

The TP Southern Odisha Distribution Limited		Specification for Single Phase DLMS Energy Meter
Meter management Group		

TECHNICAL SPECIFICATION
FOR
Single Phase
Class 1, 10-60 Amp, DLMS Compliant
Whole Current Energy Meter with Meter box

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1.0 SCOPE:

This specification covers the technical requirements of design, manufacture, testing at manufacturer's works, packing, forwarding, supply and unloading at store/site of LT Single phase two Wire, 10-60 A DLMS Compliant static energy meters of accuracy class 1.0 (here after referred as meters) complete with all accessories for efficient and trouble free operation.

2.0 APPLICABLE STANDARDS:

The equipment covered by this specification shall conform to the requirements stated in latest editions of relevant Indian/ IEC Standards and shall conform to the regulations of local statutory authorities.

- a) IS 13779 (1999) :A.C. Static Watt hour meter class 1.0 and 2.0
- b) IS 15959(Part 1-2011) : Data exchange for electricity meter reading, tariff and load control
- c) IS 15959(Part 2-2011) : Data exchange for electricity meter reading , tariff and load control
- d) IEEE 802.15.4(2003) : Standard for local and metropolitan area networks
- e) IS 9000 : Basic Environmental testing procedure for electrical and electronic items.
- f) IS 12346 (1999) : Specification for testing equipment for A.C.Electrical energy meter.
- g) IS11000 (1984) : Fire hazard testing
- h) IEC 62052-11 (2003) :Electricity Requirements (AC) General Requirements Tests and Test conditions for A.C.Static Watt hour meter for active energy Class 1.0 and 2.0.
- i) IEC 62053-21 (2003) : A.C.Static Watt hour meter for active energy Class 1.0 and 2.0
- j) IS 15707 (2006) : Testing Evaluation installation and maintenance of AC Electricity Meters- Code of practice.
- k) IEC 60068 : Environmental testing.
- l) CBIP – TR No.325 : Specification for A.C.Static Electrical Energy Meters (latest amendment).
- m)CEA Regulation (2006) : Installation and operation of meters Dtd: 17/03/2006.

3.0 CLIMATIC CONDITIONS OF THE INSTALLATION:


- a) Max. Ambient Temperature : 55 deg.C
- b) Max. Daily average ambient temp. : 40 deg.C
- c) Min Ambient Temp : -5 deg C
- d) Maximum Humidity : 95%
- e) Minimum Humidity : 10%
- f) Average No. of thunderstorm days per annum : 50
- g) Maximum Annual Rainfall : 1450 mm
- h) Average No. of rainy days per annum : 60
- i) Rainy months : June to Oct.
- j) Altitude above MSL not exceeding : 300 meters
- k) Wind Pressure : 200 kg/sq m


The atmosphere is generally laden with mild acid and dust in suspension during the dry months and is subjected to fog in cold months. The design of equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.3 g.

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4.0 GENERAL TECHNICAL REQUIREMENTS:

S.No.	DESCRIPTION	REQUIREMENT
4.1	Type of the meter	Single phase two wire ,whole current meter- direct reading type without application of any multiplication constant. It also Consists of measuring elements, TOU of register, Display.
4.2	Accuracy Class of the meter	1.0
4.3	Basic Current (Ib) & rated Maximum current (Imax)	Ib= 10A; Imax= 60 Amps (Meter shall be able to continuously carry 120% of Imax Meeting the accuracy requirements)
4.4	Reference Conditions for testing the performance of the meter	Vref = 230 V Frequency = 50hz Temperature= 27 °C (if the tests are made at the temperature other than reference temperature the results shall be corrected by applying Mean Temperature Coefficient 0.05)
4.5	Operating Voltage	Meter shall be operational with required accuracy from 0.6 Vref to 1.2 Vref. However meter shall withstand the maximum system Voltage of 440V (for minimum 5 min).
4.6	Operating Frequency	50 Hz ± 5%.
4.7	Power Consumption	Voltage circuit: Maximum 1.5 W and 10 VA Current Circuit :Maximum 1 VA
4.8	Starting Current	20mA (0.2% of Ib)
4.9	Short time over current	1800 A for 0.01 sec (30Imax for one half cycle at rated frequency)
4.10	Influence of heating	Temperature rise at any point of the external surface of the meter shall not exceed by more than 20K with an ambient temperature at 45°C.
4.11	Rated Impulse withstand voltage	6KV (shall be applied ten times with one polarity and then repeated with the other polarity.)
4.12	AC withstand voltage for 1 min	4 KV
4.13	Insulation resistance a) Between each current (or voltage circuit) & each and every other circuit. :	5 M ohm.
4.14	Mechanical requirements	Meter shall be in compliance with clause 12.3 of IS 13779
4.15	Resistance to heat and fire	The terminal block and Meter case shall ensure safety against The spread of fire. They shall not be ignited by thermal overload of live parts in contact with them as per IS 13779. Fire retardant material shall be used.
4.16	Protection against penetration of dust and water.	Degree of protection :IP 51 or better as per IS 12063/60529, but with suction in the meter. Meter shall comply with clause 6.9 and 12.5 of IS 13779

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4.17	Resistance against Climatic influence.	Meter shall be in compliance with clause 12.6 of IS 13779.	
4.18	Electromagnetic Compatibility (EMC)	Requirements shall be as per CBIP technical report no 325 (latest amendment)	
4.19	Accuracy requirements	Meter shall be in compliance with clause 11 of IS 13779.	
4.20	Power factor range	Zero lag to Zero lead.	
4.21	Energy measurement	Fundamental energy +Energy due to Harmonics	
4.22	Connection Diagram	The connection diagram for the system shall be provided on terminal cover.	
4.23	Self-Diagnostic feature	The meter shall have indications for un satisfactory / non-functioning of (i) Real Time Clock (ii) RTC battery (iii) Non Volatile Memory	
4.24	Initial startup of meter	Meter shall be fully functional within 5 sec after reference Voltage is applied to the meter terminals.	
4.25	Alternate mode of supply to the meters	In case of power failure, reading/data shall be to downloaded with the help of battery of long life(minimum ten years)	
4.26	Sleep Mode	Meter shall not go in sleep mode .Display should not be "OFF at any point of time when power up.	
4.27	Internal diameter of the terminal holes Depth of the terminal holes	8.5mm (minimum) 25 mm	
4.28	Clearance between adjacent terminals	10 mm (minimum)	
4.29	Display	Backlit LCD, Scrolling, 10 seconds for each parameter minimum 6 Digits LCD display. The back lit must be of bright colour for proper visibility of meter reading	
4.30	Security feature	Programmable facility to restrict the access to the information recorded at different security level such as read communication, write communication etc.	
4.31	Software and communication compatibility	The bidder shall supply software required for communication though CMRI and BCS software free of cost and necessary training. The meter shall be compatible to communication with GSM/GPRS/RF modems in DLMS protocol.	
4.32	Calibration	Meters shall be software calibrated at factory and modifications in calibration shall not be possible at site by any means. However parameters like RTC, TOD slots, billing date, display, tariff etc shall be reconfigure through CMRI and any other support will be provided without any additional cost to TPSODL till the useful life of the meters.	
4.33	Usage Application	Indoor	
4.34	Ultrasonic welding	Meter cover and body should be Ultrasonic/chemical welded	

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4.35	Meter Dimension in MM	Is not more than 170L*140W*100H	
4.36	Real Time clock	Accuracy of RTC Should be as per CBIP-325 report and shall not vary by more than 6 min per year. RTC should be programmed by BCS and MRI	
4.37	No display	Meter design in such a way, meter data retrieved if meter found no display.	
4.38	KVAH & KVA calculation	Apparent Calculation should be Lag+Lead	

5.0 Communication capabilities and software feasibilities:

The meter shall have facilities for data transfer locally through CMRI (Using optical port/GSM/GPRS/RF modems).

Optical communication port shall be available for communication. Communication ports shall not be affected by any type of injection /unauthenticated signals and having proper sealing arrangement. The complete data shall be downloaded within 2 minutes. Meter Optical port base of meter to be magnetic type.

The bidder should provide DLMS compliance for Communication with the meter at Optical / RJ11 (RJ11 is optional). Optical Communication port shall be available for communication along with additional RJ11 port with specific pin configuration of utility along with sealing arrangement to communicate with GSM/GPRS/RF modems.

The XML files of downloaded data from meter will be as per MIOS standards.

The bidder shall supply software required for local (CMRI) & remote (AMI) connectivity including required training to use the software free of cost. Bidder shall provide the communication protocol / APIs as per MIOS standards for communication with meter through local (CMRI) / remote (AMI) as and when required by TPC free of cost during life of meter.

Bidder should also provide software for changing firmware of meters in mass without any additional cost.

Bidder should also provide BCS for viewing the data downloaded through CMRI/Laptop/HHU.

API required for converting raw files to XML should also provide.

Communication of the meter at optical port should be as per IS15959 (Part-2):2016

Bidder must provide necessary support if required for integration of his meters with AMR/Ami systems of the utility whenever required.

