

SCOPE OF WORK

Replacement of existing control & relay panels with new relay panels of at 400/220 kV POWERGRID ITARSI Substation

POWERGRID WR-II is having 09 no. 400kV Line, 10 No. Bus & Line Reactors in 400/220 kV POWERGRID, ITARSI Substation. The relay panels installed on these lines are more than 30 years old. During commissioning, these relay panels were installed with static protection relays, later on, the same were retrofitted with Numerical Distance relays. Line wise details of each feeder and associated substation bus configurations are:

Sr. No.	Name of Substation	Name of Line/Bus Bar	Bus Configuration
1	40/220 kV POWERGRID ITARSI SS	400 kV Itarsi-Jabalpur Ckt-1,2,3 & 4 with LR	One & Half Breaker Scheme (D-Type 4 CT scheme)
2		400 kV Itarsi-Indore Ckt-1 & 2 with LR	One & Half Breaker Scheme (D-Type 4 CT scheme)
3		400 kV Itarsi-Khandwa Ckt-1 with switchable LR	One & Half Breaker Scheme (D-Type 4 CT scheme)
4		400 kV Itarsi-Khandwa Ckt-2 without LR	One & Half Breaker Scheme (D-Type 4 CT scheme)
5		400 kV Itarsi-Satpura Ckt-1 without LR	One & Half Breaker Scheme (D-Type 4 CT scheme)
6		125 MVAr Bus Reactor-1 & 2	One & Half Breaker Scheme (D-Type 4 CT scheme)
7		50 MVAr Bus Reactor-3	One & Half Breaker Scheme (D-Type 4 CT scheme)
8		315 MVA, 400/220 kV ICT-1 HV Side	One & Half Breaker Scheme (D-Type 4 CT scheme)
9		220 kV Itarsi (PG)-Itarsi (MPPTCL) Ckt-1	Double Main Transfer Scheme
10		220 kV Itarsi (PG)-Hosangabad (MPPTCL) Ckt-1	Double Main Transfer Scheme
11		315 MVA, 400/220 kV ICT-1 MV Side	Double Main Transfer Scheme

12		220 kV BUS Coupler Bay	Double Main Transfer Scheme
13		220 kV Transfer Bay	Double Main Transfer Scheme
14		400 kV Bus Bar	One & Half Breaker Scheme
15		220 kV Bus Bar	Double Main Transfer Scheme

Note:

1. The existing DC system is dual source 220V DC.
2. **Site Survey:** Agency is requested carry out site survey at their own cost for better understanding of the works being executed. For these necessary permissions shall be provided by Officer I/C of respective site.
3. **A KIOSK-based system is being adopted; therefore, a Decentralized Bus Bar Scheme has been proposed.**

Supply Portion:

1. It involves a supply of relay panels (Main 1 & Main 2 Configuration with Auto reclose relay for each line, BUS BAR Unit & REF, Differential, BU IMP, HV & MV OCEF relay for ICT & REF, Differential, BU IMP for Reactors) as mentioned above. All the instruments inside the relay panels etc. needs to be as per Standard philosophy of POWERGRID and detail given in **latest Tech. spec. CRP Rev-09, GTR – Rev 15**. All the instruments, aux. relays etc., are to be suitable for the 220V DC system.
2. The Substation Automation System (SAS) shall be installed to control and monitor all the sub-station equipment as mentioned above from Remote Control Centers (RCC) & Remote Control and Supervision Centre (RSCC), as well as from the local control center. Substation Automation System to be as per Standard philosophy of POWERGRID and detail given in **latest Tech spec substation automation Rev-04**.
3. Control Schematic is to be prepared as per Bus configuration at respective station. In 400 kV Bus Scheme is one & half breaker (D type layout with 4 CT scheme) & In 220 kV Bus Scheme is Double main transfer. 400 & 220 kV Bus scheme is to be prepared by

considering the augmentation of existing 400 & 220 kV Bays which are SCADA based & Any augmentation work with TBC bays will in the scope. 06 No. 220 kV Bays i.e. Line & ICT's bays are SCADA based (Not retrofit) will also be augmentation work with TBC.

