प्रसारभारती / **PRASAR BHARATI**
भारतीयलोकसेवाप्रसारक/ **INDIA'S PUBLIC SERVICE BROADCASTER**
अपरमहानिदेशक(अभि.)(द.क्षे) काकार्यालय/ **O/O. ADDL. DIRECTOR GENERAL (E)(SZ)**
आकाशवाणीएवंदूरदर्शन / **ALL INDIA RADIO & DOORDARSHAN**
स्वामीशिवानंदासालै, चेन्नई / **SWAMY SIVANANDA SALAI, CHENNAI – 600 005.**

सत्यम् शिवम् सुन्दरम्

F.No. DD PROJECT/GDDRC HYD/SITC/11KV/415V/5WAY RMU/2026-27 E337160 **Dt: 15.05.2026**

Sub: Extension for Date of submission of Budgetary quote request for Design, manufacturing, pre dispatch testing, delivery and SITC of **11KV, 415V, 630A, 5 way, Motorized, SCADA Compatible, SF6 Outdoor Ring Main Unit (RMU) from vendors / OEM – Reg**

Ref: DD PROJECT/GDDRC HYD/SITC/11KV/415V/5WAY RMU/2026-27 E337160, Dt: 08.05.2026

Sir/Madam,

With reference to File no referred above in reference, the date of submission of Budgetary quote for Design, manufacturing, pre dispatch testing, delivery and SITC of 11KV, 415V, 630A, 5 way, Motorized, SCADA Compatible, SF6 Outdoor Ring Main Unit (RMU) from vendors / OEM **is extended upto 21.05.2026**

Hence, the budgetary quote may kindly be provided by email to **tvproject_sz@yahoo.com** on or before **21.05.2026**.

भवदीय /Regards,

T. Nalini 15/5/2026

टी / नलिनी.T.Nalini,
उप महानिदेशक (अभि(/ DDG(E)
कृतेअपरमहानिदेशक (प्र.सं.)(द.क्षे) / for ADG(BO)(SZ)

TECHNICAL SPECIFICATION FOR SITC OF 11KV 3 PHASE OUTDOOR RMU AND INTEGRATION WITH THE HT POWER SUPPLY SYTEM.

1.0 SCOPE:

The specification covers Design, pre dispatch testing, supply, installation, testing and commissioning of **11KV 3 phase, SCADA compatible, SF6 Outdoor Ring Main Unit (RMU)** in accordance with the technical requirements mentioned in the specification and relevant standards, including foundation as per the recommendation of the manufacturer as required.

Integration with the two feeder cables from the pole structure, laying of HT cables to and from the 500kVA two numbers indoor transformers and testing the power supply system.

2.0 STANDARDS:

a) The equipment delivered shall be new and of high quality, suitable for the purpose it is intended for, free from defects and imperfections and of the classifications listed herein, or their equivalents, subject to acceptance by this office.

b) Materials used in the manufacture of the specified equipment shall be of the kind, composition and physical properties best suited to their various purposes and in accordance with the best engineering practices.

c) The equipment design shall be suitable to render satisfactory operation under the conditions prevailing at site, and the equipment shall operate satisfactorily under normal load and voltage variations and frequency variations (**50 c/s ± 3%)** ensuring the safety, further include all necessary provisions ensuring the safety of the operating and maintenance personnel.

d) The applicable standards is as specified here below:

2.1 11kV 3 phase Outdoor Ring Main unit

Description	**Standard**
11kV 3 phase Ring Main unit	
AC metal enclosed switchgear and control gear for rated voltages above 1 kV and up to and including 52 Kv	IS 3427
Classification of degrees of protection provided by enclosures of electrical equipment	IS 12063
High Voltage Switches	IS 9920 (Parts 1 to 4)
Specification for AC disconnectors and earthing switches for voltages above 1000 V	IS 9921 (Parts 1 to 5)
High voltage/Low voltage prefabricated substations	IEC 1330
Specification for Static Protective	IS 8686
Standards for high voltage metal clad switchgear up to 52 KV.	IEC 62271-200

2.2 Key RMU Configurations of RING MAIN UNIT

- RMU – left or right extensible with two incoming feeder lines and two outputs, Vacuum Circuit Breaker with short circuit withstand current 21 KV for 3 sec., manually spring charging mechanism.

3.0 Technical parameters

11 kV 3 phase RMU

3.1 Scope of Work

- Design, pre dispatch testing, supply, installation, testing and commissioning of new Ring Main Unit for connecting with two feeder cables to 4 Panel HT Switchgear and two 500kVA indoor transformers.
- RMU shall be equipped with vacuum circuit breakers and a fault passage indicator (FPI).
- Integration with the two feeder cable from the pole structure, laying of HT cables to and from the 500kVA two numbers indoor transformers and testing the power supply system.
- work includes foundation for RMU,excavation of cable trench, laying of HT cable, filling of sand & bricks and closing of trench, providing cable markers etc.
- Copper Plate earthing, resistance should be less than 1 ohm.25mmx3mm copper strip to be used for earth pits to equipment.
- Cable termination kits/lugs etc required for completing the installation including any civil works as per site condition.
- Sufficient space shall be provided in the LV compartment of RMU to accommodate feeder terminal unit.

