



**Resalat Oil Field Development Project
Phase 1 (EPC-EPD)**



Contract
No.

I/O list for PMS

Class

2

5365

Pr. Code
LRSL

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I/O List for PMS

| | | | | | | | | |
|-------------|-------------|---------------------------|--------------|-----------|---------------|----------------|--------------|----------------------|
| | | | | | <i>S.S.</i> | <i>A.S.</i> | <i>M.A.</i> | |
| 02 | 28-Jul-21 | Approved for Construction | IOEC | - | S.Saffari | A.Samadi | M.Aghaei | - |
| 01 | 12-Jun-21 | Issued for Approval | IOEC | - | S.Saffari | A.Samadi | M.Aghaei | - |
| 00 | 17-May-21 | Issued for Comment | IOEC | - | S.Saffari | A.Samadi | M.Aghaei | - |
| REV. | Date | Purpose of Issue | ORIG. | BY | PREP'D | CHECK'D | APP'D | COMPANY APP'D |



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1. INTRODUCTION

1.1. Development Overview

The Resalat Field previously known as Rakhsh Field, is located in the Persian Gulf, some 80 km to the South of Lavan Island, in water depth of 65-75 meters. The facilities which were originally developed in 1968 have sustained some damage due to the Iran/Iraq war and adverse climate conditions thereafter.

To increase oil production capacity from this field (adding 12,000 stock barrels per day to current production), Iranian Offshore Oil Company (IOOC) has defined new project which includes Engineering, Drilling, Procurement, Construction for following items:

- New satellite Wellhead Platform (WHP1) with totally nine (9) conductor slots.
- Development and renovation of Existing offshore complex consist of new power generation, control system, HVAC, Electrical /control room, electrical panels (LV &MV), process & utility piping, and all necessary activities which shall be done for connection to existing facilities (Tie in requirements).
- Drilling of two new production wells in R1 and three wells in WHP1 platform and Re-entry and work-over of one existing well in R1 platform.
- One 10” productions submarine pipeline from WHP1 to PP and a single submarine cable (power and data) from SP to WHP1
- Inspection, Strengthening, Modification and Repair of existing R1 complex Jackets and topsides and replacement of boatlanding and Barge Bumpers.

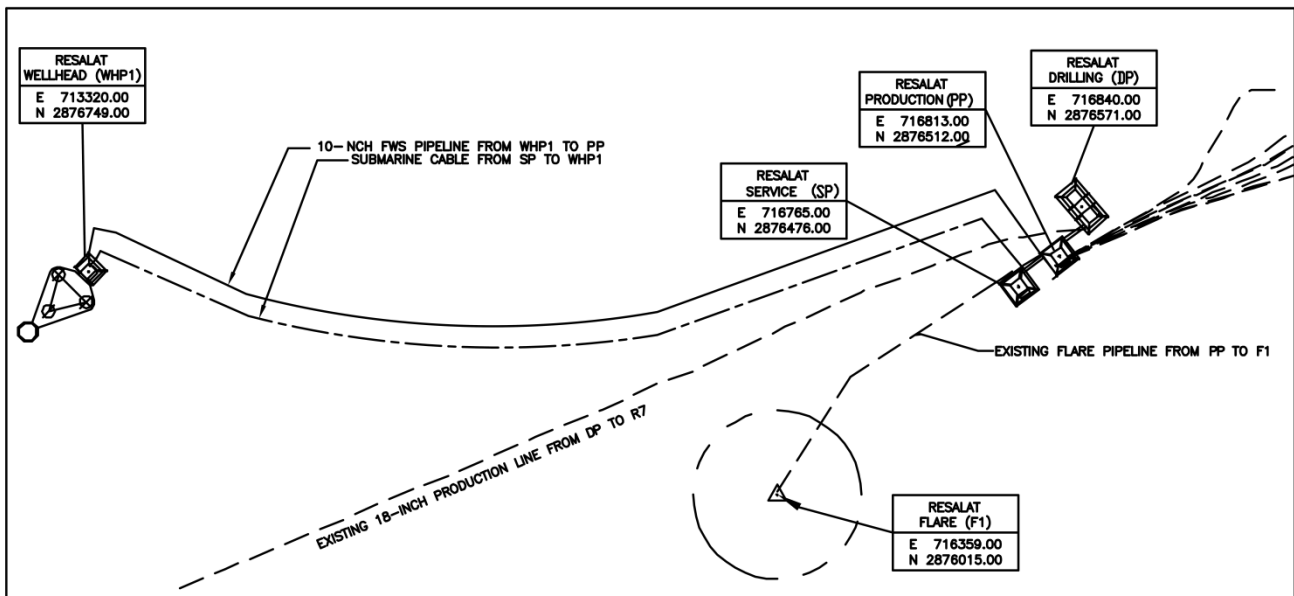


Figure 1: Resalat Development Field Layout (Datum ED 77, Zone 39, Cent. Meridian 51° East)



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1.2. Purpose of Scope

The purpose of this document is to present IO List of Power Management System.

1.3. Definitions

| | |
|-----------------------|---|
| PROJECT | Resalat Oil Field Development – Phase 1 |
| COMPANY | Iranian Offshore Oil Company (IOOC) |
| CONTRACTOR | Consortium of Iranian Offshore Engineering and Construction Company (IOEC) and Intelligent Solutions Inc. (ISI) |
| SUB-CONTRACTOR | Tehran Raymand Consulting Engineers (TRCE) |
| PURCHASER | Any firm who buy services, material and/or equipment for execution of the project within a dedicated contract. |
| SUPPLIER | Any vendor, manufacturer who supply any Service, Material or Equipment for the project |
| SHALL | Refer to a mandatory requirement |
| SHOULD | Refer to a recommendation |
| MAY | Refer to one acceptable course of action |

2. REFERENCE DOCUMENTS

| | |
|--------------------|-------------------------------------|
| LRSL-000-EL-DB-603 | Electrical Design Criteria |
| LRSL-000-PR-DB-706 | Process Design Basis |
| LRSL-R1X-EL-SD-007 | Overall Single Line Diagram |
| LRSL-R1X-EL-SM-002 | Schematic diagram for LV Switchgear |
| LRSL-R1X-EL-SM-001 | Schematic diagram for MV Switchgear |
| LRSL-R1X-EL-BD-001 | Architectural block diagram for PMS |
| LRSL-000-EL-SP-622 | Specification for PMS |
| LRSL-R1X-EL-LD-001 | ATS Logic Block Diagram |



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3. CLIMATE CONDITION

Electrical equipment shall be designed in due consideration of the geographical, meteorological and other site-specific conditions as described in the Process Design Basis (LRSL-000-PR-DB-706) and Electrical Design Criteria (LRSL-000-EL-DB-603).

4. IO LIST OF POWR MANAGEMENT SYSTEM

IO list of PMS has been presented in table 1.



