Base Load Power Hub (BLPH)

OTP HV Switchgear & 66 kV Transformer Systems

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1 INTRODUCTION

1.1 Project Overview

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

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

1.2 Project Location

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

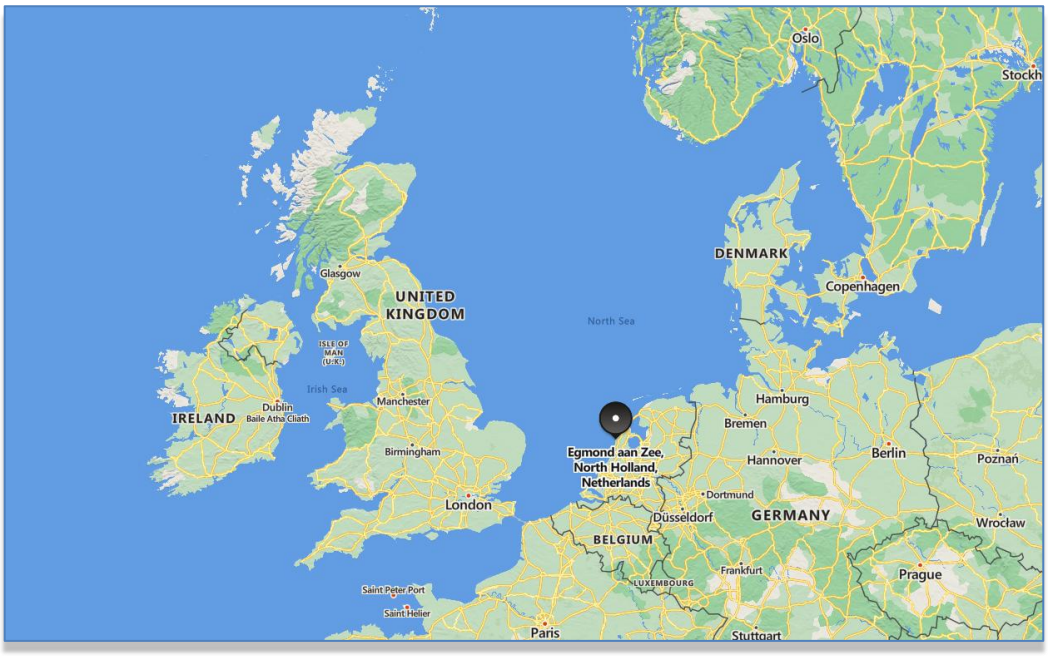


Figure 1 - HOLLANDSE KUST NOORD WIND PARK Location Map

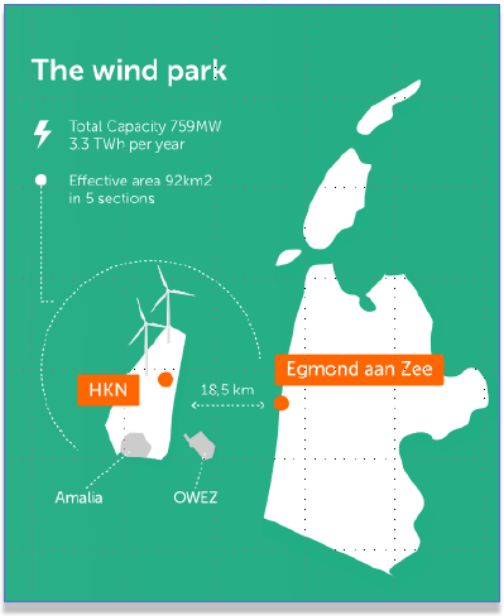


Figure 2 - Wind Park Details

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile is located on coordinates E 590719.1, N 5841602.3 and is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

1.3 Project Concept

All components included in the BLPH will be integrated onshore on a topside and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.

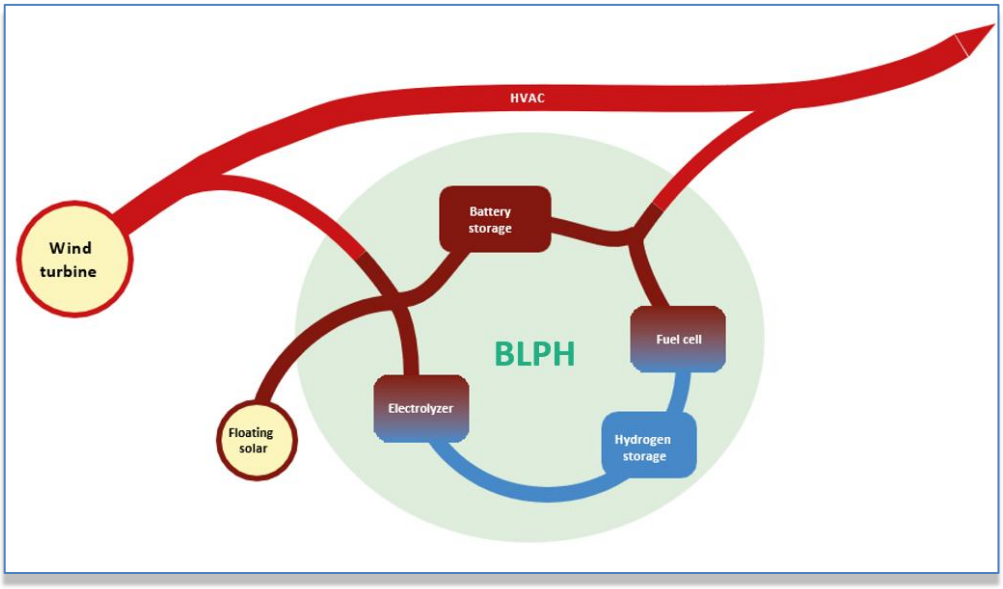


Figure 3 – BLPH Concept

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

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

2 DOCUMENT SCOPE

The purpose of this document is to describe the methodology and the planned actions to be implemented for the preparation and execution of Mechanical Completion, Pre-commissioning, Commissioning & Start-Up activities to be performed on the PLANT, including COMPANY PROVIDED ITEMS, at the onshore premises of CONTRACTOR located in Milan (Italy) offices and Piomboni yard - Marina di Ravenna (Italy).

CONTRACTOR, pursuant to CONTRACT and PROJECT requirements, shall implement an exacting methodology, complete with a distinct set of tools and documentation to meet the following key objectives:

Perform the Mechanical Completion, Pre-commissioning and Commissioning on the WORKSITE to the maximum extent possible so as to minimise the commissioning operations on SITE.

- Ensure safety for the people, environment and facilities during the execution of the Commissioning activities at WORKSITE,
- Ensure integrity and operation of the equipment for their lifetime in accordance with PROJECT design and specifications,

- Plan a smooth and flawless execution of the Commissioning activities avoiding unforeseen downtimes and delays.

Achievement of the above objectives shall be obtained by:

- Defining and prioritizing a predetermined sequence of the Mechanical Completion checks, Pre-commissioning and Commissioning tests and tasks,
- Checking, testing systematically and exhaustively all the components of PLANT in compliance with PROJECT approved procedures and CONTRACT terms, managed by a dedicated team of inspectors, technicians and field engineers who will perform the Mechanical Completion, Pre-commissioning, Commissioning and Start-Up tasks and subsequently record the results via discipline specific check, inspection and test sheets (ITR's) & where applicable via discrete Operational Test Procedures (OTP's).
- Ensuring full traceability of the performed checks and tests, through implementation of a dedicated Project Completions Management System (CMS) containing individual references to all tagged items.

3 OTP SUMMARY

3.1 Test Objective

The operating test of the 66kV Power Distribution switchboard system is executed to ensure that the system is started up in a safe and controlled manner and to verify the correct operation according to the project requirements.

The aim of this document is to provide the sequence and appropriate actions to test the 66kV Power Distribution Switchboard HNA6-AFA70.

Commissioning activities shall be developed as follows:

- ONSHORE PHASE - pre-commissioning and commissioning activities at Contractor site (WORKSITE)
- OFFSHORE PHASE - commissioning activities at SITE

3.2 System Boundary Limits

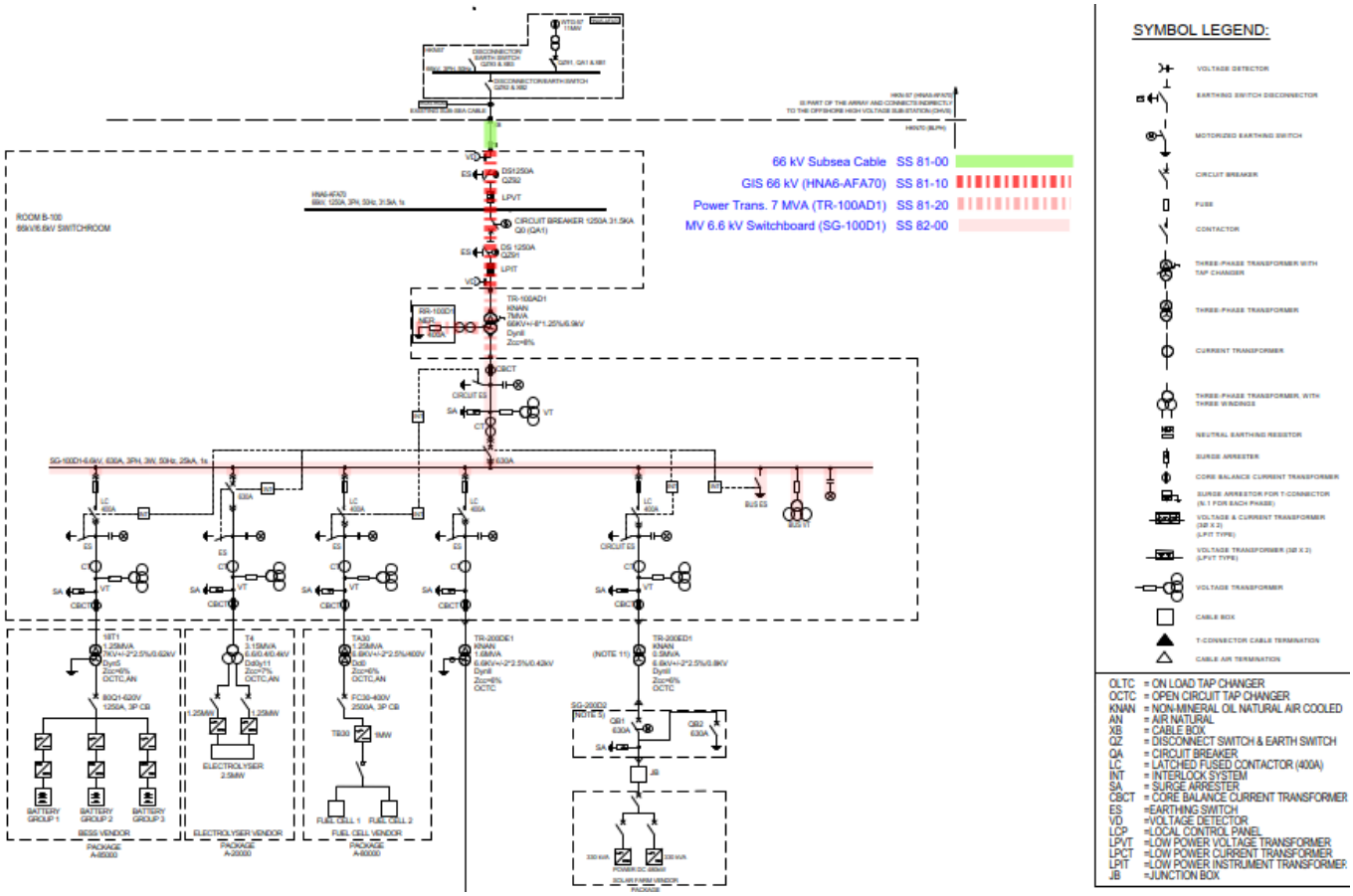


Figure 4 – OTP System Boundary Limits

This picture is extracted from the document n° 123A90-EL-DG-20158 "OVERALL/SINGLE LINE" .

3.3 Test and System Description

This document is related to the following systems/ subsystems:

- 81-10: GIS 66 kV (HNA6-AFA70)
- 81-20: Power Transformer 7 MVA (TR-100AD1)

The switchgear HNA6-AFA70 is installed inside Technical Room B-100, and power transformer TR-100AD1 is physically installed on the lower deck in proximity to the technical room B-100.

System boundary limits are defined in OVERALL SINGLE LINE DIAGRAM Doc. 123A90-DDL-EL-DG-20158.

These parts of the system shall be tested at worksite and at site.

The 66kV switchboards are metal enclosed prefabricated self-supporting type, for floor installation in compliance to the requirements of IEC 62271-203.

The 66kV switchboard (SWBD) main data are as follows:

3.3.1 GIS bay HNA6-AFA70

composed of the following 3-phase encapsulated modules:

- N. 1 66 kV Circuit breaker for 3 phases
- N. 2 Combined disconnector & earthing switch for 3 phases
- N. 1 Low power instrument transformer for 3 phases [LPIT type]
- N. 1 Low power voltage transformer for 3 phases [LPVT type]
- N. 2 Cable connection part including F-Bushing and Voltage Detecting Sensor
- Local unit control panel CP-100E1

TECHNICAL DATA

3.3.1.1 Environment

- Installation: Indoor
- Altitude: ≤ 1000 above sea level
- Ambient temperature: -5 ℃ ~ 40 ℃ (Indoor)

3.3.1.2 Complete GIS Module

- Type designation: HSGE-074B
- System voltage: 66 kV
- Rated voltage: 72.5 kV
- Number of phases: 3Φ
- Earth system: Isolated
- Rated frequency: 50 Hz
- Rated continuous current
- Feeder: 1250 A
- Rated short time withstand current: 31.5 kA rms
- Rated peak withstand current: 78.75 kA peak
- Rated duration of short-circuit: 1 sec
- Rated short-duration power-frequency withstand voltage (1 min)
- Phase-to-earth, across open switching device and between phases: 140 kV rms
- Across isolating distance: 160 kV rms
- Rated lightning impulse withstand voltage (1.2/50μs)
- Phase-to-earth, across open switching device and between phases: 325 kV peak
- Across isolating distance: 375 kV peak

- Rated switching impulse withstand voltage (250/2500μs)
- Phase-to-earth: Not Applicable
- Across open switching device: Not Applicable
- Across isolating distance: Not Applicable
- Partial discharge level: ≤ 5 pC
- Gas pressure (bar. G, at 20 ℃)
- Design: 6.59 (CB) / 6.59 (Others)
- Rated: 5 (CB) / 5 (Others)
- 1st alarm signal: 4.7 (CB) / 4.7 (Others)
- Minimum (2nd alarm signal): 4.5 (CB) / 4.5 (Others)
- Rated control voltage: 110 Vdc
- Enclosure type: 3 phases common type
- Maximum gas leakage rate [Dry air]: 0.5 %/year
- The phases are fully insulated.

3.3.1.3 Circuit Breaker (CB)

- Type designation: HCSP-E074C
- Rated continuous current
- Feeder: 1250 A
- Rated short-circuit breaking current: 31.5 kA rms
- Rated short-circuit making current: 78.75 kA peak
- Rated short-line fault breaking current: 28.35 kA rms
- Rated out-of-phase breaking current: 7.875 kA rms
- Rated capacitive switching current
- Rated line-charging breaking current: 10 A
- Rated cable-charging breaking current: 125 A
- Rated short time withstand current: 31.5 kA rms
- Rated duration of short-circuit: 1 sec
- Rated breaking time: 3 cycles (60ms)
- Operating duty cycle: O-0.3s-CO-3m-CO
- Rated short-duration power-frequency withstand voltage (1 min)
- Phase-to-earth, between phases: 140 kV rms
- Across open switching device: 140 kV rms
- Rated lightning impulse withstand voltage (1.2/50μs)

- Phase-to-earth, between phases: 325 kV peak
- Across open switching device: 325 kV peak
- Rated switching impulse withstand voltage (250/2500µs)
- Phase-to-earth: Not Applicable
- Across open switching device: Not Applicable
- Operating method: Charged Spring
- No load closing time: < 70 ms
- No load opening time: < 32 ms
- First-pole-to-clear factor: 1.5
- Trip coil current: ≤ 5 A
- Close coil current: ≤ 5 A
- Rated control voltage: 110 Vdc
- Motor power (1 motor for 3 phase): 260 Watt

3.3.1.4 Disconnecting Switch (DS)

- Type designation:
- HDMO-E74E
- HDMO-E74F
- Rated continuous current
- Feeder: 1250 A
- Rated short time withstand current: 31.5 kA rms
- Rated duration of short-circuit: 1 sec
- Rated short-duration power-frequency withstand voltage (1 min)
- Phase-to-earth, between phases: 140 kV rms
- Across isolating distance: 160 kV rms
- Rated lightning impulse withstand voltage (1.2/50µs)
- Phase-to-earth, between phases: 325 kV peak
- Across isolating distance: 375 kV peak
- Rated switching impulse withstand voltage (250/2500µs)
- Phase-to-earth: Not Applicable
- Across isolating distance: Not Applicable
- Operating method: Motor driven & Manual
- Motor & control voltage: 110 Vdc
- Motor power (1 motor for 3 phase): 350 Watt

3.3.1.5 Maintenance Earthing Switch (ES)

- Type designation:
- HEMO-E074D
- HEMO-E074E
- Rated short time withstand current: 31.5 kA rms
- Rated duration of short-circuit: 1 sec
- Rated short-duration power-frequency withstand voltage (1 min): 140 kV rms
- Rated lightning impulse withstand voltage (1.2/50μs): 325 kV peak
- Rated switching impulse withstand voltage (250/2500μs): Not Applicable
- Operating method: Motor driven & Manual
- Motor & control voltage: 110 Vdc
- Motor power (1 motor for 3 phase): 350 Watt

3.3.1.6 Low Power Current Transformer (LPCT)

- Type: LPCT
- Polarity: Subtractive
- Rated Primary Current [A], Ipr: In 250, Imax 1250
- Accuracy Class: 0.2S / 5TPE
- Rated short-time thermal current: 31.5 kA rms
- Rated short-duration power-frequency withstand voltage (1 min)
- Main circuit: 140 kV rms
- Secondary circuit: 2.2 kV rms
- Rated lightning impulse withstand voltage (1.2/50μs): 325 kV peak

3.3.1.7 Low Power Voltage Transformer (LPVT)

- Type: LPVT
- Primary voltage [kV]: 66/ √3
- Primary voltage Factor, Fv: 1.9 x Upr
- Accuracy class: 0.5 / 3P
- Rated short-duration power-frequency withstand voltage (1 min)
- Main circuit: 140 kV rms
- Secondary circuit: 2.2 kV rms
- Rated lightning impulse withstand voltage (1.2/50μs): 325 kV peak
- Rated switching impulse withstand voltage (250/2500μs): Not Applicable

3.3.1.8 Local Unit Control Panel

- Type: Stand Alone
- Size [mm]: 1000(W), 700(D), 2250(H)
- IP: 55
- Metal Thickness of Panel: SPHC 2.3mm
- Ground bus bar: 6T x 30
- Gland plate: 3T Al plate
- Front door opening angle: 120°
- Cable entry from top

3.3.1.9 HV cable Termination with VD (voltage detecting) sensor

- Type: F bushing; VD sensor built in type
- Manufacturer: TE connectivity
- Rated Voltage: 72.5 kV
- Rated continuous current: 1250 A
- Rated lightning impulse withstand voltage: 325 kV peak
- Power frequency withstand voltage: 155kV/1min
- Partial discharge: 63kV < 10pc
- : 44kV < 5pc

3.3.1.10 Power supply

There are two Aux power supply (230VAC, 110VDC).

- 110VDC A/B From UPS DP-200F1 MCB Q10, Q11.
- Supply motor spring charger
- Command circuits (feeders)
- 230V from DP-200N1 MCB Q37
- Space heaters and internal lighting and socket

3.3.2 Power Transformer TR-100AD1

composed of the following modules:

- N. 1 Transformer TR-100AD1
- N. 1 Auxiliary panel - Protection devices - CP-100E4
- N. 1 Motor Drive Unit (MDU) - OLTC Panel - CP-100E2
- N. 1 AVR control panel - CP-100E3

3.3.2.1 General

- Manufacturer: MF Trasformatori srl
- Equipment identifier: TR-100AD1
- Type of liquid preservation system: conservator with bladder or diaphragm type
- Service: Distribution transformer
- Conformity assessment system: D

3.3.2.2 Environmental conditions

- Altitude (if more than 1000m or 3280ft): not more than 1000 m
- Minimum ambient temperature: -8,4 °C
- Maximum ambient temperature: 25 °C
- Yearly average ambient temperature: 10,5 °C
- Design ambient temperature (if more than 40 °C or 104 °F): not more than 40°C
- Relative humidity at maximum operating temperature (if more than 90 %): 95 %
- Climatic conditions (K) for liquid immersed transformer: 4K26
- Special climatic conditions (Z) for liquid immersed transformer: 4Z1,4Z5,4Z14, 4Z15, 4Z17, 4Z10
- Biological conditions (B) for liquid immersed transformer: 4B2
- Chemically active substances (C) for liquid immersed transformer: 4CX
- Mechanically active substances (S) for liquid immersed transformer: 4S11
- Mechanical conditions (M) for liquid immersed transformer: 4M11
- Corrosion class: CX
- Seismic zone as per IEC 60721-2-6, figure 5: zone 2
- Location: offshore fixed
- Unusual service conditions: No
- Sound power level: 68 dB(A)

3.3.2.3 Hazardous area classification

- Hazardous area classification zone: non hazardous
- Hazardous area classification gas group: N/A
- Hazardous area classification temperature class: N/A

3.3.2.4 Technical data

Electrical system data

- Rated voltage (HV): 66 kV
- Rated voltage (LV): 6,9 kV

- Rated voltage (tertiary): N/A kV
- Rated frequency: 50 Hz
- System short circuit apparent power: 87,5 MVA
- Minimum full load power factor: 0,8
- Supply voltage harmonic content: 5 %

Transformer/reactor data

General

Power frequency withstand voltage

- Power frequency withstand voltage - HV winding: 140 kV
- Power frequency withstand voltage - LV winding: 20 kV
- Power frequency withstand voltage - tertiary winding: N/A kV
- Power frequency withstand voltage - neutral terminal: 20 kV

Lightning impulse withstand voltage

- Lightning impulse withstand voltage - HV winding: 325 kV
- Lightning impulse withstand voltage - LV winding: 60 kV
- Lightning impulse withstand voltage - tertiary winding: N/A kV
- Lightning impulse withstand voltage - neutral terminal: 60 kV
- Number of phases: 3
- Direction of power flow: bi-directional
- Connection and phase displacement symbol (vector group): Dyn11
- Percentage impedance on air natural rating at principal tap: 8 %
- High limit for zero sequence impedance: N/A ohms/ph
- Low limit for zero sequence impedance: N/A Ohms/ph
- Rated power in air natural mode (HV): 7000 kVA
- Rated power in air natural mode (LV): 7000 kVA
- Rated power in air natural mode (tertiary): N/A kVA
- Rated power in forced cooling mode (HV): N/A kVA
- Rated power in forced cooling mode (LV): N/A kVA
- Rated power in forced cooling mode (tertiary): N/A kVA
- Variation in V/Hz ratio from no load to rated load when exceeding 105 %: Not more than 105 %
- Parallel operation: No
- Requirement of 1.8 times overloading for transformer feeding a group of motors: No
- Insulating liquid: synthetic organic liquid MIDEL 7131

- Tolerance on total losses when not in accordance with IEC 60076-1: N/A %
- Tolerance on impedance value when not in accordance with IEC 60076-1: N/A %

Neutral terminal

- Level of DC current in neutral: <5 %
- Transformer neutral earthing for HV winding: N/A
- Transformer neutral earthing for LV winding: resistance grounded
- Transformer neutral earthing for tertiary winding: N/A
- Sizing of the low voltage neutral terminal: N/A %

Winding

- Winding conductor material: copper
- Requirement of delta connected stabilizing winding: No
- Method of earthing of delta connected stabilizing winding: N/A
- Winding class of insulation: A
- Non-uniform (graded) insulation: No
- High temperature insulation: No
- Thermally upgraded paper: No

Termination

- Main external termination details (HV): plug-in connection
- Main external termination details (LV): cable box
- Main external termination details (tertiary): N/A
- Main external termination details (neutral): N/A
- Cable box type: air insulated
- Main cable box design: supplier standard
- Cable type: insulated
- Number of cables (HV): TBC
- Number of cables (LV): TBC
- Number of cables (tertiary): N/A
- Cable conductor size (HV): TBC mm^2
- Cable conductor size (LV): TBC mm^2
- Cable conductor size (tertiary): N/A Select
- Number of cores per cable (HV): TBC
- Number of cores per cable (LV): TBC
- Number of cores per cable (tertiary): N/A

- Number of cables per phase (HV): TBC
- Number of cables per phase (LV): TBC
- Number of cables per phase (tertiary): N/A
- Separate neutral terminal box: No
- Canopy required for cable box: No
- Breather with dessicant or drain for main cable boxes: No
- Busduct type: N/A

Bushings

- Type of bushings (HV): Epoxy resin
- Type of bushings (LV): Porcelain
- Type of bushings (tertiary): N/A
- Type of bushings (neutral): Porcelain

Tap changer

- Tap changer required and type: OLTC
- Voltage variation required on: HV
- Type of de-energized tap changer (DETC): N/A
- Tap changer switching medium: liquid
- Category of voltage variation: CFVV
- Tapping range: ±8x1,25 %
- Number of tapping positions: 17 steps
- Principal tapping position: symmetrical
- Maximum current tapping position: 68A
- Remote tap-changer cabinet for OLTC: Yes

Cooling

- Type of cooling: KNAN
- Temperature rise of insulating liquid when not in accordance with IEC 60076-2: N/A
- Temperature rise of winding when not in accordance with IEC 60076-2 or IEC 60076-11: N/A
- Cooling water inlet temperature when not in accordance with IEC 60076-2 and IEC 60076-11: N/A
- Provision for mounting of cooling fans: N/A
- AF fan motor cabinet: N/A

Miscellaneous requirements

a. Construction

- Type of cover for liquid immersed transformer and reactor: bolted

- Surface finish of tank and radiators: zinc coated
- Painting class required: VH
- Paint shade: Supplier Standard

b. Interface

- Auxiliary supply voltage details for cooling fans: N/A V
- Auxiliary supply voltage details for RTCC: 400 V
- Requirement of current transformer in neutral terminal box: Yes
- Current transformer ratio: 250/1 A
- Current transformer accuracy class: 5P20
- Current transformer burden: 5 VA

c. Transport

- Limiting transportation dimensions (height): 5075 ±20 mm
- Limiting transportation dimensions (width): 3000 ±20 mm
- Limiting transportation dimensions (depth): 3490 ±20 mm
- Limiting transportation weight: 22750 kg
- Impact recorder requirement during transportation: Yes
- Acceleration in excess of 1 g during transportation: Yes

Reactor specific requirements

- Application: N/A
- Rated current: N/A A
- Rated short circuit current: N/A A
- Time to withstand rated short circuit current: N/A s
- Impedance at rated voltage and current: N/A Ohms

Accessories

- Lifting lugs: Yes
- Silica gel breather for main tank: Yes
- Type of silica gel breather: self-regenerating
- Liquid level indicator: Yes
- Magnetic liquid level gauge with alarm and trip contacts: Yes
- Buchholz relay with alarm and trip contacts: Yes
- Pressure Relief Device (PRD) for transformer/reactor tank: No
- Pressure relief device for OLTC: No
- Pressure relief device for liquid filled cable box: N/A

- Facility for directing emissions of liquid from the relief device in the direction specified: No
- Sudden pressure relay: Yes
- Liquid temperature Indicator with alarm and trip contacts: Yes
- Winding temperature indicator with alarm and trip contacts: Yes
- Winding temperature measurement type: PT100 RTD
- Cooling fans: N/A
- Redundancy of cooling fans: N/A
- Control panel for fan starters (for AF type transformer): N/A
- Marshalling box: Yes
- HV cable box: Yes
- LV cable box: Yes
- Tertiary cable box: N/A
- Surge arrester requirement: Yes
- Surge arrester class: Distribuition class
- Requirement of online dissolved gas analysis (DGA): No
- Requirement of fiber optic temperature sensing: No
- Number of channels of fiber optic temperature sensor: No
- Core earthing terminals at accessible location.: Yes
- Earthing cable lug size: TBC mm
- Alarm contact for diaphragm failure for transformer with diaphragm in conservator: Yes
- Bi-directional rollers: Yes
- Anti-condensation heater for cable box: Yes
- Anti-condensation heater for remote tap-changer cabinet: Yes
- Note Requirement of ladder: Yes

The basic Single Line Diagram of the switchboards and relevant connections is illustrated in the document 123A90-DDL-EL-DG-20158 “Overall/Key Single Line Electrical Diagram”.

3.4 Safety Devices

- Appropriate Personnel Protective Equipment (PPE) and safety equipment e.g., safety shoes, hand gloves, helmet, earplugs etc. are available and must be used in line with the site requirements.

- For the arc flash risk category for the 66 kV GIS, even if the arc flash calculation has not been performed (IEEE 1584 can be applied up to 15 kV), no PPE is required since the GIS is arc flash resistant with fully insulated buses, does not require any maintenance during service and considering that any local operation on the GIS must be performed from the local panel, which is located in a safe area.
- Warning safety signs are to be posted with restricted access to essential personnel only.
- Adequate firefighting equipment.

3.5 HSE Management

All necessary safety precautions must be taken to avoid any risk for personnel injury.

- All personnel involved in this operational test shall be competent for the tasks they will be required to undertake
- Place safety / warning signs and segregate the entire area with barrier tapes (safety barriers) of a colour distinguished (blue and white) from those used for construction activities
- Restrict access into area only to authorized personnel
- Conduct "Toolbox Talk" with all personnel prior to starting test work
- Appropriate Personnel Protective Equipment (PPE) and safety equipment e.g. safety shoes, hand gloves, helmet, earplugs etc. are available and must be used in line with the site requirements
- All activities carried out on the project shall be performed in accordance with the "Permit to Work" system Doc. PRO-HSE-23
- Electrical and mechanical isolations are to be assured as per Doc. PRO-HSE-08 and "Commissioning and start-up operation" procedure.
- Observe and enforce all international codes and regulations to safeguard personnel, plant and environment.
- Ensure that the working area is clean, tidy, well illuminated and that access and escape routes are free from obstructions.

Before starting work on any of the activities in this OTP it is the responsibility of the persons performing the work to:

- Familiarize themselves with the plant/equipment to be worked on
- Ensure they are aware of all other work activities that are taking place, or due to take place
- If necessary, re-plan any situation/activity
- Ensure proper communications between parties involved in the execution of the OTP
- Read the relevant Vendor documentation for the equipment covered by this OTP and observe any special requirements and limitations recommended or imposed by Vendor
- Verify that all personnel involved in the implementation of this procedure are familiar with its content as well as the associated safety requirements (Toolbox Talk)

3.6 Acceptance Criteria

This OTP will be performed to test the functioning of 66kV switchgear (HNA6-AFA70) with HV/HV (66/6.6kV) power transformer TR-100AD1

Before Power ON:

Visual inspection and verification are a crucial step to identify any obvious issues with the installation, such as loose connections, missing components, or damage to the equipment.

Crosschecking the installation with engineering documentation ensures that the installation is done correctly and according to the manufacturer's guidelines. These steps can help identify any missing or incorrect components, and wrong connections.

All protection relays must be set and compliance with the Electrical Protection Relay Selectivity Study Report 123A90-DDL-EL-RE-20168.

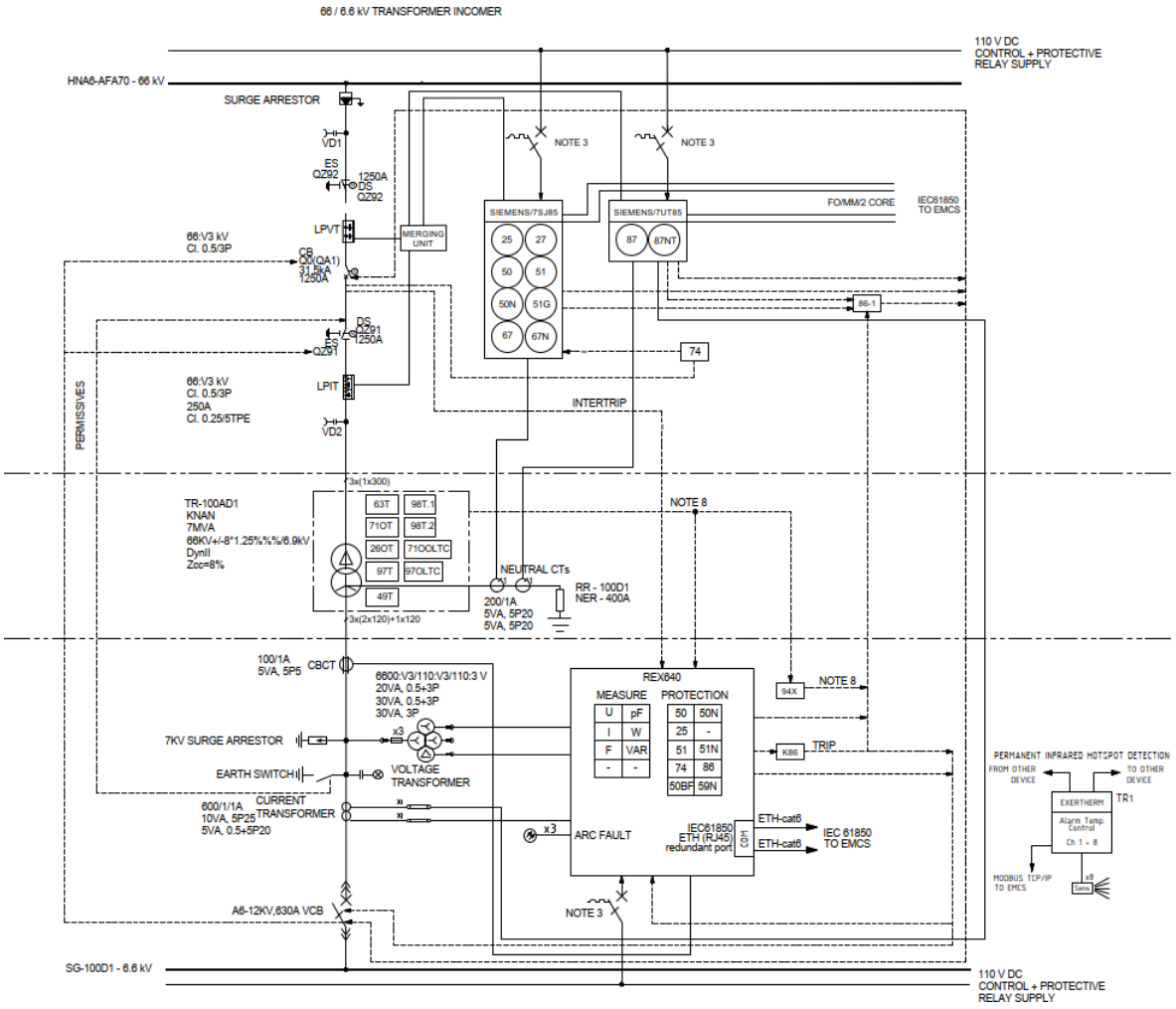


Figure 5 – Extract from 123A90-DDL-EL-DG-20014 ELECTRICAL CONTROL, PROTECTION AND METERING DIAGRAMS 66 / 6.6 kV TRANSFORMER INCOMER

Check the protection setting on related check sheet (ITR-B) for each protection.