3.1.1 Environmental Conditions

All materials supplied shall be capable of operating under relevant environmental conditions are listed as follows:

- Maximum ambient air temperature : - 45 ºC
- Minimum ambient air temperature : - 0 ºC
- Average ambient air temperature : - 45 ºC
- Maximum relative humidity : - 0-100 %
- Average thunder storm days per annum : - 10

- Average rainfall per annum : - 400 mm
- Maximum wind speed : - 119 km/hr
- Altitude above mean sea level : - 1000 m

3.1.2 Distribution Network Electrical Parameters

The main parameters of the distribution network are as follows:

- Nominal system voltage : 11 kV (rms)
- Highest system voltage : 12 kV (rms)
- Number of phases : 3
- Frequency :50 Hz
- Variation in frequency : **50 ±3% Hz**
- Type of earthing : Solid
- Power frequency withstand voltage : 28 kV rms
- Basic impulse withstand voltage : 75 kV peak

3.1.3 Testing

The specified RMU shall be subject to type tests, routine tests, and acceptance tests. Where applicable, these tests shall be carried out as per the standards stated above.

3.1.4 11 KV 3 phase Outdoor RMU TECHNICAL PARAMETERS

3.1.4.1 The scope is supply of 11 KV 3 phase RMU suitable for Outdoor application.

3.1.4.2 The RMU to be supplied shall be compact and shall meet the following requirements:

- Easy to install
- Safe and easy to operate
- Compact
- Low maintenance

3.1.4.3 It shall include, within the same metal enclosure number of MV functional units required for connection,

- Vacuum circuit breakers for two incoming feeders, 4 Panel HT Switchgear and two 500kVA indoor transformers.
- Earthing Switches
- FPI's and other allied equipment.

3.1.4.4 Equipment and material conforming to any other standard, which ensures equal or better quality, may be accepted. In such case copies of English version of the standard adopted shall be submitted.

3.1.4.5 The electrical installation shall meet the requirement of Indian Electricity Rules, 1956 as amended up to date, relevant IS code of practice and Indian Electricity Act, 1977. The Electricity Act, 2003 and Amendment if any shall also apply. In addition other rules and regulations applicable to the work shall be followed. In case any discrepancy the most stringent and restrictive one shall be binding.

3.1.4.6 The high-tension switchgear offered shall in general comply with the latest issues including amendments of the Standards as per specification but not restricted to them.

3.1.4.7 All design features of the proposed RMU, as described in the supplier's bid and in the bid's reference materials, shall be fully supported by the equipment actually delivered. The key design features include those that relate to:

- Maintainability, expandability, and life span
- Ability to operate in severe environmental conditions.
- Immunity to electrical stress and disturbance.
- Acceptable insulation properties.
- Convenient interconnection features.

3.1.4.8 **MAKE OF RMU: ABB or SIEMENS or SCHNEIDER**

3.15 **Battery**

The DC batteries shall have sufficient capacity to supply power to the devices with a nominal backup of 8 hours:

- To restore a depleted battery to 80% of full capacity in less than 8 hours.

- To deliver the load of RMU's trip coils, close coils, multifunction meters, and relays, spring charge motor.

▪ The batteries shall be of sealed lead acid or Ni-Cad type, comply with IEC 60623 and shall have a minimum life of five (5) years at 25oC. Each battery cell (For Lead Acid Cell) shall come with a transparent housing for the ease of checking of the battery water level. The battery shall have the capability to close and open the switches for at least 10 close-

open cycles (this must be verified by calculation). When sizing the AH capacity of the battery, the effect of aging shall be taken into consideration. The AH rating of the battery shall be greater than calculated AH but not less than 20AH.

- The battery charger shall be fully temperature compensated.
- To prevent deep discharge of the batteries on loss of AC power source, the battery charger shall automatically disconnect all circuitry fed by the batteries following a user-adjustable time period or when the battery voltage falls below a preset value.
- The battery charger shall be provided with an alarm displayed at the local control panel and remotely at the SCADA to account for any of the following conditions:
    - Low battery voltage
    - High battery voltage
    - Battery failed
    - Battery charger overvoltage
    - Grounded battery/battery-charger
    - Low electrolyte alarm
    - Input MCB off
    - Station AC supply fail
    - Battery Charger fail
    - Others according to manufacturer's design
- The capacity of battery and charger shall be declared in the Technical parameters.

3.15.1 Battery Charger

The charger shall be designed to provide a well regulated DC supply to the load while float charging or quick charging the battery. The charger shall be the constant potential, current limiting fully automatic type. The charger shall automatically switch to float charge after the battery is restored to 80% of its nominal capacity under BOOST charge. The BOOST charge shall be automatically ON after an emergency discharge and the duration of BOOST charge shall be less than 8 hours.

The float charge voltage shall not vary by more than +/- 2% of the set value irrespective of AC input voltage variation of +/- 10 % and of load variation from 0% to 100%. The r.m.s ripple voltage across the battery shall not exceed 1% of the nominal output voltage.