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Table 1 – IO List of PMS

GENERATOR SIGNAL LIST (F21)

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|---------------------------------------|------|--|---------------------|-----|-----|-------------|------------|--------|
| Generator Unit Control Panel | | | | | | | | |
| 1 | 02 | Generator Local(Maintenance)/Remote (on LCP) | UCP | PMS | DI | Status | Modbus RTU | |
| 2 | 01 | Generator Local/Remote (on UCP) | UCP | PMS | DI | Status | Modbus RTU | |
| 3 | 02 | Generator Auto/Manual (on UCP) | UCP | PMS | DI | Status | Modbus RTU | |
| 4 | 01 | Generator Ready to Start | UCP | PMS | DI | Status | Modbus RTU | |
| 5 | 02 | Generator Ready to Load | UCP | PMS | DI | Status | Modbus RTU | |
| 6 | 01 | Generator ON | UCP | PMS | DI | Status | Modbus RTU | |
| 7 | 01 | Generator OFF | UCP | PMS | DI | Status | Modbus RTU | |
| 8 | 01 | Generator Isochronous/Droop mode | UCP | PMS | DI | Status | Modbus RTU | |
| 9 | 01 | Generator Master/Slave Status | UCP | PMS | DI | Status | Modbus RTU | |
| 10 | 01 | Generator Alarm | UCP | PMS | DI | Alarm | Modbus RTU | |
| 11 | 01 | Generator Protection Function | UCP | PMS | DI | Alarm-Relay | Modbus RTU | |
| 12 | 01 | A/V/W/VAR/Hz./P.F./ Wh/VARh | UCP | PMS | AI | Measurement | Modbus RTU | |
| 13 | 01 | Generator Start | PMS | UCP | DO | Command | Hardwire | |
| 14 | 01 | Generator Stop | PMS | UCP | DO | Command | Hardwire | |
| GENERATOR PROTECTION PANEL | | | | | | | | |
| 15 | 00 | Generator Trip | Protection Panel | PMS | DI | Alarm | Hardwire | |
| 16 | 02 | ESD Trip | Protection Panel | PMS | DI | Alarm | Hardwire | |
| GENERATORS SYNCHRONIZING PANEL | | | | | | | | |
| 17 | 02 | Synchronizing Local/Remote | Synchronizing Panel | PMS | DI | Status | Hardwire | |
| 18 | 00 | Synchronizing Auto/Manual (on Synch. panel) | Synchronizing Panel | PMS | DI | Status | Hardwire | |
| 19 | 02 | Automatic Synchronizing in Progress | Synchronizing Panel | PMS | DI | Status | Hardwire | |
| 20 | 00 | Synch. OK | Synchronizing Panel | PMS | DI | Status | Hardwire | |



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GENERATOR SIGNAL LIST (F21)

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|------|------|---------------------------------------|----------------|--------------------------------|---------------|--------------------|---------------------|--------|
| 21 | 02 | Generator CB Synch Request | PMS | Synchronizing Panel | DO | Command | Hardwire | |
| 22 | 02 | Generator CB Synch Cancel | PMS | Synchronizing Panel | DO | Command | Hardwire | |
| 23 | 02 | Generator CB Close Command | PMS | Synchronizing Panel | DO | Command | Hardwire | |



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6.6kV SWICHGEAR (LRS�-11-MC-0301) SIGNAL LIST

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|-----------------------|------|---|-----------------|-----------------|-----|-------------|------------|--------|
| INCOMING FEEDER (F22) | | | | | | | | |
| 1 | 01 | CB Open | LRS�-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 2 | 01 | CB Close | LRS�-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 3 | 01 | CB in Test | LRS�-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 4 | 01 | CB in Service | LRS�-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 5 | 01 | ES Open | LRS�-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 6 | 01 | ES Close | LRS�-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 7 | 01 | CB available | LRS�-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 8 | 01 | CB lockout reset operated | LRS�-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 9 | 01 | CB Trip (Lock out operated) | LRS�-11-MC-0301 | PMS | DI | Alarm | Hardwire | |
| 10 | 02 | ESD Trip | LRS�-11-MC-0301 | PMS | DI | Alarm | Hardwire | |
| 11 | 01 | Loss of switchgear control supply (110VDC) | LRS�-11-MC-0301 | PMS | DI | Alarm | Hardwire | |
| 12 | 01 | Loss of switchgear auxiliary supply (230VAC) | LRS�-11-MC-0301 | PMS | DI | Alarm | Hardwire | |
| 13 | 01 | Protection Function Relay | LRS�-11-MC-0301 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 14 | 01 | Synch. Check | LRS�-11-MC-0301 | PMS | DI | Alarm-Rely | Modbus RTU | |
| 15 | 01 | A/V/W/VAR/Hz./P.F./ Wh/VARh | LRS�-11-MC-0301 | PMS | AI | Measurement | Modbus RTU | |
| 16 | 01 | CB Open Command | PMS | LRS�-11-MC-0301 | DO | Command | Hardwire | (NOTE) |

NOTE: Manual CB Close command of incomings are not permitted from PMS and are only possible from Synchronizing panel of generators.



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6.6kV SWICHGEAR (LRSL-11-MC-0301) SIGNAL LIST

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|----------------------|------|---|-----------------|-----|-----|-------------|------------|-----------------------------------|
| BUS TIE (F23) | | | | | | | | |
| 1 | 01 | CB Open | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 2 | 01 | CB Close | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 3 | 01 | CB in Test | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 4 | 01 | CB in Service | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 5 | 01 | ES BUS A Open | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 6 | 01 | ES BUS B Open | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 7 | 01 | ES BUS A Close | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 8 | 01 | ES BUS B Close | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 9 | 01 | CB available | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 10 | 01 | CB lockout reset operated | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 11 | 02 | Local/Remote (on Switchgear) | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 12 | 01 | CB Trip (Lock out operated) | LRSL-11-MC-0301 | PMS | DI | Alarm | Hardwire | |
| 13 | 01 | Loss of switchgear control supply (110VDC) | LRSL-11-MC-0301 | PMS | DI | Alarm | Hardwire | |
| 14 | 01 | Loss of switchgear auxiliary supply (230VAC) | LRSL-11-MC-0301 | PMS | DI | Alarm | Hardwire | |
| 15 | 01 | Protection Function Relay | LRSL-11-MC-0301 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 16 | 01 | Busbar A Protection Function Relay | LRSL-11-MC-0301 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 17 | 01 | Busbar B Protection Function Relay | LRSL-11-MC-0301 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 18 | 01 | Synch. Check | LRSL-11-MC-0301 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 19 | 01 | Current | LRSL-11-MC-0301 | PMS | AI | Measurement | Modbus RTU | |
| 20 | 01 | V, Hz Busbar A | LRSL-11-MC-0301 | PMS | AI | Measurement | Modbus RTU | |
| 21 | 01 | V, Hz Busbar B | LRSL-11-MC-0301 | PMS | AI | Measurement | Modbus RTU | |
| 22 | 01 | Voltage Bus A, Voltage Bus B | LRSL-11-MC-0301 | PMS | AI | Measurement | Hardwire | For under frequency load shedding |



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6.6kV SWICHGEAR (LRS�-11-MC-0301) SIGNAL LIST

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|------|------|--------------------|------|-----------------|-----|---------|----------|--------|
| 23 | 01 | CB Close Command | PMS | LRS�-11-MC-0301 | DO | Command | Hardwire | |
| 24 | 01 | CB Open Command | PMS | LRS�-11-MC-0301 | DO | Command | Hardwire | |



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6.6kV SWICHGEAR (LRSL-11-MC-0301) SIGNAL LIST

