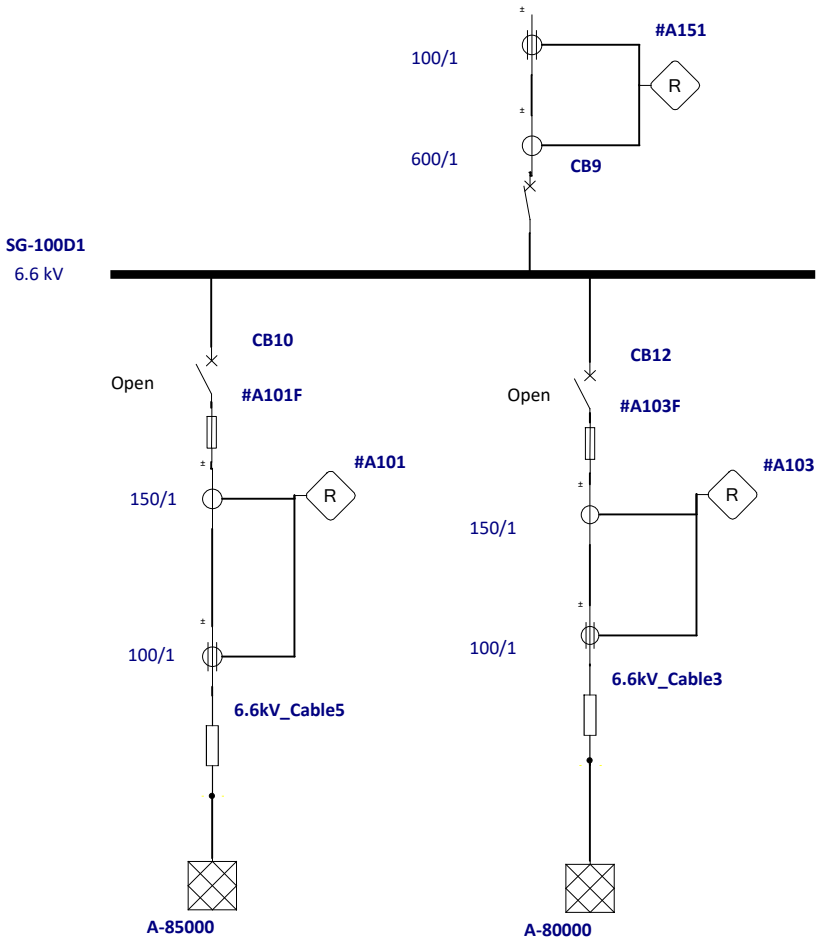
Amps X 10 SG-200N1_Line (Nom. kV=0.4, Plot Ref. kV=0.4)



ETAP Star 22.5.0C

CROSSWIND / ROSETTI MARINO	GR SEL SG-200N1	C04
Project: HOLLANDSE KUST NOORD WIND PARK Location: Netherlands Engineer: Stefano Puddu		SN: SPNGSRLIT Fault: Ground