4. **A KIOSK-based system is being adopted; therefore, a Decentralized Bus Bar Scheme has been proposed.**
5. Time synchronization of all numerical relays under scope with new GPS clock with SNTP/IRIG-B (both ports are required) is under scope.
6. The SAS shall contain the following main functional parts:
 - a) Bay Control Unit (BCU) Intelligence Electronic Devices (IEDs) for control and monitoring.
 - b) Merging Units & Switchgear Controller IEDs (applicable for Process Bus based SAS only)
 - c) Station Human Machine Interface (HMI) with industrial grade servers
 - d) Redundant managed switched Ethernet Local Area Network communication infrastructure with hot standby.
 - e) Redundant Gateway for remote monitoring and control via industrial grade hardware (to RCC), the gateway should be able to communicate with RSCC on IEC 60870-5-104 protocol. It shall be the bidder's responsibility to integrate his offered system with the existing RSCC system for exchange of desired data. There will be at least 3 RCCs.
 - f) DR / Engineering PCs, as specified.
 - g) Remote HMI and workstation along with necessary printers, only if specified in Section Project.
 - h) Peripheral equipment like printers, display units, keyboards, Mouse etc.
7. Adequate space to be provided in each relay panels for installation of:
 - a. 01 Nos Special Energy Meters (Main Meter) with TTBs.
8. Test blocks need to be provided for Main-1, Main-2, REF, Differential, BU IMP, HV & MV OCEF & any other numerical relay installed in the relay Panel.
9. All IEDs supplied under the scope shall have a communication module (FO/RJ45 Type) for IEC 61850 communications.
10. Suitable Ethernet switch is to be supplied by the bidder (at each station) for connecting the relays in the network and then to DR PC. Configuration of DR Signals in Relay as per approved schematics shall be in the scope of the bidder.

11. Supply of Two no. HMI & One no. DR PC along with monitor is also in the scope as per POWERGRID Specs.
12. Suitable Fiber Optic Patch Chords along with the conduit to be supplied for communication from IEDs up to Ethernet switch in the supplied bays panels.
13. Proper arrangement shall be available in the panels being supplied for mounting of LIUs/Ethernet switches etc.
14. All the relevant software along with licenses for offered relays like communication software, relay settings & configuration software, DR Downloading and Evaluation software etc. are also in the scope of supply. All the software shall be submitted by way of one set of original / licensed CDs per station.
15. All the required hardware like communication cables, converters etc., required for Relay Setting & Configuration in individual relays from local console (01 Set for each substation), Are also in the scope of supply.
16. Settings to be adopted in the supplied relays shall be provided by the bidder based on the Relay application. Such settings shall be implemented at site after approval from POWERGRID.

Erection Portion:

1. Bidder is to quote considering scope of work, Tech Spec. (CRP Rev-09 & GTR Rev-15) & Tech spec substation automation Rev-04 after due survey of each location. Further, Bidder shall submit detailed schematics/ configurations / BOQ etc. for retrofitting work to respective officers in-charge for approval.
2. The erection portion involves removal/ dismantling of existing Control & relay panel along with existing Main 1 & 2, REF, Differential, BU IMP, HV & MV OCEF relays, BB relays, 01 Nos. SEM meters (main meter) with TTBs, GPS and cables, erection and installation of the new relay panels as supplied by the bidder.
3. Necessary inter panel wiring from nearby Relay Panels, bus bar protection panels for extending digital inputs, shall also be in the scope of work (however, this will not include any cabling/wiring from switchyard except termination of switchyard cables in TBs).
4. Augmentation of existing 400 & 220 kV Bays (New SCADA Bays) into BB.