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|------------------------------------|------|--|-----------------|-----------------|-----|-------------|------------|-------------------------------|
| PLAIN OUTGOING FEEDER (F24) | | | | | | | | |
| 1 | 01 | CB Open | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 2 | 01 | CB Close | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 3 | 01 | CB in Test | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 4 | 01 | CB in Service | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 5 | 01 | ES Open | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 6 | 01 | ES Close | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 7 | 01 | CB available | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 8 | 01 | CB lockout reset operated | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 9 | 01 | Local/Remote | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 10 | 01 | CB Trip (Lock out operated) | LRSL-11-MC-0301 | PMS | DI | Alarm | Hardwire | |
| 11 | 01 | Loss of switchgear control supply (110VDC) | LRSL-11-MC-0301 | PMS | DI | Alarm | Hardwire | |
| 12 | 01 | Loss of switchgear auxiliary supply (230VAC) | LRSL-11-MC-0301 | PMS | DI | Alarm | Hardwire | |
| 13 | 01 | Protection Function Relay | LRSL-11-MC-0301 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 14 | 01 | A/V/W/VAR/Hz./P.F./ Wh/VARh | LRSL-11-MC-0301 | PMS | AI | Measurement | Modbus RTU | |
| 15 | 01 | CB Close Command | PMS | LRSL-11-MC-0301 | DO | Command | Hardwire | |
| 16 | 01 | CB Open Command | PMS | LRSL-11-MC-0301 | DO | Command | Hardwire | |
| 17 | 01 | WHP1 6.6kV switchgear incoming CB open | PMS | LRSL-11-MC-0301 | DO | Interlock | Hardwire | Interlock between switchgears |
| 18 | 01 | WHP1 6.6kV switchgear incoming ES open | PMS | LRSL-11-MC-0301 | DO | Interlock | Hardwire | Interlock between switchgears |



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6.6kV SWITCHGEAR (LRSL-11-MC-0301) SIGNAL LIST

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|---|------|--|-----------------|-----------------|-----|-------------|------------|--------|
| SEALED TRANSFORMER OUTGOING FEEDER (F25) | | | | | | | | |
| 1 | 01 | CB Open | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 2 | 01 | CB Close | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 3 | 01 | CB in Test | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 4 | 01 | CB in Service | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 5 | 01 | ES Open | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 6 | 01 | ES Close | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 7 | 01 | CB available | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 8 | 01 | CB lockout reset operated | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 9 | 01 | Local/Remote | LRSL-11-MC-0301 | PMS | DI | Status | Hardwire | |
| 10 | 01 | CB Trip (Lock out operated) | LRSL-11-MC-0301 | PMS | DI | Alarm | Hardwire | |
| 11 | 01 | Loss of switchgear control supply (110VDC) | LRSL-11-MC-0301 | PMS | DI | Alarm | Hardwire | |
| 12 | 01 | Loss of switchgear auxiliary supply (230VAC) | LRSL-11-MC-0301 | PMS | DI | Alarm | Hardwire | |
| 13 | 01 | Trans. Winding Temp. Alarm | LRSL-11-MC-0301 | PMS | DI | Alarm | Hardwire | |
| 14 | 01 | Trans. Winding Temp. Trip | LRSL-11-MC-0301 | PMS | DI | Alarm | Hardwire | |
| 15 | 01 | Trans. Oil Temp. Alarm | LRSL-11-MC-0301 | PMS | DI | Alarm | Hardwire | |
| 16 | 01 | Trans. Oil Temp. Trip | LRSL-11-MC-0301 | PMS | DI | Alarm | Hardwire | |
| 17 | 01 | Trans. Sudden Gas Pressure Trip | LRSL-11-MC-0301 | PMS | DI | Alarm | Hardwire | |
| 18 | 01 | Trans. Oil Level Min. | LRSL-11-MC-0301 | PMS | DI | Alarm | Hardwire | |
| 19 | 01 | Trans. Oil Level Max. | LRSL-11-MC-0301 | PMS | DI | Alarm | Hardwire | |
| 20 | 01 | Trans. Pressure Relief Valve Trip | LRSL-11-MC-0301 | PMS | DI | Alarm | Hardwire | |
| 21 | 01 | Protection Function Relay | LRSL-11-MC-0301 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 22 | 01 | A/V/W/VAR/Hz./P.F./ Wh/VARh | LRSL-11-MC-0301 | PMS | AI | Measurement | Modbus RTU | |
| 23 | 01 | CB Close Command | PMS | LRSL-11-MC-0301 | DO | Command | Hardwire | |
| 24 | 01 | CB Open Command | PMS | LRSL-11-MC-0301 | DO | Command | Hardwire | |



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6.6kV SWICHGEAR (LRS L-11-MC-0301) SIGNAL LIST

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|------|------|--------------------|------|------------------|-----|---------|----------|--------|
| 25 | 01 | PMS Load shedding | PMS | LRS L-11-MC-0301 | DO | Command | Hardwire | |
| 26 | 01 | PMS Reconnection | PMS | LRS L-11-MC-0301 | DO | Command | Hardwire | |



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2.2kV SWICHGEAR (LR1-RP-MVS01) SIGNAL LIST

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|------------------------------|------|---|--------------|--------------|-----|-------------|------------|--------|
| INCOMING FEEDER (F31) | | | | | | | | |
| 1 | 00 | CB Open | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 2 | 00 | CB Close | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 3 | 00 | CB in Test | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 4 | 00 | CB in Service | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 5 | 00 | ES Open | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 6 | 00 | ES Close | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 7 | 00 | CB available | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 8 | 01 | CB lockout reset operated | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 9 | 00 | CB Trip (Lock out operated) | LR1-RP-MVS01 | PMS | DI | Alarm | Hardwire | |
| 10 | 00 | Loss of switchgear control supply (110VDC) | LR1-RP-MVS01 | PMS | DI | Alarm | Hardwire | |
| 11 | 00 | Loss of switchgear auxiliary supply (230VAC) | LR1-RP-MVS01 | PMS | DI | Alarm | Hardwire | |
| 12 | 00 | Protection Function Relay | LR1-RP-MVS01 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 13 | 00 | A/V/W/VAR/Hz./P.F./ Wh/VARh | LR1-RP-MVS01 | PMS | AI | Measurement | Modbus RTU | |
| 14 | 00 | CB Open Command | PMS | LR1-RP-MVS01 | DO | Command | Hardwire | |
| 15 | 00 | CB Close Command | PMS | LR1-RP-MVS01 | DO | Command | Hardwire | |



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| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|---------------|------|---|--------------|-----|-----|-------------|------------|--------|
| BUS TIE (F32) | | | | | | | | |
| 1 | 00 | CB Open | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 2 | 00 | CB Close | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 3 | 00 | CB in Test | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 4 | 00 | CB in Service | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 5 | 00 | ES BUS A Open | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 6 | 00 | ES BUS B Open | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 7 | 00 | ES BUS A Close | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 8 | 00 | ES BUS B Close | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 9 | 00 | CB available | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 10 | 01 | CB lockout reset operated | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 11 | 00 | Local/Remote | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 12 | 00 | ATS On/Off | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 13 | 00 | ATS Initiated | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 14 | 00 | ATS Completed | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 15 | 00 | CB Trip (Lock out operated) | LR1-RP-MVS01 | PMS | DI | Alarm | Hardwire | |
| 16 | 00 | Loss of switchgear control supply (110VDC) | LR1-RP-MVS01 | PMS | DI | Alarm | Hardwire | |
| 17 | 00 | Loss of switchgear auxiliary supply (230VAC) | LR1-RP-MVS01 | PMS | DI | Alarm | Hardwire | |
| 18 | 00 | Protection Function Relay | LR1-RP-MVS01 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 19 | 00 | Busbar A Protection Function Relays | LR1-RP-MVS01 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 20 | 01 | Busbar B Protection Function Relays | LR1-RP-MVS01 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 21 | 00 | Synch. Check | LR1-RP-MVS01 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 22 | 00 | Current | LR1-RP-MVS01 | PMS | AI | Measurement | Modbus RTU | |
| 23 | 00 | V, Hz Busbar A | LR1-RP-MVS01 | PMS | AI | Measurement | Modbus RTU | |