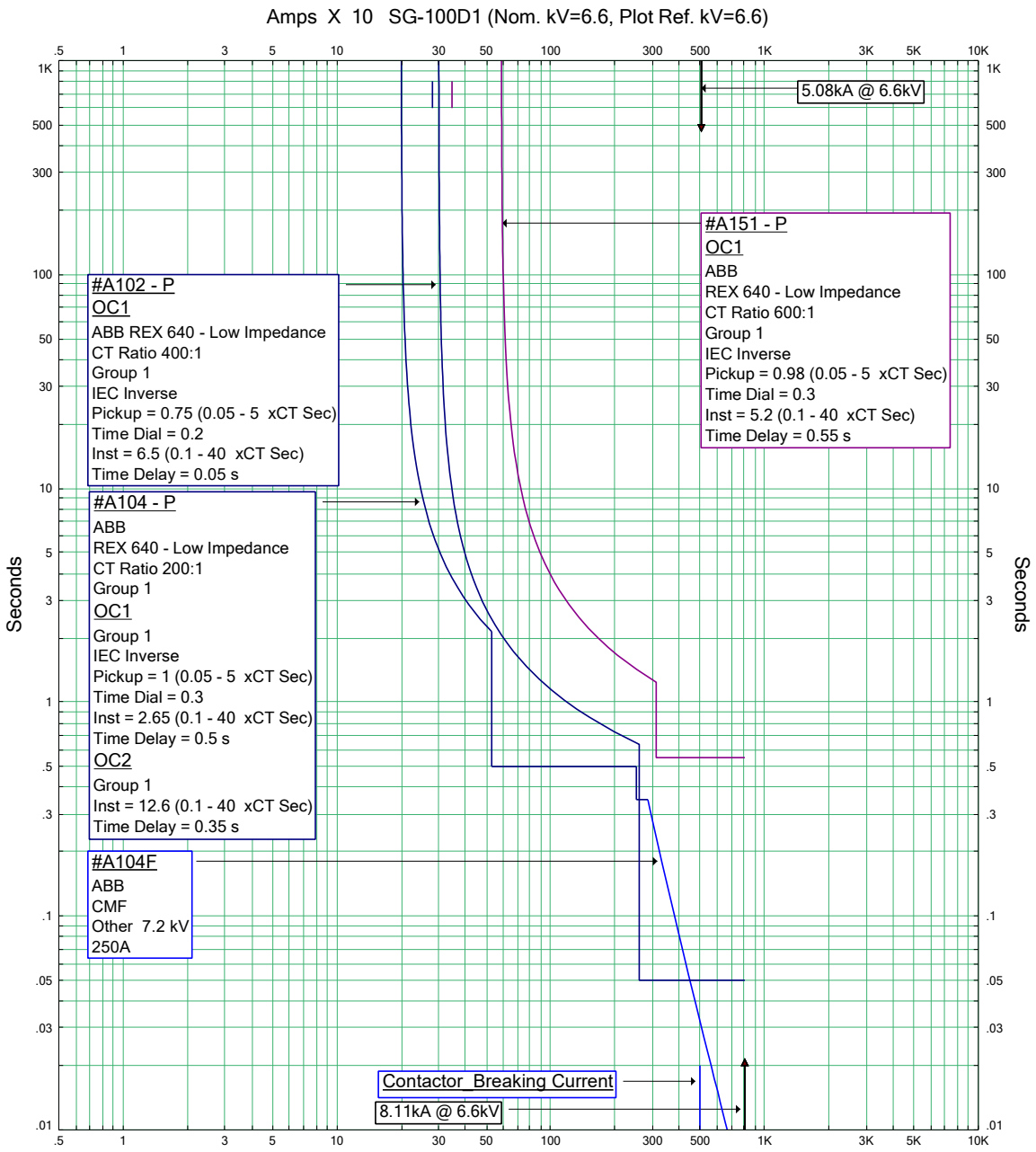


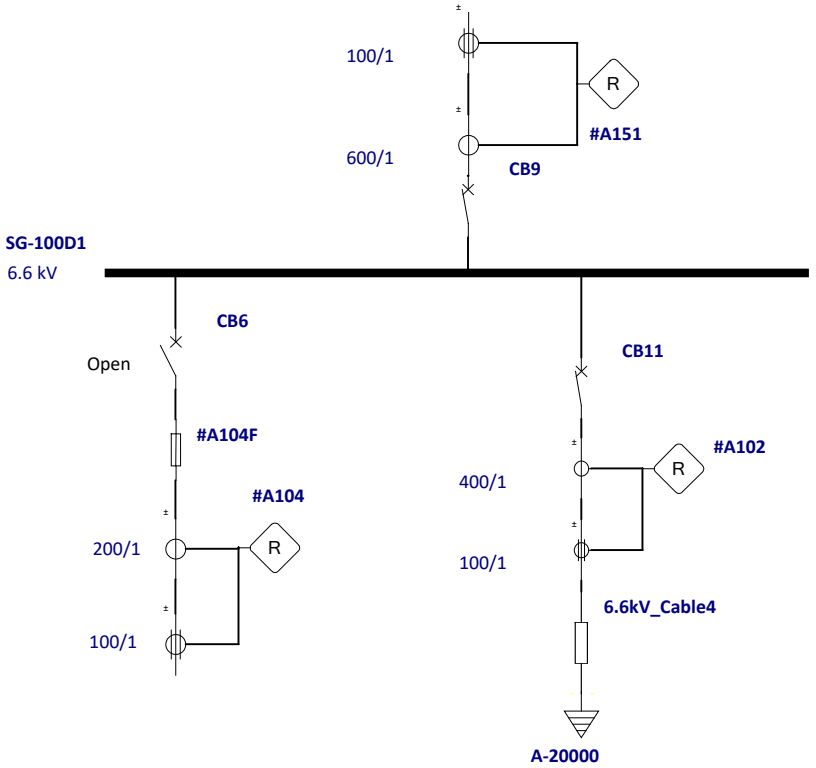
ETAP Star 22.5.0C

CROSSWIND / ROSETTI MARINO	PH SEL SG-100D1 PAGE 1	C06

Project: HOLLANDSE KUST NOORD WIND PARK
Location: Netherlands
Engineer: Stefano Puddu