The charger shall be protected against low battery voltage and short circuit at the output by employing current limiting feature. It shall also be protected against reversed battery voltage. Suitable protection shall be incorporated for DC output, transformer secondary, rectifier etc. The charger shall be designed to operate continuously at a temperature of 55°C. To ensure

long service life for the charger, all semiconductor devices shall be of industrial grade. The following instrument and control shall be provided on the charger:-

- Mains ON/OFF input circuit breaker with Mains ON neon or LED indicator, DC output MCBs with spare. All MCBs shall be of double pole design with auxiliary voltage free contact.
- BOOST selector switch, Voltmeter and Ammeter to measure charger/battery voltage and current.
- ll visual alarm indication shall be of LED type with its function clearly mentioned.

3.2 Maintainability, Expandability, and Life Span

3.2.1 Maintainability

- The Utility intends to be self-reliant for RMU maintenance. To this end, the Supplier shall provide the support, documentation, and training necessary to operate and repair the RMU. The Utility will prefers RMU designs that do not require periodic preventive maintenance and inspections. To facilitate expansion and maintenance, the RMUs should be of modular type.

3.2.2 Expandability

- The whole switchgear (RMU) should be suitable for extension on at least one side either left or right.

3.2.3 Life Span

- RMU shall have a design life of at least 20 years from the date of final acceptance. The Contractor shall make available, at no cost to the Employer, the manufacturing drawings, wiring diagrams, bill of material, foundation detail drawings, unpacking and transportation instructions, operation & maintenance manual, As-built drawings and other relevant documentation. The specific components of each component/sub-assembly shall be identified and referenced in Supplier-supplied documentation.

3.3 RMU Features

3.3.1 General

- The RMUs shall be designed specifically for outdoor installation with ingress protection degree of IP54. They shall also be suitable for conditions in which they will be exposed to heavy industrial pollution, and high levels of airborne dust.
- The outdoor RMU shall be conformably coated to meet the climatic conditions. In this respect, standards such as IEC 62271-200, covering equipment, systems, operating conditions, and environmental conditions shall apply. In particular, the RMU equipment shall have been type tested for IP54. Failure to conform to this requirement shall constitute grounds for rejection of the proposal
- In addition to the above, materials promoting the growth of fungus or susceptibility to corrosion and heat degradation shall not be used, and steps shall be taken to provide rodent proof-ness.

3.3.2 Corrosion Protection

- The main SF6 tank, should be of 2.5 mm thick (minimum) stainless steel tank so as to have high corrosion resistance and ensure high longevity. The normal operating pressure shall be 1.2 bar @ 20 deg C. However offer with nominal operating gas pressure shall be as per manufacture standard and suitable to satisfy the rated dielectric strength. This tank containing SF6 should be hermetically welded and sealed for life, ensuring a leakage rate not more than 0.1 % per annum. Except for stainless steel, all steel surfaces that are not galvanized shall be treated to protect against corrosion. As a minimum, corrosion treatment shall include the following procedures:
- The surface shall be cleaned to bare material by mechanical or chemical means.
- Must be powder coated by means of seven tank process.
- All outdoor metal enclosures shall be treated in 7 tank Pre-treatment process & should be painted with UV Resistant Pure Polyester Powder coating. The powder coated sheet steel fabrication shall fulfill 700 Hrs of Salt spray test. The thickness of Painting/Powder coating shall be of 80-90 microns to withstand tropical heat and extremes of weather.

3.3.3 Immunity to Electrical Stress and Disturbance

- The electrical and electronic components of the RMU shall conform to relevant standards concerning insulation, isolation, and the product shall comply with IEC 60270 Immunity to electrical stress & disturbance. The ability to meet these requirements shall be verified by type tests carried out by accredited test laboratories that are independent of the bidder and/or the manufacturer of the RMU components. Certified copies of all available type test certificates and test results shall be included as part of the bidder's proposal.

3.3.4 Minimum Insulation of Equipment

- The RMUs shall be of SF6 gas-insulated type with normal operating pressure shall be 1.2 bar @ 20 deg C. However offer with nominal operating gas pressure shall be as per manufacture standard and suitable to satisfy the rated dielectric strength.

3.4 Name plate Information

RMU nameplate information shall be determined in agreement with the Employer. This information may include for example:

- Name of manufacturer and country
- Type, design, and serial number
- Rated voltage and current
- Rated frequency
- Rated symmetrical breaking capacity
- Rated making capacity
- Rated short time current and its duration
- Rated lightning impulse withstand voltage
- Purchase Order number and date
- Month and year of supply

RMU shall also exhibit a Danger Board to indicate the presence of high voltage (11,000 V).

3.5 Interconnecting Cables, Wiring, Connectors, and Terminal Blocks

- The Contractor shall provide all interconnecting wires, cables, connectors, terminations and other wiring accessories such as terminal blocks required by the RMU.

3.5.1 Metallic Cables

- All metallic cables and wiring shall be of required cross-section solid or multiple strands of round copper conductors and have flame retardant insulation. All wiring shall be neatly laced and clamped.
- All wire and cable connectors and terminators shall be permanently labeled for identification. All connection points for external cables and wires shall be easily accessible for connection and disconnection and shall be permanently labeled. Conductors in multi-conductor cables shall be individually color-coded.

