



1X660MW BHUSAVAL THERMAL POWER STATION UNIT-6

TECHNICAL SPECIFICATION FOR LV DATA CONCENTRATOR SYSTEM (DCS)

BHEL DOCUMENT NO: SBD-TS-BSWL-DCS-001, REV-00



**BHARAT HEAVY ELECTRICALS LIMITED
SOLAR BUSINESS DIVISION
BANGALORE – 560012**



**1x660MW BHUSAWAL TPS UNIT-6
TECHNICAL SPECIFICATION FOR
LV DATA CONCENTRATOR SYSTEM**

SPECIFICATION NO. : SBD-TS-BSWL-DCS-001
VOLUME NO. :
SECTION :
REV NO. : 00 DATE: 12/07/2023
SHEET : 1 of 1

INSTRUCTIONS TO BIDDERS FOR PREPARING TECHNICAL OFFERS

- 1) Signed and stamped copies of the following shall be furnished by all the bidders as technical offer:
 - a) Signed copy of complete technical specification and
 - b) Technical deviations, if any, mentioning the clause and page no. of specification.
- 2) Any confirmations/ comments with reference to technical specification shall be mentioned in Deviation sheet and reply shall be sought in writing from BHEL. Any references mentioned elsewhere/ covering letter shall not be considered by BHEL.
- 3) Any confirmations/ comments regarding delivery schedules shall be furnished as part of commercial offer. Any references mentioned elsewhere/ covering letter shall not be considered by BHEL.

Any changes made by the bidder in the technical specification will not be considered by BHEL until and unless it is mentioned in deviation sheet.
- 4) Bidders to quote for all line items of price format.
- 5) Bidder shall be responsible for obtaining any clarification with respect to NIT before quoting, in case, if any technical deviations are observed during technical scrutiny w.r.t NIT, bidder shall meet the technical requirements of NIT without any price implication to BHEL.
- 6) In case of any ambiguity in specification between various clauses, vendor should clearly mention the same in technical deviations, failing which decision of BHEL would be final during execution of the order and this shall not have any price impact to BHEL.
- 7) In case of non-submission of technical deviation sheet, it is understood that the bidder does not have any technical deviations and BHEL will proceed further with technical scrutiny, without any further query.
- 8) Vendor to complete the **SUPPLY & COMMISSIONING OF LV DATA CONCENTRATOR SYSTEM** in all respects and offer **DATA CONCENTRATOR SYSTEM AS PER APPROVED DRAWINGS/ DOCUMENTS** to BHEL for inspection, prior to offering the same to MAHAGENCO for inspection.
- 9) All the bidders offer will be forwarded to MAHAGENCO for approval. Offers of only approved bidders will be further processed. MAHAGENCO reserves the right to approve/ reject any bidder, without citing any reason.

BIDDER'S STAMP & SIGNATURE

TABLE OF CONTENTS

- I. PROJECT INFORMATION
- II. CODES & STANDARDS FOR ALL EQUIPMENTS
- III. SCOPE OF SUPPLY & WORK
- IV. TECHNICAL REQUIREMENT
 - 1) DATA CONCENTRATOR
 - 2) SYSTEM ARCHITECTURE
 - 3) OWS & OEWS
 - 4) GLOBAL POSITIONING SATELLITE SYSTEM (GPS CLOCK)
 - 5) LASER PRINTER A3 & A4
 - 6) UNINTERRUPTIBLE POWER SUPPLY (UPS)
 - 7) ETHERNET SWITCH
 - 8) LAPTOP
 - 9) MONITOR
 - 10) FO CABLE
 - 11) AC TO DC CONVERTER & DC TO DC CONVERTER
 - 12) CAT 5E/ CAT 6/ CAT 6E CABLE
 - 13) FURNITURE
 - 14) DATA CONCENTRATOR PANEL
 - 15) SERVICES
- V. DOCUMENTS
- VI. TESTS
- VII. DOCUMENTS TO BE SUBMITTED IN THE OFFER

SPECIFICATION FOR NETWORKING AND DATA CONCENTRATOR SYSTEM FOR LV SWITCH GEAR**I. PROJECT INFORMATION**

Refer **Annexure-A**

II. CODES & STANDARDS FOR ALL EQUIPMENTS

1. All equipment and materials shall be designed, manufactured and tested in accordance with the latest applicable Indian Standards (IS)/ IEC except where modified and/or supplemented by this specification.
2. Equipment and materials conforming to any other standard which ensures equal or better quality may be accepted. In such case, copies of the English version of the standard adopted shall be submitted along with the bid.
3. The electrical installation shall meet the requirements of Indian Electricity Rules as amended up to date and relevant IS Codes of Practice. In addition, other rules or regulations applicable to the work shall be followed.

III. SCOPE OF SUPPLY & WORK

The Bidder's scope of supply & work shall include the supply, wiring, testing and commissioning of the following:

1. Data Concentrators with redundant Servers (Main & Standby)
2. LAN along with IEC 61850 Industrial grade managed type Ethernet Switches and necessary LIU's.
3. HMI station (Operator Work Station along with furniture i.e table and chair, Engineering cum Operator Workstations along with furniture i.e table and chair and printers with printer table)
4. Optical Fiber cable, CAT5E/CTA 6/ CAT 6E cable for communication from RS485 port & HDPE Conduit (length as required), Terminal equipment such as LIU, etc. (quantity as required), GPS and Laptops.
5. Supply and wiring of 240V AC to 220V DC converters and 240V AC/ 220V DC to 24V DC converters.
6. Mounting of Ethernet Switches in switchboards mentioned in this tender (**Annexure-B**) is in bidder scope. Connection of Relay to Ethernet switch using FO cable, MFM to Modbus-Ethernet converter using suitable cable and MFM's looping using CAT5E/ CAT6/ CAT6E cable for RS485 port is in bidder scope. Termination with proper identification at both ends is also in bidder's scope.
7. Connection of cable among Ethernet Switches is in bidder's scope.
8. Connection between converters using suitable cable is in the scope of bidder.
9. Suitable gateway to interface DDCMIS and Numerical relay network (at Data concentrator level)
10. Laying, Termination & Supervision of cables under supply (Ethernet/FO cable/LAN cable etc) between the following is also in scope of bidder:
 - a. Numerical Relay – Ethernet switch

- b. Ethernet switch – Ethernet switch
 - c. MFM-MFM
 - d. MFM- Modbus-Ethernet converter
 - e. Modbus-Ethernet converter - Ethernet Switch
11. OWS and EWS shall be supplied as per BoQ.
 12. Apart from equipment mentioned below or elsewhere in specification, any other equipment required to meet the intended specification is in scope of bidder.
 13. Refer **Annexure-C** for typical configuration of such a proposed system. Data concentrators shall be distributed functionally and geographically and shall be interconnected through Fiber Optic cables. Required number of FO ports for interface to DDCMIS with Fiber Optic cables shall be made available on all Data Concentrators. Provision for connection and arrangement for termination of Fiber Optic cables from DDCMIS at Data concentrator end shall be made.
 14. MFM shall be looped on RS485 for communication to DDCMIS over Modbus protocol. Each loop shall have maximum of 16MFM's. Required hardware & cable is in bidder's scope.
 15. Proper Data communication of MFM's to DDCMIS is vendor responsibility. If any additional hardware's are required for this requirement, bidder has to consider the same.
 16. Laying, Termination & Supervision of looping of MFM is in bidder scope.
 17. Laying, termination & supervision of looping of TCP/IP converters to TCP/IP to Ethernet converters is in scope of bidder.
 18. The supplier shall do commissioning of all numerical relays at site, free of charge, to the satisfaction of customer. The commissioning shall include establishment of time synchronization and communication of all numerical relays with local PC and remote DDCMIS / SCADA and demonstration of all functions of numerical relays. This service will be required on separate occasions during commissioning and synchronization. Non-compliance to this clause in any form will lead to the rejection of the offer.
 19. Bidder to offer their model meeting full requirement mentioned in this specification.
 20. Though minimum items required for network LAN have been listed in the enquiry however, any hardware required for networking and successful operation of data concentrator is in bidder scope. Necessary hardware required for termination of communication cable between relays, Ethernet switches, data concentrator and HMI are in bidder's scope.
 21. Generation of ICD file from GE make Numerical Relay is also in bidder scope. Interfacing with Data Concentrator is also in bidder scope.
 22. Main & Standby data-concentrator shall be connected to a KVM Switch along with foldable monitor.
 23. All items shall be guaranteed for successful operation for a period of 24 months from the date of receipt of complete lot of all items against the project.
 24. Bidder's scope shall include services mentioned elsewhere in the specification.
 25. Bidder to provide unit price for all items covered under main items for addition and deletion at later stage. Bidder shall provide unit prices for training per person per day.

26. The offer shall be submitted in two part-bid. The bidder's technical representative shall visit BHEL SBD for technical discussions and on the spot finalization of technical issues, if needed, within 1 weeks after technical bid opening.
27. Bidder shall offer latest system available with him and shall also confirm that Data concentrator system hardware / software shall be upgraded free of cost (for hardware up to commissioning of the project and software up to handing over of the project), whenever at later stage such upgradation takes place for his system offered by him or by his collaborator.
28. Supply for Ethernet switches to be arranged by the bidder from location mentioned in every switchboard through separate TB's and MCB's. Supply of TB's, MCB & required wire for wiring are also in scope of bidder.
29. During execution of the project or at the time of dispatch, any latest product is launched or introduced and same is field proven, then the same shall be supplied without any price implication.
30. All the hardware's/software's shall be latest and field proven as available in the market.

IV. TECHNICAL REQUIREMENT

A. CUSTOMER SPECIFICATION REQUIREMENT

Refer Annexure-D

1) DATA CONCENTRATOR

- The data concentrator should be based on industrial hardware design operating on Windows operating system and should allow monitoring and control the acquisition of the real-time data from numerical relays and should provide a framework for monitoring this data at HMI. The Data Concentrator shall have a facility for any kind of local maintenance activities from the Data Concentrator. Tentative System Architecture is provided in **Annexure-C**.
- Data concentrator shall have required number of ports for relay LAN connection. 20% or minimum 2 no's spare ports whichever is maximum shall be provided for future extensions.
- Data concentrator shall have required number of RS232/ RS485/RJ45 for connection to Laptop/ PC. Data concentrator shall have dual redundant FO/TCP/IP port for communication to substation MMI having operator's work station and engineering station PC.
- The communication to upper level control system shall be redundant.
- Data concentrator shall provide dual redundant gateway to upper level control system.
- Data concentrator shall have redundant power supply, communication port for each relay LAN & communication processor
- Retrieval of status or measurements shall be less than 1 milli sec.
- Redundant architecture shall be provided.
- Data concentrator shall communicate with DDCMIS on OPC server.

The design of the control system and related equipment shall adhere to the principle of “fail safe” operation at all system levels and provide reliable and efficient operation of the plant under dynamic conditions and attainment of maximum station availability.

General Specification of the server:

Refer datasheet. Necessary accessories along with the monitor shall be provided.

2) SYSTEM ARCHITECTURE

- The integration of the complete automation system (including all status, analogue indications, alarms and controls) to enable the operator to monitor the complete auxiliary power supply from the HMI station.
- The point-to-point testing of all signals for the Switchgear network at the plant and protection equipment end and the terminal end (data concentrators/Controller and HMI Workstations) shall be the responsibility of the bidder. The Bidder shall provide full details of the offered system Architecture with the Bid.
- The system shall be a computer-based system that shall integrate independently operating subsystems, such as data Concentrators, Protection Units, Metering, and alarm annunciation, into a unified data acquisition, monitoring, protection.
- The System architecture shall be flexible to allow future extensions.
- The offered equipment shall be of state of art technology and hardware shall be of proven field track record. Bidder shall submit all type test reports for the offered model along with the offer.
- Tentative System Architecture is provided in **Annexure-C**.
- Quantity of Ethernet switches for preparation of LAN network for the project shall be in bidder's scope of supply and same is mentioned in BoQ.
- The Relay LAN shall be designed so as to update all data once every second.
- All parameters on the relay are required to be available on LAN with separate address for each parameter.
- The LAN shall be redundant with redundant industrial grade Ethernet switches shall utilize standard IEEE 806.3 protocols such as Ethernet

3) OPERATOR WORK STATION (OWS) & OPERATOR CUM ENGINEERING WORK STATION (OWS cum EWS)

- Operator's workstations shall be industrial grade type and provided with colour 24" TFT monitors, Keyboard, mouse & colour LaserJet printers.
- Operator's terminals shall permit the operation and monitoring of the unit under normal condition and in all emergencies.
- OWS/ OWS cum EWS shall be built for high performance.

- Operation shall be menu driven in latest windows environment. Display screens shall be user friendly and no special software knowledge shall be required to operate the system.
- Complete operation of the unit shall be possible from any operator station. Multiple active windows, not less than 4 (four) nos simultaneously, shall be displayed on the HMI screen.
- Display navigation shall be with least number of keystrokes or steps.
- Functional requirements shall be as per customer requirement in-line with data concentrator system.
- All OWS shall be fully interchangeable i.e. all operator functions including control, monitoring and operation of any plant area or drive shall be possible from any of the OWS at any point of time without the necessity of any action like downloading of additional files.
- No single failure in HMI shall lead to non-availability of more than one OWS. In such an event i.e., single failure leading to non-availability of any OWS, it shall be possible to operate the entire plant in all regimes of operation including emergency conditions from each of the other available OWS.
- It shall perform programming /configuration of complete system and HMI and perform system diagnostic. System shall be adequately protected with software & hardware locks etc., against any inadvertent and unauthorized access.
- It shall be capable of storing data, loading, editing, testing, tuning, and monitoring all the controllers. System shall be complete with monitor, keyboard, mouse and colour LaserJet printer.
- Each station shall execute the functions not limited to the followings
 - a) System configuration
 - b) Data Base configuration
 - c) Graphics display generation and modification
 - d) OLCS/CLCS Control algorithm generation and modification
 - e) Report/Log configuration and modification
 - f) System access configuration
 - g) Downloading of program
 - h) High level programming language.
- Each station shall be equipped with a DVD writer for archiving of the configuration.
- The station shall be capable of generating all real time graphics, trends, plots etc, necessary for optimum tuning of the controllers. This feature shall also be duplicated in the operator's station.
- Open loop configuration shall be programmed in the Engineering Terminal in simple Boolean form.
- The system maintenance function shall not be limited to the followings:
 - a) Station status overview.
 - b) System alarm message display.
 - c) Individual station status display.
 - d) Data base equalization.
 - e) Date and time setting.
 - f) Network status display
- **All Other technical requirements shall be as per datasheet.**

Preferred makes of OWS / EWS / PC's are DELL, HP, COMPAQ & IBM etc.

Peripherals for Operator Station, Engineering Work Stations, KVM & Server System

a) Full flat monitors with LED back lighting

b) Key Board

It shall be possible to perform operating interface functions from engineering OPERATING STATION. Assignable function keys shall be provided for execution of command, program etc. Hardware facility shall be provided to set OPERATING STATION in engineer or operator mode. QWERTY type keyboard shall be provided for engineer's functions. QWERTY type Key Board may be offered alternatively for OWS.

c) External DVD/CD Drive

The external DVD/CD drive is a back-up device. The external DVD/CD drive shall have read/write capability and shall be provided with all required hardware interface including error detection and correction facilities.

f) DVD Writer

The DVD writer should be capable to read and write any DVDs as well as CDs. and shall be provided with all required hardware interface including error detection and correction.

g) Software License:

The Bidder shall provide software license for all software being used in DCS / any other electronic / microprocessor based system. The software licenses shall be provided for the project (e.g. organisation or site license) and shall not be hardware / machine-specific. That is, if any hardware / machine is upgraded or changed, the same license shall hold good and it shall not be necessary for Owner to seek a new license / renew license due to upgradation / change of hardware / machine in DCS / electronic / microprocessor based system at site. All licenses shall be valid for the continuous service life of the plant.

In case the software license is dependent on no of points, then quantity to be considered is 30% above the finally implemented points.

h) Software Upgrades

As a customer / owner support, the Bidder shall periodically inform the designated officer of the Owner about the software upgrades / new releases that would be taking place after each system is commissioned and handing over to owner, so that same can be procured & implemented by bidder at site.

The future updated version of any type of software shall be supplied free of cost as and when such software is upgraded, on request by owner until 5 years from the date of commissioning of the unit.

Vulnerability of DCS system Software to Virus

Bidder shall guarantee that the offered DCS system software is not susceptible to any virus and the system has not experienced any such problems in their previous similar installations around the world. In future, if any problem arises in the offered DCS on account of virus, the remedial solution shall be offered to the Owner without any price implication. Bidder shall confirm for the same.

i) Software Documentation and Software Listings

All technical manuals, reference manuals, user's guide etc., in English required for modification / editing / addition / deletion of features in the software of the DCS/ any other microprocessor based control system etc. shall be furnished. The Bidder shall furnish a comprehensive list of all system / application software documentation after system finalisation for Owner's review and approval. The software listings shall be submitted by the Bidder for source code of application software and all special-to-project data files.

j) System Documentation Facility

The system shall have the facility to generate the associated documentation with all required software and hardware tools for viewing and printing drawings and documents.

k) Programming, Diagnostic and Engineering Work Station

The Engineering stations provided with DCS shall have all the function of programming / configuration / modification / reconfiguration and documentation. The features and facilities to be included are as under:-

1. Configuration or re-configuration of a system.
2. Possibility to introduce or modify parameters.
3. Documentation of system configuration.
4. Calculation program functions.
5. Graphic editing programme.

This work station shall be able to design, configure, monitor document or trouble shoot the process activities as desired.

Engineering station shall have capability of on-line and off line programme modification without effecting the performance of the system / process. While on-line, connected to process, the engineering work station shall provide real time tuning and trouble shooting. On off-line, the engineering work station allows control system configuration.

The diagnostic system shall have extensive diagnostic software to identify all failures up to card level as well as field inputs. This shall include failure of power supplies, I / O cards, peripherals controllers etc. Failure of Analogue I / O cards, binary cards / modules shall also be displayed on the Engineering cum diagnostic station. The alarms regarding major subsystems shall be displayed on the alarm OS. Further details shall be available on the Engineer's / Programmer's OS in form of a graphic and in other display formats. The field input faults / failures shall be reported with nature and type of fault / failure clearly identified.

4) GLOBAL POSITIONING SATELLITE SYSTEM (GPS CLOCK)

- GPS shall receive coordinated Universal Time (UTS) transmitted through Global positioning satellite system (GPS) for time synchronization of all numerical relays/DC/HMI.
- GPS shall be completed in all respect including antenna, all cables, processing equipment etc.
- Clock synchronization shall be done for all the relays of the switchboard through respective data concentrator and HMI.
- The resolution of time synchronization shall be ± 1.0 Milli second or better.
- All auxiliary systems and special cables (min.60mtr) required for synchronization of various equipment shall be supplied and commissioned by the bidder.
- GPS connector shall be IRIG-B and connected to Ethernet switches with necessary converters.
- Other parameters shall be as per datasheet.

5) LASER JET PRINTER (A4)

All printers shall be low noise (less than 60dB) type with a minimum of 136 columns. Printing speed shall be a minimum of 300 characters per second. Other parameters shall be as per datasheet.

Minimum requirements of Coloured Laser Jet printer A4

- Printing speed upto 16ppm
- Resolution 600 X 600 dpi
- Memory 8MB (min.)
- External Port 1 no. USB 2.0 port, and Ethernet, Blue tooth interface
- Duty Cycle 5,000 pages per month
- Pages size A4.
- Duplex Printing Automatic

Five sets of print cartridges and five rims of papers of highest size (A4 of the respective printer) shall be provided with each printer provided by bidder.

Preferred makes of printers are HP, Canon, Fuji Xerox, & Epson.

6) UNINTERRUPTIBLE POWER SUPPLY

- UPS shall be powered up with 240V, 1 phase, 50 Hz AC power supply for HMI, printer. UPS shall have back up time of 60 minutes.
- UPS system battery with back up time of 1 hour with a capacity of minimum 2kVA or higher, whichever is required as per system design
- UPS shall have 20% extra capacity above total load requirement of data concentrator, HMI & GPS equipment.

- The equipment shall be self-protecting against all A.C. and D.C. transients, voltage surges and steady state abnormal voltages and currents.
- The procedure for battery sizing calculation shall be generally as per relevant IEEE, considering design margin as 15% and aging factor as 1.25
- For continuous operation at specified ratings, temperature rise of the various components of UPS system shall be limited to the permissible values stipulated in the relevant standards and/or this specification.
- UPS shall have display module indicating voltage, frequency, load percentage, UPS status & battery status.
- UPS shall work at its full capacity even battery is not connected with the system during normal power supply
- All other technical parameters shall be as per datasheet.

7) ETHERNET SWITCH

- Data highway shall be of high speed Ethernet and full duplex configuration. Network shall be built on the industrial grade managed Ethernet switches for better control of data traffic & performance and future expansion. Switch configuration shall be redundant with seamless changeover without any upset in the process or equipment. Failure reporting shall be available at HMI.
- All Ethernet switches to be used in the data concentrator shall be of same type and shall conform the specification requirements.
- Industrial grade managed type Ethernet switches shall be provided with in built diagnostic features, 20% spare ports & inbuilt redundant 24 VDC power supply features and Integrated Security features (IPS, ACL, Firewall). Industrial grade managed type Ethernet switch shall be rack mounted and comply with the IEC 61850 (3) and IEEE 1613 requirements.
- No. of ports shall be decided by bidder as per system architecture requirement.
- Other parameters shall be as per Datasheet

8) LAPTOP

All the Laptop will also be used as pluggable temporary Engineering/programmer's station and operator station functionalities of the Engineering/programming stations mentioned in the specifications shall be provided (including requisite license).

- 1 x windows XP/7/8/10 Professional or latest & proven version of Windows OS with Multimedia
- Minimum 4 hrs battery backup.
- Recovery software tools.
- Sound cards
- Internal speakers -General MS Windows latest, MS-Office Professional, Microsoft Visual Studio, Adobe Acrobat, anti-virus McAfee or equivalent, etc.
- Application engineering & HMI software - to suit project specific requirement.
- Carry Bag, Power Adapter.

- 1024 MB Graphic Accelerator
- Other technical parameters as per datasheet.

Preferred makes of Laptop are DELL, HP, COMPAQ, VAIO (Sony), Lenovo etc.

9) MONITOR

- | | |
|-------------------------|--|
| a) Type | : TFT monitor |
| b) Screen diagonal | : 24-inches |
| c) Display | : LED or better |
| d) Resolution | : 1920 x 1080 or better |
| e) Degree of protection | : IP-30 |
| f) External Controls | : Brightness, contrast, Horizontal / Vertical, amplification & shift |
| g) Power supply | : 100 to 240 V, 50 Hz, 1 phase |
| h) Ambient temperature | : 0-50 O C |
| i) Humidity | : 95% non-condensing |
| j) Version | : To suit industrial application |

10) FO CABLE

- Refer datasheet for minimum requirements.
- The optical fiber cable shall be of single-mode and shall meet characteristics of relevant IEC/IS standards.
- Life expectancy: Fiber Optic cable shall provide a long life expectancy of minimum 25 years under Continuous operation without degradation to optical or mechanical performance.
- The cable shall be of dual jacket & armoured.
- LIU for all the FO cable termination to be consider.
 - a) One no. LIU to be consider with pigtails, connector and suitable patch card to terminate FO cable to LV Switchgear boards for each Ethernet switch.
 - b) Slicing & Terminating all available cores of FO cable in each LIU are in bidder scope.

11) AC TO DC CONVERTER & DC TO DC CONVERTER

AC/DC to DC convertor shall be SMPS based and shall have wide range of AC/DC input voltage (85-264 V AC & 90-350 VDC). It shall have the necessary diagnostic functions like indications for DC OK, automatic overload monitoring etc.

12) CAT 5E/ CAT 6 / CAT 6E CABLE

CAT5E STP/ CAT 6 / CAT 6E or better cable shall be as per ISO/IEC 11801; EN 50288-3-1; IEC61156-5; EIA/TIA 568-B.2 for preparation of LAN network. This cable shall be manufactured, tested and verified to ISO11801 EIA / TIA standard. Wiring shall be of the structured cabling type and shall incorporate patch panels on every floor or as required. Communication cables shall be armoured and routed through HDPE protection pipe as per IS 4984, IS 12235 & TEC.G / CDS-08 / 01 of suitable size.

13) FURNITURE

- Each OWS shall be provided with Glass Top Teak wood / MDF table for mounting Operator Station monitors.
- Each EWS shall be provided with Glass Top Teak wood / MDF table for mounting Engineering Station monitors.
- Each printer to be provided with a table.
- Each OWS & EWS shall be provided with cushioned revolving, independently adjustable seat and back chair.
- Furniture shall be offered as per **Annexure**.

14) DATA CONCENTRATOR PANEL

- Enclosure shall be dust and splash proof, conforming to a degree of protection IP-54. All enclosure frames and load bearing members shall be fabricated using suitable mild steel structural sections or pressed and shaped cold rolled sheet steel of thickness 2.0mm. Frames shall be enclosed in cold rolled sheet steel of thickness 1.6 mm. Doors and covers shall also be of cold rolled sheet steel thickness 1.6 mm. Stiffeners shall be provided wherever necessary. The gland plate thickness shall be 3.0 mm for hot/cold rolled sheet steel and 4.0 mm for non-magnetic material.
- Mounting plate shall be 3.0mm thick
- It should be possible to join adjacent panels with the help of baying kit (if required)
- Each Panel shall be provided with min. 15mm thick anti-vibration pad.
- Each Panel shall be provided with space heater & thermostat arrangement in such a way that space heater is controlled through thermostat.
- CFL and door limit switch in such a way that as soon as the door is opened, CFL switches ON.
- Each panel shall be provided with ISMC 100.
- Height of the Panel excluding ISMC shall not be more than 2000mm.
- The ground bus shall be provided with two-bolt drilling with G.I. bolts & nuts at each end to receive 50 x 6 mm G.I. flats.
- Panels shall be powder coated to provide texture finish.

- Panels shall be powder coated. The thickness of finish coat shall be minimum 80 microns (minimum total DFT shall be 100 microns). However, in case electrostatic process of painting is offered for any electrical equipment, minimum paint thickness of 80 microns shall be acceptable for finish coat.
- Paint shade shall be as per follows:
 - a) Exterior : RAL7032
 - b) Interior : RAL7032
- Wiring shall be done with 1100V grade fire resistance PVC insulated stranded copper conductor of not less than 2.5 Sq.mm cross section for current control circuits and voltage circuits.
- Each wire shall be ferruled by plastic tube with indelible ink print at both end having terminal Block No., terminal numbers, destination number as per approved wiring drawing.
- All wire termination shall be made with insulated sleeve solderless crimping type tinned copper lugs. Wires shall not be tapped or spliced between terminals.
- Wiring shall be neatly bunched in groups by non-metallic cleats or bands. Each group shall be adequately supported along its run to prevent sagging or strain on the termination.
- Colour codes shall be used for wiring as per latest revision of IS: 375.
- Multi-way terminal blocks complete with necessary binding screws and washers for wire connections and marking strip for circuit identification shall be furnished for terminating the panel wiring and outgoing cables. Terminals shall be box-clamp type, 4 sq.mm minimum.
- Not more than two wires shall be connected to one terminal. If necessary, a number of terminals shall be jumpered together to provide wiring points.
- Each terminal shall be identified with designation as per approved schematic. At least 20% of the total number of active terminals shall be furnished as spare in each panel.
- The wiring and terminals shall be so arranged that individual wires of an external cable can be connected to consecutive terminals.
- The terminal blocks shall be located to allow easy access and also to suit floor openings for cable entry.
- The bottom of the terminal block shall be at least 200 mm above the incoming cable gland plate.
- Document holder shall be provided inside the panel door.

15) SERVICES

- Bidder to supply all upgrades of the software package free of cost under the guarantee period. Any bugs encountered during usage shall be rectified. Original media shall be replaced if damaged during usage.
- Support and maintenance for the package, including onsite support shall be provided as and when required during the guarantee period by the contractor/supplier without any additional charges to owner.
- The software supplier shall define if any hardware lock or key diskette floppy forms part of the Software, any such device will be replaced, free of cost, if the same fails to operate during software usage.

V. DOCUMENTS

- 1) The vendors shall furnish two sets of type test reports, with the order acceptance for approval / review by customer. In case any discrepancy or inadequacy is found by the customer during approval, the same shall be resolved by supplier with customer with no binding on BHEL and without any price implication.
- 2) Complete Communication System Architecture shall be furnished along with the offer. The system architecture shall show connectivity between all relays, Data Concentrator, connections to HMI PC and remote DDCMIS/SCADA, time synchronization of all relays and any other interfacing hardware necessary for completion of the system.
- 3) Drawing for looping of MFM, Actual animated SLD/ Scheme that will appear on the HMI screen, alarm schedules of each type of relay to be furnish by Vendor for approval.
- 4) Complete Bill of Material of the system architecture shall be furnished with the offer.
- 5) Bidder to furnish requisite sets as specified in the **Annexure-F**, scheme, datasheet, system architecture, functional design specification, MQP, SAT, FAT etc for approval. Also Bidder may be required to visit for a cross the table discussion & approval at Customer Office.
- 6) Bidder to furnish the sub-vendor list for all bought item like Ethernet switches, FO/Copper cable, LIUs, cable connectors etc for BHEL/customer approval during detail engineering. Customer approved sub-vendor list for some items are enclosed in **Annexure-C**. **All Make of Components shall be supplied as per Customer approved vendor list without any price implication to BHEL.**
- 7) Bidder to furnish the installation CDs for all applicable licensed software for the system in the offered package along with the supplies.

VI. TESTS

All the equipment supplied shall be of type tested quality. Type test reports shall be submitted for review. The panel shall be subjected to the routine test in accordance with the relevant Indian Standards/ IEC. All equipment shall be completely assembled, wired, adjusted and tested at the factory as per the relevant standards of IS/IEC Factory acceptance tests shall also be carried out (FAT).

VII. DOCUMENTS TO BE SUBMITTED IN THE TECHNICAL OFFER

Technical Offer (Technical-Bid)

- 1) Signed & stamped copy of entire specification
- 2) Deviations, if any, to be specifically mentioned in **Annexure-5**.
- 3) Detailed Bill of Material
- 4) System Architecture
- 5) Make & Model Numbers offered for all items mentioned in scope of supply
- 6) Tentative GA drawing of Data Concentrator panel.

- 7) Any other technical document, if required.

ANNEXURE-1
(MAKE OF COMPONENTS)

All equipment/ components are subjected to customer approval. There shall not be any price impact on BHEL due to non-approval of any make considered.