Applicable panels:

- 81-10: GIS 66 kV (HNA6-AFA70)
- 81-20: Power Transformer 7 MVA (TR-100AD1)

Refer Overall SLD with Marked Sub-systems.

The 66kV HNA6-AFA70 switchboard and its parts must be isolated with Circuits Breaker (CB) in safe conditions and opened, Disconnecting Switches (DS) opened and Earthing Switches (ES) closed to ensure safety conditions.

After Power ON:

Powering ON the units - before auxiliary supply and after main supply - circuits are an essential step to verify that the equipment is functioning correctly. Observing if everything is OK and any alarm will help detect possible errors or malfunctions.

Phase 1 (On-Shore worksite) It will be only auxiliary power to each unit, systems/devices that will be available at this stage.

After verifying that all cold tests are positive, after verifying the correct connections and the correct value of auxiliary power supply, after execution of the SAT procedure, it will be possible to proceed with:

- Check the correct operations of Circuit Breaker in test position (without main power).
- Check the mechanical interlocks (without main power)
- Check the electrical interlocks between CB and QZ91 (DS/ES) and QZ92 (DS/ES) (without main power)
- Check the electrical interlocks between GIS and 6.6kV switchboard SG-100D1
- Check the correct GIS Functioning (without main power)
- Check the GIS hardwired and Modbus I/O List on EMCS and on PCS as per design
- Check the correct operations of TR-100AD1 power transformer auxiliary devices
- Check the correct operations of TR-100AD1 power transformer tap changer

Phase 2 (Off-Shore Site) after Phase 1 passed and after hook-up completed, can proceed with:

- Check the correct preservation removed on all devices involved and visual check for power and auxiliary connections
- Check main GIS operations without main power supply and verify the operations of GIS Test and validation of safety interlock between 6.6kV and low voltage SWBDs
- Verify phase sequence, frequency, voltage and current
- Verify the incomer, Measuring, feeder 6.6KV A6 column, EMCS

Performing the steps in this OTP as per engineering documents is crucial to ensure that the equipment is operating correctly and that it meets the desired design specifications. Observing the results will help identify any issues that may arise during the operation.

Overall, following these steps shall provide a comprehensive and effective way to verify the equipment installation and functionality.

4 DOCUMENTS REFERENCES AND ABBREVIATIONS

4.1 Reference Documents

4.1.1 Company Documents and Standards

Document ID	Document Title
[1] K559-2254-CG-PHI-001	Commissioning Philosophy
[2] K559-2254-EL-ELL-002	BLPH Electrical Load List (CCS MODE 2(A) 'HOT STANDBY')
[3] K559-2254-EL-ELL-003	BLPH Electrical Load List (CCS MODE 3(C) 'DISCHARGING')
[4] K559-2254-EL-ELL-004	BLPH Electrical Load List (CCS MODE 4(A) 'COLD STANDBY')
[5] K559-2254-EL-ELL-005	BLPH Electrical Load List (CCS MODE 4A(D) 'EMERGENCY MODE (Island))
[6] K559-2254-EL-ELL-006	BLPH Electrical Load List (CCS MODE 5(D) 'POWER OUT (Blackout))
[7] K559-2254-PR-PHI-001	Main process control philosophy

Table 1: Company Key Reference Documentation

These documents were produced in FEED and made available to RM for info. They have subsequently been superseded by Detailed Design, similar or same deliverables.

4.1.2 Project Documents

Document ID	Document Title
[1] 123A90-PML-PM-LIS-01001	Master Document Register
[2] 123A90-PML-PM-PL-00001	Project Execution Plan
[3] 123A90-PML-QHSE-PL-00001	Project HSE Plan

Document ID	Document Title
[4] 123A90-PRO-HSE-23	RM Yard Permit To Work Procedure
[5] 123A90-PML-COM-PL-03002	Mechanical Completion & Commissioning Execution Plan
[6] 123A90-PML-COM-PRO-03007	Commissioning Strategy
[7] 123A90-PML-COM-LIS-03011	System/Sub-Systems List
[8] 123A90-PML-COM-LIS-03012	System/Sub-System Boundary Limit Diagrams
[9] 123A90-PML-COM-PRO-03038	Leak Test Procedure
[10] 123A90-PML-COM-SP-03032	Pre-Commissioning Functional Test Sheet Template Collection (ITR-B)
[11] 123A90-PML-COM-SP-03014	Commissioning TDS - Temporary Equipment & Facilities
[12] 123A90-PML-COM-PRO-03019	OTP – Onshore Performance & Integrated Test Procedure
[13] 123A90-PML-COM-LIS-03034	Inhibit-Override Register
[14] 123A90-PML-COM-LIS-03035	PSV Calibration Register
[15] 123A90-PML-COM-PRO-03036	OTP - Black Start Procedure
[16] 123A90-PML-COM-LIS-03024	Commissioning Spare Parts and Consumables List
[17] 123A90-PML-COM-PRO-03022	Initial offshore START-UP procedures
[18] 123A90-PML-COM-SP-03057	Worksite WEF (Work Execution Flow Scheme)
[19] 123A90-PML-COM-SP-03058	Site WEF (Work Execution Flow Scheme)
[20] 123A90-PML-COM-RE-03001	Commissioning Final Dossier (ITR-B)
[21] 123A90-PML-QHSE-PRO-00116	Flushing and Cleaning Procedures
[22] 123A90-PML-QHSE-SP-00118	Mechanical Completion Check Sheet Template Collection (ITR-A)
[23] 123A90-PML-QHSE-RE-00115	Mechanical Completion Final Dossier (ITR-A)
[24] 123A90-PML-QHSE-PRO-00117	Punch list Management Procedure

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Document ID	Document Title
[25] 123A90- 123A90-PML-COM-PRO-03041	OTP - Hydrogen Storage & Venting Systems
[26] 123A90- 123A90-PML-COM-PRO-03042	OTP - Sea Water Intake & Fresh Water Treatment Systems
[27] 123A90- 123A90-PML-COM-PRO-03043	OTP - Instrument Air System
[28] 123A90- 123A90-PML-COM-PRO-03055	OTP - Nitrogen Generation System
[29] 123A90- 123A90-PML-COM-PRO-03044	OTP - HVAC Systems
[30] 123A90- 123A90-PML-COM-PRO-03045	OTP - HV Switchgear & 66 kV Transformer Systems
[31] 123A90- 123A90-PML-COM-PRO-03046	OTP - 6.6 kV Switchgear & Transformer Systems
[32] 123A90- 123A90-PML-COM-PRO-03047	OTP - LV Switch Boards & LV Distribution Board Systems
[33] 123A90- 123A90-PML-COM-PRO-03048	OTP - Lighting & Small Power Systems
[34] 123A90- 123A90-PML-COM-PRO-03049	OTP - Electrical Heat Tracing Systems
[35] 123A90- 123A90-PML-COM-PRO-03050	OTP - DC UPS System 10kVA UP-200F1
[36] 123A90- 123A90-PML-COM-PRO-03051	OTP - Data Network Systems
[37] 123A90- 123A90-PML-COM-PRO-03052	OTP - Telecom & Surveillance Systems
[38] 123A90- 123A90-PML-COM-PRO-03053	OTP - Navaid System
[39] 123A90- 123A90-PML-COM-PRO-03054	OTP - F&G and ESD C&E Logics
[40] 123A90-PML-QHSE-PRO-00120	Proverlis Management Procedure
[41] 123A90-PML-COM-PRO-03056	OTP – Document Template
[42] 123A90-PML-COM-PRO-03059	OTP - AC UPS System 35kVA UP-200F3
[43] 123A90-PML-COM-PRO-03060	OTP - AC UPS System 15kVA UP-200F4

Table 2: Reference Project Deliverables

4.1.3 Vendor Documents

Document ID	Document Title
[1] 1723001595-MD-LIS-00001	SUPPLIER MASTER INFORMATION REGISTER (SMIR)

Document ID	Document Title
[2] 1723001595-EL-LIS-00030	COMMISSIONING SPARES AND 2 YEARS OPERATIONAL SPARES LIST
[3] 1723001595-EL-CA-00009	HEAT DISSIPATION CALCULATION AND LOADS
[4] 1723001595-EL-DS-00007	HIGH-VOLTAGE PROTECTIVE DEVICES CHARACTERISTICS AND RATINGS
[5] 1723001595-EL-LIS-00008	UTILITY LOAD SCHEDULE
[6] 1723001595-EL-SP-00005	FUNCTIONAL DESIGN SPECIFICATION, DEFINITIONS TAB LINE 29, INCLUDING MANUFACTURE DATA SHEET AND BOM
[7] 1723001595-EL-DA-00006	GENERAL ARRANGEMENT DRAWING INCLUDING FOUNDATION LOAD CALCULATION
[8] 1723001595-EL-DG-00014	GAS COMPARTMENT DIAGRAM
[9] 1723001595-EL-DG-00013	SWITCHGEAR SINGLE LINE DIAGRAM
[10] 1723001595-EL-DG-00016	INTER-PANEL WIRING DIAGRAM
[11] 1723001595-EL-DG-00015	CIRCUIT AND WIRING DIAGRAM
[12] 1723001595-EL-DG-00010	CONNECTION DIAGRAM
[13] 1723001595-EL-LIS-00011	SWITCHGEAR I/O LIST
[14] 1723001595-EL-DG-00012	FUNCTIONAL LOGIC DIAGRAM
[15] 1723001595-EL-DG-00017	INTER-PANEL LOGIC DIAGRAM
[16] 1723001595-EL-DS-00018	PROBABILITY OF FAILURE ON DEMAND RELIABILITY DATA
[17] 1723001595-EL-SO-00019	IED INTERROGATION AND PROGRAMMING SOFTWARE
[18] 1723001595-EL-SO-00020	RELAY IED CONFIGURATION FILES
[19] 1723001595-EL-SO-00021	IEC 61850 CONFIGURATION FILES
[20] 1723001595-EL-PRO-00023	REMOTE CONTROL SIMULATION TEST PROCEDURE
[21] 1723001595-QC-PRO-00027	ROUTINE VERIFICATION TEST (FAT) PROCEDURE
[22] 1723001595-QC-PRO-00028	SITE ACCEPTANCE TEST (SAT) PROCEDURE

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Document ID	Document Title
[23] 1723001595-COM-PRO-00029	PRE-COM AND COMMISSIONING PROCEDURE
[24] 1723001595-EL-MAN-00031	INSTALLATION, OPERATING AND MAINTENANCE MANUAL
[25] 1723001595-QC-PRO-00032	HANDLING, PACKING, SHIPPING, STORAGE AND PRESERVATION PROCEDURE
[26] 1723001697- MD-LIS-00001	SUPPLIER MASTER INFORMATION REGISTER (SMIR)
[27] 1723002197-QC-DB-00048	EQUIPMENT MANUFACTURERS RECORD BOOK
[28] 1723002197-QC-ITP-00003	INSPECTION AND TEST PLAN - LV SWITCHGEAR
[29] 1723002197-QC-LIS-00005	EQUIPMENT MANUFACTURER RECORD BOOK (FINAL DOSSIER) - INDEX
[30] 1723001697-EL-DA-00006	TR-100AD1 GENERAL ARRANGMENT DRAWINGS
[31] 1723001697-EL-DA-00009	TR-100AD1-NER - GENERAL ARRANGMENT DRAWINGS
[32] 1723001697-EL-DG-00013	RR-100D1-NER TERMINATION AND WIRING DIAGRAM
[33] 1723001697-QC-PRO-00014	FACTORY ACCEPTANCE TEST (FAT) PROCEDURE
[34] 1723001697-EL-CAL-00015	HEAT DISSIPATION CALCULATION
[35] 1723001697-QC-PRO-00016	SITE ACCEPTANCE TEST (SAT) PROCEDURE
[36] 1723001697-EL-LIS-00017	COMMISSIONING SPARES AND 2 YEARS OPERATIONAL SPARES LIST
[37] 1723001697-EL-MAN-00018	INSTALLATION, OPERATING AND MAINTENANCE MANUAL
[38] 1723001697-QC-PRO-00019	HANDLING, PACKING, SHIPPING, STORAGE AND PRESERVATION PROCEDURE

Table 3: Vendor Reference Documentation

Notes: *1723001595's documents are from HYOSUNG manufacturer. 1723001697's documents are from MF TRASFORMATORI*

4.2 Acronyms and Abbreviations

Acronyms and Abbreviations	Descriptions
AIS	Automatic Identification System
AHU	Air Handling Unit
AOC	Achievement of Commissioning
C&E	Cause & Effects
CCS	Central Control System
CCTV	Closed Circuit Television
CMS	Completions Management System
CPI	Company Provided Item
CRS	Comments Response Sheet
CSU	Commissioning & Start-Up
E&I	Electrical & Instrumentation
EMCS	Electrical Monitoring & Control System
ESD	Emergency Shut Down
FAT	Factory Acceptance Test
FT	Functional Test
F&G	Fire & Gas
GALT	Gross Air Leak Test
HAZID	Hazard Identification Studies
HAZOP	Hazard and Operability Studies
HKN	Hollandse Kust Noord
HV	High Voltage
HVAC	Heating, Ventilation and Air Conditioning

Acronyms and Abbreviations	Descriptions
HSE	Health, Safety, & Environment
ICSS	Integrated Control and Safety System
ITR	Inspection & Test Record
LC	Locked Closed
LO	Locked Open
LoSH	Limits of System Handover
LOTO	Lock-Out / Tag-Out
LV	Low Voltage
MC	Mechanical Completion
MDR	Master Document Register
MOC	Management of Change
NUI	Normally Unmanned Installation
OEM	Original Equipment Manufacturer
OMAR	Operating Modes Assurance Review
OTP	Operational Test Procedure (Commissioning)
OR	Operations Readiness
ORR	Operations Readiness Review
PACO	Process Automation, Control and Optimisation
PCS	Process Control System
PID (P&ID)	Piping and Instrumentation Diagram
PSV	Pressure Safety Valve
PTW	Permit to Work
PVP	Piping and Vessels Preparation

Acronyms and Abbreviations	Descriptions
PC&C	Pre-Commissioning & Commissioning
PSUA	Pre Start-Up Audit
PSSR	Pre Start-up Safety Review
RFC	Ready for Commissioning
RFO	Ready for Operation
RFSA	Ready For Sail Away
RFSU	Ready For Start-Up
SAT	Site Acceptance test
SECE	Safety Environmental Critical Element
SIF	Safety Instrumentation Function
SIL	Safety Integrity Level
SIMOPS	Simultaneous Operations & Maintenance
SIS	Safety Instrumented System
SLD	Single Line Diagram
SoF	Statement of Fitness
TA	Technical Authority
TQ	Technical Query
TIV	Technical Integrity verification
UPS	Uninterruptible Power Supply
VHF	Very High Frequency
VSAT	Very Small Aperture Terminal

Table 4: Acronyms and Abbreviations

5 OTP AT WORKSITE

This section refers to the activities on the Contractor worksite (construction yard).

5.1 PLANNING AND MANPOWER

5.1.1 Planned tasks with estimated manpower

Estimated manpower for the entire duration of the Test:

- 1 E&I commissioning superintendent
- 1 E&I commissioning supervisor from Contractor
- 1 E&I commissioning technicians from Contractor
- 1 Vendor technician
- 1 PCS/ESD Operator workstation specialist (phase 1,2)

5.1.2 Test duration estimate

The test duration should be as follows:

- 10 days approx.

If necessary, the estimated time can be extended in order to complete all required pre-commissioning and commissioning activities.

5.1.3 Vendor Assistance

Vendor HYOSUNG will provide a qualified specialist to assist with all aspects of commissioning of the 66kV GIS and vendor MF Trasformatori will provide qualified specialist to assist with all aspect of commissioning of the 66/6,6kV transformer.

5.1.4 Items Postponed to C&E OTP

Not applicable

5.1.5 HOLDS

Not applicable

5.2 OTP Test Requirements

First, confirm that the following equipment are installed and operational in technical room B-100:

- HVAC system
- Substation lifesaving & Intervention Kit (offshore phase)
- Lighting & Fire and Gas system
- Earthing System

5.2.1 Pre-Commissioning Achievement

Prior the commissioning operation starts, the relevant pre-commissioning ITR-Bs should be fully signed.

5.2.2 Commissioning Achievement

The commissioning achievement will be the successful operation, functionality and safeguarding test of 66kV Power distribution System, installed and put in operation during the WORKSITE phase:

- 81-10: GIS 66 kV (HNA6-AFA70)
- 81-20: Power Transformer 7 MVA (TR-100AD1)

5.2.3 Status of Required Associated Subsystems

PHASE 1 (On Shore) – Test of HNA6-AFA70 Switchgear and TR-100AD1 Power Transformer without 66kV Main Power Supply, with present only auxiliary supply only.

Subsystems required RFC for Commissioning of 66kV Switchboard

- 81-10: GIS 66 kV (HNA6-AFA70)
- 81-20: Power Transformer 7 MVA (TR-100AD1)
- 82-00: 6,6 kV Switchboard (SG-100D1)
- 83:99: Low Voltage 400V Temporary Yard Power Supply
- 82-99: 6.6kV power supply from temporary 6,6 kV Diesel Generator Yard facilities
- 88-00: Earthing System
- 84-00: UPS System UP-200F1
- 86-00: IEC61850 Ethernet Communication Network
- 86-00: MODBUS RTU Communication Network
- 87-00: Electrical Monitoring & Control System (EMCS)
- 87-10: Process Control System (PCS)
- 79-00: SIS Safety Instrumented System (ESD)

PHASE 2 – (Offshore) Test of HNA6-AFA70 Switchgear and TR-100AD1 Power Transformer with 66kV Main Power Supply and present only auxiliary supply.

Subsystems required RFC for Commissioning of 66kV Switchboard:

- 88-00: Earthing System
- 81-10: GIS 66 kV (HNA6-AFA70)
- 81-20: Power Transformer 7 MVA (TR-100AD1)
- 82-00: SG-100D1 6.6kV SWBD Unit A6 6,6 kV
- 82-40: Transformer 1,6 MVA TR-200DE1

- 82-99: 6.6kV power supply from temporary 6,6 kV Diesel Generator Yard facilities
- 83-00: 400V Switchboard SG-100D1
- 79-00: SIS Safety Instrumented System (ESD)
- 86-00: IEC61850 Ethernet Communication Network
- 86-00: MODBUS RTU Communication Network
- 87-00: Electrical Monitoring & Control System (EMCS)
- 87-10: Process Control System (PCS)

5.2.4 Special Tools & Test Equipment

The following special tool and Test Equipment are required:

- Voltage, frequency, continuity tester (Multimeter)
- Phases sequence tester
- Extracting tool & transportation trolley
- Portable radios (3 pcs + 1 per Technical Room)
- 230Vac/24VDC temporary stabilized power supply converter
- Resistance Measurement of Main Circuit
    - MEGGER MOM200
    - MEGGER MOM600
    - OMICRON CPC100
- Test on Auxiliary & Control Circuit
    - GOSSEN METRAVAT METRISO 5000
    - SCHLEICH GLP1-g-330HVAC 6/100
- Mechanical Operation Test
    - HI TECH FLY R8
- Spring motor charging time & current measurement
    - MULTI METER & CLAMP METER FLUKE
- Moisture content measurement in Dryair
    - WIKA GA11
- Diagnostic test
    - OMICRON CPC 100
    - OMICRON CMC356
    - MEGGER GOOSER
    - MEGGER ODEN AT

TESTING & MEASUREMENT INSTRUMENT USED			
Type	Serial N.	Calibration certificate	Validity

5.2.5 Consumable List

Not applicable

5.2.6 Commissioning Spare Parts

Reference is made to HYOSUNG Spare Part List 1723001595-EL-LIS-00030 regarding the 66KV SWBD spare parts and is made to "MF Trasformatori" Spare Part List 1723001697-EL-LIS-00017 regarding the 66/6.6kV Power Transformer spare parts

5.2.7 Temporary Facilities

Not applicable

5.3 OTP DESCRIPTION - WORKSITE

5.3.1 OTP Test Preparation

Step	Description	Result	Verified by	Date
1	Systems Ready for Commissioning Certificate (RFC) are issued and approved.			
2	No Mechanical Completion or Pre-commissioning punch list 'A' items are outstanding against the systems to be commissioned.			
3	Factory Acceptance Test Procedure has been carried out successfully - refer to HYOSUNG Doc. 1723001595-QC-PRO-00027 ..... ☐			

Step	Description	Result	Verified by	Date
	- refer to "MF TRASFORMATORI" Doc. 1723001697-QC-PRO-00014.....☐			
4	All personnel involved in the implementation of this procedure are familiar with its content as well as with associated safety requirements (Toolbox Talk to be conducted before initiation of activities).			
5	A final walkdown of the system has been completed, to ensure that the system and the area are ready for commissioning.			
6	Check that areas are free for work and escape routes are clear of any obstructions.			
7	All safety barriers and warning signs have been installed.			
8	Ensure that proper communications have been established between parties involved in the implementation of the procedure.			
9	Verify availability of test equipment and consumables as per section 5.2.4.			
10	With reference to Commissioning Temporary equipment & Facilities (refer on Doc. 123A90-PML-COM-SP-03014), check that power is available to any temporary equipment or test equipment (if any).			
11	System(s) isolations as per LOTO procedure defined within HSSE Permits to Work and Commissioning procedures duly prepared and approved			
12	All yard personnel have been duly notified by dedicated LUN (Livening Up Notification) that the system(s) is ready for commissioning.			

5.3.2 Electrical Preparation

Step	Description	Result	Verified by	Date
13	Check related punch list 'B' items and confirm acceptability for start of commissioning activities.			
14	Verify that all relevant associated systems / subsystems are completed.			
15	Check that grounding and bonding are in accordance with applicable documents.			
16	Review and confirm protection settings on HNA6-AFA70 main CB are in accordance with 123A90-DDL-EL-RE-20169 Electrical Protection Relay Setting Schedule			
17	Verify finalization of HNA6-AFA70 66kV Switchboard Units internal power and auxiliary circuit connections in accordance with manufacturers documentation.			
18	Verify and confirm completion and availability of associated systems and subsystems			

5.3.3 Mechanical Preparation

Not applicable.

5.3.4 Instrument Preparation

Step	Description	Result	Verified by	Date
19	Check related punch list 'B' items and confirm acceptability for start of commissioning activities.			
20	Verify that all relevant associated systems / subsystems are ready to work.			
21	Check Inhibit and Override register has been prepared and validated.			

Step	Description	Result	Verified by	Date
22	Verify that relevant equipment/ components are available and in operation for start of commissioning activities.			

5.3.5 Piping Preparation

Not applicable

5.3.6 Additional Discipline Preparation

Not applicable.

5.4 OTP Steps WORKSITE

PHASE 1 – Test of GIS HNA6-AFA70 operations without 66kV Main Power Supply, with auxiliary supplies only.

The previous sections must be successfully performed prior to commissioning of the 66kV GIS without power supply at 66 kV.

In PHASE 1 Auxiliaries Power supply will be connected as 110Vdc and 230 V without 66 kV main power supply.

In the following steps the functionality of the 66kV GIS shall be tested:

- 81-10: GIS 66 kV (HNA6-AFA70)
- 81-20: Power Transformer 7 MVA (TR-100AD1)

5.4.1 Test Preparation

Need to Verify:

- Auxiliary power supplies are available 230V DP-200N1 (Internal Heaters & Lights)
- Auxiliary power supplies are available 110 V A/B UPS UP-200F1
- Temporary Yard power supply is available SG-200N1 (A2/+08)

All systems and subsystems involved in this procedure must be ready for commissioning and available.

The following steps will be performed to prepare and achieve the correct and appropriate conditions of the 66kV and 66/6.6kV GIS transformer systems for proper operation.

Before control voltage applying, all wiring in the control mechanism will be checked with tester or buzzer based on the schematic (Vendor doc. N° 1723001595-EL-DG-00015).

The schematic wiring shall be checked by proper instrumentation and operation check according to the approved drawing

5.4.1.1 Auxiliary Supply HNA6-AFA70 66kV GIS

Step	Description	Result	Verified by	Date
Auxiliary Energization of 66kV GIS HNA6-AFA70				
23	Check related punch list 'B' items and confirm acceptability for start of commissioning activities.			
24	Verify that all relevant associated systems / subsystems are completed.			
25	Check that grounding and bonding are in accordance with applicable documents			
26	Review and confirm protection settings on 66KV GIS main breaker power supply circuit breakers.			
27	Verify and confirm the Hyosung On-Shore part of SAT procedure – *"referring to 1723001595-EL-PRO-00023 Remote and control simulation test procedure" pages to 57 to 63* - has been performed with positive result and in the detail: Relay Test - 1.1 Diagnostic Test ..... ☐ - 1.2 Relay Setting Check ..... ☐ - 1.3 IO Operation Test..... ☐ - 1.4 Measurement Test..... ☐ - 1.5 Protection Test ..... ☐ - 1.6 Remote Test..... ☐			

5.4.1.2 Test of Local Control Panel CP-100E1

Step	Description	Result	Verified by	Date
28	Verify and confirm the power presence from DP-200N1 230V (ref. vendor doc. 1723002197-EL-DG-00013) - Close MCB Q37.....☐ on Local Control Panel CP-100E1 With reference Vendor doc. N° 1723001595-EL-DG-00015 verify and confirm - Supply X30:1-2 .....Vac			
29	Verify and confirm the power on CP-100E1 for the following circuits: - Close MCB -FA – AC MAIN SUPPLY...☐ And Check: - K27 AC SUPPLY SUPERVISION must be ON .....☐ - LCP LIGHTING CIRCUIT .....☐ - SOCKET OUTLET .....☐ - LCP HEATING CIRCUIT .....☐ - CB Q0 (QA1) OPERATING MECHANISM .....☐ - CB Q0 (QA1) HEATING CIRCUIT .....☐ - DS QZ92_ES QZ92 OPERATING MECHANISM HEATING CIRCUIT.....☐ - DS QZ91_ES QZ91 OPERATING MECHANISM HEATING CIRCUIT.....☐			
30	Verify and confirm the power presence from UPS UP-200F1A/B 110V - Close MCB Q10.....☐			

Step	Description	Result	Verified by	Date
	- Close MCB Q11.....☐ on Local Control Panel CP-100E1 With reference Vendor doc. N° 1723001595-EL-DG-00015 - Supply A X31: 1-2 .....Vdc - Supply B X32: 1-2.....Vdc			
31	Verify and confirm the power on CP-100E1 for the following circuits, with reference Vendor doc. N° 1723001595-EL-DG-00015: - Close MCB -FD1 – DC1 110Vdc MAIN SUPPLY.....☐ - Close MCB -F01 – CIRCUIT BREAKER CONTROL SUPPLY CLOSING & TRIP CIRCUITs 1 .....☐ And Check: - Close command Circuits .....☐ - K86-1of 7SJ85 Protection Lock Out Relay (LOR) circuits .....☐ - LOR SET COMMAND TR-100AD1 PROTECTION TRIP.....☐ - CB Q0 (QA1) ANTI PUMPING CIRCUIT .....☐ - CB Q0 (QA1) PROTECTION & TRIP COIL CIRCUITS.....☐ - SAFETY SYSTEM POWER .....☐ - CB Q0 (QA1) GIS PRESSURE LOW STAGES-1 & 2 .....☐			
32	Verify and confirm the power on CP-100E1 for the following circuits with reference Vendor doc. N° 1723001595-EL-DG-00015: - Close MCB -F02 – CIRCUIT BREAKER MOTOR SUPPLY.....☐			

Step	Description	Result	Verified by	Date
	And Check: - CB Q0 (QA1) MOTOR OPERATING CIRCUIT .....☐ - CB Q0 (QA1) SPRING EXCESSIVE RUN TIME .....☐			
33	Verify and confirm the power on CP-100E1 for the following circuits with reference Vendor doc. N° 1723001595-EL-DG-00015: - Close MCB -F03 – INDICATION CIRCUIT SUPPLY .....☐ And Check: - LAMP TEST .....☐ - CB Q0 (QA1) POSITION INDICATOR CLOSE & OPEN.....☐ - DS QZ92 POSITION INDICATOR CLOSE & OPEN.....☐ - ES QZ92 POSITION INDICATOR CLOSE & OPEN .....☐ - DS QZ91 POSITION INDICATOR CLOSE & OPEN.....☐ - ES QZ91 POSITION INDICATOR CLOSE & OPEN.....☐ - IED FAILURE FROM 7SJ85 .....☐ - IED FAILURE FROM 7UT85 .....☐ - VD1 L1 SUPPLY.....☐ - VD1 L2 SUPPLY.....☐ - VD1 L3 SUPPLY.....☐ - VD2 L1 SUPPLY.....☐ - VD2 L2 SUPPLY.....☐ - VD2 L3 SUPPLY.....☐			

Step	Description	Result	Verified by	Date
34	Verify and confirm the power on CP-100E1 for the following circuits with reference Vendor doc. N° 1723001595-EL-DG-00015: - Close MCB -F04 – PROTECTION RELAY: -7UT85 SUPPLY .....☐ And Check: - PROTECTION RELAY 7UT85 SUPPLY ☐ - IED FAILURE FROM 7SJ85 ..... ☐			
35	Verify and confirm the power on CP-100E1 for the following circuits with reference Vendor doc. N° 1723001595-EL-DG-00015: - Close MCB -F05 – RED BOX UNIT: RSG907R SUPPLY .....☐ And Check: - RSG907R RED BOX UNIT .....☐			
36	Verify and confirm the power on CP-100E1 for the following circuits with reference Vendor doc. N° 1723001595-EL-DG-00015: - Close MCB -FD2 – DC2 110Vdc MAIN SUPPLY.....☐ - Close MCB -F11 – CIRCUIT BREAKER CONTROL SUPPLY CLOSING & TRIP CIRCUITs 2 .....☐ And Check: - REMOTE TRIP-2 COMMAND.....☐ - CB Q0(QA1) TRIP COIL-2 50/50N, 51/51G, 67, 67N..... ☐ - CB Q0(QA1) TRIP COIL-2 87..... ☐ - CB Q0(QA1) TRIP COIL-2 86..... ☐ - CB TRIP-2 COMMAND..... ☐ - PROTECTION TRIP SIGNAL ..... ☐			

Step	Description	Result	Verified by	Date
	- CB Q0(QA1) GIS PRESSURE LOW STAGE-1 ..... ☐ - CB Q0(QA1) GIS PRESSURE LOW STAGE-2 ..... ☐ - SIS SAFETY SYSTEM DC 24V INPUT.. ☐			
37	Verify and confirm the power on CP-100E1 for the following circuits with reference Vendor doc. N° 1723001595-EL-DG-00015: - Close MCB -F12 – DS & ES MOTOR & CONTROL SUPPLY ..... ☐ And Check: - DS/ES MANUAL OPER. MODE ..... ☐ - DS/ES QZ92 MOTOR OPERATION ... ☐ - DS/ES QZ91 MOTOR OPERATION ... ☐ - ES QZ92 ES OPEN COMMAND ..... ☐ - DS QZ92 DS CLOSE COMMAND..... ☐ - DS/ES QZ92 SELF HOLDING..... ☐ - ES QZ92 ES CLOSE COMMAND ..... ☐ - DS QZ92 DS OPEN COMMAND..... ☐ - MANUAL DS/ES QZ92 OPER. MODE SELECTION ..... ☐ - ES QZ91 ES OPEN COMMAND ..... ☐ - DS QZ91 DS CLOSE COMMAND..... ☐ - DS/ES QZ91 SELF HOLDING..... ☐ - ES QZ91 ES CLOSE COMMAND ..... ☐ - DS QZ91 DS OPEN COMMAND..... ☐ - MANUAL DS/ES QZ91 OPER. MODE SELECTION ..... ☐			

Step	Description	Result	Verified by	Date
38	Verify and confirm the power on CP-100E1 for the following circuits with reference Vendor doc. N° 1723001595-EL-DG-00015: - Close MCB -F13 – MERGING UNIT: IM2 SUPPLY.....☐ And Check: - MERGING UNIT: -IM2 SUPPLY.....☐			
39	Verify and confirm the power on CP-100E1 for the following circuits with reference Vendor doc. N° 1723001595-EL-DG-00015: - Close MCB -F14 – PROTECTION RELAY: -7SJ85 SUPPLY .....☐ And Check: - PROTECTION RELAY 7SJ85 SUPPLY.☐ - DS QZ91 OPEN / CLOSE.....☐ - ES QZ91 OPEN / CLOSE .....☐ - DS QZ92 OPEN / CLOSE.....☐ - ES QZ92 OPEN / CLOSE .....☐ - CB Q0(QA1) OPEN / CLOSE .....☐ - DC CONTROL VOLTAGE FAILURE....☐ - AC CONTROL VOLTAGE FAILURE....☐ - 6.6 kV ARC PROTECTION TRIP1 .....☐ - 6.6kV SWG. CB OPEN .....☐ - 6.6kV SWG. ES OPEN.....☐ - SIS OVERRIDE ENABLED.....☐ - VD1 NO VOLTAGE .....☐ - VD2 NO VOLTAGE .....☐ - CB WARNING GAS LOW STAGE-1....☐ - CB WARNING GAS LOW STAGE-2....☐ - CB SPRING MOTOR OVERLOAD .....☐			

Step	Description	Result	Verified by	Date
	- CB SPRING MOTOR EXCESSIVE RUN TIME ..... ☐ - CB MOTOR RUNTIME EXCEEDED & SPRING UNCHARGED ..... ☐ - DS/ES MOTOR MCB TRIP..... ☐ - DS OR ES MANUAL OPER. MODE .... ☐ - HAND CRANK INSERTED ..... ☐ - IED FAILURE FROM 7UT85 ..... ☐ - LOCAL STATUS ..... ☐ - REMOTE STATUS..... ☐ - TCS1 FAIL..... ☐ - TCS2 FAIL..... ☐ - SAFETY SYSTEM POWER WATCHDOG..... ☐ - CB Q0(QA1) MCB ALARM ..... ☐ - DS QZ92_ES QZ92 GIS PRESSURE LOW STAGE-1 ..... ☐ - DS QZ92_ES QZ92 GIS PRESSURE LOW STAGE-2 ..... ☐ - DS QZ91_ES QZ91 GIS PRESSURE LOW STAGE-1 ..... ☐ - DS QZ91_ES QZ91 GIS PRESSURE LOW STAGE-2 ..... ☐ - PROTECTION RELAY 7SJ85(CB202) SUPPLY..... ☐			
40	Verify and confirm ESD signal 81-XS-001 from SIS cabinet B400-SIS-001 on CP-100E1 for the following circuits with reference Vendor doc. N° 1723001595-EL-DG-00015:			