3.5.2 Connectors

- Nuts & Bolts type terminal blocks shall be provided in LV compartment for connectivity and to accommodate.
- 11KV RMU shall be provided with Vacuum circuit breakers(VCB).
- VCB recommended make:ABB/Siemens/Schneider Electric

3.6 General Requirements

- Power supply indications
- Mechanical Status indication for Open/closed position of break switch and earthing switches.
- SF_6 gas-pressure low indication.
- Indications of fault in the RMU's as detected by the FPI
- Vacuum circuit breaker open/close control

3.7 Parameter Requirements

The RMUs shall be suitable for cable networks of 630 Amps copper bus bar and loop cable networks of 400 Amps. The minimum design parameters to which their major components shall conform or exceed are summarized in the following tables.

3.8 BUSBARS:

The Busbars made up of copper of rating 630A shall be provided.

All joints and connectors shall be SF6 insulated in accordance to this specification. Any component directly connected to the power cables shall also be capable of withstanding the DC test voltage applied to the cables.

Table 1: System Parameters

Parameter	**Value**
Nominal System Voltage	11 kV
Highest System Voltage	12 kV
Rated Voltage	12 kV
System frequency	50 Hz
Number of Phases	3 Phase/3 Wire

Table 2: Vacuum Circuit Breaker Parameters

Parameter	**Value**
VCB Make	Similar to ABB/ Siemens/Schneider/CG/C&S
Rated Voltage	12kV

Parameter	Value
Rated Short Circuit Making Capacity	50 kA peak at rated voltage (Earthing Switch)
Rated Load Interrupting Current	630 Amps
Short time withstand	21kA,3 s(min)
Rated Cable Charging Interrupting Current	10 Amps
Mechanism	Spring charged, motorized with anti-umping
Indications	On/Off/Trip, spring charged , trip circuit healthy

The RMU switchgear shall be capable of withstanding the specified currents without damage in accordance with the latest versions of IEC 60694 (Common Specifications for High-Voltage Switchgear and Control Gear Standards) and IS 3427 (AC Metal Enclosed Switchgear and Control Gear for Rated Voltages above 1 kV and up to and including 52 kV).

The equipment offered shall be as per the standards specified in the bid specification and if the offered equipment is tested with any other international standards which is superior to the standards specified they can also be considered and the bidder has to submit the documentary evidence for the same.

3.9 Design Details

- The RMU shall be designed to operate at the rated voltage of 12 kV.
- It shall include, within the same metal enclosure, VCB and earthing switches. Suitable fool-proof interlocks shall be provided to the earthing switches to prevent inadvertent or accidental closing when the circuit is live.
- The degree of protection required against prevailing environmental conditions, including splashing water and dust, shall be not less than IP 54 as per IS 12063.
- The active parts of the switchgear shall be low maintenance type.
- The tank shall be made of minimum 2.5 mm thickness of stainless steel.

- The Stainless Steel tank should be completely welded so as to ensure IP 67 degree of protection and shall be internal arc tested.
- The RMU shall be suitable for mounting on its connecting cable trench.
- For RMU enclosure, a suitably sized nameplate clearly identifying the enclosure and the electrical characteristics of the enclosed devices shall be provided.
- The access to the cable compartment should be from the front of the switchgear only to have minimum operating & maintenance space at site.
- The RMU design shall be such that access to live parts shall not be possible without the use of tools.
- The design shall incorporate features that prevent any accidental opening of the earth switch when it is in the closed position. Similarly, accidental closing of a VCB shall be prevented when the same is in an open position.
- The RMU tank must be equipped with a suitable pressure relief device. The pressure relief must ensure that the escaping gases are dissipated to the rear bottom / top of the switchgear.
- The complete RMU shall be tested in an accredited INDIAN laboratory and designed for an Internal Arc.
-

3.10 Earthing

- There shall be continuity between metallic parts of the RMUs and cables so that there is no dangerous electric field in the surrounding air and the safety of personnel is ensured.
- The RMU frames shall be connected to the main earth bars, and the cables shall be earthed by an Earthing Switch having the specified short circuit making capacity.
- The Earthing Switch shall be operable only when the main switch is open. In this respect, a suitable mechanical fail-proof interlock shall be provided.
- The Earthing Switch shall be provided with a reliable earthing terminal for connection to an earthing conductor having a clamping screw suitable for the specified earth fault conditions. The connection point shall be marked with the earth symbol. The flexible connections between the earthing blade and the frame shall have

a cross-section of at least 50 mm^2 copper or conventional type copper plate earthing with dual run copper strip should be provided as per standard requirement for 5 way RMU. (Copper Plate: 600 x 600 x 3mm, Copper Strip: 25 x 3 mm)

- Number of earthing should be decided by the tenderer as required as per Electricity Norms.

- The Earthing Switch shall be fitted with its own operating mechanism. In this respect, manual closing shall be driven by a fast acting mechanism independent of the operator's action.

3.11 Incomer

- With canopy doors open, the position of power contacts and earthing contacts shall be clearly visible from the front of the RMU through the Mimic facia.