ANNEXURE-2
(PRICE FORMAT)

REFER PAGE -- OF TECHNICAL SPECIFICATION

ANNEXURE-3
(ADDITION/DELETION UNIT PRICES)

SL.No.	Item Description	Unit	Unit price

Note: Bidder to furnish unit price of all components & equipment used in this tender for successful operation of Data Concentrator including commissioning.

ANNEXURE-4
(DOCUMENT DISTRIBUTION SCHEDULE)

SL.No.	Description	Hard Copy	Soft Copy (AUTOCAD) (.dwg)	Soft Copy (.pdf)	CD
1	All Drawings / Documents -First Submission	10	Yes	Yes	NA
2	Final drawings/ documents after approval for distribution purpose (spiral binded)	10	Yes	Yes	4
3	As built drawings/ documents	10	Yes	Yes	4
4	O&M Manual	10	NA	Yes	4
5	Instruction Manual (Commissioning procedure, Data Handbooks, Catalogues etc)	4	NA	Yes	4
6	Performance and Guarantee Test reports	6	NA	Yes	4

Note: All the above documents/ drawings shall be supplied to BHEL as part of contract. Contract closure will not happen without submission of above.

ANNEXURE-5
(DEVIATION SHEET)

Sl. No.	Clause	Page	Description	Bidder's Deviation	Price impact : Yes / NO

ANNEXURE-6
(COMMISSIONING CHARGES)

SL.No.	Details	Unit	Quantity	Unit Price	Total Price
1	LUMP SUM CHARGES PER VISIT FOR DCS (ALL INCLUSIVE)	VISIT	4		
2	DAILY CHARGES FOR DCS COMMISSIONING ENGINEER (LUMP SUM ALL INCLUSIVE)	DAYS	60		


NOTE: Amount payable for data concentrator commissioning engineer per visit to site
= (Visit charge as per sl.no.1 above) x (no. of Visit at site) + (daily charge as per sl. No.2) x (no. of days at site) (to be certified by BHEL)

ANNEXURE-7
(DATASHEET)

REFER PAGE -- OF TECHNICAL SPECIFICATION


ANNEXURE-8
(NUMERICAL RELAY DETAILS & MFM DETAILS)

REFER PAGE -- OF TECHNICAL SPECIFICATION


	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: II
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 2
REV: R0	MASTER SPECIFICATIONS	Page 15 of 555

VOLUME II
SECTION – 2
GENERAL PROJECT INFORMATION

CONSULTANT : PROCON ENGINEERS

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: II
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 2
REV: R0	MASTER SPECIFICATIONS	Page 16 of 555


CONSULTANT : PROCON ENGINEERS

	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: II
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 2
REV: R0	MASTER SPECIFICATIONS	Page 17 of 555


CONTENTS

<u>CLAUSE NO.</u>	<u>DESCRIPTION</u>
1.0	INTRODUCTION
2.0	APPROACH TO SITE
3.0	LAND
4.0	SOURCE OF COAL
5.0	SOURCE OF WATER
6.0	ASH DISPOSAL AREA
7.0	PROJECT INFORMATION

CONSULTANT : PROCON ENGINEERS

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: II
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 2
REV: R0	MASTER SPECIFICATIONS	Page 18 of 555

CONSULTANT : PROCON ENGINEERS

	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: II
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 2
REV: R0	MASTER SPECIFICATIONS	Page 19 of 555

1.0 INTRODUCTION

The proposed 1x 660 MW Bhusawal Thermal Power Project will be set up by Maharashtra State Power Generation Co. Ltd. (MAHAGENCO) in Dipnagar near Bhusawal, Maharashtra, India.

The Bidder shall acquaint himself by a visit to the site, if felt necessary, with the conditions prevailing at site before submission of the bid. The information given herein under is for general guidance and shall not be contractually binding on the Owner. All relevant site data/information as may be necessary shall have to be obtained /collected by the Bidder.

2.0 APPROACH TO SITE

Deepnagar is well connected by rail and road. By road, it is about 8 Km from Bhusawal city. Nearest railway station is at Bhusawal. The nearest Airport is at Aurangabad. The nearest sea port is at Mumbai. The site is located on the Mumbai-Nagpur Highway.

3.0 LAND

Bhusawal Thermal Power Plant is already having 1x62.5 MW + 2x210 MW Units and Two (2) Units of 500 MW each are under execution stage. About 108.94 Hectares of land is acquired by MAHAGENCO near existing TPS. It is proposed to install 1x 660 MW unit on this land.


4.0 SOURCE OF COAL

Indian coal would be sourced from Machaakata coal blocks in Orissa state. The Coal will be received at Plant site directly by rail. The coal from the railway wagons would be unloaded by means of wagon tippers and will be either bunkered or stacked in the stock pile at site.

5.0 SOURCE OF WATER

The main source of water is considered Ozerkheda Reservoir which is located at around 18 km from plant site.

CONSULTANT : PROCON ENGINEERS

	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: II
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 2
REV: R0	MASTER SPECIFICATIONS	Page 20 of 555


6.0 ASH DISPOSAL AREA

The ash generated from 1 x 660 MW unit shall be disposed off in slurry form to the existing Ash Pond located at Velhala, approx. 12 Km from the site.


7.0 PROJECT INFORMATION

7.1	Client / Owner	:	Maharashtra State Power Generation Co. Ltd.
7.2	Consultant	:	Procon Engineers, Navi Mumbai (Division of Nimoto Consulting Engineers Pvt. Ltd.)
7.3	Project Title	:	BHUSAWAL T.P.S. UNIT – 6 : 1X660 MW
7.4	Location	:	Dipnagar, Near Bhusawal, Maharashtra, India
7.5	Nearest railway station	:	Bhusawal
7.6	Nearest Airport	:	Aurangabad
7.7	Nearest Harbour	:	Mumbai
7.8	Access Roads	:	NH 6 (Mumbai-Nagpur Highway)
7.9	Elevation above MSL	:	210 M
7.10	Longitude/latitude	:	75° 51' 10" East / 21° 02' 30" North
7.11	Seismic Zone	:	Zone III as per IS:1893
7.12	<u>AMBIENT TEMPERATURE</u>		
7.12.1	Mean of daily maximum temperature	:	48.25 °C (during May)
7.12.2	Mean of daily minimum temperature	:	18 °C (during January)
7.12.3	Highest temperature recorded	:	48.7°C


CONSULTANT : PROCON ENGINEERS

	MAHARASHTRA STATE POWER GENERATION CO. LTD.		Volume: II
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1		Section – 2
REV: R0	MASTER SPECIFICATIONS		Page 21 of 555
7.12.4	Lowest temperature recorded	: 13°C	
7.13	Wet bulb temperature	: 27°C (Maximum)	
7.14	Rainfall	: 112 mm average annually	
7.15	Wind Speed	: 0 to 39 Km/hr	
7.16	Wind direction	: East North East to West South West	
	<u>ELECTRICAL</u>		
7.17	<u>MAIN POWER SOURCE FROM GRID</u>		
7.17.1	Rated Voltage	: 400kV	
7.17.2	Voltage variation	: $\pm 10\%$	
7.17.3	Frequency Variation	: $\pm 5\%$	
7.17.4	Rated Short Circuit Level	: 50 kA, Three Phase Symmetrical	
7.18	<u>AUXILIARY POWER SUPPLY</u>		
	Auxiliary electrical equipment shall be suitable for operation on the following supply system:		
7.18.1	Motors above 1000 kW & other Power devices	: 11kV, 3Ph, 3wire, 50Hz system	
7.18.2	Motors below 1000 kW & above 160kW & other power devices	: 3.3kV, 3 ph, 3 wire 50 Hz, Non Effectively earthed	
7.18.3	Motors upto 160 kW & other power devices	: 415V, 3 ph, 4 wire 50 Hz	
7.18.4	Motor Starting Methods	: Direct on Line	
7.18.5	(a) Lighting fixtures, Space heaters, and single Phase motors	: 240V, 1 phase, 50 Hz Supply through suitably rated transformers to limit the short circuit level to 9kA – 1 sec.	


CONSULTANT : PROCON ENGINEERS

	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: II
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 2
REV: R0	MASTER SPECIFICATIONS	Page 22 of 555
<p>(b) Control & Instrumentation : 240V, 1 Phase, 50 Hz from UPS</p>		
7.18.6	<p>Short circuit levels of 11kV, 3.3 kV and 415V system equipments</p> <p>The equipment shall be suitable for the following short circuit levels</p>	
	<p>(a) 11kV Switchgears : 44 kA/3 sec</p>	
	<p>(b) 3.3kV Switchgears : 40 kA/3sec</p>	
	<p>(c) 415V PCC/ PMCC/ MCC : 50 kA/1sec</p>	
	<p>(d) Lighting Distribution Boards & 240V A.C. supply : 9 kA/1sec</p>	
7.18.7	<p>Auxiliary DC supply</p> <p>The auxiliary DC supply will be used for control, indication & protection, Turbine lube oil system, AVR, Emergency DC lighting of power plant and Control & Instrumentation etc.</p>	
	<p>(a) Voltage : (i) 220V DC for utility purpose</p> <p>(ii) 24V DC for Control and Instrumentation</p>	
	<p>(b) Voltage variation : + 10 %, - 15 %</p>	
7.18.8	<p>Emergency power supply</p>	
	<p>(a) Purpose : (i) Standby power to normal incomer of emergency MCC</p> <p>(ii) Alternate power source to Fire water Pumps</p>	
	<p>(b) Rated voltage and frequency : 415 V, 3 phase, 3 wire, 50 Hz.</p>	

CONSULTANT : PROCON ENGINEERS

	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: II
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 2
REV: R0	MASTER SPECIFICATIONS	Page 23 of 555
<p>7.18.9 UPS power supply</p> <p>(a) Purpose : (i) Vital process loads (ii) Critical lighting (iii) Control and Instrumentation (iv) Office for LAN power supply/Server etc.</p> <p>(b) Rated Voltage : 415V, 3 ph, neutral/240V single phase, 50Hz</p> <p>7.19 The variation in voltage and frequency may be $\pm 10\%$ and $\pm 5\%$ respectively. The combined voltage and frequency variation may be $\pm 10\%$. All devices shall be suitable for continuous operation over the entire range of voltage variation without any change in their performance</p> <p>7.20 Power socket shall be 415V AC, 50 Hz, 4 pin 32/63 Amps. Power socket outlets for portable tools, hand lamps etc shall be 240 volts, single phase, 3 pin, metal clad industrial type</p> <p>7.21 All electrical equipment shall be designed for the following ambient conditions</p> <p>(a) Maximum ambient temperature : 50°C</p> <p>(b) Minimum Ambient temperature : 13°C</p>		

CONSULTANT : PROCON ENGINEERS

 MAHAGENCO Maharashtra State Power Generation Co. Ltd.	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume: II
	BID SPECIFICATION NO.: DG/BSL U-6/2011/T-1	Section – 3
REV: R0	MASTER SPECIFICATIONS	Page 24 of 555

CONSULTANT : PROCON ENGINEERS

ANNEXURE-B

ETHERNET SWITCH & ACCESSORIES REQUIREMENT

S. NO.	MATERIAL CODE	DESCRIPTION	DESIGNATION	QUANTITY				FEEDER LOCATION
				24 PORT	16 PORT	POWER SUPPLY	SERIAL CONVERTOR	
1	ELBSWLSB001	415V DG MAIN SWBD	0DG	0	1	1	1	4F3
2	ELBSWLSB002	EMERGENCY MCC	6DG	0	1	1	1	21R4
3	ELBSWLSB003	220V MAIN DCDB	6FA	0	0	0	0	N/A
4	ELBSWLSB004	415V BOILER SERVICE PMCC	6DB	1	0	1	1	13F1
5	ELBSWLSB005	415V BLR VALVE & DAMPER DB	6HB	0	0	0	0	N/A
6	ELBSWLSB006	415V BOILER ACDB	6HC	0	1	1	1	12F6
7	ELBSWLSB007	415V TURBINE SERVICE PMCC	6DA	1	0	1	1	13R3
8	ELBSWLSB008	UNIT SERVICE ACDB	6QA	0	1	1	1	8R1
9	ELBSWLSB009	415V TURBINE VALVE MCC	6KB	0	0	0	0	N/A
10	ELBSWLSB012	ESP ID FAN AREA MCC	6HD	0	0	0	0	N/A
11	ELBSWLSB013	ESP AC & VENT MCC	6TB	0	0	0	0	N/A
12	ELBSWLSB014	415V STATION SERVICE PMCC	0DA	1	0	1	1	11R3
13	ELBSWLSB015	VENTILATION MCC	6TA	0	1	1	1	10R4
14	ELBSWLSB016	AIR CONDITIONING MCC	0TA	0	1	1	1	14R1
15	ELBSWLSB017	MISC SERVICE MCC	0QA	0	1	1	1	6R5
16	ELBSWLSB018	415V FIRE WATER P/H PMCC	0DE	0	1	1	1	13R3
17	ELBSWLSB019	PTP MCC	0SD	0	0	0	0	N/A
18	ELBSWLSB020	220V RAW WATER & CW DCDB	0FA	0	0	0	0	N/A
19	ELBSWLSB021	415V SERVICE BUILDING PMCC	0DD	0	1	1	1	2F3
20	ELBSWLSB022	415V AIR WASHER MCC	6SA	0	1	1	1	8F6
21	ELBSWLSB023	415V LIGHTING PCC	0DF	0	1	1	1	3F3
22	ELBSWLSB024	415V FUEL OIL P/H PMCC	0DJ	0	1	1	1	14R1
23	ELBSWLSB025	RAW WATER INTAKE P/H SWBD	0DK	0	1	1	1	4F1
24	ELBSWLSB026	415V CLARIFIED WATER P/H PMCC	0DH	0	1	1	1	16F3
25	ELBSWLSB027	ETP MCC	0SE	0	0	0	0	N/A
26	ELBSWLSB028	STP MCC	0SF	0	0	0	0	N/A
27	ELBSWLSB029	415V DM PLANT PMCC	0DB	0	1	1	1	11R4
28	ELBSWLSB030	415V CPU MCC	0SA	0	1	1	1	12R5
29	ELBSWLSB031	COOLING WATER MCC	0SB	0	0	0	0	N/A
30	ELBSWLSB034	415V WELDING SWBD	0DL	0	1	1	1	3F1
31	ELBSWLSB035	ESP LT MAIN SWBD-1	6DC	0	1	1	1	8R3
32	ELBSWLSB036	ESP ACP-1	-	0	1	1	1	9F3
33	ELBSWLSB037	ESP LT MAIN SWBD-2	6DD	0	1	1	1	8R3
34	ELBSWLSB038	ESP ACP-2	-	0	1	1	1	11F3
35	ELBSWLSB039	ESP LT MAIN SWBD-3	6DE	0	1	1	1	8R3
36	ELBSWLSB040	ESP ACP-3	-	0	1	1	1	8F3
37	ELBSWLSB041	ESP LT MAIN SWBD-4	6DF	0	1	1	1	7R3
38	ELBSWLSB042	ESP ACP-4	-	0	1	1	1	10F3
39	ELBSWLSB043	ESP LT MAIN SWBD-5	6DH	0	1	1	1	8R3
40	ELBSWLSB044	ESP ACP-5	-	0	1	1	1	9F3
41	ELBSWLSB045	ESP LT MAIN SWBD-6	6DJ	0	1	1	1	7R3
42	ELBSWLSB046	ESP ACP-6	-	0	1	1	1	11F3
43	ELBSWLSB047	415V SOOT BLOWER MCC	-	0	0	0	0	N/A
44	ELBSWLSB049	AHP PMCC-2	0DN34	0	1	1	1	7R4
45	ELBSWLSB050	CHP PMCC-1	0DM12	0	1	1	1	10R4
46	ELBSWLSB051	CHP PMCC-2	0DM34	0	1	1	1	13F3
47	ELBSWLSB052	CHP PMCC-3	-	0	1	1	1	28F2
48	ELBSWLSB058	DCDB CHP	0BUS	0	0	0	0	N/A
49	ELBSWLSB059	DCDB AHP	0BUR	0	0	0	0	N/A

Contents

1.	TECHNICAL DATASHEET OF DATA CONCENTRATOR	3
2.	TECHNICAL DATASHEET OF HMI SOFTWARE	4
3.	TECHNICAL DATASHEET OF HMI CPU	5
4.	TECHNICAL DATASHEET OF HMI MONITOR.....	6
5.	TECHNICAL DATASHEET OF LASER JET PRINTER	7
6.	TECHNICAL DATASHEET OF LAPTOP.....	8
7.	TECHNICAL DATASHEET OF FOLDABLE MONITOR	9
8.	TECHNICAL DATASHEET OF GPS CLOCK.....	10
9.	TECHNICAL DATASHEET OF DIGITAL DISPLAY UNIT	11
10.	TECHNICAL DATASHEET OF FIBER OPTIC CABLE	12
11.	TECHNICAL DATASHEET OF LAN CABLE.....	13
12.	TECHNICAL DATASHEET OF MODBUS TO ETHERNET CONVERTER	14
13.	TECHNICAL DATASHEET OF LINE INTERFACE UNIT	15
14.	TECHNICAL DATASHEET OF FURNITURE FOR HMI & PRINTER.....	16

1. TECHNICAL DATASHEET OF DATA CONCENTRATOR

DESCRIPTION	TECHNICAL DATA
Make	Advantech
Model No.	IPC510/610
Processor	I5
RAM	8GB
Operating Window	Windows 10,64 Bit
HDD	1 TB
Drive Bay	3.5"
Cooling	Fan & Air Filter
Front I/O Interface	USB, PS/2
Miscellaneous	
LED Indicators	Power, HDD, and Power Voltage Status
Rear panel	Backplane Version: one 9 pin D-Sun Opening
	Mother board Version: Five 9 pin D-Sub & one 68-pin SCSI Openings
Environment	
Operating Temp	0-40°C
Vibration	1Grms
Relative Humidity	10 to 85% non-condensing
Shock	10G (With 11ms duration, half sine wave)
Physical	
Dimension	482x177x479mm
Weight	15 kg

ABOVE MENTIONED VALUES FOR PARAMETERS ARE MINIMUM. EQUIVALENT OR BETTER SPECIFICATION IS ALSO ACCEPTABLE

2. TECHNICAL DATASHEET OF HMI SOFTWARE

DESCRIPTION	TECHNICAL DATA
Software Make	AS PER CUSTOMER APPROVED VENDORS
No. of operator stations configured / supported	1 nos.
No. of printers For alarm /logs/ reports/ color copies	1 no.
Length of data highway offered/supported	Upto 5Kms- Ring Topology, SM Optic Fibre
No. of Total Relay Communicate	276
SOFTWARE for SCADA PC	
Specify the operating system	Windows 10,64 Bit
Anti-Virus Software	Included for one year
Basic (System)Software	Schneider
Type of basic software	SCADA Software
Version	Latest
Availability of graphics builder package	Yes
Availability of alarm/event handling package	Yes
Availability of trend (Real / history) package	Yes
Availability of shift / daily/ monthly log package	Yes
Possibility of trend retrieval on media and analysis later	Yes
Is graceful shutdown of the system mandatory	No
Time taken to reboot an operation station	
After graceful shutdown	2-5min
After power outage	2-5min

ABOVE MENTIONED VALUES FOR PARAMETERS ARE MINIMUM. EQUIVALENT OR BETTER SPECIFICATION IS ALSO ACCEPTABLE

3. TECHNICAL DATASHEET OF HMI CPU

DESCRIPTION	TECHNICAL DATA
Make	Advantech
Model No.	IPC510/610
Processor	I5 Processor
RAM	4GB
Operating Window	Window 10,64 Bit
HDD	500GB
Drive Bay	3.5"
Cooling	Fan & Air Filter
Front I/O Interface	USB, PS/2
Miscellaneous	
LED Indicators	Power, HDD, and Power Voltage Status
Rear panel	Backplane Version: one 9 pin D-Sun Opening
	Mother board Version: Five 9 pin D-Sub & one 68-pin SCSI Openings
Environment	
Operating Temp	0-40°C
Vibration	1Grms
Relative Humidity	10 to 85% non-condensing
Shock	10G (With 11ms duration, half sine wave)
Physical	
Dimension	482x177x479mm
Weight	15 kg

ABOVE MENTIONED VALUES FOR PARAMETERS ARE MINIMUM. EQUIVALENT OR BETTER SPECIFICATION IS ALSO ACCEPTABLE

4. TECHNICAL DATASHEET OF HMI MONITOR

DESCRIPTION	TECHNICAL DATA
Make	HP/Dell/Equivalent
Panel type	LED Backlight
Viewable image area	21.5" inches
Viewing angle	Up to 178° horizontal / 178° vertical
Brightness	250cd/m ²
Contrast ratio	5000: 1
Response ratio	5ms with on/off
Aspect Ratio	16:9
Native resolution	1920x1080@60 Hz
Input signal	1VGA port, 1HDMI port
Input power	100 to 240VAC, 50 or 60Hz
Power Consumption	28.5W (max), 22.5W (normal), 0.5W (standby)
Dimensions (W×D×H)	With Stand: (16.45x22.34x7.51 inches) Typical
Weight without stand assembly	4.5Kgs Approx
Stand	Tilt
Environmental compliance	ENERGY STAR, EPEAT Silver
Quantity	As per Approved System Architecture

ABOVE MENTIONED VALUES FOR PARAMETERS ARE MINIMUM. EQUIVALENT OR BETTER SPECIFICATION IS ALSO ACCEPTABLE

5. TECHNICAL DATASHEET OF LASER JET PRINTER

DESCRIPTION	TECHNICAL DATA
Make	Canon/HP/Equivalent
Type	A4 Color Laser Jet
Memory Std	8MB SDRAM
Print Speed (Black)	Up to 16ppm
Print Speed (Color)	Up to 4ppm
Resolution	Up to 600X600dpi resolution
Interface	10/100Base-TX Ethernet, USB 2.0
Paper Handling Paper input	Standard input tray: 150 sheets 50 sheet multipurpose tray
Power Supply	220 to 240VAC (+/- 10%), 50Hz (+/- 2 Hz)
Power Consumption	Standby < 18.5W & Printing < 1070W
Acoustics	
Pressure emissions	56dB (A)
Temperature.	15-32°C
Quantity (No.)	As per Approved System Architecture

ABOVE MENTIONED VALUES FOR PARAMETERS ARE MINIMUM. EQUIVALENT OR BETTER SPECIFICATION IS ALSO ACCEPTABLE

6. TECHNICAL DATASHEET OF LAPTOP

DESCRIPTION	TECHNICAL DATA
Make	DELL/HP/Equivalent
Basic Information	
Operating System	Window 10, 64 bit
Display	
Resolution	1366x768
Display Size	15.6 inch
Display Technology	HD LED Backlit display with true life
Connectivity	
Wireless Connectivity	Wi-Fi , Bluetooth
Connectivity	2xUSB2.0, 1xUSB3.0, HDMI
Pointing Device	Touchpad
Memory	
RAM Included	8GB
RAM Type	DDR3
RAM Speed	1600mhz
Physical Specifications	
Laptop Weight	Approx: 2.4kg
Laptop Dimension	381.4 x 267.6 x 25.6mm
Processor	
Processor Model Name	Intel core i3
Clock speed	1.7Hz
Storage	
Hard drive Capacity	500GB
Hard drive Speed	5400rpm
Laptop Bag	DELL/HP
Battery Charger	AS per OEM Spec

ABOVE MENTIONED VALUES FOR PARAMETERS ARE MINIMUM. EQUIVALENT OR BETTER SPECIFICATION IS ALSO ACCEPTABLE

7. TECHNICAL DATASHEET OF FOLDABLE MONITOR

DESCRIPTION	TECHNICAL DATA
Make	PARASHA/Adaptek/Equivalent
Basic Information	
Device Type	KVM console - 19" TFT
Built-in Devices	Keyboard, touchpad
Native Resolution	1280 x 1024
Resolution	1366x768
Response Time	12 ms
Display Technology	LCD, Bright 19" Active Matrix TFT Display
Connectivity	
Interface	Keyboard / mouse / video
Power	
Power Supply	External
Manufacturer Warranty	
Service & Support	1 year warranty
Service & Support Details	Limited warranty - 1 year
Physical Specifications	
Dimensions (W x D x H)	18.3 in x 18.9 in x 1.7 in
Height (Rack Units)	1U
Environmental Parameters	
Min Operating Temperature	32°F
Max Operating Temperature	122°F

ABOVE MENTIONED VALUES FOR PARAMETERS ARE MINIMUM. EQUIVALENT OR BETTER SPECIFICATION IS ALSO ACCEPTABLE

8. TECHNICAL DATA SHEET OF GPS CLOCK

DESCRIPTION	TECHNICAL DATA
Make	Masibus/Sertel/Equivalent
Model	MC-1-DH
Power Supply	110/220 VDC/VAC
Power Consumption	<15W
Features	
	Synchronization software for Server & Client
	Support synchronization of IEC61850 Compliant Devices Via NTP & SNTP Output
	2 NTP Ports
	IRIG-B TTL
User Interface	
Display	6 Digits, 14mm Seven Segment LED Display
Status LEDs	Power, 1PPs, Watchdog, Event, GPS Locked
Configuration Programming	Ethernet Parameters and display parameters using TELNET (Ethernet RJ45 port)
Antenna	
Type	Active L1, GPS, 30 dB gain
Ingress Protection	IP67
Operating Temp	-40° to +45° C
Antenna Cable length	100 Meter
GPS Receiver	
Tracking	12 Parallel channels
Output type	
IRIG-B TTL	TTL into 50 ohm
Protocol Support	NTP V3, SNTP, SNMP V2
Physical Characteristic	
Enclosure	Din Rail (35mm) Panel Mounting
Size	72 H×144 W×140 D mm
Weight	800 gm (Approx.)

ABOVE MENTIONED VALUES FOR PARAMETERS ARE MINIMUM. EQUIVALENT OR BETTER SPECIFICATION IS ALSO ACCEPTABLE

9. TECHNICAL DATASHEET OF DIGITAL DISPLAY UNIT

DESCRIPTION	TECHNICAL DATA
Make	Masibus/Sertel/Equivalent
Model	DDU-TDC
Power Supply	90-264V AC, 47-63Hz, 120-370V DC
Power Consumption	<10W
Operating Temperature	0°C to 55°C
Storage Temperature	-20 to 80°C
Humidity	20 to 90% RH
Degree of Protection	IP20
No of Digit	6
No of Display	7 Segment
Display Colors	Red
Dimension	175Hx665Wx60
Weight	3.8 Kg
Mounting	Panel mount
Port	SNTP/NTP port
Protocol	IRIG-B TTL

ABOVE MENTIONED VALUES FOR PARAMETERS ARE MINIMUM. EQUIVALENT OR BETTER SPECIFICATION IS ALSO ACCEPTABLE

10. TECHNICAL DATASHEET OF FIBER OPTIC CABLE

DESCRIPTION	TECHNICAL DATA	
Make	Finolex/Aksh/Equivalent	
Application	Suitable for Indoor/Outdoor Local Area Network System	
Description	Central Loose Tube with Jelly Compound	
Standards	ISO 11801, IEC 60793-1/60794-1-2	
Environmental		
Operating Temperature	-20°C to +50°C	
Storage Temperature	-40°C to +50°C	
Jacket Material	FRLS	
Mechanical		
Fiber Count	6	
Outer Diameter(mm)	9 ± 0.3 (Tentative)	
Thickness of Jacket	1.8 ± 0.2 (Tentative)	
Nominal Cable Weight(kg/km)	95(Approx.)	
Pulling Tension	Short Term – 2000, Long Term - 1000	
Crush Load (N/100mm)	2000	
Bend Radius (mm)	Short Term – 20D, Long Term- 10D	
Color Code	BL-Blue, OR-Orange, GR-Green, BR-Brown, Gy-Grey,WH-White	
Optic Fiber Characteristic		
Fiber Type	62.5um	125um
Operational Wavelength	850nm	1300nm
Maximum Attenuation (db/km)	3.5	1.5
Minimum Bandwidth (Mhz-km)	200	600

ABOVE MENTIONED VALUES FOR PARAMETERS ARE MINIMUM. EQUIVALENT OR BETTER SPECIFICATION IS ALSO ACCEPTABLE

Characteristic Single-Mode		
Fiber-Type & Refractive Index	9/125/ G.652D	1.4670/1.4675
Model-Field/Cladding Diameter	9.2 ± 0.4	125 ± 0.7
Wavelength(nm)	1310	1550
Dispersion	≤3.5	≤1.8
PMD (ps/km)	≤0.2	
Cable Cut-off Wavelength (nm)	≤1260	

11. TECHNICAL DATASHEET OF LAN CABLE

DESCRIPTION	TECHNICAL DATA
Make	D-Link/Equivalent
Conductor metal	23 AWG Solid bare copper
Color code	Gray±
Cable diameter	6.1 mm nominal
Insulation material	High Density Polyethylene
Mutual capacitance	<5.6nF/100m
Characteristic impedance	100ohm ± 6 ohm
Conductor resistance	<9.38 ohm/100m
Temp range	-20'C+70' C
No of Wires	8 wires inside (4 pair wire) 1-2 (White-orange stripe & orange) 4-5 (White-Blue stripe & Blue) 3-6 (White-Green Stripe & Green) 7-8 (White-Brown Stripe & Brown)
Sheath	FR-PVC Insulation thickness 0.2mm nominal
Standards	TIA/EIA 568-C and ISO/IEC 11801Class E

ABOVE MENTIONED VALUES FOR PARAMETERS ARE MINIMUM. EQUIVALENT OR BETTER SPECIFICATION IS ALSO ACCEPTABLE

12. TECHNICAL DATASHEET OF MODBUS TO ETHERNET CONVERTER

DESCRIPTION	TECHNICAL DATA
Make	ORing/D-Link/Eq.
Model	IDS-312L
Power Supply	Dual 12-48VDC (works on parallel redundant supply in 220 VDC to 24 VDC Converter)
Operation Mode	RS-232/422/485
Pin Definition	
RS-232	DCD, RXD, TXD, DTR, GND, DSR, RTS, CTS, RI
RS-422	Tx-, Tx+, Rx+, Rx-, GND
RS-485	4 wire: Tx-, Tx+, Rx+, Rx- 2 wire: Data-, Data+
Network Protocol	ICMP, IP, TCP, UDP, DHCP, BOOTP, SSH, DNS, SNMP V1/V2c, HTTPS, SMTP
Power consumption (Typ.)	1.44 W
Environmental	
Operating humidity	5% to 95% Non-condensing
Storage Temp./Operating Temp.	-40 to 85°C (-40 to 185°F) / -40 to 70°C (-40 to 158°F)
Quantity (No.)	As per Approved System Architecture
Physical Characteristics	
Enclosure	IP-30
Dimension (W x Dx H)	45W x 81D x 95H mm
Weight (g)	316g