Step	Description	Result	Verified by	Date
	- ESD Signal 81-XS-001 comes in healthy condition and in the terminal X13:13-14 there will be 24Vdc. KSIL1 DC 24V TRIP SAFETY SYSTEM will be ON .....☐ KSIL1 is ON in healthy condition the NO contact (terminal 13-14) is closed And Check: - -KSIL2 DC 24V TRIP SAFETY SYSTEM must be ON and GIS will be in healthy condition.....☐ - ESD (SIS) Override selector -SR1 must be disabled to permit any signals of Emergency Shut Down. Confirm or place in disabled condition .....☐			

5.4.1.3 Auxiliary Supply TR-100AD1 66/6.6kV Transformer

Step	Description	Result	Verified by	Date
Auxiliaries Energization of 66/6.6kV Transformer TR-100AD1				
41	Verify and confirm the power presence from DP-200N1 230V (ref. vendor doc. 1723002197-EL-DG-00013) - Close MCB Q33.....☐ on Auxiliary Local Control Panel CP-100E4 With reference Vendor doc. N° 1723001697-EL-DG-00010 verify and confirm - Supply X1: L-N ..... Vac			
42	Verify and confirm the power on CP-100E4 for the following circuits:			

Step	Description	Result	Verified by	Date
	- Close MCB -Q1 – Auxiliary Local Control Panel MAIN BREAKER .....☐ And Check: - Control panel lamp circuit composed by lamp H1 and microswitch F1 has been powered .....☐ - Control panel heater circuit composed by internal heater R1 and internal thermostat T1 has been powered .....☐ - HV 66kV – cable box heater circuit composed by heater R2 and thermostat T2 has been powered .....☐ - LV 6.9kV – cable box heater circuit composed by heater R3 and thermostat T3 has been powered .....☐ - The winding temperature indicator 49T circuit has been powered .....☐ - The bladder rupture relay 99T.1 circuit has been powered .....☐ - The self-dehydrating breather 98T.2 circuit has been powered .....☐			
43	Verify and confirm the power presence from DP-200N1 230V (ref. vendor doc. 1723002197-EL-DG-00013) - Close MCB Q32.....☐ On AVR Local Control Panel CP-100E3 With reference Vendor doc. N° 1723001697-EL-DG-00010 verify and confirm - Supply X2: L-N .....Vdc			
44	Verify and confirm the power on CP-100E3 AVR local control panel for the following circuits:			

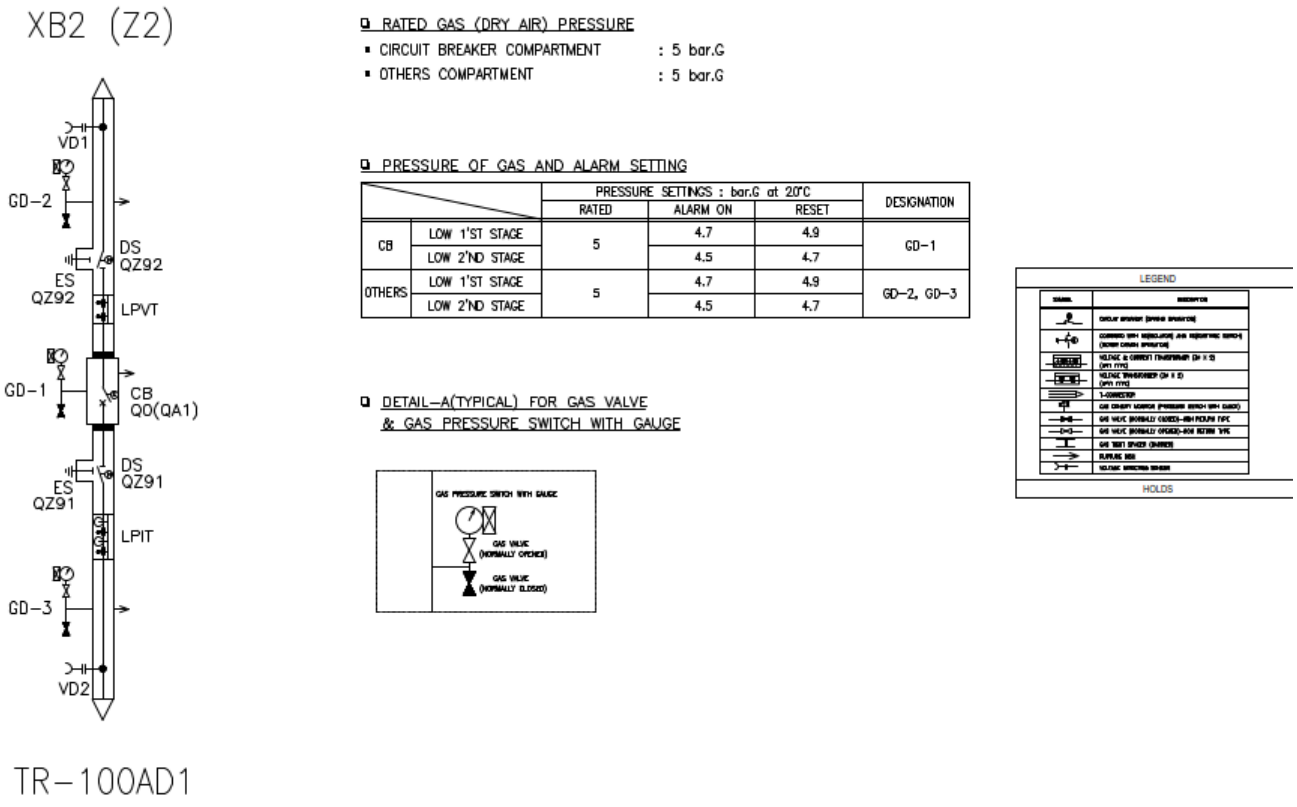
Step	Description	Result	Verified by	Date
	- Close MCB -Q1 – AVR Local Control Panel MAIN BREAKER .....☐ And Check: - Control panel lamp circuit composed by lamp H1 and microswitch F1 has been powered .....☐ - Control panel heater circuit composed by internal heater R1 and internal thermostat T1 has been powered .....☐ - The automatic voltage regulator N1 circuit has been powered .....☐			
45	Verify and confirm the power presence from DP-200N1 230V (ref. vendor doc. 1723002197-EL-DG-00013) - Close MCB Q31.....☐ On MDU Motor Drive Unit control panel CP-100E2 With reference Vendor doc. N° 1723001697-EL-DG-00010 verify and confirm - Supply X1:L1-L2-L3-N..... Vac			
46	Verify and confirm the power on CP-100E2 for the following circuits: - Close MCB -S35A – MDU Motor Drive Unit control panel CP-100E2 MAIN BREAKER .....☐ And Check: - Control panel lamp circuit composed by hand lamp E1 and door contact S10 has been powered .....☐ - Close MCB -F16 – internal heater MDU Motor Drive Unit CP-100E2 heater MAIN BREAKER .....☐			

Step	Description	Result	Verified by	Date
	And Check: - Control panel heater circuit composed by internal heater R1 has been powered .....☐ - Close MCB -Q1 – motor protective switch of motor M1 .....☐ And Check: - M1 Motor drive circuit composed by Motor protective switch Q1 and Contactors K1 and K2 has been powered .....☐			
47	Confirm all transformer control panel are ready to operate: - CP-100E4 – Transformer Auxiliary local control panel .....☐ - CP-100E3 - Transformer AVR local control panel .....☐ - CP-100E2 – Transformer MDU motor drive unit local control panel .....☐			

5.4.2 Test steps

5.4.2.1 Command and Feedback Verification on 66kV GIS Switchgear HNA6-AFA70

The next steps will be performed with assistance of vendor technician and referring to related SAT Procedure

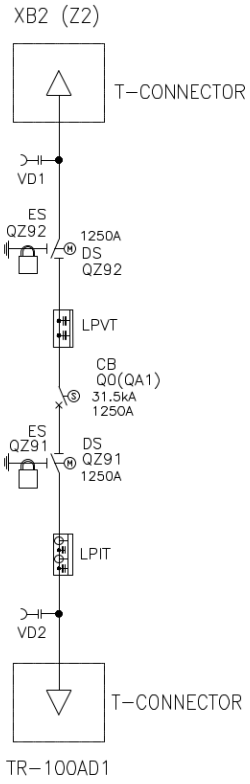
Step	Description	Result	Verified by	Date
Verification of GIS command – preliminary checks				
	 *Figure 6 – extract of 66kV Switchgear (GIS) Gas Single Line Diagram - vendor doc. 1723001595 EL-DG-00014*			
48	Gas Insulated Switchgear (GIS) must be filled with Dry air before operation. In the final stage of installation or maintenance, fill Dry air into enclosure of GIS to the rated gas pressure. If Dry air is not filled before operation, under-mentioned performance will not be ready;			

Step	Description	Result	Verified by	Date
	- Dielectric strength for main circuit - Interruption performance - Mechanical damping action for Circuit Breaker operation Verify and confirm that the correct gas charging has been performed			
49	Before operating on 66kV Switchgear verify and confirm the correct pressure of dry air of all compartments (barG at 20°C). In the details: CB compartment - Rated pressure 5 barG - Pressure at GD-1 gas pressure switch with gauge..... barG Upstream compartment - Rated pressure 5 barG - Pressure at GD-2 gas pressure switch with gauge..... barG Downstream compartment - Rated pressure 5 barG - Pressure at GD-3 gas pressure switch with gauge..... barG Confirm settings of pressure switches on compartments. GD-1 1st LOW stage - Alarm ON - 4,7 barG ..... ☐ - Reset – 4,9 barG ..... ☐ GD-1 2nd LOW stage - Alarm ON - 4,5 barG ..... ☐ - Reset – 4,7 barG ..... ☐ GD-2 1st LOW stage			

Step	Description	Result	Verified by	Date
	- Alarm ON - 4,7 barG ..... ☐ - Reset – 4,9 barG ..... ☐ GD-2 2nd LOW stage - Alarm ON - 4,5 barG ..... ☐ - Reset – 4,7 barG ..... ☐ GD-3 1st LOW stage - Alarm ON - 4,7 barG ..... ☐ - Reset – 4,9 barG ..... ☐ GD-3 2nd LOW stage - Alarm ON - 4,5 barG ..... ☐ - Reset – 4,7 barG ..... ☐			
50	Verify and confirm all external electrical interlock are ready to permit the GIS operating On control panel CP-100E1 and referring to vendor document N° 1723001595-EL-DG-00015: - ESD Signal 81-XS-001 from SIS system is in healthy condition ..... ☐ - KSIL1 and KSIL2 must be ON in heathy condition .....☐ - Interlock from 6.6kV SWBD CB Open - Confirm close circuit between terminal X13: 15-16 - CB local Close command circuits (page. 18/72).....☐ - Interlock from 6.6kV SWBD trip signal - Confirm open circuit between terminal X13: 19-20 – set-reset K86 command Circuits (page. 18/72).....☐ - Interlock from 6.6kV SWBD Earthing Switch Open - Confirm close circuit between terminal X13: 29-30 – DS QZ91 local close command circuit (page. 23/72).....☐			

Step	Description	Result	Verified by	Date
	- Interlock from 6.6kV SWBD CB Open - Confirm close circuit between terminal X13: 33-34 - ES QZ91 local close command circuit (page. 23/72)..... ☐			
51	Verify and confirm all mechanical interlock are ready to permit the GIS operating. On ES/DS QZ91 downstream Earthing / Disconnecting Switch: - Padlock of mechanical interlock must be removed ..... ☐ On ES/DS QZ92 Upstream Earthing / Disconnecting Switch: - Padlock of mechanical interlock must be removed ..... ☐			

Step	Description	Result	Verified by	Date



❑ HNA6-AFA70 INTERLOCK TABLE

CLOSE/OPEN INTERLOCK MATRIX OF CB,DS & ES.											REMARK
COMMAND	66kV GIS					6.6KV SWG.		COMMAND SOURCE		OTHER EXTERNAL INTERLOCKS	
	Q0(QA1)	DS(QZ92)	DS(QZ91)	ES(QZ92)	ES(QZ91)	CB	ES	LOCAL	REMOTE		
CB Q0(QA1) (CLOSE)		C	C			O		X	X	GAS PRESSURE IS NOT LOWER THAN 1'ST ALARM PRESSURE CLOSING SPRING NOT DISCHARGED	SERVICE
		O	O			O		X		GAS PRESSURE IS NOT LOWER THAN 1'ST ALARM PRESSURE	TEST
CB(Q0) (OPEN)								X	X	GAS PRESSURE IS NOT LOWER THAN MINIMUM PRESSURE	SERVICE
										GAS PRESSURE IS NOT LOWER THAN MINIMUM PRESSURE	BY PROTECTION RELAY
DS(QZ92) (CLOSE/OPEN)	O			(O)				X	X		SERVICE
DS(QZ91) (CLOSE)	O				(O)		O	X	X		SERVICE
DS(QZ91) (OPEN)	O				(O)			X	X		SERVICE
ES(QZ92) (CLOSE)	O	(O)						X	X	LINE VD RELAY EXCITED	SERVICE
ES(QZ92) (OPEN)	O	(O)						X	X		SERVICE
ES(QZ91) (CLOSE)	O		(O)			O		X	X		SERVICE
ES(QZ91) (OPEN)	O		(O)					X	X		SERVICE

C : CLOSE
O : OPEN
( ) : MECHANICAL INTERLOCK

Figure 7 – extract of 66kV Switchgear (GIS) Inter Panel Logic Diagram - vendor doc. 1723001595-EL-DG-00012

THE FOLLOWING STEPS SHALL BE PERFORMED WITH VENDOR (HYOSUNG & MF TRASFORMATORI) TECHNICAL ASSISTANCE

In the following steps, the close and open commands will be checked, according to the "close/open interlock matrix of CB, DS & ES" shown in Figure 7.

OPERATION FROM LOCAL CONTROL PANEL AND REMOTE-CONTROL PANEL

Operation of CB, DS and ES is able to be performed at Local position and/or Remote position by the Change-Over Switch (KEY LOCKABLE SWITCH) -S01.

CB opening and closing

When opening and closing CB, the Remote or Local operation may be performed by setting the -S01 on Local Control Panels (CP-100E1). The -S01 is marked "REMOTE & LOCAL" on CP-100E1.

Step	Description	Result	Verified by	Date
	CB opening from Remote Control EMCS or from Local Control Panel CP-100E1 a) Set the -S01 on CP-100E1 to "REMOTE (or LOCAL)" position. b) Command the CB opening from the Remote Control EMCS or Local Control Panel CP-100E1 CB closing from Remote Control EMCS or from Local Control Panel CP-100E1 a) Set the -S01 on CP-100E1 to "REMOTE (or LOCAL)" position. b) Command the CB closing from the Remote Control EMCS or Local Control Panel CP-100E1 DS opening and closing of combined DS & ES 1) Opening a) Set the -S01 on CP-100E1 to "REMOTE (or LOCAL)" position b) Push-turn the Control Switch CS.. of DS to "OPEN" position. 2) Closing a) Set the -S01 on CP-100E1 of Bay to "LOCAL (or REMOTE)" position. b) Push-turn the Control Switch CS.. of DS to "CLOSE" position. ES opening and closing of Combined with DS & ES 1) Opening a) Set the -S01 on CP-100E1 of Bay to "LOCAL (or REMOTE)" position. b) Push-turn the CS.. of ES to "OPEN" position. 2) Closing c) Set the -S01 on CP-100E1 of Bay to "LOCAL (or REMOTE)" position. d) Push-turn the CS.. of ES to "CLOSE" position.			

Step	Description	Result	Verified by	Date

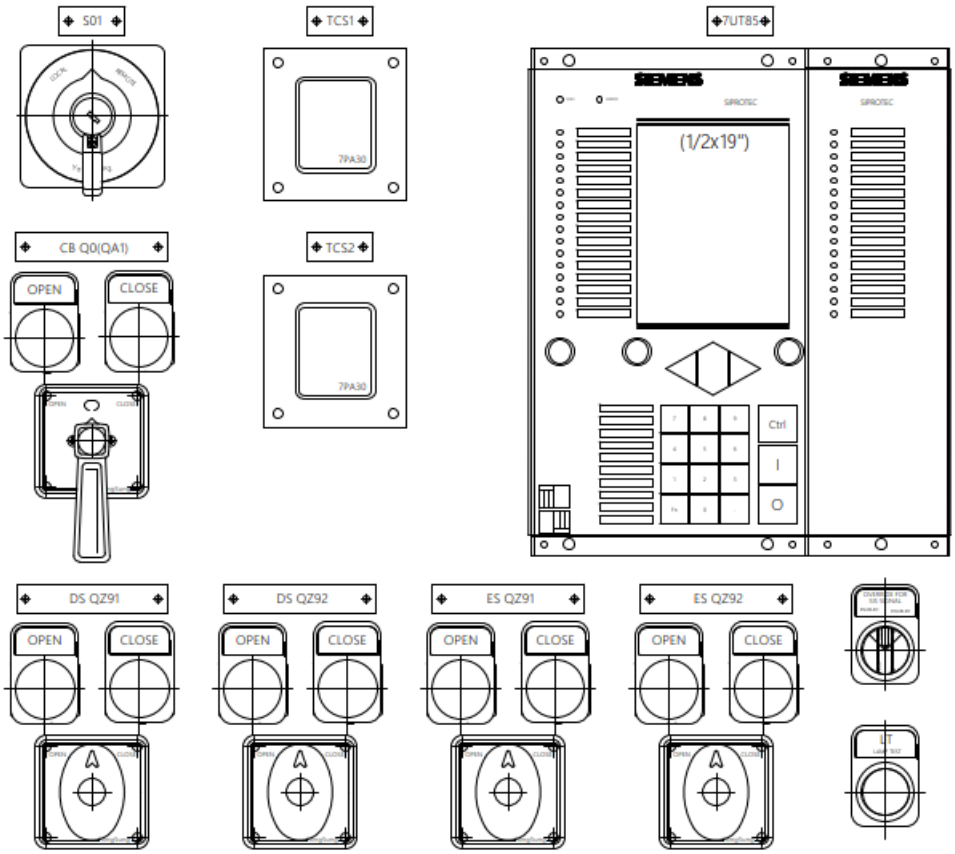


Figure 8 – extract of 66kV Switchgear (GIS) Front command layout of Control Panel CP-100E1 "CIRCUIT AND WIRING DIAGRAM" - vendor doc. 1723001595-EL-DG-00015

-S01 LOCAL/REMOTE SELECTOR KEY CAM SWITCH MANUAL RETURN TYPE

-CS1 SELECTOR SWITCH FOR CB Q0(QA1) SELECT SWITCH / PISTOL TYPE HANDLE / PULL AND TURN TYPE

-CS2 SELECTOR SWITCH FOR DS QZ92 SELECT SWITCH / EGG TYPE HANDLE / PULL AND TURN TYPE

-CS3 SELECTOR SWITCH FOR ES QZ92 SELECT SWITCH / EGG TYPE HANDLE / PULL AND TURN TYPE

-CS4 SELECTOR SWITCH FOR DS QZ91SELECT SWITCH / EGG TYPE HANDLE / PULL AND TURN TYPE

-CS5 SELECTOR SWITCH FOR ES QZ91SELECT SWITCH / EGG TYPE HANDLE / PULL AND TURN TYPE

GIS Operational test without 66kV and 6.6kV power supply: Open/Close CB, DS & ES with selector -S01 in Local position.

The commands for CB Q0(QA1), QZ92 ES&DS and QZ91 ES&DS are possible ONLY if the gas pressure is higher than 1st alarm pressure

Step	Description	Result	Verified by	Date
The reference is made to vendor doc. 1723001595-EL-DG-00012 "Functional logic Diagram" for the CB, ES and DS command functioning, protection logics and protection trip logics.				
Operating Test - local command without 66kV power supply				
52	Starting situation: GIS is in healthy condition, 66kV power supply is not present and then: - QZ92 ES Close on Earthing position and DS is Open - QZ91 ES Close on Earthing position and DS is open - QO(QA1) CB is Open - All auxiliary circuits are powered and ready to work			
53	Local operations Place selector -S01 in LOCAL position ..... ☐			
54	CLOSE and OPEN QZ92 - Remove padlock on earthing switch ES (If any) ..... ☐ - Pull-turn selector switch CS3 to left side (open) and ES will open ..... ☐ - Pull-turn selector switch CS3 to right side (close) and ES will close ..... ☐ - Pull-turn selector switch CS2 to right side (close) and DS will close ..... ☐ - Pull-turn selector switch CS2 to left side (open) and DS will open ..... ☐ - Keep QZ92 with ES opened and DS closed to allow the next steps ..... ☐			
55	CLOSE and OPEN QZ91 - Remove padlock on earthing switch ES (If any) ..... ☐			

Step	Description	Result	Verified by	Date
	- Pull-turn selector switch CS5 to left side (open) and **ES** will open ..... ☐ - Pull-turn selector switch CS5 to right side (close) and **ES** will close ..... ☐ - Pull-turn selector switch CS4 to right side (close) and **DS** will close ..... ☐ - Pull-turn selector switch CS4 to left side (open) and **DS** will open ..... ☐ - Keep QZ91 with **ES** opened and **DS** closed to allow the next steps ..... ☐			
56	CLOSE and OPEN Q0(QA1) – the DSs are in open position - Pull-turn selector switch CS1 to right side (close) and **CB** will close ..... ☐ - Pull-turn selector switch CS1 to left side (open) and **CB** will open ..... ☐ - Keep **CB** opened to allow the next steps . ☐			
57	CLOSE and OPEN Q0(QA1) – with **DS**s in close position - Pull-turn selector switch CS1 to right side (close) and **CB** will close ..... ☐ - Pull-turn selector switch CS1 to left side (open) and **CB** will open ..... ☐ - Keep **CB** opened and **DS**s closed to allow the next steps ..... ☐			
Operating Test - Remote command without 66kV power supply				
58	Remote operations from EMCS System (IEC 61850) and HV SCADA Place selector -S01 in **REMOTE** position ..... ☐			
59	CLOSE and OPEN QZ92			

Step	Description	Result	Verified by	Date
	- Remove padlock on earthing switch **ES** (If any).....☐ - Receiving closing signal _____ from HV SCADA **ES** will close .....☐ - Receiving opening signal _____ from HV SCADA, **ES** will open .....☐ - Receiving opening signal _____ from HV SCADA, **DS** will open.....☐ - Receiving closing signal _____ from HV SCADA **DS** will close.....☐ - Keep QZ92 with **ES** opened and **DS** closed to allow the next steps .....☐ N.B.1: in remote mode, to permit **CB** manoeuvres, **ES** must be opened, and **DS** must be closed (see Interlock Matrix Figure 7) N.B.2: HV SCADA Signals must be simulated			
60	CLOSE and OPEN QZ91 - Remove padlock on earthing switch **ES** (If any).....☐ - Receiving closing signal _____ from EMCS System **ES** will close .....☐ - Receiving opening signal _____ from EMCS System, **ES** will open .....☐ - Receiving opening signal _____ from EMCS System, **DS** will open.....☐ - Receiving closing signal _____ from EMCS System **DS** will close.....☐ - Keep QZ91 with **ES** opened and **DS** closed to allow the next steps .....☐			

Step	Description	Result	Verified by	Date
	N.B.: in remote mode, to permit CB manoeuvres, ES must be opened, and DS must be closed (see Interlock Matrix Figure 7)			
61	CLOSE and OPEN CB Q0(QA1) - Receiving closing signal _____ from EMCS System, CB will close.....☐ - Receiving opening signal _____ from EMCS System, CB will open .....☐ - Receiving closing signal _____ from EMCS System, CB will close.....☐ - Receiving opening signal _____ from HV SCADA, CB will open .....☐ N.B.1: in remote mode, to permit CB manoeuvres, ES must be opened, DS must be closed and 6.6kV main CB must be open (see Interlock Matrix Figure 7) N.B.2: HV SCADA Signals must be simulated N.B.3: In remote mode the CB closing command is possible only from EMCS System; The CB opening command is possible from EMCS System and HV Scada			

5.4.2.2 Command and Feedback Verification on 66/6.6kV power transformer TR-100AD1

After auxiliary energization will check the devices are installed on Power Transformer

The next steps will be performed with assistance of vendor technician and referring to related SAT Procedure

Step	Description	Result	Verified by	Date

Auxiliaries Energization of 66/6.6kV Transformer TR-100AD1

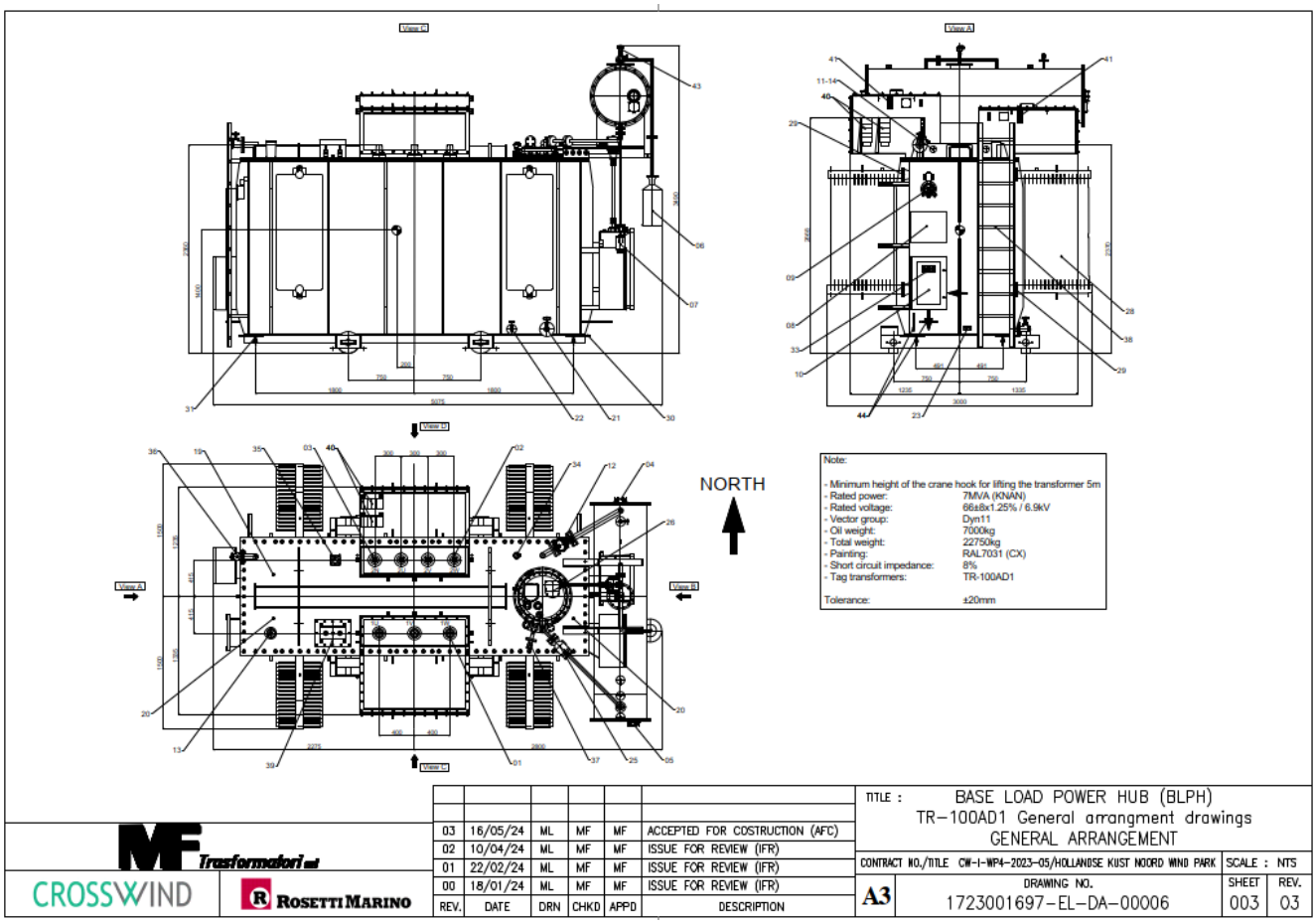


Figure 9 – extract of 66/6.6kV Power Transformer General Arrangement - vendor doc. 1723001697-EL-DA-00006 pag.003

Step	Description	Result	Verified by	Date

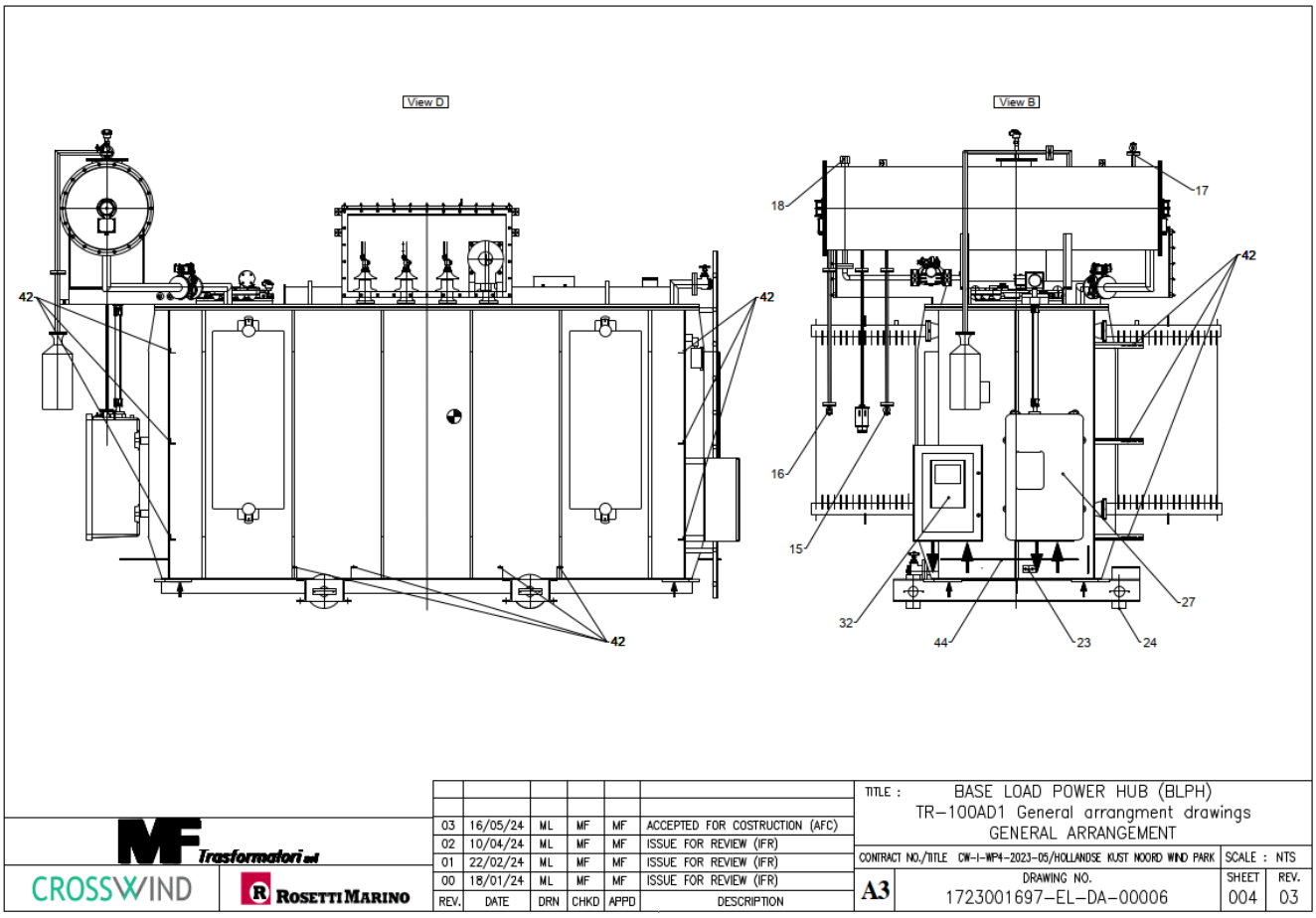


Figure 10 – extract of 66/6.6kV Power Transformer General Arrangement - vendor doc. 1723001697-EL-DA-00006 pag.004

Step	Description	Result	Verified by	Date

EQUIPMENTS LIST

ITEM	DESCRIPTION	N°	SUPPLIER	TYPE	ITEM	DESCRIPTION	N°	SUPPLIER	TYPE
01	66kV H.V. Terminals	03	NEXANS	R900AR-8-L	23	Earthing terminal	02	MF	Stainless steel plate 90x50 with n.2 holes MA16 - distance 50
02	6.9kV H.V. Terminals with extention copper bars	03	EMC	UNEL 12kV/630A	24	Bi-directional wheels	04	MF	Ø250x100
03	6.9kV H.V. Neutral Terminal	01	EMC	UNEL 12kV/630A	25	Protection relay with 1contact - OLTC	01	MR	RS2001
04	Oil level indicator with 2 contacts - TRANSFO	01	COMEM	LB14XON	26	On Load Tap Changer	01	MR	VACUTAP VV III 250D-76-10 19 3W
05	Oil level indicator with 2 contacts - OLTC	01	COMEM	LA14XON	27	Motor Drive Unit (MDU) - OLTC Panel - CP-100E2	01	MR	ED100
06	Dehydrating breather - TRANSFO	01	COMEM	ESDB 14C	28	Cooling elements	04	WARM	17 EL - Int. 1300
07	Dehydrating breather - OLTC	01	COMEM	EM1DB	29	Cooling element valves	08	ETI	WU080
08	Rating plate	01	MF		30	Haulage lugs	04	MF	Ø50
09	Oil thermometer with 2 contacts	01	TERMAF	Type A - DS150	31	Jacking pads	04	MF	Ø150x10
10	Auxiliary panel - Protection devices - CP-100E4	01	MF	Stainless steel - IP65	32	AVR control panel - CP-100E3	01	MF	Stainless steel - IP65
11	Lifting eyebolts for removable part	04	MF	Ø70	33	Winding Temperature Indicator	01	TECSYSTEM	NT133/3
12	Buchholz relay with 2 contacts	01	COMEM	BR50	34	Thermal sensor for WTI	01	TECSYSTEM	PTO
13	Pressure relay with 1 contact	01	QUALITROL	900-FLA-T-NO-STD	35	Current transformer signal for WTI	01	ETI	SM2-X
14	Lifting eyebolts transformer	04	MF	Ø70	36	Oil treatment valve - TRANSFO	01	MF	DN50-PN10
15	Conservator oil drain valve - TRANSFO	01	BARBERI	DN15-PN10	37	Oil treatment valve - OLTC	01	MR	DN25-PN10
16	Conservator oil drain valve - OLTC	01	BARBERI	DN15-PN10	38	Ladder	01	MF	
17	Conservator air release valve - TRANSFO	01	BARBERI	DN15-PN10	39	Core earthing terminals	02	MF	
18	Conservator air release cap - OLTC	01	MF	2"	40	Current transformer	02	STE	250/1A - 5P20 - 5VA
19	Thermal pocket for pos. 09	01	MF	3/4"	41	Heating element with thermostat	02	MF	100W
20	Thermal pocket (spare)	02	MF	3/4"	42	Support cable duct	06	MF	
21	Oil drain valve - TRANSFO	01	BARBERI	DN50-PN10	43	Diaphragm failure device with alarm contact	01	PRONAL	STP-BBR
22	Oil sampling valve - TRANSFO	01	BARBERI	DN15-PN10	44	Support auxiliary cables	02	MF	