- The position indicator shall provide positive contact indication in accordance with IS 9920. In addition, the manufacturer shall prove the reliability of indication in accordance with IS 9921. These switches shall have three positions (or states), i.e., Open, Closed, and Earthed, and shall be constructed in such a way that natural interlocking prevents unauthorized operations.

- The switches shall be fully assembled, tested, and inspected in the factory.
- Opening and closing shall be driven by a fast-acting mechanism independent of manual operator action.
- The switch and earthing switch mechanisms shall have a mechanical endurance of at least 1,000 operations.

3.12 Cable Termination

- Bushings shall be conveniently located for working with the specified cables and shall allow for the termination of these cables in accordance with the prevailing practice and guidelines of cable manufacturers. The dimensions of the terminals shall be in accordance with IS 10601.

- Cable Termination Cable entry shall be vermin proof, Maintenance free and Cable entry with proper supporting to firmly grip the cable to avoid any loose contacts and entry of moisture.

- The 11 KV XLPE cable size shall be 3cx240 Sq.mm and suitable bushing studs and cable clamps shall be arranged.

- A non Ferro-magnetic cable clamp arrangement shall be provided for each cable to be terminated in the RMU.

- A suitable arrangement for the Earthing Switches shall be provided so that these devices can be padlocked in the "Open" and "Closed" positions.

- A permanent "Live Cable" indication as per IEC 61958 shall be provided for each cable using a capacitor voltage divider.

- It shall be possible to test the core or sheath insulation of the cables without disconnecting the cables in the cable compartment, after accessing the cable compartment.

3.13 Safety of Equipment

- With respect to the RMU SF6-filled equipment, any accidental overpressure inside the sealed chamber shall be limited by the opening of a pressure-limiting device in the enclosure so that the gas will be released away from the operator and to the rear bottom or top of the tank without endangering the operator or anyone else in the vicinity of the RMU.

- All manual operations, monitoring of open/close position of switches, live line indicators, FPI indication, SF6 gas pressure indication access to the cable compartment shall be carried out from the front of the RMU only.

3.14 H T Metering facility including TOD Meter, CT/PT set etc - 1 set

3.14.1 Current and Voltage Transformers.

The RMU shall be provided with current and voltage transformers. These CTs & PTs shall meet the electrical and mechanical ratings as per the relevant standards.

Current Transformers

- 3 nos., ring type, single core CTs shall be provided in each incoming load break switch for metering purposes. A similar arrangement shall be provided in each circuit breaker cable compartment to mount a 3 nos., single-core, ring type CT for protection purposes.
- The CTs shall conform to IS 2705. The design and construction shall be sufficiently robust to withstand thermal and dynamic stresses during short circuits. Secondary terminals of CTs shall be brought out suitably to a terminal block, which will be easily accessible for testing and terminal connections.

- Further characteristics and features distinguishing CTs used for metering from CTs used for protection are listed as follows:

CTs for Metering:

- Material: Epoxy resin cast/ Tape wound
- Burden: 2.5VA
- Ratio: 400-200-100/1 A
- Accuracy Class: 0.5

CTs for Protection:

- Material: Epoxy resin cast/ Tape wound
- Burden: 2.5VA
- Ratio: 400-200-100/1 A
- Accuracy Class: 5 P 10

The RMU's other CTs / sensors, i.e., those used by Fault Passage Indicators (FPIs), shall be supplied by the manufacturer. These CTs/sensors shall be an integral part of the FPI's design to ensure that they properly match the requirements of the FPI.

Voltage Transformers

- A 3 phase single or 3 nos. single phase potential transformers shall be provided. These should be housed in a separate air insulated PT Panel, directly connected to the RMU

through main bus. The burden per transformer shall not be more than 50 VA and the voltage ratio shall be **11000 V/ √ 3 /110 V/ √ 3**. The accuracy class shall be 0.5.

- HRC fuses shall be provided on the HV side.

  The PTs shall be of cast epoxy-resin construction, and they shall conform to IS 3156. Their design and construction, in particular, shall be sufficiently robust to withstand the thermal and dynamic stresses during short circuits.

3.15 Fault Passage Indicator for RMU

The FPI shall facilitate quick detection of faulty section of line. The fault indication may be on the basis of monitoring fault current flow through the device. The FPI should be self-powered and should have internal lithium battery for external indication and setting of FPI in the absence of current.

3.15.1 The FPIs shall include:

- Fault detection - Phase to phase and Phase to earth faults.
- Local Fault Indications - FPI fault indication shall be LCD/LED.
- Multiple reset option –
- End of time delay (Adjustable from 2 to 16 Hrs)
- Manual reset (Reset button on front panel of FPI)
- Auto reset on current restoration.

3.15.2 The characteristics of the FPIs shall include:

- Phase fault thresholds configurable from at least 100 to 800 A
- Earth fault thresholds configurable from at least 20 to 200 A
- Multiple number of steps for adjusting phase and earth fault thresholds.
- Fault current duration range configurable from at least 40 ms to 100 ms in 20 ms steps and further 100 ms to 300 ms in 50 ms steps.
- Variations with respect to these characteristics may be acceptable as long as they prove applicable and provide the same or better flexibility.