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2.2kV SWICHGEAR (LR1-RP-MVS01) SIGNAL LIST

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|------|------|--------------------|--------------|--------------|-----|-------------|------------|--------|
| 24 | 00 | V, Hz Busbar B | LR1-RP-MVS01 | PMS | AI | Measurement | Modbus RTU | |
| 25 | 00 | CB Close Command | PMS | LR1-RP-MVS01 | DO | Command | Hardwire | |
| 26 | 00 | CB Open Command | PMS | LR1-RP-MVS01 | DO | Command | Hardwire | |



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2.2kV SWICHGEAR (LR1-RP-MVS01) SIGNAL LIST

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|--|------|--|--------------|--------------|-----|-------------|------------|--------|
| 2.2KV MOTOR OUTGOING FEEDER (F33) | | | | | | | | |
| 1 | 00 | CB Open | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 2 | 00 | CB Close | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 3 | 00 | CB in Test | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 4 | 00 | CB in Service | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 5 | 00 | ES Open | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 6 | 00 | ES Close | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 7 | 00 | CB available | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 8 | 01 | CB lockout reset operated | LR1-RP-MVS01 | PMS | DI | Status | Hardwire | |
| 9 | 00 | CB Trip (Lock out operated) | LR1-RP-MVS01 | PMS | DI | Alarm | Hardwire | |
| 10 | 00 | Loss of switchgear control supply (110VDC) | LR1-RP-MVS01 | PMS | DI | Alarm | Hardwire | |
| 11 | 00 | Loss of switchgear auxiliary supply (230VAC) | LR1-RP-MVS01 | PMS | DI | Alarm | Hardwire | |
| 12 | 00 | Protection Function Relay | LR1-RP-MVS01 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 13 | 00 | A/V/W/VAR/Hz./P.F./ Wh/VARh | LR1-RP-MVS01 | PMS | AI | Measurement | Modbus RTU | |
| 14 | 00 | PMS Load shedding | PMS | LR1-RP-MVS01 | DO | Command | Hardwire | |
| 15 | 00 | PMS Reconnection | PMS | LR1-RP-MVS01 | DO | Command | Hardwire | |
| 16 | 00 | PMS Permission | PMS | LR1-RP-MVS01 | DO | Command | Hardwire | |



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0.4kV SWICHGEAR (LR1-RP-LV01) SIGNAL LIST

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|------------------------------|------|---|-------------|-------------|-----|-------------|------------|--------|
| INCOMING FEEDER (F41) | | | | | | | | |
| 1 | 00 | CB Open | LR1-RP-LV01 | PMS | DI | Status | Hardwire | |
| 2 | 00 | CB Close | LR1-RP-LV01 | PMS | DI | Status | Hardwire | |
| 3 | 00 | CB in Test | LR1-RP-LV01 | PMS | DI | Status | Hardwire | |
| 4 | 00 | CB in Service | LR1-RP-LV01 | PMS | DI | Status | Hardwire | |
| 5 | 00 | CB available | LR1-RP-LV01 | PMS | DI | Status | Hardwire | |
| 6 | 01 | CB lockout reset operated | LR1-RP-LV01 | PMS | DI | Status | Hardwire | |
| 7 | 00 | CB Trip (Lock out operated) | LR1-RP-LV01 | PMS | DI | Alarm | Hardwire | |
| 8 | 00 | Loss of switchgear control supply (110VDC) | LR1-RP-LV01 | PMS | DI | Alarm | Hardwire | |
| 9 | 00 | Loss of switchgear auxiliary supply (230VAC) | LR1-RP-LV01 | PMS | DI | Alarm | Hardwire | |
| 10 | 00 | Protection Function Relay | LR1-RP-LV01 | PMS | DI | Alarm-Rely | Modbus RTU | |
| 11 | 00 | A/V/W/VAR/Hz./P.F./ Wh/VARh | LR1-RP-LV01 | PMS | AI | Measurement | Modbus RTU | |
| 12 | 00 | CB Open Command | PMS | LR1-RP-LV01 | DO | Command | Hardwire | |
| 13 | 00 | CB Close Command | PMS | LR1-RP-LV01 | DO | Command | Hardwire | |



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0.4kV SWICHGEAR (LR1-RP-LV01) SIGNAL LIST

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|---------------|------|-------------------------------------|-------------|-------------|-----|-------------|------------|--------|
| BUS TIE (F42) | | | | | | | | |
| 1 | 00 | CB Open | LR1-RP-LV01 | PMS | DI | Status | Hardwire | |
| 2 | 00 | CB Close | LR1-RP-LV01 | PMS | DI | Status | Hardwire | |
| 3 | 00 | CB in Test | LR1-RP-LV01 | PMS | DI | Status | Hardwire | |
| 4 | 00 | CB in Service | LR1-RP-LV01 | PMS | DI | Status | Hardwire | |
| 5 | 00 | CB available | LR1-RP-LV01 | PMS | DI | Status | Hardwire | |
| 6 | 01 | CB lockout reset operated | LR1-RP-LV01 | PMS | DI | Status | Hardwire | |
| 7 | 00 | Local/Remote | LR1-RP-LV01 | PMS | DI | Status | Hardwire | |
| 8 | 00 | ATS On/Off | LR1-RP-LV01 | PMS | DI | Status | Hardwire | |
| 9 | 00 | ATS Initiated | LR1-RP-LV01 | PMS | DI | Status | Hardwire | |
| 10 | 00 | ATS Completed | LR1-RP-LV01 | PMS | DI | Status | Hardwire | |
| 11 | 00 | CB Trip (Lock out operated) | LR1-RP-LV01 | PMS | DI | Alarm | Hardwire | |
| 12 | 00 | Protection Function Relay | LR1-RP-LV01 | PMS | DI | Alarm-Rely | Modbus RTU | |
| 13 | 00 | Busbar A Protection Function Relays | LR1-RP-LV01 | PMS | DI | Alarm-Rely | Modbus RTU | |
| 14 | 01 | Busbar B Protection Function Relays | LR1-RP-LV01 | PMS | DI | Alarm-Rely | Modbus RTU | |
| 15 | 00 | Synch. Check | LR1-RP-LV01 | PMS | DI | Alarm-Rely | Modbus RTU | |
| 16 | 00 | Current | LR1-RP-LV01 | PMS | AI | Measurement | Modbus RTU | |
| 17 | 00 | V, Hz Busbar A | LR1-RP-LV01 | PMS | AI | Measurement | Modbus RTU | |
| 18 | 00 | V, Hz Busbar B | LR1-RP-LV01 | PMS | AI | Measurement | Modbus RTU | |
| 19 | 00 | CB Close Command | PMS | LR1-RP-LV01 | DO | Command | Hardwire | |
| 20 | 00 | CB Open Command | PMS | LR1-RP-LV01 | DO | Command | Hardwire | |