Bidder to supply protocol to read the meters supplied against, using intelligent GSM/GPRS/RF modems with store and forward feature without any additional cost. Bidder to provide API on MIOS standard to convert meter data in to XML and read API for hosting in server and modems GSM/GPRS/RF based for readings of meters from any third party manufactured modems. Bidder must provide necessary support if required during integration

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6.0 Immunity against external influencing signals:

6.0.1 Magnetic Field:

Meter shall record accurate energy in case of any external influencing signals in line with IS 13779:1999 Cl.11.2 and variation in limits of error (up to 100% I_{max}) shall be as per the table 17 of IS 13779. Meter shall be immune to magnetic field such that it shall not affect the normal overall functionality. However, in case of abnormal magnetic field as defined below meter shall perform as per the following features:

- a) Meter shall log the event in its memory as "MAGNET" with date and time stamp within 2 minutes of application of abnormal magnetic field and shall start recording at 100% I_{max} and after removal of magnet, back to normal recording within 2 minutes
- b) Meter shall show "Magnet" in the display.

Abnormal Magnetic field is defined as below;

- a) Continuous DC magnetic induction: $>0.2 \text{ Tesla} \pm 5\%$ (Value of the magneto motive force to be applied shall be generally $>10000 \text{ ATs}$,
- b) AC magnetic induction: Immune for 10 milli Tesla (if produced with circular metal core with square cross section as specified in CBIP latest report with 2800 AT
- c) Permanent Magnet: Immune up to 0.5T and Event logging $>0.5T$

6.0.2 Electrostatic Discharge (ESD)

Meter shall be immune up to 50 kV and shall record accurate energy as per IS13779:1999. Meter shall log the event into memory as 'ESD' with date & time stamp for any ESD greater than 50 kV.

The shielding around the meter shall be such that it does not get affected by high voltage, high and low energy impulse when comes in contact with meter from any side.

The meter should immune to high/ low frequency Jammer devices. Meter shall log event in its memory as jammer with date and time stamp along with snapshot.

The meter should be immune or log the tamper on application of any other higher magnetic field of any frequency waves, micro waves etc.

6.0.3 Neutral Disturbance

The meter shall log in the memory as 'NEUTRAL DISTURBANCE' with date and time stamp and show 'ND' for Frequency variation below 47 Hz and above 53 Hz with time delay of 2 min and for Pulsating DC and Chopped AC of any value with time delay of 2 min.

The meter shall not saturate on passage of direct current, which can cause the meter either to stop recording/ record inaccurately. DC injection shall be tested both in phase and neutral. Measurement by meter shall not get influenced by injection of DC signal/ DC pulse upto 330V and for any value beyond this, the meter shall log the event into memory as 'NEUTRAL DISTURBANCE' with date & time stamp after time delay of 2 min(occurrences and restoration time).

The meter shall record energy proportional to the current and V Ref (230V) when any of the tamper circuits enclosed as per annexure are used to tamper energy using a diode or a variable resistance or a variable capacitance energy saving device. The measurement by meter shall not get influenced by injection of AC Voltages/Chopped signal/DC signal/ DC pulse of low frequency and harmonics. The meter should be immune to such Neutral Disturbance. In case the meter accuracy is disturbed under Neutral Disturbance, it should be able to log the event.

6.0.4 Single Wire

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Single Wire tamper (Neutral Missing): When neutral is disconnected from both load side and supply side, the meter should record energy as per rated parameters (Vref). However, meter shall start registering energy

- a) At a current of >500mA under tamper condition of neutral missing (where battery is used for voltage reference). Meter will perform the fraud energy registration above 500mA assuming Vref (from battery) and Unity power factor.
- b) Condition no. 38 of Annexure I (Timer test) : The timer operation duration shall be 30 seconds.

6.0.5 Abnormal and Tamper conditions:

The meter shall record forward energy under any abnormal conditions as given in the annexure I.

All the tamper events i.e. shall be logged in the memory of the meter with date and time stamp of occurrence and restoration along with instantaneous electrical parameter (Voltage, Current (phase and neutral), energy, pf , frequency etc)

Meter shall store cumulative count and cumulative durations all the tamper event which have logged by meter from the date of energization till life of meter.

Tamper count shall be incremented only on the occurrence of the any tamper event with date and time Stamp on FIFO basis. The event of which the restoration not occurred those should not be removed from meter memory and FIFO should not applicable for unrestored event.

The cover open tamper detection should be through heavy duty, sturdy micro switch such that it should not Operate on vibration or impact during handling or testing.

Meter shall have neutral CT for tamper identification and analysis.

Persistence time for occurrence and restoration for the events and compartment block size shall be as per table given below

Persistence Time for Occurrences	Persistence Time for Restoration	Threshold Value for Occurrence of Events	Threshold Value for Restoration of Events	Compartment Size
ESD/JAMMER = immediate (record only 1 event on first application & only one event for next 1min)	ESD/JAMMER = 0 Hr 01 Min 0 sec (ESD) (should restore after 1 min. of last	Immunity up to 50 KV	Removal of ESD/ Jammer signal	25

)	application)			
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Magnet = 0 Hr 2 Min 0 sec (MAG)	Magnet = 0 Hr 2 Min 0 sec (MAG)	<p>>0.5 Tesla for permanent magnetic induction ></p> <p>OR</p> <p>DC magnetic induction ></p> <p>OR</p> <p>AC magnetic induction > 10 mT</p>	<p>magnet < 0.5 Tesla for permanent magnet OR DC magnetic induction < 0.2T or AC magnetic induction <10 mT</p>	25
Meter Top Cover Open (TC Open) Immediate	Meter Top Cover Open (TC Open) immediate	If meter top cover is opened	NA	05 (Stay put Type)
Single Wire = 0 Hr 30 Min 0 sec (SW)	Single Wire = 0 Hr 2 Min 0 sec (SW)	<p>a) At a current of >500mA under tamper condition of neutral missing (where battery is used for voltage reference). Meter will perform the fraud energy registration above 500mA assuming Vref (from battery) and UPF.</p> <p>b) At a current of >1 amps under tamper condition of neutral missing (where third CT is used for voltage reference). Meter will perform the fraud energy registration above 1A assuming Vref (from third CT) and UPF.</p> <p>c) Condition no. 38 of Annexure I (Timer test): The timer operation duration on/off time for 30 seconds with constant current for 30 min.</p>	Voltage > 190 V	25
Neutral Disturbance = 0 Hr 1 Min 0 sec (ND)	Neutral Disturbance = 0 Hr 02 Min 0 sec (ND)	Voltage >145% of Vref, Current >10% Ib OR Frequency < 47 Hz OR Frequency > 53 Hz OR DC voltage /signal injection/ as per the conditions of clause 4.3.4	Voltage <115% of Vref Current > 10% Ib AND Frequency > 47 Hz OR Frequency < 52 Hz	25

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Current Mismatch = 0 Hr 10 Min 0 sec (CM)	Current Mismatch = 0 Hr 02 Min 0 sec (CM)	$In - I_p \geq 20\% \text{ of } I_b$ AND $In > I_p$ Meter recording should be on higher of the current (either phase or neutral) if there is a mismatch	$In - I_p < 20\% \text{ of } I_b$	25
Low Voltage Check = 0 Hr 30 Min 0 sec (LVC)	Low Voltage Check = 0 Hr 02 Min 0 sec (LVC)	Voltage $< 70\% \text{ of } V_{ref}$ AND current $> 2\% I_b$	Voltage $> 80\% \text{ of } V_{ref}$ AND current $> 2\% I_b$	25
Power OFF = 0 Hr 10 Min 0 sec	Power On = immediate	Actual Voltage off	Actual Voltage On	25
Over Load (If enabled) OL 0 Hr 30 Min 0 sec	Over Load = 0 Hr 2 Min 0 sec	$> 120\% I_{max}$	$< 100\% I_{max}$	25
Microwave immediate (record only 1 event on first application & only one event for next 1min)	Microwave 0 Hr 01 Min 0 sec (should restore after 1 min. of last application)	Any higher frequency magnetic waves, micro waves $> 10 \text{ mT}$	Removal of device	25
Temperature Rise = 0 Hr 30 Min 0 sec (TR)	Temperature Rise = 0 Hr 02 Min 0 sec (TR)	Temperature $> 70^\circ\text{C}$	Temperature $< 60^\circ\text{C}$	25 (Stay put type)
EL WC 0 Hr 30 Min 0 sec	EL WC 0 Hr 02 Min 0 sec	The difference between phase and neutral current $> 6.25\% \text{ of } I_b$	the difference between phase and neutral current $< 6.25\% \text{ of } I_b$	10

7.0 GENERAL TECHNICAL REQUIREMENTS

The Meter shall be designed and constructed in such a way as to avoid introducing any danger in normal use and under normal conditions, so as to ensure especially personal safety against electric shock, safety against effect of excessive temperature, protection against spread of fire, protection against penetration of solid objects, dust and water.

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All parts, which are subject to corrosion under normal working conditions, shall be protected effectively. Any protective coating shall not be liable to damage by ordinary handling or damage due to exposure to air, under normal working conditions. Meter shall withstand Solar radiation.