Figure 11 – extract of 66/6.6kV Power Transformer General Arrangement - vendor doc. 1723001697-EL-DA-00006 pag.005

62	Verify and confirm transformer control panel is powered and ready for operation: - CP-100E2..... ☐ - CP-100E3..... ☐ - CP-100E4..... ☐			

Step	Description	Result	Verified by	Date

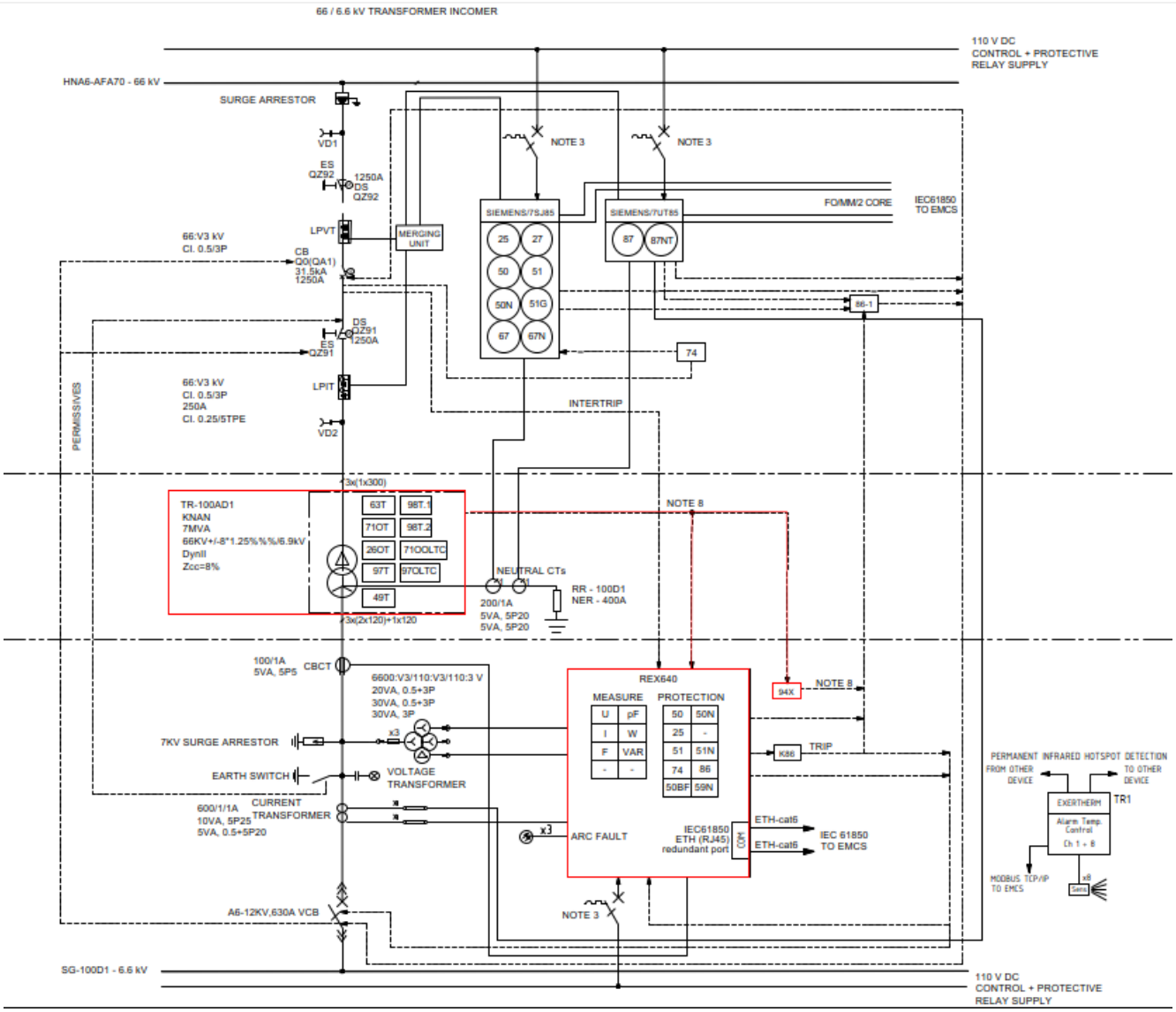
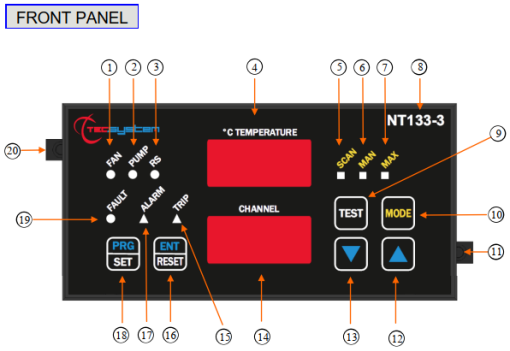


Figure 12 – Extract from 123A90-DDL-EL-DG-20014 ELECTRICAL CONTROL, PROTECTION AND METERING DIAGRAMS 66 / 6.6 kV TRANSFORMER INCOMER

63	Verify and confirm that on 66/6.6kV Power Transformer TR-100AD1 are installed the following protective devices. The transformer alarm is wired on SG-100D1 Unit A6 Protection Relay			

Step	Description	Result	Verified by	Date
	- 97T BUCHHOLZ RELAY ..... ☐ - 26OT OIL THERMOMETER ..... ☐ - 71OT OIL LEVEL INDICATOR ..... ☐ - 63T PRESSURE RELAY ..... - 28T.1 & 27T.2 THERMAL SENSOR PT100 FOR WTI ..... ☐ - 49T WINDING TEMPERATURE INDICATOR ..... ☐ - 98T.1 BLADDER RUPTURE RELAY ..... ☐ - 98T.2 THE SELF DEHYDRATING BREATHER ..... ☐ Trip signals are instead wired to 94X INTERPOSING RELAYS: - 94B BUCHHOLZ TRIP AUXILIARY RELAY ..... ☐ - 94L OIL LEVEL AUXILIARY RELAY ..... ☐ - 94OT OIL TEMPERATURE TRIP AUXILIARY RELAY ..... ☐ - 94WT WINDING TEMPERATURE TRIP AUXILIARY RELAY ..... ☐ - 94P PRESSURE RELIEF DEVICE TRIP AUXILIARY RELAY ..... ☐ - 94X TRANSFORMER PROTECTION TRIP AUXILIARY RELAY ..... ☐			
64	49T WINDING TEMPERATURE INDICATOR In front of control panel is installed TEC SYSTEM temperature protection relay. Pushing UP (12) and DOWN (13) button read the winding temperature: - T1 ..... °C - T2 ..... °C			

Step	Description	Result	Verified by	Date
	- T3 ..... °C  1) FAN led (yellow) — 11) Fixing block 2) PUMP led (yellow) — 12) UP key 3) RS led (green) — 13) DOWN key 4) Temperature display — 14) Channel display 5) SCAN led (green) — 15) TRIP led (red) 6) MAN led (yellow) — 16) Enter / Reset key 7) MAX led (red) — 17) ALARM led (red) 8) Control unit series — 18) Programming / Set key 9) Test key — 19) FAULT led (red) 10) Mode key — 20) Fixing block			
65	ON LOAD TAP CHANGER On-load tap-changers are used to adjust the transmission ratio of transformers without interrupting the load flow. This makes it possible to compensate for aspects such as fluctuations in voltage occurring in the power transmission grid. For this purpose, on-load tap-changers are fitted in transformers and connected to the active part of the transformer. A motor-drive unit which receives a control impulse (e.g. from a voltage regulator) changes the operating position of the on-load tap-changer, and the transformer's transmission ratio is adapted to the prevailing operating requirements as a result. The position of TAP CHANGER is driven by EMCS System. The TAP CHANGER test is performed to Transformer Site Acceptance Test with technical			

Step	Description	Result	Verified by	Date
	assistance of MF TRASFORMATORI Technician and EMCS System operator. - Verify and confirm the TAP CHANGER test has been performed ..... ☐			
66	97OLTC PROTECTION RELAY ON LOAD TAP CHANGER and 71OOLTC OIL LEVEL INDICATOR ON LOAD TAP CHANGER The protective relay is looped into the circuit breaker tripping circuit. It is tripped when the specified speed of flow from the on-load tap-changer head to the oil conservator is exceeded due to a fault. The flowing insulating fluid actuates the flap valve which tips over into position OFF. The contact in the dry-reed magnetic switch is thereby actuated, the circuit breakers are tripped, and the transformer is de-energized. The protective relay is a component of an on-load tap-changer filled with insulating fluid and its properties conform to the respective applicable version of IEC publication 60214-1. The TAP CHANGER test is performed to Transformer Site Acceptance Test with technical assistance of MF TRASFORMATORI Technician - Verify and confirm the 97OLTC protection has been tested ..... ☐ - Verify and confirm the 71OOLTC protection has been tested ..... ☐			

5.4.2.3 Test EMCS IEC61850 - Electrical Monitoring & Control System of I/O from/to 66kV GIS Switchgear HNA6-AFA70 and 66/6.6kV power Transformer

Check 66kV GIS Switchgear I/O list, referring to Vendor document 1723001595-EL-LIS-00011

The following I/O list comes from Siemens protection relay 7SJ85 on board of control panel CP-100E1

No	Signal Name(Description)		Data Type	Signal Name	EMCS				HV SCADA				Check	
					Control	Status	Measure	Config	Control	Status	Measure	Config	IED	Test Server
1	SIEMENS_7SJ85	Physical channel status (Station bus)-EMCS	LCCH	BLPH_EW200Mod3_Channel1PRP_LCCH2ST$ChLiv$stVal		•								
2	SIEMENS_7SJ85	Physical channel status of redundant channel (Station bus)-EMCS	LCCH	BLPH_EW200Mod3_Channel1PRP_LCCH2ST$RedChLiv$stVal		•								
3	SIEMENS_7SJ85	Physical channel status (Station bus)-HV SCADA	LCCH	BLPH_EW200Mod4_Channel1PRP_LCCH3ST$ChLiv$stVal		•								
4	SIEMENS_7SJ85	Physical channel status of redundant channel (Station bus)-HV SCADA	LCCH	BLPH_EW200Mod4_Channel1PRP_LCCH3ST$RedChLiv$stVal		•								
5	SIEMENS_7SJ85	Physical channel status (Process bus)	LCCH	BLPH_EW200Mod2_Channel1PRP_LCCH1ST$ChLiv$stVal		•								
6	SIEMENS_7SJ85	Physical channel status of redundant channel (Process bus)	LCCH	BLPH_EW200Mod2_Channel1PRP_LCCH1ST$RedChLiv$stVal		•								
7	SIEMENS_7SJ85	IED physical device health	LPHD	BLPH_EW200Application$LPHD0$ST$PhyHealth$stVal:3		•								
8	SIEMENS_7SJ85	Time synchronized	LTMS	BLPH_EW200Application$LTMS0$ST$TmSynErr$stVal		•								
9	SIEMENS_7SJ85	GOOSE Sub. fail al\arm	LPHD	BLPH_EW200ComSupervision_GOOSE$CALH1$ST$GrAlm$stVa		•								
10	SIEMENS_7SJ85	Memory fail alarm	LPHD	BLPH_EW200Application$LPHD0$ST$FlshDskHth$stVal:3		•								
11	SIEMENS_7SJ85	Process bus processor fail alarm	LLN0	BLPH_EW200ComSupervision_SV$LLN0$ST$Health$stVal:3		•								
12	SIEMENS_7SJ85	Sampled value sub. fail alarm	CALH	BLPH_EW200ComSupervision_SV/CALH1STGrAlm$stVal		•								
13	SIEMENS_7SJ85	IED Local/Remote Status	LLN0	BLPH_EW200Application$LLN0$ST$LocKey$stVal		•								
14	SIEMENS_7SJ85	CB QA1 status(Q0) For EMCS	CSWI	BLPH_EW200CB1$CSWI4$STPosstVal		•								
15	SIEMENS_7SJ85	CB QA1 control(Q0) For EMCS	CSWI	BLPH_EW200CB1$CSWI4$STPosctVal	•									
16	SIEMENS_7SJ85	DS QZ91 status F\or EMCS	CSWI	BLPH_EW200Dc1$CSWI1$COPosstVal		•								
17	SIEMENS_7SJ85	DS QZ91 control For EMCS	CSWI	BLPH_EW200Dc1$CSWI1$COPosctVal	•									
18	SIEMENS_7SJ85	DS QZ92 status For EMCS	XSWI	BLPH_EW200Dc2$XSWI2$STPosstVal		•								
19	SIEMENS_7SJ85	ES QZ91 status For EMCS	CSWI	BLPH_EW200Dc4$XSWI4$STPosstVal		•								
20	SIEMENS_7SJ85	ES QZ91 control For EMCS	CSWI	BLPH_EW200Dc3$CSWI3$COPosctVal	•									
21	SIEMENS_7SJ85	ES QZ92 status For EMCS	XSWI	BLPH_EW200Dc3$CSWI3$COPosstVal		•								
22	SIEMENS_7SJ85	CB QA1 status(Q0) For HV-SCADA	CSWI	BLPH_EW200CBc1$CSWI6$STPosstVal						•				
23	SIEMENS_7SJ85	CB QA1 open command(Q0) For HV-SCADA	CSWI	BLPH_EW200CBc1$CSWI6$STPosctVal					•					
24	SIEMENS_7SJ85	DS QZ91 status For HV-SCADA	XSWI	BLPH_EW200Dc1$XSWI1$STPosstVal						•				
25	SIEMENS_7SJ85	DS QZ92 status For HV-SCADA	CSWI	BLPH_EW200Dc2$CSWI2$STPosstVal						•				
26	SIEMENS_7SJ85	DS QZ92 control For HV-SCADA	CSWI	BLPH_EW200Dc2$CSWI2$STPosctVal					•					
27	SIEMENS_7SJ85	ES QZ91 status For HV-SCADA	XSWI	BLPH_EW200Dc3$XSWI3$STPosstVal						•				
28	SIEMENS_7SJ85	ES QZ92 status For HV-SCADA	CSWI	BLPH_EW200Dc4$CSWI5$STPosstVal						•				
29	SIEMENS_7SJ85	ES QZ92 control For HV-SCADA	CSWI	BLPH_EW200Dc4$CSWI5$STPosctVal					•					
30	SIEMENS_7SJ85	DC Control Voltage Failure	USER1	BLPH_EW200UD$USER1$STSPSstVal		•								

No	Signal Name(Description)		Data Type	Signal Name	EMCS				HV SCADA				Check	
					Control	Status	Measure	Config	Control	Status	Measure	Config	IED	Test Server
31	SIEMENS_7SJ85	AC Control Voltage Failure	USER1	BLPH_EW200UD$USER1$ST$SPS1$stVal		•								
32	SIEMENS_7SJ85	6.6kV SWGR CB Open Status	USER1	BLPH_EW200UD$USER1$ST$SPS2$stVal		•								
33	SIEMENS_7SJ85	6.6kV SWGR ES Open Status	USER1	BLPH_EW200UD$USER1$ST$SPS3$stVal		•								
34	SIEMENS_7SJ85	VD1 NO VOLTAGE	USER1	BLPH_EW200UD$USER1$ST$SPS4$stVal		•								
35	SIEMENS_7SJ85	VD2 NO VOLTAGE	USER1	BLPH_EW200UD$USER1$ST$SPS5$stVal		•								
36	SIEMENS_7SJ85	CB Warning Gas Low Stage-1	USER1	BLPH_EW200UD$USER1$ST$SPS6$stVal		•								
37	SIEMENS_7SJ85	CB Warning Gas Low Stage-2	USER1	BLPH_EW200UD$USER1$ST$SPS7$stVal		•								
38	SIEMENS_7SJ85	CB Spring Motor Overload	USER1	BLPH_EW200UD$USER1$ST$SPS8$stVal		•								
39	SIEMENS_7SJ85	CB Spring Motor Excessive Run Time	USER1	BLPH_EW200UD$USER1$ST$SPS9$stVal		•								
40	SIEMENS_7SJ85	CB Motor Exceeded & Spring Uncharged	USER1	BLPH_EW200UD$USER1$ST$SPS10$stVal		•								
41	SIEMENS_7SJ85	DS/ES MOTOR MCB TRIP	USER1	BLPH_EW200UD$USER1$ST$SPS11$stVal		•								
42	SIEMENS_7SJ85	DS OR ES MANUAL OPER MODE	USER1	BLPH_EW200UD$USER1$ST$SPS12$stVal		•								
43	SIEMENS_7SJ85	HAND CRANK INSERTED	USER1	BLPH_EW200UD$USER1$ST$SPS13$stVal		•								
44	SIEMENS_7SJ85	7UT85 Relay Failure	USER1	BLPH_EW200UD$USER1$ST$SPS14$stVal		•								
45	SIEMENS_7SJ85	LCC LOCAL Status	USER1	BLPH_EW200UD$USER1$ST$SPS15$stVal		•								
46	SIEMENS_7SJ85	LCC REMOTE Status	USER1	BLPH_EW200UD$USER1$ST$SPS16$stVal		•								
47	SIEMENS_7SJ85	TCS1 FAIL	USER1	BLPH_EW200UD$USER1$ST$SPS17$stVal		•								
48	SIEMENS_7SJ85	TCS2 FAIL	USER1	BLPH_EW200UD$USER1$ST$SPS18$stVal		•								
49	SIEMENS_7SJ85	SAFETY SYSTEM POWER WATCHDOG	USER1	BLPH_EW200UD$USER1$ST$SPS19$stVal		•								
50	SIEMENS_7SJ85	MCB Alarm - Q0	USER1	BLPH_EW200UD$USER1$ST$SPS20$stVal		•								
51	SIEMENS_7SJ85	DS/ES QZ92 GAS Pressure Low Stage-1	USER1	BLPH_EW200UD$USER1$ST$SPS21$stVal		•								
52	SIEMENS_7SJ85	DS/ES QZ92 GAS Pressure Low Stage-2	USER1	BLPH_EW200UD$USER1$ST$SPS22$stVal		•								
53	SIEMENS_7SJ85	DS/ES QZ91 GAS Pressure Low Stage-1	USER1	BLPH_EW200UD$USER1$ST$SPS23$stVal		•								
54	SIEMENS_7SJ85	DS/ES QZ91 GAS Pressure Low Stage-2	USER1	BLPH_EW200UD$USER1$ST$SPS24$stVal		•								
55	SIEMENS_7SJ85	LOR RESET COMMAND	USER1	BLPH_EW200UD$USER1$COSPCctVal	•									
56	SIEMENS_7SJ85	CB QA1 open command by HV SCADA	USER1	BLPH_EW200UD$USER1$ST$SPS25$stVal		•								
57	SIEMENS_7SJ85	DS QZ92 open command by HV SCADA	USER1	BLPH_EW200UD$USER1$ST$SPS26$stVal		•								
58	SIEMENS_7SJ85	DS QZ92 close command by HV SCADA	USER1	BLPH_EW200UD$USER1$ST$SPS27$stVal		•								
59	SIEMENS_7SJ85	ES QZ92 open command by HV SCADA	USER1	BLPH_EW200UD$USER1$ST$SPS28$stVal		•								
60	SIEMENS_7SJ85	ES QZ92 close command by HV SCADA	USER1	BLPH_EW200UD$USER1$ST$SPS29$stVal		•								
61	SIEMENS_7SJ85	SIS OVERRIDE ENABLED	USER1	BLPH_EW200UD$USER1$ST$SPS30$stVal		•								
62	SIEMENS_7SJ85	Physical channel status (Process bus)	USER1	BLPH_EW200GS$USER1$ST$RxChLiv$stVal		•								
63	SIEMENS_7SJ85	Physical channel status of redundant channel (Process bus)	USER1	BLPH_EW200GS$USER1$ST$RxRedChLiv$stVal		•								
64	SIEMENS_7SJ85	IED physical device health	USER1	BLPH_EW200GS$USER1$ST$RxPhyHealth$stVal		•								
65	SIEMENS_7SJ85	Time synchronized	USER1	BLPH_EW200GS$USER1$ST$RxTmSyn$stVal		•								
66	SIEMENS_7SJ85	Internal power fail alarm	USER1	BLPH_EW200GS$USER1$ST$RxInd005$stVal		•								

No	Signal Name(Description)		Data Type	Signal Name	EMCS				HV SCADA				Check	
					Control	Status	Measure	Config	Control	Status	Measure	Config	IED	Test Server
67	SIEMENS_7SJ85	Process bus processor fail alarm	USER1	BLPH_EW200GS$USER1$ST$RxInd012$stVal		•								
68	SIEMENS_7SJ85	Sampled value publish fail alarm	USER1	BLPH_EW200GS$USER1$ST$RxInd030$stVal		•								
69	SIEMENS_7SJ85	CH1 SC Critical alarm	USER1	BLPH_EW200GS$USER1$ST$RxInd020SC1$stVal		•								
70	SIEMENS_7SJ85	CH1 SC Temperature alarm	USER1	BLPH_EW200GS$USER1$ST$RxInd021SC1$stVal		•								
71	SIEMENS_7SJ85	CH1 SC Pressure alarm	USER1	BLPH_EW200GS$USER1$ST$RxInd022SC1$stVal		•								
72	SIEMENS_7SJ85	CH2 SC Critical alarm	USER1	BLPH_EW200GS$USER1$ST$RxInd020SC2$stVal		•								
73	SIEMENS_7SJ85	CH2 SC Temperature alarm	USER1	BLPH_EW200GS$USER1$ST$RxInd021SC2$stVal		•								
74	SIEMENS_7SJ85	CH2 SC Pressure alarm	USER1	BLPH_EW200GS$USER1$ST$RxInd022SC2$stVal		•								
75	SIEMENS_7SJ85	CH3 SC Critical alarm	USER1	BLPH_EW200GS$USER1$ST$RxInd020SC3$stVal		•								
76	SIEMENS_7SJ85	CH3 SC Temperature alarm	USER1	BLPH_EW200GS$USER1$ST$RxInd021SC3$stVal		•								
77	SIEMENS_7SJ85	CH3 SC Pressure alarm	USER1	BLPH_EW200GS$USER1$ST$RxInd022SC3$stVal		•								
78	SIEMENS_7SJ85	CH4 SC Critical alarm	USER1	BLPH_EW200GS$USER1$ST$RxInd020SC4$stVal		•								
79	SIEMENS_7SJ85	CH4 SC Temperature alarm	USER1	BLPH_EW200GS$USER1$ST$RxInd021SC4$stVal		•								
80	SIEMENS_7SJ85	Level 1 50 pick-up General	PTOC	BLPH_EW200GS$USER1$ST$RxInd022SC4$stVal		•								
81	SIEMENS_7SJ85	Level 1 50 operation General	PTOC	BLPH_EW200VI3p2_5051OC3phase1ID_PTOC1STOpgeneral		•								
82	SIEMENS_7SJ85	Level 1 50N pick-up General	PTOC	BLPH_EW200VI3p2_5051NOCgndB1ND_PTOC1STStrgeneral		•								
83	SIEMENS_7SJ85	Level 1 50N operation General	PTOC	BLPH_EW200VI3p2_5051NOCgndB1ND_PTOC1STOpgeneral		•								
84	SIEMENS_7SJ85	Level 1 51 pick-up General	PTOC	BLPH_EW200VI3p2_5051OC3phase1II_PTOC1STStrgeneral		•								
85	SIEMENS_7SJ85	Level 1 51 operation General	PTOC	BLPH_EW200VI3p2_5051OC3phase1II_PTOC1STOpgeneral		•								
86	SIEMENS_7SJ85	Level 1 51G pick-up General	PTOC	BLPH_EW200VI3p2_5051NOCgndB1NI_PTOC1STStrgeneral		•								
87	SIEMENS_7SJ85	Level 1 51G operation General	PTOC	BLPH_EW200VI3p2_5051NOCgndB1NI_PTOC1STOpgeneral		•								
88	SIEMENS_7SJ85	Level 1 67 pick-up General	PTRC	BLPH_EW200VI3p2_67DirOC3phB1$PTRC5$STStrgeneral		•								
89	SIEMENS_7SJ85	Level 1 67 operation General	PTRC	BLPH_EW200VI3p2_67DirOC3phB1$PTRC5$STOpgeneral		•								
90	SIEMENS_7SJ85	Level 1 67N pick-up General	PTRC	BLPH_EW200VI3p2_67NDirOCgndB1$PTRC1$STStrgeneral		•								
91	SIEMENS_7SJ85	Level 1 67N operation General	PTRC	BLPH_EW200VI3p2_67NDirOCgndB1$PTRC1$STOpgeneral		•								
92	SIEMENS_7SJ85	Level 1 27 pick-up General	PTRC	BLPH_EW200V3p2_27Undervoltage1$PTRC1$STStrgeneral		•								
93	SIEMENS_7SJ85	Level 1 27 operation General	PTRC	BLPH_EW200V3p2_27Undervoltage1$PTRC1$STOpgeneral		•								
94	SIEMENS_7SJ85	CB 1st (BUS_P1)-AB Phase to phase voltages magnitude	MMXU	BLPH_EW200V3p1_FundSymComp$FPRE_MMXU3$MXPPVphsAB$cVal$mag$f			•							
95	SIEMENS_7SJ85	CB 1st (BUS_P1)-AB Phase to phase voltages angle	MMXU	BLPH_EW200V3p1_FundSymComp$FPRE_MMXU3$MXPPVphsAB$cVal$ang$f			•							
96	SIEMENS_7SJ85	CB 1st (BUS_P1)-BC Phase to phase voltages magnitude	MMXU	BLPH_EW200V3p1_FundSymComp$FPRE_MMXU3$MXPPVphsBC$cVal$mag$f			•							
97	SIEMENS_7SJ85	CB 1st (BUS_P1)-BC Phase to phase voltages angle	MMXU	BLPH_EW200V3p1_FundSymComp$FPRE_MMXU3$MXPPVphsBC$cVal$ang$f			•							
98	SIEMENS_7SJ85	CB 1st (BUS_P1)-CA Phase to phase voltages magnitude	MMXU	BLPH_EW200V3p1_FundSymComp$FPRE_MMXU3$MXPPVphsCA$cVal$mag$f			•							
99	SIEMENS_7SJ85	CB 1st (BUS_P1)-CA Phase to phase voltages angle	MMXU	BLPH_EW200V3p1_FundSymComp$FPRE_MMXU3$MXPPVphsCA$cVal$ang$			•							
100	SIEMENS_7SJ85	CB 1st (BUS_P1)-A Phase voltages magnitude	MMXU	BLPH_EW200V3p1_FundSymComp$FPRE_MMXU3$MXPhVphsA$cVal$mag$f			•							
101	SIEMENS_7SJ85	CB 1st (BUS_P1)-A Phase voltages angle	MMXU	BLPH_EW200V3p1_FundSymComp$FPRE_MMXU3$MXPhVphsA$cVal$ang$f			•							
102	SIEMENS_7SJ85	CB 1st (BUS_P1)-B Phase voltages magnitude	MMXU	BLPH_EW200V3p1_FundSymComp$FPRE_MMXU3$MXPhVphsB$cVal$mag$f			•							

No	Signal Name(Description)		Data Type	Signal Name	EMCS				HV SCADA				Check	
					Control	Status	Measure	Config	Control	Status	Measure	Config	IED	Test Server
103	SIEMENS_7SJ85	CB 1st (BUS_P1)-B Phase voltages angle	MMXU	BLPH_EW200V3p1_FundSymComp$FPRE_MMXU3$MXPhVphsB$cVal$ang$f			•							
104	SIEMENS_7SJ85	CB 1st (BUS_P1)-C Phase voltages magnitude	MMXU	BLPH_EW200V3p1_FundSymComp$FPRE_MMXU3$MXPhVphsC$cVal$mag$f			•							
105	SIEMENS_7SJ85	CB 1st (BUS_P1)-C Phase voltages angle	MMXU	BLPH_EW200V3p1_FundSymComp$FPRE_MMXU3$MXPhVphsC$cVal$ang$f			•							
106	SIEMENS_7SJ85	CB 1st (BUS_P1)-N Phase voltages magnitude	MMXU	BLPH_EW200V3p1_FundSymComp$FPRE_MMXU3$MXPhVres$cVal$mag$f			•							
107	SIEMENS_7SJ85	CB 1st (BUS_P1)-N Phase voltages angle	MMXU	BLPH_EW200V3p1_FundSymComp$FPRE_MMXU3$MXPhVres$cVal$ang$f			•							
108	SIEMENS_7SJ85	CB 1st (BUS_P2)-AB Phase to phase voltages magnitude	MMXU	BLPH_EW200V3p2_FundSymComp$FPRE_MMXU1$MXPPVphsAB$cVal$mag$f			•							
109	SIEMENS_7SJ85	CB 1st (BUS_P2)-AB Phase to phase voltages angle	MMXU	BLPH_EW200V3p2_FundSymComp$FPRE_MMXU1$MXPPVphsAB$cVal$ang$f			•							
110	SIEMENS_7SJ85	CB 1st (BUS_P2)-BC Phase to phase voltages magnitude	MMXU	BLPH_EW200V3p2_FundSymComp$FPRE_MMXU1$MXPPVphsBC$cVal$mag$f			•							
111	SIEMENS_7SJ85	CB 1st (BUS_P2)-BC Phase to phase voltages angle	MMXU	BLPH_EW200V3p2_FundSymComp$FPRE_MMXU1$MXPPVphsBC$cVal$ang$f			•							
112	SIEMENS_7SJ85	CB 1st (BUS_P2)-CA Phase to phase voltages magnitude	MMXU	BLPH_EW200V3p2_FundSymComp$FPRE_MMXU1$MXPPVphsCA$cVal$mag$f			•							
113	SIEMENS_7SJ85	CB 1st (BUS_P2)-CA Phase to phase voltages angle	MMXU	BLPH_EW200V3p2_FundSymComp$FPRE_MMXU1$MXPPVphsCA$cVal$ang$			•							
114	SIEMENS_7SJ85	CB 1st (BUS_P2)-A Phase voltages magnitude	MMXU	BLPH_EW200V3p2_FundSymComp$FPRE_MMXU1$MXPhVphsA$cVal$mag$f			•							
115	SIEMENS_7SJ85	CB 1st (BUS_P2)-A Phase voltages angle	MMXU	BLPH_EW200V3p2_FundSymComp$FPRE_MMXU1$MXPhVphsA$cVal$ang$f			•							
116	SIEMENS_7SJ85	CB 1st (BUS_P2)-B Phase voltages magnitude	MMXU	BLPH_EW200V3p2_FundSymComp$FPRE_MMXU1$MXPhVphsB$cVal$mag$f			•							
117	SIEMENS_7SJ85	CB 1st (BUS_P2)-B Phase voltages angle	MMXU	BLPH_EW200V3p2_FundSymComp$FPRE_MMXU1$MXPhVphsB$cVal$ang$f			•							
118	SIEMENS_7SJ85	CB 1st (BUS_P2)-C Phase voltages magnitude	MMXU	BLPH_EW200V3p2_FundSymComp$FPRE_MMXU1$MXPhVphsC$cVal$mag$f			•							
119	SIEMENS_7SJ85	CB 1st (BUS_P2)-C Phase voltages angle	MMXU	BLPH_EW200V3p2_FundSymComp$FPRE_MMXU1$MXPhVphsC$cVal$ang$f			•							
120	SIEMENS_7SJ85	CB 1st (BUS_P2)-N Phase voltages magnitude	MMXU	BLPH_EW200V3p2_FundSymComp$FPRE_MMXU1$MXPhVres$cVal$mag$f			•							
121	SIEMENS_7SJ85	CB 1st (BUS_P2)-N Phase voltages angle	MMXU	BLPH_EW200V3p2_FundSymComp$FPRE_MMXU1$MXPhVres$cVal$ang$f			•							
122	SIEMENS_7SJ85	CB 2nd (FDR_P1)-Total active power	MMXU	BLPH_EW200VI3p1_OperationalValues$PPRE_MMXU1$MX$TotW$mag$f			•				•			
123	SIEMENS_7SJ85	CB 2nd (FDR_P1)-Total reactive power	MMXU	BLPH_EW200VI3p1_OperationalValues$PPRE_MMXU1$MX$TotVAr$mag$f			•				•			
124	SIEMENS_7SJ85	CB 2nd (FDR_P1)-Total apparent power	MMXU	BLPH_EW200VI3p1_OperationalValues$PPRE_MMXU1$MX$TotVA$mag$f			•				•			
125	SIEMENS_7SJ85	CB 2nd (FDR_P1)-Average power factor	MMXU	BLPH_EW200VI3p1_OperationalValues$PPRE_MMXU1$MX$TotPF$mag$f			•				•			
126	SIEMENS_7SJ85	CB 2nd (FDR_P1)-Frequency	MMXU	BLPH_EW200VI3p1_OperationalValues$PPRE_MMXU1$MX$TotPF$mag$f			•				•			
127	SIEMENS_7SJ85	CB 2nd (FDR_P1)-AB Phase to phase voltages magnitude	MMXU	BLPH_EW200VI3p1_FundSymComp$FPRE_MMXU1$MXPPVphsAB$cVal$mag$f			•							
128	SIEMENS_7SJ85	CB 2nd (FDR_P1)-AB Phase to phase voltages angle	MMXU	BLPH_EW200VI3p1_FundSymComp$FPRE_MMXU1$MXPPVphsAB$cVal$ang$f			•							
129	SIEMENS_7SJ85	CB 2nd (FDR_P1)-BC Phase to phase voltages magnitude	MMXU	BLPH_EW200VI3p1_FundSymComp$FPRE_MMXU1$MXPPVphsBC$cVal$mag$f			•							
130	SIEMENS_7SJ85	CB 2nd (FDR_P1)-BC Phase to phase voltages angle	MMXU	BLPH_EW200VI3p1_FundSymComp$FPRE_MMXU1$MXPPVphsBC$cVal$ang$f			•							
131	SIEMENS_7SJ85	CB 2nd (FDR_P1)-CA Phase to phase voltages magnitude	MMXU	BLPH_EW200VI3p1_FundSymComp$FPRE_MMXU1$MXPPVphsCA$cVal$mag$f			•							
132	SIEMENS_7SJ85	CB 2nd (FDR_P1)-CA Phase to phase voltages angle	MMXU	BLPH_EW200VI3p1_FundSymComp$FPRE_MMXU1$MXPPVphsCA$cVal$ang$f			•							
133	SIEMENS_7SJ85	CB 2nd (FDR_P1)-A Phase voltages magnitude	MMXU	BLPH_EW200VI3p1_FundSymComp$FPRE_MMXU1$MXPhVphsA$cVal$mag$f			•							
134	SIEMENS_7SJ85	CB 2nd (FDR_P1)-A Phase voltages angle	MMXU	BLPH_EW200VI3p1_FundSymComp$FPRE_MMXU1$MXPhVphsA$cVal$ang$f			•							
135	SIEMENS_7SJ85	CB 2nd (FDR_P1)-B Phase voltages magnitude	MMXU	BLPH_EW200VI3p1_FundSymComp$FPRE_MMXU1$MXPhVphsB$cVal$mag$f			•							
136	SIEMENS_7SJ85	CB 2nd (FDR_P1)-B Phase voltages angle	MMXU	BLPH_EW200VI3p1_FundSymComp$FPRE_MMXU1$MXPhVphsB$cVal$ang$f			•							
137	SIEMENS_7SJ85	CB 2nd (FDR_P1)-C Phase voltages magnitude	MMXU	BLPH_EW200VI3p1_FundSymComp$FPRE_MMXU1$MXPhVphsC$cVal$mag$f			•							
138	SIEMENS_7SJ85	CB 2nd (FDR_P1)-C Phase voltages angle	MMXU	BLPH_EW200VI3p1_FundSymComp$FPRE_MMXU1$MXPhVphsC$cVal$ang$f			•							