SN: SPNGSRLIT
Fault: Phase



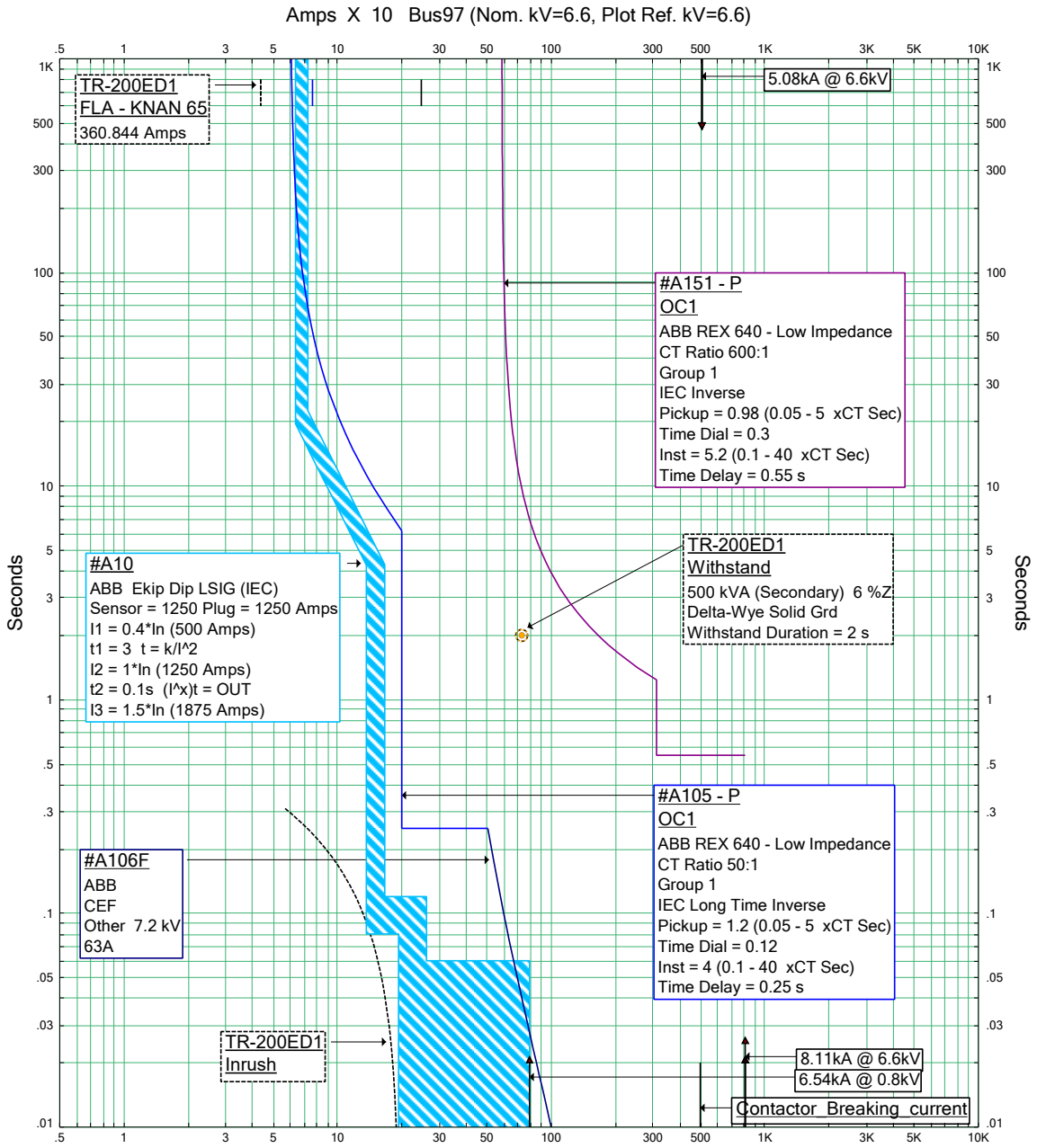


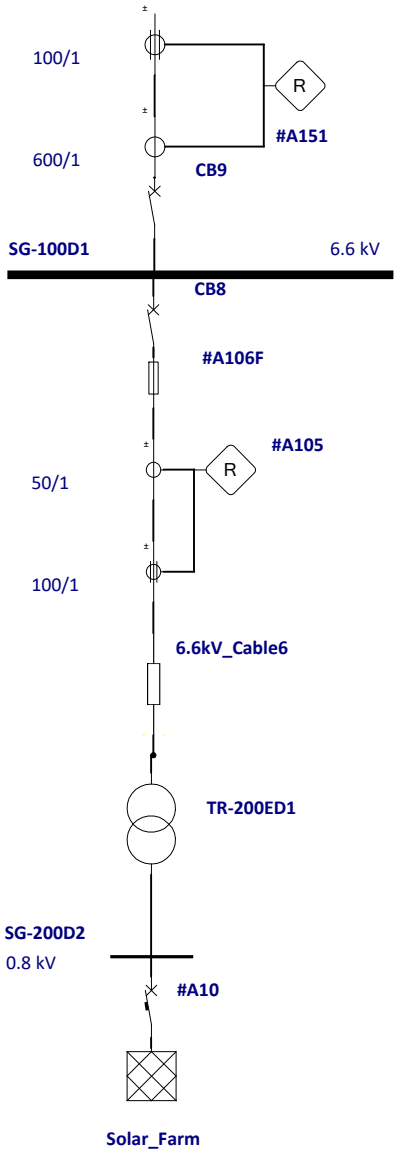
ETAP Star 22.5.0C

CROSSWIND / ROSETTI MARINO	PH SEL SG-100D1 PAGE 2	C07

Project: HOLLANDSE KUST NOORD WIND PARK
Location: Netherlands
Engineer: Stefano Puddu