3.16 Construction

- The RMU shall be sufficiently sturdy to withstand handling during shipment, installation, and start-up without damage. The configuration for shipment shall adequately protect the RMU equipment from scraping, banging, or any other damage.

3.17 Enclosures

- All supplied enclosures shall be sized to provide convenient access to all enclosed components. It shall not be necessary to remove any component to gain access to another component for maintenance purposes or any other reason.
- The enclosures shall also be designed to ensure that the enclosure remains rigid and retains its structural integrity under all operating and service conditions with and without the enclosure door closed.
- The thickness of all enclosure panels shall be at least 2 mm (minimum) of CRCA steel. The appropriate corrosion treatment and finish requirements shall apply to both inside and outside enclosure surfaces. Other required features are as follows:
- All enclosure panels shall be 7 tank Pre-treatment process & should be painted with UV Resistant Pure Polyester Powder coating. The powder coated sheet steel fabrication shall fulfill 700 Hrs of Salt spray test. The thickness of Painting/Powder coating shall be of 80-90 microns to withstand tropical heat and extremes of weather.
- Means, such as insulated heat shields and/or air vents, to prevent high temperatures from damaging the RMUs enclosed components. If air vents are installed, these vents shall in no way reduce the effectiveness of the enclosure's protective characteristics.
- A metal pocket attached to the inside of the front door to hold documentation, maintenance log sheets, and other such information.
- Door opening mechanism with built-in key-lock facility suitable for padlocking. An opening mechanism that is less prone to breaking than a projecting door handle is preferred, e.g., a push-button opening mechanism.

- A grounding terminal including grounding bolt and lock washer for connecting a 50 mm^2 copper or galvanized steel grounding conductor. The grounding bolt and lock washer shall be made of stainless steel.
- Means of protection against rain water, and high levels of airborne dust, should be provided.
- The door shall be fitted with a perimeter flange and gasket (rubber or neoprene) to prevent the entrance of water. In addition, a means of monitoring and indicating that the door is open shall be provided.

3.17.1 Front Plate

- The front plate shall include a clear mimic diagram indicating RMU functionality.
- The position indicators shall correctly depict the position of the main contacts and shall be clearly visible to the operator. The lever operating direction shall be clearly indicated.

3.18 Inspection and Test

- Inspections and tests shall be performed to ensure RMU compliance with these Technical Specifications. Responsibility for conducting the inspections and tests shall rest with the Supplier. The Utility representatives will participate in the RMU inspections and will witness the testing as described in the following sub-clauses.

3.19.1 Inspections

- Utility's representatives shall be allowed access to supplier's facility where the RMU or its parts are being produced or tested. Such access will be used to verify by inspection that the RMU is being or has been fabricated and tested in accordance with the Technical Specifications.
- The supplier shall give the utility's representatives 15 days notice in writing concerning the date and place at which the equipment will be ready for inspection or testing. The supplier shall provide all the necessary assistance and facilities to utility's representatives to carry such inspections and test witnessing.

- The supplier shall provide any and all documentation that is necessary to complete the inspections. The representatives shall be allowed to inspect the supplier's quality assurance standards, procedures, and records. Inspections, as a minimum, shall include checks on inventory, general appearance, cabling, drawing conformance, and labeling.

3.19.2 Test Procedures

- The supplier shall provide test plans and detailed procedures for all required testing. The plans and procedures shall ensure that each test is comprehensive and verifies proper performance of the RMU under test and, in this respect, shall be submitted for review and approval by the Utility.

- The test plans shall include all routine tests and acceptance tests as per relevant BIS/IEC standards and shall describe the overall test process including the responsibilities of the test personnel and how the test results will be documented.

- The test procedures shall describe the individual tests segments and the steps comprising each segment, particularly the methods and processes to be followed.

3.19.3 Test Reports

- The Tenderers should, along with the tender documents, submit copies of all Type test certificate of their make in full shape as confirming to IS 3427 / IEC 62271-100/200 of latest issue obtained from a International/National Govt. Lab/Recognized laboratory.

- The above type test certificates should accompany the drawings for the materials duly signed by the institution that has type test certificate.

- The supplier shall maintain complete records of all test results. The records shall be keyed to the test procedures.

- Upon completion of each test, the supplier should submit a test report summarizing the tests performed and the results of the tests along with the complete details of type test reports inclusive of drawings.

- The bids received without complete type test reports along with drawings will be treated as non-responsive.

3.19.4 Factory Acceptance Test

- A formal factory acceptance test shall be conducted to ensure that the RMU has been designed to meet the utility's functional requirements in all respects. Utility representatives shall witness the test on a representative RMU, and the test shall be carried out in accordance with the supplier's test plan and procedures as approved by the Utility. Should the factory acceptance test prove unsatisfactory in any way, the Utility reserves the right to have further tests conducted and, if applicable, request further improvements in the supplier's RMU design.