ABOVE MENTIONED VALUES FOR PARAMETERS ARE MINIMUM. EQUIVALENT OR BETTER SPECIFICATION IS ALSO ACCEPTABLE

13. TECHNICAL DATASHEET OF LINE INTERFACE UNIT(LIU)

Technical Data	Description
Make	UL Group/Eq.
Features	
1. MS with Powder Coating.	Yes.
2. Mounting	Din Rail
3. 3 Port SC Duplex Adapter Panel	Yes
4. 6 SC Simplex Pigtails	
5. Allow max 2 cables entry at top & bottom.	Yes
6. High impact resistance splicing tray.	Yes
Mechanical & Physical	
1. Dimensions	60H x 130w x 100D
2. Ambient Temp.	0-70 egree
3. Relative Humidity	95% (Non condensed type)

ABOVE MENTIONED VALUES FOR PARAMETERS ARE MINIMUM. EQUIVALENT OR BETTER SPECIFICATION IS ALSO ACCEPTABLE

14. TECHNICAL DATASHEET OF FURNITURE FOR HMI & PRINTER

Technical Data	Description
Furniture Details	Wooden Type
5. Overall Dimension	750 (H) x 1000 + 1450 (W) x 600 (D) mm
6. Construction Details	Wooden
7. Material	
a. Desktop	25 mm thick TOP
b. Tray for Key Board	Yes
c. Table Drawer	Yes
d. Cable Entry	Bottom
Furniture color paint shade	
1. External color	Furniture color shade shall be with match of color shade of control room furniture.
2. Internal color	Furniture color shade shall be with match of color shade of control room furniture.
Electrical Items	As required

Size mentioned is minimum. It shall be suitable for EWS, OWS & Printer offered

ABOVE MENTIONED VALUES FOR PARAMETERS ARE MINIMUM. EQUIVALENT OR BETTER SPECIFICATION IS ALSO ACCEPTABLE

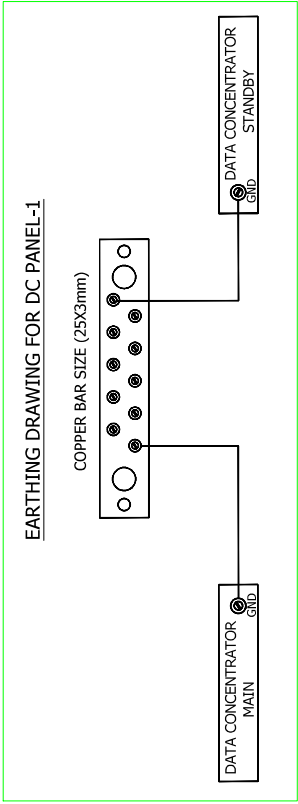
NUMERICAL RELAY & MFM BOARD WISE - BHUSAWAL

S. NO.	DESCRIPTION	DESIGN ATION	LOCATION	ACB I/C & B/C	ACB O/G	BUS PT PMCC	MOTOR FEEDER	DG I/C & TIE	MFM
				P14DB15D3B0020E	P14NB15B3B0020E	P94VB15B3B0020E	P24NM16A6C0620A	P346916A6S0380M	ELITE-445
1	415V DG MAIN SWBD	0DG	DG BUILDING			1		3	3
2	EMERGENCY MCC	6DG	LV SWGR ROOM 12MTR			1	9	3	3
3	415V BOILER SERVICE PMCC	6DB	BOILER MCC ROOM 27.5MTR	3	3	2	9	1	3
4	415V BOILER ACDB	6HC	BOILER MCC ROOM 27.5MTR	3					2
5	415V TURBINE SERVICE PMCC	6DA	SWGR ROOM 3.5MTR	3	3	2	7		2
6	UNIT SERVICE ACDB	6QA	LV SWGR ROOM 12MTR	3					2
7	415V STATION SERVICE PMCC	0DA	LV SWGR ROOM 12MTR	3	7	2	6	1	3
8	VENTILATION MCC	6TA	BOILER MCC ROOM 27.5MTR	3					2
9	AIR CONDITIONING MCC	0TA	SWGR ROOM 3.5MTR	3					2
10	MISC SERVICE MCC	0QA	SWGR ROOM 3.5MTR	3					2
11	415V FIRE WATER P/H PMCC	0DE	RAW WATER P/H	3		2	6		2
12	415V SERVICE BUILDING PMCC	0DD	LV SWGR ROOM 12MTR	3	3	2			2
13	415V AIR WASHER MCC	6SA	SWGR ROOM 3.5MTR	3					2
14	415V LIGHTING PCC	0DF	LV SWGR ROOM 12MTR	3		2			2
15	415V FUEL OIL P/H PMCC	0DJ	FUEL OIL PRESSURISING P/H	3		2	3		2
16	RAW WATER INTAKE P/H SWBD	0DK	RAW WATER INTAKE P/H	3		2	4		2
17	415V CLARIFIED WATER P/H PMCC	0DH	CLARIFIED WATER P/H	3		2	6		2
18	415V DM PLANT PMCC	0DB	DM PLANT	3	5	2			2
19	415V CPU MCC	0SA	DM PLANT	3					2
20	415V WELDING SWBD	0DL	BOILER MCC ROOM 27.5MTR	1		1			1
21	ESP LT MAIN SWBD-1	6DC	ESP CONTROL ROOM	3	3	2			2
22	ESP ACP-1	-	ESP CONTROL ROOM	3					2
23	ESP LT MAIN SWBD-2	6DD	ESP CONTROL ROOM	3	3	2			2
24	ESP ACP-2	-	ESP CONTROL ROOM	3					2
25	ESP LT MAIN SWBD-3	6DE	ESP CONTROL ROOM	3	3	2			2
26	ESP ACP-3	-	ESP CONTROL ROOM	3					2
27	ESP LT MAIN SWBD-4	6DF	ESP CONTROL ROOM	3	3	2			2
28	ESP ACP-4	-	ESP CONTROL ROOM	3					2
29	ESP LT MAIN SWBD-5	6DH	ESP CONTROL ROOM	3	3	2			2
30	ESP ACP-5	-	ESP CONTROL ROOM	3					2
31	ESP LT MAIN SWBD-6	6DJ	ESP CONTROL ROOM	3	3	2			2
32	ESP ACP-6	-	ESP CONTROL ROOM	3					2
33	AHP PMCC-2	0DN34		3		2			2
34	CHP PMCC-1	0DM12		3		2	4		2
35	CHP PMCC-2	0DM34		3		2	4		2
36	CHP PMCC-3	-		3		2	4		2
37	AHP PMCC-1			3		2	7		2
38	FGD PCC	6DK	FGD CONTROL ROOM	3		2			2
39	FGD MCC	6QB	FGD CONTROL ROOM	3		2			2
40	GYP SUM MCC	6QC	FGD CONTROL ROOM	3		2			2
41	LIMESTONE MCC	6QD	FGD CONTROL ROOM	3		2			2
42	FGD EMERGENCY MCC	6DL	FGD CONTROL ROOM	3		2			2
43	WATER SYSTEM A/C VENTILATION MCC	6TB	FGD CONTROL ROOM	3		2			2
				121	39	55	60	2	83

EARTHING DRAWING FOR DC PANEL- 1 TO 5

TENTATIVE

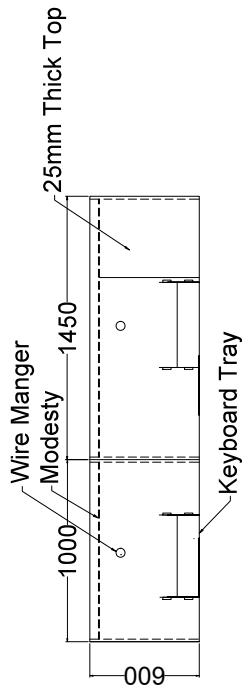
EARTH BUSBAR SHALL BE AS PER SPECIFICATION MENTIONED.
SAME ARRANGEMENT SHALL BE PROVIDED IN ALL DATA
CONCENTRATOR PANEL



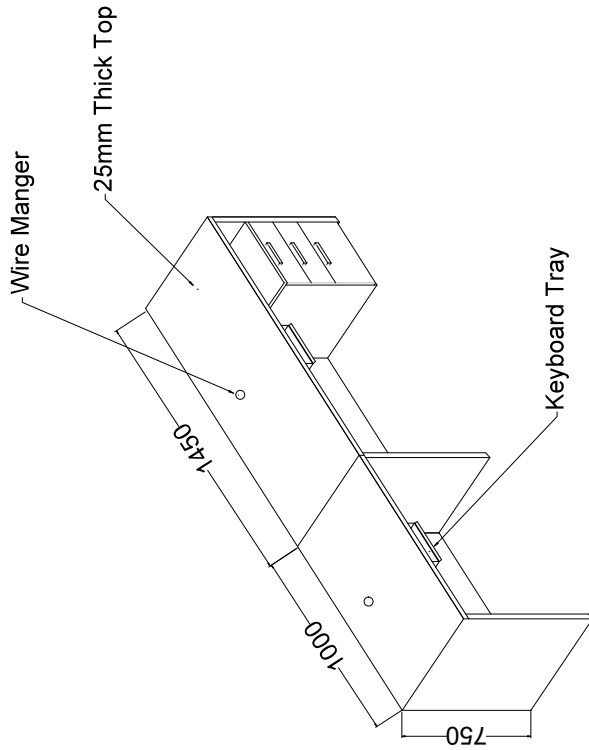
FURNITURE DRAWING

TENTATIVE

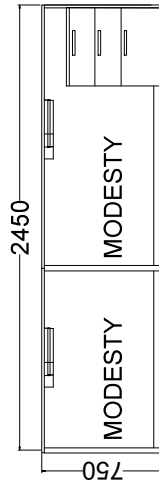
QUANTITY SHALL BE AS PER SPECIFICATION



PLAN VIEW



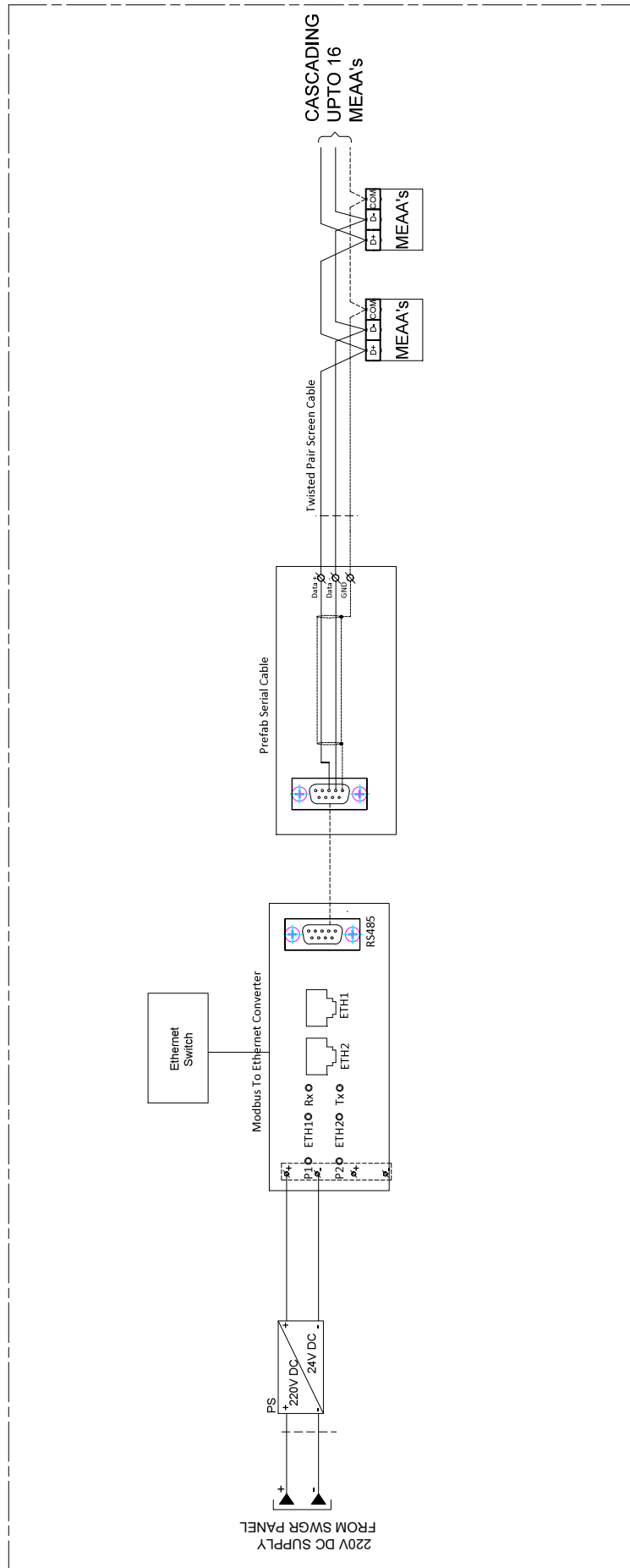
ISOMETRIC VIEW



ELEVATION

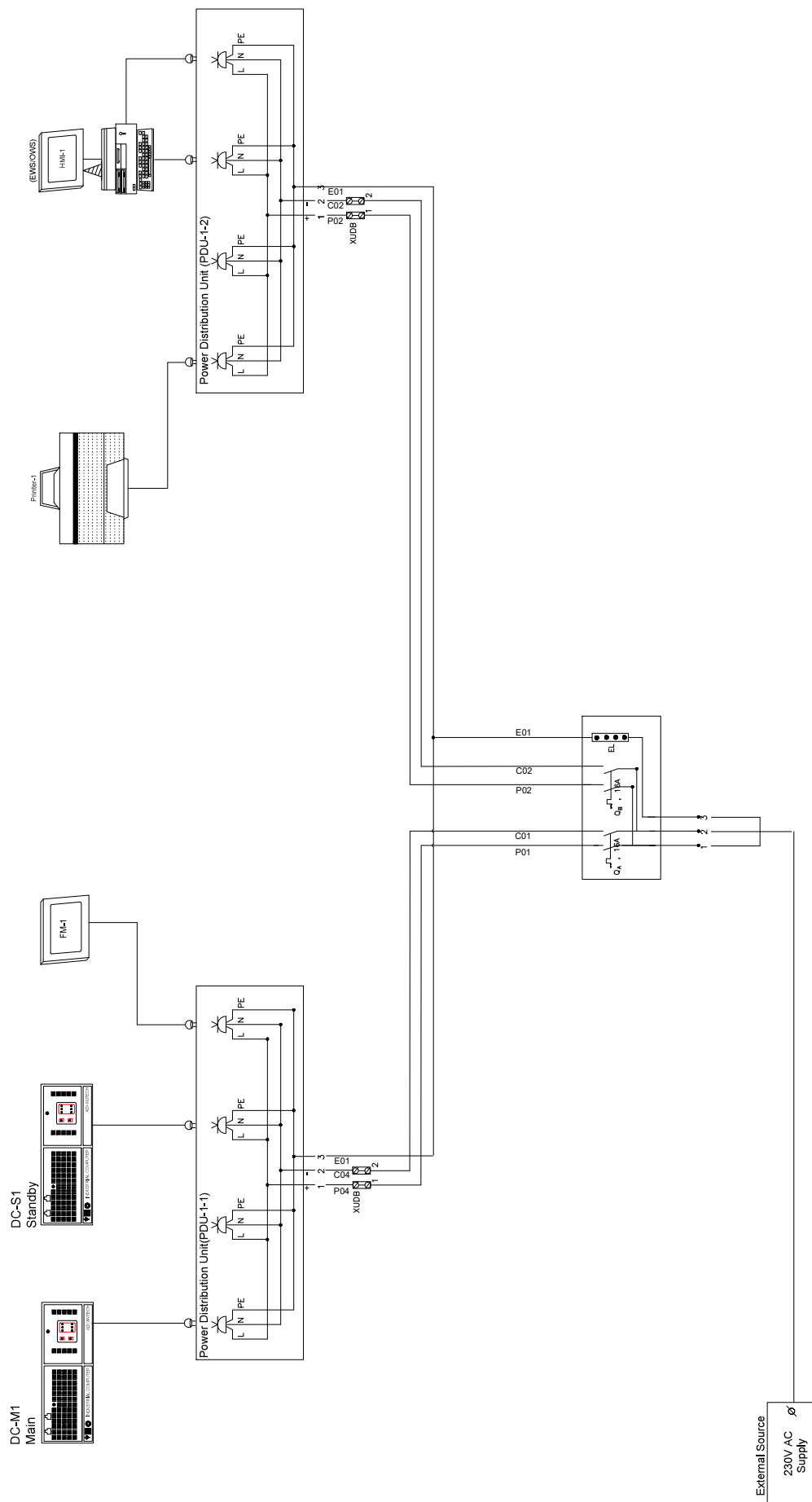
AUX SUPPLY TO BE PROVIDED IN EACH SWITCHBOARD WHEREVER MF/MR/ETHERNET SWITCH IS APPLICABLE

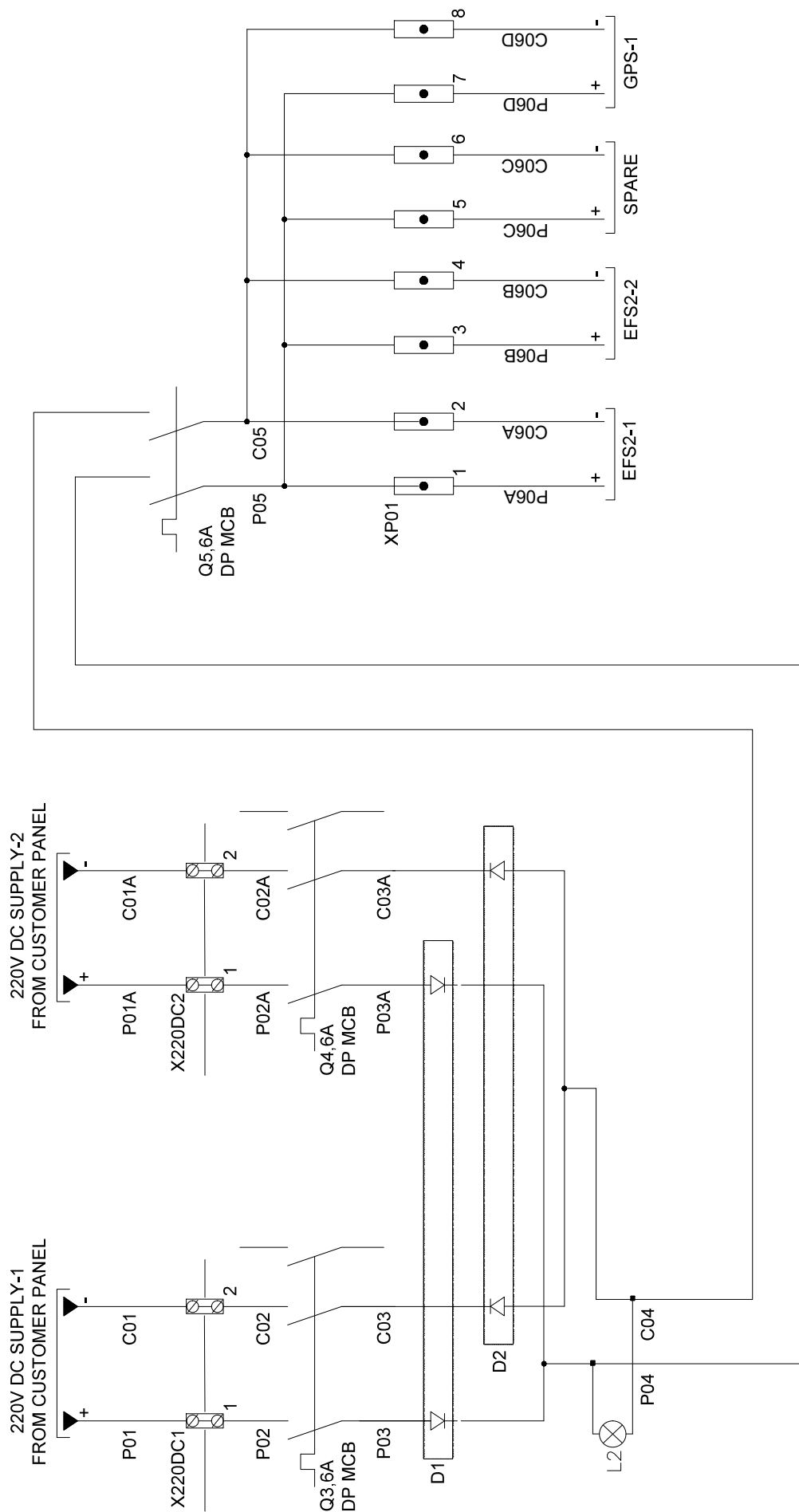
TYPICAL AUX. SUPPLY CONNECTION DIAGRAM FOR ETHERNET SWITCH & MODBUS TO SERIAL CONVERTER TO BE INSTALLED IN SWITCHBOARDS LV PANEL



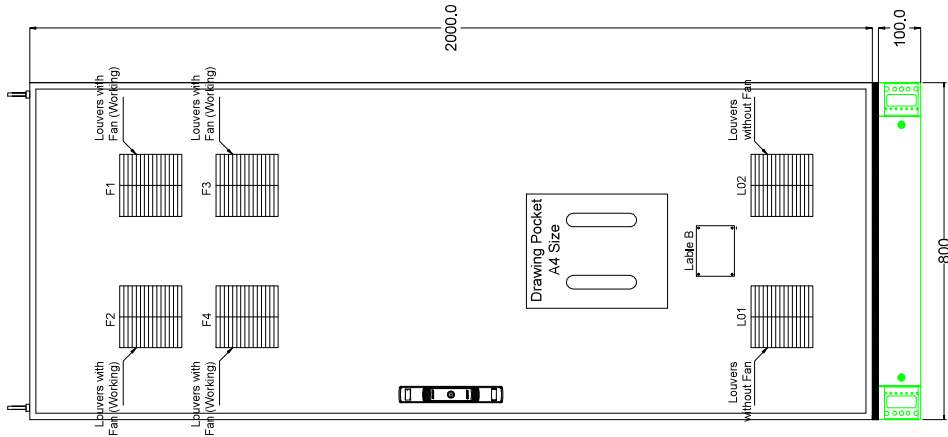
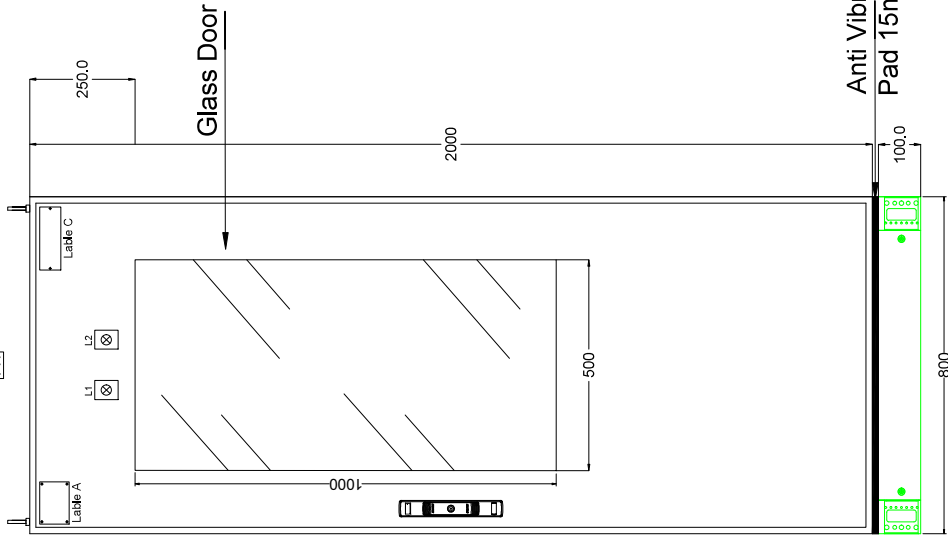
TENTATIVE

QUANTITY SHALL DEPEND ON NO. OF DATA CONCENTRATOR PANELS. THIS IS TYPICAL CONNECTION FOR ONE DATA CONCENTRATOR SYSTEM





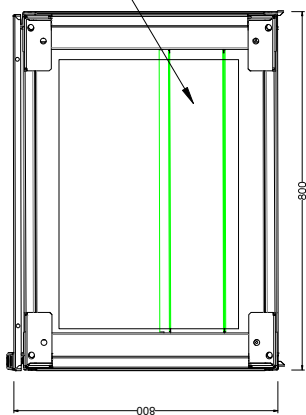
TENTATIVE GA OF DC PANEL



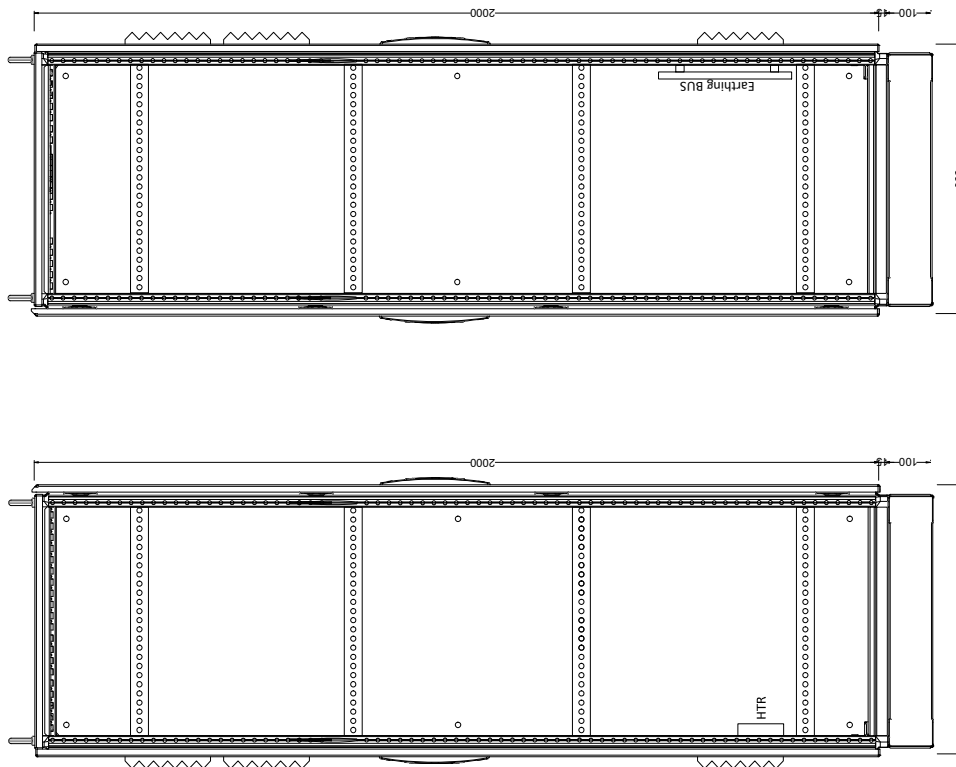
- Legends description:
- L1 : Indication light for 230V AC supply
 - L2 : Indication light for 220V DC supply

TENTATIVE

REMOVABLE GLAND PLATE



BOTTOM VIEW



RIGHT SIDE VIEW

LEFT SIDE VIEW

This document must not be copied without our written permission and the contents there of must not be imparted. to a third party nor be used for any unauthorized purpose.Contravention will be prosecuted.Schneider Electric.