SN: SPNGSRLIT
Fault: Phase



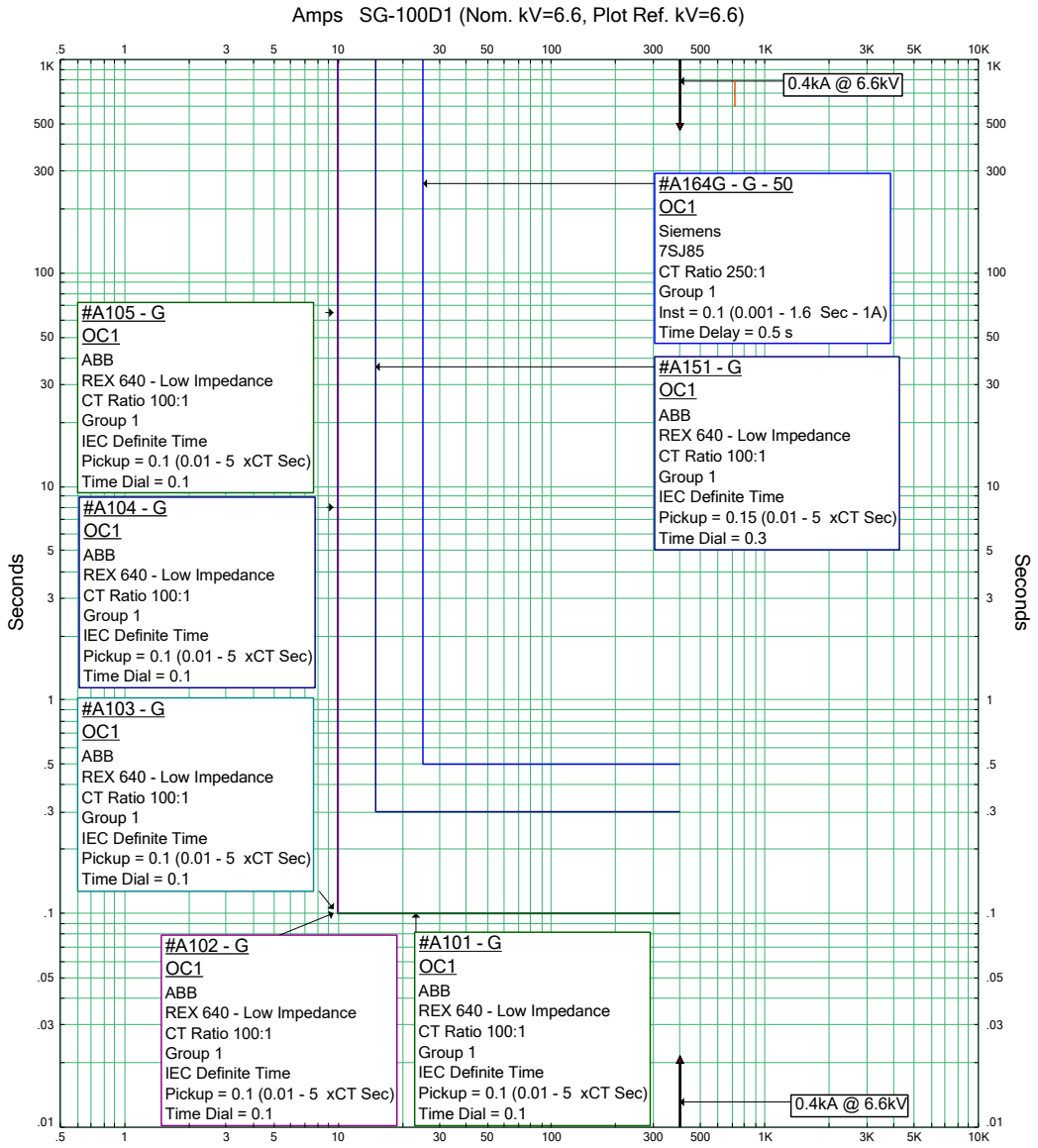


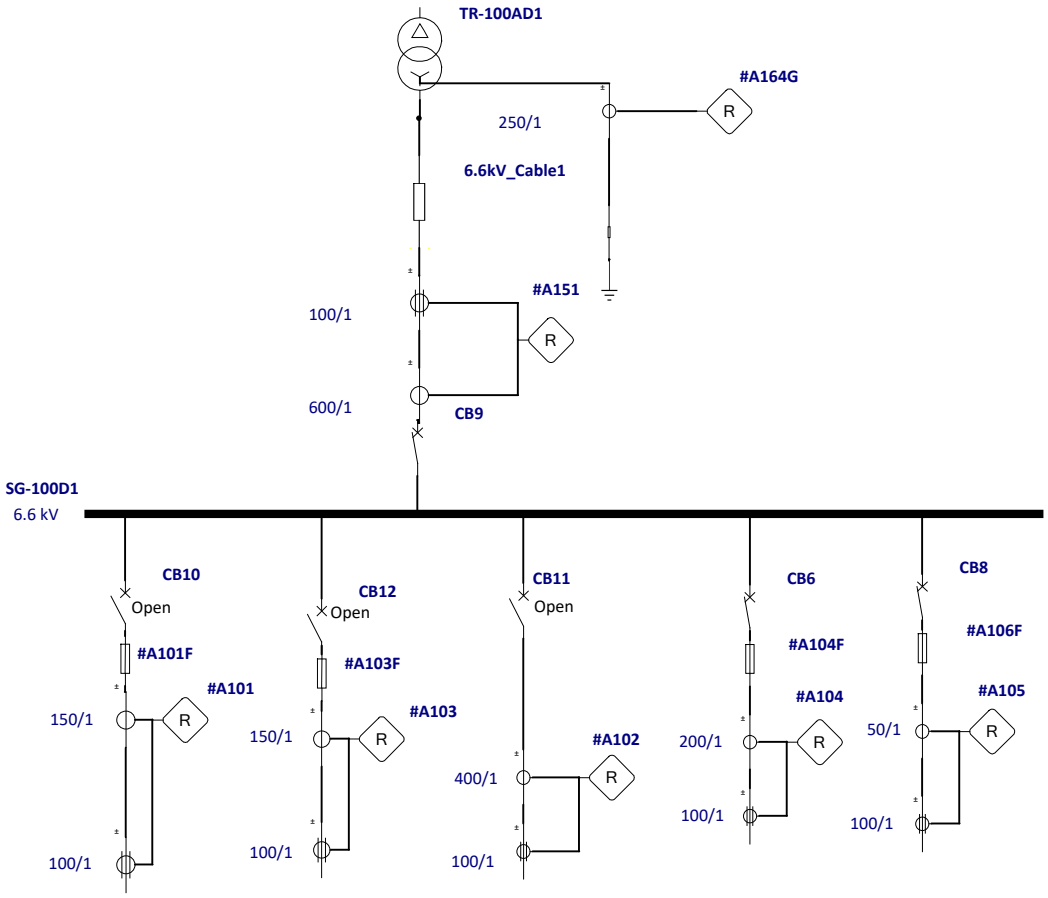
ETAP Star 22.5.0C

CROSSWIND / ROSETTI MARINO	PH SEL SG-100D1 PAGE 3	C08

Project: HOLLANDSE KUST NOORD WIND PARK
Location: Netherlands
Engineer: Stefano Puddu