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0.4kV SWICHGEAR (LR1-RP-DB01) SIGNAL LIST

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|-------------------------------------|------|---|-------------|-------------|-----|-------------|------------|--------|
| NORMAL INCOMING FEEDER (F43) | | | | | | | | |
| 1 | 00 | CB Open | LR1-RP-DB01 | PMS | DI | Status | Hardwire | |
| 2 | 00 | CB Close | LR1-RP-DB01 | PMS | DI | Status | Hardwire | |
| 3 | 00 | CB in Test | LR1-RP-DB01 | PMS | DI | Status | Hardwire | |
| 4 | 00 | CB in Service | LR1-RP-DB01 | PMS | DI | Status | Hardwire | |
| 5 | 00 | CB available | LR1-RP-DB01 | PMS | DI | Status | Hardwire | |
| 6 | 01 | CB lockout reset operated | LR1-RP-DB01 | PMS | DI | Status | Hardwire | |
| 7 | 00 | CB Trip (Lock out operated) | LR1-RP-DB01 | PMS | DI | Alarm | Hardwire | |
| 8 | 00 | Loss of switchgear control supply (110VDC) | LR1-RP-DB01 | PMS | DI | Alarm | Hardwire | |
| 9 | 00 | Loss of switchgear auxiliary supply (230VAC) | LR1-RP-DB01 | PMS | DI | Alarm | Hardwire | |
| 10 | 00 | Protection Function Relay | LR1-RP-DB01 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 11 | 00 | A/V/W/VAR/Hz./P.F./ Wh/VARh | LR1-RP-DB01 | PMS | AI | Measurement | Modbus RTU | |
| 12 | 00 | CB Open Command | PMS | LR1-RP-DB01 | DO | Command | Hardwire | |
| 13 | 00 | CB Close Command | PMS | LR1-RP-DB01 | DO | Command | Hardwire | |



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0.4kV SWICHGEAR (LR1-RP-DB01) SIGNAL LIST

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|---------------|------|-------------------------------------|-------------|-------------|-----|-------------|------------|--------|
| BUS TIE (F42) | | | | | | | | |
| 1 | 00 | CB Open | LR1-RP-DB01 | PMS | DI | Status | Hardwire | |
| 2 | 00 | CB Close | LR1-RP-DB01 | PMS | DI | Status | Hardwire | |
| 3 | 00 | CB in Test | LR1-RP-DB01 | PMS | DI | Status | Hardwire | |
| 4 | 00 | CB in Service | LR1-RP-DB01 | PMS | DI | Status | Hardwire | |
| 5 | 00 | CB available | LR1-RP-DB01 | PMS | DI | Status | Hardwire | |
| 6 | 01 | CB lockout reset operated | LR1-RP-DB01 | PMS | DI | Status | Hardwire | |
| 7 | 00 | Local/Remote | LR1-RP-DB01 | PMS | DI | Status | Hardwire | |
| 8 | 00 | ATS On/Off | LR1-RP-DB01 | PMS | DI | Status | Hardwire | |
| 9 | 00 | ATS Initiated | LR1-RP-DB01 | PMS | DI | Status | Hardwire | |
| 10 | 00 | ATS Completed | LR1-RP-DB01 | PMS | DI | Status | Hardwire | |
| 11 | 00 | CB Trip (Lock out operated) | LR1-RP-DB01 | PMS | DI | Alarm | Hardwire | |
| 12 | 00 | Protection Function Relay | LR1-RP-DB01 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 13 | 00 | Busbar A Protection Function Relays | LR1-RP-DB01 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 14 | 01 | Busbar B Protection Function Relays | LR1-RP-DB01 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 15 | 00 | Synch. Check | LR1-RP-DB01 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 16 | 00 | Current | LR1-RP-DB01 | PMS | AI | Measurement | Modbus RTU | |
| 17 | 00 | V, Hz Busbar A | LR1-RP-DB01 | PMS | AI | Measurement | Modbus RTU | |
| 18 | 00 | V, Hz Busbar B | LR1-RP-DB01 | PMS | AI | Measurement | Modbus RTU | |
| 19 | 00 | CB Close Command | PMS | LR1-RP-DB01 | DO | Command | Hardwire | |
| 20 | 00 | CB Open Command | PMS | LR1-RP-DB01 | DO | Command | Hardwire | |



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0.4kV SWICHGEAR (LR1-RP-DB01) SIGNAL LIST

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|--|------|---|-------------|-------------|-----|-------------|------------|--------|
| EMERGENCY INCOMING FEEDER (F45) | | | | | | | | |
| 1 | 00 | CB Open | LR1-RP-DB01 | PMS | DI | Status | Hardwire | |
| 2 | 00 | CB Close | LR1-RP-DB01 | PMS | DI | Status | Hardwire | |
| 3 | 00 | CB in Test | LR1-RP-DB01 | PMS | DI | Status | Hardwire | |
| 4 | 00 | CB in Service | LR1-RP-DB01 | PMS | DI | Status | Hardwire | |
| 5 | 00 | CB available | LR1-RP-DB01 | PMS | DI | Status | Hardwire | |
| 6 | 01 | CB lockout reset operated | LR1-RP-DB01 | PMS | DI | Status | Hardwire | |
| 7 | 00 | CB Trip (Lock out operated) | LR1-RP-DB01 | PMS | DI | Alarm | Hardwire | |
| 8 | 00 | Loss of switchgear control supply (110VDC) | LR1-RP-DB01 | PMS | DI | Alarm | Hardwire | |
| 9 | 00 | Loss of switchgear auxiliary supply (230VAC) | LR1-RP-DB01 | PMS | DI | Alarm | Hardwire | |
| 10 | 00 | Protection Function Relay | LR1-RP-DB01 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 11 | 00 | A/V/W/VAR/Hz./P.F./ Wh/VARh | LR1-RP-DB01 | PMS | AI | Measurement | Modbus RTU | |
| 12 | 00 | CB Open Command | PMS | LR1-RP-DB01 | DO | Command | Hardwire | |
| 13 | 00 | CB Close Command | PMS | LR1-RP-DB01 | DO | Command | Hardwire | |



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6.6kV SWICHGEAR IN WHP1 (LRSL-11-MVS-401) SIGNAL LIST

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|------------------------|------|--|-----------------|-----------------|-----|-------------|------------|-------------------------------|
| INCOMING FEEDER | | | | | | | | |
| 1 | 00 | CB Open | LRSL-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 2 | 00 | CB Close | LRSL-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 3 | 00 | CB in Test | LRSL-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 4 | 00 | CB in Service | LRSL-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 5 | 00 | ES Open | LRSL-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 6 | 00 | ES Close | LRSL-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 7 | 00 | CB available | LRSL-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 8 | 01 | CB lockout reset operated | LRSL-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 9 | 00 | CB Trip (Lock out operated) | LRSL-11-MVS-401 | PMS | DI | Alarm | Hardwire | |
| 10 | 00 | Loss of switchgear control supply (110VDC) | LRSL-11-MVS-401 | PMS | DI | Alarm | Hardwire | |
| 11 | 00 | Loss of switchgear auxiliary supply (230VAC) | LRSL-11-MVS-401 | PMS | DI | Alarm | Hardwire | |
| 12 | 00 | Protection Function Relay | LRSL-11-MVS-401 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 13 | 00 | A/V/W/VAR/Hz./P.F./Wh/VARh | LRSL-11-MVS-401 | PMS | AI | Measurement | Modbus RTU | |
| 14 | 00 | CB Open Command | PMS | LRSL-11-MVS-401 | DO | Command | Hardwire | |
| 15 | 00 | CB Close Command | PMS | LRSL-11-MVS-401 | DO | Command | Hardwire | |
| 16 | 00 | R1 6.6kV switchgear outgoing CB open | PMS | LRSL-11-MVS-401 | DO | Interlock | Hardwire | Interlock between switchgears |
| 17 | 01 | R1 6.6kV switchgear outgoing CB close | PMS | LRSL-11-MVS-401 | DO | Interlock | Hardwire | Interlock between switchgears |