3.19.5 Routine Factory Tests

- These tests shall be carried out during RMU manufacture as a quality control measure, i.e., to ensure RMU to be delivered meets the Employer's minimum requirements including all relevant standards. Recording and reporting the routine test results shall be the responsibility of the Supplier.
- At the Utility's discretion, Utility representatives will witness such testing. This may include requesting the Supplier to perform tests on RMU that the Supplier deems ready to be delivered to site. Should any such test prove unsatisfactory, the Utility reserves the right to have further tests conducted and for delivery not to take place until a mutually agreed course of action has been reached.
- Further for additional reliability of the manufactured RMU it is mandatory to have the complete assembled tank tested for partial discharge.

3.20 Operating Manuals

- The Supplier shall submit, operating manuals for all RMU components including items such as FPI, , and other equipment provided by the bidder. These manuals shall be in English. They shall include the RMU operating instructions. Context sensitivity shall be used to go directly to the appropriate place in the manual.
- The manuals shall be organized for quick access to each detailed description of the operator procedures that are required to interact with the RMU functions. This shall

include the procedures to define, build, edit, and expand all data points provided with the RMU.

- The manuals shall present in a clear and concise manner all information that operators, including maintenance personnel, need to know to understand and operate RMU satisfactorily. The manuals shall make abundant use of diagrams and/or photographs to illustrate the various procedures involved.

3.20.1 As-Built Documents and Drawings

The supplier shall submit as built documents including applicable drawings for review and approval. All deliverable documents and drawings shall be revised by the supplier to reflect the as- built RMU components including all the FPI & LLI. Any errors in or modifications to an RMU resulting from its factory and/or site acceptance test shall be incorporated. Within this same context, all previously submitted documents that are changed because of engineering changes, contract changes, errors, or omissions shall be resubmitted for review and approval. The successful bidder has to provide his quality document to Utility.

3.21. Test certificates certified as per IEC 62271-100 / 200 or relevant IS Standard with latest amendments not more than 10 years. Following Test Certificates has to be submitted.

- Dielectric Withstand Test
- Short time withstand - STC withstand test
- Mechanical endurance test
- Internal Arc test - IAC Test.
- Tank & Cable compartment test (AFLR/AFL) for 1 sec as per IEC Standard IEC 62271-200.
- Degree of protection test – IP test

Note: The bids received without complete type test reports along with drawings will be treated as non-responsive

3.22. Warranty:

During the warranty period of 5 years in case of any flashover on bushings whether external or internal will lies in the scope of bidder.

3.23. Patent Rights

The Supplier will indemnify the Purchaser against all third-party claims of infringement of patent, trademark, or industrial design rights arising from use of the Materials/ equipment or any part thereof.

3.24. Special conditions

- Bear all the charges for submission of RMU drawings to Electricity dept.
- Vendor must coordinate with SOUTHERN POWER DISTRIBUTION COMPANY OF TELANGANA LTD. for approval of incomer VCBs, revenue metering arrangements, CT/PT ratios, and relay settings, inspection etc.
- Any deviations from this specification must be clearly listed in the bid.
- Bidders must submit short-circuit and ampacity calculations to confirm adequacy of cable sizing (120 mm^2).

Schedule-A
GUARANTEED TECHNICAL PARTICULARS FOR OUTDOOR RMU
PART 1

01.	Manufacturer's Name and Country of origin	
02.	Manufacturer's Design/Type/Model	
03.	Material used for making the body of the RMU	
04.	Standards of manufacturing	
05.	Whether painting for RMU is done as per standards	
06.	Whether the enclosure is anti-corrosive	
07.	Whether RMU metal clad has sufficient space for integration of: ▪ 2 numbers of Vacuum Circuit breaker ▪ Sufficient space for inspection, testing, etc. ▪ Earthing arrangements ▪ Terminal output points for automation ▪ Sufficient arrangement for future extension with Circuit Breakers	
08.	Maximum withstanding ambient temperatures	
09.	Spacing between live parts to earth	
10.	Whether RMU are designed to withstand all weather conditions including chemical industry and polluted areas	
11.	Period of guarantee of the RMU	
12.	Over all dimensions of the 5 Way RMU (L x W x H).	
13.	Material & Gauge of material used for fabrication of the RMU	
14.	Whether RMU is manufactured as per IEC/IS standards to hold SF6 gas without leakage	
15.	Whether RMU has provision for sensors for temperature compensated pressure measurement in the relevant gas compartment to monitor the pressure of SF6 gas	
16.	Whether RMU is sealed pressure system	
17.	Weight of RMU complete with operating mechanism	
18.	RMU is provided with necessary take off terminals for automation	
19.	Whether gas chamber is made of stainless steel	

SCHEDULE OF GUARANTEED PARTICULARS FOR BREAKER
PART 2

01.	Manufacturer's Name and Country of origin	
02.	Manufacturer's Design / Type ref/ Model.	
03.	Material used for making the body of the breaker	
04.	Standards of manufacturing	
05.	Whether the breaker is manufactured as per IEC/IS standards Please give Standards no.	
06.	Maximum temperature withstand of the breakers	
07.	1 Spacing between live part to Earth inside the breaker 2 Spacing between poles	
08.	Period of guarantee of the breaker	
09.	Rated frequency	
10.	Rated voltage	
11.	Highest system voltage	
12.	Rated current	
13.	Short time current rating with duration	
14.	Certificate or report of short circuit type test	
15.	Rated operating duty cycle	
16.	Short circuit breaking current (a) Symmetrical (b) Symmetrical at rated voltage (c) Asymmetrical at rated voltage (i) Per Phase (ii) Average (d) DC Component	
17.	Arcing time (At rated breaking current) in ms.	
18.	Opening time	
19.	Total break time in mili sec. (a) At 10% rated interrupting capacity (b) At rated interrupting capacity	
20.	Breaking Current (a) Rated out of phase current (b) Rated cable charging current (c) Rated fault level MVA	