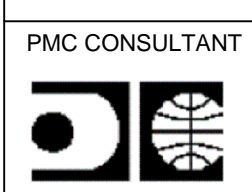


TENTATIVE SYSTEM ARCHITECTURE

ANNEXURE-C

List of drawings

SHEET	REVISION							DESIGNATION	CUSTOMER DRAWING NO.	SUPPLIER DRAWING NO.
	00	01	02	03	04	05	06			
01								List of drawing	BP-DG-415-401-0055	SEIL-4915029-109
02								System Architecture	BP-DG-415-401-0055	SEIL-4915029-109
03								Symbol & Legends	BP-DG-415-401-0055	SEIL-4915029-109
04								No. of relays & meters in each control rooms	BP-DG-415-401-0055	SEIL-4915029-109

			MDL NO: BP-DG-415-401-0055			
					NAME	DATE
01	As per customer's comments	SYD	24.01.22	DRAWN	SYD	16.12.21
00	First submission	SYD	16.12.21	CHKD	SR	16.12.21
REV	DISCRIPTION	NAME	DATE	APPD	PKR	16.12.21

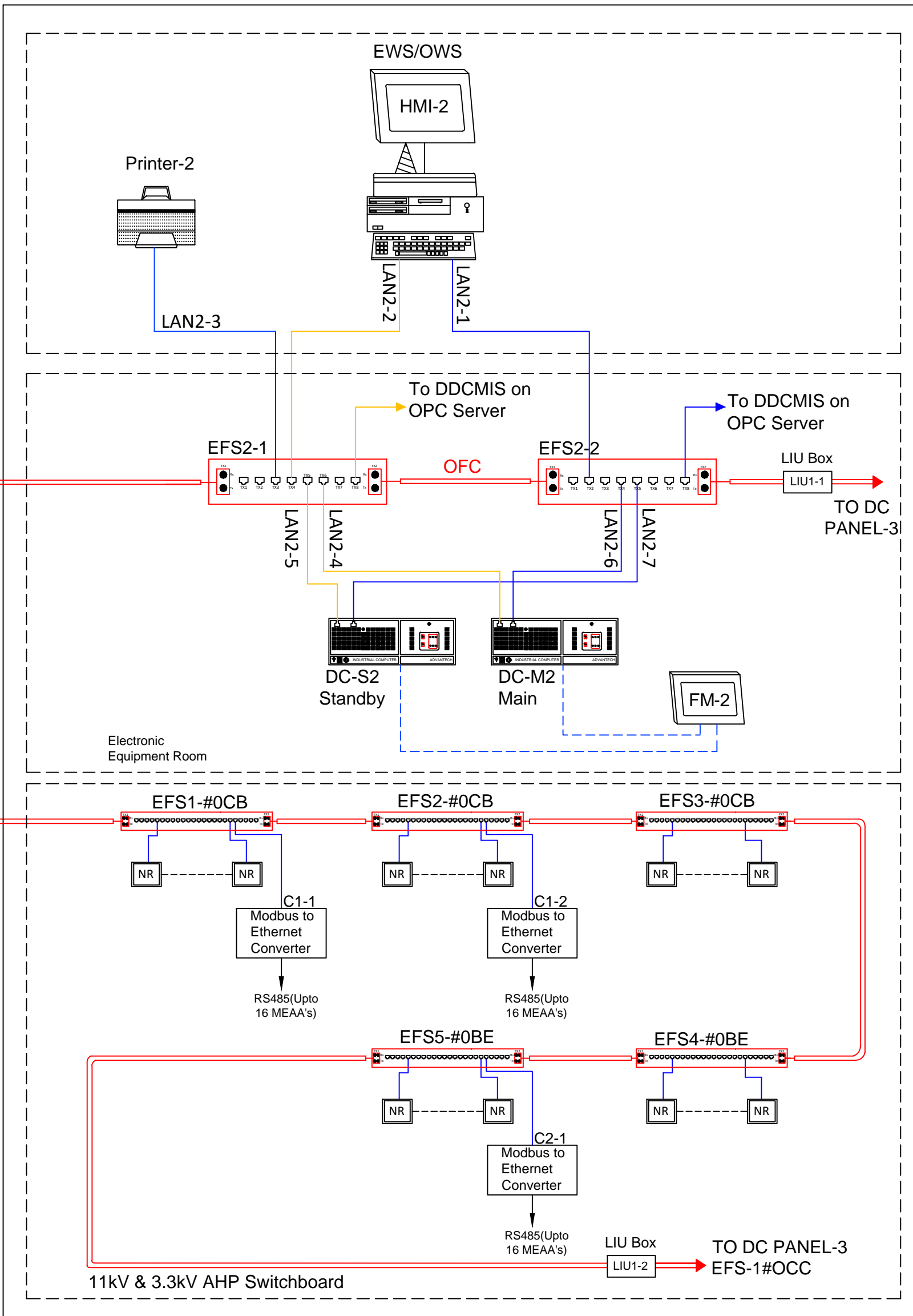
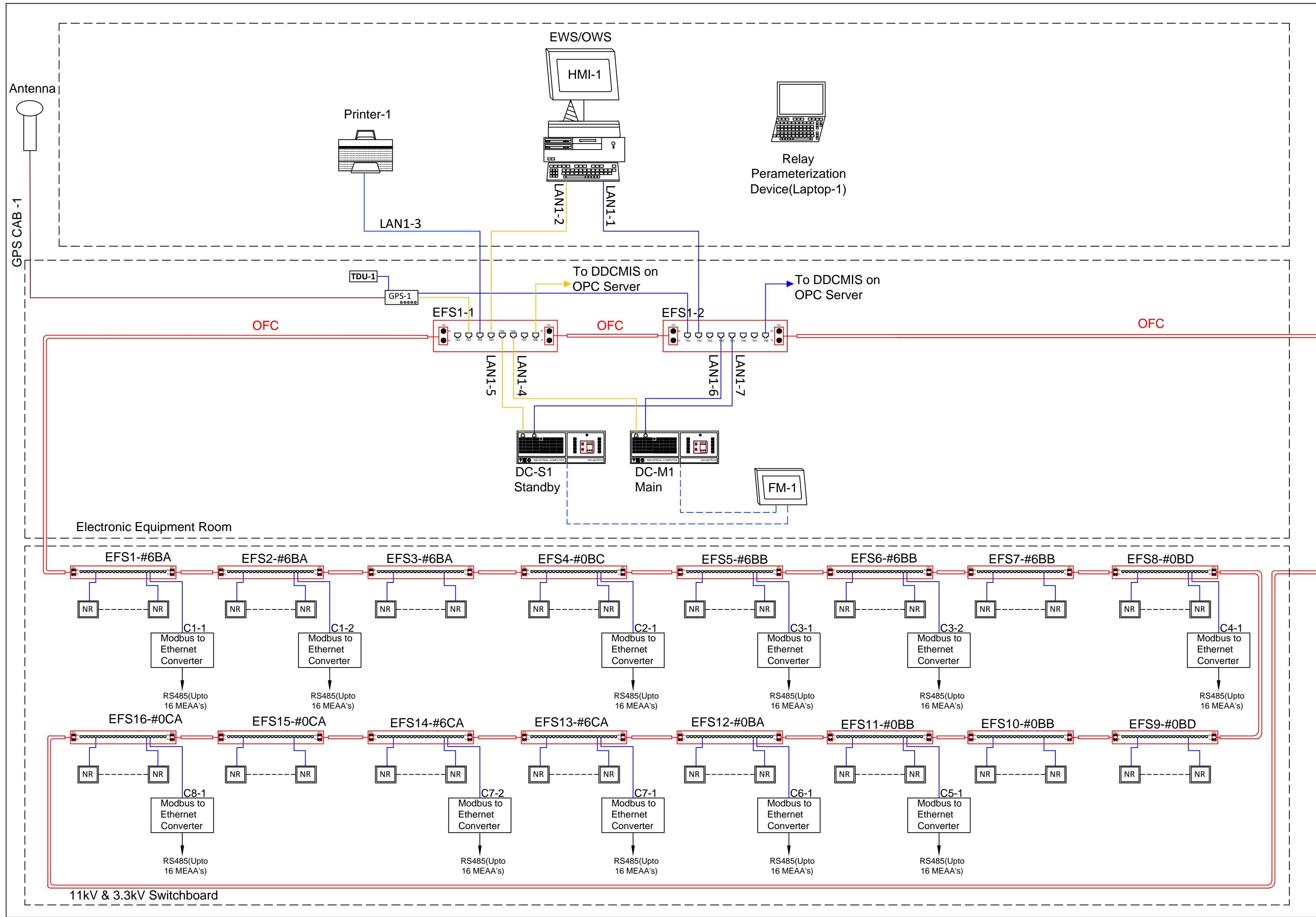
	OWNER:	MAHARASHTRA STATE POWER GENERATION CORPORATION LTD MAHARASHTRA STATE, INDIA				
	CONSULTANT:	DEVELOPMENT CONSULTANT PVT. LTD. CONSULTING ENGINEERS VASHI NAVI MUMBAI				
	CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL				
	MANUFACTURER:	SCHNEIDER ELECTRIC INDIA LTD				PAGE SIZE A4
	PROJECT:	1X660 MW BHUSAWAL TPS				REV. NO. 01
	SHEET TITLE:	LIST OF DRAWINGS				NO.OF SHEETS 04
	PROJECT CODE: SEIL-4915029	TYPE OF EQUIPMENT DATA CONCENTRATOR PANEL		SUPPLIER NO: SEIL-4915029-109		

System Architecture

TYPICAL ARCHITECTURE

CENTRAL CONTROL ROOM DC Panel -1

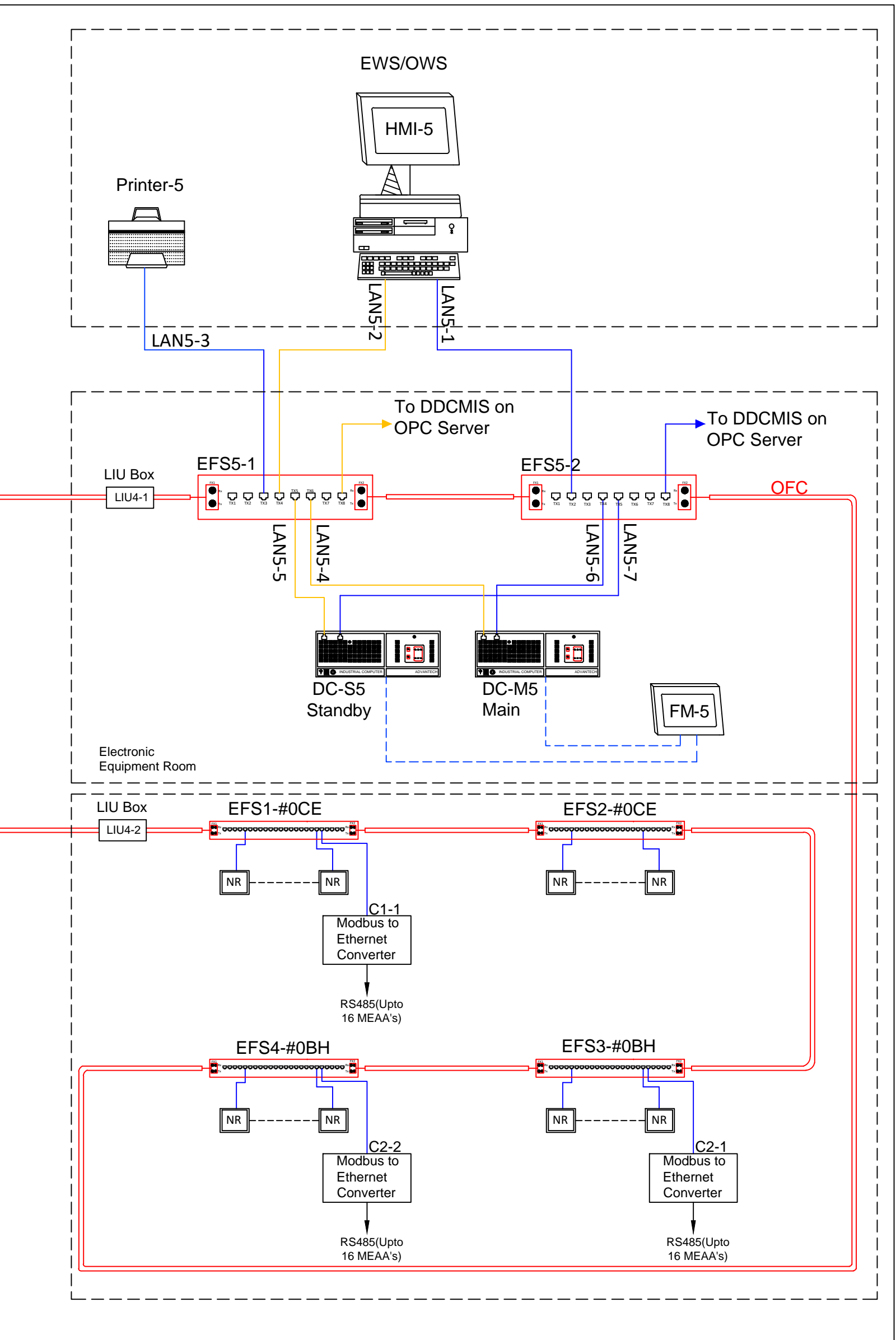
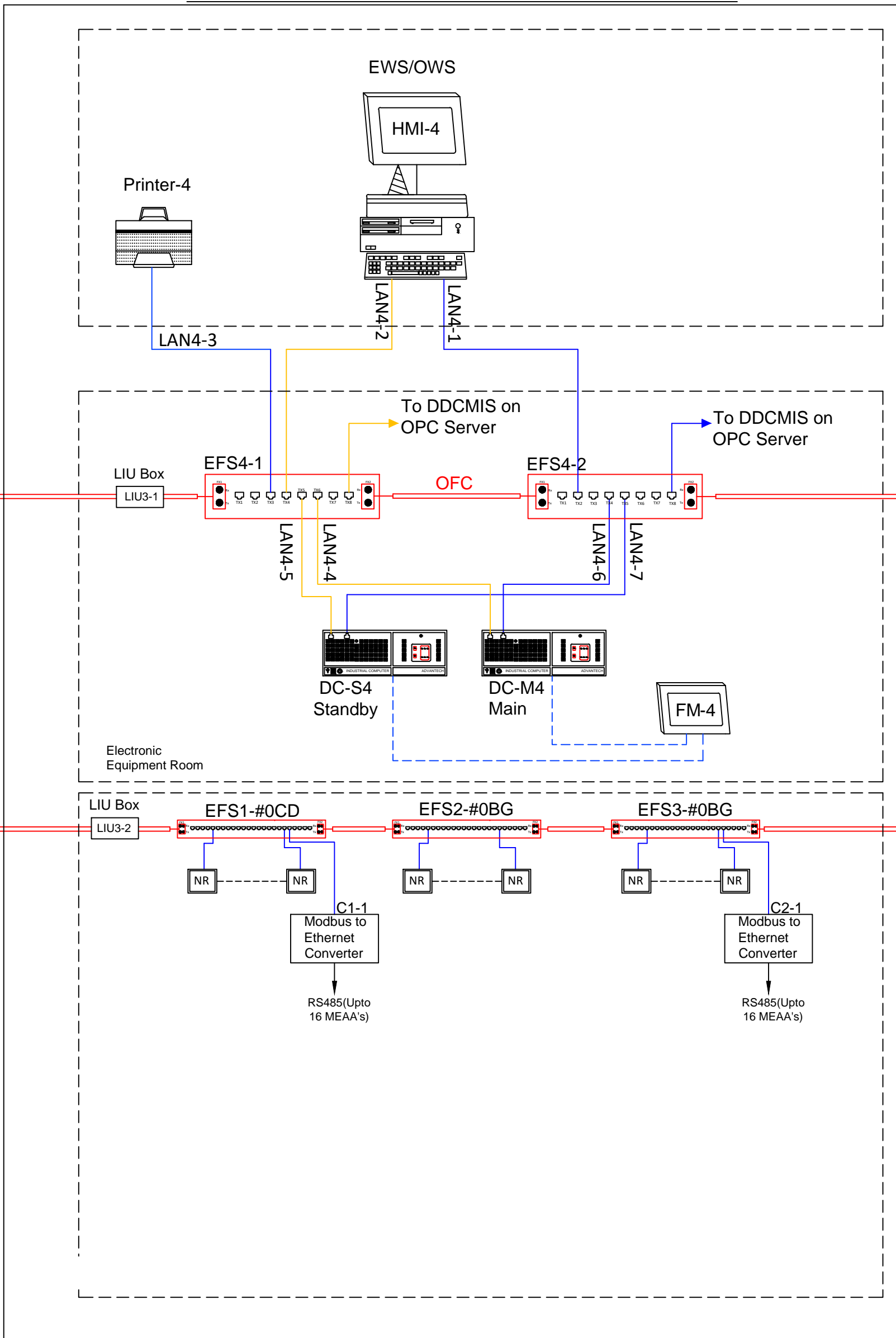
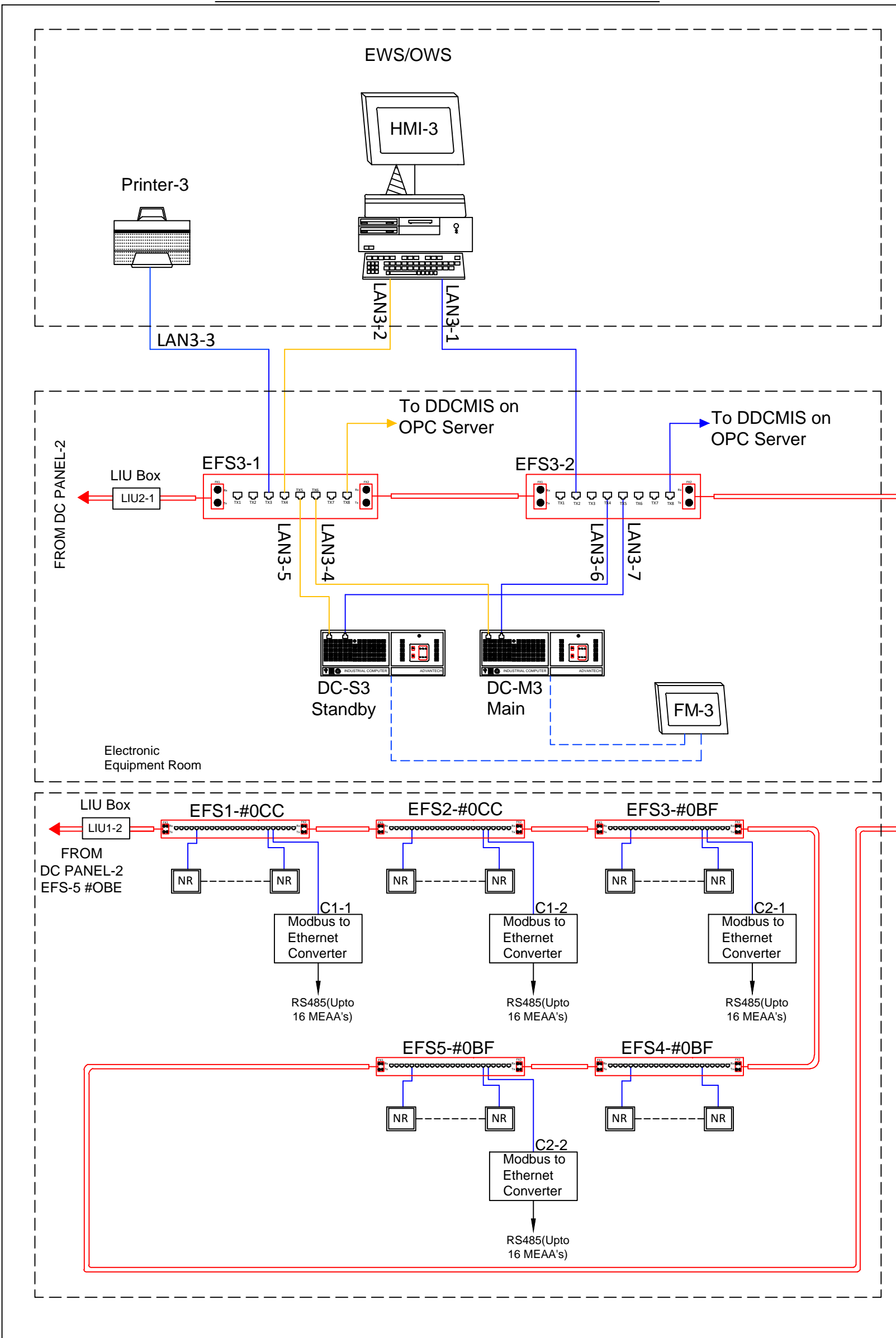
AHP CONTROL ROOM DC Panel -2



CHP CONTROL ROOM DC Panel -3

FIRE WATER CONTROL ROOM DC Panel -4

FGD CONTROL ROOM DC Panel -5



LEGENDS:

- EFS1-1 To EFS1-2 : Ethernet Fiber Switch (8CU+2Fx), CCR DC PANEL-1
- EFS2-1 To EFS2-2 : Ethernet Fiber Switch (8CU+2Fx), AHP CONTROL ROOM DC PANEL-2
- EFS3-1 To EFS3-2 : Ethernet Fiber Switch (8CU+2Fx), CHP CONTROL ROOM DC PANEL-3
- EFS4-1 To EFS4-2 : Ethernet Fiber Switch (8CU+2Fx), FIRE WATER ROOM DC PANEL-4
- EFS5-1 To EFS5-2 : Ethernet Fiber Switch (8CU+2Fx), FGD CONTROL ROOM DC PANEL-5
- DC M1 Main : Data Concentrator Main for CCR DC PANEL-1
- DC S1 Standby : Data Concentrator Standby for CCR DC PANEL-1
- DC M2 Main : Data Concentrator Main for AHP CONTROL ROOM DC PANEL-2
- DC S2 Standby : Data Concentrator Standby for AHP CONTROL ROOM DC PANEL-2
- DC M3 Main : Data Concentrator Main for CHP CONTROL ROOM DC PANEL-3
- DC S3 Standby : Data Concentrator Standby for CHP CONTROL ROOM DC PANEL-3
- DC M4 Main : Data Concentrator Main for FIRE WATER CONTROL ROOM DC PANEL-4
- DC S4 Standby : Data Concentrator Standby for FIRE WATER CONTROL ROOM DC PANEL-4
- DC M5 Main : Data Concentrator Main for FGD CONTROL ROOM DC PANEL-5
- DC S5 Standby : Data Concentrator Standby for FGD CONTROL ROOM DC PANEL-5
- OFC : Optical Fiber Cable, Singlemode
- EWS/OWS : Engineer Work Station/Operator Work Station
- GPS-1 : GPS Receiver with associated accessories for CCR DC PANEL-1
- HMI-1 : Human Machine Interface for CCR DC PANEL-1(EWS/OWS)
- HMI-2 : Human Machine Interface for AHP CONTROL ROOM DC PANEL-2(EWS/OWS)
- HMI-3 : Human Machine Interface for CHP CONTROL ROOM DC PANEL-3(EWS/OWS)
- HMI-4 : Human Machine Interface for FIRE WATER CONTROL ROOM DC PANEL-4 (EWS/OWS)
- HMI-5 : Human Machine Interface for FGD CONTROL ROOM DC PANEL-5(EWS/OWS)
- Laptop-1 : Relay Parameterization Device for CCR DC PANEL-1
- Printer -1 : A4 Size Printer for CCR DC PANEL-1
- Printer -2 : A4 Size Printer for AHP CONTROL ROOM DC PANEL-2
- Printer -3 : A4 Size Printer for CHP CONTROL ROOM DC PANEL-3
- Printer -4 : A4 Size Printer for FIRE WATER CONTROL ROOM DC PANEL-4
- Printer -5 : A4 Size Printer for FGD CONTROL ROOM DC PANEL-5
- FM-1 : Foldable Monitor for CCR DC PANEL-1
- FM-2 : Foldable Monitor for AHP CONTROL ROOM DC PANEL-2
- FM-3 : Foldable Monitor for CHP CONTROL ROOM DC PANEL-3
- FM-4 : Foldable Monitor for FIRE WATER CONTROL ROOM DC PANEL-4
- FM-5 : Foldable Monitor for FGD CONTROL ROOM DC PANEL-5
- TDU-1 : Time Display Unit for CCR DC PANEL-1
- LIU1-1, LIU1-2 : Line Interface Unit (6 PORTS, SC-TYPE, SINGLE MODE) - DC PANEL-2
- LIU2-1, LIU2-2 : Line Interface Unit (6 PORTS, SC-TYPE, SINGLE MODE) - DC PANEL-3
- LIU3-1, LIU3-2 : Line Interface Unit (6 PORTS, SC-TYPE, SINGLE MODE) - DC PANEL-4
- LIU4-1, LIU4-2 : Line Interface Unit (6 PORTS, SC-TYPE, SINGLE MODE) - DC PANEL-5

NOTES:

- EFS1-#6BA to EFS3-#6BA : Ethernet Fiber Switch (24CU+4Fx), CCR DC PANEL-1
- EFS4-#0BC : Ethernet Fiber Switch (24CU+4Fx), CCR DC PANEL-1
- EFS5-#6BB to EFS7-#6BB : Ethernet Fiber Switch (24CU+4Fx), CCR DC PANEL-1
- EFS8-#0BD to EFS9-#0BD : Ethernet Fiber Switch (24CU+4Fx), CCR DC PANEL-1
- EFS10-#0BB to EFS11-#0BB : Ethernet Fiber Switch (24CU+4Fx), CCR DC PANEL-1
- EFS12-#0BA : Ethernet Fiber Switch (24CU+4Fx), CCR DC PANEL-1
- EFS13-#6CA to EFS14-#6CA : Ethernet Fiber Switch (24CU+4Fx), CCR DC PANEL-1
- EFS15-#0CA to EFS16-#0CA : Ethernet Fiber Switch (24CU+4Fx), CCR DC PANEL-1
- EFS1-#0CB to EFS3-#0CB : Ethernet Fiber Switch (24CU+4Fx), AHP SWGR ROOM DC PANEL-2
- EFS4-#0BE to EFS5-#0BE : Ethernet Fiber Switch (24CU+4Fx), AHP SWGR ROOM DC PANEL-2
- EFS1-#0CE to EFS2-#0CE : Ethernet Fiber Switch (24CU+4Fx), CHP SWGR ROOM DC PANEL-3
- EFS3-#0BF to EFS5-#0BF : Ethernet Fiber Switch (24CU+4Fx), CHP SWGR ROOM DC PANEL-3
- EFS1-#0CD : Ethernet Fiber Switch (24CU+4Fx), FIRE WATER ROOM DC PANEL-4
- EFS2-#0BG to EFS3-#0BG : Ethernet Fiber Switch (24CU+4Fx), FIRE WATER ROOM DC PANEL-4
- EFS1-#0CE to EFS2-#0CE : Ethernet Fiber Switch (24CU+4Fx), FGD SWGR DC PANEL-5
- EFS3-#0BH to EFS4-#0BH : Ethernet Fiber Switch (24CU+4Fx), FGD SWGR DC PANEL-5

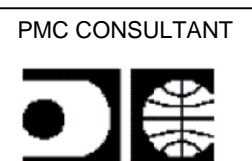
CABLE DETAILS:

- Optical Fiber Cable, Single Mode, 6 Core
- Ethernet Cable (LAN), RJ-45 port, 10/100Mbps,
- GPS Antenna Cable
- Ethernet Cable (LAN) Coming From Standby Ethernet Switch
- Serial Cable: Shielded cable with twisted pair



OWNER:

MAHARASHTRA STATE POWER GENERATION CORPORATION LTD
MAHARASHTRA STATE, INDIA



CONSULTANT:

DEVELOPMENT CONSULTANT PVT. LTD. CONSULTING ENGINEERS
VASHI NAVI MUMBAI

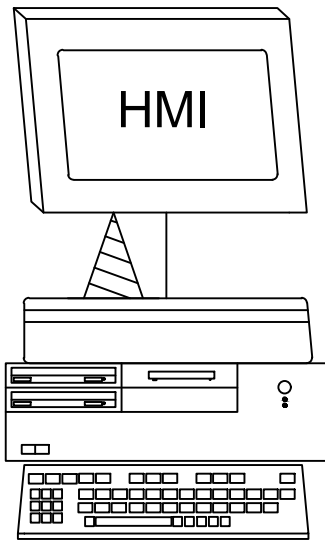
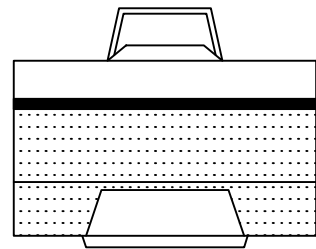
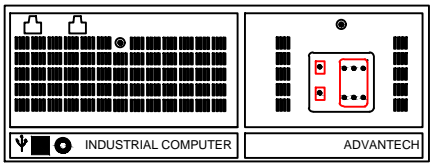
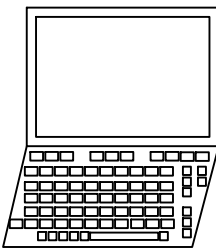
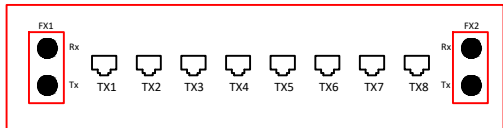
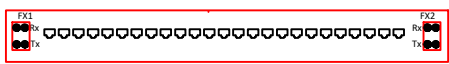
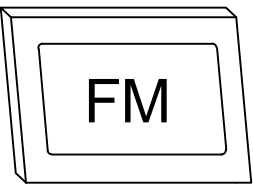
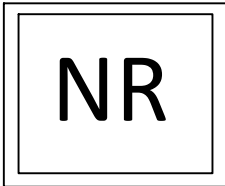










CONTRACTOR:





BHARAT HEAVY ELECTRICALS LIMITED

This document must not be copied without our written permission and the contents there of must not be imparted. to a third party nor be used for any unauthorized purpose.Contravention will be prosecuted.Schneider Electric.

Symbol & Legends

 Human Machine Interface	 Printer	 Data Concentrator (Server)	 Relay Perameterization Device (Laptop)
 Ethernet Fibre Switch (8Cu + 2Fx)	 Ethernet Fibre Switch (24Cu + 4Fx)	 Foldable Monitor	 Numerical Relays
 Modbus to Ethernet Convertor	 Line Inter Face Unit	 GPS Receiver	 Time Display Unit
 Optical Fibre Cable	 Ethernet Cable LAN	 GPS Antenna Cable LAN	 Ethernet Cable LAN for redundancy

			MDL NO: BP-DG-415-401-0055			
				NAME	DATE	
01	As per customer's comments	SYD	24.01.22	DRAWN	SYD	16.12.21
00	First submission	SYD	16.12.21	CHKD	SR	16.12.21
REV	DISCRPTION	NAME	DATE	APPD	PKR	16.12.21






 OWNER:	MAHARASHTRA STATE POWER GENERATION CORPORATION LTD MAHARASHTRA STATE, INDIA				
 CONSULTANT:	DEVELOPMENT CONSULTANT PVT. LTD. CONSULTING ENGINEERS VASHI NAVI MUMBAI				
 CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL				
 MANUFACTURER:	SCHNEIDER ELECTRIC INDIA LTD			PAGE SIZE A4	REV. NO. 01
PROJECT:	1X660 MW BHUSAWAL TPS			NO.OF SHEETS	04
SHEET TITLE:	SYMBOL & LEGENDS			SHEET	03
PROJECT CODE: SEIL-4915029	TYPE OF EQUIPMENT DATA CONCENTRATOR PANEL		SUPPLIER NO: SEIL-4915029-109		

This document must not be copied without our written permission and the contents there of must not be imparted to a third party nor be used for any unauthorized purpose.Contravention will be prosecuted.Schneider Electric.

No. of Relays & Meters in each control room

<p><u>CENTRAL CONTROL ROOM DC Panel -1</u></p> <p>1. No. of relays = 156</p> <p>2. No. of MEAA'S = 127</p> <p>3. No. of modbus to ethernet converter = 11</p>	<p><u>AHP CONTROL ROOM DC Panel -2</u></p> <p>1. No. of relays = 52</p> <p>2. No. of MEAA'S = 46</p> <p>3. No. of modbus to ethernet converter = 3</p>	<p><u>CHP CONTROL ROOM DC Panel -3</u></p> <p>1. No. of relays = 56</p> <p>2. No. of MEAA'S = 47</p> <p>3. No. of modbus to ethernet converter = 4</p>
<p><u>FIRE WATER CONTROL ROOM DC Panel -4</u></p> <p>1. No. of relays = 31</p> <p>2. No. of MEAA'S = 27</p> <p>3. No. of modbus to ethernet converter = 2</p>	<p><u>FGD CONTROL ROOM DC Panel -5</u></p> <p>1. No. of relays = 42</p> <p>2. No. of MEAA'S = 34</p> <p>3. No. of modbus to ethernet converter = 3</p>	

			MDL NO: BP-DG-415-401-0055			
					NAME	DATE
01	As per customer's comments	SYD	24.01.22	DRAWN	SYD	16.12.21
00	First submission	SYD	16.12.21	CHKD	SR	16.12.21
REV	DISCRIPTION	NAME	DATE	APPD	PKR	16.12.21


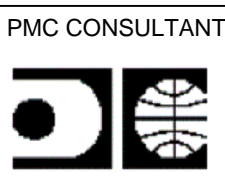


	OWNER:	MAHARASHTRA STATE POWER GENERATION CORPORATION LTD MAHARASHTRA STATE, INDIA			
	CONSULTANT:	DEVELOPMENT CONSULTANT PVT. LTD. CONSULTING ENGINEERS VASHI NAVI MUMBAI			
	CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL			
	MANUFACTURER:	SCHNEIDER ELECTRIC INDIA LTD	PAGE SIZE A4	REV. NO. 01	
	PROJECT:	1X660 MW BHUSAWAL TPS	NO.OF SHEETS	04	
	SHEET TITLE:	NO. OF RELAYS & METERS IN EACH CONTROL ROOM	SHEET	04	
PROJECT CODE: SEIL-4915029	TYPE OF EQUIPMENT DATA CONCENTRATOR PANEL	SUPPLIER NO: SEIL-4915029-109			

1X660 MW TPS, UNIT-6, BHUSAWAL, MAHARASHTRA, INDIA

NETWORK DRAWING		
SL.NO.	DESCRIPTION	MDL NO.
1.	NETWORK DRAWING FROM DCP-1 TO DCP-5	BP-DG-415-401-0033

TENTATIVE NETWORK CONFIGURATION

			MDL NO: BP-DG-415-401-0033			
					NAME	DATE
01	As per customer's comments	SYD	24.01.22	DRAWN	SYD	16.12.21
00	First submission	SYD	16.12.21	CHKD	SR	16.12.21
REV	DISCRIPTION	NAME	DATE	APPD	PKR	16.12.21

<div><div><div>MAHAGENCO</div><div>MAHARASHTRA STATE POWER GENERATION LTD</div></div><div><div>PMC CONSULTANT</div></div><div><div>BHEL</div></div><div><div>Schneider Electric</div></div></div>	OWNER:	MAHARASHTRA STATE POWER GENERATION CORPORATION LTD MAHARASHTRA STATE, INDIA			
	CONSULTANT:	DEVELOPMENT CONSULTANT PVT. LTD. CONSULTING ENGINEERS VASHI NAVI MUMBAI			
	CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL			
	MANUFACTURER:	SCHNEIDER ELECTRIC INDIA LTD			PAGE SIZE A4
PROJECT:		1X660 MW BHUSAWAL TPS			REV. NO. 01
SHEET TITLE:		PROJECT DETAILS			NO.OF SHEETS 18
PROJECT CODE: SEIL-4915029		TYPE OF EQUIPMENT DATA CONCENTRATOR PANEL		SUPPLIER NO: SEIL-4915029-107	

This document must not be copied without our written permission and the contents there of must not be imparted to a third party nor be used for any unauthorized purpose.Contravention will be prosecuted.Schneider Electric.