No	Signal Name(Description)		Data Type	Signal Name	EMCS				HV SCADA				Check	
					Control	Status	Measure	Config	Control	Status	Measure	Config	IED	Test Server
139	SIEMENS_7SJ85	CB 2nd (FDR_P1)-N Phase voltages magnitude	MMXU	BLPH_EW200VI3p1_FundSymComp$FPRE_MMXU1$MXPhVres$cVal$mag$f			•							
140	SIEMENS_7SJ85	CB 2nd (FDR_P1)-N Phase voltages angle	MMXU	BLPH_EW200VI3p1_FundSymComp$FPRE_MMXU1$MXPhVres$cVal$ang$f			•							
141	SIEMENS_7SJ85	CB 2nd (FDR_P1)-A Phase currents magnitude	MMXU	BLPH_EW200VI3p1_FundSymComp$FPRE_MMXU1$MXAphsA$cVal$mag$f			•							
142	SIEMENS_7SJ85	CB 2nd (FDR_P1)-A Phase currents angle	MMXU	BLPH_EW200VI3p1_FundSymComp$FPRE_MMXU1$MXAphsA$cVal$ang$f			•							
143	SIEMENS_7SJ85	CB 2nd (FDR_P1)-B Phase currents magnitude	MMXU	BLPH_EW200VI3p1_FundSymComp$FPRE_MMXU1$MXAphsB$cVal$mag$f			•							
144	SIEMENS_7SJ85	CB 2nd (FDR_P1)-B Phase currents angle	MMXU	BLPH_EW200VI3p1_FundSymComp$FPRE_MMXU1$MXAphsB$cVal$ang$f			•							
145	SIEMENS_7SJ85	CB 2nd (FDR_P1)-C Phase currents magnitude	MMXU	BLPH_EW200VI3p1_FundSymComp$FPRE_MMXU1$MXAphsC$cVal$mag$f			•							
146	SIEMENS_7SJ85	CB 2nd (FDR_P1)-C Phase currents angle	MMXU	BLPH_EW200VI3p1_FundSymComp$FPRE_MMXU1$MXAphsC$cVal$ang$f			•							
147	SIEMENS_7SJ85	CB 2nd (FDR_P1)-N Phase currents magnitude	MMXU	BLPH_EW200VI3p1_FundSymComp$FPRE_MMXU1$MXAres$cVal$mag$f			•							
148	SIEMENS_7SJ85	CB 2nd (FDR_P1)-N Phase currents angle	MMXU	BLPH_EW200VI3p1_FundSymComp$FPRE_MMXU1$MXAres$cVal$ang$f			•							
149	SIEMENS_7SJ85	CB 2nd (FDR_P1)-A Phase active power magnitude	MMXU	BLPH_EW200VI3p1_OperationalValues$PPRE_MMXU1$MXWphsA$cVal$mag$f			•							
150	SIEMENS_7SJ85	CB 2nd (FDR_P1)-B Phase active power magnitude	MMXU	BLPH_EW200VI3p1_OperationalValues$PPRE_MMXU1$MXWphsB$cVal$mag$f			•							
151	SIEMENS_7SJ85	CB 2nd (FDR_P1)-C Phase active power magnitude	MMXU	BLPH_EW200VI3p1_OperationalValues$PPRE_MMXU1$MXWphsC$cVal$mag$f			•							
152	SIEMENS_7SJ85	CB 2nd (FDR_P1)-A Phase reactive power magnitude	MMXU	BLPH_EW200VI3p1_OperationalValues$PPRE_MMXU1$MXVArphsA$cVal$mag$f			•							
153	SIEMENS_7SJ85	CB 2nd (FDR_P1)-B Phase reactive power magnitude	MMXU	BLPH_EW200VI3p1_OperationalValues$PPRE_MMXU1$MXVArphsB$cVal$mag$f			•							
154	SIEMENS_7SJ85	CB 2nd (FDR_P1)-C Phase reactive power magnitude	MMXU	BLPH_EW200VI3p1_OperationalValues$PPRE_MMXU1$MXVArphsC$cVal$mag$f			•							
155	SIEMENS_7SJ85	CB 2nd (FDR_P1)-Import active energy	MMTR	BLPH_EW200VI3p1_Energy$XPRE_MMTR1$ST$DmdWh$actVal			•							
156	SIEMENS_7SJ85	CB 2nd (FDR_P1)-Export active energy	MMTR	BLPH_EW200VI3p1_Energy$XPRE_MMTR1$ST$SupVArh$actVal			•							
157	SIEMENS_7SJ85	CB 2nd (FDR_P1)-Import reactive energy	MMTR	BLPH_EW200VI3p1_Energy$XPRE_MMTR1$ST$DmdVArh$actVal			•							
158	SIEMENS_7SJ85	CB 2nd (FDR_P1)-Export reactive energy	MMTR	BLPH_EW200VI3p1_Energy$XPRE_MMTR1$ST$SupVArh$actVal			•							
159	SIEMENS_7SJ85	CB 2nd (FDR_P2)-Total active power	MMXU	BLPH_EW200VI3p2_OperationalValues$PPRE_MMXU1$MX$TotW$mag$f			•				•			
160	SIEMENS_7SJ85	CB 2nd (FDR_P2)-Total reactive power	MMXU	BLPH_EW200VI3p2_OperationalValues$PPRE_MMXU1$MX$TotVAr$mag$f			•				•			
161	SIEMENS_7SJ85	CB 2nd (FDR_P2)-Total apparent power	MMXU	BLPH_EW200VI3p2_OperationalValues$PPRE_MMXU1$MX$TotVA$mag$f			•				•			
162	SIEMENS_7SJ85	CB 2nd (FDR_P2)-Average power factor	MMXU	BLPH_EW200VI3p2_OperationalValues$PPRE_MMXU1$MX$TotPF$mag$f			•				•			
163	SIEMENS_7SJ85	CB 2nd (FDR_P2)-Frequency	MMXU	BLPH_EW200VI3p2_OperationalValues$PPRE_MMXU1$MX$TotPF$mag$f			•				•			
164	SIEMENS_7SJ85	CB 2nd (FDR_P2)-AB Phase to phase voltages magnitude	MMXU	BLPH_EW200VI3p2_FundSymComp$FPRE_MMXU1$MXPPVphsAB$cVal$mag$f			•							
165	SIEMENS_7SJ85	CB 2nd (FDR_P2)-AB Phase to phase voltages angle	MMXU	BLPH_EW200VI3p2_FundSymComp$FPRE_MMXU1$MXPPVphsAB$cVal$ang$f			•							
166	SIEMENS_7SJ85	CB 2nd (FDR_P2)-BC Phase to phase voltages magnitude	MMXU	BLPH_EW200VI3p2_FundSymComp$FPRE_MMXU1$MXPPVphsBC$cVal$mag$f			•							
167	SIEMENS_7SJ85	CB 2nd (FDR_P2)-BC Phase to phase voltages angle	MMXU	BLPH_EW200VI3p2_FundSymComp$FPRE_MMXU1$MXPPVphsBC$cVal$ang$f			•							
168	SIEMENS_7SJ85	CB 2nd (FDR_P2)-CA Phase to phase voltages magnitude	MMXU	BLPH_EW200VI3p2_FundSymComp$FPRE_MMXU1$MXPPVphsCA$cVal$mag$f			•							
169	SIEMENS_7SJ85	CB 2nd (FDR_P2)-CA Phase to phase voltages angle	MMXU	BLPH_EW200VI3p2_FundSymComp$FPRE_MMXU1$MXPPVphsCA$cVal$ang$f			•							
170	SIEMENS_7SJ85	CB 2nd (FDR_P2)-A Phase voltages magnitude	MMXU	BLPH_EW200VI3p2_FundSymComp$FPRE_MMXU1$MXPhVphsA$cVal$mag$f			•							
171	SIEMENS_7SJ85	CB 2nd (FDR_P2)-A Phase voltages angle	MMXU	BLPH_EW200VI3p2_FundSymComp$FPRE_MMXU1$MXPhVphsA$cVal$ang$f			•							
172	SIEMENS_7SJ85	CB 2nd (FDR_P2)-B Phase voltages magnitude	MMXU	BLPH_EW200VI3p2_FundSymComp$FPRE_MMXU1$MXPhVphsB$cVal$mag$f			•							
173	SIEMENS_7SJ85	CB 2nd (FDR_P2)-B Phase voltages angle	MMXU	BLPH_EW200VI3p2_FundSymComp$FPRE_MMXU1$MXPhVphsB$cVal$ang$f			•							
174	SIEMENS_7SJ85	CB 2nd (FDR_P2)-C Phase voltages magnitude	MMXU	BLPH_EW200VI3p2_FundSymComp$FPRE_MMXU1$MXPhVphsC$cVal$mag$f			•							

No	Signal Name(Description)		Data Type	Signal Name	EMCS				HV SCADA				Check	
					Control	Status	Measure	Config	Control	Status	Measure	Config	IED	Test Server
175	SIEMENS_7SJ85	CB 2nd (FDR_P2)-C Phase voltages angle	MMXU	BLPH_EW200VI3p2_FundSymComp$FPRE_MMXU1$MXPhVphsC$cVal$ang$f			•							
176	SIEMENS_7SJ85	CB 2nd (FDR_P2)-N Phase voltages magnitude	MMXU	BLPH_EW200VI3p2_FundSymComp$FPRE_MMXU1$MXPhVres$cVal$mag$f			•							
177	SIEMENS_7SJ85	CB 2nd (FDR_P2)-N Phase voltages angle	MMXU	BLPH_EW200VI3p2_FundSymComp$FPRE_MMXU1$MXPhVres$cVal$ang$f			•							
178	SIEMENS_7SJ85	CB 2nd (FDR_P2)-A Phase currents magnitude	MMXU	BLPH_EW200VI3p2_FundSymComp$FPRE_MMXU1$MXAphsA$cVal$mag$f			•							
179	SIEMENS_7SJ85	CB 2nd (FDR_P2)-A Phase currents angle	MMXU	BLPH_EW200VI3p2_FundSymComp$FPRE_MMXU1$MXAphsA$cVal$ang$f			•							
180	SIEMENS_7SJ85	CB 2nd (FDR_P2)-B Phase currents magnitude	MMXU	BLPH_EW200VI3p2_FundSymComp$FPRE_MMXU1$MXAphsB$cVal$mag$f			•							
181	SIEMENS_7SJ85	CB 2nd (FDR_P2)-B Phase currents angle	MMXU	BLPH_EW200VI3p2_FundSymComp$FPRE_MMXU1$MXAphsB$cVal$ang$f			•							
182	SIEMENS_7SJ85	CB 2nd (FDR_P2)-C Phase currents magnitude	MMXU	BLPH_EW200VI3p2_FundSymComp$FPRE_MMXU1$MXAphsC$cVal$mag$f			•							
183	SIEMENS_7SJ85	CB 2nd (FDR_P2)-C Phase currents angle	MMXU	BLPH_EW200VI3p2_FundSymComp$FPRE_MMXU1$MXAphsC$cVal$ang$f			•							
184	SIEMENS_7SJ85	CB 2nd (FDR_P2)-N Phase currents magnitude	MMXU	BLPH_EW200VI3p2_FundSymComp$FPRE_MMXU1$MXAres$cVal$mag$f			•							
185	SIEMENS_7SJ85	CB 2nd (FDR_P2)-N Phase currents angle	MMXU	BLPH_EW200VI3p2_FundSymComp$FPRE_MMXU1$MXAres$cVal$ang$f			•							
186	SIEMENS_7SJ85	CB 2nd (FDR_P2)-A Phase active power magnitude	MMXU	BLPH_EW200VI3p2_OperationalValues$PPRE_MMXU1$MXWphsA$cVal$mag$f			•							
187	SIEMENS_7SJ85	CB 2nd (FDR_P2)-B Phase active power magnitude	MMXU	BLPH_EW200VI3p2_OperationalValues$PPRE_MMXU1$MXWphsB$cVal$mag$f			•							
188	SIEMENS_7SJ85	CB 2nd (FDR_P2)-C Phase active power magnitude	MMXU	BLPH_EW200VI3p2_OperationalValues$PPRE_MMXU1$MXWphsC$cVal$mag$f			•							
189	SIEMENS_7SJ85	CB 2nd (FDR_P2)-A Phase reactive power magnitude	MMXU	BLPH_EW200VI3p2_OperationalValues$PPRE_MMXU1$MXVArphsA$cVal$mag$f			•							
190	SIEMENS_7SJ85	CB 2nd (FDR_P2)-B Phase reactive power magnitude	MMXU	BLPH_EW200VI3p2_OperationalValues$PPRE_MMXU1$MXVArphsB$cVal$mag$f			•							
191	SIEMENS_7SJ85	CB 2nd (FDR_P2)-C Phase reactive power magnitude	MMXU	BLPH_EW200VI3p2_OperationalValues$PPRE_MMXU1$MXVArphsC$cVal$mag$f			•							
192	SIEMENS_7SJ85	CB 2nd (FDR_P2)-Import active energy	MMTR	BLPH_EW200VI3p2_Energy$XPRE_MMTR1$ST$DmdWh$actVal			•							
193	SIEMENS_7SJ85	CB 2nd (FDR_P2)-Export active energy	MMTR	BLPH_EW200VI3p2_Energy$XPRE_MMTR1$ST$SupVArh$actVal			•							
194	SIEMENS_7SJ85	CB 2nd (FDR_P2)-Import reactive energy	MMTR	BLPH_EW200VI3p2_Energy$XPRE_MMTR1$ST$DmdVArh$actVal			•							
195	SIEMENS_7SJ85	CB 2nd (FDR_P2)-Export reactive energy	MMTR	BLPH_EW200VI3p2_Energy$XPRE_MMTR1$ST$SupVArh$actVal			•							
196	SIEMENS_7SJ85	Current Total Demand Distortion phsA	MHAI	BLPH_EW200VI3p2_TDDC_MHAI1MX$TddA$phsA$cVal$mag$f			•							
197	SIEMENS_7SJ85	Current Total Demand Distortion phsB	MHAI	BLPH_EW200VI3p2_TDDC_MHAI1MX$TddA$phsB$cVal$mag$f			•							
198	SIEMENS_7SJ85	Current Total Demand Distortion phsC	MHAI	BLPH_EW200VI3p2_TDDC_MHAI1MX$TddA$phsC$cVal$mag$f			•							
199	SIEMENS_7SJ85	Voltage unbalance max overall	QVUB	BLPH_EW200VI3p2_QVUB$V2toV1_QVUB1$MX$MaxVVa$mag$f			•							
200	SIEMENS_7SJ85	Voltage dip Dur.	QVVR	BLPH_EW200VI3p2_VoltVarDip_QVVR1MX$VVaTm$mag$f			•							
201	SIEMENS_7SJ85	Voltage dip Vres.	QVVR	BLPH_EW200VI3p2_VoltVarDip_QVVR1MXVvamag$f			•							
202	SIEMENS_7SJ85	Voltage swell Dur.	QVVR	BLPH_EW200VI3p2_VoltVar$Swell_QVVR1$MX$VVaTm$mag$f			•							
203	SIEMENS_7SJ85	Voltage swell Vsw.	QVVR	BLPH_EW200VI3p2_VoltVar$Swell_QVVR1$MXVvamag$f			•							
204	SIEMENS_7SJ85	Voltage interrup. Dur.	QVVR	BLPH_EW200VI3p2_VoltVar$Intr_QVVR1$MXVvamag$f			•							
205	SIEMENS_7SJ85	Voltage interrup. Vres.	QVVR	BLPH_EW200VI3p2_VoltVar$Intr_QVVR1$MX$VVaTm$mag$f			•							

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Step	Description	Result	Verified by	Date
67	Confirm correct and positive result of pre-commissioning Check Sheet for above signals I/O list	Correct and positive results.....☐		

Check 66kV GIS Switchgear I/O list, referring to Vendor document 1723001595-EL-LIS-00011

The following I/O list comes from Siemens protection relay 7ST85 on board of control panel CP-100E1

No	Signal Name (Description)		Data Type	Signal Name	EMCS				HV SCADA			Check	
					Control	Status	Measur	Config	Control	Status	Measure Config	IED	Test Server
1	SIEMENS_7UT85	Physical channel status (Station bus)	LCCH	BLPH_EW100Mod3_Channel1PRP_LCCH1ST$ChLiv$stVal		•							
2	SIEMENS_7UT85	Physical channel status of redundant channel (Station bus)	LCCH	BLPH_EW100Mod3_Channel1PRP_LCCH1ST$RedChLiv$stVal		•							
3	SIEMENS_7UT85	Physical channel status (Process bus)	LCCH	BLPH_EW100Mod2_Channel1PRP_LCCH1ST$ChLiv$stVal		•							
4	SIEMENS_7UT85	Physical channel status of redundant channel (Process bus)	LCCH	BLPH_EW100Mod2_Channel1PRP_LCCH1ST$RedChLiv$stVal		•							
5	SIEMENS_7UT85	IED physical device health	LPHD	BLPH_EW100Application$LPHD0$ST$PhyHealth$stVal:3		•							
6	SIEMENS_7UT85	Time synchronized	LTMS	BLPH_EW100Application$LTMS0$ST$TmSynErr$stVal		•							
7	SIEMENS_7UT85	Memory fail alarm	LPHD	BLPH_EW100Application$LPHD0$ST$FlshDskHth$stVal		•							
8	SIEMENS_7UT85	Process bus processor fail alarm	LLN0	BLPH_EW100ComSupervision_SV$LLN0$ST$Health$stVal:3		•							
9	SIEMENS_7UT85	Sampled value publish fail alarm	LLN0	BLPH_EW100ComSupervision_SV$CALH1$ST$GrAlm$stVal		•							
10	SIEMENS_7UT85	IED Locla/Remote Status	LLN0	BLPH_EW100Application$LLN0$ST$LocKey$stVal		•							
11	SIEMENS_7UT85	7SJ85 Relay Failure	USER1	BLPH_EW100UD1$USER1$STSPSstVal		•							
12	SIEMENS_7UT85	Level 1 87T pick-up General	PTRC	BLPH_EW100PTD1_87TrafoDiffProt1$PTRC5$STStrgeneral		•							
13	SIEMENS_7UT85	Level 1 87T operation General	PTRC	BLPH_EW100PTD1_87TrafoDiffProt1$PTRC5$STOpgeneral		•							
14	SIEMENS_7UT85	Level 1 87N pick-up General	PDIF	BLPH_EW100PTS2REF_PDIF1STStrgeneral		•							
15	SIEMENS_7UT85	Level 1 87N operation General	PDIF	BLPH_EW100PTS2REF_PDIF1STOpgeneral		•							
16	SIEMENS_7UT85	TR 1st side (FDR_P1) A Phase currents magnitude	MMXU	BLPH_EW100PTS1_FundSymComp$FPRE_MMXU1$MXAphsA$cVal$mag$f			•						
17	SIEMENS_7UT85	TR 1st side (FDR_P1) A Phase currents angle	MMXU	BLPH_EW100PTS1_FundSymComp$FPRE_MMXU1$MXAphsA$cVal$ang$f			•						
18	SIEMENS_7UT85	TR 1st side (FDR_P1) B Phase currents magnitude	MMXU	BLPH_EW100PTS1_FundSymComp$FPRE_MMXU1$MXAphsB$cVal$mag$f			•						
19	SIEMENS_7UT85	TR 1st side (FDR_P1) B Phase currents angle	MMXU	BLPH_EW100PTS1_FundSymComp$FPRE_MMXU1$MXAphsB$cVal$ang$f			•						
20	SIEMENS_7UT85	TR 1st side (FDR_P1) C Phase currents magnitude	MMXU	BLPH_EW100PTS1_FundSymComp$FPRE_MMXU1$MXAphsC$cVal$mag$f			•						
21	SIEMENS_7UT85	TR 1st side (FDR_P1) C Phase currents angle	MMXU	BLPH_EW100PTS1_FundSymComp$FPRE_MMXU1$MXAphsC$cVal$ang$f			•						
22	SIEMENS_7UT85	TR 1st side (FDR_P1) N Phase currents magnitude	MMXU	BLPH_EW100PTS1_FundSymComp$FPRE_MMXU1$MXAres$cVal$mag$f			•						
23	SIEMENS_7UT85	TR 1st side (FDR_P1) N Phase currents angle	MMXU	BLPH_EW100PTS1_FundSymComp$FPRE_MMXU1$MXAres$cVal$ang$f			•						
16	SIEMENS_7UT85	TR 1st side (FDR_P2) A Phase currents magnitude	MMXU	BLPH_EW100VI3p2_FundSymComp$FPRE_MMXU1$MXAphsA$cVal$mag$f			•						
17	SIEMENS_7UT85	TR 1st side (FDR_P2) A Phase currents angle	MMXU	BLPH_EW100VI3p2_FundSymComp$FPRE_MMXU1$MXAphsA$cVal$ang$f			•						
18	SIEMENS_7UT85	TR 1st side (FDR_P2) B Phase currents magnitude	MMXU	BLPH_EW100VI3p2_FundSymComp$FPRE_MMXU1$MXAphsB$cVal$mag$f			•						
19	SIEMENS_7UT85	TR 1st side (FDR_P2) B Phase currents angle	MMXU	BLPH_EW100VI3p2_FundSymComp$FPRE_MMXU1$MXAphsB$cVal$ang$f			•						
20	SIEMENS_7UT85	TR 1st side (FDR_P2) C Phase currents magnitude	MMXU	BLPH_EW100VI3p2_FundSymComp$FPRE_MMXU1$MXAphsC$cVal$mag$f			•						
21	SIEMENS_7UT85	TR 1st side (FDR_P2) C Phase currents angle	MMXU	BLPH_EW100VI3p2_FundSymComp$FPRE_MMXU1$MXAphsC$cVal$ang$f			•						
22	SIEMENS_7UT85	TR 1st side (FDR_P2) N Phase currents magnitude	MMXU	BLPH_EW100VI3p2_FundSymComp$FPRE_MMXU1$MXAres$cVal$mag$f			•						
23	SIEMENS_7UT85	TR 1st side (FDR_P2) N Phase currents angle	MMXU	BLPH_EW100VI3p2_FundSymComp$FPRE_MMXU1$MXAres$cVal$ang$f			•						
24	SIEMENS_7UT85	TR 2nd side A Phase currents magnitude	MMXU	BLPH_EW100PTS2_FundSymComp$FPRE_MMXU2$MXAphsA$cVal$mag$f			•						

No	Signal Name (Description)		Data Type	Signal Name	EMCS				HV SCADA			Check	
					Control	Status	Measur	Config	Control	Status	Measure Config	IED	Test Server
25	SIEMENS_7UT85	TR 2nd side A Phase currents angle	MMXU	BLPH_EW100PTS2_FundSymComp$FPRE_MMXU2$MXAphsA$cVal$ang$f			•						
26	SIEMENS_7UT85	TR 2nd side B Phase currents magnitude	MMXU	BLPH_EW100PTS2_FundSymComp$FPRE_MMXU2$MXAphsB$cVal$mag$f			•						
27	SIEMENS_7UT85	TR 2nd side B Phase currents angle	MMXU	BLPH_EW100PTS2_FundSymComp$FPRE_MMXU2$MXAphsB$cVal$ang$f			•						
28	SIEMENS_7UT85	TR 2nd side C Phase currents magnitude	MMXU	BLPH_EW100PTS2_FundSymComp$FPRE_MMXU2$MXAphsC$cVal$mag$f			•						
29	SIEMENS_7UT85	TR 2nd side C Phase currents angle	MMXU	BLPH_EW100PTS2_FundSymComp$FPRE_MMXU2$MXAphsC$cVal$ang$f			•						
30	SIEMENS_7UT85	TR 2nd side N Phase currents magnitude	MMXU	BLPH_EW100PTS2_FundSymComp$FPRE_MMXU2$MXAres$cVal$mag$f			•						
31	SIEMENS_7UT85	TR 2nd side N Phase currents angle	MMXU	BLPH_EW100PTS2_FundSymComp$FPRE_MMXU2$MXAres$cVal$ang$f			•						
32	SIEMENS_7UT85	TR 1st current Total Harmonic Distortion phsA	MHAI	BLPH_EW100PTS1_THDHarmonicsI_MHAI1MX$ThdA$phsA$cVal$mag$f			•						
33	SIEMENS_7UT85	TR 1st current Total Harmonic Distortion phsB	MHAI	BLPH_EW100PTS1_THDHarmonicsI_MHAI1MX$ThdA$phsB$cVal$mag$f			•						
34	SIEMENS_7UT85	TR 1st current Total Harmonic Distortion phsC	MHAI	BLPH_EW100PTS1_THDHarmonicsI_MHAI1MX$ThdA$phsC$cVal$mag$f			•						
35	SIEMENS_7UT85	TR 2nd current Total Harmonic Distortion phsA	MHAI	BLPH_EW100PTS2_THDHarmonicsI_MHAI1MX$ThdA$phsA$cVal$mag$f			•						
36	SIEMENS_7UT85	TR 2nd current Total Harmonic Distortion phsB	MHAI	BLPH_EW100PTS2_THDHarmonicsI_MHAI1MX$ThdA$phsB$cVal$mag$f			•						
37	SIEMENS_7UT85	TR 2nd current Total Harmonic Distortion phsC	MHAI	BLPH_EW100PTS2_THDHarmonicsI_MHAI1MX$ThdA$phsC$cVal$mag$f			•						

Step	Description	Result	Verified by	Date
68	Confirm correct and positive result of pre-commissioning Check Sheet for above signals I/O list	Correct and positive results.....☐		

Check 66/6.6kV Power Transformer I/O list, referring to EMCS Vendor document 1724000594-IN-LIS-00005

The following OPC-UA I/O list comes from EMCS System (IEC61850)

OPC-UA Path	Prefix	Component	Sub Component	Tag Name	Type	Comment	Access R/W
Logic.Application.SG_100D1.A6.TR-100AD1.TRANSFORMER_PROTECTION_TRIPPED_"OIL_TEMPERATURE"	Logic.Application	SG_100D1	A6.TR-100AD1	TRANSFORMER PROTECTION TRIPPED "OIL TEMPERATURE"	BOOL		R
Logic.Application.SG_100D1.A6.TR-100AD1.TRANSFORMER_PROTECTION_ALARM_"OIL_TEMPERATURE"	Logic.Application	SG_100D1	A6.TR-100AD1	TRANSFORMER PROTECTION ALARM "OIL TEMPERATURE"	BOOL		R
Logic.Application.SG_100D1.A6.TR-100AD1.TRANSF._PROTECTION_TRIPPED_"WINDING_TEMPERATURE"	Logic.Application	SG_100D1	A6.TR-100AD1	TRANSF. PROTECTION TRIPPED "WINDING TEMPERATURE"	BOOL		R
Logic.Application.SG_100D1.A6.TR-100AD1.TRANSF._PROTECTION_ALARM_"WINDING_TEMPERATURE	Logic.Application	SG_100D1	A6.TR-100AD1	TRANSF. PROTECTION ALARM "WINDING TEMPERATURE	BOOL		R
Logic.Application.SG_100D1.A6.TR-100AD1.Phase_L1-Temperature_Detection-Cabel_Compart	Logic.Application	SG_100D1	A6.TR-100AD1	Phase L1 - Temperature Detection - Cabel Compart	FLOAT		R
Logic.Application.SG_100D1.A6.TR-100AD1.Phase_L2-Temperature_Detection-Cabel_Compart	Logic.Application	SG_100D1	A6.TR-100AD1	Phase L2 - Temperature Detection - Cabel Compart	FLOAT		R
Logic.Application.SG_100D1.A6.TR-100AD1.Phase_L3-Temperature_Detection-Cabel_Compart	Logic.Application	SG_100D1	A6.TR-100AD1	Phase L3 - Temperature Detection - Cabel Compart	FLOAT		R

OPC-UA Path	Prefix	Component	Sub Component	Tag Name	Type	Comment	Access R/W
Logic.Application.SG_100D1.A6.TR-100AD1.Phase_L1-Temperature_Detection-C.B._Compart	Logic.Application	SG_100D1	A6.TR-100AD1	Phase L1 - Temperature Detection - C.B. Compart	FLOAT		R
Logic.Application.SG_100D1.A6.TR-100AD1.Phase_L2-Temperature_Detection-C.B._Compart	Logic.Application	SG_100D1	A6.TR-100AD1	Phase L2 - Temperature Detection - C.B. Compart	FLOAT		R
Logic.Application.SG_100D1.A6.TR-100AD1.Phase_L3-Temperature_Detection-C.B._Compart	Logic.Application	SG_100D1	A6.TR-100AD1	Phase L3 - Temperature Detection - C.B. Compart	FLOAT		R
Logic.Application.SG_100D1.A6.TR-100AD1.Phase_L1-Temperature_Detection-Main_Bus_Bar	Logic.Application	SG_100D1	A6.TR-100AD1	Phase L1 - Temperature Detection - Main Bus Bar	FLOAT		R
Logic.Application.SG_100D1.A6.TR-100AD1.Phase_L3-Temperature_Detection-Main_Bus_Bar	Logic.Application	SG_100D1	A6.TR-100AD1	Phase L3 - Temperature Detection - Main Bus Bar	FLOAT		R
Logic.Application.SG_100D1.A6.TR-100AD1.TRANSFORMER_PROTECTION_TRIPPED_"OIL_PRESSURE"	Logic.Application	SG_100D1	A6.TR-100AD1	TRANSFORMER PROTECTION TRIPPED "OIL PRESSURE"	BOOL		R
Logic.Application.TransformerAVR.AnalogStatus.Band_center_voltage_1	Logic.Application	TransformerAVR	AnalogStatus	Band center voltage 1	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Band_center_voltage_2	Logic.Application	TransformerAVR	AnalogStatus	Band center voltage 2	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Band_center_voltage_3	Logic.Application	TransformerAVR	AnalogStatus	Band center voltage 3	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Band_center_voltage_	Logic.Application	TransformerAVR	AnalogStatus	Band center voltage	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Control_Voltage	Logic.Application	TransformerAVR	AnalogStatus	Control Voltage	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Total_active_power_(total_P)	Logic.Application	TransformerAVR	AnalogStatus	Total active power (total P)	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Total_reactive_power_(total_Q)	Logic.Application	TransformerAVR	AnalogStatus	Total reactive power (total Q)	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Total_apparent_power_(total_S)	Logic.Application	TransformerAVR	AnalogStatus	Total apparent power (total S)	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Phase_to_phase_voltage_L1L2	Logic.Application	TransformerAVR	AnalogStatus	Phase to phase voltage L1L2	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Phase_to_phase_voltage_L2L3	Logic.Application	TransformerAVR	AnalogStatus	Phase to phase voltage L2L3	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Phase_to_phase_voltage_L3L1	Logic.Application	TransformerAVR	AnalogStatus	Phase to phase voltage L3L1	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Phase_to_neutral_voltage_L1	Logic.Application	TransformerAVR	AnalogStatus	Phase to neutral voltage L1	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Phase_to_neutral_voltage_L2	Logic.Application	TransformerAVR	AnalogStatus	Phase to neutral voltage L2	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Phase_to_neutral_voltage_L3	Logic.Application	TransformerAVR	AnalogStatus	Phase to neutral voltage L3	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Phase_active_power_(P)_L1	Logic.Application	TransformerAVR	AnalogStatus	Phase active power (P) L1	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Phase_active_power_(P)_L2	Logic.Application	TransformerAVR	AnalogStatus	Phase active power (P) L2	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Phase_active_power_(P)_L3	Logic.Application	TransformerAVR	AnalogStatus	Phase active power (P) L3	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Phase_reactive_power_(Q)_L1	Logic.Application	TransformerAVR	AnalogStatus	Phase reactive power (Q) L1	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Phase_reactive_power_(Q)_L2	Logic.Application	TransformerAVR	AnalogStatus	Phase reactive power (Q) L2	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Phase_reactive_power_(Q)_L3	Logic.Application	TransformerAVR	AnalogStatus	Phase reactive power (Q) L3	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Phase_apparent_power_(S)_L1	Logic.Application	TransformerAVR	AnalogStatus	Phase apparent power (S) L1	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Phase_apparent_power_(S)_L2	Logic.Application	TransformerAVR	AnalogStatus	Phase apparent power (S) L2	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Phase_apparent_power_(S)_L3	Logic.Application	TransformerAVR	AnalogStatus	Phase apparent power (S) L3	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Minumum_voltage_value_for_dynamic_setpoint_control	Logic.Application	TransformerAVR	AnalogStatus	Minumum voltage value for dynamic setpoint control	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Maximum_voltage_value_for_dynamic_setpoint_control	Logic.Application	TransformerAVR	AnalogStatus	Maximum voltage value for dynamic setpoint control	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Voltage_value_for_dynamic_setpoint_control_at_active_power_of_0_W	Logic.Application	TransformerAVR	AnalogStatus	Voltage value for dynamic setpoint control at active power of 0 W	FLOAT		R