The meters shall be designed and manufactured using SMT (Surface Mount Technology) components. All the material and electronic power components used in the manufacture of the meter shall be of highest quality and reputed make to ensure higher reliability, longer life and sustained accuracy as given below or any other equivalent make with the strict approval of Purchaser:

S No	Component Function	Requirement	Makes and Origin
1.	Measurement/ computing chips	The Measurement/ computing chips used in the meter should be with the Surface mount type along with the ASICs	<u>USA:</u> Anolog Devices, Cyrus Logic, Atmel, Phillips <u>South Africa:</u> SAMES <u>Japan:</u> NEC or any reputed make
2.	Memory chips	The memory chips should not be affected by the external parameters like sparking, high voltage spikes or electrostatic discharges.	<u>USA:</u> Atmel, National Semiconductors, Texas Instruments, Phillips <u>Japan:</u> Hitachi or Oki
3.	Display modules	The display modules should be well protected from the external UV radiations . The display visibility should be sufficient to read the meter mounted between height of 0.5m and 2m. The construction of the modules should be such that the displayed quantity should not disturbed with the life of display. (Pin Type) It should be trans-reflective STN type industrial grade with extended temperature range.	<u>Taiwan:</u> Holtek <u>Singapore:</u> Bonafied Technologies <u>Korea:</u> Advantek <u>China:</u> Xiamen
4.	Optical port	Optical port should be used to transfer the meter data to meter reading instrument. The mechanical construction of the port should be such to facilitate the data transfer easily.	<u>USA:</u> National Semiconductors <u>Holland / Korea:</u> Phillips <u>Taiwan:</u> MAXIM <u>Japan:</u> Hitachi
5	P.C.B.	Glass Epoxy, fire resistance grade FR4, with minimum thickness 1.6 mm	<u>A class vendor</u>
6.	Electronic Components	The active & passive components should be of the surface mount type & are to be handLead & soldered by the state of art assembly processes.	<u>USA:</u> National Semiconductors, Atmel, Phillips, Texas Instruments <u>Japan:</u> Hitachi, Oki, AVX or Ricoh <u>Korea:</u> Samsung
7.	Battery	Lithium with guaranteed life of 15 years	Varta / Tedirun /Sanyo or equivalent.
8.	RTC / Micro controller	The accuracy of RTC shall be as per relevant IEC / IS standards	<u>USA:</u> Philips , Dallas, Atmel, Motorola <u>Japan:</u> NEC or Oki

Note: The makes of the components are in the preferential order. The bidder shall submit necessary documents for the components.

Meter	The TP Southern Odisha Distribution Limited		Specification for single Phase DLMS Energy Meter (10-60A)	8.0 Body:
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Meter body shall be made of unbreakable, high grade, fire retardant reinforced Insulating material (protective Class II) with FVo Fire Retardant, self extinguishing, UV stabilize, recyclable and Anti oxidation properties. The minimum thickness of the meter enclosure shall be 2mm. Meter base shall be opaque with polycarbonate LEXAN 500R or equivalent on prior approval from the Purchaser. Meter cover shall be transparent with polycarbonate LEXAN 143R/943A or equivalent on prior approval from the Purchaser. Meter cover & base shall be provided with continuous and seamless Ultrasonic/chemical welding such that it is not opened without breaking the enclosure. Front cover & base shall be such that it is not possible to cut & open the meter without certainly damaging the meter body and by no means shall an attempt to reassemble would not leave physical evidence. The meter body shall be sealed in such a way that opening of meter base and cover is possible only after breaking the seal(s). Unidirectional screws to be used on meter covers where ever required.

However single case meter body would be highly preferred. I.e. meter top cover and base shall be of single mould, thus nullifying the possibility of opening of meter case.

9.0 Terminals, Terminal Block

Terminals may be grouped in terminal block having adequate insulating properties and mechanical strength. In order to satisfy such requirements when choosing insulating materials for the terminal block adequate testing of materials shall be taken into account. Terminal block and terminal cover shall be of a material which complies with the requirements of IS11731 (part 1) method FH1. The material of which the terminal block is made shall be capable of passing the test given in ISO 75 for temperature of 135°C and pressure of 1.8 M Pa. The terminal block shall be of opaque with polycarbonate LEXAN500R or equivalent on prior approval from the Purchaser

The terminals shall be marked properly on the terminal block for making external connections.

The terminals and connections shall be suitable to carry up to 120 % of I_{max} continuously (I_{max} 60 A). The terminal block, the terminal cover and the meter case shall ensure reasonable safety against the spread of fire. They shall not be ignited by thermal overload of live parts in contact with them.

The manner of fixing the conductors to the terminals shall ensure adequate and durable contact such that there is no risk of loosening or undue heating. Terminals shall be preferably of MS cage clamp type as per IS: 15707 or of flat end screw with at least 9 mm dia of screw for better contact area.

Internal diameter of the terminal holes shall be minimum 8.5 mm; minimum clearance between adjacent terminals shall be 10 mm. Depth of the terminal holes shall be of 25 mm. Terminal screws shall be of Zinc plated MS bottle type.

Terminal block shall be such that the risk of corrosion resulting from contact with any other metal part is minimized. Electrical connections shall be so designed that contact pressure is not transmitted through insulating material.

Terminal Cover:

Terminal cover shall be of short type and shall be transparent with polycarbonate LEXAN 143R/943A or equivalent on prior approval from the Purchaser. Appropriate space shall be available for incoming /out going cables without damaging/stressing terminal cover (terminal cover design shall be as per the Purchaser approval). After sealing the cover, terminals shall not be accessible without breaking the seals. Terminal Cover with 4 U cuts to enable smooth insertion of cable in the terminals.

Sealing of meter

Reliable sealing arrangement shall be provided to make the meter tamper evident and to avoid fiddling or tampering by unauthorized persons.

. One no polycarbonate seal and two nos hologram seals shall be provided by the bidder. All the seals shall be fixed on meter body by the bidder at his works before dispatch.

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One sealing provision shall be provided at meter terminal cover, such that terminal shall not be accessible without breaking the seals. All the seals shall be provided on front side only and as per the Purchaser specification. Rear side sealing arrangement shall not be accepted. Bidder shall provide seals as per CEA regulation (2006). Only patented seals to be used as per CEA requirements.

10 TOD Feature:

The meter shall be capable of measuring Cumulative Energy (KWh), KVarh Lag, Kvarh Lead, Kvah and MD (KW, KVA) with time of day (TOD) registers having 2 zones (no. of zones & time slot shall be programmable by CMRI with adequate security level). Annexure attached.

TOD Slot Configuration shall be as follows-

	Time Slots
TOD 1	00 to 06 Hrs
TOD 2	06 to 24 Hrs

11 MD Integration:

The MD integration period shall be 15 minutes (integration period-programmable by CMRI at site and also thru AMR with adequate security level). The MD resetting shall be automatic at the 1st of the month i.e. 0000 hours of 1st day of the month. Manual MD reset button shall not be available. Last 12 MD values shall be stored in the memory. MD shall be recorded and displayed with minimum three digits before decimal and minimum two digits after decimal points. MD integration shall be Block Type Demand.

12 Parameters In BCS

All these parameters shall be downloaded locally or remotely. All the parameters shall be recorded in its NVM(Non Volatile Memory). NVM shall have minimum retention time of 10 Years. Below mention current, history billing data and at least 25 tamper event for each tamper shall be available In NVM.

Billing Information

Current+ 12 History billing Date

Current + 12 Month History of Energy (KWH, KVAH, KVARH Lag, KVARH Lead,)

Current + 12 Month History Consumption (KWH, KVAH, KVARH Lag, KVARH Lead)

Current + 12 Month History of Demand (KW,KVA, KVAR Lag, KVAR Lead) Along with date and time stamp

Current + 12 Month History of PF

Current + 12 Month Power ON/Off Hours

TOD wise billing Information

Current + 12 Month History of Energy (KWH, KVAH, KVARH Lag, KVARH Lead)

Current + 12 Month History of Consumption (KWH, KVAH, KVAR Lag, KVAR Lead)

Current + 12 Month History of Demand (KW, KVA, KVAR Lag, KVAR Lead) along with date and time stamp

Current + 12 Month History of PF

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Load survey:

The meter shall be capable of recording load profile of 90 days 15 min IP for ON days only for following parameters.

Voltage
Phase Current
Neutral Current
PF
KWH
KVAH
KW
KVA

MID Night Energy:

Meter shall be capable of recording daily Midnight Energy(KWH, KVAH, KVARH Lag, KVARH Lead) and Demand(KW,KVA) 00:00 to 24:00 Hrs for 90 power ON days.

Instantaneous Parameters:

Meter shall be capable of recoding following Instantaneous parameter In Memory and should be available in BCS

Meter Serial No
Meter Type
Meter date and Time
MRI date and time
Dump date and time
Voltage
Phase Current
Neutral current
Signed Power Factor
Instantaneous Load (KW, KVA)
Present Cumulative energy (KWH, KVAH)
Cumulative Tamper count
Cumulative Billing Count
Cumulative Power ON duration in minutes
Other Parameter as per IS15959

General Information:-

Meter shall be capable for providing below mention general parameters in memory and should be available in BCS

Meter serial No
Meter Type
Manufacture Name
Manufacture date
Meter Class
Meter constant
Meter voltage rating
Meter current rating
Firmware version of meter

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TOD profile showing timing and seasons
Meter display sequence

Transactions:-

All the change in software of meter to be logged along with date and time stamp, reading and.

13 Display units:

The display unit shall be Pin type built-in liquid crystal display (Permanently backlit type LCD). The LCD shall be of STN (Super Twisted Nematic) construction suitable for maximum temperature withstands 65 degree C and minimum temperature withstands 0degree C during normal operating condition. The LCD display shall have a wide viewing angle of 120 degree. When the meter is not energized the electronic display need not be visible. The display shall not be affected by electrical, magnetic disturbances and ESD. The back lit must be green in color while in normal registration modes.