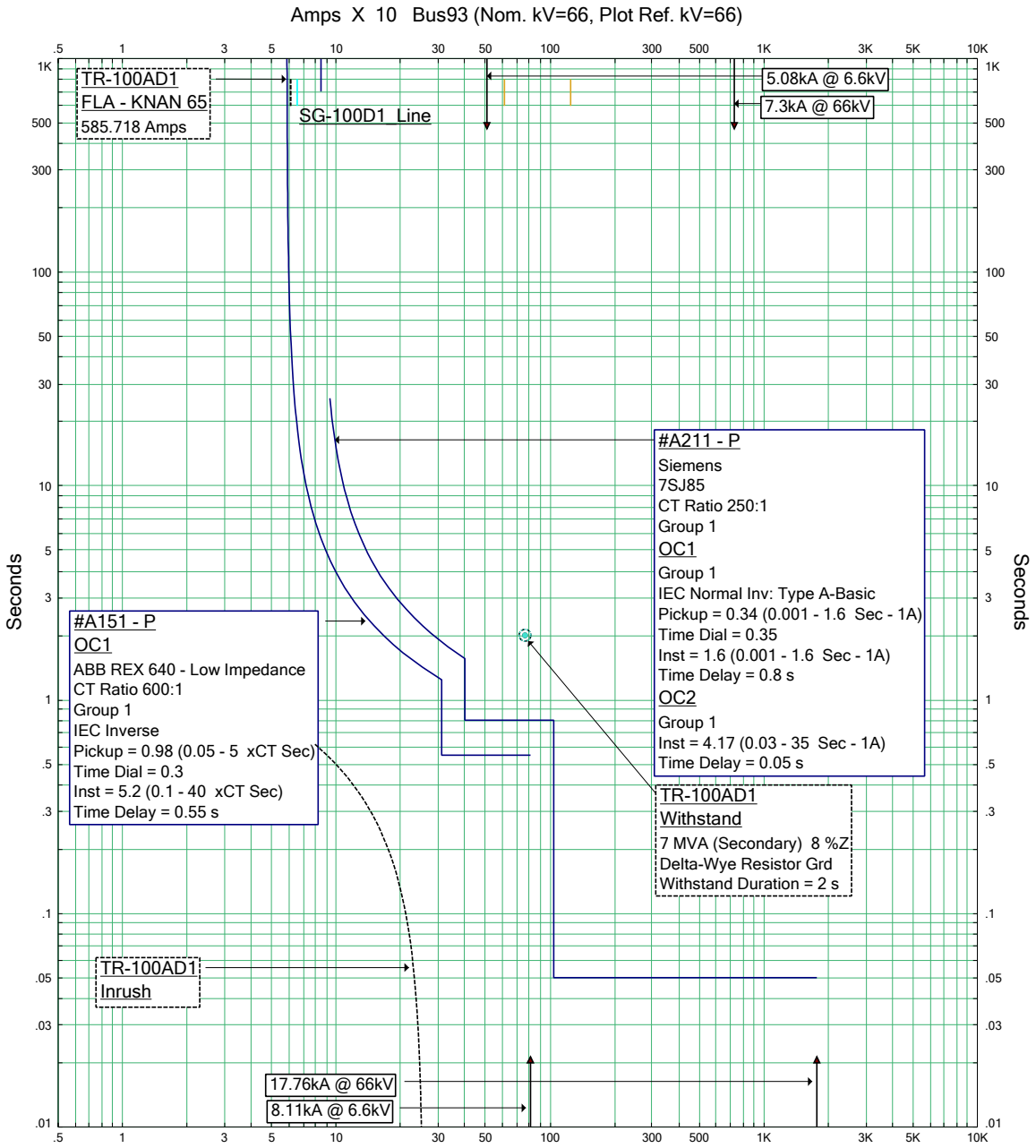
SN: SPNGSRLIT
Fault: Phase

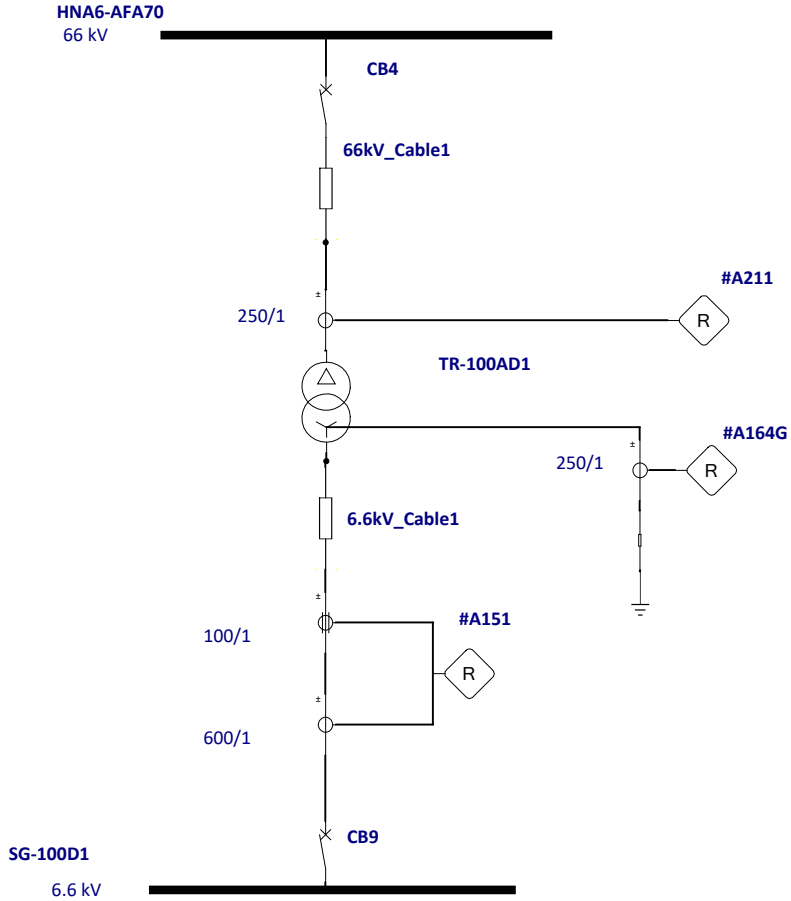




ETAP Star 22.5.0C

CROSSWIND / ROSETTI MARINO	GR SEL SG-100D1	C09
Project: HOLLANDSE KUST NOORD WIND PARK Location: Netherlands Engineer: Stefano Puddu		SN: SPNGSRLIT Fault: Ground