SHEET	REVISION								DESIGNATION	CUSTOMER MDL NO.
	00	01	02	03	04	05	06	07		
01									PROJECT DETAILS	BP-DG-415-401-0033
02									LIST OF DRAWING	BP-DG-415-401-0033
03									Network Drawing for SWBD 6BA(DC PANEL-1)	BP-DG-415-401-0033
04									Network Drawing for SWBD 0BC(DC PANEL-1)	BP-DG-415-401-0033
05									Network Drawing for SWBD 6BB(DC PANEL-1)	BP-DG-415-401-0033
06									Network Drawing for SWBD 0BD(DC PANEL-1)	BP-DG-415-401-0033
07									Network Drawing for SWBD 0BB(DC PANEL-1)	BP-DG-415-401-0033
08									Network Drawing for SWBD 0BA(DC PANEL-1)	BP-DG-415-401-0033
09									Network Drawing for SWBD 6CA(DC PANEL-1)	BP-DG-415-401-0033
10									Network Drawing for SWBD 0CA(DC PANEL-1)	BP-DG-415-401-0033
11									Network Drawing for SWBD 0CB(DC PANEL-2)	BP-DG-415-401-0033
12									Network Drawing for SWBD 0BE(DC PANEL-2)	BP-DG-415-401-0033
13									Network Drawing for SWBD 0CC(DC PANEL-3)	BP-DG-415-401-0033
14									Network Drawing for SWBD 0BF(DC PANEL-3)	BP-DG-415-401-0033
15									Network Drawing for SWBD 0CD(DC PANEL-4)	BP-DG-415-401-0033
16									Network Drawing for SWBD 0BG(DC PANEL-4)	BP-DG-415-401-0033
17									Network Drawing for SWBD 0CE(DC PANEL-5	BP-DG-415-401-0033
18									Network Drawing for SWBD 0BH(DC PANEL-5)	BP-DG-415-401-0033

			MDL NO: BP-DG-415-401-0033			
					NAME	DATE
01	As per customer's comments	SYD	24.01.22	DRAWN	SYD	16.12.21
00	First submission	SYD	16.12.21	CHKD	SR	16.12.21
REV	DISCRIPTION	NAME	DATE	APPD	PKR	16.12.21

	OWNER:	MAHARASHTRA STATE POWER GENERATION CORPORATION LTD MAHARASHTRA STATE, INDIA			
	CONSULTANT:	DEVELOPMENT CONSULTANT PVT. LTD. CONSULTING ENGINEERS VASHI NAVI MUMBAI			
	CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL			
	MANUFACTURER:	SCHNEIDER ELECTRIC INDIA LTD			PAGE SIZE A4
	PROJECT:	1X660 MW BHUSAWAL TPS			REV. NO. 01
	SHEET TITLE:	LIST OF DRAWING			NO.OF SHEETS 18
	PROJECT CODE: SEIL-4915029	TYPE OF EQUIPMENT DATA CONCENTRATOR PANEL		SUPPLIER NO: SEIL-4915029-107	
					02

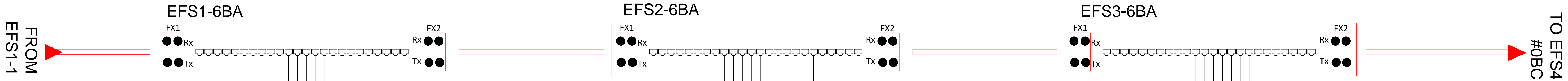
A

B

C

D





This document must not be copied without our written permission and the contents there of must not be imparted. to a third party nor be used for any unauthorized purpose.Contravention will be prosecuted.Schneider Electric.



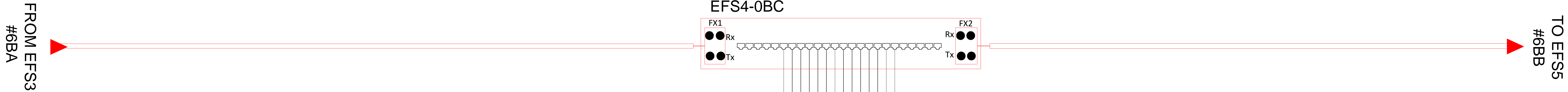
NOTES:

Relay Quantity : 30
Ethernet to RS485 Convector : 2

MDL NO: BP-DG-415-401-0033						
				NAME	DATE	
01	As per customer's comments	SYD	24.01.22	DRAWN	SYD	16.12.21
00	First submission	SYD	16.12.21	CHKD	SR	16.12.21
REV	DISCRIPTION	NAME	DATE	APPD	PKR	16.12.21

 PMG CONSULTANT 	OWNER:	MAHARASHTRA STATE POWER GENERATION CORPORATION LTD MAHARASHTRA STATE, INDIA		
	CONSULTANT:	DEVELOPMENT CONSULTANT PVT. LTD. CONSULTING ENGINEERS VASHI NAVI MUMBAI		
	CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL		
	MANUFACTURER:	SCHNEIDER ELECTRIC INDIA LTD	PAGE SIZE A4	REV. NO. 01
PROJECT: SHEET TITLE:	1X660 MW BHUSAWAL TPS Network Drawing for SWBD 6BA (DC PANEL-1)		NO.OF SHEETS SHEET	18 03
	PROJECT CODE: SEIL-4915029	TYPE OF EQUIPMENT DATA CONCENTRATOR PANEL	SUPPLIER NO: SEIL-4915029-107	




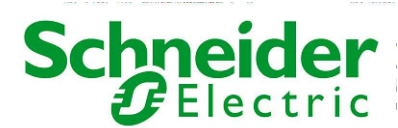
This document must not be copied without our written permission and the contents there of must not be imparted. to a third party nor be used for any unauthorized purpose.Contravention will be prosecuted.Schneider Electric.



NOTES:

Relay Quantity : 13
Ethernet to RS485 Convertor : 1

			MDL NO: BP-DG-415-401-0033			
				NAME	DATE	
01	As per customer's comments	SYD	24.01.22	DRAWN	SYD	16.12.21
00	First submission	SYD	16.12.21	CHKD	SR	16.12.21
REV	DISCRIPTION	NAME	DATE	APPD	PKR	16.12.21

 OWNER:  CONSULTANT:  CONTRACTOR:  MANUFACTURER:	MAHARASHTRA STATE POWER GENERATION CORPORATION LTD MAHARASHTRA STATE, INDIA		PAGE SIZE A4	REV. NO. 01
	DEVELOPMENT CONSULTANT PVT. LTD. CONSULTING ENGINEERS VASHI NAVI MUMBAI		NO.OF SHEETS	18
	BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL		SHEET	04
	PROJECT: SHEET TITLE: PROJECT CODE: SEIL-4915029	1X660 MW BHUSAWAL TPS Network Drawing for SWBD OBC (DC PANEL-1) TYPE OF EQUIPMENT DATA CONCENTRATOR PANEL		SUPPLIER NO: SEIL-4915029-107

This document must not be copied without our written permission and the contents there of must not be imparted. to a third party nor be used for any unauthorized purpose.Contravention will be prosecuted.Schneider Electric.

1

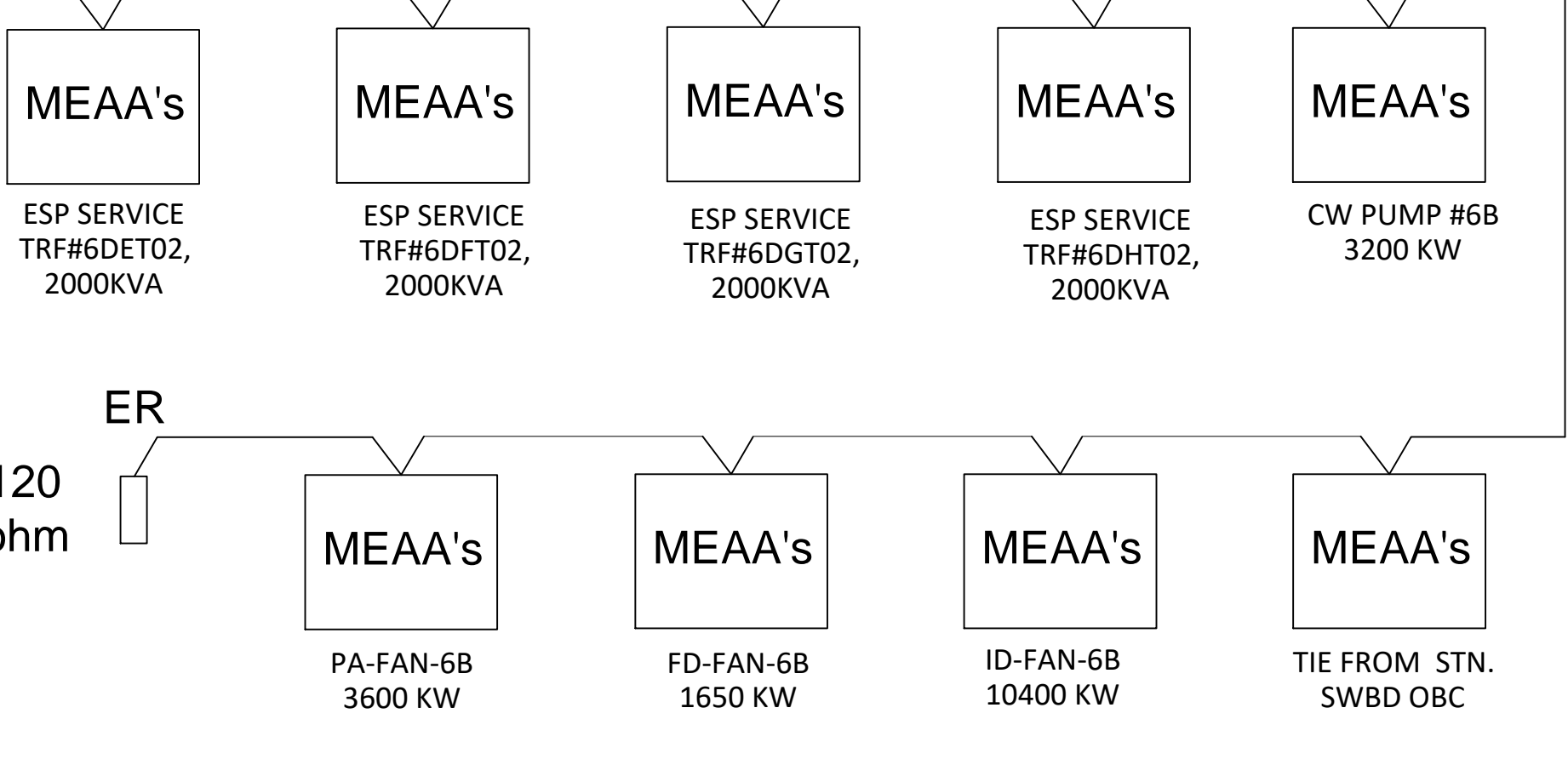
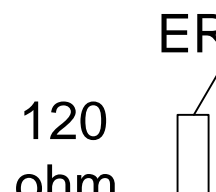
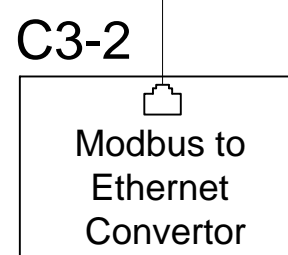
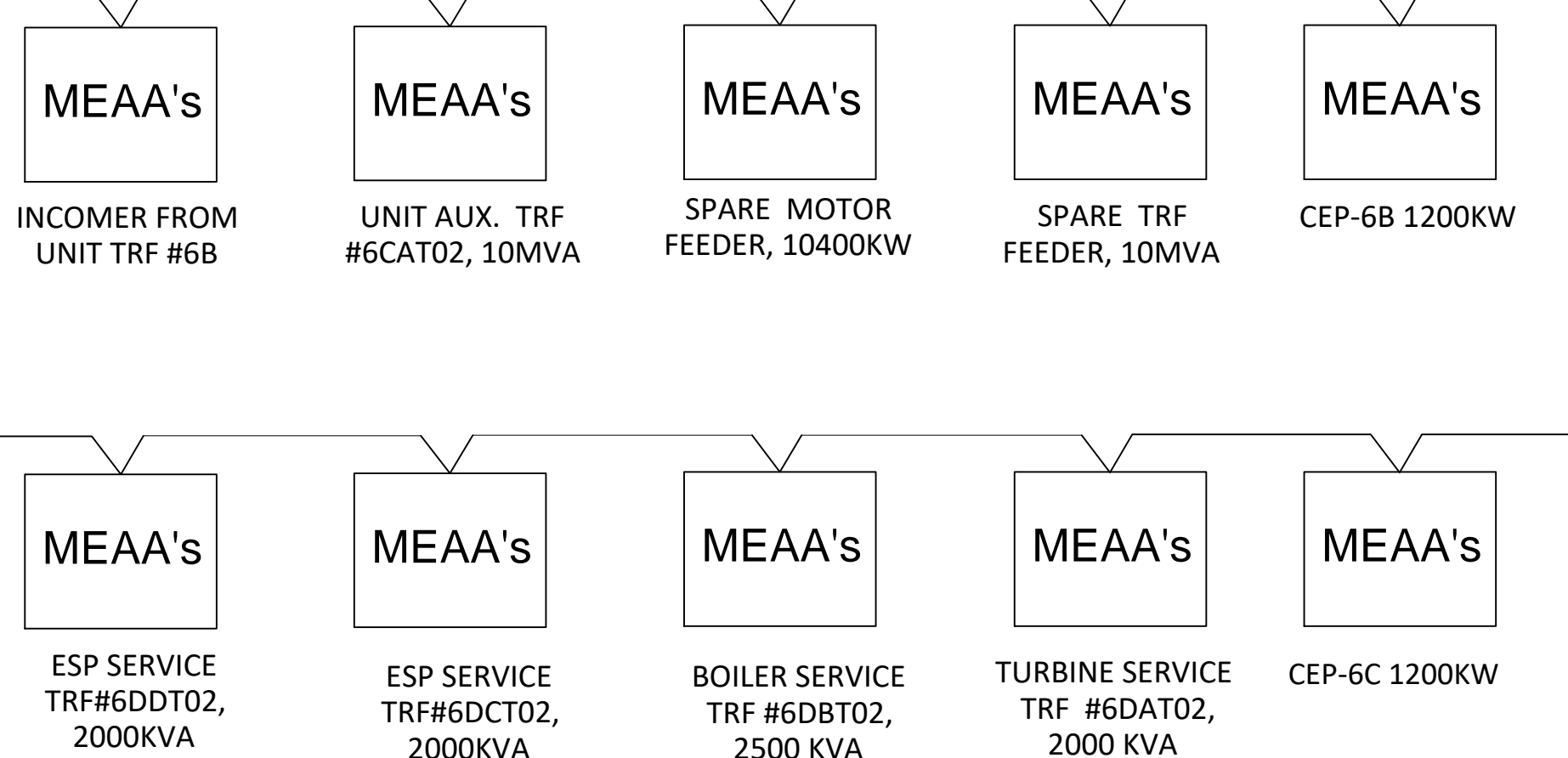
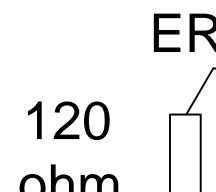
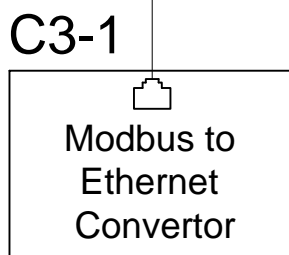
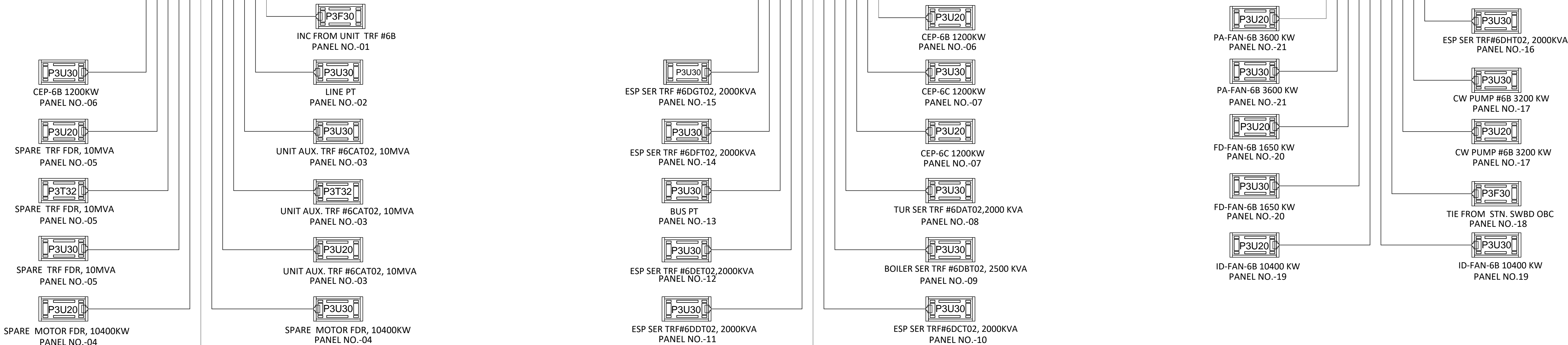
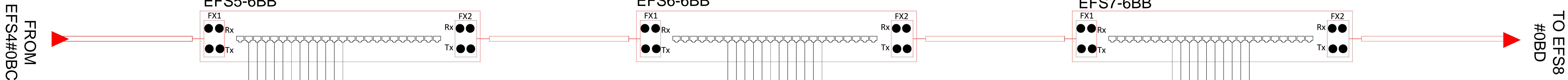
2

3

4

5

6



NOTES:

Relay Quantity : 32
Ethernet to RS485 Convertor : 2

MDL NO: BP-DG-415-401-0033						
				NAME	DATE	
01	As per customer's comments	SYD	24.01.22	DRAWN	SYD	16.12.21
00	First submission	SYD	16.12.21	CHKD	SR	16.12.21
REV	DISCRIPTION	NAME	DATE	APPD	PKR	16.12.21

	OWNER:	MAHARASHTRA STATE POWER GENERATION CORPORATION LTD MAHARASHTRA STATE, INDIA			
	CONSULTANT:	DEVELOPMENT CONSULTANT PVT. LTD. CONSULTING ENGINEERS VASHI NAVI MUMBAI			
	CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL			
	MANUFACTURER:	SCHNEIDER ELECTRIC INDIA LTD		PAGE SIZE A4	REV. NO. 01
PROJECT:		1X660 MW BHUSAWAL TPS		NO.OF SHEETS	18
SHEET TITLE:		Network Drawing for SWBD 6BB (DC PANEL-1)		SHEET	05
PROJECT CODE: SEIL-4915029		TYPE OF EQUIPMENT DATA CONCENTRATOR PANEL		SUPPLIER NO: SEIL-4915029-107	

1

2

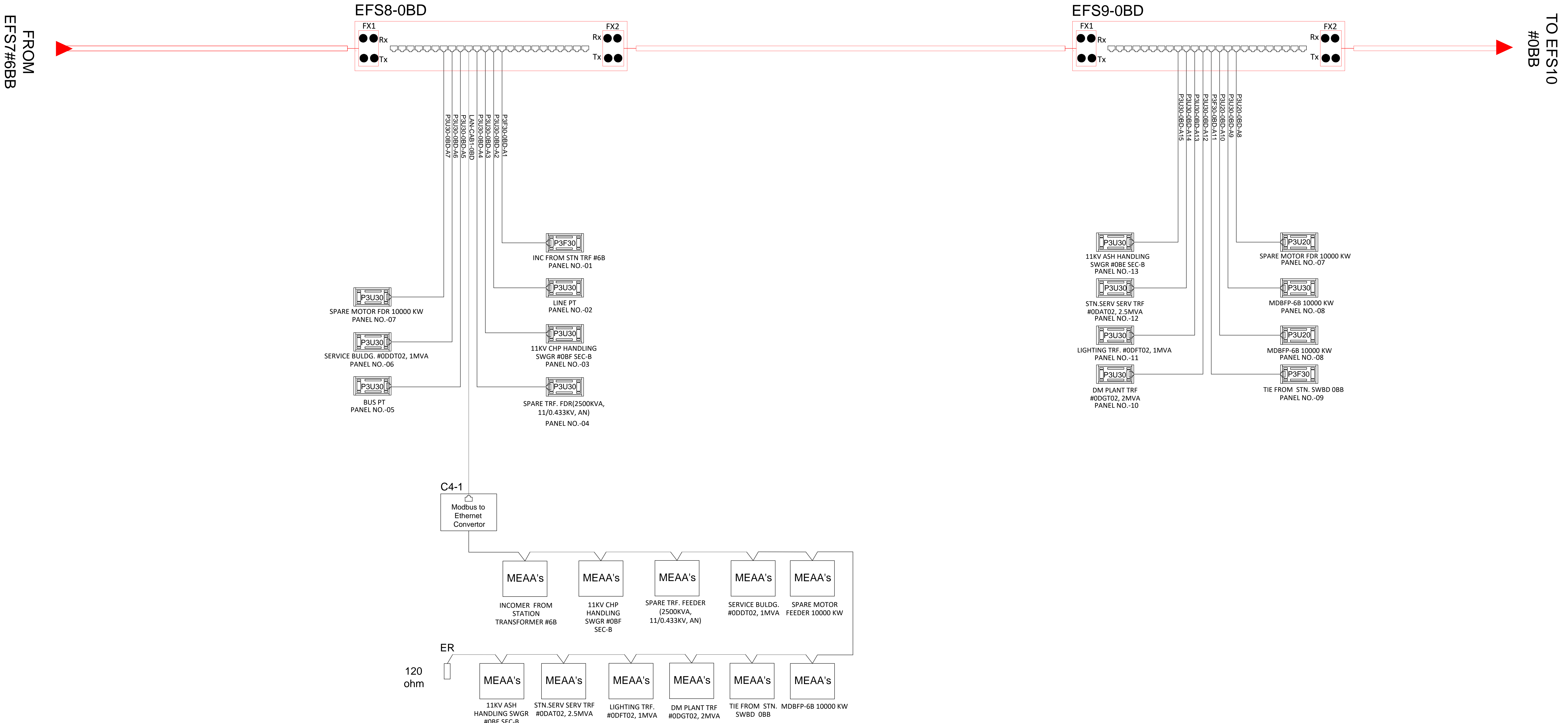
3

4

5

6




This document must not be copied without our written permission and the contents there of must not be imparted. to a third party nor be used for any unauthorized purpose.Convention will be prosecuted.Schneider Electric.



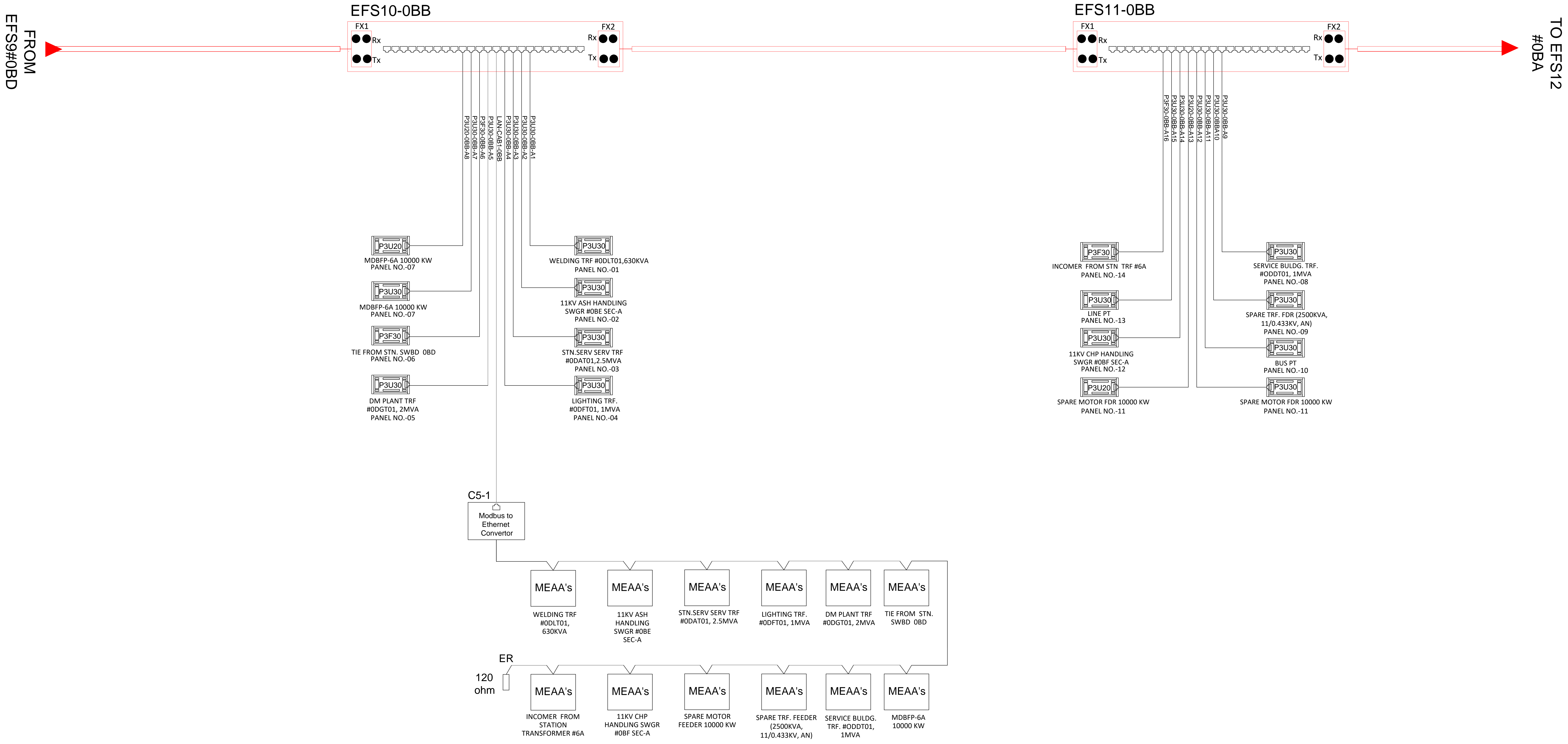
NOTES:

Relay Quantity : 15
Ethernet to RS485 Convector : 1

MDL NO: BP-DG-415-401-0033						
				NAME	DATE	
01	As per customer's comments	SYD	24.01.22	DRAWN	SYD	16.12.21
00	First submission	SYD	16.12.21	CHKD	SR	16.12.21
REV	DISCRIPTION	NAME	DATE	APPD	PKR	16.12.21

	OWNER:	MAHARASHTRA STATE POWER GENERATION CORPORATION LTD MAHARASHTRA STATE, INDIA		
	CONSULTANT:	DEVELOPMENT CONSULTANT PVT. LTD. CONSULTING ENGINEERS VASHI NAVI MUMBAI		
	CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL		
	MANUFACTURER:	SCHNEIDER ELECTRIC INDIA LTD	PAGE SIZE A4	REV. NO. 01
PROJECT: SHEET TITLE:	1X660 MW BHUSAWAL TPS Network Drawing for SWBD 0BD (DC PANEL-1)		NO.OF SHEETS SHEET	18 06
	PROJECT CODE: SEIL-4915029	TYPE OF EQUIPMENT DATA CONCENTRATOR PANEL	SUPPLIER NO: SEIL-4915029-107	




This document must not be copied without our written permission and the contents there of must not be imparted. to a third party nor be used for any unauthorized purpose.Contravention will be prosecuted.Schneider Electric.