The KWh register shall have minimum 6 digits and size of the digits shall be minimum 10mmx6mm. Cumulative energy (KWh) shall be displayed without decimal in auto scroll mode. (However decimal shall be available in push button mode for high resolution display(minimum 4digits after decimal) for testing). Separate mode for high resolution display to be provided with scroll lock facility.

Persistence time for each parameter shall be 10 second. Values followed by header shall be avoided. (I.e. if MD1 is displayed in Auto scroll mode, Header (MD1) and value (say 5.23 KW) shall be shown simultaneously; it shall not be shown in successive displays. Off time shall not be available in auto scroll mode between each cycle. Auto scroll mode is restored after 30 sec, if push button is not operated.

Display Sequence

Auto Mode of Display:- LCD
Segment Check
Meter Date
Meter Time
Cumulative KWh
Previous month Maximum Demand (KW)

Push Button Mode of Display :-

LCD Segment Check Meter
Sl. No.
Date
Time
Cumulative Kwh
Previous Month Cumulative KWh(History1-3)
Present Month MD KW followed by Date & Time
Previous Month MD KW (History1-3) followed by Date & Time
Present Month MD KVA followed by Date & Time
Previous Month MD KVA (History1-3) followed by Date & Time
Voltage
Phase Current
Neutral Current
Instantaneous Power Factor with Lag/Lead Sign
Instantaneous Load in KW

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High Resolution Display Cumulative Kwh (4 Digits after Decimal) shall be provided with scroll lock facility).
Auto scroll mode is restored after 30 sec, if push button is not operated.

14 Output Device:

The meters shall have a suitable test output device. Red color blinking LED (marked as imp/kWh) shall be provided in the front. This device shall be suitable for using with sensing probe used with test benches or reference standard meters. Power ON indication- LED or Icon on LCD Display

15 NAME PLATE AND MARKING:

Meters shall have a name plate clearly visible and effectively secured against removal. The base color of Name plate shall be white indelibly and distinctly marked with all essential particulars as per relevant standards along with the following. The Serial no. series applicable for the meters shall be provided by TPSODL

- i.Manufacturer's name
- ii.Type designation
- iii.Category
- iv.Number of phases and wires
- v.Serial number (Meter serial number shall be laser printed on name plate instead on sticker)
- vi.Serial number along with barcode
- vii.Month and Year of manufacture
- viii.Unit of measurement
- ix.Reference voltage ,frequency
- x.Ref. temperature if different from 27 deg. C
- xi.Rated basic and maximum Current
- xii.Meter constant (imp/kWh)
- xiii.'BIS' Mark
- xiv.Class index of meter
- xv."Property of TPSODL
- xvi.Purchase Order No. & date
- xvii.Guarantee period
- xviii.Sign of double square
- xix.Country of manufacture
- xx.Firmware version of meter

16 TESTS:

All routine, acceptance & type tests shall be carried out on the meter and meter body separately in accordance with the relevant IS/IEC. All routine/acceptance tests shall be witnessed by the purchaser/his authorized representative. All the components shall also be type tested as per the relevant standards. Following tests shall be necessarily conducted in addition to the tests specified in IS/IEC.

Routine Test

- i.AC High Voltage test
- ii.Insulation test
- iii.Test on limits of error
- iv.Test of starting current
- v.Test of no load condition

Acceptance test:

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- i. AC High Voltage test
- ii. Insulation test
- iii. Test on limits of error with following loads

120% I max(72A)	I max (60A)	Ib(10A)	0.5 Ib (5A)	0.1Ib (1A)	0.05Ib (0.5A)
UPF, 0.8 lead and 0.5 lag	UPF, 0.8 lead and 0.5 lag	UPF, 0.8 lead and 0.5 lag	UPF, 0.8 lead and 0.5 lag	UPF, 0.8 Lead and 0.5 lag	UPF

- iv. Test of meter constant
- v. Test of starting current
- vi. Test of no load condition
- vii. Test of repeatability of error.
- viii. Test of power consumption.
- ix. Test for Immunity against external influencing signal as per the Purchaser specification
- x. Test for Immunity against DC Immunity as per the Purchaser specification
- xi. Test for Immunity against Tamper conditions as per the Purchaser specification
- xii. Error measurements with 38 abnormal condition as per annexure I
- xiii. Test to Influence of Harmonics
- xiv. Supply voltage and frequency variation test
- xv. Testing of self diagnostic features and tamper count increment and logging with date and time.

Type test:

- i. All tests as defined in IS 13779:1999 with latest edition.
- ii. Test against abnormal magnetic influence as per CBIP TR 325 with latest edition.
- iii. DC immunity test (injection both on phase and neutral terminal) with latest edition
- iv. Test for Material used for Terminal Block and meter body as per relevant standards with latest edition

Note:- Bidder must mention IS 13779:1999 with latest edition in factory test report.

Special test:

- i. The bidder shall demonstrate the communication capability of the meter through communication modes as defined in the specification before conducting acceptance tests. The bidder shall ensure that API (Application protocol interface) is compatible with TPC.
- ii. Overload test at 120% of I_{max} for accuracy under different abnormal condition as per as per annexure I.

17 TYPE TESTS CERTIFICATES:

The bidder shall furnish the type test certificates of the meter for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI / ERDA as per the relevant standards. Type test should have been conducted in certified Test Laboratories during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports i.e. any test report not acceptable or any/all type tests (including additional type tests, if any) not carried out, same shall be carried out without any cost implication to TPSODL.

18 PRE-DISPATCH INSPECTION:

The successful bidder shall submit two prototype samples for further testing and compliance as per specifications and getting approval before mass manufacturing. Inspection may be made at any stage of manufacture at the discretion of the purchaser and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection.

Equipment shall be subject to inspection by a duly authorized representative of the Purchaser. Bidder shall grant free access to the places of manufacture to TPSODL's representatives at all times when the work is in progress. Inspection by the TPSODL or its authorized representatives shall not relieve the bidder of his obligation of

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furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPSODL. Following documents shall be sent along with

- a) Test reports
- b) MDCC issued by TPC
- c) Invoice in duplicate
- d) Packing list
- e) Drawings & catalogue
- f) Guarantee / Warrantee card
- g) Delivery Challan
- h) Other Documents (as applicable)

19 INSPECTION AFTER RECEIPT AT STORE:

The material received at Purchaser's store shall be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Project Engineering department.

The successful bidder shall submit two extra boxes (unpaid) per lot delivered, with serial nos. in continuation to the lot (lot size shall be 15,000 numbers or as defined in the order) to the Purchaser for further testing and confirmation in line with the specifications and the material shall be liable for rejection, if test results are found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Project Engineering department.

20 GUARANTEE:

Bidder shall stand guarantee towards design, materials, workmanship & quality of process / manufacturing of items under this contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the purchaser up to a period of at least 60 months from the date of commissioning or 66 months from the date of last supplies made under the contract whichever is earlier, Bidder shall be liable to undertake to replace/rectify such defects at its own costs, within mutually agreed time frame, and to the entire satisfaction of the Company, failing which the purchaser will be at liberty to get it replaced/rectified at bidder's risks and costs and recover all such expenses plus the Company's own charges (@ 20% of expenses incurred), from the bidder or from the "Security cum Performance Deposit" as the case may be.

Bidder shall further be responsible for 'free replacement at site' for another period of THREE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by the purchaser. Data of all defective meters sent to bidder shall be downloaded by bidder prior to repairing these meters.

Manufacture should collect disputed meter from meter stores and provide testing report of disputed meter refer by TPSODL for lifetime.

21 PACKING:

Bidder shall ensure that all material covered under this specification shall be prepared for rail/road transport (local equipment) and be packed in such a manner as to protect it from damage in transit. The material used for packing shall be environmentally friendly.


Packing and transportation shall be as per IS 15707:206 clauses 9.1 and 9.2. Routine test report of the individual meter shall be kept inside each card board carton of the meter. Serial numbers of meters need to be mentioned in the form of barcodes on external surface of meter packing box.

22 TENDER SAMPLE:

Bidders are required to manufacture 3nos. sample meters as per the Purchaser specification and submit the sample along with bid for approval.

23 QUALITY CONTROL:

The bidder shall submit with the offer Quality assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items

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fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished.

Quality should be ensured at the following stages:

- At PCB manufacturing stage, each board shall be subjected to computerized bare board testing.
- At insertion stage, all components should undergo computerized testing for conforming to design parameter and orientation.
- Complete assembled and soldered PCB should undergo functional testing using Automatic Test Equipment (ATEs).
- Prior to final testing and calibration, sample meters shall be subjected to ageing test (i.e. meters will be kept in ovens for 24 hours at 55 Deg. C temperature and atmospheric humidity under real-life condition at its full load current. After 24 hours meter should work satisfactorily)

The Purchaser's engineer or its nominated representative shall have free access to the bidder's/manufacturer's works to carry out inspections.

24 MINIMUM TESTING FACILITIES:

Bidder shall have adequate in house testing facilities for carrying out all routine tests & acceptance tests as per relevant International / Indian standards. The bidder shall have duly calibrated Reference Standard meter of Class 0.05 accuracy or better. The bidder's Lab must be NABL accredited. Necessary document to be submitted along with the Bid.

25 MANUFACTURING ACTIVITIES:

The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart shall be in line with the Quality assurance plan submitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order.