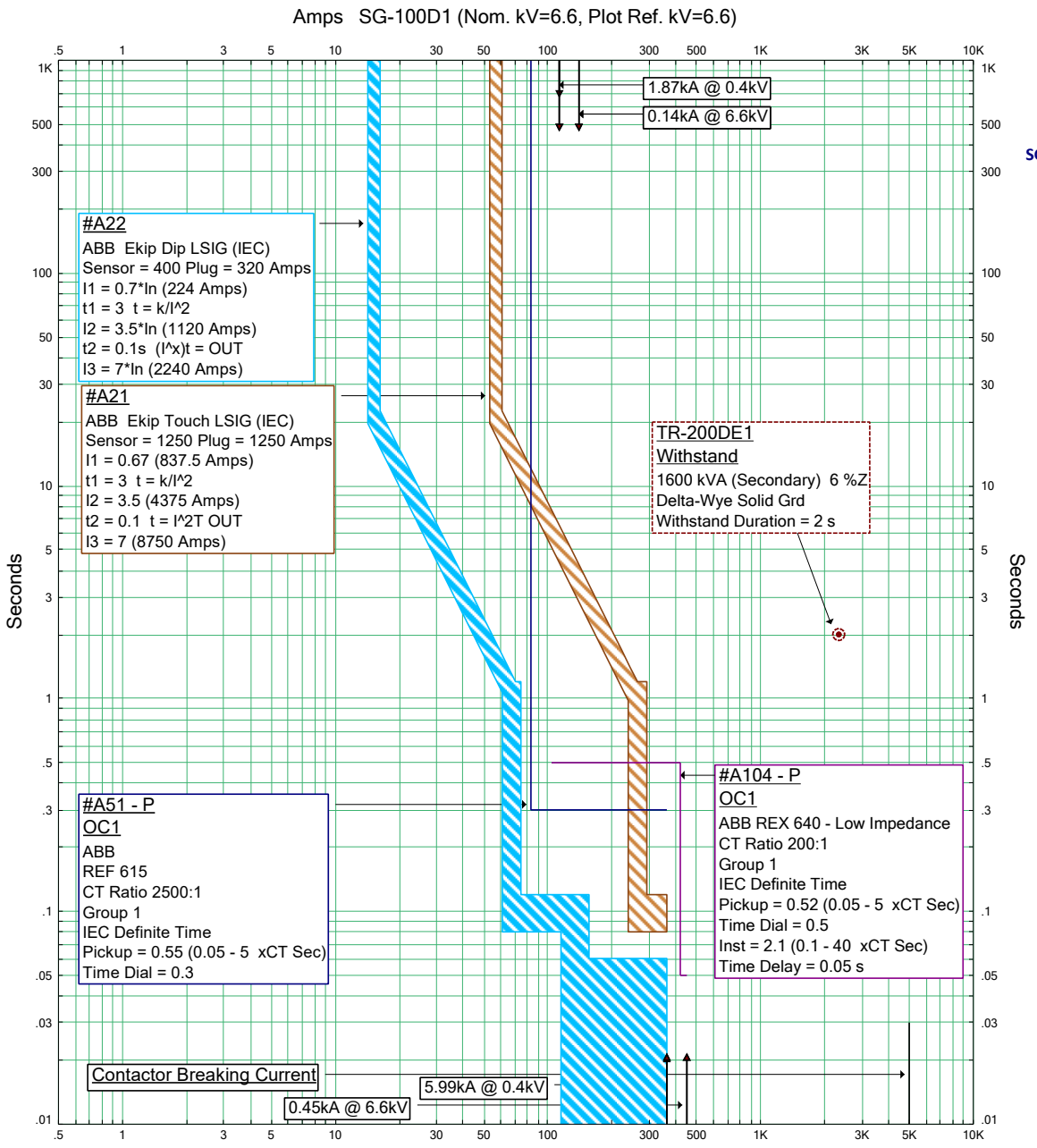


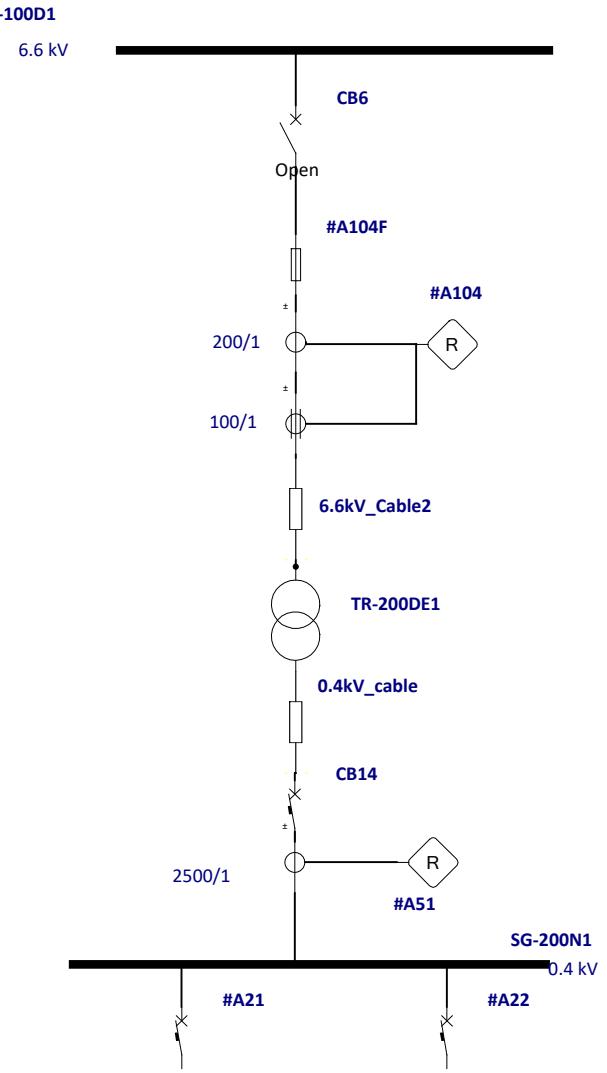
ETAP Star 22.5.0C

CROSSWIND / ROSETTI MARINO	PH SEL HNA6-AFA70	C10

Project: HOLLANDSE KUST NOORD WIND PARK
Location: Netherlands
Engineer: Stefano Puddu