NOTES:

Relay Quantity : 16
Ethernet to RS485 Convertor : 1

MDL NO: BP-DG-415-401-0033					
				NAME	DATE
01	As per customer's comments	SYD	24.01.22	DRAWN	SYD 16.12.21
00	First submission	SYD	16.12.21	CHKD	SR 16.12.21
REV	DISCRIPTION	NAME	DATE	APPD	PKR 16.12.21

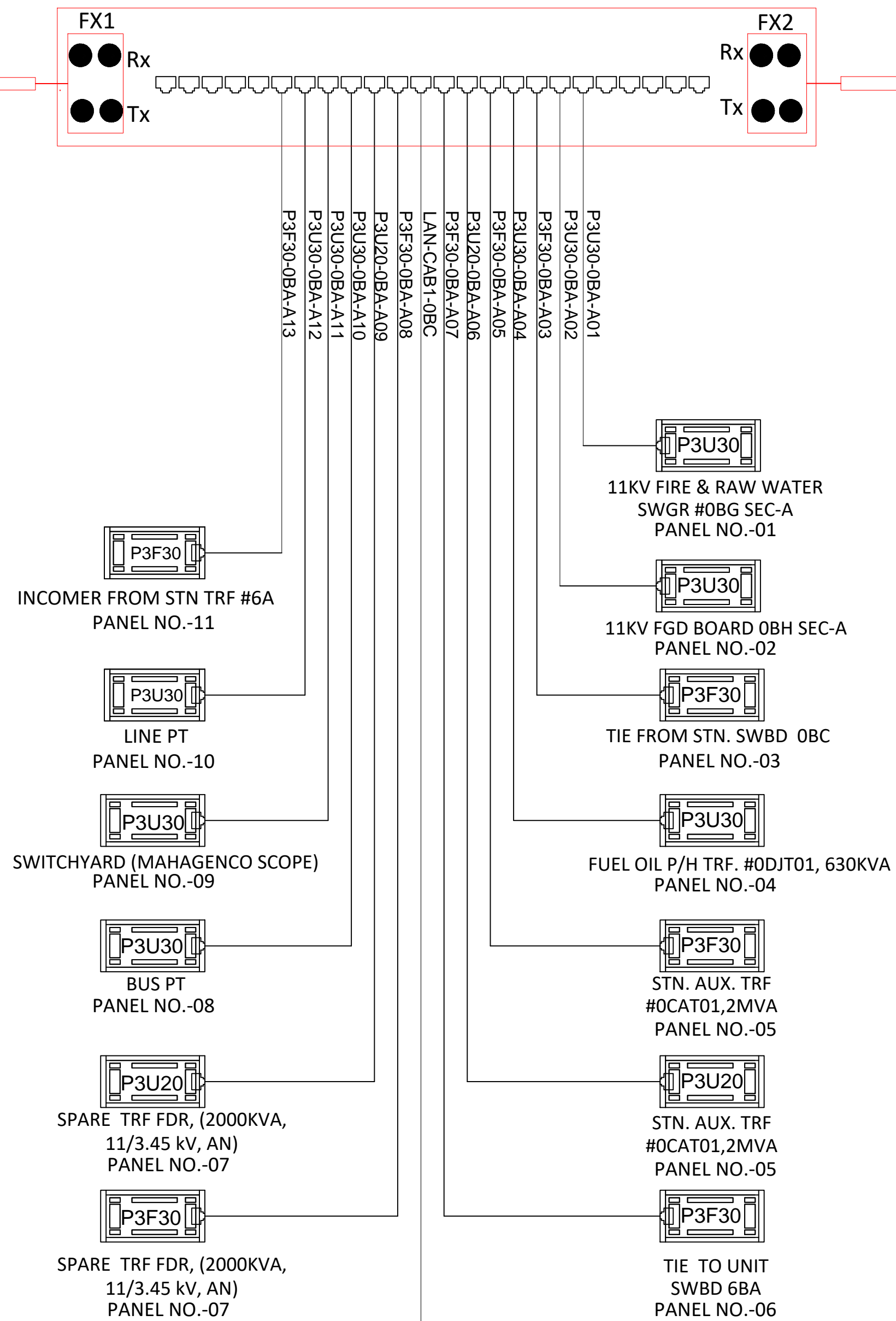
	OWNER:	MAHARASHTRA STATE POWER GENERATION CORPORATION LTD MAHARASHTRA STATE, INDIA		
	CONSULTANT:	DEVELOPMENT CONSULTANT PVT. LTD. CONSULTING ENGINEERS VASHI NAVI MUMBAI		
	CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL		
	MANUFACTURER:	SCHNEIDER ELECTRIC INDIA LTD	PAGE SIZE A4	REV. NO. 01
PROJECT:		1X660 MW BHUSAWAL TPS	NO.OF SHEETS	18
SHEET TITLE:		Network Drawing for SWBD OBB (DC PANEL-1)	SHEET	07
PROJECT CODE: SEIL-4915029		TYPE OF EQUIPMENT DATA CONCENTRATOR PANEL	SUPPLIER NO: SEIL-4915029-107	

This document must not be copied without our written permission and the contents there of must not be imparted. to a third party nor be used for any unauthorized purpose.Contravention will be prosecuted.Schneider Electric.

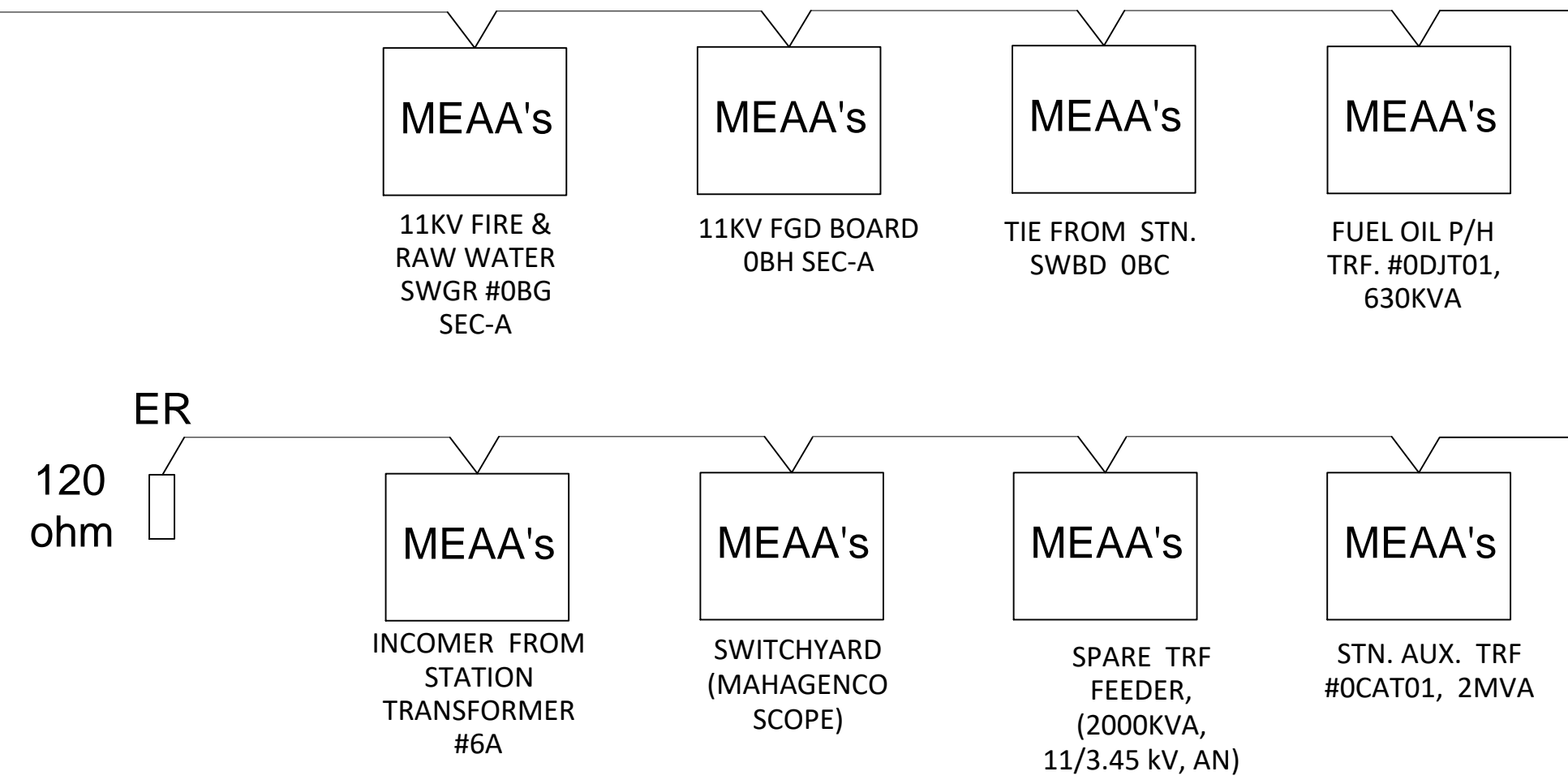
FROM EFS11
#0BB

EFS12-0BA

TO EFS13
#6CA







C5-2
Modbus to
Ethernet
Convertor



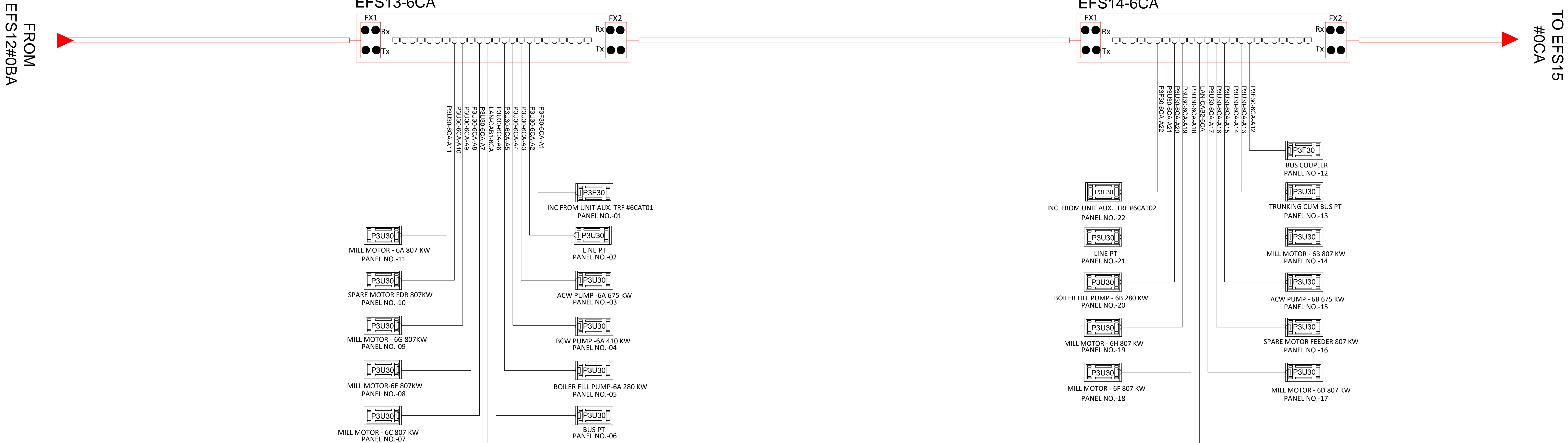
NOTES:

Relay Quantity : 13
Ethernet to RS485 Convertor : 1

MDL NO: BP-DG-415-401-0033						
				NAME	DATE	
01	As per customer's comments	SYD	24.01.22	DRAWN	SYD	16.12.21
00	First submission	SYD	16.12.21	CHKD	SR	16.12.21
REV	DISCRIPTION	NAME	DATE	APPD	PKR	16.12.21

 OWNER:	MAHARASHTRA STATE POWER GENERATION CORPORATION LTD MAHARASHTRA STATE, INDIA		
 CONSULTANT:	DEVELOPMENT CONSULTANT PVT. LTD. CONSULTING ENGINEERS VASHI NAVI MUMBAI		
 CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL		
 MANUFACTURER:	SCHNEIDER ELECTRIC INDIA LTD	PAGE SIZE A4	REV. NO. 01
PROJECT:	1X660 MW BHUSAWAL TPS	NO.OF SHEETS	18
SHEET TITLE:	Network Drawing for SWBD OBA (DC PANEL-1)		08
PROJECT CODE: SEIL-4915029	TYPE OF EQUIPMENT DATA CONCENTRATOR PANEL	SUPPLIER NO: SEIL-4915029-107	




This document must not be copied without our written permission and the contents there of must not be imparted to a third party nor be used for any unauthorized purpose.Contravention will be prosecuted.Schneider Electric.



NOTES:

Relay Quantity : 22
Ethernet to RS485 Convector : 2

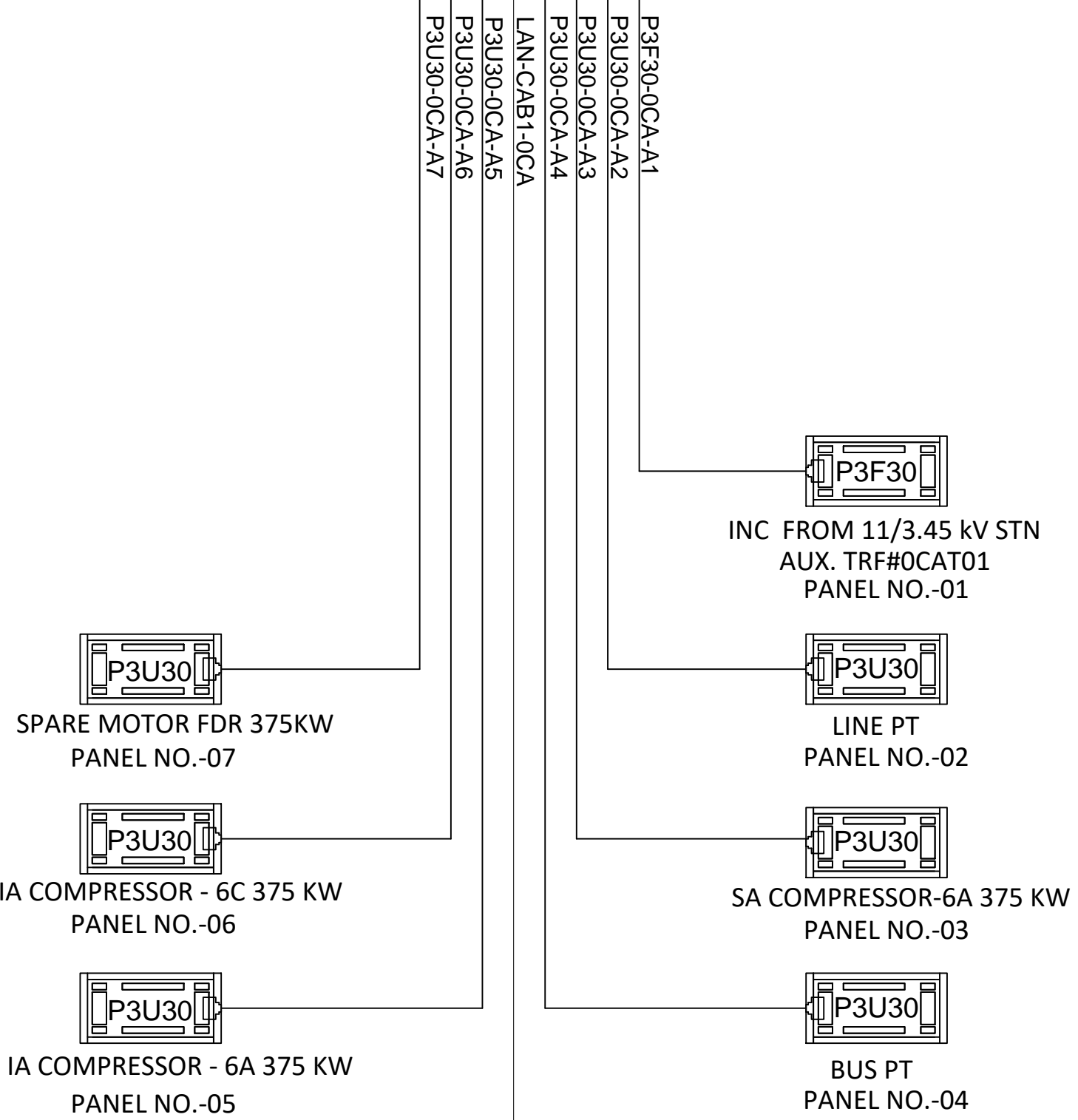
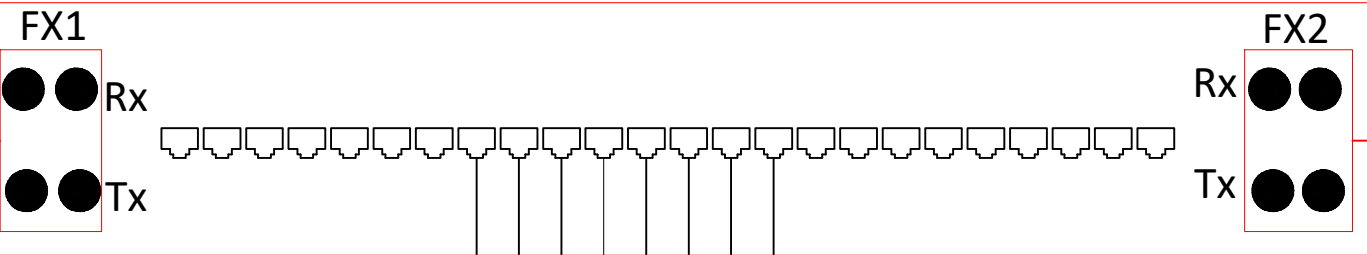
MDL NO: BP-DG-415-401-0033						
				NAME	DATE	
01	As per customer's comments	SYD	24.01.22	DRAWN	SYD	16.12.21
00	First submission	SYD	16.12.21	CHKD	SR	16.12.21
REV	DISCRIPTION	NAME	DATE	APPD	PKR	16.12.21

	OWNER:	MAHARASHTRA STATE POWER GENERATION CORPORATION LTD MAHARASHTRA STATE, INDIA			
	CONSULTANT:	DEVELOPMENT CONSULTANT PVT. LTD. CONSULTING ENGINEERS VASHI NAVI MUMBAI			
	CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL			
	MANUFACTURER:	SCHNEIDER ELECTRIC INDIA LTD		PAGE SIZE A4	REV. NO. 01
PROJECT:		1X660 MW BHUSAWAL TPS		NO.OF SHEETS	18
SHEET TITLE:		Network Drawing for SWBD 6CA (DC PANEL-1)		SHEET	09
PROJECT CODE: SEIL-4915029		TYPE OF EQUIPMENT DATA CONCENTRATOR PANEL		SUPPLIER NO: SEIL-4915029-107	

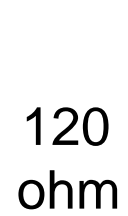
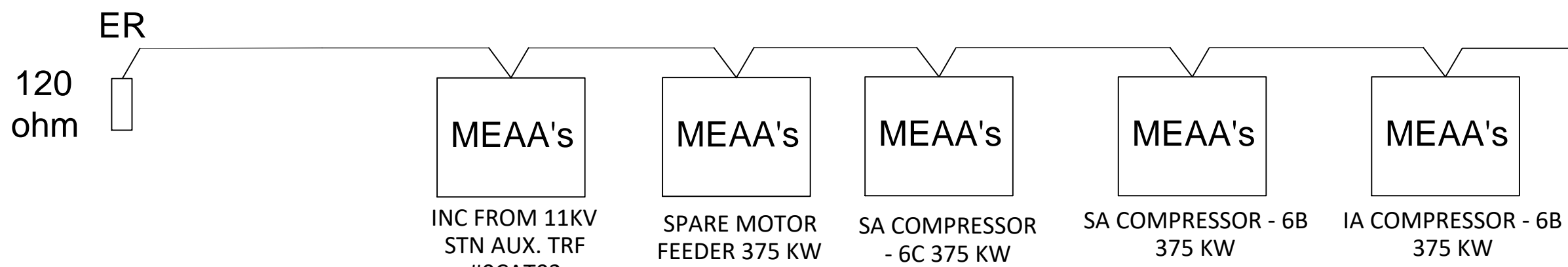
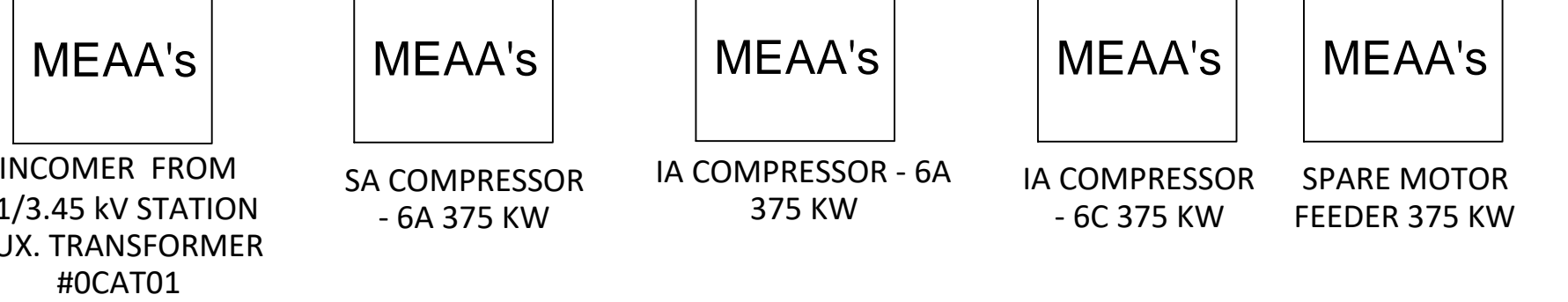
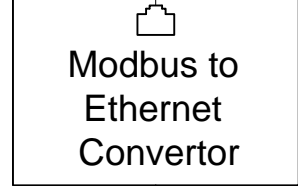
This document must not be copied without our written permission and the contents there of must not be imparted. to a third party nor be used for any unauthorized purpose.Contravention will be prosecuted.Schneider Electric.

FROM
EFS14#6CA

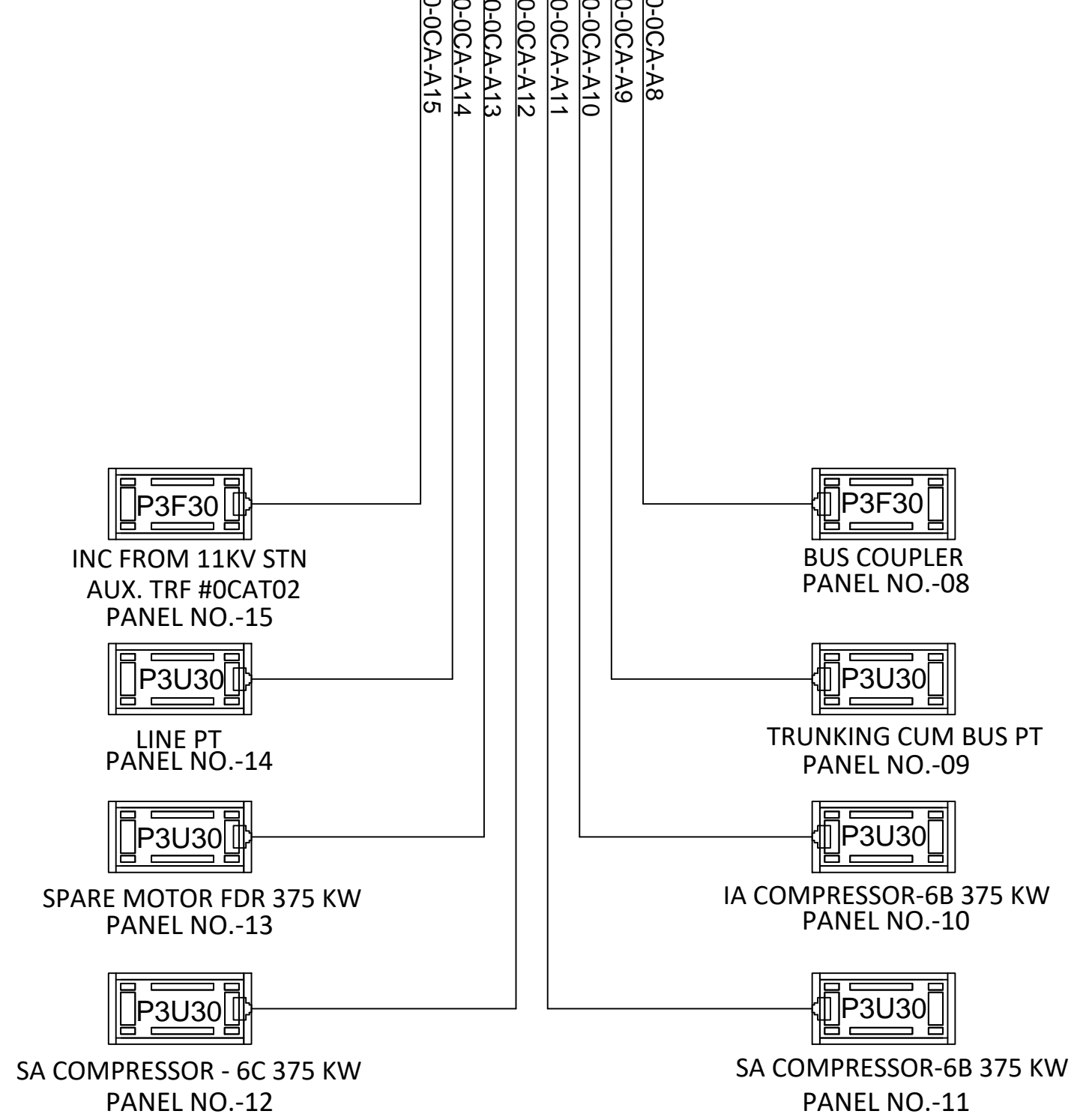
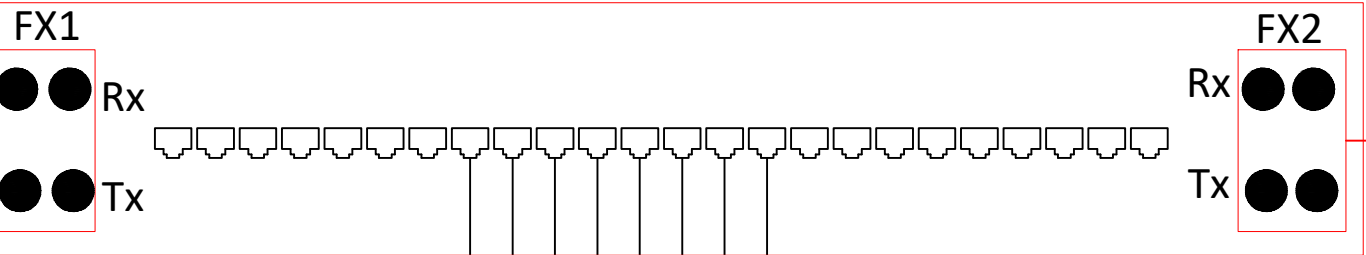
EFS15-0CA



C7-1



EFS16-0CA



TO DC PANEL-2
EFS1 #0CB

NOTES:

Relay Quantity : 15
Ethernet to RS485 Convertor : 1

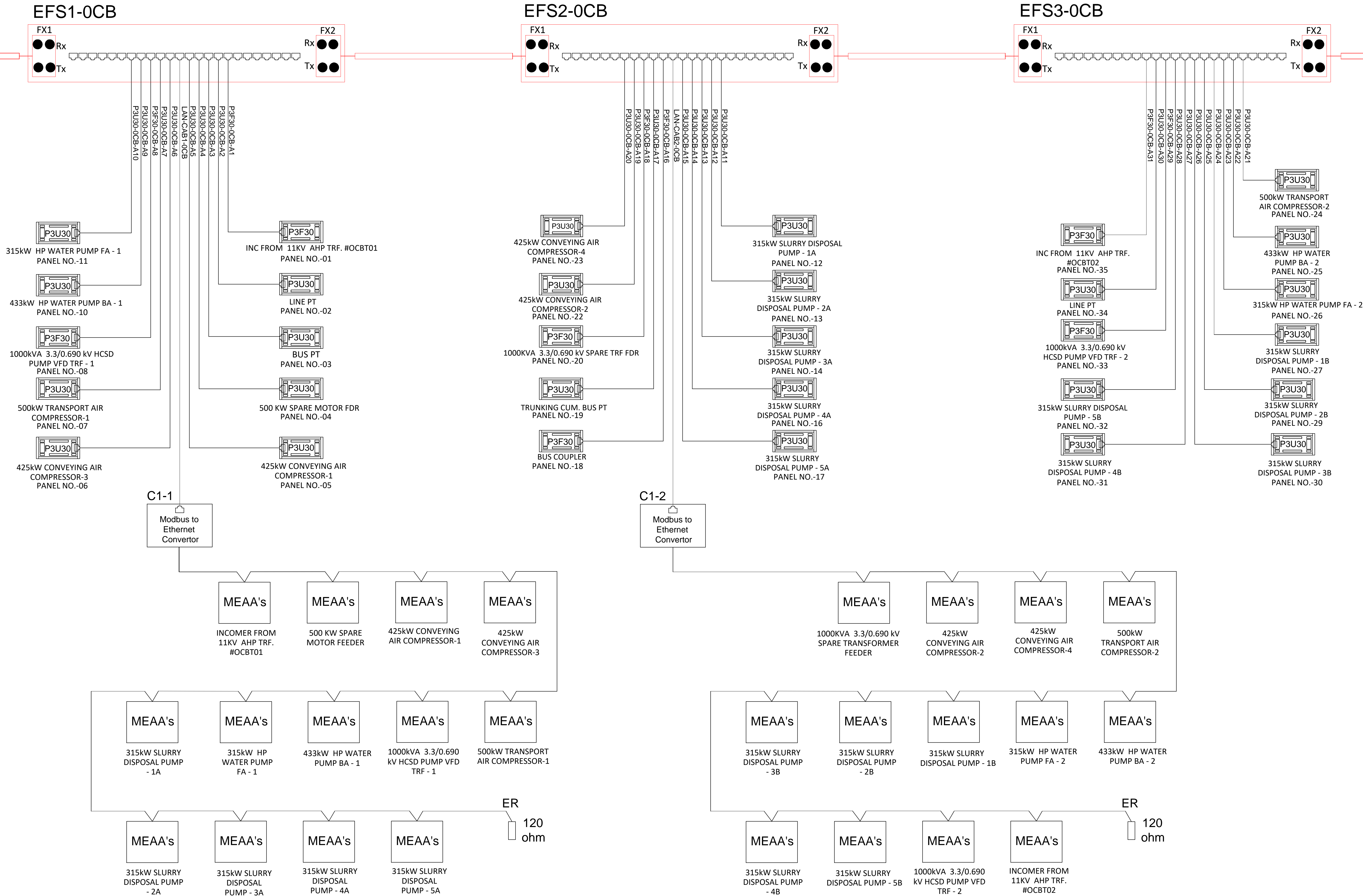
MDL NO: BP-DG-415-401-0033						
				NAME	DATE	
01	As per customer's comments	SYD	24.01.22	DRAWN	SYD	16.12.21
00	First submission	SYD	16.12.21	CHKD	SR	16.12.21
REV	DISCRPTION	NAME	DATE	APPD	PKR	16.12.21

	OWNER:	MAHARASHTRA STATE POWER GENERATION CORPORATION LTD MAHARASHTRA STATE, INDIA		
	CONSULTANT:	DEVELOPMENT CONSULTANT PVT. LTD. CONSULTING ENGINEERS VASHI NAVI MUMBAI		
	CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL		
	MANUFACTURER:	SCHNEIDER ELECTRIC INDIA LTD	PAGE SIZE A4	REV. NO. 01
PROJECT:		1X660 MW BHUSAWAL TPS	NO.OF SHEETS	18
SHEET TITLE:		Network Drawing for SWBD OCA (DC PANEL-1)	SHEET	10
PROJECT CODE: SEIL-4915029		TYPE OF EQUIPMENT DATA CONCENTRATOR PANEL	SUPPLIER NO: SEIL-4915029-107	

This document must not be copied without our written permission and the contents there of must not be imparted.
to a third party nor be used for any unauthorized purpose.Contravention will be prosecuted.Schneider Electric.