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6.6kV SWITCHGEAR IN WHP1 (LRS�-11-MVS-401) SIGNAL LIST

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|----------------|------|---|-----------------|-----|-----|-------------|------------|--------|
| BUS TIE | | | | | | | | |
| 1 | 00 | CB Open | LRS�-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 2 | 00 | CB Close | LRS�-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 3 | 00 | CB in Test | LRS�-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 4 | 00 | CB in Service | LRS�-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 5 | 00 | ES BUS A Open | LRS�-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 6 | 00 | ES BUS B Open | LRS�-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 7 | 00 | ES BUS A Close | LRS�-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 8 | 00 | ES BUS B Close | LRS�-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 9 | 00 | CB available | LRS�-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 10 | 01 | CB lockout reset operated | LRS�-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 11 | 00 | Local/Remote | LRS�-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 12 | 00 | ATS On/Off | LRS�-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 13 | 00 | ATS Initiated | LRS�-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 14 | 00 | ATS Completed | LRS�-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 15 | 00 | CB Trip (Lock out operated) | LRS�-11-MVS-401 | PMS | DI | Alarm | Hardwire | |
| 16 | 00 | Loss of switchgear control supply (110VDC) | LRS�-11-MVS-401 | PMS | DI | Alarm | Hardwire | |
| 17 | 00 | Loss of switchgear auxiliary supply (230VAC) | LRS�-11-MVS-401 | PMS | DI | Alarm | Hardwire | |
| 18 | 00 | Protection Function Relay | LRS�-11-MVS-401 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 19 | 00 | Busbar A Protection Function Relays | LRS�-11-MVS-401 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 20 | 01 | Busbar B Protection Function Relays | LRS�-11-MVS-401 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 21 | 00 | Synch. Check | LRS�-11-MVS-401 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 22 | 00 | Current | LRS�-11-MVS-401 | PMS | AI | Measurement | Modbus RTU | |
| 23 | 00 | V, Hz Busbar A | LRS�-11-MVS-401 | PMS | AI | Measurement | Modbus RTU | |



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6.6kV SWICHGEAR IN WHP1 (LRSL-11-MVS-401) SIGNAL LIST

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|------|------|--------------------|-----------------|-----------------|-----|-------------|------------|--------|
| 24 | 00 | V, Hz Busbar B | LRSL-11-MVS-401 | PMS | AI | Measurement | Modbus RTU | |
| 25 | 00 | CB Close Command | PMS | LRSL-11-MVS-401 | DO | Command | Hardwire | |
| 26 | 00 | CB Open Command | PMS | LRSL-11-MVS-401 | DO | Command | Hardwire | |



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6.6kV SWITCHGEAR IN WHP1 (LRSL-11-MVS-401) SIGNAL LIST

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|---|------|--|-----------------|-----------------|-----|-------------|------------|--------|
| 6.6/2.2KV UNIT TRANSFORMER OUTGOING FEEDER | | | | | | | | |
| 1 | 00 | CB Open | LRSL-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 2 | 00 | CB Close | LRSL-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 3 | 00 | CB in Test | LRSL-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 4 | 00 | CB in Service | LRSL-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 5 | 00 | ES Open | LRSL-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 6 | 00 | ES Close | LRSL-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 7 | 00 | CB available | LRSL-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 8 | 01 | CB lockout reset operated | LRSL-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 9 | 00 | CB Trip (Lock out operated) | LRSL-11-MVS-401 | PMS | DI | Alarm | Hardwire | |
| 10 | 00 | Loss of switchgear control supply (110VDC) | LRSL-11-MVS-401 | PMS | DI | Alarm | Hardwire | |
| 11 | 00 | Loss of switchgear auxiliary supply (230VAC) | LRSL-11-MVS-401 | PMS | DI | Alarm | Hardwire | |
| 12 | 00 | Protection Function Relay | LRSL-11-MVS-401 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 13 | 00 | A/V/W/VAR/Hz./P.F./Wh/VARh | LRSL-11-MVS-401 | PMS | AI | Measurement | Modbus RTU | |
| 14 | 00 | PMS Load shedding | PMS | LRSL-11-MVS-401 | DO | Command | Hardwire | |
| 15 | 00 | PMS Reconnection | PMS | LRSL-11-MVS-401 | DO | Command | Hardwire | |
| 16 | 00 | PMS Permission | PMS | LRSL-11-MVS-401 | DO | Command | Hardwire | |



**Resalat Oil Field Development Project
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6.6kV SWITCHGEAR IN WHP1 (LRS�-11-MVS-401) SIGNAL LIST

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|---|------|--|-----------------|-----|-----|-------------|------------|--------|
| SEALED TRANSFORMER OUTGOING FEEDER | | | | | | | | |
| 1 | 00 | CB Open | LRS�-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 2 | 00 | CB Close | LRS�-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 3 | 00 | CB in Test | LRS�-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 4 | 00 | CB in Service | LRS�-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 5 | 00 | ES Open | LRS�-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 6 | 00 | ES Close | LRS�-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 7 | 00 | CB available | LRS�-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 8 | 01 | CB lockout reset operated | LRS�-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 9 | 00 | Local/Remote | LRS�-11-MVS-401 | PMS | DI | Status | Hardwire | |
| 10 | 00 | CB Trip (Lock out operated) | LRS�-11-MVS-401 | PMS | DI | Alarm | Hardwire | |
| 11 | 00 | Loss of switchgear control supply (110VDC) | LRS�-11-MVS-401 | PMS | DI | Alarm | Hardwire | |
| 12 | 00 | Loss of switchgear auxiliary supply (230VAC) | LRS�-11-MVS-401 | PMS | DI | Alarm | Hardwire | |
| 13 | 00 | Trans. Winding Temp. Alarm | LRS�-11-MVS-401 | PMS | DI | Alarm | Hardwire | |
| 14 | 00 | Trans. Winding Temp. Trip | LRS�-11-MVS-401 | PMS | DI | Alarm | Hardwire | |
| 15 | 00 | Trans. Oil Temp. Alarm | LRS�-11-MVS-401 | PMS | DI | Alarm | Hardwire | |
| 16 | 00 | Trans. Oil Temp. Trip | LRS�-11-MVS-401 | PMS | DI | Alarm | Hardwire | |
| 17 | 00 | Trans. Sudden Gas Pressure Trip | LRS�-11-MVS-401 | PMS | DI | Alarm | Hardwire | |
| 18 | 00 | Trans. Oil Level Min. | LRS�-11-MVS-401 | PMS | DI | Alarm | Hardwire | |
| 19 | 00 | Trans. Oil Level Max. | LRS�-11-MVS-401 | PMS | DI | Alarm | Hardwire | |
| 20 | 00 | Trans. Pressure Relief Valve Trip | LRS�-11-MVS-401 | PMS | DI | Alarm | Hardwire | |
| 21 | 00 | Protection Function Relay | LRS�-11-MVS-401 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 22 | 00 | A/V/W/VAR/Hz./P.F./Wh/VARh | LRS�-11-MVS-401 | PMS | AI | Measurement | Modbus RTU | |