26 SPARES, ACCESSORIES & TOOLS:

Bidder to provide free of cost 02 nos of JIG for retrieving data from memory of meter with every new design of meter. Jig should be such that NVM can be push fit on jig and data can be retrieve from this NVM

27 Blue Tooth Meter Reading:

Inbuilt facility for blue tooth based meter reading is preferable.

- 28 List of additional annexures to be submitted by individual utilities during procurement process:**
- a) Display sequence
 - b) TOD configuration
 - c) Kvah & Kva calculation method


29 DRAWINGS:

Following drawings & Documents shall be prepared based on TPSODL specifications and statutory requirements and shall be submitted with the bid: a) Completely filled-in Technical Parameters.

- b) General arrangement drawing of the meter
- c) Terminal Block dimensional drawing
- d) Mounting arrangement drawings.
- e) General description of the equipment and all components with makes and technical requirement f) Type Test Certificates
- g) Experience List
- h) Manufacturing schedule and test schedule

After the award of the contract, four (4) copies of following drawings, drawn to scale, describing the equipment in detail shall be forwarded for approval:

S. No.	Description	For Approval	For Review Information	Final Submission
1	Technical Parameters	<input type="checkbox"/>		<input type="checkbox"/>

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2	General Arrangement drawings	<input type="checkbox"/>		<input type="checkbox"/>
3	Terminal block Dimensional drawings	<input type="checkbox"/>		<input type="checkbox"/>
4	Mounting arrangement drawing.	<input type="checkbox"/>		<input type="checkbox"/>
5	Manual/Catalogues		√	
6	Transport/ Shipping dimension drawing	<input type="checkbox"/>		<input type="checkbox"/>
7	QA & QC Plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Routine, Acceptance and Type Test Certificates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>


Bidder shall subsequently provide Four (4) complete sets of final drawings, one of which shall be auto positive suitable for reproduction, before the dispatch of the equipment. Soft copy (Compact Disk CD) of all the drawing, GTP, Test certificates shall be submitted after the final approval of the same to purchaser.


All the documents & drawings shall be in English language.


Instruction Manuals: Bidder shall furnish two softcopies (CD) and four (4) hard copies of nicely bound manuals (In English language) covering erection and maintenance instructions and all relevant information and drawings pertaining to the main equipment as well as auxiliary devices.

30 GUARANTEED TECHNICAL PARTICULARS:

S.No	Description	Units	As Furnished by Bidder
1	Type of meter		
2	Accuracy Class of the meter		
3	Ib & I _{max}	A	
4	Operating Voltage	V	
5	Operating Frequency	Hz	
6	Power Consumption and Burden		
7	Starting Current	mA	
8	Short time over current	A	
9	Influence of heating		
10	Rated impulse withstand voltage	KV	
11	AC withstand Voltage for 1 min	KV	
12	Insulation resistance a) Between frame & Current, voltage circuits connected together: b) Between each current (or voltage circuit) & each and every other circuit.	M ohm	
13	Mechanical requirement as per IS 13779		

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14	Resistance to heat and fire (As per specification)		
15	Degree of protection		
16	Resistance against climatic influence (as per IS 13779)		
17	Electromagnetic Compatibility (EMC) as per CBIP Technical report no 88(latest amendment)		
18	Accuracy requirements (As per IS 13779)		
19	Power factor range		
20	Energy measurement		
21	Connection Diagram for system on terminal cover	Yes/No	
22	Self diagnostic feature		
23	Initial start up of meter (meter shall be fully functional within 5 sec after reference voltage is applied to the meter terminals)		
24	Terminal block		
	a) Depth of the Terminal holes	mm	
	b) Internal diameter of terminal holes	mm	
	c) Clearance between adjacent terminals	mm	
25	Communication capabilities as per clause 5.0		
26	Immunity against abnormal Magnetic influence,		
27	Immunity against HV ESD		
28	DC Immunity as defined in		
29	Grade of material for a) Meter base		
	b) Meter cover		
	c) Terminal block		
	d) Terminal cover		
30	Total Tamper counts		

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31	Recording forward energy in all conditions as per annexure I (including current/potential reversal)	Yes/No	
32	Makes of all components used in the meter.	Yes/No	
33	Non Volatile memory (Retention period)		
34	Measuring elements used in the meter		
35	Power supply to circuit in case of supply failure		
36	Display of measured values (As per specification –clause 13)	Yes/No	
37	LCD display (Type and viewing angle)		
38	Pulse rate	Imp/kWh, Imp/kVArh	
39	Name plate marking	Yes/No	
40	Routine test certificates	Yes/No	
41	Acceptance test certificates	Yes/No	
42	Type test certificates	Yes/No	
43	Guarantee certificates	Yes/No	
44	Display Sequence	Yes/No	
45	Tamper thresholds	Yes/No	
46	Ultrasonic Welding of cover and Base	Yes/No	
47	Fire retardant category of meter Body And terminal block		
48	Supply of jig for retrieval of Damaged/ burnt meter.		
49	Meter shall be programed for like RTC, TOD etc		
50	Dimension of meters L*B*H		
51	KVAH & KVA calculation		
52	Meter data retrieved if meter found no display	Yes/No	
53	RJ 11 Pin configuration as per TPC	Yes/No	

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54	Clause wise Compliance & mention Deviation against each clause if any	Agreed/Not Agreed	

Electronics parts

Sr NO	Component Fundtion	Requirement	Makes and Origin (to be provide by Bidder)
1.	Measurement/ computing chips	The Measurement/ computing chips used in the meter should be with the Surface mount type along with the ASICs	
2.	Memory chips	The memory chips should not be affected by the external parameters like sparking, high voltage spikes or electrostatic discharges.	
3.	Display modules	The display modules should be well protected from the external UV radiations . The display visibility should be sufficient to read the meter mounted between height of 0.5m and 2m. The construction of the modules should be such that the displayed quantity should not disturbed with the life of display. (Pin Type) It should be trans-reflective STN type industrial grade with extended temperature range.	
4.	Optical port	Optical port should be used to transfer the meter data to meter reading instrument. The mechanical construction of the port should be such to facilitate the data transfer easily.	
5	P.C.B.	Glass Epoxy, fire resistance grade FR4, with minimum thickness 1.6 mm and Conformal coating required to protect from Environment like moisture	
6.	Electronic Components	The active & passive components should be of the surface mount type & are to be handled & soldered by the state of art assembly processes.	
7.	Battery	Lithium with guaranteed life of 15 years	
8.	RTC / Micro controller	The accuracy of RTC shall be as per relevant IEC / IS standards	
Note: Bidder shall submit necessary documents for substantiate the component makes.			

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31 SCHEDULES OF DEVIATIONS:

The bidders shall set out all deviations from this specification, Clause by Clause in this schedule. Unless specifically mentioned in this schedule, the tender shall be deemed to confirm the purchaser's specifications.

(TO BE ENCLOSED WITH THE BID)

All deviations from this specification shall be set out by the bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the purchaser's specifications:

S.No.	Clause No.	Details of deviation with justifications

We confirm that there are no deviations apart from those detailed above.
of the Company.

Seal

Designation

Signature

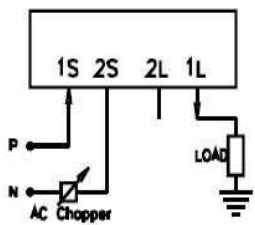
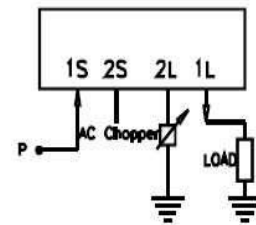
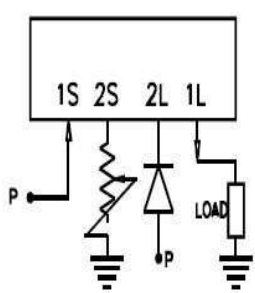
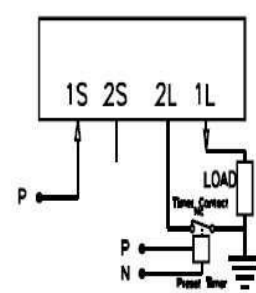
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Annexure :-1

No	Name of Condition	Graphical View	No	Name of Condition	Graphical View
1	Normal condition		2	Phase neutral interchanged at supply side4	
3	Supply-Load interchanged		4	Phase & Neutral interchanged in condition (3)	
5	Full Load Earthed		6	phase-neutral interchanged at supply side in condition (5)	
7	supply load interchanged in condition(5)		8	phase and neural wire interchanged in condition (7)	
9	Partial load earthed		10	phase & Neutral wire interchanged in condition (9)	
11	supply-load interchanging in condition (9)		12	Phase & Neutral wire interchanged in condition (11)	
13	Neutral current reversed		14	Phase & Neutral interchanged in condition 13	
15	supply load interchanging in condition 13		16	Phase-Neutral interchanged in condition 15	