OPC-UA Path	Prefix	Component	Sub Component	Tag Name	Type	Comment	Access R/W
Logic.Application.TransformerAVR.AnalogStatus.Minumum_active_power_value_for_dynamic_setpoint_control	Logic.Application	TransformerAVR	AnalogStatus	Minumum active power value for dynamic setpoint control	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Maximum_active_power_value_for_dynamic_setpoint_control	Logic.Application	TransformerAVR	AnalogStatus	Maximum active power value for dynamic setpoint control	FLOAT		R
Logic.Application.TransformerAVR.AnalogCommand.Band_center_voltage_1	Logic.Application	TransformerAVR	AnalogCommand	Band center voltage 1	FLOAT		W
Logic.Application.TransformerAVR.AnalogCommand.Band_center_voltage_2	Logic.Application	TransformerAVR	AnalogCommand	Band center voltage 2	FLOAT		W
Logic.Application.TransformerAVR.AnalogCommand.Band_center_voltage_3	Logic.Application	TransformerAVR	AnalogCommand	Band center voltage 3	FLOAT		W
Logic.Application.TransformerAVR.AnalogCommand.Minumum_voltage_value_for_dynamic_setpoint_control	Logic.Application	TransformerAVR	AnalogCommand	Minumum voltage value for dynamic setpoint control	FLOAT		W
Logic.Application.TransformerAVR.AnalogCommand.Maximum_voltage_value_for_dynamic_setpoint_control	Logic.Application	TransformerAVR	AnalogCommand	Maximum voltage value for dynamic setpoint control	FLOAT		W
Logic.Application.TransformerAVR.AnalogCommand.Voltage_value_for_dynamic_setpoint_control_at_active_power_of_0_W	Logic.Application	TransformerAVR	AnalogCommand	Voltage value for dynamic setpoint control at active power of 0 W	FLOAT		W
Logic.Application.TransformerAVR.AnalogCommand.Minimum_active_power_value_for_dynamic_setpoint_control	Logic.Application	TransformerAVR	AnalogCommand	Minimum active power value for dynamic setpoint control	FLOAT		W
Logic.Application.TransformerAVR.AnalogCommand.Maximum_active_power_value_for_dynamic_setpoint_control	Logic.Application	TransformerAVR	AnalogCommand	Maximum active power value for dynamic setpoint control	FLOAT		W
Logic.Application.TransformerAVR.DigitalCommand.Change_Tap_Position_Raise	Logic.Application	TransformerAVR	DigitalCommand	Change Tap Position Raise	BOOL	1 = raise	W
Logic.Application.TransformerAVR.DigitalCommand.Change_Tap_Position_Lower	Logic.Application	TransformerAVR	DigitalCommand	Change Tap Position Lower	BOOL	1 = lower	W
Logic.Application.TransformerAVR.DigitalCommand.Change_Voltage_Raise	Logic.Application	TransformerAVR	DigitalCommand	Change Voltage Raise	BOOL	1 = raise	W
Logic.Application.TransformerAVR.DigitalCommand.Change_Voltage_Lower	Logic.Application	TransformerAVR	DigitalCommand	Change Voltage Lower	BOOL	1 = lower	W
Logic.Application.TransformerAVR.DigitalCommand.Automatic/Manual_operation	Logic.Application	TransformerAVR	DigitalCommand	Automatic/Manual operation	BOOL	0 = Manual; 1 = Automatic	W
Logic.Application.TransformerAVR.DigitalCommand.Band_center_voltage_1_active	Logic.Application	TransformerAVR	DigitalCommand	Band center voltage 1 active	BOOL	1 = Activate Bandcenter 1; desired value	W
Logic.Application.TransformerAVR.DigitalCommand.Band_center_voltage_2_active_	Logic.Application	TransformerAVR	DigitalCommand	Band center voltage 2 active	BOOL	1 = Activate Bandcenter 2; desired value	W
Logic.Application.TransformerAVR.DigitalCommand.Band_center_voltage_3_active	Logic.Application	TransformerAVR	DigitalCommand	Band center voltage 3 active	BOOL	1 = Activate Bandcenter 3; desired value	W
Logic.Application.TransformerAVR.DigitalCommand.Parallel/Independent	Logic.Application	TransformerAVR	DigitalCommand	Parallel/Independent	BOOL	0 = Independent; 1 = Parallel	W
Logic.Application.TransformerAVR.DigitalCommand.Master_mode_selection_activation(parallel_control)	Logic.Application	TransformerAVR	DigitalCommand	Master mode selection activation(parallel control)	BOOL	1 = Activate Master Paralleling	W
Logic.Application.TransformerAVR.DigitalCommand.Follower_mode_selection_activation(parallel_control)	Logic.Application	TransformerAVR	DigitalCommand	Follower mode selection activation(parallel control)	BOOL	1 = Activate Follower Paralleling	W
Logic.Application.TransformerAVR.DigitalCommand.Circulating_current_selection_activation_(parallel_control)	Logic.Application	TransformerAVR	DigitalCommand	Circulating current selection activation (parallel control)	BOOL	1 = Activate Circulating Current Paralleling	W
Logic.Application.TransformerAVR.DigitalCommand.Line_Drop_Compensation	Logic.Application	TransformerAVR	DigitalCommand	Line Drop Compensation	BOOL	1 = R and X; 0 = Z	W
Logic.Application.TransformerAVR.DigitalCommand.Time_delay_linear_or_integral_characteristic_for_regulation_of_voltage	Logic.Application	TransformerAVR	DigitalCommand	Time delay linear or integral characteristic for regulation of voltage	BOOL	0 = linear; 1 = integral	W
Logic.Application.TransformerAVR.DigitalCommand.TAPCON_dynamic_set_point_control	Logic.Application	TransformerAVR	DigitalCommand	TAPCON dynamic set point control	BOOL	0 = deactivate; 1 = activate	W
Logic.Application.TransformerAVR.DigitalCommand.General_Purpose_Command_1	Logic.Application	TransformerAVR	DigitalCommand	General Purpose Command 1	BOOL	0 = deactivate; 1 = activate	W
Logic.Application.TransformerAVR.DigitalCommand.General_Purpose_Command_2	Logic.Application	TransformerAVR	DigitalCommand	General Purpose Command 2	BOOL	0 = deactivate; 1 = activate	W
Logic.Application.TransformerAVR.DigitalCommand.General_Purpose_Command_3	Logic.Application	TransformerAVR	DigitalCommand	General Purpose Command 3	BOOL	0 = deactivate; 1 = activate	W
Logic.Application.TransformerAVR.DigitalCommand.General_Purpose_Command_4	Logic.Application	TransformerAVR	DigitalCommand	General Purpose Command 4	BOOL	0 = deactivate; 1 = activate	W
Logic.Application.TransformerAVR.DigitalCommand.General_Purpose_Command_5	Logic.Application	TransformerAVR	DigitalCommand	General Purpose Command 5	BOOL	0 = deactivate; 1 = activate	W
Logic.Application.TransformerAVR.DigitalCommand.General_Purpose_Command_6	Logic.Application	TransformerAVR	DigitalCommand	General Purpose Command 6	BOOL	0 = deactivate; 1 = activate	W
Logic.Application.TransformerAVR.DigitalCommand.General_Purpose_Command_7	Logic.Application	TransformerAVR	DigitalCommand	General Purpose Command 7	BOOL	0 = deactivate; 1 = activate	W
Logic.Application.TransformerAVR.DigitalCommand.General_Purpose_Command_8	Logic.Application	TransformerAVR	DigitalCommand	General Purpose Command 8	BOOL	0 = deactivate; 1 = activate	W

OPC-UA Path	Prefix	Component	Sub Component	Tag Name	Type	Comment	Access R/W
Logic.Application.TransformerAVR.DigitalCommand.General_Purpose_Command_9	Logic.Application	TransformerAVR	DigitalCommand	General Purpose Command 9	BOOL	0 = deactivate; 1 = activate	W
Logic.Application.TransformerAVR.DigitalCommand.General_Purpose_Command_10	Logic.Application	TransformerAVR	DigitalCommand	General Purpose Command 10	BOOL	0 = deactivate; 1 = activate	W
Logic.Application.TransformerAVR.DigitalCommand.Desired_power_factor_selection_activation_(parallel_control)	Logic.Application	TransformerAVR	DigitalCommand	Desired power factor selection activation (parallel control)	BOOL	1 = Activate desired power factor paralleling	W
Logic.Application.TransformerAVR.DigitalCommand.Desired_load_type_selection	Logic.Application	TransformerAVR	DigitalCommand	Desired load type selection	BOOL	0 = inductive; 1 = capacitive	W
Logic.Application.TransformerAVR.DigitalStatus.Automatic/Manual_operation	Logic.Application	TransformerAVR	DigitalStatus	Automatic/Manual operation	BOOL	0 = Manual, 1 = Automatic	R
Logic.Application.TransformerAVR.DigitalStatus.Band_center_voltage_(desired_value)_1_active	Logic.Application	TransformerAVR	DigitalStatus	Band center voltage (desired value) 1 active	BOOL	1 = Active Bandcenter 1	R
Logic.Application.TransformerAVR.DigitalStatus.Band_center_voltage_(desired_value)_2_active	Logic.Application	TransformerAVR	DigitalStatus	Band center voltage (desired value) 2 active	BOOL	1 = Active Bandcenter 2	R
Logic.Application.TransformerAVR.DigitalStatus.Band_center_voltage_(desired_value)_3_active	Logic.Application	TransformerAVR	DigitalStatus	Band center voltage (desired value) 3 active	BOOL	1 = Active Bandcenter 3	R
Logic.Application.TransformerAVR.DigitalStatus.Parallel/Independent	Logic.Application	TransformerAVR	DigitalStatus	Parallel/Independent	BOOL	0 = Independent, 1 = Parallel	R
Logic.Application.TransformerAVR.DigitalStatus.Master_mode_selection_activation(parallel_control)	Logic.Application	TransformerAVR	DigitalStatus	Master mode selection activation(parallel control)	BOOL	1 = Active Master Paralleling	R
Logic.Application.TransformerAVR.DigitalStatus.Follower_mode_selection_activation(parallel_control)	Logic.Application	TransformerAVR	DigitalStatus	Follower mode selection activation(parallel control)	BOOL	1 = Active Follower Paralleling	R
Logic.Application.TransformerAVR.DigitalStatus.Circulating_current_selection_activation_(parallel_control)	Logic.Application	TransformerAVR	DigitalStatus	Circulating current selection activation (parallel control)	BOOL	1 = Active Circulating Current Paralleling	R
Logic.Application.TransformerAVR.DigitalStatus.Line_Drop_Compensation	Logic.Application	TransformerAVR	DigitalStatus	Line Drop Compensation	BOOL	1 = LDC (or 1 = Off), 0 = Z	R
Logic.Application.TransformerAVR.DigitalStatus.Time_delay_linear_or_integral_characteristic	Logic.Application	TransformerAVR	DigitalStatus	Time delay linear or integral characteristic	BOOL	0 = linear, 1 = integral	R
Logic.Application.TransformerAVR.DigitalStatus.TAPCON_dynamic_set_point_control	Logic.Application	TransformerAVR	DigitalStatus	TAPCON dynamic set point control	BOOL	0 = inactive, 1 = active	R
Logic.Application.TransformerAVR.DigitalStatus.Error_of_parallel_operation	Logic.Application	TransformerAVR	DigitalStatus	Error of parallel operation	BOOL	1 = paralleling error	R
Logic.Application.TransformerAVR.DigitalStatus.Tap_indication_error_(e.g._wrong_BCD_code)	Logic.Application	TransformerAVR	DigitalStatus	Tap indication error (e.g. wrong BCD code)	BOOL	1 = tap indication error	R
Logic.Application.TransformerAVR.DigitalStatus.Local_operation	Logic.Application	TransformerAVR	DigitalStatus	Local operation	BOOL	0 = remote, 1 = local	R
Logic.Application.TransformerAVR.DigitalStatus.Health	Logic.Application	TransformerAVR	DigitalStatus	Health	BOOL	0 = OK, 1 = error	R
Logic.Application.TransformerAVR.DigitalStatus.Function_monitoring	Logic.Application	TransformerAVR	DigitalStatus	Function monitoring	BOOL	1 = function monitoring active	R
Logic.Application.TransformerAVR.DigitalStatus.Motor_drive_running	Logic.Application	TransformerAVR	DigitalStatus	Motor drive running	BOOL	1 = motor drive running	R
Logic.Application.TransformerAVR.DigitalStatus.LTC_inhibit_due_to_under_voltage	Logic.Application	TransformerAVR	DigitalStatus	LTC inhibit due to under voltage	BOOL	1 = LTC inhibit	R
Logic.Application.TransformerAVR.DigitalStatus.LTC_inhibit_due_to_over_voltage	Logic.Application	TransformerAVR	DigitalStatus	LTC inhibit due to over voltage	BOOL	1 = LTC inhibit	R
Logic.Application.TransformerAVR.DigitalStatus.LTC_inhibit_due_to_over_current	Logic.Application	TransformerAVR	DigitalStatus	LTC inhibit due to over current	BOOL	1 = LTC inhibit	R
Logic.Application.TransformerAVR.DigitalStatus.End_position_raise_or_highest_allowed_tap_position_reached	Logic.Application	TransformerAVR	DigitalStatus	End position raise or highest allowed tap position reached	BOOL	1 = end position reached	R
Logic.Application.TransformerAVR.DigitalStatus.End_position_lower_or_lowest_allowed_tap_position_reached	Logic.Application	TransformerAVR	DigitalStatus	End position lower or lowest allowed tap position reached	BOOL	1 = end position reached	R
Logic.Application.TransformerAVR.DigitalStatus.Block_Automatic_Control	Logic.Application	TransformerAVR	DigitalStatus	Block Automatic Control	BOOL	1 = automatic control blocked	R
Logic.Application.TransformerAVR.DigitalStatus.Voltage_high_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	Voltage high limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.Voltage_high_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	Voltage high limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.Voltage_low_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	Voltage low limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.Voltage_low_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	Voltage low limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.Current_overload	Logic.Application	TransformerAVR	DigitalStatus	Current overload	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.Current_overload_2	Logic.Application	TransformerAVR	DigitalStatus	Current overload 2	BOOL	1 = limit exceeded	R

OPC-UA Path	Prefix	Component	Sub Component	Tag Name	Type	Comment	Access R/W
Logic.Application.TransformerAVR.DigitalStatus.Current_underload	Logic.Application	TransformerAVR	DigitalStatus	Current underload	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.Current_underload_2	Logic.Application	TransformerAVR	DigitalStatus	Current underload 2	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.Apparent_power_high_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	Apparent power high limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.Apparent_power_high_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	Apparent power high limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.Apparent_power_low_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	Apparent power low limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.Apparent_power_low_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	Apparent power low limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.Active_power_high_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	Active power high limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.Active_power_high_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	Active power high limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.Active_power_low_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	Active power low limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.Active_power_low_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	Active power low limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.Reactive_power_high_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	Reactive power high limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.Reactive_power_high_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	Reactive power high limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.Reactive_power_low_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	Reactive power low limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.Reactive_power_low_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	Reactive power low limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.Power_Factor_(Cosinus_phi)_low_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	Power Factor (Cosinus phi) low limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.Power_Factor_(Cosinus_phi)_low_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	Power Factor (Cosinus phi) low limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.Voltage_input_failure_(e.g._missing_connection)	Logic.Application	TransformerAVR	DigitalStatus	Voltage input failure (e.g. missing connection)	BOOL	1 = failure	R
Logic.Application.TransformerAVR.DigitalStatus.TAPCON_dynamic_set_point_control_failure_(TDSC)	Logic.Application	TransformerAVR	DigitalStatus	TAPCON dynamic set point control failure (TDSC)	BOOL	0 = ok, 1 = failure	R
Logic.Application.TransformerAVR.DigitalStatus.General_Purpose_Command_1_(GPC1)	Logic.Application	TransformerAVR	DigitalStatus	General Purpose Command 1 (GPC1)	BOOL	0 = inactive, 1 = active	R
Logic.Application.TransformerAVR.DigitalStatus.General_Purpose_Command_2_(GPC2)	Logic.Application	TransformerAVR	DigitalStatus	General Purpose Command 2 (GPC2)	BOOL	0 = inactive, 1 = active	R
Logic.Application.TransformerAVR.DigitalStatus.General_Purpose_Command_3_(GPC3)	Logic.Application	TransformerAVR	DigitalStatus	General Purpose Command 3 (GPC3)	BOOL	0 = inactive, 1 = active	R
Logic.Application.TransformerAVR.DigitalStatus.General_Purpose_Command_4_(GPC4)	Logic.Application	TransformerAVR	DigitalStatus	General Purpose Command 4 (GPC4)	BOOL	0 = inactive, 1 = active	R
Logic.Application.TransformerAVR.DigitalStatus.General_Purpose_Command_5_(GPC5)	Logic.Application	TransformerAVR	DigitalStatus	General Purpose Command 5 (GPC5)	BOOL	0 = inactive, 1 = active	R
Logic.Application.TransformerAVR.DigitalStatus.General_Purpose_Command_6_(GPC6)	Logic.Application	TransformerAVR	DigitalStatus	General Purpose Command 6 (GPC6)	BOOL	0 = inactive, 1 = active	R
Logic.Application.TransformerAVR.DigitalStatus.General_Purpose_Command_7_(GPC7)	Logic.Application	TransformerAVR	DigitalStatus	General Purpose Command 7 (GPC7)	BOOL	0 = inactive, 1 = active	R
Logic.Application.TransformerAVR.DigitalStatus.General_Purpose_Command_8_(GPC8)	Logic.Application	TransformerAVR	DigitalStatus	General Purpose Command 8 (GPC8)	BOOL	0 = inactive, 1 = active	R
Logic.Application.TransformerAVR.DigitalStatus.General_Purpose_Command_9_(GPC9)	Logic.Application	TransformerAVR	DigitalStatus	General Purpose Command 9 (GPC9)	BOOL	0 = inactive, 1 = active	R
Logic.Application.TransformerAVR.DigitalStatus.General_Purpose_Command_10_(GPC10)	Logic.Application	TransformerAVR	DigitalStatus	General Purpose Command 10 (GPC10)	BOOL	0 = inactive, 1 = active	R
Logic.Application.TransformerAVR.DigitalStatus.General_Purpose_Message_1_(GPM1)	Logic.Application	TransformerAVR	DigitalStatus	General Purpose Message 1 (GPM1)	BOOL	0 = inactive, 1 = active	R
Logic.Application.TransformerAVR.DigitalStatus.General_Purpose_Message_2_(GPM2)	Logic.Application	TransformerAVR	DigitalStatus	General Purpose Message 2 (GPM2)	BOOL	0 = inactive, 1 = active	R
Logic.Application.TransformerAVR.DigitalStatus.General_Purpose_Message_3_(GPM3)	Logic.Application	TransformerAVR	DigitalStatus	General Purpose Message 3 (GPM3)	BOOL	0 = inactive, 1 = active	R
Logic.Application.TransformerAVR.DigitalStatus.General_Purpose_Message_4_(GPM4)	Logic.Application	TransformerAVR	DigitalStatus	General Purpose Message 4 (GPM4)	BOOL	0 = inactive, 1 = active	R
Logic.Application.TransformerAVR.DigitalStatus.General_Purpose_Message_5_(GPM5)	Logic.Application	TransformerAVR	DigitalStatus	General Purpose Message 5 (GPM5)	BOOL	0 = inactive, 1 = active	R

OPC-UA Path	Prefix	Component	Sub Component	Tag Name	Type	Comment	Access R/W
Logic.Application.TransformerAVR.DigitalStatus.General_Purpose_Message_6_(GPM6)	Logic.Application	TransformerAVR	DigitalStatus	General Purpose Message 6 (GPM6)	BOOL	0 = inactive, 1 = active	R
Logic.Application.TransformerAVR.DigitalStatus.General_Purpose_Message_7_(GPM7)	Logic.Application	TransformerAVR	DigitalStatus	General Purpose Message 7 (GPM7)	BOOL	0 = inactive, 1 = active	R
Logic.Application.TransformerAVR.DigitalStatus.General_Purpose_Message_8_(GPM8)	Logic.Application	TransformerAVR	DigitalStatus	General Purpose Message 8 (GPM8)	BOOL	0 = inactive, 1 = active	R
Logic.Application.TransformerAVR.DigitalStatus.General_Purpose_Message_9_(GPM9)	Logic.Application	TransformerAVR	DigitalStatus	General Purpose Message 9 (GPM9)	BOOL	0 = inactive, 1 = active	R
Logic.Application.TransformerAVR.DigitalStatus.General_Purpose_Message_10_(GPM10)	Logic.Application	TransformerAVR	DigitalStatus	General Purpose Message 10 (GPM10)	BOOL	0 = inactive, 1 = active	R
Logic.Application.TransformerAVR.DigitalStatus.Desired_power_factor_selection_activation_(parallel_control)	Logic.Application	TransformerAVR	DigitalStatus	Desired power factor selection activation (parallel control)	BOOL	1 = Active desired power factor paralleling	R
Logic.Application.TransformerAVR.DigitalStatus.Desired_load_type_selection	Logic.Application	TransformerAVR	DigitalStatus	Desired load type selection	BOOL	0 = inductive, 1 = capacitive	R
Logic.Application.TransformerAVR.DigitalStatus.Motor_protective_switch_triggered	Logic.Application	TransformerAVR	DigitalStatus	Motor protective switch triggered	BOOL	1 = triggered	R
Logic.Application.TransformerAVR.DigitalStatus.Event_category_Information_active	Logic.Application	TransformerAVR	DigitalStatus	Event category Information active	BOOL	1 = active	R
Logic.Application.TransformerAVR.DigitalStatus.Event_category_Warning_active	Logic.Application	TransformerAVR	DigitalStatus	Event category Warning active	BOOL	1 = active	R
Logic.Application.TransformerAVR.DigitalStatus.Event_category_Error_active	Logic.Application	TransformerAVR	DigitalStatus	Event category Error active	BOOL	1 = active	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_1_low_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 1 low limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_1_low_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 1 low limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_1_high_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 1 high limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_1_high_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 1 high limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_2_low_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 2 low limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_2_low_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 2 low limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_2_high_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 2 high limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_2_high_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 2 high limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_3_low_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 3 low limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_3_low_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 3 low limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_3_high_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 3 high limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_3_high_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 3 high limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_4_low_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 4 low limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_4_low_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 4 low limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_4_high_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 4 high limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_4_high_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 4 high limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_5_low_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 5 low limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_5_low_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 5 low limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_5_high_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 5 high limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_5_high_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 5 high limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_6_low_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 6 low limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_6_low_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 6 low limit exceeded	BOOL	1 = limit exceeded	R

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OPC-UA Path	Prefix	Component	Sub Component	Tag Name	Type	Comment	Access R/W
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_6_high_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 6 high limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_6_high_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 6 high limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_7_low_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 7 low limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_7_low_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 7 low limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_7_high_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 7 high limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_7_high_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 7 high limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_8_low_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 8 low limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_8_low_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 8 low limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_8_high_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 8 high limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_8_high_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 8 high limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_9_low_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 9 low limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_9_low_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 9 low limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_9_high_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 9 high limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_9_high_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 9 high limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_10_low_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 10 low limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_10_low_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 10 low limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_10_high_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 10 high limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_10_high_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 10 high limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_11_low_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 11 low limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_11_low_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 11 low limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_11_high_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 11 high limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_11_high_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 11 high limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_12_low_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 12 low limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_12_low_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 12 low limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_12_high_limit_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 12 high limit exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.General_purpose_analog_input_12_high_limit_2_exceeded	Logic.Application	TransformerAVR	DigitalStatus	General purpose analog input 12 high limit 2 exceeded	BOOL	1 = limit exceeded	R
Logic.Application.TransformerAVR.DigitalStatus.OLTC_position_even	Logic.Application	TransformerAVR	DigitalStatus	OLTC position even	BOOL	1 = position even	R
Logic.Application.TransformerAVR.DigitalStatus.OLTC_position_odd	Logic.Application	TransformerAVR	DigitalStatus	OLTC position odd	BOOL	1 = position odd	R
Logic.Application.TransformerAVR.DigitalStatus.Tap_change_operation_incomplete	Logic.Application	TransformerAVR	DigitalStatus	Tap change operation incomplete	BOOL	1 = operation incomplete	R
Logic.Application.TransformerAVR.DigitalStatus.Switching_delay-only_TC230_AVT	Logic.Application	TransformerAVR	DigitalStatus	Switching delay - only TC230 AVT	BOOL	1 = active	R
Logic.Application.TransformerAVR.DigitalStatus.DIO_Input_X1/1_(DI_16-110V-1)	Logic.Application	TransformerAVR	DigitalStatus	DIO Input X1/1 (DI 16-110V-1)	BOOL	1 = input active	R
Logic.Application.TransformerAVR.DigitalStatus.DIO_Input_X1/2_(DI_16-110V-1)	Logic.Application	TransformerAVR	DigitalStatus	DIO Input X1/2 (DI 16-110V-1)	BOOL	1 = input active	R
Logic.Application.TransformerAVR.DigitalStatus.DIO_Input_X1/3_(DI_16-110V-1)	Logic.Application	TransformerAVR	DigitalStatus	DIO Input X1/3 (DI 16-110V-1)	BOOL	1 = input active	R

OPC-UA Path	Prefix	Component	Sub Component	Tag Name	Type	Comment	Access R/W
Logic.Application.TransformerAVR.DigitalStatus.DIO_Input_X1/4_(DI_16-110V-1)	Logic.Application	TransformerAVR	DigitalStatus	DIO Input X1/4 (DI 16-110V-1)	BOOL	1 = input active	R
Logic.Application.TransformerAVR.DigitalStatus.DIO_Input_X1/5_(DI_16-110V-1)	Logic.Application	TransformerAVR	DigitalStatus	DIO Input X1/5 (DI 16-110V-1)	BOOL	1 = input active	R
Logic.Application.TransformerAVR.DigitalStatus.DIO_Input_X1/6_(DI_16-110V-1)	Logic.Application	TransformerAVR	DigitalStatus	DIO Input X1/6 (DI 16-110V-1)	BOOL	1 = input active	R
Logic.Application.TransformerAVR.DigitalStatus.DIO_Input_X1/7_(DI_16-110V-1)	Logic.Application	TransformerAVR	DigitalStatus	DIO Input X1/7 (DI 16-110V-1)	BOOL	1 = input active	R
Logic.Application.TransformerAVR.DigitalStatus.DIO_Input_X1/8_(DI_16-110V-1)	Logic.Application	TransformerAVR	DigitalStatus	DIO Input X1/8 (DI 16-110V-1)	BOOL	1 = input active	R
Logic.Application.TransformerAVR.DigitalStatus.DIO_Input_X2/1_(DI_16-110V-1)	Logic.Application	TransformerAVR	DigitalStatus	DIO Input X2/1 (DI 16-110V-1)	BOOL	1 = input active	R
Logic.Application.TransformerAVR.DigitalStatus.DIO_Input_X2/2_(DI_16-110V-1)	Logic.Application	TransformerAVR	DigitalStatus	DIO Input X2/2 (DI 16-110V-1)	BOOL	1 = input active	R
Logic.Application.TransformerAVR.DigitalStatus.DIO_Input_X2/3_(DI_16-110V-1)	Logic.Application	TransformerAVR	DigitalStatus	DIO Input X2/3 (DI 16-110V-1)	BOOL	1 = input active	R
Logic.Application.TransformerAVR.DigitalStatus.DIO_Input_X2/4_(DI_16-110V-1)	Logic.Application	TransformerAVR	DigitalStatus	DIO Input X2/4 (DI 16-110V-1)	BOOL	1 = input active	R
Logic.Application.TransformerAVR.DigitalStatus.DIO_Input_X2/5_(DI_16-110V-1)	Logic.Application	TransformerAVR	DigitalStatus	DIO Input X2/5 (DI 16-110V-1)	BOOL	1 = input active	R
Logic.Application.TransformerAVR.DigitalStatus.DIO_Input_X2/6_(DI_16-110V-1)	Logic.Application	TransformerAVR	DigitalStatus	DIO Input X2/6 (DI 16-110V-1)	BOOL	1 = input active	R
Logic.Application.TransformerAVR.DigitalStatus.DIO_Input_X2/7_(DI_16-110V-1)	Logic.Application	TransformerAVR	DigitalStatus	DIO Input X2/7 (DI 16-110V-1)	BOOL	1 = input active	R
Logic.Application.TransformerAVR.DigitalStatus.DIO_Input_X2/8_(DI_16-110V-1)	Logic.Application	TransformerAVR	DigitalStatus	DIO Input X2/8 (DI 16-110V-1)	BOOL	1 = input active	R
Logic.Application.TransformerAVR.AnalogStatus.Band_width_voltage_	Logic.Application	TransformerAVR	AnalogStatus	Band width voltage	FLOAT	as percent of nominal voltage	R
Logic.Application.TransformerAVR.AnalogStatus.Control_intentional_time_delay_for_regulation_of_voltage	Logic.Application	TransformerAVR	AnalogStatus	Control intentional time delay for regulation of voltage	FLOAT	in seconds	R
Logic.Application.TransformerAVR.AnalogStatus.Line_drop_voltage_due_to_line_resistance_component_	Logic.Application	TransformerAVR	AnalogStatus	Line drop voltage due to line resistance component	FLOAT	ohmic behaviour of the cable	R
Logic.Application.TransformerAVR.AnalogStatus.Line_drop_voltage_due_to_line_reactance_component_	Logic.Application	TransformerAVR	AnalogStatus	Line drop voltage due to line reactance component	FLOAT	inductive behaviour of the cable	R
Logic.Application.TransformerAVR.AnalogStatus.Control_voltage_below_which_auto_Lower_commands_blocked_	Logic.Application	TransformerAVR	AnalogStatus	Control voltage below which auto Lower commands blocked	FLOAT	relative	R
Logic.Application.TransformerAVR.AnalogStatus.Limit_Load_Current_	Logic.Application	TransformerAVR	AnalogStatus	Limit Load Current	FLOAT	LTC Block Load Current percentage	R
Logic.Application.TransformerAVR.AnalogStatus.Line_drop_voltage_due_to_line_total_impedance_	Logic.Application	TransformerAVR	AnalogStatus	Line drop voltage due to line total impedance	FLOAT	percentage of nominal voltage	R
Logic.Application.TransformerAVR.AnalogStatus.Tap_position_of_Load_Tap_Changer_where_automatic_Raise_commands_are_blocked	Logic.Application	TransformerAVR	AnalogStatus	Tap position of Load Tap Changer where automatic Raise commands are blocked	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Tap_position_of_Load_Tap_Changer_where_automatic_Lower_commands_are_blocked	Logic.Application	TransformerAVR	AnalogStatus	Tap position of Load Tap Changer where automatic Lower commands are blocked	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Control_Voltage_Deviation_	Logic.Application	TransformerAVR	AnalogStatus	Control Voltage Deviation	FLOAT	in percent of BndCtr	R
Logic.Application.TransformerAVR.AnalogStatus.Load_Current_	Logic.Application	TransformerAVR	AnalogStatus	Load Current	FLOAT	transformer secondary current	R
Logic.Application.TransformerAVR.AnalogStatus.Phase_Angle_of_LodA_relative_to_CtlV	Logic.Application	TransformerAVR	AnalogStatus	Phase Angle of LodA relative to CtlV	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Circulating_Current_(reactive)	Logic.Application	TransformerAVR	AnalogStatus	Circulating Current (reactive)	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Average_power_factor_(total_PF)	Logic.Application	TransformerAVR	AnalogStatus	Average power factor (total PF)	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Frequency	Logic.Application	TransformerAVR	AnalogStatus	Frequency	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Phase_current_L1	Logic.Application	TransformerAVR	AnalogStatus	Phase current L1	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Phase_current_L2	Logic.Application	TransformerAVR	AnalogStatus	Phase current L2	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Phase_current_L3	Logic.Application	TransformerAVR	AnalogStatus	Phase current L3	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Phase_current_N	Logic.Application	TransformerAVR	AnalogStatus	Phase current N	FLOAT		R

OPC-UA Path	Prefix	Component	Sub Component	Tag Name	Type	Comment	Access R/W
Logic.Application.TransformerAVR.AnalogStatus.Phase_power_factor_L1	Logic.Application	TransformerAVR	AnalogStatus	Phase power factor L1	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Phase_power_factor_L2	Logic.Application	TransformerAVR	AnalogStatus	Phase power factor L2	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Phase_power_factor_L3	Logic.Application	TransformerAVR	AnalogStatus	Phase power factor L3	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Phase_Angle_U1I1	Logic.Application	TransformerAVR	AnalogStatus	Phase Angle U1I1	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Phase_Angle_U2I2	Logic.Application	TransformerAVR	AnalogStatus	Phase Angle U2I2	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Phase_Angle_U3I3	Logic.Application	TransformerAVR	AnalogStatus	Phase Angle U3I3	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Tap_Position	Logic.Application	TransformerAVR	AnalogStatus	Tap Position	FLOAT	For the validity of the value note the corresponding data point. Tap indication error	R
Logic.Application.TransformerAVR.AnalogStatus.Operation_counter_(LSB/MSB)	Logic.Application	TransformerAVR	AnalogStatus	Operation counter (LSB/MSB)	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Operation_counter_MSB	Logic.Application	TransformerAVR	AnalogStatus	Operation counter MSB	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Desired_power_factor	Logic.Application	TransformerAVR	AnalogStatus	Desired power factor	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.General_purpose_analog_input_1	Logic.Application	TransformerAVR	AnalogStatus	General purpose analog input 1	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.General_purpose_analog_input_2	Logic.Application	TransformerAVR	AnalogStatus	General purpose analog input 2	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.General_purpose_analog_input_3	Logic.Application	TransformerAVR	AnalogStatus	General purpose analog input 3	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.General_purpose_analog_input_4	Logic.Application	TransformerAVR	AnalogStatus	General purpose analog input 4	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.General_purpose_analog_input_5	Logic.Application	TransformerAVR	AnalogStatus	General purpose analog input 5	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.General_purpose_analog_input_6	Logic.Application	TransformerAVR	AnalogStatus	General purpose analog input 6	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.General_purpose_analog_input_7	Logic.Application	TransformerAVR	AnalogStatus	General purpose analog input 7	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.General_purpose_analog_input_8	Logic.Application	TransformerAVR	AnalogStatus	General purpose analog input 8	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.General_purpose_analog_input_9	Logic.Application	TransformerAVR	AnalogStatus	General purpose analog input 9	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.General_purpose_analog_input_10	Logic.Application	TransformerAVR	AnalogStatus	General purpose analog input 10	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.General_purpose_analog_input_11	Logic.Application	TransformerAVR	AnalogStatus	General purpose analog input 11	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.General_purpose_analog_input_12	Logic.Application	TransformerAVR	AnalogStatus	General purpose analog input 12	FLOAT		R
Logic.Application.TransformerAVR.AnalogStatus.Target_tap_position	Logic.Application	TransformerAVR	AnalogStatus	Target tap position	FLOAT		R
Logic.Application.TransformerAVR.AnalogCommand.Band_width_voltage_	Logic.Application	TransformerAVR	AnalogCommand	Band width voltage	FLOAT	as percent of nominal voltage	W
Logic.Application.TransformerAVR.AnalogCommand.Control_intentional_time_delay_for_regulation_of_voltage	Logic.Application	TransformerAVR	AnalogCommand	Control intentional time delay for regulation of voltage	FLOAT	in seconds	W
Logic.Application.TransformerAVR.AnalogCommand.Line_drop_voltage_due_to_line_resistance_component_	Logic.Application	TransformerAVR	AnalogCommand	Line drop voltage due to line resistance component	FLOAT	ohmic behaviour of the cable	W
Logic.Application.TransformerAVR.AnalogCommand.Line_drop_voltage_due_to_line_reactance_component_	Logic.Application	TransformerAVR	AnalogCommand	Line drop voltage due to line reactance component	FLOAT	inductive behaviour of the cable	W
Logic.Application.TransformerAVR.AnalogCommand.Control_voltage_below_which_auto_Lower_commands_blocked_	Logic.Application	TransformerAVR	AnalogCommand	Control voltage below which auto Lower commands blocked	FLOAT	relative	W
Logic.Application.TransformerAVR.AnalogCommand.Limit_Load_Current	Logic.Application	TransformerAVR	AnalogCommand	Limit Load Current	FLOAT	LTC Block Load Current percentage	W
Logic.Application.TransformerAVR.AnalogCommand.Line_drop_voltage_due_to_line_total_impedance_	Logic.Application	TransformerAVR	AnalogCommand	Line drop voltage due to line total impedance	FLOAT	percentage of nominal voltage	W
Logic.Application.TransformerAVR.AnalogCommand.Tap_position_of_Load_Tap_Changer_where_automatic_Raise_commands_are_blocked	Logic.Application	TransformerAVR	AnalogCommand	Tap position of Load Tap Changer where automatic Raise commands are blocked	FLOAT		W
Logic.Application.TransformerAVR.AnalogCommand.Tap_position_of_Load_Tap_Changer_where_automatic_Lower_commands_are_blocked	Logic.Application	TransformerAVR	AnalogCommand	Tap position of Load Tap Changer where automatic Lower commands are blocked	FLOAT		W

OPC-UA Path	Prefix	Component	Sub Component	Tag Name	Type	Comment	Access R/W
Logic.Application.TransformerAVR.AnalogCommand.Desired_power_factor	Logic.Application	TransformerAVR	AnalogCommand	Desired power factor	FLOAT		W
Logic.Application.TransformerAVR.AnalogCommand.Target_tap_position	Logic.Application	TransformerAVR	AnalogCommand	Target tap position	FLOAT		W

Step	Description	Result	Verified by	Date
1	Confirm correct and positive result of pre-commissioning Check Sheet for above signals I/O list	Correct and positive results.....☐		

5.4.2.4 OTP Worksite PHASE 1 - Test Notes and Remarks

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5.4.2.5 OTP Worksite PHASE 1 - Tests Certifying Authority Table of Attendances

Name and Surname	Certifying Authority	Position	Signature

5.4.2.6 OTP Worksite PHASE 1 - Tests Final Signatures and Company Acceptance

Name and Surname	Certifying Authority	Position	Signature

6 OTP AT SITE OFFSHORE

6.1 PLANNING AND MANPOWER

6.1.1 Offshore site test overview

It is expected that all pre-commissioning tests, systems energization and commissioning steps will have been successfully performed during the Onshore Phases.