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6.6kV SWICHGEAR IN WHP1 (LRSL-11-MVS-401) SIGNAL LIST

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|------|------|--------------------|------|-----------------|-----|---------|----------|--------|
| 23 | 00 | CB Close Command | PMS | LRSL-11-MVS-401 | DO | Command | Hardwire | |
| 24 | 00 | CB Open Command | PMS | LRSL-11-MVS-401 | DO | Command | Hardwire | |
| 25 | 00 | PMS Load shedding | PMS | LRSL-11-MVS-401 | DO | Command | Hardwire | |
| 26 | 00 | PMS Reconnection | PMS | LRSL-11-MVS-401 | DO | Command | Hardwire | |



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0.4kV SWICHGEAR IN WHP1 (LRSL-11-LVS-401) SIGNAL LIST

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|-----------------|------|---|-----------------|-----------------|-----|-------------|------------|--------|
| INCOMING FEEDER | | | | | | | | |
| 1 | 00 | CB Open | LRSL-11-LVS-401 | PMS | DI | Status | Hardwire | |
| 2 | 00 | CB Close | LRSL-11-LVS-401 | PMS | DI | Status | Hardwire | |
| 3 | 00 | CB in Test | LRSL-11-LVS-401 | PMS | DI | Status | Hardwire | |
| 4 | 00 | CB in Service | LRSL-11-LVS-401 | PMS | DI | Status | Hardwire | |
| 5 | 00 | CB available | LRSL-11-LVS-401 | PMS | DI | Status | Hardwire | |
| 6 | 01 | CB lockout reset operated | LRSL-11-LVS-401 | PMS | DI | Status | Hardwire | |
| 7 | 00 | CB Trip (Lock out operated) | LRSL-11-LVS-401 | PMS | DI | Alarm | Hardwire | |
| 8 | 00 | Loss of switchgear control supply (110VDC) | LRSL-11-LVS-401 | PMS | DI | Alarm | Hardwire | |
| 9 | 00 | Loss of switchgear auxiliary supply (230VAC) | LRSL-11-LVS-401 | PMS | DI | Alarm | Hardwire | |
| 10 | 00 | Protection Function Relay | LRSL-11-LVS-401 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 11 | 00 | A/V/W/VAR/Hz./P.F./ Wh/VARh | LRSL-11-LVS-401 | PMS | AI | Measurement | Modbus RTU | |
| 12 | 00 | CB Open Command | PMS | LRSL-11-LVS-401 | DO | Command | Hardwire | |
| 13 | 00 | CB Close Command | PMS | LRSL-11-LVS-401 | DO | Command | Hardwire | |



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0.4kV SWICHGEAR IN WHP1 (LRS L-11-LVS-401) SIGNAL LIST

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|---------|------|-------------------------------------|------------------|------------------|-----|-------------|------------|--------|
| BUS TIE | | | | | | | | |
| 1 | 00 | CB Open | LRS L-11-LVS-401 | PMS | DI | Status | Hardwire | |
| 2 | 00 | CB Close | LRS L-11-LVS-401 | PMS | DI | Status | Hardwire | |
| 3 | 00 | CB in Test | LRS L-11-LVS-401 | PMS | DI | Status | Hardwire | |
| 4 | 00 | CB in Service | LRS L-11-LVS-401 | PMS | DI | Status | Hardwire | |
| 5 | 00 | CB available | LRS L-11-LVS-401 | PMS | DI | Status | Hardwire | |
| 6 | 01 | CB lockout reset operated | LRS L-11-LVS-401 | PMS | DI | Status | Hardwire | |
| 7 | 00 | Local/Remote | LRS L-11-LVS-401 | PMS | DI | Status | Hardwire | |
| 8 | 00 | ATS On/Off | LRS L-11-LVS-401 | PMS | DI | Status | Hardwire | |
| 9 | 00 | ATS Initiated | LRS L-11-LVS-401 | PMS | DI | Status | Hardwire | |
| 10 | 00 | ATS Completed | LRS L-11-LVS-401 | PMS | DI | Status | Hardwire | |
| 11 | 00 | CB Trip (Lock out operated) | LRS L-11-LVS-401 | PMS | DI | Alarm | Hardwire | |
| 12 | 00 | Protection Function Relay | LRS L-11-LVS-401 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 13 | 00 | Busbar A Protection Function Relays | LRS L-11-LVS-401 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 14 | 01 | Busbar B Protection Function Relays | LRS L-11-LVS-401 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 15 | 00 | Synch. Check | LRS L-11-LVS-401 | PMS | DI | Alarm-Relay | Modbus RTU | |
| 16 | 00 | Current | LRS L-11-LVS-401 | PMS | AI | Measurement | Modbus RTU | |
| 17 | 00 | V, Hz Busbar A | LRS L-11-LVS-401 | PMS | AI | Measurement | Modbus RTU | |
| 18 | 00 | V, Hz Busbar B | LRS L-11-LVS-401 | PMS | AI | Measurement | Modbus RTU | |
| 19 | 00 | CB Close Command | PMS | LRS L-11-LVS-401 | DO | Command | Hardwire | |
| 20 | 00 | CB Open Command | PMS | LRS L-11-LVS-401 | DO | Command | Hardwire | |



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400V DIESEL GENERATOR SIGNAL LIST

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|------|------|--------------------------------|------|-----|-----|-------------|------------|--------------|
| 1 | 01 | DG Local/Remote | DG | PMS | DI | Status | Modbus RTU | If available |
| 2 | 01 | DG Ready to Start | DG | PMS | DI | Status | Modbus RTU | If available |
| 3 | 01 | Ready To Load | DG | PMS | DI | Status | Modbus RTU | If available |
| 4 | 00 | DG ON | DG | PMS | DI | Status | Modbus RTU | |
| 5 | 00 | DG OFF | DG | PMS | DI | Status | Modbus RTU | |
| 7 | 00 | DG Trip | DG | PMS | DI | Alarm | Modbus RTU | |
| 8 | 01 | DG Alarm | DG | PMS | DI | Alarm | Modbus RTU | If available |
| 12 | 01 | Battery Charger System Fault | DG | PMS | DI | Alarm | Modbus RTU | If available |
| 13 | 01 | Fuel Day Tank Low | DG | PMS | DI | Alarm | Modbus RTU | If available |
| 14 | 01 | Fuel Oil System Fault | DG | PMS | DI | Alarm | Modbus RTU | If available |
| 15 | 01 | Water System Fault | DG | PMS | DI | Alarm | Modbus RTU | If available |
| 16 | 01 | Cooler Temp Fault | DG | PMS | DI | Alarm | Modbus RTU | If available |
| 17 | 01 | Diesel Start Incomplete | DG | PMS | DI | Alarm | Modbus RTU | If available |
| 9 | 01 | DG Protection Function | DG | PMS | DI | Alarm-Relay | Modbus RTU | If available |
| 6 | 01 | A/V/W/VAR/Hz./P.F./ Wh/VARh | DG | PMS | AI | Measurement | Modbus RTU | If available |
| 10 | 00 | DG Start | PMS | DG | DO | Command | Hardwire | |
| 11 | 00 | DG Stop | PMS | DG | DO | Command | Hardwire | |