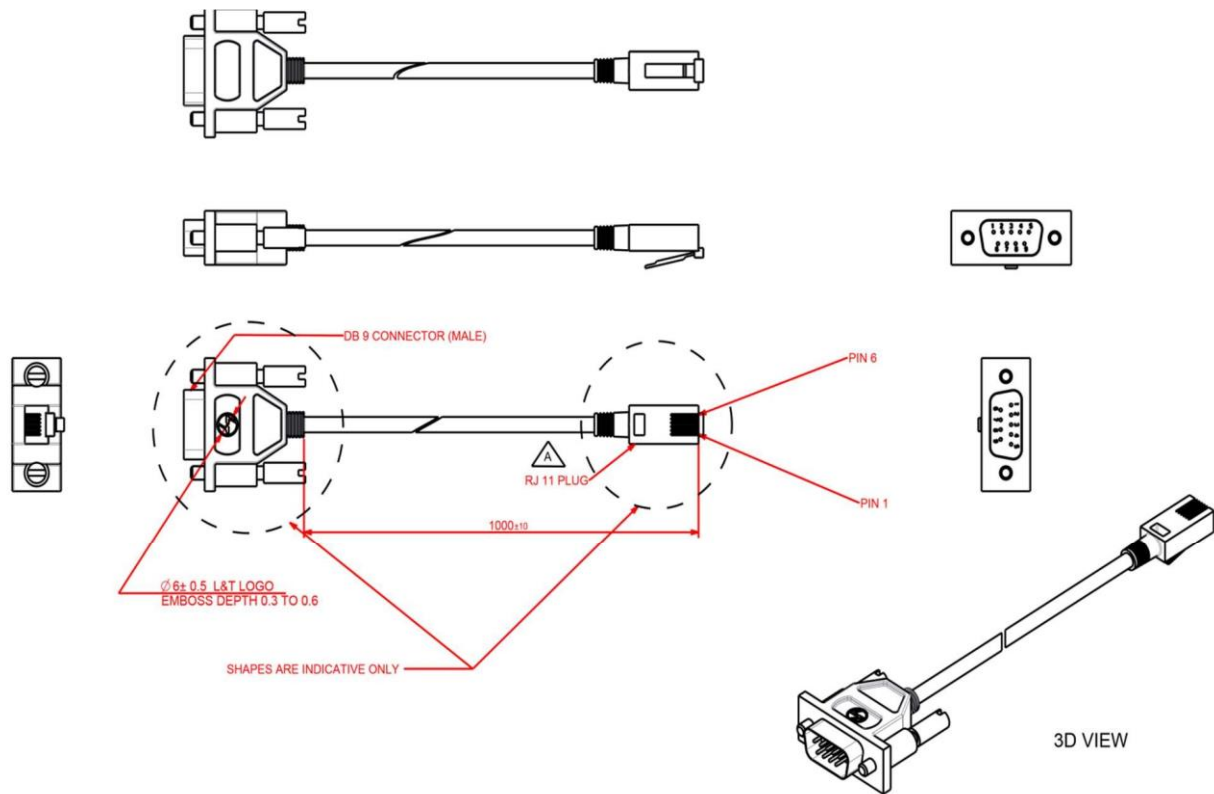
No	Name of Condition	Graphical View	No	Name of Condition	Graphical View
17	Partial load earthed in condition 13		18	Phase-Neutral interchanged in condition 17	
19	Supply-load interchanging in condition 17		20	Phase-Neutral Interchanged in condition 19	
21	Current bypass		22	Neutral Missing	
23	Neutral Missing Phase-at 2S		24	Supply-load interchanged in condition 22	
25	Phase at 2L in condition 24		26	Diode (Reversed) in Neutral	
27	Diode(forward) in Neutral		28	Full load earthed in condition 26	
29	Full load earthed in condition 27		30	Neutral Missing, diode (reversed) at 2L & earthed full load earthed	
31	Diode forward in condition 30		32	Neutral Missing, variable load at 2L & earthed, full load earthed	
33	Neutral Missing, variable capacitance at 2L & earthed, full load earthed		34	chopper in neutral	

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No	Name of Condition	Graphical View	No	Name of Condition	Graphical View
35	Load earthed in condition 34		36	Neutral Missing, AC Chopper & earthed, full load earthed	
37	Neutral Missing, earthed load, diode in output and variable resistance with earthing at the input		38	Neutral Missing full load earthed at regular time interval	

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Pin configuration of RJ11 Port is as below:-



RJ11 PIN Name	RJ11PLUG	DB9 MALE CNR	DB9 PIN Name
VCC	PIN 2	PIN 7	VCC
GRND	PIN 3	PIN 5	GRND
TX	PIN 5	PIN 2	RX
RX	PIN 4	PIN 3	TX
		PIN 4 & 6 Short	
		PIN 7 & 8 Short	

Note:- FCI make RJ11 6P4C plug to be used.

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TECHNICAL SPECIFICATION FOR POLYCARBONATE METER BOX (HINGE TYPE)

1	SCOPE	This specification covers the technical requirements of design, manufacture, testing at manufacturer's works, packing, forwarding, supply and unloading at store/site and performance of single phase polycarbonate meter box (Hinge Type) with all accessories for trouble free and efficient operation.																	
2	APPLICABLE STANDARDS	<p>The equipment covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with the latest editions of the following Indian/International standards and shall conform to the regulations of the local statutory authorities.</p> <table border="1"> <tr> <td>IS: 14772-2000</td> <td>General requirements for enclosure for accessories for household and similar fixed electrical installationsSpecification</td> </tr> <tr> <td>IS: 8623(Part 1)-1993</td> <td>Specification for low-voltage switchgear and control gear assemblies Part 1 for type tested and partially type tested assemblies</td> </tr> <tr> <td>IS: 11731(Part II)-1992</td> <td>Methods of test for determination of Flammability of solid electrical insulating materials when exposed to an igniting source</td> </tr> <tr> <td>IS 4249-1967</td> <td>Specification for classification and method of test for non-ignitable and self-extinguishing properties of solid electrical insulating materials</td> </tr> <tr> <td>IS 8828-1996</td> <td>Electrical Accessories- Circuit Breakers for Over Current Protection for Household and Similar Installations</td> </tr> <tr> <td>IS 5133(Part II)-1969</td> <td>Specification for boxes for the enclosure of electrical accessories</td> </tr> <tr> <td>IS 2500(Part 1)-2000</td> <td>Sampling procedure for inspection by attributes part 1 sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection</td> </tr> <tr> <td>UL 746-C</td> <td>Polymeric materials in electrical equipments</td> </tr> </table>		IS: 14772-2000	General requirements for enclosure for accessories for household and similar fixed electrical installationsSpecification	IS: 8623(Part 1)-1993	Specification for low-voltage switchgear and control gear assemblies Part 1 for type tested and partially type tested assemblies	IS: 11731(Part II)-1992	Methods of test for determination of Flammability of solid electrical insulating materials when exposed to an igniting source	IS 4249-1967	Specification for classification and method of test for non-ignitable and self-extinguishing properties of solid electrical insulating materials	IS 8828-1996	Electrical Accessories- Circuit Breakers for Over Current Protection for Household and Similar Installations	IS 5133(Part II)-1969	Specification for boxes for the enclosure of electrical accessories	IS 2500(Part 1)-2000	Sampling procedure for inspection by attributes part 1 sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection	UL 746-C	Polymeric materials in electrical equipments
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UL 746-C	Polymeric materials in electrical equipments																		

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3	CLIMATIC CONDITIONS OF THE INSTALLATI ON	<p>The atmosphere is generally laden with mild acid and dust suspended during dry months and subjected to fog in cold months. The design of the equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.1g.</p> <p>a) Max. Ambient Temperature : 50 deg.C b) Max. Daily average ambient temp. : 40 deg.C c) Min Ambient Temp : 0 deg C d) Maximum Humidity : 95% e) Minimum Humidity : 10% f) Average No. of thunderstorm days per annum : 50 g) Average Annual Rainfall : 750 mm h) Average No. of rainy days per annum : 60 i) Rainy months : June to Oct. j) Altitude above MSL not exceeding : 300 meters k) Wind Pressure : 126kg/sq m up to an elevation of 10mtrs</p> <p>The atmosphere is generally laden with mild acid and dust suspended during dry months and subjected to fog in cold months. The design of the equipment and</p>
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		accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.1g
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4.0	GENERAL TECHNICAL REQUIREMENTS	
S. NO.	DESCRIPTION	REQUIREMENT
1	Application	Outdoor
2	Degree of ingress protection	IP 55
3	Flammability requirement	FV0
4	Grade of material	Fire Retardant Polycarbonate, Self Extinguishing, UV stabilized and anti oxidation properties
5	Material a) Base : b) Cover :	a) Polycarbonate equivalent to Lexan 943 A/ Makrolon 6457 transparent (no colour) b) Polycarbonate equivalent to Lexan 943 A/ Makrolon 6457 with clear transparent (no color)
6	Thickness of box	2 mm (minimum)
7	Gasket material	Soft neoprene rubber gasket shall be provided all around the periphery of box for protection against ingress of dust & water inside the box.
8	Material withstand temperature	125 deg. C +/- 2 deg. C
9	Dielectric withstand for the box	5 kV for 1 min