Consequently, during the offshore SITE phase, the respective systems will be inspected prior to re-energization.

No additional test steps will be required on these items of equipment, correct operation and functioning will be verified.

6.1.2 Planned tasks with estimated manpower

Estimated manpower for the entire duration of the Test:

- 1 E&I commissioning superintendent
- 1 E&I commissioning supervisor from Contractor
- 2 E&I commissioning technicians from Contractor

6.1.3 Test duration estimate

The test duration should be as follows:

- 3 days

6.1.4 Vendor Assistance

Not applicable

6.1.5 Items Postponed to C&E OTP

Not applicable

6.1.6 HOLDS

Not applicable

6.2 OTP TEST REQUIREMENTS-OFFSHORE SITE

6.2.1 Pre-Commissioning Achievement

Not applicable

6.2.2 Commissioning Achievement

The commissioning achievement will be the successful operation, functionality and safeguarding test of 66kV Power distribution System, installed and put in operation during the WORKSITE IN ONSHORE phase.

In OFFSHORE Phase the 66kV GIS Switchboard will be powered ON to be ready to operate with 66/6.6kV Power transformer with incomer/feeder connected on it.

Once powered on the 66kV GIS Switchboard will be ready to operate with:

- Upstream - 66kV grid connected
- Downstream - TR-100AD1 66/6.6kV Power Transformer
- 6.6kV Switchboard SG-200N1 and associated feeders

6.2.3 Status of Required Associated Subsystems

Subsystems required for Commissioning of 66KV Power Distribution:

- SS 81-10: GIS 66 kV (HNA6-AFA70)
- SS 81-20: Power Transformer 7 MVA (TR-100AD1)
- SS 83-00: 6,6 kV Switchboard
- SS 87-00: Electrical Monitoring & Control System (EMCS)
- SS 87-10: Process Control System (PCS)
- SS 79-00: SIS Safety Instrumented System
- SS 84-00: UPS System UP-200F1
- SS 84-10: UPS System UP-200F3

6.2.4 Special Tools & Test Equipment

The following special tool and Test Equipment are required:

- Voltage, frequency, continuity tester (Multimeter)
- Phases sequence tester
- Portable radios (3 pcs + 1 per Technical Room)

TESTING & MEASUREMENT INSTRUMENT USED			
Type	Serial N.	Calibration certificate	Validity

6.2.5 Consumable List

Not applicable

6.2.6 Commissioning Spare Parts

Reference is made to HYOSUNG Spare Part List 1723001595-EL-LIS-00030 regarding the 66KV SWBD spare parts and is made to MF TRASFORMATORI Spare Part List 1723001697-EL-LIS-00017 regarding the 66/6.6kV Power Transformer spare parts

6.2.7 Temporary Facilities

Not applicable

6.3 OTP DESCRIPTION – OFFSHORE SITE

6.3.1 OTP Test Preparation

Step	Description	Result	Verified by	Date
2	System Ready for Operation (RFO) from worksite phase Certificate is issued and approved.			
3	No blocking punch list items are outstanding against the system to be commissioned.			
4	System(s), (de)isolations as per LOTO procedure enclosed within commissioning			

Step	Description	Result	Verified by	Date
	Work Permits procedures prepared and approved			
5	Verify and confirm that all steps performed at WORKSITE of this procedure are completed without any pending issues that would prevent from proceeding with the offshore SITE PROCEDURE			
6	All personnel involved in the implementation of this procedure are familiar with this procedure as well as with associated safety requirements (Toolbox Talk to be conducted before initiation of activities).			
7	A final walkdown after hook-up of the systems has been completed, any preservation items have been removed and to ensure that the system and the area are ready for energization for following items: - SGIS 66 kV (HNA6-AFA70) - Power Transformer 7 MVA (TR-100AD1) - 6,6 kV Switchboard SG-100D1 - Electrical Monitoring & Control System (EMCS) - Process Control System (PCS) - SIS Safety Instrumented System - 84-00: UPS System UP-200F1 - 84-10: UPS System UP-200F3			
8	Check that areas are free for work and escape routes are clear of any obstructions.			
9	Ensure that proper communications have been established between parties involved in the implementation of the procedure.			

Step	Description	Result	Verified by	Date
10	Verify availability of test equipment and consumables as per chapters 6.2.4.			
11	Confirm that the HV 66kV and 6.6kV systems are ready to be powered on and that the 66kV HV is present.			
12	All personnel have been duly notified during dedicated daily SIMOPS meetings that the system(s) is ready for commissioning.			

6.3.2 Electrical Preparation

Step	Description	Result	Verified by	Date
13	No blocking punch list items are outstanding against the system to be commissioned.			
14	Review and confirm no changes are required to be performed on existing protection settings.			

6.3.3 Mechanical Preparation

Not applicable.

6.3.4 Instrument Preparation

Step	Description	Result	Verified by	Date
15	Check related punch list 'B' items and confirm acceptability for start of commissioning activities.			
16	Verify that all relevant associated systems / subsystems are ready.			
17	Verify as relevant Inhibit and Override list has been prepared and validated.			

Step	Description	Result	Verified by	Date
18	Verify that relevant equipment/ components are available and in operation for start of commissioning activities.			

6.3.5 Piping Preparation

Not applicable

6.3.6 Additional Discipline Preparation

Not applicable.

6.4 OTP Steps OFFSHORE SITE

The previous chapters must be successfully completed prior to commissioning of the 66kV GIS Switchboard, and UPS-200F1 must be already energized.

In the following steps, the functionality of the 6.6KV Power Distribution Switchboards shall be tested for:

- SS 81-10: GIS 66 kV (HNA6-AFA70)
- SS 81-20: Power Transformer 7 MVA (TR-100AD1)

6.4.1 Test preparation

Need to Verify:

- Auxiliary power supplies are available 230V DP-200N1 (Internal Heaters & Lights)
- Auxiliary power supplies are available 110 V A/B UPS UP-200F1
- Temporary power supply is available SG-200N1 (A2/+08)

All systems and subsystems involved in this procedure must already be commissioned during the onshore phase and available.

The following steps will be performed to prepare and achieve the correct and appropriate conditions of the 66kV GIS Switchgear and 66/6.6kV transformer systems for proper operation.

6.4.1.1 Auxiliary Supply HNA6-AFA70 66kV GIS and TR-100AD1 66/6.6kV Power Transformer

Step	Description	Result	Verified by	Date
Auxiliary Energization of 66kV GIS HNA6-AFA70				
19	Check related punch list 'B' items and confirm acceptability for start of commissioning activities.			
20	Check that grounding and bonding are in accordance with applicable documents			
21	Review and confirm onshore testing protection settings on 66KV GIS main breaker power supply circuit breakers.			
22	Verify and confirm that the Hyosung Off-Shore part of the SAT procedure – *"referring to 1723001595-EL-PRO-00023 Remote and control simulation test procedure" pages to 64 to 70* - has been performed with positive results. Relay Test - 1.1 Diagnostic Test .....☐ - 1.2 Relay Setting Check .....☐ - 1.3 IO Operation Test.....☐ - 1.4 Measurement Test.....☐ - 1.5 Protection Test .....☐ - 1.6 Remote Test.....☐			
23	Verify and confirm the power presence from DP-200N1 230V (ref. vendor doc. 1723002197-EL-DG-00013) - Close MCB Q37.....☐			
24	Verify and confirm the power on CP-100E1 for the following circuits: - Close MCB -FA – AC MAIN SUPPLY...☐			

Step	Description	Result	Verified by	Date
	And following circuits will be supplied: K27 AC SUPPLY SUPERVISION; LCP LIGHTING CIRCUIT; SOCKET OUTLET; LCP HEATING CIRCUIT; CB Q0(QA1) OPERATING MECHANISM; CB Q0 (QA1) HEATING CIRCUIT; DS QZ92_ES QZ92 OPERATING MECHANISM HEATING CIRCUIT; DS QZ91_ES QZ91 OPERATING MECHANISM HEATING CIRCUIT			
25	Verify and confirm the power presence from UPS UP-200F1A/B 110V - Close MCB Q10.....☐ - Close MCB Q11.....☐			
26	Verify and confirm the power on CP-100E1 for the following circuits: - Close MCB -FD1 – DC1 110Vdc MAIN SUPPLY.....☐ - Close MCB -F01 – CIRCUIT BREAKER CONTROL SUPPLY CLOSING & TRIP CIRCUITS 1.....☐ And following circuits will be supplied: Close command Circuits; K86-1of 7SJ85; Protection Lock Out Relay (LOR) circuits; LOR SET COMMAND TR-100AD1 PROTECTION TRIP; CB Q0(QA1) ANTI PUMPING CIRCUIT; CB Q0(QA1) PROTECTION & TRIP COIL CIRCUITS; SAFETY SYSTEM POWER; CB Q0 (QA1) GIS PRESSURE LOW STAGES-1 & 2			
27	Verify and confirm the power on CP-100E1 for the following circuits: - Close MCB -F02 – CIRCUIT BREAKER MOTOR SUPPLY.....☐ And following circuits will be supplied:			

Step	Description	Result	Verified by	Date
	CB Q0(QA1) MOTOR OPERATING CIRCUIT; CB Q0(QA1) SPRING EXCESSIVE RUN TIME			
28	Verify and confirm the power on CP-100E1 for the following circuits: - Close MCB -F03 – INDICATION CIRCUIT SUPPLY .....☐ And following circuits will be supplied: LAMP TEST; CB Q0 (QA1) POSITION INDICATOR CLOSE & OPEN; DS QZ92 POSITION INDICATOR CLOSE & OPEN; ES QZ92 POSITION INDICATOR CLOSE & OPEN; DS QZ91 POSITION INDICATOR CLOSE & OPEN; ES QZ91 POSITION INDICATOR CLOSE & OPEN; IED FAILURE FROM 7SJ85; IED FAILURE FROM 7UT85; VD1 L1/L2/L3 SUPPLY; VD2 L1/L2L3 SUPPLY			
29	Verify and confirm the power on CP-100E1 for the following circuits: - Close MCB -F04 – PROTECTION RELAY: -7UT85 SUPPLY .....☐ And following circuits will be supplied: PROTECTION RELAY 7UT85 SUPPLY; IED FAILURE FROM 7SJ85			
30	Verify and confirm the power on CP-100E1 for the following circuits: - Close MCB -F05 – RED BOX UNIT: RSG907R SUPPLY .....☐ And following circuits will be supplied: RSG907R RED BOX UNIT			
31	Verify and confirm the power on CP-100E1 for the following circuits: - Close MCB -FD2 – DC2 110Vdc MAIN SUPPLY.....☐			

Step	Description	Result	Verified by	Date
	- Close MCB -F11 – CIRCUIT BREAKER CONTROL SUPPLY CLOSING & TRIP CIRCUITS 2.....☐ And following circuits will be supplied: REMOTE TRIP-2 COMMAND; CB Q0(QA1) TRIP COIL-2 50/50N, 51/51G, 67, 67N; CB Q0(QA1) TRIP COIL-2 87; CB Q0(QA1) TRIP COIL-2 86; CB TRIP-2 COMMAND; PROTECTION TRIP SIGNAL; CB Q0(QA1) GIS PRESSURE LOW STAGE-1; CB Q0(QA1) GIS PRESSURE LOW STAGE-2SIS SAFETY SYSTEM DC 24V INPUT			
32	Verify and confirm the power on CP-100E1 for the following circuits: - Close MCB -F12 – DS & ES MOTOR & CONTROL SUPPLY .....☐ And following circuits will be supplied: DS/ES MANUAL OPER. MODE; DS/ES QZ92 MOTOR OPERATION; DS/ES QZ91 MOTOR OPERATION; ES QZ92 ES OPEN COMMAND; DS QZ92 DS CLOSE COMMAND; DS/ES QZ92 SELF HOLDING; ES QZ92 ES CLOSE COMMAND; DS QZ92 DS OPEN COMMAND; MANUAL DS/ES QZ92 OPER. MODE SELECTION; ES QZ91 ES OPEN COMMAND; DS QZ91 DS CLOSE COMMAND; DS/ES QZ91 SELF HOLDING; ES QZ91 ES CLOSE COMMAND; DS QZ91 DS OPEN COMMAND MANUAL; DS/ES QZ91 OPER. MODE SELECTION			
33	Verify and confirm the power on CP-100E1 for the following circuits: - Close MCB -F13 – MERGING UNIT: IM2 SUPPLY.....☐ And following circuits will be supplied: MERGING UNIT: -IM2 SUPPLY			

Step	Description	Result	Verified by	Date
34	Verify and confirm the power on CP-100E1 for the following circuits: - Close MCB -F14 – PROTECTION RELAY: -7SJ85 SUPPLY .....☐ And following circuits will be supplied: PROTECTION RELAY 7SJ85 SUPPLY; DS QZ91 OPEN / CLOSE; ES QZ91 OPEN / CLOSE; DS QZ92 OPEN / CLOSE; ES QZ92 OPEN / CLOSE; CB Q0(QA1) OPEN / CLOSE; DC CONTROL VOLTAGE FAILURE; AC CONTROL VOLTAGE FAILURE; 6.6 kV ARC PROTECTION TRIP1; 6.6kV SWG. CB OPEN; 6.6kV SWG. ES OPEN; SIS OVERRIDE ENABLED; VD1 NO VOLTAGE; D2 NO VOLTAGE; CB WARNING GAS LOW STAGE-1; CB WARNING GAS LOW STAGE-2; CB SPRING MOTOR OVERLOAD; CB SPRING MOTOR EXCESSIVE RUN TIME; CB MOTOR RUNTIME EXCEEDED & SPRING UNCHARGED; DS/ES MOTOR MCB TRIP; DS OR ES MANUAL OPER. MODE; HAND CRANK INSERTED; IED FAILURE FROM 7UT85; LOCAL STATUS; REMOTE STATUS; TCS1 FAIL; TCS2 FAIL; SAFETY SYSTEM POWER WATCHDOG; CB Q0(QA1) MCB ALARM; DS QZ92_ES QZ92 GIS PRESSURE LOW STAGE-1; DS QZ92_ES QZ92 GIS PRESSURE LOW STAGE-2; DS QZ91_ES QZ91 GIS PRESSURE LOW STAGE-1; DS QZ91_ES QZ91 GIS PRESSURE LOW STAGE-2; PROTECTION RELAY 7SJ85(CB202) SUPPLY;			
35	Verify and confirm ESD signal 81-XS-001 from SIS cabinet B400-SIS-001 on CP-100E1 for the following circuits with reference Vendor doc. N° 1723001595-EL-DG-00015: - ESD Signal 81-XS-001 comes in healthy condition and in the terminal X13:13-14 there will be 24Vdc. KSIL1 DC 24V TRIP SAFETY SYSTEM will be ON .....☐			

Step	Description	Result	Verified by	Date
	KSIL1 is ON in healthy condition the NO contact (terminal 13-14) is closed And Check: - -KSIL2 DC 24V TRIP SAFETY SYSTEM must be ON and GIS will be in healthy condition.....☐			
Auxiliaries Energization of 66/6.6kV Transformer TR-100AD1				
36	Verify and confirm the power presence from DP-200N1 230V (ref. vendor doc. 1723002197-EL-DG-00013) - Close MCB Q33.....☐			
37	Verify and confirm the power on Auxiliary Control Panel CP-100E4 for the following circuits: - Close MCB -Q1 – Auxiliary Local Control Panel MAIN BREAKER .....☐ And following circuits will be supplied: Control panel lamp circuit H1; Control panel R1 heater circuit; HV 66kV – cable box R2 heater circuit; LV 6.9kV – cable box R3 heater circuit; The winding temperature indicator 49T circuit; The bladder rupture relay 99T.1 circuit; The self-dehydrating breather 98T.2 circuit;			
38	Verify and confirm the power presence from DP-200N1 230V (ref. vendor doc. 1723002197-EL-DG-00013) - Close MCB Q32.....☐			
39	Verify and confirm the power on CP-100E3 AVR Local Control Panel for the following circuits: - Close MCB -Q1 – AVR Local Control Panel MAIN BREAKER .....☐ And following circuits will be supplied:			

Step	Description	Result	Verified by	Date
	Control panel lamp H1 circuit; Control panel R1 heater circuit; Automatic voltage regulator N1 circuit;			
40	Verify and confirm the power presence from DP-200N1 230V (ref. vendor doc. 1723002197-EL-DG-00013) - Close MCB Q31.....☐			
41	Verify and confirm the power on CP-100E2 MDU Motor Drive Unit Control Panel for the following circuits: - Close MCB -S35A – MDU Motor Drive Unit control panel CP-100E2 MAIN BREAKER .....☐ And following circuits will be supplied: Control panel E1 hand lamp circuit; - Close MCB -F16 – internal heater MDU Motor Drive Unit CP-100E2 heater MAIN BREAKER .....☐ And following circuits will be supplied: Control panel heater R1 circuit; - Close MCB -Q1 – motor protective switch of motor M1 .....☐ And following circuits will be supplied: Motor M1 drive circuit			
42	Confirm all transformer control panel are ready to operate: - CP-100E4 – Transformer Auxiliary local control panel .....☐ - CP-100E3 - Transformer AVR local control panel .....☐ - CP-100E2 – Transformer MDU motor drive unit local control panel .....☐			

Test Steps

The 66kV Switchboard HNA6-AFA70 and 66/6.6kV Power Transformer have all auxiliary circuits powered on, and they are ready to operate on 66kV network side and on 6.6kV distribution system side.

6.4.1.2 Command and feedback test on HNA6-AFA70 GIS without power from 66kV power supply from both side

Step	Description	Result	Verified by	Date
Verification of GIS command – preliminary checks				

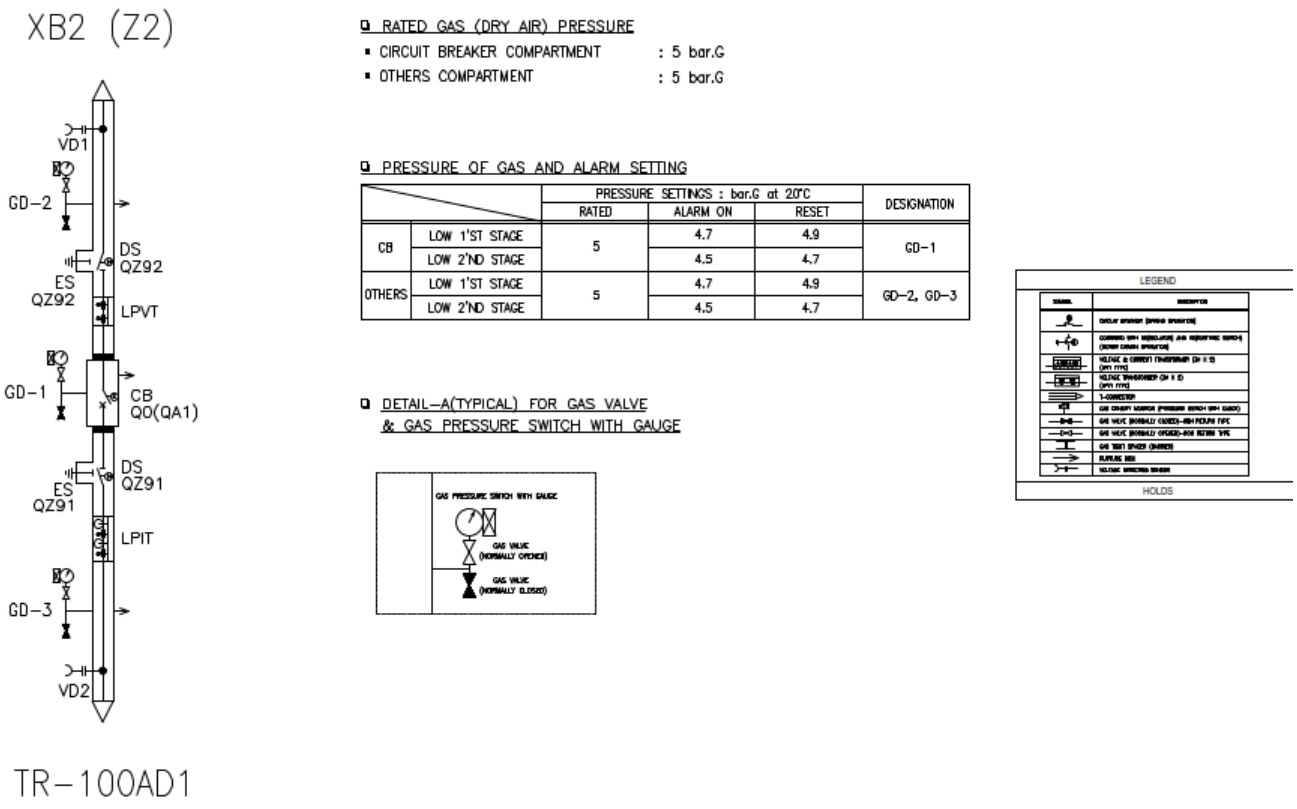


Figure 13 – extract of 66kV Switchgear (GIS) Gas Single Line Diagram - vendor doc. 1723001595 EL-DG-00014

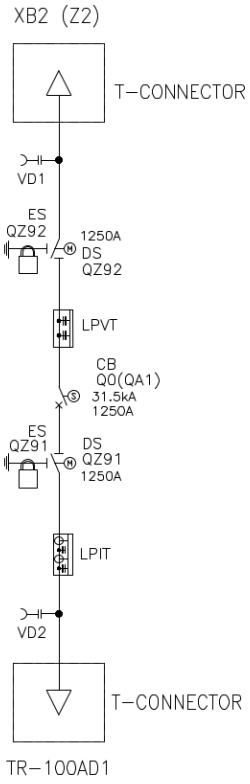
43	Gas Insulated Switchgear (GIS) must be filled with Dry air (figure 13). Before operation on GIS devices must be checked the Dry Air pressure into CB and ES/DS compartments of GIS. The inside gas pressure must be at rated pressure and in any case not lower than 1st stage threshold. If Dry air does not have the right			

Step	Description	Result	Verified by	Date
	pressure under-mentioned performances will not be available and the GIS will be blocked in a healthy condition. - Dielectric strength for main circuit - Interruption performance - Mechanical damping action for Circuit Breaker operation Verify and confirm that the correct gas charging has been performed			
44	Before operating on 66kV Switchgear verify and confirm the correct pressure of dry air of all compartments (barG at 20°C). In the details: CB compartment - Rated pressure 5 barG - Pressure at GD-1 gas pressure switch with gauge..... barG Upstream compartment - Rated pressure 5 barG - Pressure at GD-2 gas pressure switch with gauge..... barG Downstream compartment - Rated pressure 5 barG - Pressure at GD-3 gas pressure switch with gauge..... barG Confirm settings of pressure switches on compartments. GD-1 1st LOW stage - Alarm ON - 4,7 barG ..... ☐ - Reset – 4,9 barG ..... ☐ GD-1 2nd LOW stage - Alarm ON - 4,5 barG ..... ☐			

Step	Description	Result	Verified by	Date
	- Reset – 4,7 barG ..... ☐ GD-2 1st LOW stage - Alarm ON - 4,7 barG ..... ☐ - Reset – 4,9 barG ..... ☐ GD-2 2nd LOW stage - Alarm ON - 4,5 barG ..... ☐ - Reset – 4,7 barG ..... ☐ GD-3 1st LOW stage - Alarm ON - 4,7 barG ..... ☐ - Reset – 4,9 barG ..... ☐ GD-3 2nd LOW stage - Alarm ON - 4,5 barG ..... ☐ - Reset – 4,7 barG ..... ☐			
45	Verify and confirm all external electrical interlock are ready to permit the GIS operating On control panel CP-100E1 and referring to vendor document N° 1723001595-EL-DG-00015: - ESD Signal 81-XS-001 from SIS system is in healthy condition ..... ☐ - KSIL1 and KSIL2 must be ON in heathy condition ..... ☐ - ESD (SIS) Override selector -SR1 must be disabled to permit any signals of Emergency Shut Down. Confirm or place in disabled condition ..... ☐ - Interlock from 6.6kV SWBD CB Open - Confirm close circuit between terminal X13: 15-16 - CB local Close command circuits (page. 18/72) ..... ☐			

Step	Description	Result	Verified by	Date
	- Interlock from 6.6kV SWBD SG-200N1 trip signal - Confirm open circuit between terminal X13: 19-20 – set-reset K86 command Circuits (page. 18/72) ..... ☐ - Interlock from 6.6kV SWBD Earthing Switch Open - Confirm close circuit between terminal X13: 29-30 – DS QZ91 local close command circuit (page. 23/72) ..... ☐ - Interlock from 6.6kV SWBD CB Open - Confirm close circuit between terminal X13: 33-34 - ES QZ91 local close command circuit (page. 23/72) ..... ☐			
46	Verify and confirm all mechanical interlock are ready to permit the GIS operating. On ES/DS QZ91 downstream Earthing / Disconnecting Switch: - Padlock of mechanical interlock must be removed ..... ☐ On ES/DS QZ92 Upstream Earthing / Disconnecting Switch: - Padlock of mechanical interlock must be removed ..... ☐			

Step	Description	Result	Verified by	Date



❑ HNA6-AFA70 INTERLOCK TABLE

CLOSE/OPEN INTERLOCK MATRIX OF CB,DS & ES.											REMARK
COMMAND	66kV GIS					6.6KV SWG.		COMMAND SOURCE		OTHER EXTERNAL INTERLOCKS	
	Q0(QA1)	DS(QZ92)	DS(QZ91)	ES(QZ92)	ES(QZ91)	CB	ES	LOCAL	REMOTE		
CB Q0(QA1) (CLOSE)		C	C			O		X	X	GAS PRESSURE IS NOT LOWER THAN 1'ST ALARM PRESSURE CLOSING SPRING NOT DISCHARGED	SERVICE
		O	O			O		X		GAS PRESSURE IS NOT LOWER THAN 1'ST ALARM PRESSURE	TEST
CB(Q0) (OPEN)								X	X	GAS PRESSURE IS NOT LOWER THAN MINIMUM PRESSURE	SERVICE
										GAS PRESSURE IS NOT LOWER THAN MINIMUM PRESSURE	BY PROTECTION RELAY
DS(QZ92) (CLOSE/OPEN)	O			(O)				X	X		SERVICE
DS(QZ91) (CLOSE)	O				(O)		O	X	X		SERVICE
DS(QZ91) (OPEN)	O				(O)			X	X		SERVICE
ES(QZ92) (CLOSE)	O	(O)						X	X	LINE VD RELAY EXCITED	SERVICE
ES(QZ92) (OPEN)	O	(O)						X	X		SERVICE
ES(QZ91) (CLOSE)	O		(O)			O		X	X		SERVICE
ES(QZ91) (OPEN)	O		(O)					X	X		SERVICE

C : CLOSE
O : OPEN
( ) : MECHANICAL INTERLOCK

Figure 14 – extract of 66kV Switchgear (GIS) Inter Panel Logic Diagram - vendor doc. 1723001595-EL-DG-00012

THE FOLLOWING STEPS SHALL BE PERFORMED WITH VENDOR (HYOSUNG & MF TRASFORMATORI) TECHNICAL ASSISTANCE

In the following steps, the close and open commands will be checked, according to the "close/open interlock matrix of CB, DS & ES" shown in Figure 14.

OPERATION FROM LOCAL CONTROL PANEL AND REMOTE-CONTROL PANEL

Operation of CB, DS and ES is able to be performed at Local position and/or Remote position by the Change-Over Switch (KEY LOCKABLE SWITCH) -S01.

CB opening and closing

When opening and closing CB, the Remote or Local operation may be performed by setting the -S01 on Local Control Panels (CP-100E1). The -S01 is marked "REMOTE & LOCAL" on CP-100E1.

CB opening from Remote Control EMCS or from Local Control Panel CP-100E1

Step	Description	Result	Verified by	Date
	a) Set the -S01 on CP-100E1 to "REMOTE (or LOCAL)" position. b) Command the CB opening from the Remote Control EMCS or Local Control Panel CP-100E1 CB closing from Remote Control EMCS or from Local Control Panel CP-100E1 a) Set the -S01 on CP-100E1 to "REMOTE (or LOCAL)" position. b) Command the CB closing from the Remote Control EMCS or Local Control Panel CP-100E1 DS opening and closing of combined DS & ES 1) Opening a) Set the -S01 on CP-100E1 to "REMOTE (or LOCAL)" position b) Push-turn the Control Switch CS of DS to "OPEN" position. 2) Closing a) Set the -S01 on CP-100E1 of Bay to "LOCAL (or REMOTE)" position. b) Push-turn the Control Switch CS of DS to "CLOSE" position. ES opening and closing of Combined with DS & ES 1) Opening a) Set the -S01 on CP-100E1 of Bay to "LOCAL (or REMOTE)" position. b) Push-turn the CS of ES to "OPEN" position. 2) Closing c) Set the -S01 on CP-100E1 of Bay to "LOCAL (or REMOTE)" position. d) Push-turn the CS of ES to "CLOSE" position.			

Step	Description	Result	Verified by	Date

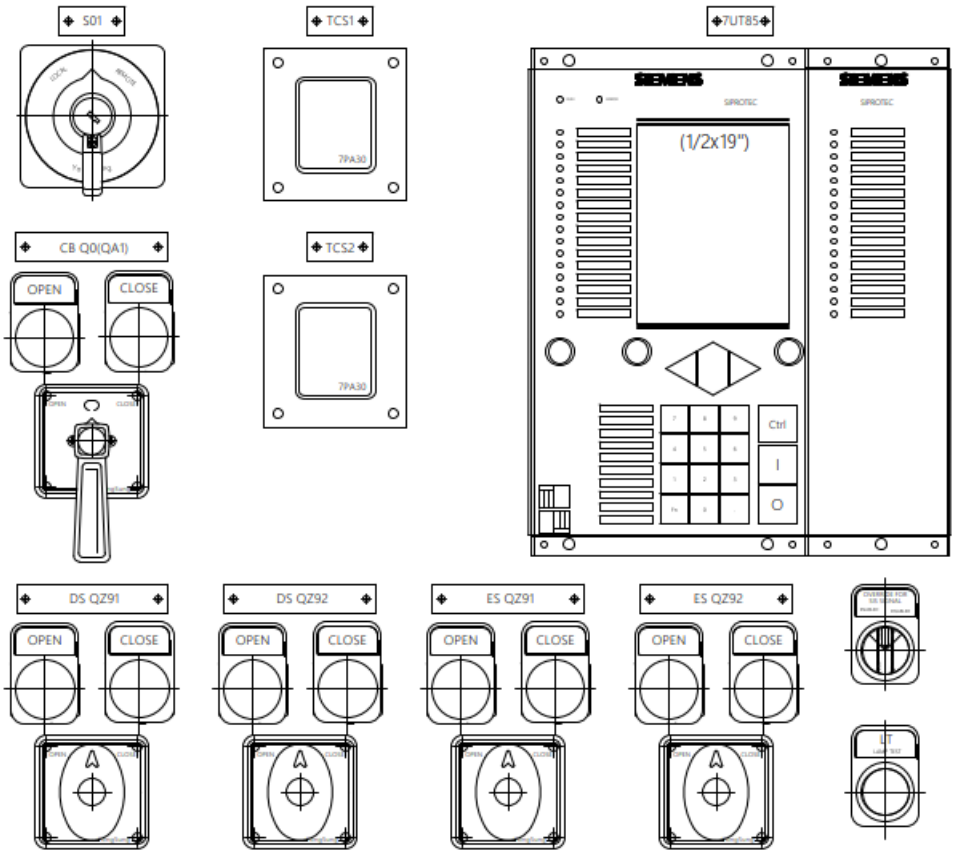


Figure 15 – extract of 66kV Switchgear (GIS) Front command layout of Control Panel CP-100E1 "CIRCUIT AND WIRING DIAGRAM" - vendor doc. 1723001595-EL-DG-00015

-S01 LOCAL/REMOTE SELECTOR KEY CAM SWITCH MANUAL RETURN TYPE

-CS1 SELECTOR SWITCH FOR **CB** Q0(QA1) SELECT SWITCH / PISTOL TYPE HANDLE / PULL AND TURN TYPE

-CS2 SELECTOR SWITCH FOR **DS** QZ92 SELECT SWITCH / EGG TYPE HANDLE / PULL AND TURN TYPE

-CS3 SELECTOR SWITCH FOR **ES** QZ92 SELECT SWITCH / EGG TYPE HANDLE / PULL AND TURN TYPE

-CS4 SELECTOR SWITCH FOR **DS** QZ91SELECT SWITCH / EGG TYPE HANDLE / PULL AND TURN TYPE

-CS5 SELECTOR SWITCH FOR **ES** QZ91SELECT SWITCH / EGG TYPE HANDLE / PULL AND TURN TYPE

GIS Operational test without 66kV and 6.6kV power supply: Open/Close CB, DS & ES with selector -S01 in Local position.