FROM DC PANEL-1
EFS16 #OCA

TO EFS4
#0BE






NOTES:

Relay Quantity : 31
Ethernet to RS485 Converter : 2

MDL NO: BP-DG-415-401-0033

					NAME	DATE
01	As per customer's comments	SYD	24.01.22	DRAWN	SYD	16.12.21
00	First submission	SYD	16.12.21	CHKD	SR	16.12.21
REV	DISCRIPTION	NAME	DATE	APPD	PKR	16.12.21

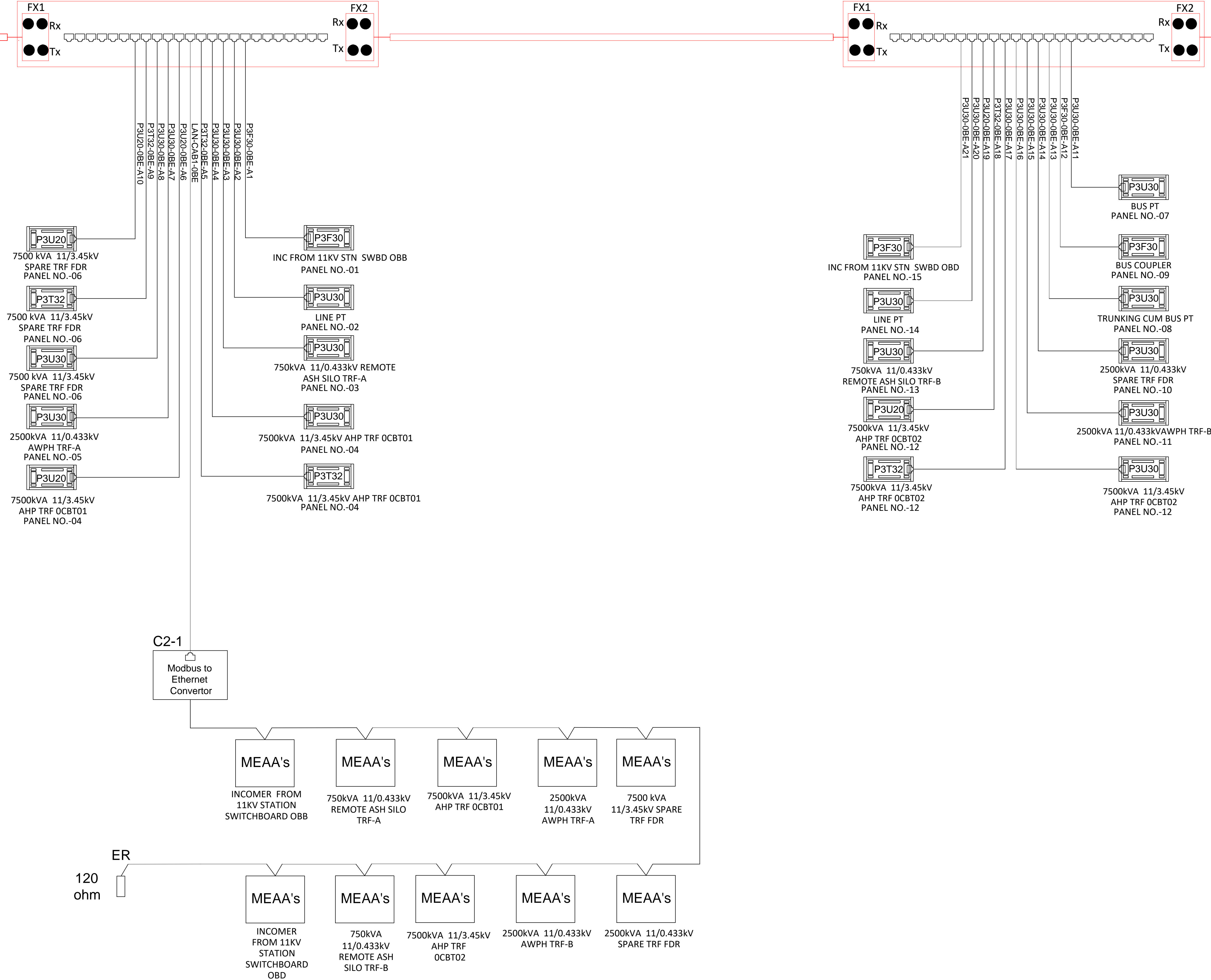
	OWNER:	MAHARASHTRA STATE POWER GENERATION CORPORATION LTD MAHARASHTRA STATE, INDIA		
	CONSULTANT:	DEVELOPMENT CONSULTANT PVT. LTD. CONSULTING ENGINEERS VASHI NAVI MUMBAI		
	CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL		
	MANUFACTURER:	SCHNEIDER ELECTRIC INDIA LTD	PAGE SIZE A4	REV. NO. 01
PROJECT:		1X660 MW BHUSAWAL TPS	NO.OF SHEETS	18
SHEET TITLE:		Network Drawing for SWBD OCB (DC PANEL-2)	SHEET	11
PROJECT CODE: SEIL-4915029		TYPE OF EQUIPMENT DATA CONCENTRATOR PANEL	SUPPLIER NO: SEIL-4915029-107	

FROM
EFS3#0CB

EFS4-0BE

EFS5-0BE

TO DC PANEL-3
EFS1 #0CC



NOTES:

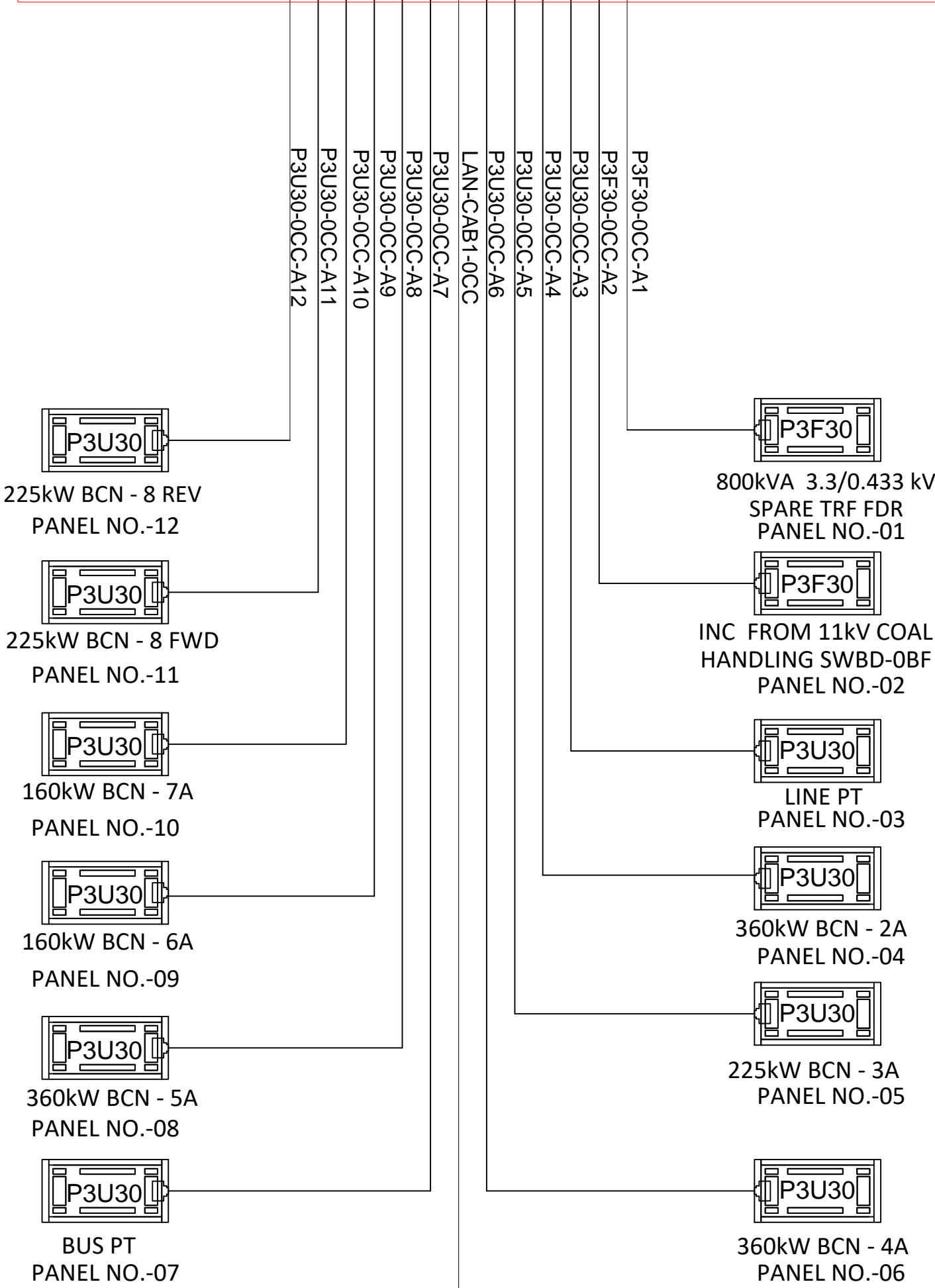
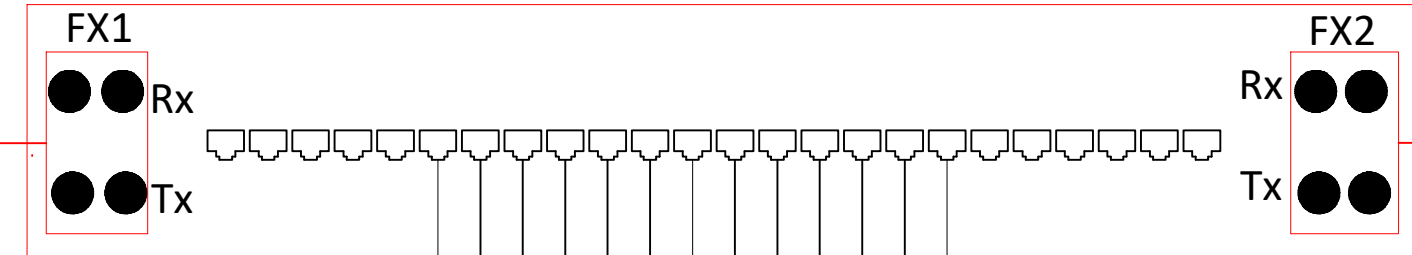
Relay Quantity : 21
Ethernet to RS485 Convertor : 1

MDL NO: BP-DG-415-401-0033						
				NAME	DATE	
01	As per customer's comments	SYD	24.01.22	DRAWN	SYD	16.12.21
00	First submission	SYD	16.12.21	CHKD	SR	16.12.21
REV	DISCRIPTION	NAME	DATE	APPD	PKR	16.12.21

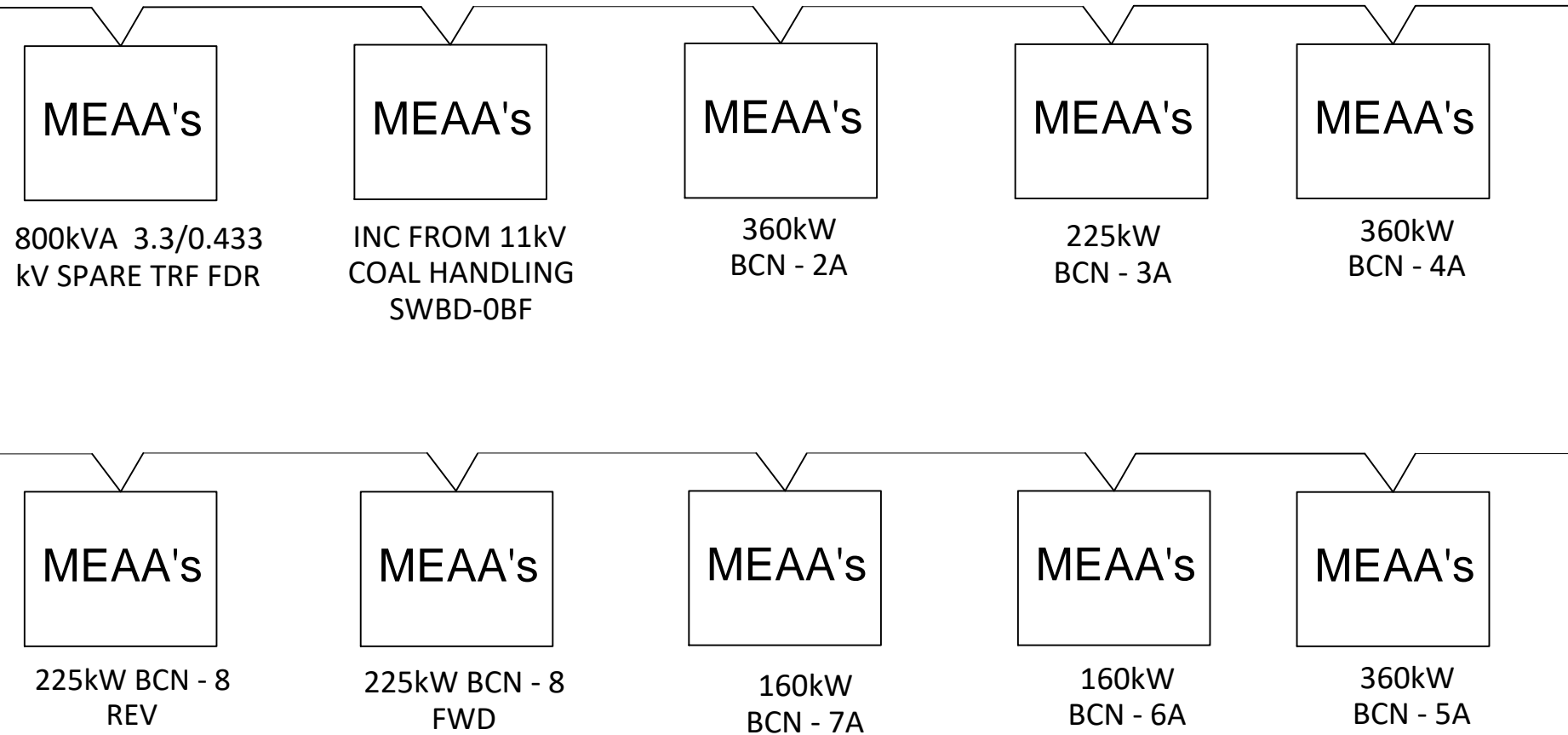
	OWNER:	MAHARASHTRA STATE POWER GENERATION CORPORATION LTD MAHARASHTRA STATE, INDIA		
	CONSULTANT:	DEVELOPMENT CONSULTANT PVT. LTD. CONSULTING ENGINEERS VASHI NAVI MUMBAI		
	CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL		
	MANUFACTURER:	SCHNEIDER ELECTRIC INDIA LTD	PAGE SIZE A4	REV. NO. 01
PROJECT:		1X660 MW BHUSAWAL TPS	NO.OF SHEETS	18
SHEET TITLE:		Network Drawing for SWBD OBE(DC PANEL-2)	SHEET	12
PROJECT CODE: SEIL-4915029		TYPE OF EQUIPMENT DATA CONCENTRATOR PANEL	SUPPLIER NO: SEIL-4915029-107	

FROM DC PANEL-2
EFS5#0BE

EFS1-0CC

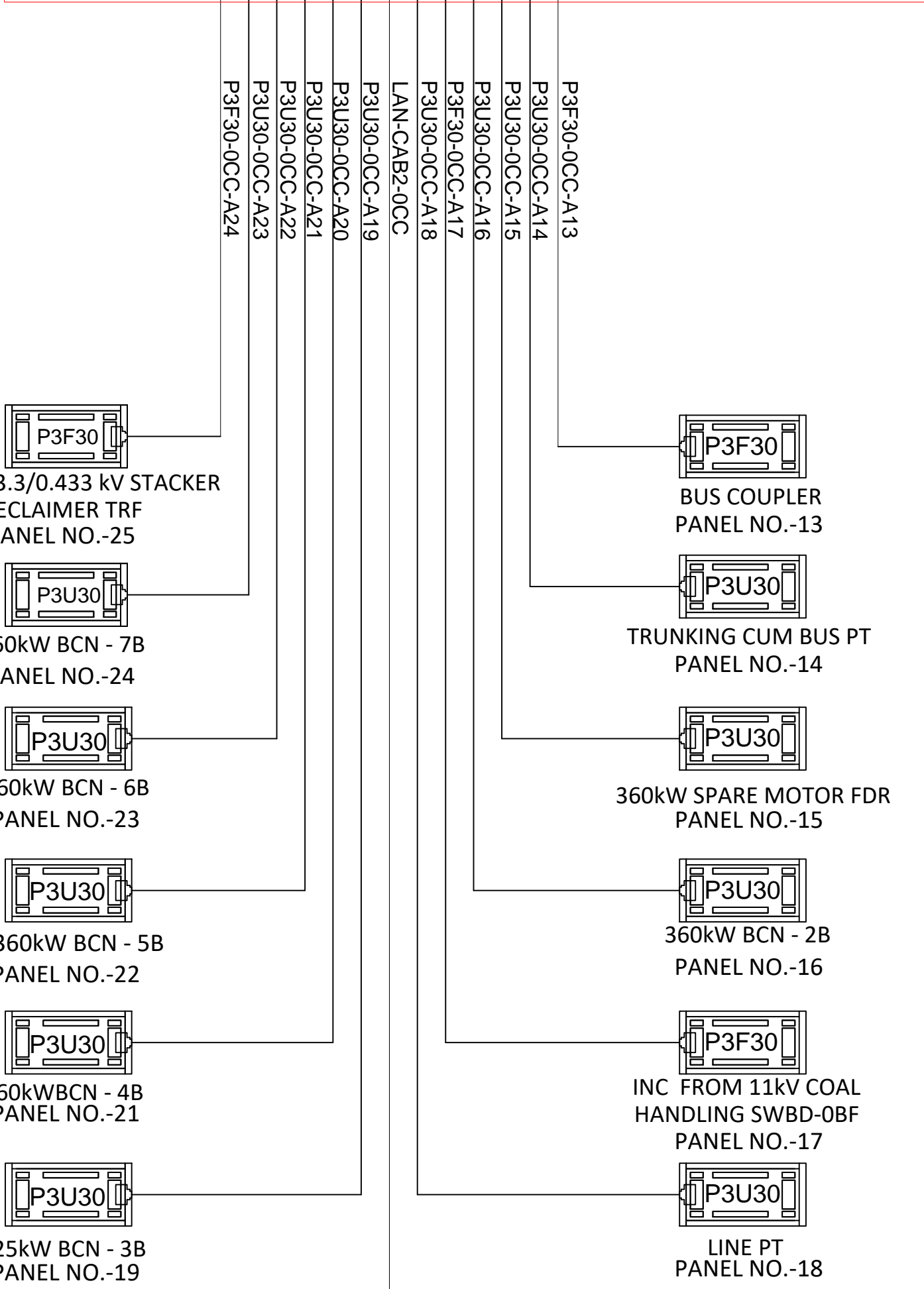
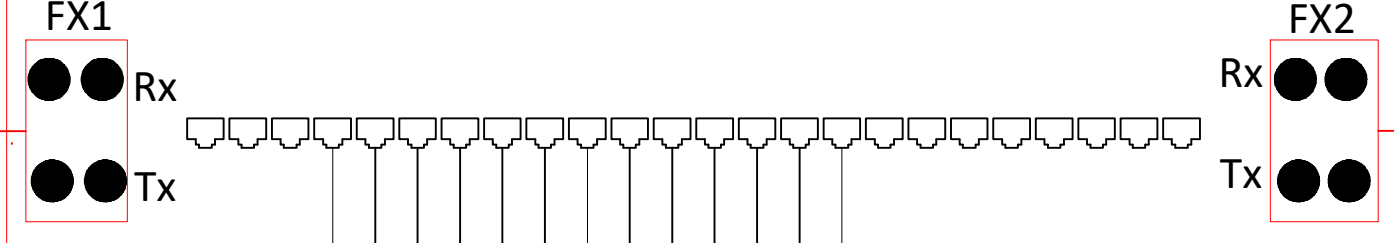


C1-1
Modbus to
Ethernet
Convertor

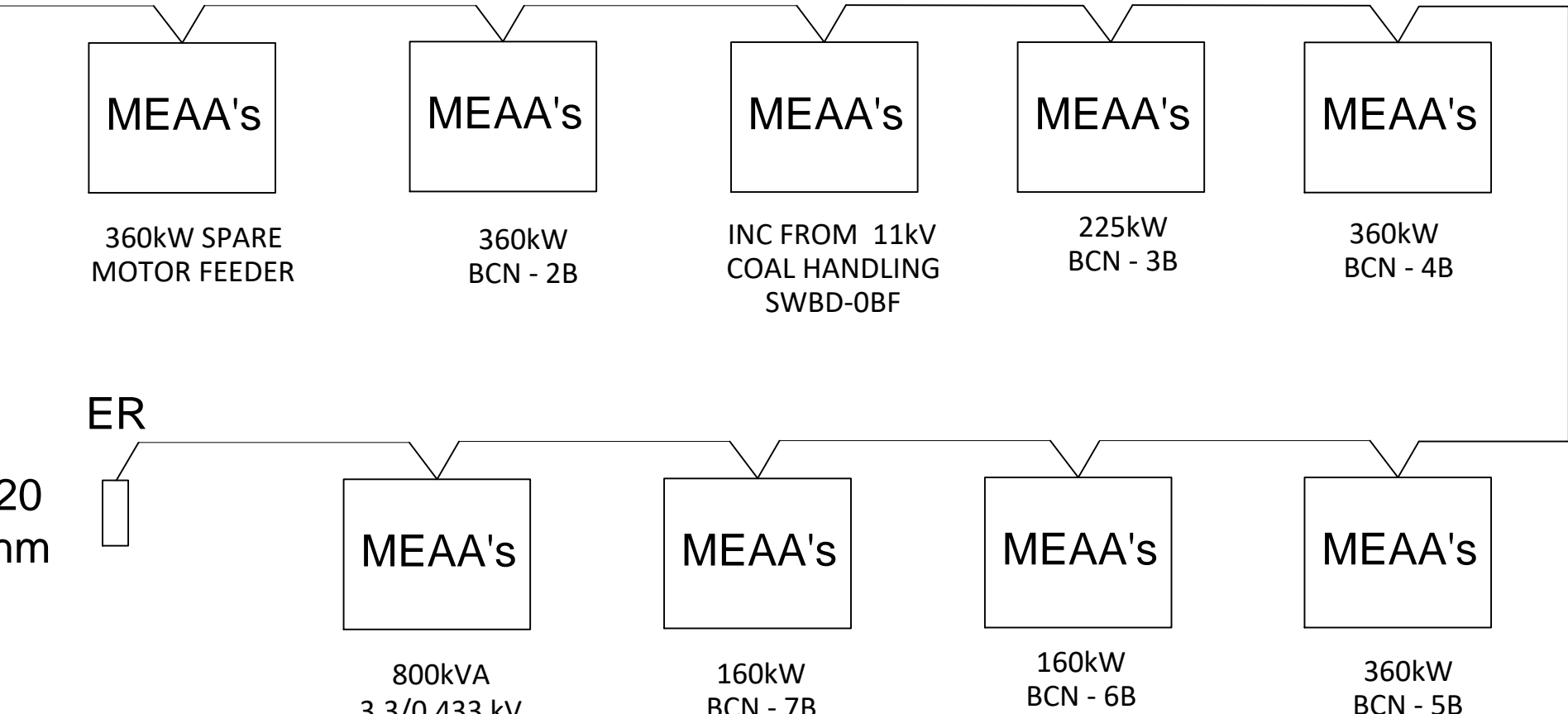


ER
120
ohm

EFS2-0CC



C1-2
Modbus to
Ethernet
Convertor






ER
120
ohm

TO EFS3
#0BF

NOTES:

Relay Quantity : 24
Ethernet to RS485 Convertor : 2

MDL NO: BP-DG-415-401-0033						
					NAME	DATE
01	As per customer's comments	SYD	24.01.22	DRAWN	SYD	16.12.21
00	First submission	SYD	16.12.21	CHKD	SR	16.12.21
REV	DISCRIPTION	NAME	DATE	APPD	PKR	16.12.21

	OWNER:	MAHARASHTRA STATE POWER GENERATION CORPORATION LTD MAHARASHTRA STATE, INDIA			
	CONSULTANT:	DEVELOPMENT CONSULTANT PVT. LTD. CONSULTING ENGINEERS VASHI NAVI MUMBAI			
	CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL			
	MANUFACTURER:	SCHNEIDER ELECTRIC INDIA LTD		PAGE SIZE A4	REV. NO. 01
PROJECT:		1X660 MW BHUSAWAL TPS		NO.OF SHEETS	18
SHEET TITLE:		Network Drawing for SWBD OCC(DC PANEL-3)		SHEET	13
PROJECT CODE: SEIL-4915029		TYPE OF EQUIPMENT DATA CONCENTRATOR PANEL		SUPPLIER NO: SEIL-4915029-107	

This document must not be copied without our written permission and the contents there of must not be imparted. to a third party nor be used for any unauthorized purpose.Contravention will be prosecuted.Schneider Electric.

FROM
EFS2#0CC

EFS3-0BF

EFS4-0BF

EFS5-0BF

TO DC PANEL-4
EFS1 #0CD

C2-1

C2-2

Modbus to
Ethernet
Converto

Modbus to
Ethernet
Converto

ER
120
ohm





ER
120
ohm

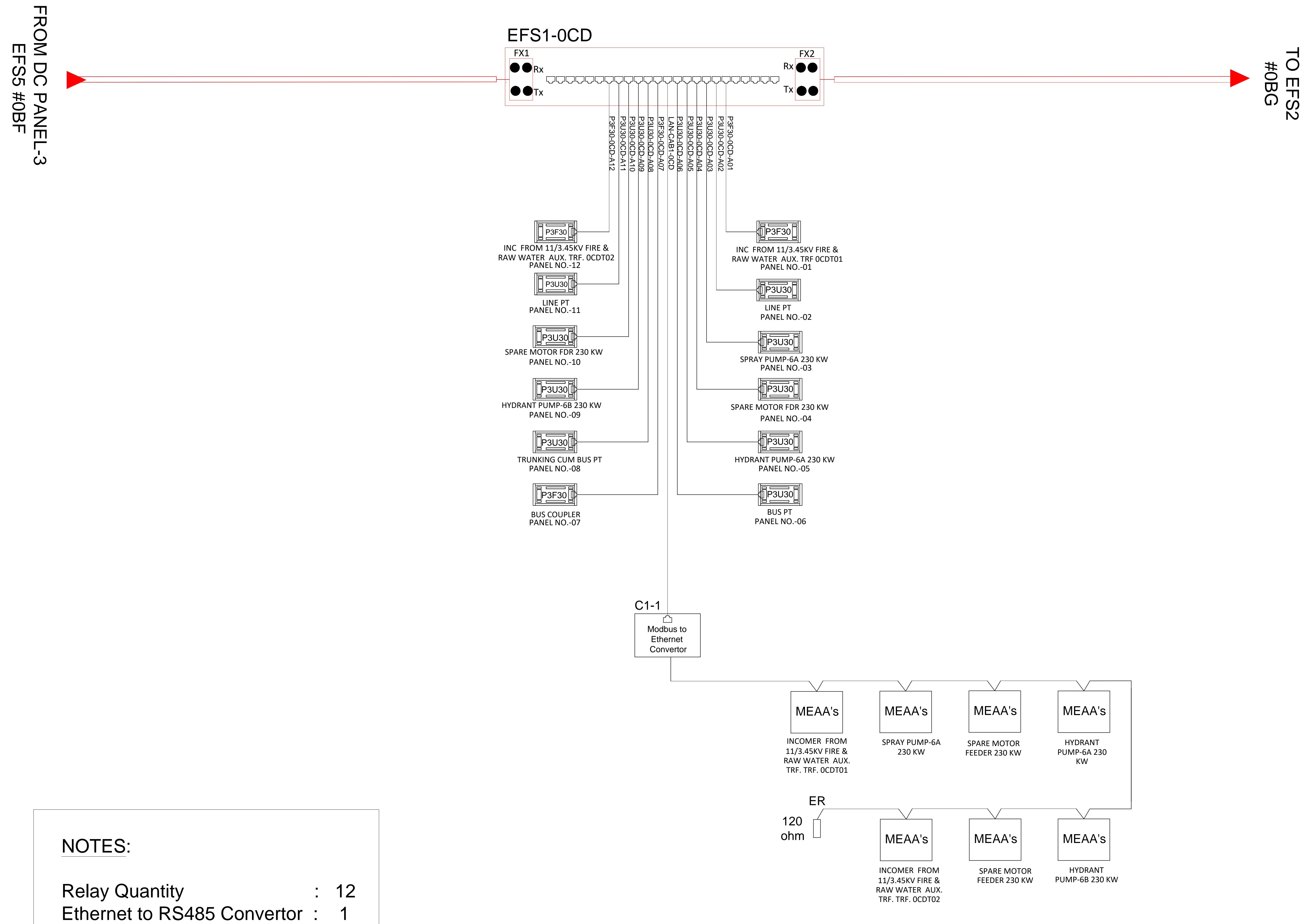
NOTES:

Relay Quantity : 32
Ethernet to RS485 Converto : 2





MDL NO: BP-DG-415-401-0033

					NAME	DATE
01	As per customer's comments	SYD	24.01.22	DRAWN	SYD	16.12.21
00	First submission	SYD	16.12.21	CHKD	SR	16.12.21
REV	DISCRIPTION	NAME	DATE	APPD	PKR	16.12.21

	OWNER:	MAHARASHTRA STATE POWER GENERATION CORPORATION LTD MAHARASHTRA STATE, INDIA			
	CONSULTANT:	DEVELOPMENT CONSULTANT PVT. LTD. CONSULTING ENGINEERS VASHI NAVI MUMBAI			
	CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL			
	MANUFACTURER:	SCHNEIDER ELECTRIC INDIA LTD		PAGE SIZE A4	REV. NO. 01
PROJECT:		1X660 MW BHUSAWAL TPS		NO.OF SHEETS	18
SHEET TITLE:		Network Drawing for SWBD OBF (DC PANEL-3)		SHEET	14
PROJECT CODE: SEIL-4915029		TYPE OF EQUIPMENT DATA CONCENTRATOR PANEL		SUPPLIER NO: SEIL-4915029-107	