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110VDC UPS

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|------|------|---|------------|-----|-----|--------|------------|--------|
| 1 | 00 | Charger in equalizing mode-A | 110VDC UPS | PMS | DI | Status | Modbus RTU | |
| 2 | 00 | Charger running -A | 110VDC UPS | PMS | DI | Status | Modbus RTU | |
| 3 | 00 | Charger in equalizing mode-B | 110VDC UPS | PMS | DI | Status | Modbus RTU | |
| 4 | 00 | Charger running -B | 110VDC UPS | PMS | DI | Status | Modbus RTU | |
| 5 | 00 | Grouped general fault trip-A | 110VDC UPS | PMS | DI | Alarm | Modbus RTU | |
| 6 | 00 | Charger Shut down-A | 110VDC UPS | PMS | DI | Alarm | Modbus RTU | |
| 7 | 00 | Imminent discharge of battery alarm-A | 110VDC UPS | PMS | DI | Alarm | Modbus RTU | |
| 8 | 00 | Loss of input to charger alarm-A | 110VDC UPS | PMS | DI | Alarm | Modbus RTU | |
| 9 | 00 | DC Under voltage alarm-A | 110VDC UPS | PMS | DI | Alarm | Modbus RTU | |
| 10 | 00 | DC Over voltage alarm-A | 110VDC UPS | PMS | DI | Alarm | Modbus RTU | |
| 11 | 00 | DC system earth fault alarm-A | 110VDC UPS | PMS | DI | Alarm | Modbus RTU | |
| 12 | 00 | High charge rate inhibited-A | 110VDC UPS | PMS | DI | Alarm | Modbus RTU | |
| 13 | 00 | Failure of charger to deliver current-A | 110VDC UPS | PMS | DI | Alarm | Modbus RTU | |
| 14 | 00 | Battery isolated alarm-A | 110VDC UPS | PMS | DI | Alarm | Modbus RTU | |
| 15 | 00 | High DC Voltage-A | 110VDC UPS | PMS | DI | Alarm | Modbus RTU | |
| 16 | 00 | Cubicle fan/s failure alarm-A | 110VDC UPS | PMS | DI | Alarm | Modbus RTU | |
| 17 | 00 | Grouped general fault trip-B | 110VDC UPS | PMS | DI | Alarm | Modbus RTU | |
| 18 | 00 | Charger Shut down-B | 110VDC UPS | PMS | DI | Alarm | Modbus RTU | |
| 19 | 00 | Imminent discharge of battery alarm-B | 110VDC UPS | PMS | DI | Alarm | Modbus RTU | |
| 20 | 00 | Loss of input to charger alarm-B | 110VDC UPS | PMS | DI | Alarm | Modbus RTU | |
| 21 | 00 | DC Under voltage alarm-B | 110VDC UPS | PMS | DI | Alarm | Modbus RTU | |
| 22 | 00 | DC Over voltage alarm-B | 110VDC UPS | PMS | DI | Alarm | Modbus RTU | |
| 23 | 00 | DC system earth fault alarm-B | 110VDC UPS | PMS | DI | Alarm | Modbus RTU | |
| 24 | 00 | High charge rate inhibited-B | 110VDC UPS | PMS | DI | Alarm | Modbus RTU | |
| 25 | 00 | Failure of charger to deliver current-B | 110VDC UPS | PMS | DI | Alarm | Modbus RTU | |
| 26 | 00 | Battery isolated alarm-B | 110VDC UPS | PMS | DI | Alarm | Modbus RTU | |



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110VDC UPS

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|------|------|-------------------------------|------------|-----|-----|-------|------------|--------|
| 27 | 00 | High DC Voltage-B | 110VDC UPS | PMS | DI | Alarm | Modbus RTU | |
| 28 | 00 | Cubicle fan/s failure alarm-B | 110VDC UPS | PMS | DI | Alarm | Modbus RTU | |
| 29 | 00 | Output Voltage/Current | 110VDC UPS | PMS | DI | Alarm | Modbus RTU | |



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230VAC UPS

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|------|------|---|------------|-----|-----|--------|------------|--------|
| 1 | 00 | Static Switch Position | 230VAC UPS | PMS | DI | Status | Modbus RTU | |
| 2 | 00 | Manual Bypass Switch Position | 230VAC UPS | PMS | DI | Status | Modbus RTU | |
| 3 | 00 | Operation in equalizing mode-A | 230VAC UPS | PMS | DI | Status | Modbus RTU | |
| 4 | 00 | Charger running-A | 230VAC UPS | PMS | DI | Status | Modbus RTU | |
| 5 | 00 | Operation in equalizing mode-B | 230VAC UPS | PMS | DI | Status | Modbus RTU | |
| 6 | 00 | Charger running-B | 230VAC UPS | PMS | DI | Status | Modbus RTU | |
| 7 | 00 | Static switch failure | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 8 | 00 | Bypass Supply Fault (Alarm) | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 9 | 00 | Bypass in Operation (Alarm) | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 10 | 00 | Cubicle fan/s failure alarm-A | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 11 | 00 | AC Output Under/Over Voltage-A | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 12 | 00 | AC Output Under/Over Frequency-A | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 13 | 00 | High DC Voltage-A | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 14 | 00 | Imminent Discharge of Battery-A | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 15 | 00 | Loss of Input to Charger (Alarm)-A | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 16 | 00 | Rectifier Failure Trip (Alarm)-A | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 17 | 00 | DC Under Voltage (Alarm)-A | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 18 | 00 | Battery Isolated (Alarm)-A | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 19 | 00 | High Charge Rate Inhibited (Alarm)-A | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 20 | 00 | Inverter Failure (Alarm)-A | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 21 | 00 | Inverter over temperature(Alarm)-A | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 22 | 00 | Output Voltage Deviation Trip (Alarm)-A | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 23 | 00 | AC UPS General Fault (Alarm)-A | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 24 | 00 | Cubicle fan/s failure alarm-B | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 25 | 00 | AC Output Under/Over Voltage-B | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 26 | 00 | AC Output Under/Over Frequency-B | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |



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230VAC UPS

| Item | Rev. | Signal Description | From | To | I/O | Class | Protocol | Remark |
|------|------|---|------------|-----|-----|-------|------------|--------|
| 27 | 00 | High DC Voltage-B | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 28 | 00 | Imminent Discharge of Battery-B | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 29 | 00 | Loss of Input to Charger (Alarm)-B | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 30 | 00 | Rectifier Failure Trip (Alarm)-B | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 31 | 00 | DC Under Voltage (Alarm)-B | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 32 | 00 | Battery Isolated (Alarm)-B | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 33 | 00 | High Charge Rate Inhibited (Alarm)-B | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 34 | 00 | Inverter Failure (Alarm)-B | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 35 | 00 | Inverter over temperature(Alarm)-B | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 36 | 00 | Output Voltage Deviation Trip (Alarm)-B | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 37 | 00 | AC UPS General Fault (Alarm)-B | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 38 | 00 | AC Distribution Earth Fault (Alarm) | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |
| 39 | 00 | Output Voltage/Current | 230VAC UPS | PMS | DI | Alarm | Modbus RTU | |