	(d) Rated capacitor breaking current	
21.	Make time in ms.	
22.	Maximum temperature rise over ambient	
	Main contacts Terminals	
23.	Rated restriping voltage at 100% and 50% rated capacity. a) Amplitude factor b) Phase factor c) Natural frequency d) R.R.R.V. (Volts/micro sec.)	
24.	Dry 1 minute power frequency withstand test voltage a) Between line terminal and earth KV RMS b) Between terminals with breaker contacts open KV RMS.	
25.	1.2/50 full wave impulse withstand test voltage a) Between line terminal and earth KVp. b) Between terminals with breaker contacts open KVp.	
26.	VCB interrupter make	
27.	Contact separation distance	
28.	Type of main contacts	
29.	Contact pressure	
30.	Contact resistance	
31.	Life of the interrupter (in number of operations) (i)Tripping at rated current (ii)Tripping at maximum fault current. (Allowable maximum erosion 3 mm) (iii)Mechanical operations.	
32.	Details of main contacts making contact with the breaker truck with the panel	
33.	Control circuit voltage AC/DC.	
34.	Whether trip free or not	
35.	Whether all the interlocks provided	

SCHEDULE OF GUARANTEED PARTICULARS FOR EARTHING SWITCHERS
PART 3

Sl. No.	Description	Load Break Switch	Isolator (Earthing Switch)
01.	Manufacturer's Name and Country of origin		
02.	Manufacturer's Design / Type ref/ Model.		
03.	Material used for making the body of the isolators.		
04.	Standards of manufacturing		
05.	Whether the isolators & earth positions are manufactured as per IEC/IS standards		
06.	Maximum temperature withstand of the isolators & earth switches		
07.	1) Spacing between live part to Earth 2) Spacing between fixed and moving contacts in the open position.		
08.	Period of guarantee of the Earthing switches		
09.	Rated frequency		
10.	Rated voltage		
11.	Highest system voltage		
12.	Rated current		
13.	Short time current rating with duration		
14.	Certificate or report of short circuit type test		
15.	Rated operating duty cycle		
16.	Short circuit breaking current		
17.	Arcing time (At rated breaking current) in ms.		
18.	Opening time		
19	Whether all the interlocks provided		

SHEDULE OF GUARANTEED TECHNICAL PARTICULARS FOR SELF POWERED MICRO-PROCESSOR BASED NUMERICAL RELAYS
PART 4

01.	Manufacturer's Name and Country of origin		
02.	Manufacturer's design / Ref. Type		
03.	Applicable Standards		
04.	Current Setting range for (a) Over current relay (b) Earth fault Element	IDMT Definite Time	
05.	Whether the relay has the in-built facilities of IDMT, OL, EL		
06.	Details of IDMT Characteristics		
07.	Accuracy for different settings and limits of errors		
08.	Whether Alpha numeric / LED display		
09.	Whether compatible for 1 A CT Secondary		
10.	Whether draw out type		
11.	Type of case		
12.	Reset time		
13.	Burden of relay		
14.	Maximum and Minimum, operating ambient air temp.		
15.	Whether technical literature pamphlets about the relay offered.		
16.	Period of guarantee.		
17.	Certificate of Proof for Electro Magnetic Interference.		
18	Communications port – RS 232 / RS 485		
19	Communication Protocol – MODBUS		

Annexure-A

Standard Make of Relay and fitment

1.	Relays	Similar To: ABB/Siemens/Schneider Electric/ C&S /CGL or OEM make
2.	Breaker Control Switch	
3.	Ammeter/Voltmeter Selector switch	
4.	Static Ammeter/ Voltmeter	
5.	Push Buttons	
6.	Indicating Lamps with lenses	
7.	Panel Wiring	
8.	Vacuum Interrupter	
9.	FPI	

SCHEDULE 'B'

SCHEDULE OF TENDERER's EXPERIENCE

The tenderer shall furnish here the list of the similar orders executed/under execution by him to whom a reference may be made by the purchaser in case he considers such reference necessary.

Sr. No	Name of the client & Description of the order	Value of order	Period of supply & commissioning	Name and address to whom ref can be made

NAME OF THE FIRM :_____

NAME & SIGNATURE OF THE TENDERER :_____

DESIGNATION :_____

DATE :_____

SCHEDULE OF DEVIATION

(i) TECHNICAL (FORMAT-VII (A))

Sl. No.	Requirements / Equipment	Specification Clause No.	Deviations	Remarks

It is hereby conformed that except for deviations mentioned above, the offer conforms to all the other features specified in Technical Specification Section ____ of this Bid Document

Place :

Date :

Signature of the Bidder :

Name :

Business address :