The commands for CB Q0(QA1), QZ92 ES&DS and QZ91 ES&DS are possible ONLY if the gas pressure is higher than 1st alarm pressure

Step	Description	Result	Verified by	Date
The reference is made to vendor doc. 1723001595-EL-DG-00012 "Functional logic Diagram" for the CB, ES and DS command functioning, protection logics and protection trip logics.				
Operating Test - local command without 66kV power supply				
47	Starting situation: GIS is in healthy condition, 66kV and 6.6kV power supply are not present and then: - QZ92 ES Close on Earthing position and DS is Open - QZ91 ES Close on Earthing position and DS is open - QO(QA1) CB is Open - All auxiliary circuits are powered and ready to work			
48	Local operations Place selector -S01 in LOCAL position ..... ☐			
49	CLOSE and OPEN QZ92 - Remove padlock on earthing switch ES (If any) ..... ☐ - Pull-turn selector switch CS3 to left side (open) and ES will open ..... ☐ - Pull-turn selector switch CS3 to right side (close) and ES will close ..... ☐ - Pull-turn selector switch CS2 to right side (close) and DS will close ..... ☐ - Pull-turn selector switch CS2 to left side (open) and DS will open ..... ☐ - Keep QZ92 with ES opened and DS closed to allow the next steps ..... ☐			
50	CLOSE and OPEN QZ91 - Remove padlock on earthing switch ES (If any) ..... ☐			

Step	Description	Result	Verified by	Date
	- Pull-turn selector switch CS5 to left side (open) and **ES** will open.....☐ - Pull-turn selector switch CS5 to right side (close) and **ES** will close.....☐ - Pull-turn selector switch CS4 to right side (close) and **DS** will close .....☐ - Pull-turn selector switch CS4 to left side (open) and **DS** will open .....☐ - Keep QZ91 with **ES** opened and **DS** closed to allow the next steps .....☐			
51	CLOSE and OPEN Q0(QA1) – the DSs are in open position - Pull-turn selector switch CS1 to right side (close) and **CB** will close .....☐ - Pull-turn selector switch CS1 to left side (open) and **CB** will open .....☐ - Keep **CB** opened to allow the next steps .☐			
52	CLOSE and OPEN Q0(QA1) – with **DS**s in close position - Pull-turn selector switch CS1 to right side (close) and **CB** will close .....☐ - Pull-turn selector switch CS1 to left side (open) and **CB** will open .....☐ - Keep **CB** opened and **DS**s closed to allow the next steps .....☐			
Operating Test - Remote command without 66kV power supply				
53	Remote operations from EMCS System (IEC 61850) and HV SCADA Place selector -S01 in **REMOTE** position.....☐			
54	CLOSE and OPEN QZ92			

Step	Description	Result	Verified by	Date
	- Remove padlock on earthing switch **ES** (If any).....☐ - Receiving closing signal _____ from HV SCADA **ES** will close .....☐ - Receiving opening signal _____ from HV SCADA, **ES** will open .....☐ - Receiving opening signal _____ from HV SCADA, **DS** will open .....☐ - Receiving closing signal _____ from HV SCADA **DS** will close.....☐ - Keep QZ92 with **ES** opened and **DS** closed to allow the next steps .....☐ N.B.1: in remote mode, to permit **CB** manoeuvres, **ES** must be opened, and **DS** must be closed (see Interlock Matrix Figure 7) N.B.2: HV SCADA Signals must be simulated			
55	CLOSE and OPEN QZ91 - Remove padlock on earthing switch **ES** (If any).....☐ - Receiving closing signal _____ from EMCS System **ES** will close .....☐ - Receiving opening signal _____ from EMCS System, **ES** will open .....☐ - Receiving opening signal _____ from EMCS System, **DS** will open.....☐ - Receiving closing signal _____ from EMCS System **DS** will close.....☐ - Keep QZ91 with **ES** opened and **DS** closed to allow the next steps .....☐ N.B.: in remote mode, to permit **CB** manoeuvres, ES must be opened, and DS must be closed (see Interlock Matrix Figure 7)			

Step	Description	Result	Verified by	Date
56	CLOSE and OPEN CB Q0(QA1) - Receiving closing signal _____ from EMCS System, CB will close.....☐ - Receiving opening signal _____ from EMCS System, CB will open .....☐ - Receiving closing signal _____ from EMCS System, CB will close.....☐ - Receiving opening signal _____ from HV SCADA, CB will open .....☐ N.B.1: in remote mode, to permit CB manoeuvres, ES must be opened, DS must be closed and 6.6kV main CB must be open (see Interlock Matrix Figure 7) N.B.2: HV SCADA Signals must be simulated N.B.3: In remote mode the CB closing command is possible only from EMCS System; The CB opening command is possible from EMCS System and HV Scada			

6.4.1.3 Command and Feedback test on 66/6.6kV power transformer TR-100AD1

After auxiliary energization will check the devices are installed on Power Transformer

The next steps will be performed with assistance of vendor technician and referring to related SAT Procedure.

Step	Description	Result	Verified by	Date

Auxiliaries Energization of 66/6.6kV Transformer TR-100AD1

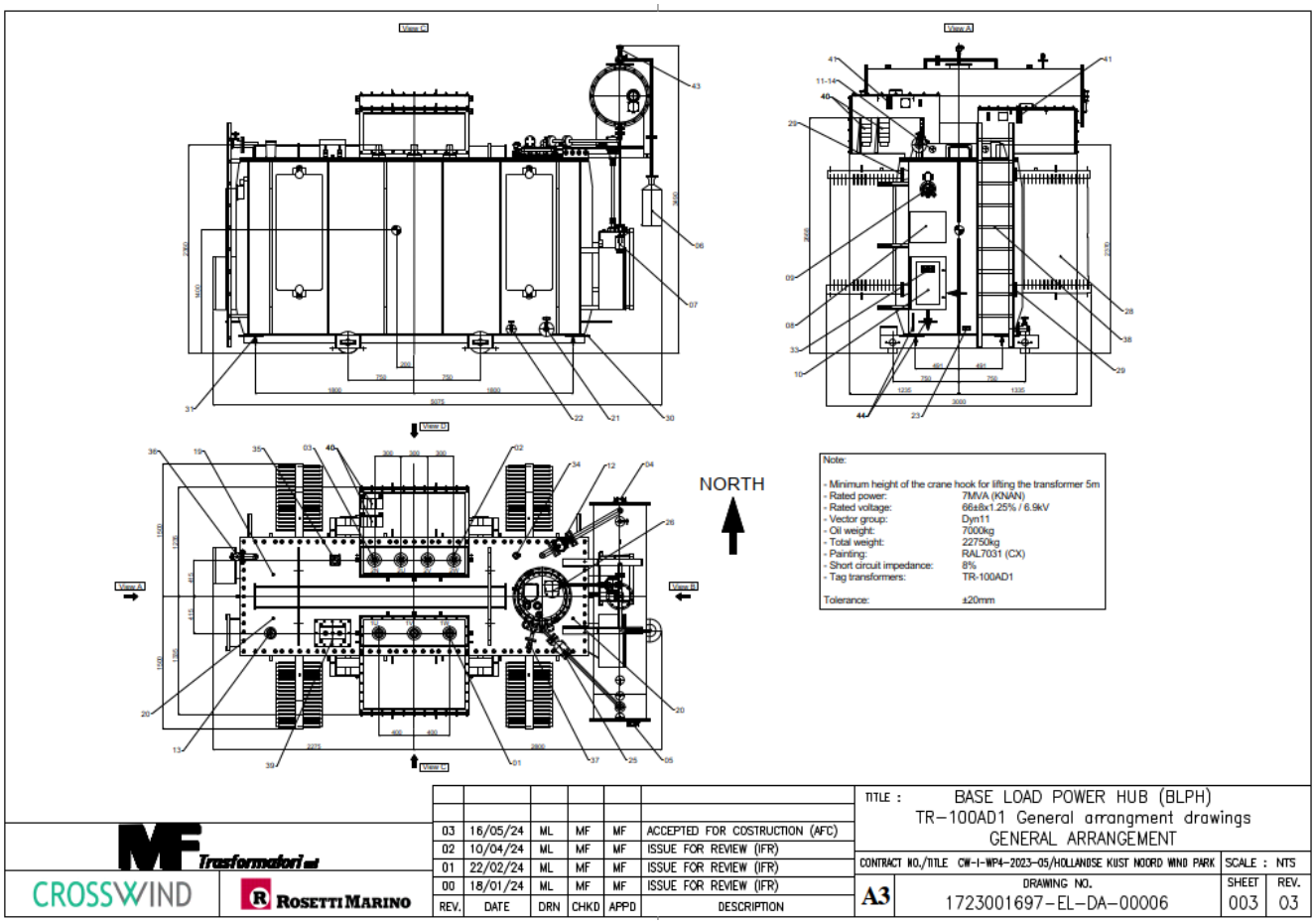


Figure 16 – extract of 66/6.6kV Power Transformer General Arrangement - vendor doc. 1723001697-EL-DA-00006 pag.003

Step	Description	Result	Verified by	Date

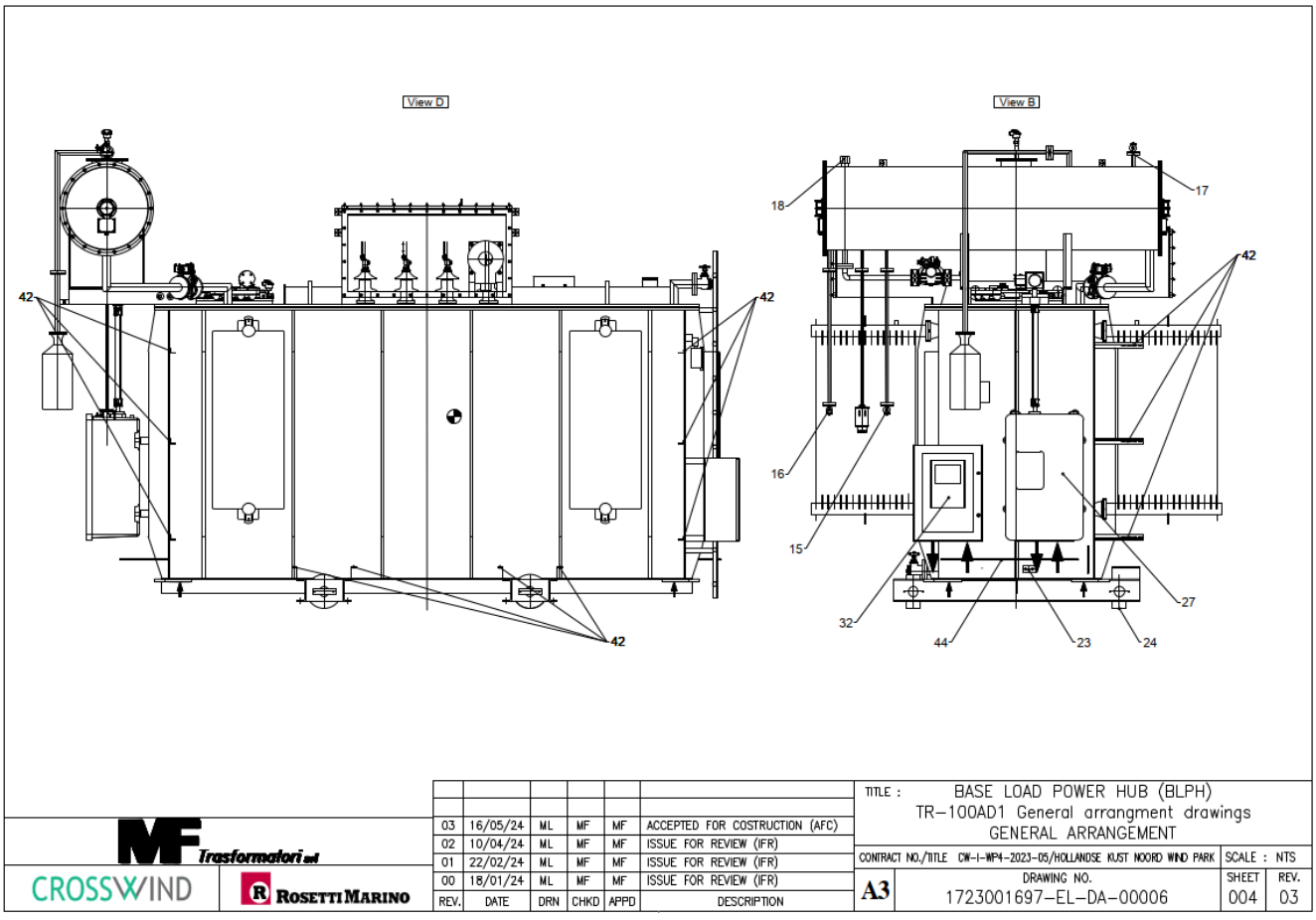


Figure 17 – extract of 66/6.6kV Power Transformer General Arrangement - vendor doc. 1723001697-EL-DA-00006 pag.004

Step	Description	Result	Verified by	Date

EQUIPMENTS LIST

ITEM	DESCRIPTION	N°	SUPPLIER	TYPE	ITEM	DESCRIPTION	N°	SUPPLIER	TYPE
01	66kV H.V. Terminals	03	NEXANS	R900AR-8-L	23	Earthing terminal	02	MF	Stainless steel plate 90x50 with n.2 holes MA16 - distance 50
02	6.9kV H.V. Terminals with extention copper bars	03	EMC	UNEL 12kV/630A	24	Bi-directional wheels	04	MF	Ø250x100
03	6.9kV H.V. Neutral Terminal	01	EMC	UNEL 12kV/630A	25	Protection relay with 1contact - OLTC	01	MR	RS2001
04	Oil level indicator with 2 contacts - TRANSFO	01	COMEM	LB14XON	26	On Load Tap Changer	01	MR	VACUTAP VV III 250D-76-10 19 3W
05	Oil level indicator with 2 contacts - OLTC	01	COMEM	LA14XON	27	Motor Drive Unit (MDU) - OLTC Panel - CP-100E2	01	MR	ED100
06	Dehydrating breather - TRANSFO	01	COMEM	ESDB 14C	28	Cooling elements	04	WARM	17 EL - Int. 1300
07	Dehydrating breather - OLTC	01	COMEM	EM1DB	29	Cooling element valves	08	ETI	WU080
08	Rating plate	01	MF		30	Haulage lugs	04	MF	Ø50
09	Oil thermometer with 2 contacts	01	TERMAF	Type A - DS150	31	Jacking pads	04	MF	Ø150x10
10	Auxiliary panel - Protection devices - CP-100E4	01	MF	Stainless steel - IP65	32	AVR control panel - CP-100E3	01	MF	Stainless steel - IP65
11	Lifting eyebolts for removable part	04	MF	Ø70	33	Winding Temperature Indicator	01	TECSYSTEM	NT133/3
12	Buchholz relay with 2 contacts	01	COMEM	BR50	34	Thermal sensor for WTI	01	TECSYSTEM	PTO
13	Pressure relay with 1 contact	01	QUALITROL	900-FLA-T-NO-STD	35	Current transformer signal for WTI	01	ETI	SM2-X
14	Lifting eyebolts transformer	04	MF	Ø70	36	Oil treatment valve - TRANSFO	01	MF	DN50-PN10
15	Conservator oil drain valve - TRANSFO	01	BARBERI	DN15-PN10	37	Oil treatment valve - OLTC	01	MR	DN25-PN10
16	Conservator oil drain valve - OLTC	01	BARBERI	DN15-PN10	38	Ladder	01	MF	
17	Conservator air release valve - TRANSFO	01	BARBERI	DN15-PN10	39	Core earthing terminals	02	MF	
18	Conservator air release cap - OLTC	01	MF	2"	40	Current transformer	02	STE	250/1A - 5P20 - 5VA
19	Thermal pocket for pos. 09	01	MF	3/4"	41	Heating element with thermostat	02	MF	100W
20	Thermal pocket (spare)	02	MF	3/4"	42	Support cable duct	06	MF	
21	Oil drain valve - TRANSFO	01	BARBERI	DN50-PN10	43	Diaphragm failure device with alarm contact	01	PRONAL	STP-BBR
22	Oil sampling valve - TRANSFO	01	BARBERI	DN15-PN10	44	Support auxiliary cables	02	MF	

Figure 18 – extract of 66/6.6kV Power Transformer General Arrangement - vendor doc. 1723001697-EL-DA-00006 pag.005

57	Verify and confirm the power presence from DP-200D1 230V - Close MCB Q33 ..... ☐			
58	Verify and confirm the power presence from DP-200D1 230V - Close MCB Q32 ..... ☐			
59	Verify and confirm the power presence from DP-200D1 230V - Close MCB Q31 ..... ☐			
60	Verify and confirm all transformer control panel are powered and ready to operate - CP-100E2 .....☐ - CP-100E3 .....☐ - CP-100E4 .....☐			

Step	Description	Result	Verified by	Date

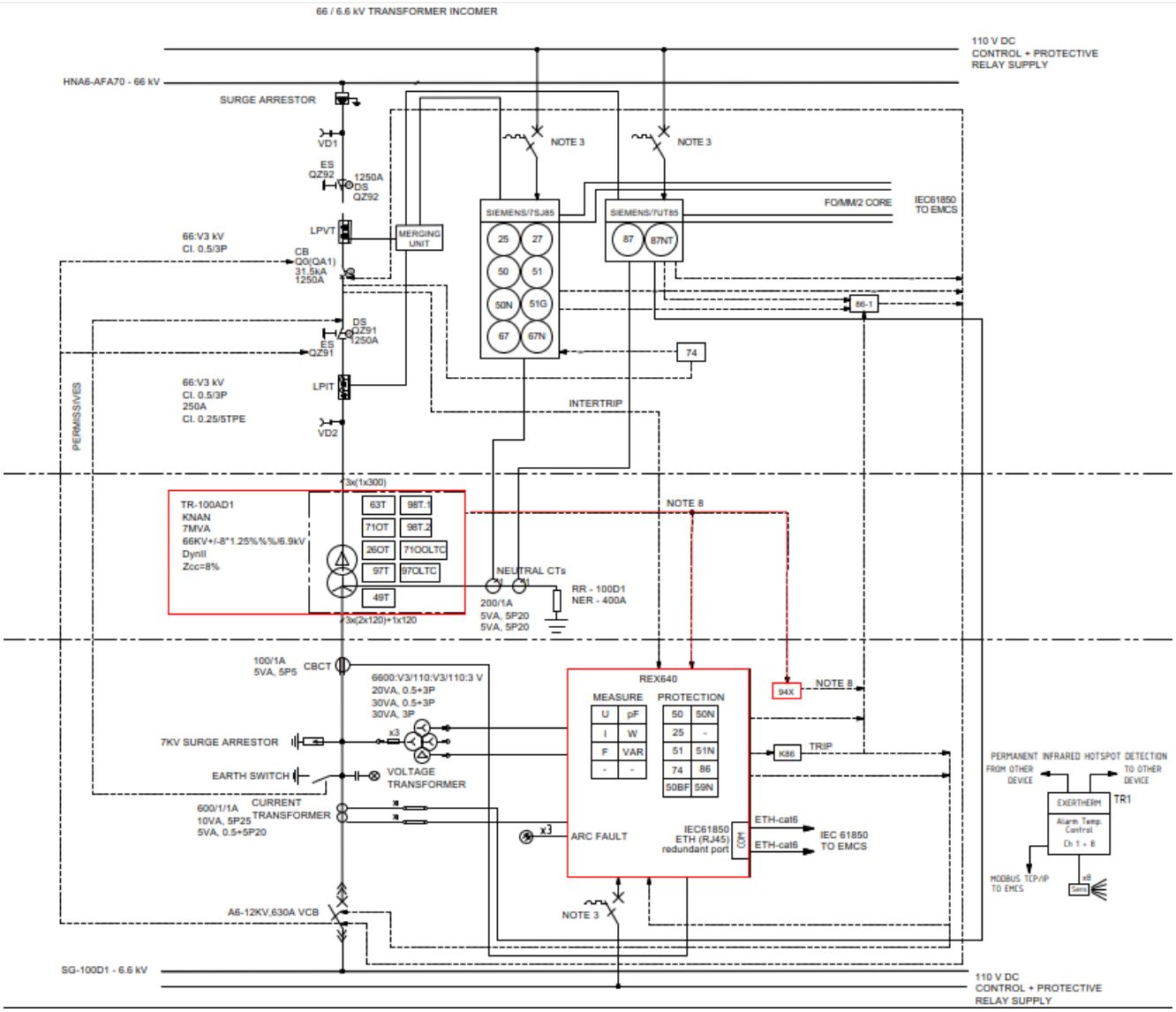
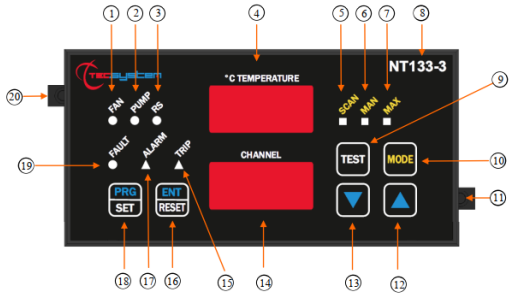


Figure 19 – Extract from 123A90-DDL-EL-DG-20014 ELECTRICAL CONTROL, PROTECTION AND METERING DIAGRAMS 66 / 6.6 kV TRANSFORMER INCOMER

61	Verify and confirm that on 66/6.6kV Power Transformer TR-100AD1 are installed the following protective devices. The transformer alarm is wired on SG-100D1 Unit A6 Protection Relay			

Step	Description	Result	Verified by	Date
	- 97T BUCHHOLZ RELAY .....☐ - 26OT OIL THERMOMETER .....☐ - 71OT OIL LEVEL INDICATOR.....☐ - 63T PRESSURE RELAY..... - 28T.1 & 27T.2 THERMAL SENSOR PT100 FOR WTI .....☐ - 49T WINDING TEMPERATURE INDICATOR.....☐ - 98T.1 BLADDER RUPTURE RELAY .....☐ - 98T.2 THE SELF DEHYDRATING BREATHER .....☐ Trip signals are instead wired to **94X INTERPOSING RELAYS**: - 94B BUCHHOLZ TRIP AUX. RELAY.....☐ - 94L OIL LEVEL AUXILIARY RELAY.....☐ - 94OT OIL TEMPERATURE TRIP AUXILIARY RELAY.....☐ - 94WT WINDING TEMPERATURE TRIP AUXILIARY RELAY.....☐ - 94P PRESSURE RELIEF DEVICE TRIP AUXILIARY RELAY.....☐ - 94X TRANSFORMER PROTECTION TRIP AUXILIARY RELAY.....☐			
62	49T WINDING TEMPERATURE INDICATOR In front of control panel is installed TEC SYSTEM temperature relay. Pushing UP (12) and DOWN (13) button read the winding temperature: - T1 .....°C - T2.....°C - T3.....°C			

Step	Description	Result	Verified by	Date
	FRONT PANEL  1MN0150 REV. 0 1) FAN led (yellow) — 11) Fixing block 2) PUMP led (yellow) — 12) UP key 3) RS led (green) — 13) DOWN key 4) Temperature display — 14) Channel display 5) SCAN led (green) — 15) TRIP led (red) 6) MAN led (yellow) — 16) Enter / Reset key 7) MAX led (red) — 17) ALARM led (red) 8) Control unit series — 18) Programming / Set key 9) Test key — 19) FAULT led (red) 10) Mode key — 20) Fixing block			
63	ON LOAD TAP CHANGER On-load tap-changers are used to adjust the transmission ratio of transformers without interrupting the load flow. This makes it possible to compensate for aspects such as fluctuations in voltage occurring in the power transmission grid. For this purpose, on-load tap-changers are fitted in transformers and connected to the active part of the transformer. A motor-drive unit which receives a control impulse (e.g. from a voltage regulator) changes the operating position of the on-load tap-changer, and the transformer's transmission ratio is adapted to the prevailing operating requirements as a result. The position of TAP CHANGER is driven by EMCS System. The TAP CHANGER test has been performed to Transformer Site Acceptance Test with technical assistance of MF TRASFORMATORI Technician and EMCS System operator.			

Step	Description	Result	Verified by	Date
	- Verify and confirm the TAP CHANGER test has been performed .....☐ - Verify and confirm that the operating test of the On Load Tap Changer with voltage regulation (simulated) from EMCS has been performed.....☐			
64	97 OLTC PROTECTION RELAY ON LOAD TAP CHANGER and 71 OLTC OIL LEVEL INDICATOR ON LOAD TAP CHANGER The protective relay is looped into the circuit breaker tripping circuit. It is tripped when the specified speed of flow from the on-load tap-changer head to the oil conservator is exceeded due to a fault. The flowing insulating fluid actuates the flap valve which tips over into position OFF. The contact in the dry-reed magnetic switch is thereby actuated, the circuit breakers are tripped, and the transformer is de-energized. The protective relay is a component of an on-load tap-changer filled with insulating fluid and its properties conform to the respective applicable version of IEC publication 60214-1. The TAP CHANGER test is performed to Transformer Site Acceptance Test with technical assistance of MF TRASFORMATORI Technician - Verify and confirm the 97OLTC protection has been tested .....☐ - Verify and confirm the 71OOLTC protection has been tested .....☐			

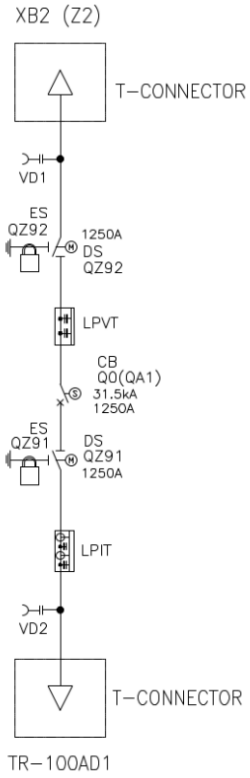
6.4.1.4 Operational test on HNA6-AFA70 GIS with main power supply from 66kV network

In the following steps, the closing and opening commands will be checked, according to the "close/open interlock matrix of CB, DS & ES" shown in Figure 14.

OPERATION FROM LOCAL CONTROL PANEL, FROM EMCS SYSTEM AND HV SCADA

Operation of CB, DS and ES is able to be performed at Local position and/or Remote position by the Change-Over Switch (KEY LOCKABLE SWITCH) -S01 (see Figure 15).

The system shall be tested with selector -S01 in REMOTE position

Step	Description	Result	Verified by	Date
GIS System verification to prepare the 66kV power supply receiving				
				
	Figure 20 – extract of 66kV Switchgear (GIS) Single Line Diagram - vendor doc. 1723001595-EL-DG-00013			
65	All personnel have been duly notified during dedicated daily SIMOPS and toolbox talk meetings			

Step	Description	Result	Verified by	Date
	about the tests with 66kV power supply, and moreover: - All HV SCADA operator are in proper position and ready to operate ..... ☐ - All EMCS operator are in proper position and ready to operate..... ☐ - All technician in platform are in proper and in healthy position..... ☐			
66	Ensure that all override, jumper, or simulation hardware and software used during the previous tests without 66kV power supply has been removed.			
67	GIS Starting condition: - ES QZ92 closed..... ☐ - DS QZ92 opened..... ☐ - ES QZ91 closed..... ☐ - DS QZ91 opened..... ☐ - CB Q0(QA1) opened ..... ☐ SG-100D1 6.6kV Switchboard - Earthing Switch BGE Unit A6 opened ..... ☐ - Main Breaker QM unit A6 opened ..... ☐ TR-100AD1 - CP-100E2 is energized ..... ☐ - CP-100E3 is energized..... ☐ - CP-100E4 is energized..... ☐			
68	Place selector -S01 in REMOTE position - Send the communication to HV SCADA Operator "System in Remote condition"... ☐ - Send the communication to EMCS Operator "System in Remote condition"... ☐			

Step	Description	Result	Verified by	Date

❑ HNA6–AFA70 INTERLOCK TABLE

CLOSE/OPEN INTERLOCK MATRIX OF CB,DS & ES.										REMARK
COMMAND	66kV GIS					6.6KV SWG.		COMMAND SOURCE		OTHER EXTERNAL INTERLOCKS	
	Q0(QA1)	DS(QZ92)	DS(QZ91)	ES(QZ92)	ES(QZ91)	CB	ES	LOCAL	REMOTE		
CB Q0(QA1) (CLOSE)		C	C			O		X	X	GAS PRESSURE IS NOT LOWER THAN 1'ST ALARM PRESSURE CLOSING SPRING NOT DISCHARGED	SERVICE
		O	O			O		X		GAS PRESSURE IS NOT LOWER THAN 1'ST ALARM PRESSURE	TEST
CB(Q0) (OPEN)								X	X	GAS PRESSURE IS NOT LOWER THAN MINIMUM PRESSURE	SERVICE
										GAS PRESSURE IS NOT LOWER THAN MINIMUM PRESSURE	BY PROTECTION RELAY
DS(QZ92) (CLOSE/OPEN)	O			(O)				X	X		SERVICE
DS(QZ91) (CLOSE)	O				(O)		O	X	X		SERVICE
DS(QZ91) (OPEN)	O				(O)			X	X		SERVICE
ES(QZ92) (CLOSE)	O	(O)						X	X	LINE VD RELAY EXCITED	SERVICE
ES(QZ92) (OPEN)	O	(O)						X	X		SERVICE
ES(QZ91) (CLOSE)	O		(O)			O		X	X		SERVICE
ES(QZ91) (OPEN)	O		(O)					X	X		SERVICE

C : CLOSE
O : OPEN
( ) : MECHANICAL INTERLOCK

Figure 21 – GIS Interlock Matrix - vendor doc. 1723001595-EL-DG-00017

69	Wait for ES QZ92 opening command from HV SCADA Operator - Send radio feedback that the ES QZ92 has been opened to the HV SCADA Operator. Ask him if the opening feedback has been arrived ..... ☐			
70	Wait communication from HV SCADA operator that the power supply is arriving from 66kV network - Send radio message "ready to receive 66kV" to the HV SCADA operator ..... ☐			

Step	Description	Result	Verified by	Date
	- Receive countdown from the HV SCADA operator and observe the consequent closing command of the 66kV network.... ☐ - Voltage Detector VD1 Lamps are ON .....☐			
71	Wait DS QZ92 closing command from HV SCADA Operator - Send radio feedback for DS QZ92 that is closed to HV SCADA Operator. Ask him if the closing feedback has been arrived .....☐ - Confirm Voltage & Frequency reading to each phase on EMCS System .....☐ - Confirm Voltage & Frequency reading to each phase on HV SCADA .....☐ - Confirm Voltage & Frequency reading to each phase on control panel CP-100E1 protection relay 7SJ85 .....☐			
72	Wait ES QZ91 opening command from EMCS Operator - Send radio feedback that the ES QZ91 has been opened to the EMCS Operator. Ask him if the opening feedback has been arrived .....☐			
73	Wait DS QZ91 closing command from the EMCS Operator - Send radio feedback that the DS QZ91is closed to EMCS Operator. Ask him if the closing feedback has been arrived .....☐			
In the next steps, the CB Q0(QA1) will be closed, the 66/6.6kV power transformer TR-100AD1 will be powered on. The 6.6kV power supply will arrive at the Unit A6 incomer of the SG-100D1 switchboard. The 6.6kV Switchboard SG-100N1 is ready to receive the power supply from transformer: - The Earthing Switch BGE on Unit A6 is already opened - The main breaker QM on Unit A6 is opened				

Step	Description	Result	Verified by	Date
- All switchboard auxiliary circuits are energized				
74	Wait CB Q0(QA1) QZ91 closing command from the EMCS Operator - Send radio feedback that the CB Q0(QA1) is closed to EMCS Operator. Ask him if the closing feedback has been arrived .....☐ - Voltage Detector VD2 Lamps are ON .....☐			
75	The power transformer TR-100AD1 is energized from 66kV GIS. On EMCS: - Verify the transformer winding temperature on Control panel CP-100E4 .....☐ - Verify the transformer winding temperature on EMCS .....☐			
76	Verify and confirm that the EMCS is managing the On Load Tap Changer properly. - Without load .....☐			
77	The Unit A6 of 6.6kV Switchboard SG-100D1 is energized. - Voltage detector lamps C1 are on .....☐			
78	On Unit A6 protection relay FP1 verify and confirm the Phases voltage & frequency readings: - L1 .....(6.6) kV - L2 .....(6.6) kV - L3 .....(6.6) kV - Frequency .....(50) Hz			
To begin the process of energized the entire 6.6kV switchboard, refer to OTP 123A90-PML-COM-PRO-03046.				

6.4.2 OTP OFFSHORE SITE - Tests Notes and Remarks

6.4.3 OTP OFFSHORE SITE Tests Certifying Authority Table of Attendances

Name and Surname	Certifying Authority	Position	Signature

6.4.4 OTP OFFSHORE SITE Tests Final Signatures and Company Acceptance

Name and Surname	Certifying Authority	Position	Signature

6.5 POST TEST CONDITIONS

The electrical contacts which were disconnected for the testing purposes must be reconnected.

After functional tests have been completed, system / sub-systems are left in healthy and safety condition and that they are operational.

6.6 REINSTATEMENT AND PRESERVATION TASKS

Generally, the system/ sub-system shall be reinstated at its initial condition; and the following activities must be carried out as minimum:

- all inhibition done for the test shall be removed (as per Inhibit / Override List)
- all equipment/devices shall be returned in healthy functional conditions.

7 APPENDICES

7.1 Vendor SAT Procedure

7.1.1 The GIS Vendor SAT procedure is a document number 1723001595-QC-PRO-00028

7.1.2 The Transformer Vendor SAT procedure is a document number 1723001697-QC-PRO-00016

7.2 Proverlis Summary Reports

7.3 Equipment Related Technical Queries

7.4 As built Documentation

After the commissioning phases, when the tests will be completed, all marked up as built documentation of the 66KV SWBD will be issued:

- General arrangement 1723002197-EL-DA-00006
- Wiring diagram A6 1723002197-EL-DG-00015
- Wiring diagram A5 1723002197-EL-DG-00016
- Wiring diagram A3 1723002197-EL-DG-00017
- Wiring diagram A1 1723002197-EL-DG-00018
- Wiring diagram A7 1723002197-EL-DG-00019
- Wiring diagram A2 1723002197-EL-DG-00020
- Wiring diagram A4 1723002197-EL-DG-00021

7.5 Management of Change – Summary Table of Tasks and Details of Affected Related Documentation

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03045