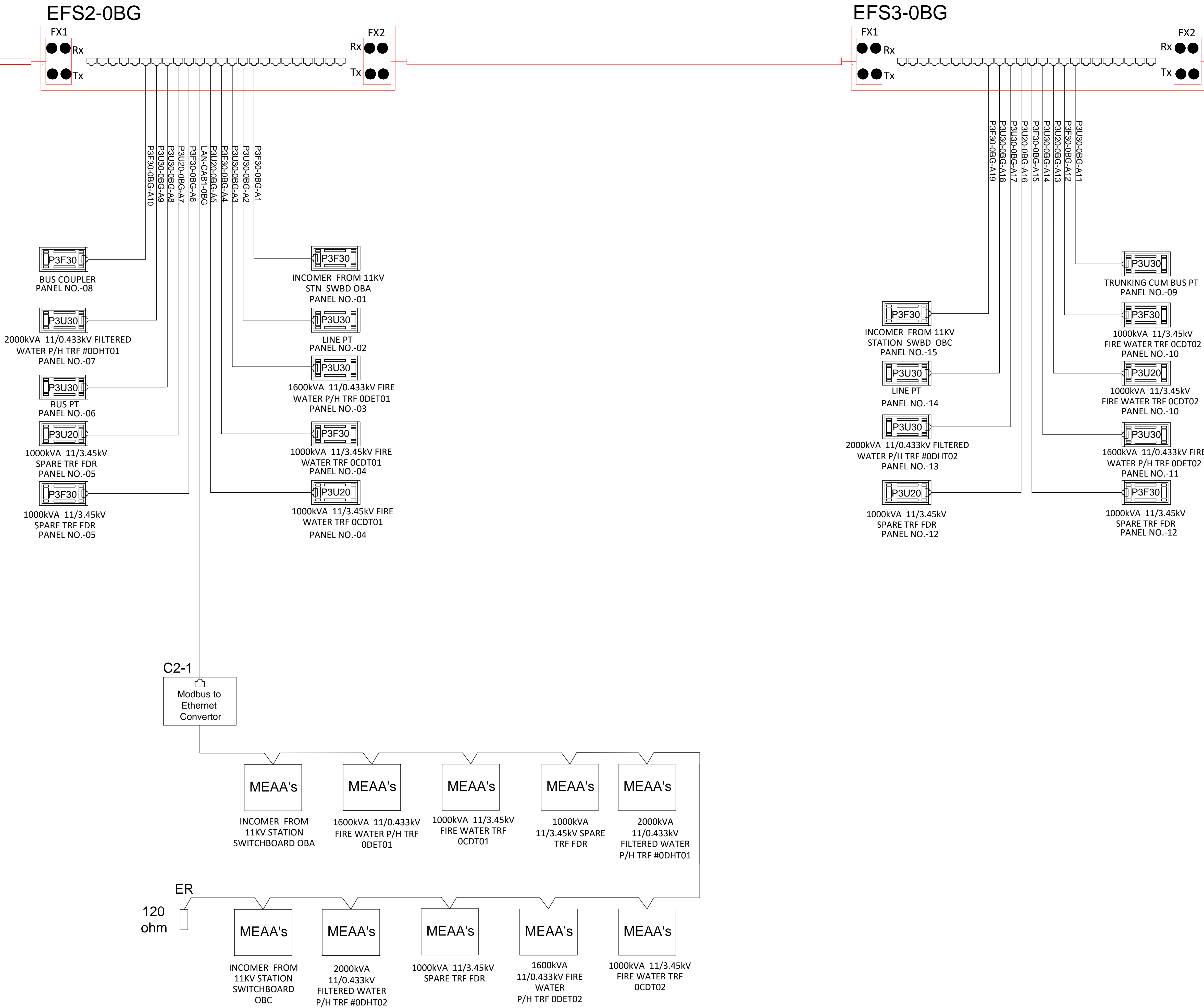


			MDL NO: BP-DG-415-401-0033			
					NAME	DATE
01	As per customer's comments	SYD	24.01.22	DRAWN	SYD	16.12.21
00	First submission	SYD	16.12.21	CHKD	SR	16.12.21
REV	DISCRPTION	NAME	DATE	APPD	PKR	16.12.21

 OWNER:	MAHARASHTRA STATE POWER GENERATION CORPORATION LTD MAHARASHTRA STATE, INDIA		
 CONSULTANT:	DEVELOPMENT CONSULTANT PVT. LTD. CONSULTING ENGINEERS VASHI NAVI MUMBAI		
 CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL		
 MANUFACTURER:	SCHNEIDER ELECTRIC INDIA LTD	PAGE SIZE A4	REV. NO. 01
PROJECT:	1X660 MW BHUSAWAL TPS	NO.OF SHEETS	18
SHEET TITLE:	Network Drawing for SWBD OCD (DC PANEL-4)	SHEET	15
PROJECT CODE: SEIL-4915029	TYPE OF EQUIPMENT DATA CONCENTRATOR PANEL	SUPPLIER NO: SEIL-4915029-107	

This document must not be copied without our written permission and the contents there of must not be imparted. to a third party nor be used for any unauthorized purpose.Contravention will be prosecuted.Schneider Electric.




FROM
EFS1 #0CD



NOTES:

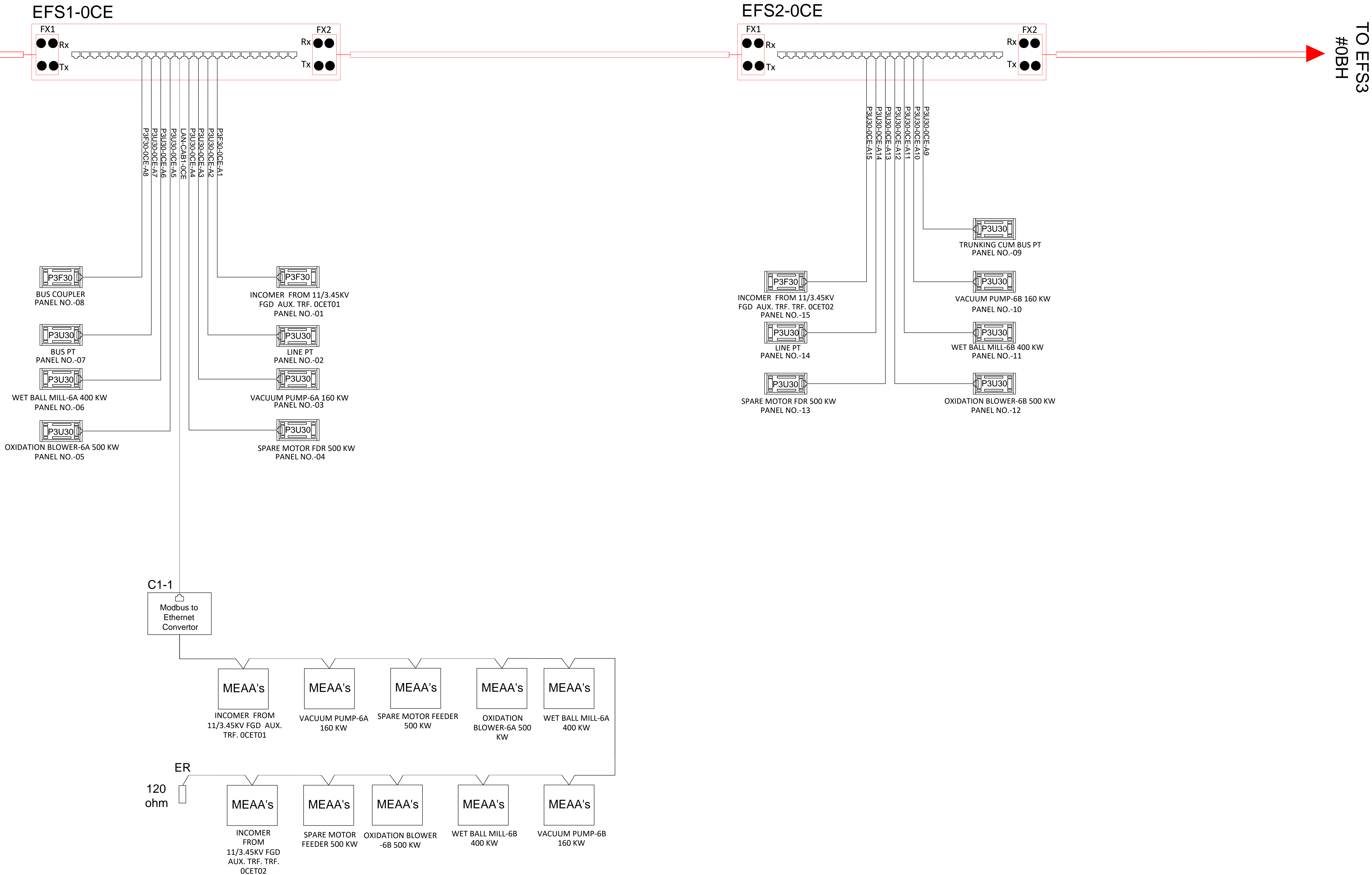
Relay Quantity : 19
Ethernet to RS485 Converter : 1

MDL NO: BP-DG-415-401-0033						
				NAME	DATE	
01	As per customer's comments	SYD	24.01.22	DRAWN	SYD	16.12.21
00	First submission	SYD	16.12.21	CHKD	SR	16.12.21
REV	DISCRIPTION	NAME	DATE	APPD	PKR	16.12.21

	OWNER:	MAHARASHTRA STATE POWER GENERATION CORPORATION LTD MAHARASHTRA STATE, INDIA		
	CONSULTANT:	DEVELOPMENT CONSULTANT PVT. LTD. CONSULTING ENGINEERS VASHI NAVI MUMBAI		
	CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL		
	MANUFACTURER:	SCHNEIDER ELECTRIC INDIA LTD	PAGE SIZE A4	REV. NO. 01
PROJECT:		1X660 MW BHUSAWAL TPS	NO.OF SHEETS	18
SHEET TITLE:		Network Drawing for SWBD OBG (DC PANEL-4)	SHEET	16
PROJECT CODE: SEIL-4915029		TYPE OF EQUIPMENT DATA CONCENTRATOR PANEL	SUPPLIER NO: SEIL-4915029-107	

This document must not be copied without our written permission and the contents there of must not be imparted. to a third party nor be used for any unauthorized purpose.Contravention will be prosecuted.Schneider Electric.




FROM DC
PANEL-4
EFS3#0BG



NOTES:

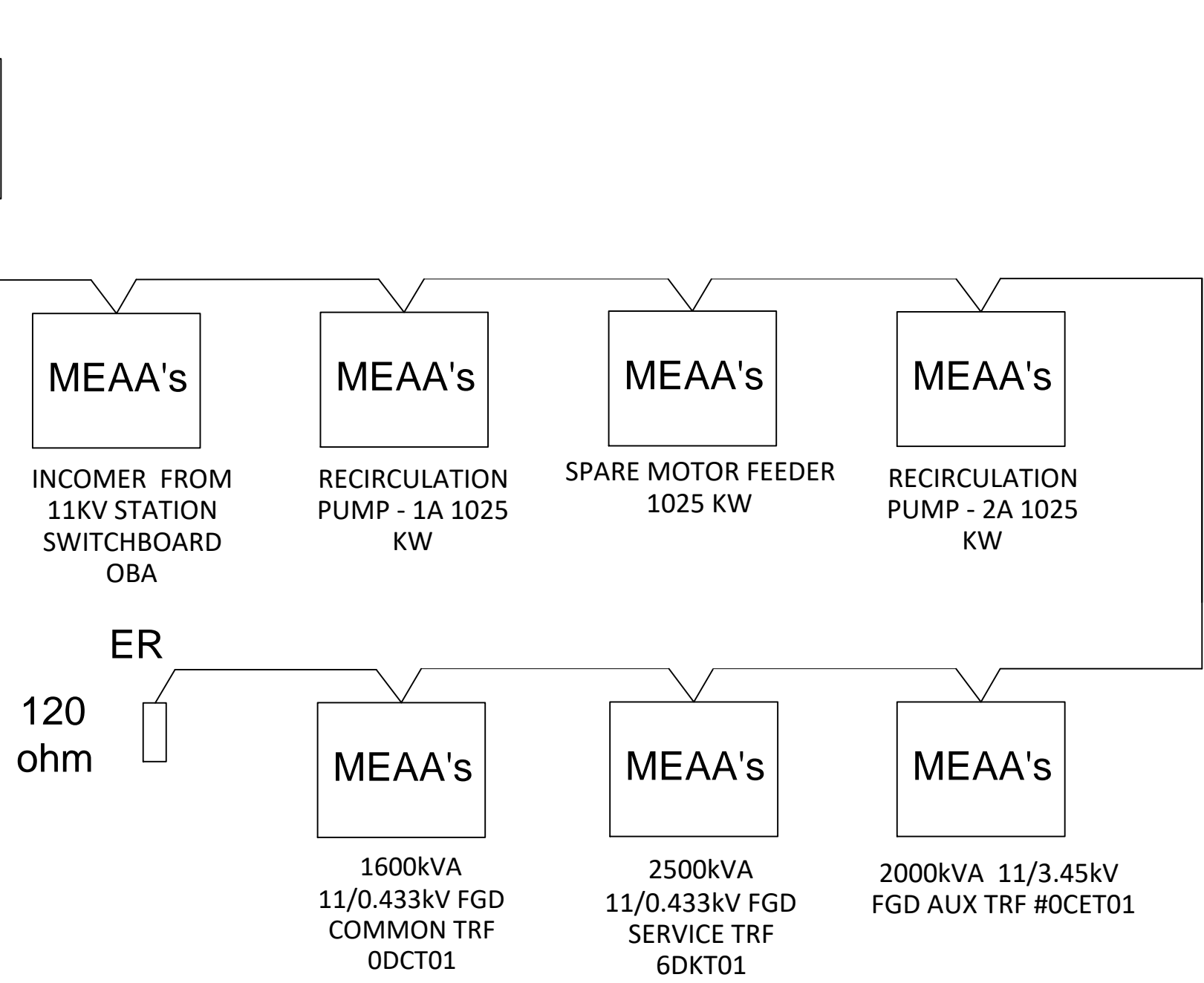
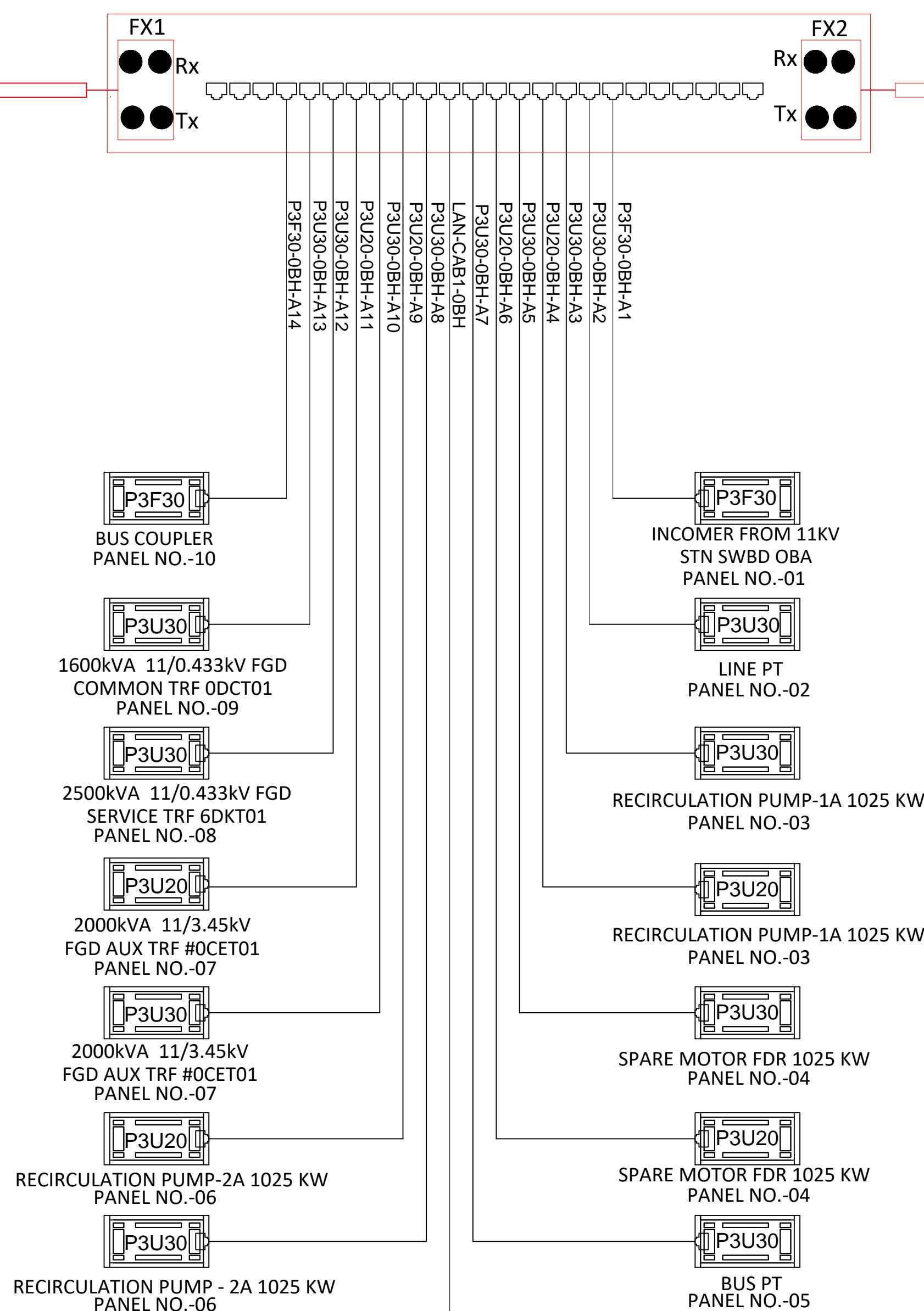
Relay Quantity : 15
Ethernet to RS485 Converter : 1

MDL NO: BP-DG-415-401-0033						
					NAME	DATE
01	As per customer's comments	SYD	24.01.22	DRAWN	SYD	16.12.21
00	First submission	SYD	16.12.21	CHKD	SR	16.12.21
REV	DISCRIPTION	NAME	DATE	APPD	PKR	16.12.21

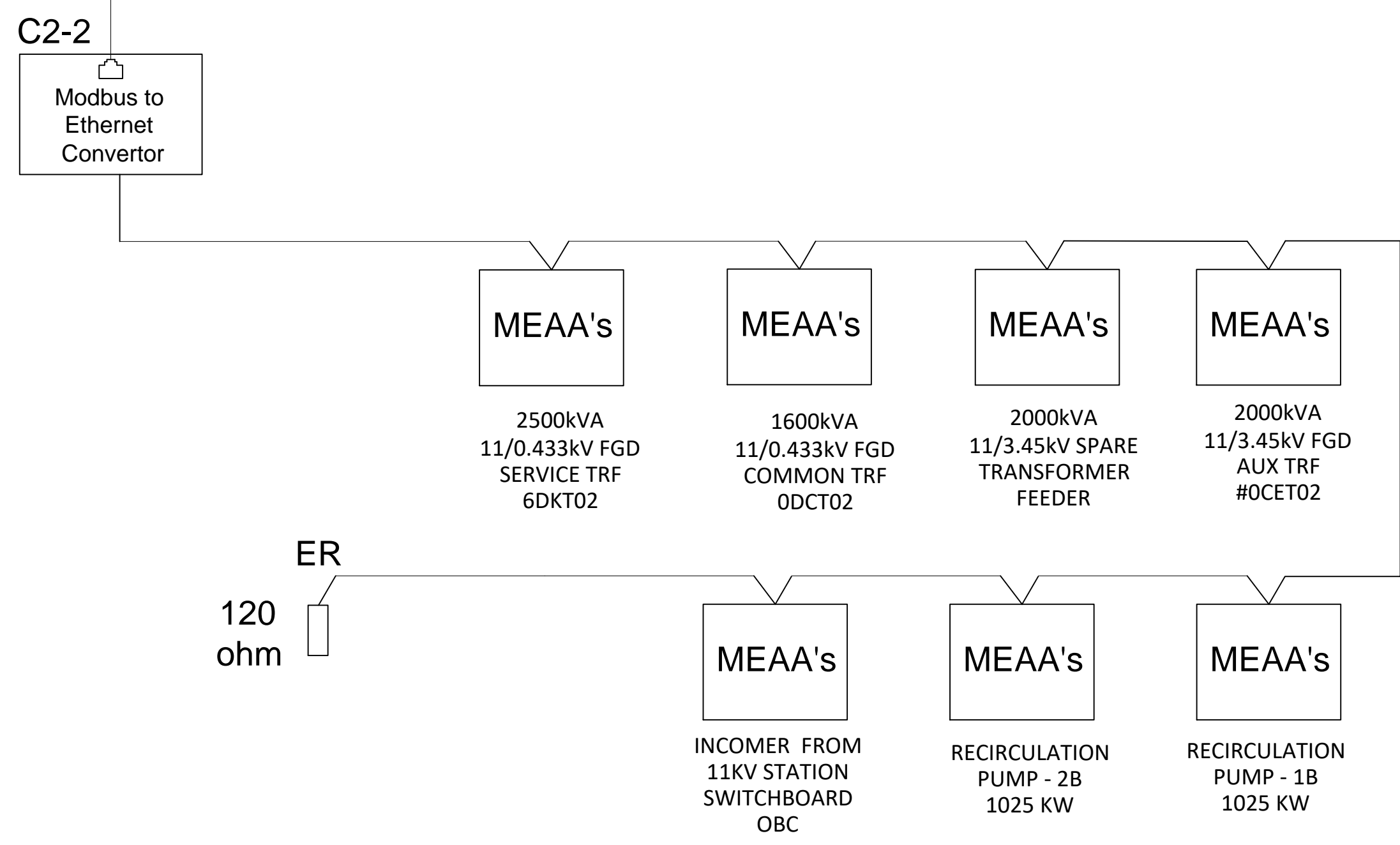
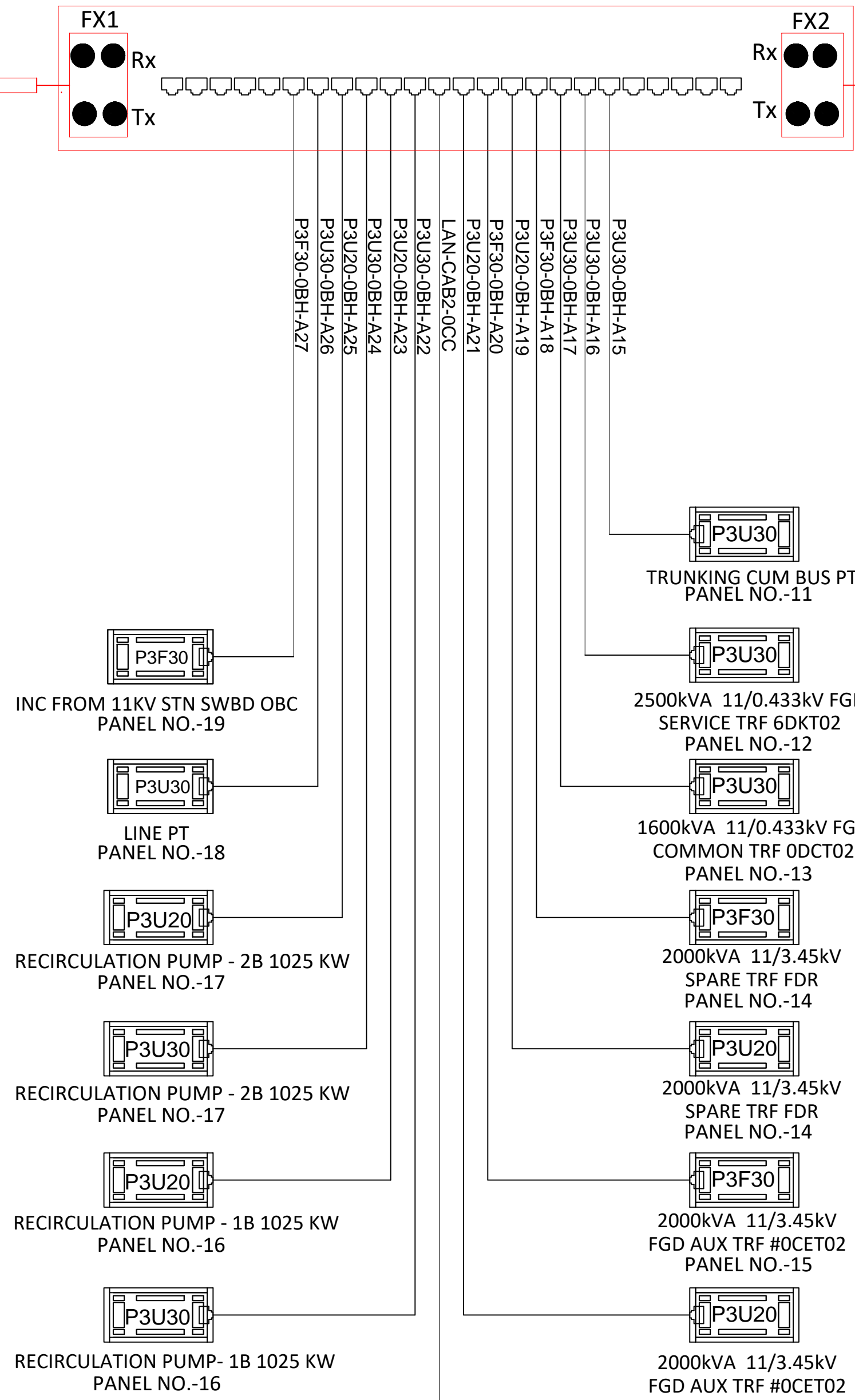
	OWNER:	MAHARASHTRA STATE POWER GENERATION CORPORATION LTD MAHARASHTRA STATE, INDIA		
	CONSULTANT:	DEVELOPMENT CONSULTANT PVT. LTD. CONSULTING ENGINEERS VASHI NAVI MUMBAI		
	CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL		
	MANUFACTURER:	SCHNEIDER ELECTRIC INDIA LTD	PAGE SIZE A4	REV. NO. 01
PROJECT:		1X660 MW BHUSAWAL TPS	NO.OF SHEETS	18
SHEET TITLE:		Network Drawing for SWBD OCE(DC PANEL-5)	SHEET	17
PROJECT CODE: SEIL-4915029		TYPE OF EQUIPMENT DATA CONCENTRATOR PANEL	SUPPLIER NO: SEIL-4915029-107	

FROM
EFS2#0CE

EFS3-0BH



EFS4-0BH






NOTES:


Relay Quantity : 27
Ethernet to RS485 Convertor : 2

MDL NO: BP-DG-415-401-0033


					NAME	DATE
01	As per customer's comments	SYD	24.01.22	DRAWN	SYD	16.12.21
00	First submission	SYD	16.12.21	CHKD	SR	16.12.21
REV	DISCRIPTION	NAME	DATE	APPD	PKR	16.12.21

	OWNER:	MAHARASHTRA STATE POWER GENERATION CORPORATION LTD MAHARASHTRA STATE, INDIA			
	CONSULTANT:	DEVELOPMENT CONSULTANT PVT. LTD. CONSULTING ENGINEERS VASHI NAVI MUMBAI			
	CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL			
	MANUFACTURER:	SCHNEIDER ELECTRIC INDIA LTD		PAGE SIZE A4	REV. NO. 01
PROJECT:		1X660 MW BHUSAWAL TPS		NO.OF SHEETS	18
SHEET TITLE:		Network Drawing for SWBD OBH(DC PANEL-5)		SHEET	18
PROJECT CODE: SEIL-4915029		TYPE OF EQUIPMENT DATA CONCENTRATOR PANEL		SUPPLIER NO: SEIL-4915029-107	

ANNEXURE-D

	MAHARASHTRA STATE POWER GENERATION CO. LTD.	Volume : V
	BID SPECIFICATION NO.:DG/BSL U-6/2011/T-1	Section – 5
REV: R0	CONTROL & INSTRUMENTATION	Page 366 of 718
<p>(c) GSC level control.</p> <p>(d) Deaerator pegging steam pressure control.</p> <p>(e) Flash tank level control.</p> <p>5.14 <u>ELECTRICAL DISTRIBUTION MANAGEMENT SYSTEM (EDMS)</u></p> <p>5.14.1 The purpose of the EDMS is to provide Control and Monitoring of the unit in-plant Electrical Distribution System from DCS.</p> <p>5.14.2 Control configuration for EDMS shall not be limited to the following :</p> <p>(a) Dual redundant multifunction controllers.</p> <p>(b) Two operator stations.</p> <p>(c) DCS Historian will be used for collection of events, analog values.</p> <p>5.14.3 EDMS shall display the followings as a minimum:</p> <p>(a) Animated single line diagram of the electrical network.</p> <p>(b) Alarm summary.</p> <p>(c) Display of analog & digital parameters.</p> <p>(d) Display of breaker status (local/Remote, Service/Test, Spring charge etc.).</p> <p>(e) Display of faceplate.</p> <p>(f) Real time and history trend of all analog and critical digital parameters.</p> <p>5.14.4 The maximum time taken from issuing a circuit breaker close / open command at the HMI keyboard to observe a change of status on the screen shall not be more than 1.0 Second.</p>		

CONSULTANT : PROCON ENGINEERS

 MAHARASHTRA STATE POWER GENERATION CO. LTD.		Volume : V
	BID SPECIFICATION NO.:DG/BSL U-6/2011/T-1	Section – 5
REV: R0	CONTROL & INSTRUMENTATION	Page 367 of 718
5.14.5	All binary and analog inputs shall be hardwired. Similarly, output from the system connecting to different switchgear units shall also be hardwired. Non-critical interlocks can be implemented in DCS.	
5.14.6	EDMS shall control the following functions as a minimum:	
(a)	11 kV & 3.3 kV System Incomers, bus tie, Bus coupler and Outgoing feeders except HT motor feeders, which will be controlled through process partition of DCS.	
(b)	415V System (i) For PCC/PMCC Incomers & Bus couplers of all PCC/Switchgear, Outgoing (ACB operated) feeders to MCC except motor feeders which will be controlled through process partition of DCS. (ii) For 415V MCC All ACB operated incomers and Bus couplers.	
(c)	11 kV, 3.3 kV & 415V Auto changeover: Fast Bus changeover/Slow Bus changeover (i.e. Unit to Reserve/ Reserve to unit with auto/manual synchronization).	
5.14.7	Control system shall control all the Bus Tie, Transformer Feeders, Incomers and Outgoing feeders stationed at operation building. Upstream breakers for the off-site plants and common system like Ash Handling Plant, Raw water & DM Plant, CW & ACW system, Coal handling plant located at power House building shall also be controlled from the control system.	
5.14.8	Electrical Network stationed at outside power house such as network of Ash Handling Plant, CW & ACW system, Raw water & Demineralisation Plant, Coal handling plant shall be controlled from their respective DCS /PLC unit and MMI station in addition to local switch board operation. Any	

CONSULTANT : PROCON ENGINEERS