5. Similarly, time synchronization of the relay with the new GPS clock of the substation shall also be in the scope of bidder (including supply of minor hardware required) Bidder needs to visit the site.
6. Bidder will have to check/inspect the schematics of existing panels for compatibility to suit the installation of new CRP & BB panels in KIOSK. The complete engineering for successful installation of CRP & BB panels is in the scope of bidder, including modifications required in the existing schematic drawing etc. Required existing schematic drawings etc. will be made available to the successful bidder. However, if required, bidders will have to depute their engineers for understanding the existing schematics, in case of non-availability original drawings etc. For any modification required in the existing schematics, necessary clearance will have to be taken from POWERGRID authorities by submitting all calculations and drawings. After all the updated schematic drawing after getting approved needs to be submitted by bidder in five copies and properly binded.
7. ICT#1 (POWERGRID) which is in the DIA of 400 kV Bhopal-Itarsi Ckt#1 (MPPTCL bay). Hence Contractor has to commissioned the system in a manner that the control & relay panels associated with 400kV Bhopal-Itarsi #1&2 Line bays shall remain in the existing control room as it belongs to ownership of MPPTCL. Rest of the system shall be installed & commissioned in respective KIOSK based. However, control & relay protection of 400 kV ICT#1 which is in the DIA of 400 kV Bhopal-Itarsi Ckt#1 feeder has to arrange in such a manner that ICT#1 shall be in the KIOSK & control & relay panels of 400 kV Bhopal-Itarsi Ckt#1 feeder shall be in the existing control room only.
8. Automation of existing DG set & FFPH system shall be in the scope of contractor only. Supply of Auxilary BCU for LT system & installation & commissioning in line with standard POWERGRID TS, GTR and scope of work.
9. Sufficient binary input cards should be available for successful configuration of all NTAMC/RTAMC signals.
10. The contractor has to provide life time validity of SCADA based software's.
11. Supply & installation of insulation mats in each Kiosk in line with TS Technical Specification, Section: SE REV. No:10 shall be in the scope of contractor only.
12. Bidder needs to ensure wiring of watchdog contact of the offered relay in the BCU which is to be on DC changeover supply facility.

13. All the hardware and arrangements required for successful installation of relay panels, existing relays and necessary wiring is also in the scope of bidder (e.g. 2.5sq mm copper wires for intra and inter-panel wiring, lugs, ferrules, ties, Terminal blocks, Fuses, Links, MCBs, Test Block/ Plug, Blanking Plates, Auxiliary Relay-if required etc.).
14. Bidder shall arrange all necessary tools and plants, as well as testing instruments and any other special devices required for successful installation, testing & commissioning of the numerical relays in their place.
15. Bidder will have to arrange OEM person only in the form of Qualified Engineers and skilled technicians for the complete installation work including the testing and commissioning of the newly installed CRP & BB panels at site. Any T&P required for lifting up the panels shall be in the scope of bidder.
16. Bidder will have to work with due care, so that existing system will not be disturbed. Party needs to mobilize all the resources for early completion of the work and only limited shutdown shall be provided for commissioning of the same. Party needs to carry out maximum possible work under charged/live conditions. POWERGRID will supervise the work of testing and commissioning along with installation work. The entire work shall be done as per the requirements of POWERGRID.
17. POWERGRID shall provide necessary permits to carry out the above works.
18. Agency has to undertake all safety precautions and has to ensure compliance of all safety norms during the execution of the work. Agency shall be wholly responsible for any untoward incident during the execution of the work.
19. Supply of any other item (hardware as well as software), which is not covered in this scope of work and if required for successful installation and commissioning of the relays, is in the scope of successful bidder.
20. As the switchyard will be in live condition, Bidder will have to ensure that the work be carried out with all safety precautions with safety tools and plants with their working staff.
21. Bidder shall complete the entire work as per the technical specifications enclosed herewith. The Bidder shall ensure the successful commissioning of all Relays by carrying out all necessary activities as mentioned above and also activities which are not mentioned and deemed required during the works for successful commissioning.

22. After completion of work, three sets of as-built scheme drawings will have to be submitted, in soft copy as well as hard copy.

The above-mentioned scope of work is only indicative; the scope of work shall also include all such items which are not specifically mentioned in the scope of work but necessary for successful, efficient and reliable performance of the equipment and fulfil the POWERGRID Technical Specification Tech. spec. CRP Rev-09, GTR – Rev 15 & Tech spec substation automation Rev_04.