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5.0	GENERAL CONSTRUCT IONS	<p>5.1- The meter box shall be weather proof, tamper proof and shall be made of Injection moulded reinforce polycarbonate material having FV0 fire retardant, selfextinguishing, UV stabilization and Anti oxidation properties. Base shall be transparent(no color) whereas the cover shall be completely transparent for polycarbonate material .The material for base and cover shall be Lexan 943 A/ Makrolon 6457 or equivalent with 2 mm thickness.</p> <p>5.2- The meter box shall have a taper corner for easy flow of rain water and shall have degree of IP55 for protection against dust and water.</p> <p>5.3-The box shall be provided with meter mounting arrangement along with MS plate on top for mounting the meter from different manufacturers, having different mounting dimensions. The top plate shall be fixed on the base taking care of the alignment with the fixing holes provided in the base. The detail drawing of the mounting arrangement of all the meters shall be provided to successful bidders by the TPSODL. A generalized arrangement (Base of the box) for fixing of different makes of meter to be provided. Detailed Dimensional Drawing shall be provided with the Bid.</p> <p>5.4- The meter shall be mounted with the help of MS plate such that it is centrally placed in the box and there shall be clearance of 25 mm between the meter and top of the box. A minimum clearance of 50 mm shall be maintained on both sides, between meter and box. A minimum clearance of 10mm at the back & 15mm on the front shall be maintained. A minimum clearance of 50mm shall be provided from the terminal cover to the box to be provided.</p> <p>5.5- The design of the meter box shall be such as to easy facilitate easy wiring and access to meter terminals. Nylon gland of internal diameter of around 25 mm shall be provided for I/C and O/G cables of size armoured 2Cx16. The holes for I/C and O/G</p>
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		<p>cables shall be provided in left and right side of meter box at around 30-35mm from bottom corner.</p> <p>5.6- The number of pillers to be provided in box as per TPSODL different type of meters. If there is any change in existing meter design or new meter introduced, bidder shall provide meter mounting piller accordingly in meter box with modification in their mould without any extra cost.</p> <p>5.7- The box cover shall be fixed to the base through two nos. Metallic Hinges having Minimum length 40 mm with three screws. The arrangement of the hinges shall be provided on left side of the box. The screws shall not be fixed from outside so that it cannot be visible from outside to avoid any manipulation. The overlapping on hinges should be such that its metallic portion should not be accessible from outside when closed, to achieve this the cover lapping to be provided. The box cover shall be open able by more than 120 degrees. All metallic parts should be well protected against corrosion.</p> <p>5.8- For holding and sealing the box, four U-shaped latches of approx..size 25 mm shall be provided on three side of box(two on right side and one each on top and bottom side).The latch shall be GI with minimum thickness of 1.2 mm. The latch shall be provided along with suitable clamp assembly in base as well as cover, such that these are fully covered by the latch after closing. The clamp along with the latch shall be provided with a sealing hole such as to provide a sealing arrangement in the assembly and alignment of holes should be perfect so that seal wire may be easily install.</p> <p>5.9- Suitable rubber gasket of suitable size (properly fixed throughout the periphery in groove without any white marks) for protection all around the cover shall be provided.</p> <p>5.10. The box shall be provided with four mounting (fixing) holes of 8 mm size. The screws and gaskets of 6mm size with around 50mm length to be provided for mounting of box in each box in packed in a separate pack.</p> <p>5.11- After closing and sealing the meter box, it shall not be possible to forcefully enter any sharp object inside the box without breaking base/cover. The material should not be flexible to allow any deformation for any object entry . Suitable overlapping (20 mm) shall be provided between base and cover to avoid access to the meter or its accessories inside the meter box by any means after sealing the box.</p> <p>5.12- Box shall be provided with 1 no. earthing nut and bolt of size M8x35 mm on the left hand side in the base of meter box for providing earth connection. The earth terminal shall be identified by means of the sign ,marked in a legible manner on or adjacent the terminal.</p> <p>5.13 The box size should be such that it should accommodate the meter having top opening hinged terminal cover</p> <p>5.14 The earthing bolt and the gland shall be connected with metallic GI plate of 1.2mm thick. This plate shall be placed inside of the box.</p> <p>5.15 The glands should be of 25 mm diameter and without inclined length but should have extended threads of 15mm inside box and a gland cap should be fixed on this gland from inside. The inside gland cap shall have opening of 18mm on the side of the earthing bolt incoming side and other side gland cap (outgoing) shall have 16mm opening.</p>
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		<p>5.16 The box cover and base should have overlapping of more than 22mm long from inside and outside (Cover design should ensure the same) Such that the cover and the base once fixed one should not force insert any sharp object or screwdriver etc. This shall be tested at any sample during tendering, premanufacturing or during supply.</p> <p>5.17 Push button arrangement (spring loaded) shall be required on the cover of the box to operate the meter display push button from outside the meter box for reading the meter display parameters in absence of power supply without opening the meter cover.</p> <p>The base of the box shall be provided with multiple arrangements so that different makes of meters may also be fitted.</p> <p>5.18 Two nos. of holes of adequate size capable of accommodating service cable shall be provided at two sides of the box for cable incoming & outgoing. It shall not be possible to access the meter terminals from outside of the meter box. Suitable arrangement to be provided.</p>												
6.0	NAME PLATE AND MARKING	<p>The meter box shall be provided with durable and legible marking laser printed / embossing. The following shall be embossed / laser printed with “PO No with date” , “PROPERTY OF TPSODL” , “ITEM CODE NUMBER” , The name plate shall be indelibly and distinctly marked with all essential particulars as per the relevant standards along with the following information :</p> <ol style="list-style-type: none"> a) Manufacturer’s name b) Serial number c) Month and Year of manufacturing d) PO Number & date e) Property OF TPSODL-Odisha f) Danger Sign 												
7.0	TESTS	<p>All routine, acceptance & type tests shall be carried out in accordance with the relevant IS/IEC. All routine & acceptance tests shall be witnessed by the purchaser/his authorized representative. All the components shall also be type tested as per the relevant standards. Following tests shall be necessarily conducted on the meter box in addition to others specified in IS/IEC standards.</p>												
7.1	Type Test	<table border="1"> <thead> <tr> <th>S.no.</th> <th>Tests/ Standard</th> <th>Requirements</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Protection against electric shock (IS : 14772 - 2000)</td> <td>Enclosure shall be so designed that when they are mounted as for normal use, the live parts of any correctly installed accessories or any parts of these accessories which may become live due to a fault shall not be accessible.</td> </tr> <tr> <td>2</td> <td>Provision for earthing (IS : 14772-2000)</td> <td>Enclosure shall be provided with a facility for permanent and reliable connection to earthing</td> </tr> <tr> <td>3</td> <td>Resistance to ageing, humid conditions, Ingress of solid objects and to harmful ingress of water (IS : 14772-2000)</td> <td>Resistance to Ageing : Enclosure shall be kept in a heating cabinet with temp 70 ± 2 deg C for 7 days as per IS. After completion of the test, the enclosure shall not show any cracks. Humid conditions : Enclosure shall be kept in a cabinet with humidity</td> </tr> </tbody> </table>	S.no.	Tests/ Standard	Requirements	1	Protection against electric shock (IS : 14772 - 2000)	Enclosure shall be so designed that when they are mounted as for normal use, the live parts of any correctly installed accessories or any parts of these accessories which may become live due to a fault shall not be accessible.	2	Provision for earthing (IS : 14772-2000)	Enclosure shall be provided with a facility for permanent and reliable connection to earthing	3	Resistance to ageing, humid conditions, Ingress of solid objects and to harmful ingress of water (IS : 14772-2000)	Resistance to Ageing : Enclosure shall be kept in a heating cabinet with temp 70 ± 2 deg C for 7 days as per IS. After completion of the test, the enclosure shall not show any cracks. Humid conditions : Enclosure shall be kept in a cabinet with humidity
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				between 91 to 95 % for 7 days as per IS. After completion of the test, the enclosure shall not show any cracks. Resistance against ingress of solid objects and to harmful ingress of water : Enclosure shall be subjected to test for degree of protection (IP 55) as per IS 12063 IS 60529.	
		4	Mechanical strength/ Impact Resistance Test (IS : 14772-2000)/(UL : 746 C)	The sample shall be subjected to Impact resistance test as per the respective standards and shall not show occurrence of any of the following: making uninsulated live parts accessible to contact, producing a condition that might affect the mechanical performances of the enclosure, producing a condition that would increase the likelihood of an electric shock	
		5	Resistance to heat / Ball Pressure Test (IS : 14772-2000)	The test shall be made on a sample in a heating cabinet at a temp of 125 ±2 deg C for 1 per IS. After completion of test, the diameter of the impression caused by the ball shall be measured and should not exceed 2 mm.	
		6	Resistance to Abnormal heat and fire/ Glow wire test (IS : 14772-2000)	Parts of insulating materials which might be exposed to thermal stresses due to electric effects shall not be affected by abnormal heat and by fire. The compliance shall be checked by means of the glow wire test performed at 960 deg C, according to IS 11000(Part 2/sec 1) with no flame and glowing.	
		7	Resistance to Tracking (IS 14772-2000)	The sample when tested as per clause no 17 of IS: 14772, shall show no flashover after completion.	
		8	Flammability test (IS : 11731 (Part II)1986)/UL :94)	The sample shall comply to flammability requirements of category FV0/V0 as per respective standards	
		9	Test for self-extinguishing property (IS:4249-1967)	The sample when tested as per clause 3.5.1 of IS 4249, shall comply to the specified requirements.	
		10	Test for water absorption (IS: 5133 (Part II)-1969)	The sample shall be heated to a temperature of 50 ± 3 deg. C for 24 h, as per IS and after completion, the water absorbed should not be more than 1%.	