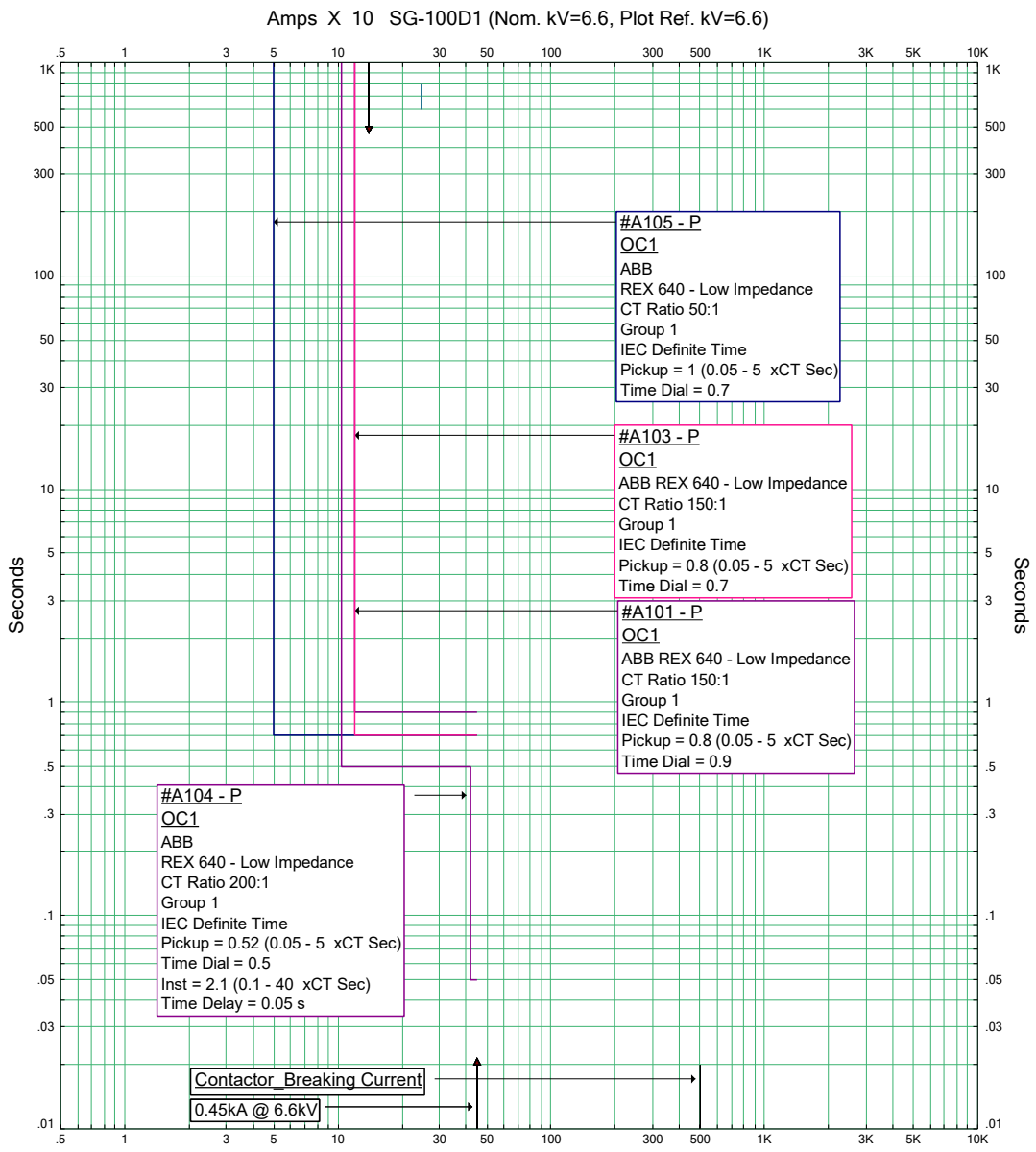
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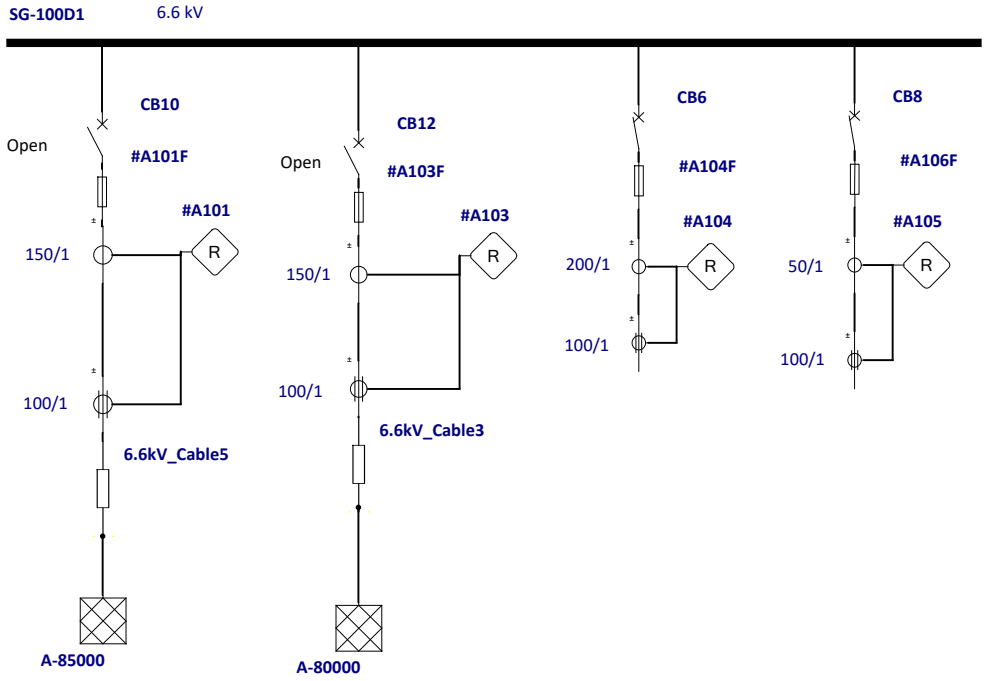




ETAP Star 22.5.0C

CROSSWIND / ROSETTI MARINO	PH SEL SG-200N1 ISLAND	C11
Project: HOLLANDSE KUST NOORD WIND PARK Location: Netherlands Engineer: Stefano Puddu		SN: SPNGSRLIT Fault: Phase





ETAP Star 22.5.0C

CROSSWIND / ROSETTI MARINO	PH SEL SG-100D1 ISLAND	C12
Project: HOLLANDSE KUST NOORD WIND PARK Location: Netherlands Engineer: Stefano Puddu		SN: SPNGSRLIT Fault: Phase