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		11	Verification of Die-electric properties (IS :8623 (Part I)-1993)	The enclosure shall be tested as per clause no 8.2.2 of IS 8623(Part 1), with test voltage of 5 kV for 1 minute and withstand it satisfactorily.
		12	UV Light Exposure (UL-746C)	The sample when exposed to UV light as per the defined test method, shall comply to following <ul style="list-style-type: none"> a) Physical Properties: The average value of physical properties after the UV light exposure shall not be lower than 70% of its initial value (without UV aging) i.e. the variation shall not be more than 30%. b) Flammability Test : After the UV light exposure, the flammability requirement of FV0 shall remain unchanged. c) Flexural Strength: After the UV light exposure, Flexural strength shall not be lower than 70% of its initial value (without UV aging) i.e. the variation shall not be more than 30 %.
7.2	Routine tests	<ol style="list-style-type: none"> 1. Marking 2. Visual Examination and Dimensions 3. Protection against electric shock 4. Provision for earthing 		
7.3	Acceptance Tests	<ol style="list-style-type: none"> 1. Marking 2. Visual Examination and Dimensions 3. Protection against electric shock 4. Provision for earthing 5. Mechanical strength/Impact Resistance Test 6. Resistance to Abnormal heat and fire/ Glow wire test 7. Flammability test 8. Verification of Die-electric properties 9. Finishing of box 		
8.0	TYPE TEST CERTIFICATES	The bidder shall furnish the type test certificates for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI/ERDA/UL or equivalent accredited labs as per the relevant standards. Type tests should have been conducted in certified Test laboratories during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports, i.e. any test report not acceptable, same shall be carried out without any cost implication to the Purchaser.		
9.0	PREDISPATCH INSPECTION	The successful bidder shall submit one pre-manufacturing sample samples (nonreturnable) for further testing and compliance as per specifications and should get approval from TPDDL before mass manufacturing.		

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		<p>Equipment shall be subject to inspection by a duly authorized representative of the Purchaser.</p> <p>Inspection may be made at any stage of manufacture at the option of the purchaser and the equipment if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall grant free access to the places of manufacture to the Purchaser's representatives at all times when the work is in progress. Inspection by the Purchaser or its authorized representatives shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by the Purchaser.</p> <p>Following documents shall be sent along with material :</p> <ol style="list-style-type: none"> a) Test reports b) MDCC issued by Purchaser c) Invoice in duplicate d) Packing list e) Drawings & catalogue f) Guarantee / Warrantee card g) Delivery Challan h) Other Documents (as applicable)
10.0	INSPECTION AFTER RECEIPT AT STORE	<p>The material received at Purchaser's store shall be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Engineering department.</p> <p>TPSODL can send any of the supplied material for further testing at any lab for compliance of material in line with the specifications and the material shall be liable for rejection, if test results are found different from the reports of the pre-dispatch inspection or tender test reports.</p>
11.0	GUARANTEE	<p>Bidder shall stand guarantee towards design, materials, workmanship & quality of process/manufacturing of items under the contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the Purchaser up to a period of 60 months from the date of commissioning or 66 months from the date of last supplies made under the contract, whichever is earlier. Bidder shall be liable to undertake to replace/rectify such defects at his own costs, within mutually agreed timeframe, and to the entire satisfaction of the Purchaser, failing which the Purchaser will be at liberty to get it replaced/rectified at Bidder's risks and costs and recover all such expenses plus the Purchaser's own charges (@ 20% of expenses incurred), from the Bidder or from the "Security cum performance Deposit" as the case may be. In case box fails within the guarantee period, the purchaser will immediately inform the bidder who shall take back the failed box within 15 days from the date of intimation at his own cost and replace/repair the box within forty five days of date of intimation with a roll over guarantee.</p> <p>Bidder shall further be responsible for 'free replacement' for another period of THREE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by the Purchaser.</p>
12.0	PACKING	<p>Bidder shall ensure that all the equipment covered under this specification shall be prepared for rail/road transport in a manner so as to protect the equipment from damage in transit. The material used for packing shall be environmentally friendly.</p>
13.0	TENDER SAMPLE	<p>Bidders are required to manufacture three sample boxes as per the TPSODL specification and submit the sample boxes along with the bid for further testing and approval of samples. These samples shall be retained till the final PO placed against tender and for successful bidder these shall be retained till final supply against order.</p>

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14.0	QUALITY CONTROL	The bidder shall submit with the offer Quality assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The Purchaser's engineer or its nominated representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections.																									
15.0	MINIMUM TESTING FACILITIES	Bidder shall have adequate in house testing facilities for carrying out all routine tests, acceptance tests as per Indian/International standards.																									
16.0	MANUFACTURING ACTIVITIES	The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality assurance plan submitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order.																									
17.0	SPARES, ACCESSORIES AND TOOLS	Not applicable																									
18.0	DRAWING AND DOCUMENTS	<p>Following drawings and documents shall be prepared based on Purchaser specifications and statutory requirements and shall be submitted with the bid :</p> <ol style="list-style-type: none"> Completely filled in Technical Particulars (GTP) General description of the equipment and all components & accessories General arrangement for meter box Experience List Type test certificates <p>After the award of the contract, soft copies of following drawings, drawn to scale, describing the equipment in detail shall be forwarded for approval.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;">Sr. No.</th> <th style="width: 45%;">Description</th> <th style="width: 15%;">For Approval</th> <th style="width: 15%;">For Review Information</th> <th style="width: 20%;">Final Submission</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td>Technical Parameters (GTP)</td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;">2</td> <td>GA Drawing of meter box with all details and marking of pillars</td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;">3</td> <td>QA & QC Plan</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;">4</td> <td>Test Certificates</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </tbody> </table> <p>After the receipt of the order, the successful bidder will be required to furnish all detailed drawings of components for TPDDL approval.</p>	Sr. No.	Description	For Approval	For Review Information	Final Submission	1	Technical Parameters (GTP)	<input type="checkbox"/>		<input type="checkbox"/>	2	GA Drawing of meter box with all details and marking of pillars	<input type="checkbox"/>		<input type="checkbox"/>	3	QA & QC Plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4	Test Certificates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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	RS	2	Degree of protection		
		3	Flammability requirement		
		4	Grade of material		

		5	Material a) Base : b) Cover :		
		6	Thickness of box (Base and Cover)	mm	
		7	Material of the gasket		
		8	Material withstand temperature	deg. C	
		9	Dielectric withstand capacity		
		10	Construction features of the box		
		a)	Clear inside dimensions of meter box i. Length ii. Width iii. Depth	mm mm mm	
		b)	Minimum clearance between meter and box on 4 sides	mm	
		c)	Minimum clearance from meter on front	mm	
		d)	Minimum clearance from back of meter	mm	
		e)	Earthing arrangement	Numbers	
		f)	Sealing Arrangement (with length)	Numbers	
		g)	Colour of Meter Box (base & cover)		
		h)	Box mounting arrangement with four screws provided	Yes/No	
		i)	Push Button Arrangement		
		i)	A. Size of incoming & outgoing cable hole is 25mm B. location of hole from bottom base (30-40mm)	Yes/No	
		j)	Weight of complete box in kg with +/- tolerance	kg	
k)	Cover is overlapping the base more than 22 mm from inside and outside of box base	Yes/no			
l)	4 Number Gitti and screws provided with M6 Screw with min. length 50mm	Yes/no			
m)	MS plate for meter mounting provided on Top side (without sharp corners)				

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		n)	Two nos. GI Hinges having Minimum length 40 mm with three screws	Number & mm	
		o)	Angle of Box opening	degree	
		p)	Number of U-shaped GI clamp & latches – 4	Number	
		q)	GI U clamp with 1.2mm thickness on three sides having min.25mm length	Yes/No	

		r)	Sealing hole to be provided in clamp and latches		
		s)	Overlapping of cover on base inside and outside	mm	
		t)	Number and size of earthing M8 bolt with 35mm length	Number & mm	
		u)	Location of earthing bolt on Sides above side gland		
		v)	Earthing sign with green background on GI sheet to be provided near earth bolt		
		w)	Two nos. of holes of adequate size capable of accommodating service cable shall be provided at two sides of the box for cable incoming & outgoing. It shall not be possible to access the meter terminals from outside of the meter box. Suitable arrangement to be provided.		
		11	Name plate and marking		
		12	Type test Report		
		13	The both gland provided with inside gland cap		
		14	The earth connectivity plate between incoming gland and earth bolt provided with 1.2mm thick GI		
		15	Gland cap thickness 3mm and design per annexure-1 having 15mm threading width for fixing on gland from inside box.		
		16	Mounting pillars as per annexure 2 and agreed to provide any changes in future as per prevailing meters & TPSODL requirements		
		17	The box size is suitable for single phase meter having top opening hinged terminal cover (Suitability shall be tested on samples)		
		18	Clause wise Compliance & mention Deviation against each clause if any	Agreed /Not Agreed	

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20.0	SCHEDULE OF DEVIATION	<p>The bidders shall set out all deviations from this specification, Clause by Clause in this schedule. Unless specifically mentioned in this schedule, the tender shall be deemed to confirm the purchaser's specifications.</p> <p style="text-align: center;"><u>(TO BE ENCLOSED WITH THE BID)</u></p> <p>All deviations from this specification shall be set out by the bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the purchaser's specifications:</p>			
		S.No.	Clause No.	Details of deviation with justifications	
		<p>We confirm that there are no deviations apart from those detailed above.</p> <p>Seal of the Company Signature :</p> <p style="text-align: right;">Designation :</p>			